

## Memory Distrust and Acceptance of Misinformation

SASKIA VAN BERGEN<sup>1\*</sup>, ROBERT HORSELENBERG<sup>2</sup>,  
HARALD MERCKELBACH<sup>1</sup>,  
MARKO JELICIC<sup>1</sup> and ROOS BECKERS<sup>1</sup>

<sup>1</sup>*Department of Clinical Psychological Science, Maastricht University, The Netherlands*

<sup>2</sup>*Department of Criminal Law and Criminology, Maastricht University, The Netherlands*

### SUMMARY

Relying on a community sample ( $N = 80$ ), the present study examined whether memory distrust is related to an increased tendency to accept misinformation and whether it interacts with passage of time. Participants were shown video footage of an armed robbery. Approximately 30 minutes later, they were asked to describe as accurately as possible what they had seen. Either 1 day or 2 weeks later they were presented with their own statements, to which five misinformation items had been added. The results showed that people suffering from memory distrust accepted more misinformation than those with optimistic beliefs about their memory. In addition, both age and free recall seemed to modulate this relationship. However, memory evaluation did not interact with time interval. Copyright © 2009 John Wiley & Sons, Ltd.

Eyewitness testimony is of crucial importance to the legal system. Judges and juries often heavily rely on such testimony when deciding on a case, even though they know that eyewitness evidence may not be accurate (Doyle, 2005). Indeed, a substantial number of studies have shown that people's memories can easily be distorted when incorrect post-event information or feedback is presented (e.g. Wade, Garry, Read, & Lindsay, 2002; Wright, Loftus, & Hall, 2001). Post-event information can be given through leading questions (e.g. during police interrogations), through statements made by authorities (e.g. in the media), or through co-witnesses (Morris, Laney, Bernstein, & Loftus, 2006).

Exposure to misleading post-event information may affect people's memory reports in either of two ways. First, people may have failed to attend to the event and, therefore, may have poor memories. As a result, they are unable to come up with contradictory arguments when they are exposed to misinformation, making them vulnerable to incorporate the misinformation (Loftus, 2005). Second, post-event information might suggest a more accurate or complete version of the event than one's own memory, resulting in an increased willingness to accept the misinformation (Sutherland & Hayne, 2001). There is some debate about how post-event misinformation affects the original memory: Whether the original information is completely and permanently lost (Loftus, 2005; Loftus & Palmer, 1974) or is retained, but has become (partly) inaccessible (McCloskey & Zaragoza, 1985).

\*Correspondence to: Saskia van Bergen, Department of Clinical Psychological Science, Faculty of Psychology and Neuroscience, Maastricht University, P.O. Box 616, 6200 MD Maastricht, The Netherlands.  
E-mail: s.vanbergen@maastrichtuniversity.nl

Either way, exposure to misinformation may lead people to incorporate incorrect information into their memories (Sutherland & Hayne, 2001). These incorrect elements are often endorsed with high levels of confidence (Loftus, 2005). Moreover, recent research has shown that once an inaccurate memory has been formed on the basis of misleading post-event information, it remains stable across time (Devilley, Varker, Hansen, & Gist, 2007; but see Huffman, Crossman, & Ceci, 1997). The relevance of the misinformation effect to the legal domain is almost self-evident: It may distort eyewitness testimony, such that it could potentially lead to wrongful convictions (Doyle, 2005).

Many situational factors modulate the misinformation effect (see e.g. Sutherland & Hayne, 2001). A case in point is the passage of time. Research has shown that people are more susceptible to misinformation when time has had the chance to weaken the memory trace (Loftus, 2005). Thus, the longer the interval between the original event and exposure to post-event misinformation, the higher the probability that misinformation will be incorporated into memory. Another important factor is the way misinformation is presented. Within a social context (e.g. conversation) people are more likely to accept misinformation than when confronted with written statements (Gabbert, Memon, Allan, & Wright, 2004). Protocol presentation also affects misinformation detection. It appears that misinformation is detected more often when eyewitnesses read their own statements after the interview than when the statements were read out loud by a police officer (Christianson, Engelberg, & Gustafson, 2007).

Besides situational factors, individual differences appear to influence the misinformation effect. For example, younger children are more susceptible to misinformation than older children and adults (Bruck & Ceci, 1999; Otgaar, Candel, Merckelbach, & Wade, 2009). Also, gender seems to play a role with women being more likely to accept and incorporate misinformation than men (Tomes & Katz, 1997). Furthermore, high scores on personality characteristics such as empathy, imagery ability, dissociation and introversion have been found to predict a larger misinformation effect (Loftus, 2005; Ward & Loftus, 1985).

A less researched characteristic that may be relevant in this context is *memory distrust* (Gudjonsson & MacKeith, 1982). Gudjonsson (2003) argued that people who distrust their memories tend to rely on external sources and cues. Memory distrust is conceptualised as a phenomenon that is closely related to source amnesia, since people suffering from memory distrust often find it difficult to distinguish between information that is internally generated and information that is externally suggested (Gudjonsson, Kopelman, & MacKeith, 1999). According to Gudjonsson (2003), memory distrust may result from memory problems during encoding and consolidation or from police interrogations in which confidence in one's memory is undermined. Another distinction is that between state memory distrust and trait memory distrust (Van Bergen, Jelicic, & Merckelbach, 2008). State memory distrust refers to a particular situation in which one experiences a lack of trust in one's memory as a result of, for example, interrogative stress and health problems. People with trait memory distrust, on the other hand, show a stable tendency to distrust their memory (Van Bergen, Jelicic, & Merckelbach, 2009). This latter type of memory distrust is not uncommon in the general population with at least 10 per cent of various age groups showing pessimistic memory evaluations (Crombag, Merckelbach, & Elffers, 2000).

In legal settings, eyewitnesses who distrust their own memories (i.e. who lack confidence of their memories) are often treated as less credible than people who present their eyewitness accounts in a confident manner (Gudjonsson & MacKeith, 1982). This practice is contradicted by extensive research showing that there is no clear-cut relationship

between memory confidence and accuracy (e.g. Brewer, 2006; but see Odinet & Wolters, 2006). Meanwhile, it is not clear whether eyewitnesses who suffer from memory distrust are more vulnerable to developing memory distortions when confronted with post-event information (e.g. during police interrogations) than those who are confident about their memory.

With these considerations in mind, the present study examined the relationship between subjective memory evaluation and the acceptance of misinformation. In addition, following suggestions made by Christianson et al. (2007), it tested whether memory distrust interacted with the passage of time. During a first session, participants watched a video fragment of an armed robbery. Afterwards, they had to give an account of the event they had witnessed. In a second session that took place either 1 day or 2 weeks after the first session, they had to check the written version of their account to which five misinformation items had been added. We opted for adding items to a statement because in several European countries including the Netherlands, it is standard practice that the verbal statements are not directly written down. Statements are later interpreted and formulated by the interrogator (Van Koppen, 2007; Van Koppen & Penrod, 2003). In this way, it is not unlikely that misinformation ends up in written statements. Following Gudjonsson's line of reasoning (2003), we expected people suffering from memory distrust to accept misinformation more easily than those with high memory confidence, especially with a long time interval (i.e. 2 weeks) between the sessions. A subsidiary aim of the present study was to explore how beliefs about one's memory functioning are related to self-report indices of cognitive failures, compliance and interrogative suggestibility. We expected that those with pessimistic beliefs about their memory would report more everyday lapses and cognitive blunders and would be more compliant and suggestible (i.e. would be more willing to rely on external sources) than those who are more confident about their own memory.

## METHODS

### Participants

Our sample consisted of 80 adults (54 women). Their age varied between 18 and 49 years ( $M = 33.6$  years,  $SD = 9.5$ ). Participants were recruited through advertisements in local newspapers, as well as through flyers distributed in a shopping mall and announcements on billboards at Maastricht University. During a telephone interview, they were asked to evaluate their memory functioning and to rate it in terms of a 10-point scale (anchors 1 = very poor; 10 = excellent). Those people who were very confident (i.e. gave subjective evaluations  $\geq 7$ ) and those who were doubtful about their memory (i.e. gave subjective evaluations  $\leq 4$ ) were selected and assigned to the memory confidence and the memory distrust group, respectively. They were given a small financial compensation for participating. The study was approved by the standing ethical committee of the Faculty of Psychology, Maastricht University.

### Materials

#### *Video footage*

Participants were presented with 2 minutes video footage of a simulated armed robbery at a wine shop. Participants were instructed to pay close attention to what happened. The

fragment showed a wine shop with some customers and the owner. Suddenly, a man flourishing a gun entered the shop. He ordered the customers to lie down on the floor, while the owner was forced to hand over the money. Finally, the robber fled the store.

#### *Eyewitness accounts*

Immediately after having seen the video fragment, participants were asked to provide a free recall about what they had seen. Their statements were recorded using a digital voice recorder. Subsequently, each free recall was written out verbatim and five misinformation items were added, consisting of altered and new information. These items were selected on the basis of a pilot study, in which six people were asked to give a detailed description of the fragment. From their descriptions, we chose two items that were recalled most often and therefore most plausible to be recalled by our future participants. These altered items were 'the attacker wore a cap' and 'the total number of people was 6'. We replaced the first item by 'the attacker wore a hood' and the second by 'the total number of people was 7'. When participants recalled an incorrect number of people, we added one more person to the number they had mentioned. In some cases, this resulted in changing the number of people into the correct number. Note that, also in this case, the correct number of people that was reported should have been detected, as it differed from the number originally mentioned by the participant. The other three misinformation items added completely new elements because they were not part of the fragment and were never mentioned by any of the pilot participants. These items were 'the robber nearly fell', 'the robber put the plastic bag containing the money in his pocket', and 'the robber held the customers continuously at gunpoint'. Corresponding with the procedure by Christianson et al. (2007), and because the altered and new items correlated highly ( $r = .53, p < .05$ ), they were collapsed into a single variable (i.e. misinformation detection), ranging from 0 to 5. The written eyewitness account was designed in such way that it looked like an official police document.

#### *Free recall scoring*

We used a procedure that was similar to that of Smeets, Candel, and Merckelbach (2004). During the pilot study, the video footage was shown to 6 people. They were instructed to give a detailed description. The items that were mentioned by at least 4 people were added to a scoring list. The final list consisted of 20 critical details of the video fragment. Free recall was scored by summing the number of list items mentioned by the participant, ranging from 0 to 20.

#### *Questionnaires and tests*

We administered five tests to the participants. The first was the Dutch version of the Squire Subjective Memory Questionnaire (SSMQ; Squire, Wetzel, & Slater, 1979; Van Bergen, Brands, Jelicic, & Merckelbach, 2009; Cronbach's  $\alpha = .96$ ). This is a self-report scale consisting of 18 items tapping subjective evaluations of one's own memory. Items are scored on a 9-point scale ( $-4 = \textit{disastrous}$ ;  $4 = \textit{perfect}$ ). Sample items are 'My ability to remember things that have happened more than a year ago is ...' and 'My ability to recall things when I really try is ...'. Scores are summed to obtain a total SSMQ score varying from  $-72$  to  $72$ , with negative scores corresponding with pessimistic judgements about one's own memory and positive scores reflecting optimistic memory evaluations.

The second questionnaire was the Dutch version of the Cognitive Failures Questionnaire (CFQ; Broadbent, Cooper, Fitzgerald, & Parkes, 1982; Merckelbach, Muris, Nijman, & De Jong, 1996; Cronbach's  $\alpha = .92$ ). The CFQ is a self-report scale that taps failures in

everyday actions, perception and attention, and memory over the last month. It consists of 25 items that are scored on a 5-point scale (0 = *never*; 4 = *very often*). Illustrative items are 'Do you fail to notice signposts on the road?' and 'Do you forget where you put something like a newspaper or a book?' Scores were summed to obtain a total CFQ score varying from 0 to 100, with higher scores indicating more self-reported cognitive failures.

The third questionnaire was the Dutch version of the Gudjonsson Compliance Scale (GCS; Gudjonsson, 1989; Smeets, 2008; Cronbach's  $\alpha = .81$ ). This self-report instrument measures people's levels of compliance. It focuses on two types of behaviour, namely eagerness to please others, and avoidance of conflicts. The scale consists of 20 items using a *true/false* format. Examples are 'I give in easily to people when I am pressured' and 'I try hard to do what is expected of me'. After recoding items 17 to 19, a total GCS score varying from 0 to 20 can be obtained by summing the number of *true* responses, with higher scores indexing more compliant behaviour.

To measure interrogative suggestibility, the participants were given the Gudjonsson Suggestibility Scale (GSS; Gudjonsson, 1997; Merckelbach, Muris, Wessel, & Van Koppen, 1998). The GSS consists of a story that is read out loud by the experimenter. Participants have to answer 20 questions of which 15 are misleading and 5 are neutral and address factual details of the story. After participants have answered the questions, they receive negative feedback about their performance. They are asked to answer the questions one more time and to be more accurate this time. Thus, all questions are answered twice and in this way several GSS parameters can be calculated. First, *yield 1* refers to the number of misleading questions that the participant accepts during the first round (range 0–15). Second, *yield 2* refers to the number of misleading questions accepted during the second round (range 0–15). Third, *shift* refers to the number of changes that participants make in their answers after having received negative feedback (range 0–20). Finally, the *total GSS score* is the sum of yield 1 and shift, with higher scores reflecting higher levels of interrogative suggestibility (range 0–35).

The fifth test was the Dutch version of the National Adult Reading Test (NART; Nelson, 1982; Schmand, Lindeboom, & Van Harskamp, 1992), that gives an estimate of verbal intelligence (correlation with Wechsler Adult Intelligence Scale ranging from .74 to .85 among healthy controls; Bright, Jaldow, & Kopelman, 2002; Schmand et al., 1992). The NART consists of 50 irregularly spelled words that have to be pronounced. An example item is the word 'enzyme'. Words can either be pronounced correctly (score = 2), spuriously (score = 1) or incorrectly (score = 0). Scores are summed to obtain a NART score varying from 0 to 100. This score is then transformed into an IQ score, with a higher score reflecting a higher IQ.

## Design and procedure

Testing occurred in two sessions: Either 1 day or 2 weeks after the participants had seen the video of the robbery. More specifically, half of the memory distrust group ( $n = 20$ ) and half of the memory confidence group ( $n = 20$ ) were asked to return to the lab 1 day after the first session. The other participants ( $n = 40$ ) were asked to return after 2 weeks. Thus, our design was basically a 2 (memory: Memory distrust *vs.* memory confidence)  $\times$  2 (time interval: 1 day *vs.* 2 weeks) between-subjects set-up.

During the first session, participants were asked to give informed consent. Subsequently, the video footage was presented to them. Next, participants were asked to complete the SSMQ, CFQ, GCS and NART, as well as some filler tasks. The order in which the tests

Table 1. Demographic data and mean scores on self-report tests of the two groups. Standard deviations are presented in parenthesis

Demographic data/tests	Memory distrust	Memory confidence
Gender	13 men–27 women	13 men–27 women
Age	38.55 (7.87)	28.60 (8.27)
Squire Subjective Memory Questionnaire	–8.32 (17.31)	34.46 (14.33)
Cognitive Failures Questionnaire	74.08 (12.54)	56.11 (10.85)
Gudjonsson Compliance Scale	10.84 (4.08)	9.38 (4.63)
Gudjonsson Suggestibility Scale (total score)	8.13 (4.09)	7.05 (3.70)
National Adult Reading Test	100.70 (7.81)	104.26 (6.16)
Free recall	9.45 (2.79)	10.94 (3.01)

were given was counterbalanced across participants. Approximately 30 minutes after they had seen the video footage, participants were asked to recall everything they could remember. After the first session, the recorded free recall was written out by the experimenter. During the second session, participants were confronted with their written accounts. We chose to present their accounts in this way as written statements play an important role in the legal system, while research has shown that people are more easily misled when post-event information is presented in a written form (Itsukushima, Nishi, Maruyama, & Takahashi, 2006). We asked participants to check their testimony carefully. The experimenter stressed that the statements had to be correct. In case they had doubts about some of the statements, they were instructed to underline these sentences so that these could be discussed later. Participants were asked to sign the testimony if they approved with its content.<sup>1</sup> Finally, participants had to complete some filler tasks and the GSS.

## RESULTS

### Demographic data and tests

Table 1 shows demographic data and mean scores on self-report tests of the two memory groups. The memory distrust group was significantly older than the memory confidence group [ $t(78) = 5.51, p < .05$ ]. There were no gender differences between the memory groups. As expected, the memory distrust group had significantly lower scores on the SSMQ than the memory confidence group [ $t(77) = 11.95, p < .05$ ].<sup>2</sup> By the same token, participants distrusting their memory scored significantly higher on the CFQ than participants who were very confident about their memory [ $t(75) = 6.72, p < .05$ ]. Regarding the GCS and the total GSS score, no significant group differences were found [ $t(74) = 1.45, p = .15$  and  $t(78) = 1.23, p = .22$ , respectively]. Neither were there group differences for any of the GSS subscales (i.e. Yield1, Yield2, Shift; all *ps* ns). Furthermore, both memory groups differed in IQ scores [ $t(77) = 2.24, p < .05$ ], with the memory confidence group outperforming the memory distrust group on the NART. Finally,

<sup>1</sup>Of the 80 participants, 31 participants signed the testimony. Despite the instruction, this group of 31 individuals consisted of both participants who detected misinformation and/or rejected accurate information and participants who did not.

<sup>2</sup>Due to missing values, the degrees of freedom vary.

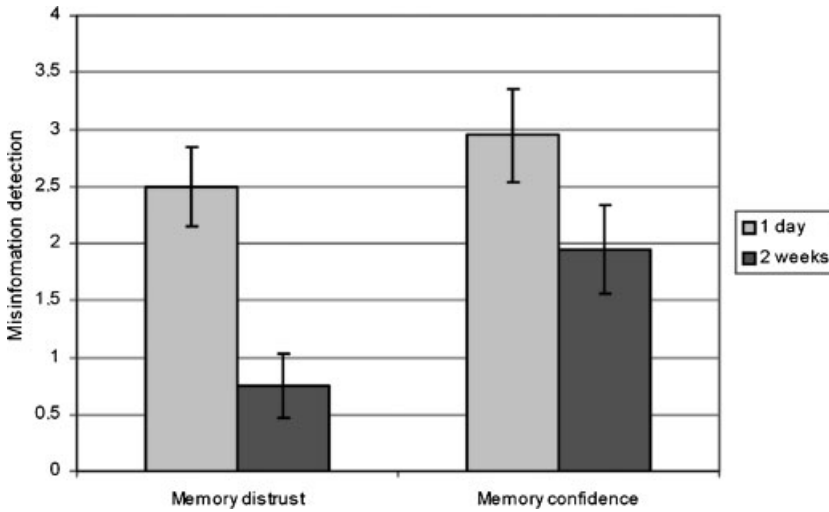


Figure 1. Average amount of misinformation detection of the memory groups (i.e. memory distrust and memory confidence) at the two-time intervals (1 day and 2 weeks)

participants suffering from memory distrust had poorer free recall (i.e. objective memory performance) than participants who were very confident about their memory [ $t(78) = 2.29$ ,  $p < .05$ ].

### Misinformation detection

Figure 1 shows the extent to which the two groups detected misinformation at the two time delays. A two-way Analysis of Variance (ANOVA) revealed a non-significant interaction effect of memory group and time interval ( $p = .31$ ). After removing the interaction term, two significant main effects were found. People suffering from memory distrust detected significantly less misinformation than people who were confident about their memory,  $F(1,77) = 5.15$ ,  $p < .05$ ,  $\eta_p^2 = .06$ . Furthermore, participants who were tested after 1 day detected more misinformation than those who were tested after 2 weeks,  $F(1,77) = 14.31$ ,  $p < .05$ ,  $\eta_p^2 = .16$ .

### Covariates

A close examination of the correlation matrix showed that misinformation detection correlated significantly with age ( $r = -.26$ ,  $p < .05$ ) and free recall ( $r = .22$ ,  $p = .05$ ). As these factors might have confounded the obtained results, Analysis of Covariance (ANCOVA) was conducted. After removing the non-significant interaction term between memory group and time interval, both age and free recall failed to reach significance ( $p = .27$  and  $p = .28$ , respectively). However, it should be noted that due to the inclusion of age and free recall, the main effect of memory group disappeared [ $F(1,75) = 1.13$ ,  $p = .29$ ]. The main effect of time interval was not affected by the inclusion of the covariates and remained significant [ $F(1,75) = 14.19$ ,  $p < .05$ ].

### Rejected accurate information

We also performed an ANOVA on the number of items that participants indicated to be incorrect, when in fact they were correct (i.e. *rejected accurate information*). The two-way ANOVA showed no significant interaction effect between memory and time ( $p = .26$ ) and this interaction was therefore removed from the model. The main effect of memory group was significant [ $F(1,77) = 4.81, p < .05, \eta_p^2 = .06$ ]. Participants who were confident about their memory more often rejected correct items ( $M = .90, SD = 1.74, \text{range } 0\text{--}7$ ) than those suffering from memory distrust ( $M = .28, SD = .55, \text{range } 0\text{--}2$ ).<sup>3</sup> The main effect of time interval failed to reach significance [ $F(1,77) = 2.78, p = .10$ ].

## DISCUSSION

Our findings can be summarized as follows. First, participants who suffer from memory distrust accept more misinformation than those who report to be confident about their memory. Second, this effect does not become stronger over time (i.e. no group  $\times$  time interaction). Third, a longer time interval between sessions promotes acceptance of misinformation. Fourth, age and free recall performance seem to modulate the relationship between memory group and misinformation acceptance. Fifth, people who are confident about their memory more frequently reject accurate information than people who distrust their memory.

That our recruitment procedure was successful is shown by the fact that the memory distrust group reported more negative subjective memory evaluations (indexed by the SSMQ) and more cognitive failures (indexed by the CFQ) than the memory confidence group. Furthermore, the two groups differed with regard to the proxy measure of IQ (i.e. NART) and free recall performance, an issue to which we will return.

The finding that people who believe to have poor memory abilities show more difficulty to detect misinformation corresponds well with our first hypothesis. Apparently, people who distrust their memory more readily rely on external cues and suggestions, as has been proposed by Gudjonsson (2003). Consequently, they run a risk of incorporating misinformation into their memory. Conversely, confidence in one's own memory is associated with less misinformation incorporation probably because it does not go along with an increased sensitivity to external cues. Note also that there is a fundamental integrity to memory confidence evaluations. That is, those who distrusted their memory exhibited poorer free recall performance than those who were confident about their memory. Overall, our findings are in line with a recent study by Van Bergen and colleagues (Van Bergen, Jelicic et al., 2009) showing that subjective memory evaluation is positively related with objective memory performance.

We anticipated that the memory distrust group's tendency to accept misinformation would increase with the passage of time, but this interaction was not borne out by the data. It would be premature though to conclude that memory distrust and passage of time are independently operating factors. The reason is that a floor effect at the 2-week session (i.e. many participants accepting the misinformation elements) might have overruled an

<sup>3</sup>These data contain outliers. However, these were included as they reveal relevant information. Note that after excluding these outliers the main effect of memory group remains significant, means being .00 ( $SD = .00$ ) for the memory distrust group and .39 ( $SD = .60, \text{range} = 0\text{--}2$ ) for the memory confidence group [ $F(1,64) = 12.87, p < .05, \eta_p^2 = .17$ ].



interaction effect. Thus, this issue warrants further study, probably with a measure of misinformation that allows for more variability.

Indeed, we found that, after a relatively long time interval, the chance to detect discrepancies between authentic memory representations and misinformation decreases. This effect holds true both for people who are confident about their memory and those who distrust their memory. The effect size associated with this main effect of time was relatively large. Misinformation will be incorporated more easily when time passes by, because after a while it makes the impression of providing a more complete version of what has happened than one's own memory recollections (Lee, 2004).

While neither age nor free-recall was a significant covariate, together they seemed to be relevant, since their inclusion in an ANCOVA resulted in the disappearance of a significant main effect of memory group. Why this occurred becomes more comprehensible when looking at the zero-order correlations between subjective memory evaluation and age ( $r = -.53, p < .05$ ), between memory evaluation and free recall ( $r = .25, p < .05$ ) and between age and free recall ( $r = -.40, p < .05$ ). That older people more frequently distrust their memory has been reported a number of times (Commissaris, Ponds, & Jolles, 1998; Ponds & Jolles, 1996; Ponds, Van Boxtel, & Jolles, 2000). We do not think that age has a direct influence on the acceptance of misinformation in memory. Rather, it seems that when people grow older, some of them will start to attribute memory difficulties to internal (organic) factors, rather than blaming such problems on external (situational) factors (Commissaris et al., 1998). As a result, memory distrust is more frequent in older than in younger people, even though our group of participants suffering from memory distrust is still considerably younger than the samples described in the above mentioned studies.

The fact that free recall together with age moderates the relationship between memory group and acceptance of misinformation is interesting. According to the discrepancy detection principle (Schooler & Loftus, 1993; Tousignant, Hall, & Loftus, 1986), having detailed and accurate memories about an event allows people to detect discrepancies between the original event and misinformation that is provided about that event. So, poor free recall performance will on the one hand, fuel one's negative memory evaluations (see also Van Bergen, Brands et al., 2009; Van Bergen, Jelicic et al., 2009), and on the other hand, it will make one vulnerable to misinformation.

This study also looked at the rejection of accurate information. Interestingly, participants with memory distrust less often rejected accurate information than participants who were confident about their own memory. At first sight, this seems to contradict the pattern that we found for the detection of misinformation. Thus, while participants were less correct when it came to accepting misinformation, they were more accurate in rejecting accurate information, relative to the memory confidence group. An obvious explanation for this is that our participants were confronted with an external source claiming to reflect their written statements. Compared to the memory confidence group, memory distrust individuals were less likely to express doubts about their statements, whether these were true or false. As scores on the self-report tests show, this difference is unlikely to be a product of group differences in compliance or interrogative suggestibility. As a matter of fact, participants suffering from memory distrust did not have higher scores on the GCS and the GSS than memory confidence participants. Previous studies have shown that the relationship between subjective memory evaluations and memory accuracy is a complex one (e.g. Odinot & Wolters, 2006; Sporer, Penrod, Read, & Cutler, 1995). Our finding that memory distrust is accompanied by both heightened levels of misinformation acceptance and lowered levels of incorrect rejections further underlines this point. To put this finding

into perspective, note that the highest average number of rejected accurate information (i.e. in the memory confidence group) was still lower than 1. Furthermore, both in the memory distrust group and memory confidence group the majority of participants did not reject any accurate information (77.5% vs. 60%, respectively).

There is reason to believe that levels of misinformation acceptance might be even higher if misinformation had been introduced in a more social way, for example during a conversation with a confederate (Gabbert et al., 2004). We anticipate that the increase of the effect would be higher in the memory distrust group since people suffering from memory distrust are more prone to rely on suggestions by others (Gudjonsson, 2003).

The limitations of the present study deserve some comment. First, an *ad hoc* criterion was adopted to recruit participants for one of the two memory groups. In future research, it might be of interest to use multiple criteria and to select more extreme groups. Second, there was a significant age difference between both memory groups. Therefore, future studies on memory distrust and misinformation should match on age. In doing so, they will be able to avoid that age becomes a difficult interpretable covariate, as was the case in the present study. Finally, the current study was correlational in nature and so, it remains to be seen whether poor free recall performance is the principal driver of memory distrust and heightened levels of misinformation acceptance. A closer look at participants' memory functioning would therefore be useful in future studies. Studies in which this causal interpretation can be directly tested would further increase our understanding.

As eyewitness testimonies bear strong relevance to forensic settings, it is important to examine factors that might affect their reliability. Since eyewitnesses who distrust their memory are often considered to be more susceptible to memory distortions, they will be treated as less credible than people without memory complaints (Gudjonsson & MacKeith, 1982). The present study shows that there is some wisdom to this because people suffering from memory distrust are indeed more vulnerable to misinformation than those who are very confident about their memory. The most important implication of our study, however, is that eyewitnesses or suspects suffering from memory distrust should be interviewed or interrogated in a prudent way.

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### REFERENCES

- Brewer, N. (2006). Uses and abuses of eyewitness identification confidence. *Legal and Criminological Psychology*, *11*, 3–23.
- Bright, P., Jaldow, E., & Kopelman, M. D. (2002). The National Adult Reading Test as a measure of premorbid intelligence: A comparison with estimates derived from demographic variables. *Journal of the International Neuropsychological Society*, *8*, 847–854.
- Broadbent, D. E., Cooper, P. F., Fitzgerald, P., & Parkes, K. R. (1982). The Cognitive Failures Questionnaire (CFQ) and its correlates. *British Journal of Clinical Psychology*, *21*, 1–16.

- Bruck, M., & Ceci, S. J. (1999). The suggestibility of children's memory. *Annual Review of Psychology*, 50, 419–439.
- Christianson, S. Å., Engelberg, E., & Gustafson, Å. (2007). Recognition of previous eyewitness testimony from an altered interrogation protocol: Potential effects of distortions. *Psychology, Crime & Law*, 13, 583–589.
- Commissaris, C., Ponds, R., & Jolles, J. (1998). Subjective forgetfulness in a normal Dutch population: Possibilities for health education and other interventions. *Patient Education and Counseling*, 34, 25–32.
- Crombag, H., Merckelbach, H., & Elffers, H. (2000). Other people's memory. *Psychology, Crime & Law*, 6, 251–265.
- Devilly, G. J., Varker, T., Hansen, K., & Gist, R. (2007). An analogue study of the effects of psychological debriefing on eyewitness memory. *Behaviour Research and Therapy*, 45, 1245–1254.
- Doyle, J. M. (2005). *True witness: Cops, court, science, and the battle against misidentification*. New York: Palgrave Macmillan.
- Gabbert, F., Memon, A., Allan, K., & Wright, D. B. (2004). Say it to my face: Examining the effects of socially encountered misinformation. *Legal and Criminological Psychology*, 9, 215–227.
- Gudjonsson, G. H. (1989). Compliance in an interrogative situation: A new scale. *Personality and Individual Differences*, 10, 535–540.
- Gudjonsson, G. H. (1997). *The Gudjonsson Suggestibility Scales manual*. Hove, UK: Psychology Press.
- Gudjonsson, G. H. (2003). *The psychology of interrogations and confessions: A handbook*. New York: Wiley.
- Gudjonsson, G. H., Kopelman, M. D., & MacKeith, J. A. C. (1999). Unreliable admissions to homicide: A case of misdiagnosis of amnesia and misuse of abreaction technique. *British Journal of Psychiatry*, 174, 455–459.
- Gudjonsson, G. H., & MacKeith, J. A. C. (1982). False confessions: Psychological effects of interrogation. A discussion paper. In A. Trankell (Ed.), *Reconstructing the past: The role of psychologists in criminal trials* (pp. 253–269). Deventer: Kluwer.
- Huffman, M. L., Crossman, A. M., & Ceci, S. J. (1997). Are false memories permanent?: An investigation of the long-term effects of source misattributions. *Consciousness and Cognition: An International Journal*, 6, 482–490.
- Itsukushima, Y., Nishi, M., Maruyama, M., & Takahashi, M. (2006). The effect of presentation medium of post-event information: Impact of co-witness information. *Applied Cognitive Psychology*, 20, 575–585.
- Lee, K. (2004). Age, neuropsychological, and social cognitive measures as predictors of individual differences in susceptibility to the misinformation effect. *Applied Cognitive Psychology*, 18, 997–1019.
- Loftus, E. F. (2005). Planting misinformation in the human mind: A 30-year investigation of the malleability of memory. *Learning and Memory*, 12, 361–366.
- Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of Verbal Learning and Verbal Behavior*, 13, 585–589.
- McCloskey, M., & Zaragoza, M. (1985). Misleading postevent information and memory for events: Arguments and evidence against memory impairment hypotheses. *Journal of Experimental Psychology: General*, 114, 1–16.
- Merckelbach, H., Muris, P., Nijman, H., & De Jong, P. J. (1996). Self-reported cognitive failures and neurotic symptomatology. *Personality and Individual Differences*, 20, 715–724.
- Merckelbach, H., Muris, P., Wessel, I., & Van Koppen, P. J. (1998). The Gudjonsson Suggestibility Scale (GSS): Further data on its reliability, validity, and metacognition correlates. *Social Behavior and Personality*, 26, 203–210.
- Morris, E. K., Laney, C., Bernstein, D. M., & Loftus, E. F. (2006). Susceptibility to memory distortion: How do we decide it has occurred? *American Journal of Psychology*, 119, 255–274.
- Nelson, H. E. (1982). *National Adult Reading Test*. Windsor: PN NFER-Nelson.
- Odinot, G., & Wolters, G. (2006). Repeated recall, retention interval and the accuracy-confidence relation in eyewitness memory. *Applied Cognitive Psychology*, 20, 973–985.

- Otgaar, H., Candel, I., Merckelbach, H., & Wade, K. A. (2009). Abducted by a UFO: Prevalence information affects young children's false memories for an implausible event. *Applied Cognitive Psychology, 23*, 115–125.
- Ponds, R. W. H. M., & Jolles, J. (1996). Memory complaints in elderly people: The role of memory abilities, metamemory, depression, and personality. *Educational Gerontology, 22*, 341–357.
- Ponds, R. W. H. M., Van Boxtel, M. P. J., & Jolles, J. (2000). Age-related changes in subjective cognitive functioning. *Educational Gerontology, 26*, 67–81.
- Schmand, B., Lindeboom, J., & Van Harskamp, F. (1992). *Nederlandse Leestest voor Volwassenen [Dutch Adult Reading Test]*. Lisse: Swets & Zeitlinger.
- Schooler, J. W., & Loftus, E. F. (1993). Multiple mechanisms mediate individual differences in eyewitness accuracy and suggestibility. In J. M. Puckett, & H. W. Reese (Eds.), *Mechanisms of everyday cognition* (pp. 177–203). Hillsdale, NJ, England: Lawrence Erlbaum Associates, Inc.
- Smeets, T. (2008). Gudjonsson Suggestibility Scales en Gudjonsson Compliance Scale [Gudjonsson Suggestibility Scales and Gudjonsson Compliance Scale]. In T. Giesbrecht, C. de Ruiter, & M. Jelicic (Eds.), *Forensisch psychodiagnostisch gereedschap. Malingering, psychopathie en andere persoonlijkheidstrekken [Forensic psychodiagnostic tools. Malingering, psychopathy and other personality traits]* (pp. 63–72). Amsterdam: Harcourt.
- Smeets, T., Candel, I., & Merckelbach, H. (2004). Accuracy, completeness, and consistency of emotional memories. *American Journal of Psychology, 117*, 595–609.
- Sporer, S. L., Penrod, S., Read, D., & Cutler, B. (1995). Choosing, confidence, and accuracy: A meta-analysis of the confidence-accuracy relation in eyewitness identification studies. *Psychological Bulletin, 118*, 315–327.
- Squire, L. R., Wetzel, C., & Slater, P. C. (1979). Memory complaint after electroconvulsive therapy: Assessment with a new self-rating instrument. *Biological Psychiatry, 14*, 791–801.
- Sutherland, R., & Hayne, H. (2001). The effect of postevent information on adults' eyewitness reports. *Applied Cognitive Psychology, 15*, 249–263.
- Tomes, J. L., & Katz, A. N. (1997). Habitual susceptibility to misinformation and individual differences in eyewitness memory. *Applied Cognitive Psychology, 11*, 233–251.
- Tousignant, J. P., Hall, D., & Loftus, E. F. (1986). Discrepancy detection and vulnerability to misleading postevent information. *Memory and Cognition, 14*, 329–338.
- Van Bergen, S., Brands, I., Jelicic, M., & Merckelbach, H. (2009). Assessing trait memory distrust: Psychometric properties of the Squire Subjective Memory Questionnaire. Manuscript submitted for publication.
- Van Bergen, S., Jelicic, M., & Merckelbach, H. (2008). Interrogation techniques and memory distrust. *Psychology, Crime & Law, 14*, 435–449.
- Van Bergen, S., Jelicic, M., & Merckelbach, H. (2009). Are subjective memory problems related to suggestibility, compliance, false memories, and objective memory performance? *American Journal of Psychology, 122*, 249–257.
- Van Koppen, P. J. (2007). Nederlandse feiten in het strafrecht [Dutch facts in criminal law]. *Mt.*, 3, 84.
- Van Koppen, P. J., & Penrod, S. D. (2003). Adversarial or inquisitorial: Comparing systems. In P. J. Van Koppen, & S. D. Penrod (Eds.), *Adversarial versus inquisitorial justice: Psychological perspectives on criminal justice systems* (pp. 2–20). New York: Plenum.
- Wade, K. A., Garry, M., Read, J., & Lindsay, S. (2002). A picture is worth a thousand lies: Using false photographs to create false childhood memories. *Psychonomic Bulletin and Review, 9*, 597–603.
- Ward, R. A., & Loftus, E. F. (1985). Eyewitness performance in different psychological types. *Journal of General Psychology, 112*, 191–200.
- Wright, D. B., Loftus, E. F., & Hall, M. (2001). Now you see it; now you don't: Inhibiting recall and recognition of scenes. *Applied Cognitive Psychology, 15*, 471–482.