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Denial-Induced Forgetting:

False Denials Undermine Memory, But External Denials Undermine Belief

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Abstract

We examined the mnemonic effects of false denials. In a previous experiment (Otgaar, Howe, Memon, & Wang, 2014), false denials resulted in participants denying that they talked about details with the experimenter when in fact they did. This denial-induced forgetting (DIF) was further examined. In Experiment 1, participants received pictures and their belief and memory for details were tested. In the false denial group, participants had to falsely deny in response to each question. In the external denial group, an experimenter falsely denied to the participants that certain details were present. The control group had to answer the questions honestly. We found evidence for DIF. In Experiment 2, we used a video and again found DIF. Moreover, when the experimenter provided external denials, nonbelieved memory rates increased. Together, our experiments suggest that false denials undermine memory while external denials appear to reduce belief.

Keyword: False denials; false memory; nonbelieved memory; belief; recollection; memory conformity

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According to anecdotal evidence, false denials in the context of the legal field are not all that uncommon. For example, victims of sexual abuse sometimes falsely deny that certain parts of the abuse actually happened. They even sometimes falsely deny that they were the victim of sexual abuse (Lyon, 2007), even when this abuse is documented (Goodman et al., 2003). The main focus of our research is on an examination of false denials of the former type; that is, for cases in which people witness and remember an event and subsequently *explicitly* state that they did not experience certain parts of that event. That is, our focus is on the mnemonic consequences of false denials.

Work on False Denials

Scientific documentation on false denials is however quite limited. Of utmost relevance for the current work is recent experimentation into false denials from our lab (Otgaar et al., 2014). In this research, children (6-8- and 10-12-year-olds) and adults were presented with a video about an electrician stealing items at a home. Participants received questions about details of the video and were asked about their memory and belief for the events. Participants were assigned to three groups. For the current experiments, only the false denial group is relevant to discuss. In the false denial group, participants had to falsely deny in response to each of the questions. Specifically, they had to falsely deny that certain details were shown in the video (e.g., "The man did not steal anything"). One week later, participants were specifically asked whether they talked about certain details with the experimenter and whether they had seen these details on the video. Although false denials had no effect on memory for the video, they did increase

participants' false denials about having talked to the experimenter about the details that were shown in the video. So, forcing participants to falsely deny impaired memory for the *interview*. This latter effect is labeled *denial-induced forgetting (DIF)*.

The Present Research

The goal of the present experiments was two-fold. First, the paradigm used in our original experiment was based on the forced confabulation procedure in which participants were forced to confabulate a response about the content of a *video* they had just watched (Ackil & Zaragoza, 1998). However, to show the robustness of DIF, we examined whether our DIF effect could be replicated when using other stimuli: pictures. This would show that our DIF effect is not a stimulus effect but can be revealed in other situations as well (Vieira & Lane, 2013; for related work with pictures). Another reason for using pictures is that unlike videos, they are static stimuli and are poorer recollected than more dynamic stimuli such as videos (Goldstein, Stance, Hoisington, & Buescher, 1982). Poorer recollection of details means that it is especially difficult to falsely deny picture details and lead to DIF. Hence, if DIF is a strong effect, it should also appear when using pictures.

Second, in our original experiment, we examined the effects of false denials on memory *and* belief. This was done to because previous memory research has mainly focused on *believed* memories whereas recent research has shown that belief (truth value attributed to an event) and recollection (mental re-experience of an event) are independent constructs (Otgaar, Scoboria, & Mazzoni, 2014). This distinction between belief and recollection has led to a new research line showing that on certain occasions, people develop nonbelieved memories. Nonbelieved memories refer to recollections of events for which the belief in the occurrence of those events is undermined (Mazzoni, Scoboria, & Harvey, 2010; Otgaar, Scoboria, & Smeets, 2013). This is

interesting as in most instances when people have memories of certain events they also believe that the events occurred. Nonbelieved memories constitute an exception to this situation. In our original experiment, no effect of false denials on nonbelieved memories was found.

Empirical work on nonbelieved memories has revealed that social feedback might lead to the production of nonbelieved memories (Scoboria, Boucher, & Mazzoni, 2014). In the current research, we added an extra group in which the experimenter (falsely) denied to participants that certain details had been presented (= external denial). Recent studies have shown that this form of social pressure (i.e., feedback by others) often leads to decreases in belief while leaving recollection intact (e.g., Mazzoni, Clark, & Nash, 2014). Based on this, false denials might exert different effects on belief and recollection depending on whether false denials are generated internally or externally through social feedback. Thus, we hypothesized that internal false denials would lead to the standard DIF effect, but that external false denials would undermine belief, which then might lead to increased nonbelieved memories rates.

External denials are related to research on omission errors and misinformation in which participants receive misleading information about their memory performance leading to failures of memory about experienced events (Loftus, 2005; Merckelbach, Van Roermund, & Candel, 2007). From a theoretical stance, the idea of social feedback (external denials) affecting belief and/or memory comes close to the concept of autobiographical memory being inherently social in nature (e.g., Nelson, 2003). Specifically, work in this area stresses that our (autobiographical) memory is unique because it is shaped by social influences like discussions with friend, parents etc. To be more specific, recent work shows that autobiographical memory is composed of belief in occurrence (and accuracy) and recollection and here, findings show that social feedback is more likely to influence belief and not recollection (e.g., Scoboria et al., 2014).

Experiment 1

Method

Participants

Using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007), a power analysis with a medium effect size ($f = 0.31$) and power of 0.80 indicated a sample size of 80 participants. We tested 86 participants (mean age = 21.16, $SD = 2.53$, range 18-31; 72 women). Participants were undergraduate students from the Faculty of Psychology and Neuroscience, Maastricht University. Participants received credit points or a financial compensation for their involvement (7.50 euro). The experiment was approved by the standing ethical committee of the Faculty of Psychology and Neuroscience, Maastricht University**.**

Materials

Design and Procedure

Adults were randomly assigned to the different conditions and were tested in laboratory rooms at the psychology faculty. The experiment contained two sessions separated by a 24-hour interval. During the first session, participants received 12 negative and 12 neutral IAPS (International Affective Picture System; Lang, Bradley, & Cuthbert, 2008) pictures[1], presented in a blocked order in a counterbalanced fashion. Hence, experiment 1 employed a 3 (Condition: False Denial, External Denial, Honest) x 2 (Emotion: Negative vs. Neutral) mixed model design with the first factor being a between-subjects factor. The pictures were presented using E-Prime on a 17-inch computer screen. Pictures were shown for 5000 ms with 1000 ms inter-stimulus interval. After viewing the pictures, participants received a short distractor task (playing Tetris) lasting for 5 minutes. Then, participants' baseline belief and memory for details was measured. Participants were asked ten questions related to details present in the pictures (e.g., What was the

woman at the office doing?), and they had to indicate their belief (i.e., whether or not participants believed that a particular detail occurred in the stimuli; 1 = definitely did not happen, 8 = definitely did happen) and memory (1 = no memory at all, 8 = clear and complete memory) for the presented questions. These questions were derived from the Autobiographical Belief and Memory Questionnaire (ABMQ; Scoboria et al., 2004). Following this, participants received a 5-minute filler task (Bejeweled).

Next, participants were asked 10 open-ended questions. Six questions were already asked during the baseline phase (i.e., true event questions). The remaining 4 questions concerned false details that were not asked during the baseline phase. Participants in the False Denial group (n = 29) were instructed to (falsely) deny in response to each question (e.g., "What object was between the blue T-shirt and jeans?"; Answer: "There was no object between the blue T-shirt and jeans"). In the External Denial condition (n = 29), participants received the same set of questions, but received social negative feedback to a fixed number of details (i.e., 3 true event questions and 2 false event questions; i.e., half of the six true details and half of the 4 false details) from the experimenter. Specifically, the experimenter suggested that certain details were not present in the picture (e.g., as a response to the participants' answer: "That [specific detail] was not present in the picture, think about it for tomorrow". Of course, the experimenter did not deny all responses of participants as this might make the participant suspicious of the aim of the experiment. Participants in the honest group (n = 28) were instructed to provide answers to questions they were absolutely sure about without guessing. Again, all participants received the same set of questions (see Appendix B).

The second session occurred the next day. Participants were informed that their memory for the pictures would be tested. First, participants were provided with a source memory task

containing twelve items each containing two closed (i.e., yes/no) questions in chronological order. Here is an example of an item: (1) "When we talked yesterday, did we talk about which jewellery the woman wore?" [interview questions], (2) "When you viewed the pictures, did you see which jewellery the woman wore?" [picture question]. After the picture question, participants were instructed to rate their memory and belief for the items once more. The source memory task consisted of 6 true event questions asked during session 1, 2 true event questions not asked in session 1, 2 false event questions asked in session 1, and 2 false event questions not asked in session 1. Debriefing took place after all participants were tested.

Results

Baseline Scores

We first looked at the baseline mean belief scores. No statistical interaction ($F(2, 83) = 3.41$, $p = .15$, $\eta^2_{partial} = .04$) or main effect of Condition was detected ($F(2, 83) = .06$, $p = .94$, $\eta^2_{partial} = .001$). When we analysed the baseline mean memory scores, we found the following. Again, no statistical interaction ($F(2, 83) = 3.08$, $p = .051$, $\eta^2_{partial} = .7$) or main effect of Condition ($F(2, 83) = 0.40$, $p = .67$, $\eta^2_{partial} = .01$) was found. In sum, the baseline scores show that before the denial manipulation, groups did not notably differ on belief and memory for the details.

False Denials

A 3 (Condition: False Denial, External Denial, Honest) x 2 (Emotion: Negative vs. neutral) repeated measures ANOVA was executed on the mean total false denial rates for the interview question at the second session. We replicated our DIF effect.[2] That is, our analysis demonstrated a statistically significant Condition effect ($F(2, 83) = 12.37$, $p < .001$, $\eta^2_{partial} = .23$) in the absence of any other effects. Post-hoc Bonferroni corrected comparisons showed that

participants in the False Denial group (M = 0.71, CI [0.54, 0.88]) were statistically more likely to falsely deny having talked about details discussed at the first session than the External Denial (M = 0.17, CI [0.00, 0,34] and Honest groups (M = 0.21, CI [0.04, 0.39], all ps < .001; see Figure 1), thus demonstrating the DIF effect. All other effects were not statistically significant (ps > .05). To examine how strong our data supported the DIF effect, we also calculated a Bayes Factor (BF) score (e.g., Wagenmakers, Verhagen, Matzke, Steingroever, Rouder, & Morey, in press). Bayesian analyses found very strong evidence that our data supported the alternative hypothesis and hence, our DIF effect (BF(10) = 683.81). We also examined whether false denials might have affected the false denial rates for the picture questions but found no statistical effects (all ps > .05). When analysing the false event questions, we did find that the False Denial group (M = 0.43, CI [0.30, 0.57]) was more likely to recollect false details of the pictures than the Honest group (M = 0.16, CI [0.02, 0.30]; p = .02; F(2, 83) = 3.90, p = .02, $\eta^2_{partial}$ = .09).

Nonbelieved Memories

One of our goals was to test whether our external denial manipulation might have fuelled the creation of nonbelieved memories. As per previous research (Clark, Nash, Fincham, & Mazzoni, 2012), we classified ratings as nonbelieved memories only if the memory ratings were at least 2 scale-points higher than the belief ratings. So, for example, if a participant gave a memory rating of 7 referring to a strong recollection, but also gave a belief rating of 5 indicating a moderate belief score, then this was scored as a nonbelieved memory. We first examined the existence of spontaneous nonbelieved memories (nonbelieved memories that occurred before any manipulation during the baseline phase). Seven participants had 1 nonbelieved memory for the negative-related questions and 1 participant had 2 nonbelieved memories for the negative-related questions. For the neutral-related questions, 5 participants had 1 nonbelieved memory.

Of more interest was the question whether the External Denial group resulted in more nonbelieved memories. A 3 (Condition: False Denial, External Denial, Honest) x 2 (Emotion: Negative vs. neutral) repeated measures ANOVA on the mean total negative and neutral nonbelieved memory rates did not reveal any statistical effects of our denial manipulations (all *p*s > .05). Although mean total nonbelieved memory rates were higher in the External Denial group ($M = 0.15$) than in the False Denial ($M = 0.05$) and Honest group ($M = 0.05$), the difference was not statistically significant ($F(2, 83) = 1.71$, $p = .19$, $\eta^2_{partial} = .04$).

We also conducted chi-square analyses on the frequency of negative and neutral nonbelieved memories. For both types of nonbelieved memories, no statistical effects emerged (negative: $p = .17$; neutral: $p = .59$).

Discussion

In Experiment 1, we found convincing evidence for DIF. Also, DIF only occurred for self-induced denials and was absent for external denials. Furthermore, although we found that external denials elevated nonbelieved memory rates, this was not statistically significant. We conducted a second experiment in which we wanted to examine more closely the effect of external denials and examine whether the DIF effect was also absent when other external denials are presented (e.g., from a confederate). This also allowed us to re-test the effect of false denials on the creation of nonbelieved memory rates. One reason for the absence of an effect of external denials on belief and recollection could be that our social feedback manipulation was not effective enough. Hence, to deal with this issue, we included an extra external denial group in which false denials were provided by a confederate. Such a procedure has been used frequently in memory conformity and omission errors research (Merckelbach et al., 2007; Wright, Memon, Skagerberg, & Gabbert, 2009). In such studies, participants are presented with a video of a

crime. After this, they discuss the event with a confederate who introduces some form of suggestion. Such social pressure procedures have shown to boost memory distortion and lead to omission errors. However, based on the literature on nonbelieved memories (Otgaar et al., 2014), we expected that our external denial manipulation might affect belief more than recollection..

Experiment 2

Method

Participants

Using G*Power with a power of 0.80 and an expected medium effect size, a sample of 96 participants was needed. We stopped data collection after testing 100 participants (mean age = 21.80, *SD* = 2.87, range 18-32, 86 female). Participants had not taken part in the first experiment. They could receive credit points or a financial compensation (7.50 euro).

Materials

Video. The same video was used here as in our previous study (Otgaar et al., 2014). In this 6-minute video, a tradesman called Eric enters an unoccupied house for some electrical jobs. In the house, he steals several items.

Design and Procedure

In the current experiment, we used a between-subjects design with Condition (False Denial, External Denial-Experimenter, External Denial-Confederate, Honest) as our independent factor. Participants were randomly assigned to the different conditions (n = 25 in each condition).

As in the first experiment, Experiment 2 involved two sessions separated by 1 day. The procedure was almost identical to the one used in the original study (Otgaar et al., 2014) except that we now included external denial manipulations. Participants first watched a short video. In

the External Denial-Confederate condition, before watching the video, participants saw the confederate leave the lab room. During this time, the experimenter told the confederate to wait in the corridor because the experimenters wanted to ask the confederate some questions later on. This was done to convince the participants that the confederate was part of the experiment and had seen the video. After the video, participants received a short distractor task (5 minutes Tetris). Then, participants' baseline belief and memory for details were measured. They were asked nine items related to details presented in the video (e.g., "Where did Eric find the key?") and they had to indicate their belief (i.e., whether or not participants believed that a particular detail occurred in the stimuli; 1 = definitely did not happen, 8 = definitely did happen) and memory (1 = no memory at all, 8 = clear and complete memory for the event) for the items. The questions were asked in the same chronological sequence as in the video. Next, participants were provided with a 5-minute distractor task (Bejeweled).

In the next phase, participants in all groups were asked the same set of 12 open-ended questions. Eight of these questions pertained to details that were presented in the video (true event questions). Answers to 4 of these 8 true event questions were denied by the confederate (External denial-confederate group) or by the experimenter (External denial-experimenter group). Four questions related to details not presented in the video (false event questions). Answers to 2 of these questions were also denied by the confederate (External denial-confederate group) or by the experimenter (External denial-experimenter group). As has been mentioned before, in the external denial groups, depending on the group, not all questions were denied by the confederate or experimenter as this could increase suspicion among participants. In the False Denial Condition, participants had to make a denial in response to each question (e.g., "The man did not steal anything"). In the External Denial-Confederate condition, the participant first

answered the question after which the confederate denied certain items. In the script, answers were also included that the confederate should provide to certain predetermined questions that had to be denied. In the External Denial-Experimenter condition, instead of a confederate, the same answers to a fixed set of questions were denied by the experimenter. In the Honest group, participants were instructed to give answers to questions they were absolutely sure about without guessing (Appendix B).

One day later, participants were provided with a source memory test. The test contained 15 questions including (1) 5 true event questions that were asked the day before, (2) 4 true event questions which had not been previously asked, (3) 3 false event questions that we already asked the previous day, and (4) 3 new false event questions. During the source memory test, participants were asked two closed (i.e., yes/no) questions in chronological order about their recollection of the interview (interview questions) and video (video questions). Following this, they were instructed to complete memory and belief ratings once again. Finally, participants were debriefed about the purpose of the experiment.

Results

Baseline Scores

Univariate ANOVAs were conducted on the mean belief and memory scores. No statistical Condition effect emerged for the belief ($F(3, 96) = 1.09$, $p = .36$, $\eta^2_{partial} = .03$) and memory scores ($F(3, 96) = 0.26$, $p = .85$, $\eta^2_{partial} = .01$). This shows that before the denial manipulation, the groups did not statistically vary in terms of belief and memory.

False Denials

For the analysis examining the DIF effect, we first concentrated on the interview questions (true and false). As expected, we again found evidence for our DIF effect (see Figure

2; $F(3, 96) = 8.01$, $p < .001$, $\eta^2_{partial} = .20$). Our Bayesian analysis detected strong evidence for our DIF effect ($BF(10) = 303.33$). The effect was mainly the result of participants in the False Denial group denying that they talked about false details while in fact they did ($F(3, 96) = 6.92$, $p < .001$, $\eta^2_{partial} = .18$). Also, we found, as predicted, that the DIF effect only appeared for details concerning the interview but was absent for the recollections of the video ($F(3, 96) = 2.10$, $p = .11$, $\eta^2_{partial} = .06$).

Nonbelieved Memories

We were also interested in whether our external denial groups might have led to increased nonbelieved memory rates. For nonbelieved true memories (mean total), we indeed found support for this prediction. That is, we found a statistically significant Condition effect ($F(3, 96) = 3.25$, $p = .03$, $\eta^2_{partial} = .09$) with post-hoc Bonferroni correction revealing that the participants who received external denials from the experimenter ($M = 0.44$, CI [.12; .76]) had statistically higher nonbelieved memory rates than the honest group ($M = 0.04$, CI [-.04; .12], $p = .02$). The other groups did not statistically differ from each other (False Denial: $M = 0.20$, CI [.03; .37]; External Denial-Confederate: $M = 0.13$, CI [-.01; .27]; all ps > .05). This effect aligned with our result showing that the External Denial-Experimenter group ($M = 6.43$, $SD = 1.35$) remembered statistically fewer details from the video than the Internal Denial group ($M = 7.48$, $SD = 1.58$; $F(3, 96) = 3.32$, $p = .02$, $\eta^2_{partial} = .09$). For the nonbelieved false memories (mean total), however, no Condition effect emerged ($F(3, 96) = 0.64$, $p = .59$, $\eta^2_{partial} = .02$).

We also conducted chi-square analyses on the frequency of nonbelieved true and false memories. For nonbelieved true memories, we did find a statistically significant condition effect ($\chi^2(9) = 18.57$, $p = .03$, Cramer's $V = .25$) showing a higher frequency of nonbelieved memories ($n = 11$) in the External Denial-experimenter group compared to the External Denial-confederate

(n = 3), false denial (n = 5), and honest group (n = 1). For the nonbelieved false memories, no statistical effect emerged (p = .29).[3]

Discussion

In Experiment 2, we found that the DIF effect emerges only when people falsely deny items themselves. Another interesting result was that when the experimenter falsely denied that certain details were present, participants' beliefs were undermined leading to increased rates of nonbelieved memories. This finding dovetails nicely with recent work showing that people relinquish belief when they are exposed to social feedback (e.g., Scoboria et al., 2014).

General Discussion

Our two experiments lend further support for the existence of the DIF effect. In two experiments, we found that (1) the DIF effect is present when using pictorial (Experiment 1) and video (Experiment 2) stimuli, (2) false denials only led to impaired memory for the interview while leaving memory for the event itself unaffected, and (3) although false denials undermine memory, external denials seem to decrease the belief in the occurrence of events. We now unpack each of these findings.

That the DIF effect is detected when using different types of stimuli provides substantial proof for the robustness of the effect. Put simply, when participants had to deny that certain details were present in pictures or a video this made them more likely to falsely deny that they talked about these details with the experimenter the following day. Therefore, it would appear that false denials lead to higher forgetting rates. There is some related research by Vieira and Lane (2013) who also used pictures. Although Vieira and Lane found that false denials impaired memory performance as well, they only found that false denials negatively affected the retrieval of the pictures.

As expected, we found some support for the prediction that external denials reduced the belief in the occurrence of events thereby increasing nonbelieved memory rates (i.e., memories of events of which the belief in the occurrence of those events is relinquished). In Experiment 2, we found that external denials enhanced the formation of nonbelieved memories. Our prediction was based on recent work on autobiographical belief and recollection showing that social feedback, such as external denials, is one of the most important factors for generating nonbelieved memories (Otgaar et al., 2014; Scoboria et al., 2014). Thus, it seems that when participants are told by others (i.e., experimenter) that their memory is incorrect, they sometimes choose to relinquish belief but maintain a recollection of that event.

However, in Experiment 2, we found that this increase in nonbelieved memory rates only arose when external denials were presented by an experimenter and not by a confederate. Although this might be seen to run counter to the idea that social feedback catalyzes nonbelieved memory rates, a plausible explanation could be that the confederate (i.e., a student) was not regarded as being as trustworthy as the experimenter. In order to reduce belief, participants should regard the external denials as coming from someone who has more knowledge and authority about the experiment than themselves (Festinger, 1957; Wright et al., 2009). Thus, it is likely that the experimenter was judged to have more authority than the confederate leading to our observed nonbelieved memory findings. In Experiment 2, we also found that the participants in the external denial-experimenter group remembered the fewest details from the video. This suggests that nonbelieved memories might be related to omission errors in which people remember an event but withhold reporting it (Otgaar, Candel, Smeets, & Merckelbach, 2010).

Of course, besides forgetting mechanisms, the DIF effect might also be caused by other factors. For example, it might be the case that the instruction to deny could lead to a lower

confidence in the memory of the interview and the stimuli and this would lead to a failure to report. Although it would be interesting to include confidence ratings in future research, this explanation cannot fully account for the fact that we only found our denial manipulation to target the 'memory' of the interview and not the interview. Another explanation could be that participants complied with the instruction at the first session and continued to withhold statements. However, in previous research (Otgaar et al., 2014), at the second session, another experimenter interviewed participants in an attempt to reduce compliance effects. Despite this, the DIF effect still emerged.

Another alternative explanation for our DIF effect is that it is caused by a lack of processing. Specifically, one might argue that when participants received the instruction to deny, they could simply follow this rule without processing the exact details. This lack of processing might lead to impoverished memory for the interview. However, several aspects of the data speak against this idea. If this assertion is true then this lack of processing would also decrease memory for details that were only mentioned during the second session. Specifically, because lack of processing leads to impoverished memories for the interview, then participants would not know exactly which details were mentioned during the first session and would deny newly-mentioned details during the second session as well. We explored this issue and found that false denial rates were statistically higher for details that were mentioned during sessions 1 and 2 than for newly-mentioned details during session 2 ($F(1,96), = 4.56$, $p = .04$, $\eta^2_{partial} = .05$; Experiment 2). This suggests that our denial instruction did lead to sufficient processing of details.

Practical Application

Our results also have some legal implications. It is not uncommon that victims of sexual abuse are repeatedly interviewed. Some of these victims have been forced by the perpetrator to

deny being abused (Goodman-Brown, Edelstein, Goodman, Jones, & Gordon, 2003). Our experiments show that such false denials can have unwanted side-effects. That is, if such victims are interviewed on a second occasion they might not specifically remember what they stated on the first occasion, thereby coming up with inconsistent statements. Such inconsistent statements are often regarded as a sign of low reliability (e.g., Smeets, Candel, & Merckelbach, 2004), something that might fuel the idea that the victim is lying. This suggests that such false denials are not a good strategy to use in an interview setting and that it might be better to come forward and be upfront with everything that happened from the very beginning.

Conclusion

To recap, the present experiments found convincing evidence that having participants falsely deny parts of experiences leads those participants to forget that they talked about those details with the experimenter. This DIF effect was shown for both pictures and videos. Furthermore, we found that when social feedback was presented in the form of external denials by the experimenter, nonbelieved memory rates increased. Thus, different types of denial seem to have differential effects on belief and recollection in such a way that false denials undermine memory, but external denials undermine belief.

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Footnotes

[1] We used negative and neutral pictures for exploratory reasons. As we did not have any specific predictions concerning the use of these different pictures and because they did not affect DIF, they are not discussed further.

[2] One might argue that our DIF effect is caused by participants' lack of motivation to talk about the denial. If this is correct, then false denial rates between true and false denials would not statistically differ from each other. An exploratory 3(Condition: False Denial, External Denial, Honest) x 2 (Emotion: Negative vs. neutral) x (Detail: True vs. false) repeated measures ANOVA was conducted on the mean total false denial rates for the interview questions. We found that false denial rates between true and false details did statistically differ ($F(1, 83) = 6.94$, $p = .01$, $\eta^2_{partial} = .08$) with higher false denial rates for the true ($M = .37$) than false details ($M = .28$). This result suggests that lack of motivation is unlikely to explain our DIF effect.

[3] We have also looked at highly conservative NBMs in Experiments 1 and 2 with a belief score of 3 and lower and a memory score of 6 and higher. The number of these highly conservative NBMs was low. In Experiment 1,we found 4 NBMs that met this criterion and in Experiment 2, we found 11 NBMs.

Figure Captions

Figure 1. *False denial rates (mean total) as a function of Condition (error bars represent confidence intervals; Experiment 1)*

Figure 2. *False denial rates (mean total) as a function of Condition (error bars represent confidence intervals; Experiment 2; External Denial-E = External Denial-Experimenter, External Denial-C = External Denial-Confederate)*

Figure 1

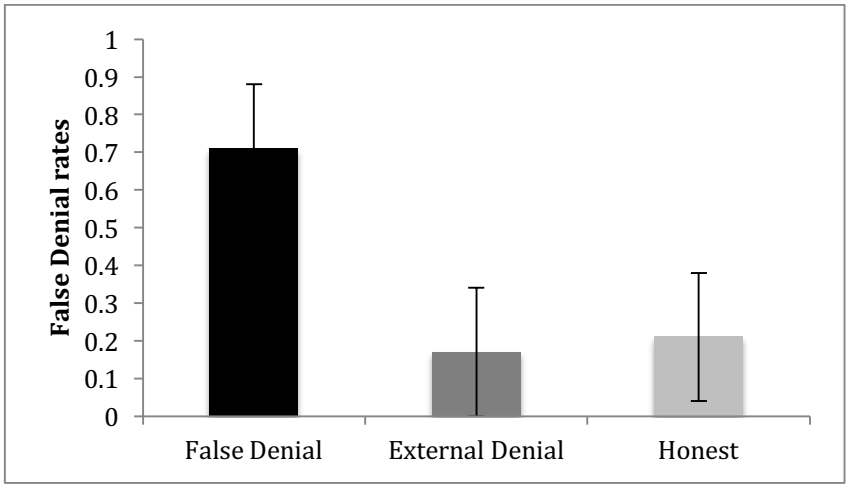
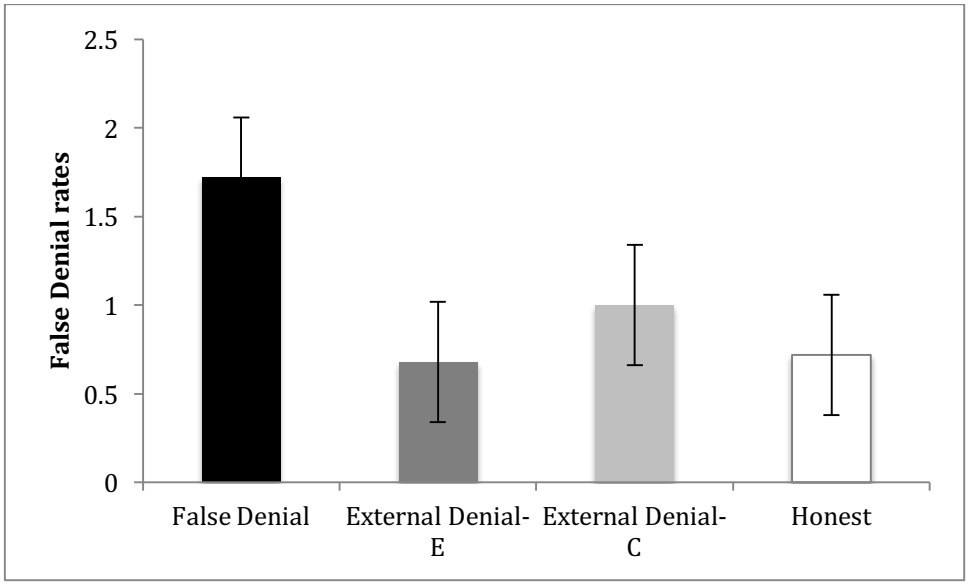

False Denial rates
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
False Denial
External Denial
Honest

Figure 2


False Denial rates
2.5
2
1.5
1
0.5
0
False Denial
External Denial-E
External Denial-C
Honest

Appendix A

Denial instructions provided to the different groups (Session 1)

Experiment 1:

False denial: "At the start of this study, you saw some pictures. I am now going to ask you some questions about the pictures. I want to ask you that you should deny in response to each question. So, for example, if I ask: "Did the giraffe have a long tongue?" then you should say: "No, the giraffe did not have a long tongue". Is everything clear?"

External denial: "At the start of this study, you saw some pictures. I am now going to ask you some questions about the pictures and I will sometimes provide you with feedback. So, if I ask: "Did the giraffe have a long tongue?" while this was not presented on the pictures, but you say: "Yes", then I will tell you and say the following: "This was presented on the pictures, think about for tomorrow". Is everything clear?"

Honest: "At the start of this study, you saw some pictures. I am now going to ask you some questions about the pictures. I want to ask you that you should only answer if you really know the answer. Do not guess. If you do not know the answer, you can just say that. Is everything clear?"

Experiment 2:

False denial: "You just saw a video. I am now going to ask you some questions. I want to ask you that you should deny in response to each question. So, for example, if I ask: "What did the man steal?" then you should say: "The man did not steal anything". Is everything clear?"

External denial-experimenter: "You just saw a video. I am now going to ask you some questions and I will sometimes provide you with feedback. Is everything clear?"

External denial-confederate: "You saw a video. I am now going to ask both of you some. Is everything clear?"

Honest: "You saw a video. I am now going to ask you some questions. I want to ask you that you should only answer if you really know the answer. Do not guess. If you do not know the answer, you can just say that. Is everything clear?"