Received: 6 June 2022 | Accepted: 11 July 2022
DOI: 10.1002/acp.3986

REGISTERED REPORT STAGE 2

WILEY

Registered report: The effects of incentivized lies on memory

Paul Riesthuis[1,2] | **Henry Otgaar**[1,2] | **Lorraine Hope**[3] | **Ivan Mangiulli**[1,4]

[1]Leuven Institute of Criminology, Catholic University of Leuven, Leuven, Belgium
[2]Forensic Psychology, Faculty of Psychology and Neuroscience, Maastricht University, Maastricht, The Netherlands
[3]Department of Psychology, University of Portsmouth, Portsmouth, UK
[4]Department of Education, Psychology, Communication, University of Bari, Bari, Italy

Correspondence
Paul Riesthuis, Leuven Institute of Criminology, Catholic University of Leuven, Oude Markt 13, 3000, Leuven, Belgium.
Email: paul.riesthuis@kuleuven.be

Funding information
Fonds Wetenschappelijk Onderzoek, Grant/Award Number: g0d3621n; Onderzoeksraad, KU Leuven, Grant/Award Number: zkd5384

Abstract

In the current experiment, we examined the effects of self-generated deceptive behavior on memory. Participants ($n = 230$) were randomly assigned to a "strong-incentive to cheat" or "weak-incentive to cheat" condition and played the adapted Sequential Dyadic Die-Rolling paradigm. Participants in the "strong-incentive to cheat" condition were incentivized to lie to avoid a financial penalty (i.e., punishment). Participants in the "weak-incentive to cheat" could also choose to lie but the outcome was a prosocial one (i.e., benefit for unknown co-participant). Two-days later, memory for the die-rolling event was assessed. A similar number of participants lied to avoid punishment as for pro-social reasons. Interestingly, we did not find evidence for unethical amnesia. However, participants who engaged in deceptive behavior, irrespective of their motives, produced more memory errors than honest participants. Although our results suggest that engaging in deceptive behavior does not lead to motivated forgetting, it can lead to memory errors.

KEYWORDS
deception, lying, memory, unethical amnesia

1 | INTRODUCTION

Avoiding punishment is one of the reasons why people lie in investigations and, ultimately, in the courtroom. But what happens to memory for events that have been lied about when the purpose of the lie is to avoid punishment? Take for instance the case of Alfred Dewayne Brown (Innocence Project, 2020). Brown was arrested for a store robbery during which a cashier and police officer were killed. Two accomplices, named Dashan Glaspie and Elijah Joubert, claimed that Brown was the shooter (Possley, 2015). In exchange for his testimony, Glaspie avoided the death penalty and received a 30-year prison sentence. Additionally, Brown's girlfriend, Ericka Dockery, testified that Brown confessed to the crime while under the threat of losing custody of her children. Even though shortly after the conviction Joubert and Dockery recanted their statements and admitted that these were false testimonies, new evidence was necessary to exonerate Brown. The recanted statements were deemed unreliable (Innocence project, 2020; Possley, 2015). A crucial question underpinning cases such as the one described here is whether memories about an experienced event become adversely affected after having lied about it? More specifically, does engaging in deceptive behaviors to avoid punishment lead to memory impairing effects? This question was the focus of the current experiment.

1.1 | Forced confabulation and memory

Empirical research in the memory and deception domain suggests that lying can have adverse effects on memory (Otgaar & Baker, 2018). In this experiment, we specifically examined the effects of confabulations on memory. One method to study the effects of confabulations on memory, developed by Ackil and Zaragoza (1998), is the forced confabulation paradigm. In this paradigm participants watch a short video about a boy's experience in a summer camp and are later interviewed about details in the video. A crucial element of this interview is that participants are additionally questioned about details that never occurred in the video. Before the interview, participants are divided into two groups: the forced confabulation and control group. The forced confabulation group is required to answer all questions and guess when uncertain, while the control group is instructed to answer only when certain and to avoid guessing. After a 1-week delay, participants' memory for the video event is examined using a source-monitoring test. Previous research using the forced confabulation paradigm has consistently shown that participants formed false memories for their confabulations (Ackil & Zaragoza, 1998, 2011; Chrobak & Zaragoza, 2008, 2013; Drivdahl & Zaragoza, 2001; Hanba & Zaragoza, 2007; Otgaar et al., 2014; Pezdek et al., 2007, 2009; Zaragoza et al., 2001).

Numerous studies have examined variables that can inflate the forced confabulation effect (Hanba & Zaragoza, 2007; Pezdek et al., 2007, 2009; Zaragoza et al., 2001). One such variable that has been examined is confirmatory interviewer feedback. In studies using this type of feedback (Hanba & Zaragoza, 2007; Zaragoza et al., 2001), participants followed similar steps as in the forced confabulation paradigm. However, the forced confabulation group additionally received confirmatory interviewer feedback (e.g., "That's right, _____ is the correct answer") or neutral interviewer feedback (e.g., "____, O.K.") expressed in a monotone voice for the details that did not occur in the video. Confirmatory interviewer feedback not only led to false memories for confabulated items after a one-week delay, but also increased the participants' persistence and confidence in their false memories (Hanba & Zaragoza, 2007; Zaragoza et al., 2001). This finding suggests that social-motivational factors can enhance the forced confabulation effect.

Another variable that impacts the forced confabulation effect is whether the confabulation is forced or voluntary (Pezdek et al., 2007, 2009). To examine this issue, Pezdek and colleagues had participants watch a video of a car-jacking and then gave them 16 answerable and six unanswerable questions about the video. All participants received instructions to answer all questions. However, half of the participants had the option to indicate "I do not know" as a response. A week later, memory for the video was assessed through the same 22 questions but now all participants received the "I do not know" option. The forced confabulation effect was detected for participants who did not have the "I do not know" option available in the initial test. Interestingly, participants who spontaneously confabulated a response for unanswerable questions when the "I do not know" option was available were more likely to repeat that answer at the second memory test relative to participants who were forced to confabulate during the first memory test. This effect increased when participants were questioned and forced to fabricate multiple times about details in the video (Pezdek et al., 2007). These findings suggest that when participants voluntarily self-generate an answer to unanswerable questions, they are more likely to produce persisting false memories than when the responses are forced (Pezdek et al., 2007, 2009). That is, if people voluntarily self-generate misinformation, it is more likely that this misinformation will be incorporated into memory in comparison to people who are forced to self-generate misinformation. Taken together, the social-motivational role of confirmatory interviewer feedback and whether misinformation was voluntarily self-generated seem to increase the effect of confabulation on memory (Hanba & Zaragoza, 2007; Pezdek et al., 2007, 2009; Zaragoza et al., 2001).

1.2 | Self-generated deceptive behavior and memory

In a recent study, a different approach was used to examine the effects of confabulations on memory (Kouchaki & Gino, 2016). Specifically, in this study, the authors examined the memory impairing effects caused by self-generated deceptive behavior for monetary rewards. In their experiment, participants played a die-rolling game wherein they threw a die 20 times. Each die roll counted for points, which later was converted into money. Higher die rolls led to increased earnings for the participant. Before each die roll, participants had to indicate whether they wanted the top side (visible) or down side (invisible) to count. That is, if a participant chose the down side of the die roll to count and then threw the number "3," he/she received 4 points because the number "4" was on the down side of the die. If the participant chose the top side of the die roll to count and then threw the number "3," he/she received 3 points. Critically, half of the participants had to explicitly report which side they wanted to count before throwing the die (no-cheating condition), while the other half of participants could decide it mentally (likely-cheating condition) and were permitted to keep this decision to themselves. After a two-day delay, participants were asked to think back to the die-rolling task and completed the Autobiographical Memory Questionnaire (AMQ) via a 7-point Likert scale (1 = *strongly agree*, 7 = *strongly disagree*; AMQ; Rubin et al., 2003). The AMQ measures recollection and belief for autobiographical memories via questions assessing visual imagery, auditory imagery, emotions, and exact knowledge regarding the memory (e.g., "as I think about the task, I can actually remember it"). Kouchaki and Gino (2016) found that participants in the likely-cheating condition scored lower on the AMQ for the die-rolling task compared with participants in the no-cheating condition. This effect has been termed *unethical amnesia*. *Unethical amnesia* specifically refers to situations in which engaging in deceptive behavior leads to lower recollection and belief of an experienced event (Kouchaki & Gino, 2016; but see also Stanley et al., 2018). However, memory accuracy for the die rolling game itself was not examined. In the current experiment, we examined the effects of *unethical amnesia* in an adapted paradigm. Additionally, we assessed whether engaging in deceptive behaviors affects the memory for the event itself.

One possible underlying mechanism of *unethical amnesia* is motivated forgetting (Anderson & Hanslmayr, 2014). Motivated forgetting essentially refers to an active attempt to forget unwanted experiences, such as behaving inappropriately (e.g., cheating on an exam). Research demonstrated that instructing participants during encoding to forget items, compared to instructions to remember, can lead to forgetting of the to-be-forgotten items (MacLeod, 1998). This type of forgetting is termed directed forgetting. Similar forgetting effects have also been reported when participants are instructed to forget items at retrieval (Anderson & Green, 2001). Taken together, these findings suggest that deliberately forgetting specific experiences can lead to memory impairing effects.

With respect to motivated forgetting, when a person's behavior does not align with their perceived self-image (e.g., as an honest person), it can lead to an individual actively forgetting their past behavior, resulting in similar memory undermining effects as directed forgetting (Anderson & Hanslmayr, 2014; Kouchaki & Gino, 2016). Take for instance the hypothetical case of Elsa. Elsa is an honest student who, however, has cheated on an exam to get a higher grade. This dishonest behavior threatens her moral self-image which motivates her to actively forget the dishonest behavior. When Elsa actively tries to forget her dishonest behavior, the memory for it fades, although the memory for unrelated ethical details such as the content of the exam will not. Hence, the idea of motivated forgetting is that actively trying to forget past dishonest behavior leads to memory undermining effects for the dishonest act. However, the memory for details unrelated to their ethical behavior might remain intact (Anderson & Hanslmayr, 2014; Kouchaki & Gino, 2016; Shu et al., 2011).

1.3 | The current experiment

The primary goal of our experiment was to examine whether voluntary self-generated deceptive behavior, motivated by punishment avoidance, has contaminating effects on memory. Hence, our aim was to replicate the results of Kouchaki and Gino (2016) where recollection and belief for the die rolling event was lower for the participants who engaged in deceptive behaviors compared to participants who did not. To study the adverse effects of deceptive behavior on memory, participants played an adapted version of the Sequential Dyadic Die-Rolling paradigm (Weisel & Shalvi, 2015). Usually in this paradigm, participant A (computer in our experiment although participants think it is another participant) anonymously rolls a die and then reports the corresponding number to participant B (actual participant). After participant B receives the reported die roll, participant B anonymously rolls a die and then reports the outcome to participant A. A standard finding is the disproportional high numbers of identical reports when rewarding outcomes that were aligned (e.g., if both reported number 5, both received 5 euros; Weisel & Shalvi, 2015; Wouda et al., 2017). This result is in line with other literature showing that a negative aspect of collaboration is an increased tendency toward dishonest behavior (Conrads et al., 2013; Kocher et al., 2018; Wouda et al., 2017). In the present experiment, we adapted the Sequential Dyadic Die-Rolling paradigm for two reasons. First, in our adapted version, participants were not able to earn monetary rewards but could avoid monetary deductions when engaging in collaborative deceptive behavior. This modification of the Sequential Dyadic Die-Rolling paradigm reflected more accurately the incentives suspects or eyewitnesses have in the courtroom to lie, which is to avoid punishment or negative consequences. Additionally, it has been demonstrated that avoiding a loss produces a stronger incentive to behave dishonestly than gaining rewards (Schindler & Pfattheicher, 2017). Second, the adapted version allowed us to observe what the participants actually threw in the die roll and what was reported at an individual level. Having this behavioral ground truth enabled us to examine the effects of lying on the memory accuracy for the event instead of solely the memory experience, as was the case in the studies on unethical amnesia (Kouchaki & Gino, 2016).

Specifically, to examine the effects of self-generated deceptive behavior, driven by punishment avoidance, on memory, we randomly assigned participants to either a “strong-incentive to cheat” condition or the “weak-incentive to cheat” condition. Participants in both conditions received five euros in their “bank” at the start of the experiment. In the “strong-incentive to cheat” condition, participants were punished through monetary deductions if the reported numbers were not equivalent (i.e., aligned outcomes). In the “weak-incentive to cheat” condition participants were instructed to throw, remember, and report the die roll outcome and were told that only the other participant received one point if their reported numbers were equivalent. After a two-day delay, we examined participants' memory experience for the die rolling event via the AMQ (Rubin et al., 2003). Additionally, we assessed the amount of memory errors using a specific die roll memory questionnaire (i.e., “how many times did you throw/report each number?”; “what was the color of the thrown/reported die?”; see Appendix B). According to the notion of motivated forgetting, behaving dishonestly can cause people to actively try to forget that behavior, leading to impoverished memory for such act (Anderson & Hanslmayr, 2014). Hence, we predicted that participants in the “strong-incentive to cheat” condition would have lower recollection and belief for the die rolling event and perform worse on the specific die roll memory accuracy questions. That is, we expected to replicate the unethical amnesia effect and predicted to observe higher incorrect recall of thrown and reported die rolls.

2 | HYPOTHESES

1. We predicted that participants in the “strong-incentive to cheat” condition would have lower recollection and belief scores for the die-rolling task on the AMQ (Rubin et al., 2003) as compared with participants in the “weak-incentive to cheat” condition.
2. Additionally, we predicted that the magnitude of the errors on the specific die roll memory accuracy questions would be greater for the “strong-incentive to cheat” condition as compared with the “weak-incentive to cheat” condition. The magnitude of errors was defined by the difference between the amount of times a participant actually threw/reported a number and the amount they remembered having thrown/reported a number.

3 | PILOT STUDY

In a pilot study, we examined whether our manipulation (i.e., punishment avoidance) led to more cheating for participants in the "strong-incentive to cheat" condition than participants in the "weak-incentive to cheat" condition in the adapted Sequential Dyadic Die-Rolling paradigm. We also examined the effectiveness of our procedure through participants' self-reported experiences. We expected that more participants in the "strong-incentive to cheat" condition would lie and would do so more frequently than participants in the "weak-incentive to cheat" condition.

4 | METHOD

4.1 | Participants, materials, design, and procedure

For the pilot study, we recruited 50 participants (M_{age} = 41.1, *SD* = 12.9, range: 23–70; 26 males) via Amazon Mechanical Turk (MTurk). The pilot study was a one-session study and took on average 16.3 min (*SD* = 6.2 min). All participants were rewarded with five dollars for their participation, regardless of their performance on the adapted Sequential Dyadic Die-Rolling paradigm. None of the participants failed the attention checks (i.e., "What did Jamie_1789 throw"). The experiment was conducted online via Qualtrics. Data are available on the Open Science Framework (OSF; https://osf.io/u2nhv/).

Participants took part in the adapted Sequential Dyadic Die-Rolling paradigm (see Materials for Current Experiment) and completed Part 1 (see Procedure for Current Experiment). Qualtrics randomly assigned participants to either the "strong-incentive to cheat" condition (*n* = 24) or the "weak-incentive to cheat" condition (*n* = 26). After completing the adapted Sequential Dyadic Die-Roll paradigm, participants were asked to rate their agreement/disagreement on a 7-point Likert scale (1 = *strongly agree*, 7 = *strongly disagree*) for the following five statements: (i) whether participants agreed that their die roll was completely anonymous—only they could know what they rolled; (ii) whether they agreed that they played with another participant; (iii) whether they thought the die roll was fair (completely random, like a real die); (iv) whether they suspected that the researchers would check whether they cheated during the die roll game; and lastly (v) whether they cheated in the die rolling game (Appendix C).

The number of lies told was calculated by examining the number of times participants' die roll reports were different from what they actually threw and whether their report was the required number to avoid monetary deduction (i.e., "strong-incentive to cheat" condition) or to give the other participant (i.e., Jamie_1789) one point (i.e., "weak-incentive to cheat" condition). A participant was classified as a liar when they lied at least once.

5 | RESULTS AND DISCUSSION

The aim of the pilot study was to examine whether participants would engage in deceptive behavior to avoid punishment. Our findings showed that, overall, 41.6% (10/24) of participants in the "strong-incentive to cheat" condition lied to avoid punishment. In total, participants in the "strong-incentive to cheat" condition lied 120 times. In contrast, 27% percent (7/26) of participants in the "weak-incentive to cheat" condition lied to give the other participant (i.e., computer) a point. In the "weak-incentive to cheat" condition participants lied 68 times in total.

We also examined the effectiveness of our manipulation through participants' self-reports. Overall, participants agreed that their die roll was completely anonymous – only they knew what they rolled (62%; 31/50) (*M* = 3.10, *SD* = 1.98). Also, 88% (44/50) of participants agreed that the die was fair (completely random, like a real die; *M* = 2.18, *SD* = 1.21). Ninety percent (45/50) of participants agreed that they played with another participant (*M* = 1.86, *SD* = 1.29). Participants were divided as to whether researchers were going to check if they cheated in the die roll game: 44% (22/50) agreed, 24% (12/50) neither agreed nor disagreed, and 32% disagreed (*M* = 3.92, *SD* = 1.95). Finally, we found that 56.3% (9/16) of participants admitted that they engaged in deceptive behavior when they cheated (*M* = 5.68, *SD* = 2.08).

Taken together these results suggest that our manipulation was successful in that avoiding punishment can lead to higher rates of deceptive behavior. However, there were participants in the "strong-incentive to cheat" condition who remained honest even if they were punished. A possible explanation for participants remaining honest is that a considerable number of participants were aware that their die rolls were going to be checked. Hence, it is possible that this awareness made participants behave in a more socially desirable manner, reducing the amount of cheating observed in the "strong-incentive to cheat" condition. As an exploratory aim of the current experiment, we examined whether in the main experiment, such honest participants were present as well in the "strong-incentive to cheat" condition. We used these honest participants in the "strong-incentive to cheat" condition as an additional control condition. Specifically, we examined the adverse memory effects between participants in the "strong-incentive to cheat" condition that engaged in deceptive behavior and those who did not. Finally, we conducted exploratory analyses to examine whether cheating for selfish reasons (e.g., avoiding punishment) impacts memory differently as compared with cheating for prosocial reasons (e.g., giving the other participant one point without any personal benefit).

6 | MAIN EXPERIMENT

6.1 | Method

6.1.1 | Participants

A Bayes Factor Design Analysis (BFDA; Schindler & Pfattheicher, 2017; Schönbrodt & Stefan, 2018) for a directional Bayesian t-test was performed to determine the sample size. We aimed for compelling strength of evidence of 6. That is, our BFDA fixed-N design was based on a $BF_{10} = 6$ meaning that we based our sample size calculation on whether we could obtain substantial evidence that the alternative hypothesis was six times more in favor than the null hypothesis, if there is indeed an effect. We decided to use a $BF_{10} = 6$ to detect, at the least, solid moderate evidence in favor of the alternative hypothesis (Lee &

Wagenmakers, 2014; Schönbrodt & Wagenmakers, 2018). We used a cautionary expected effect size (Cohen's $d = 0.5$) based on the study by Kouchaki and Gino (2016) where they found an effect size Cohen's $d = 0.57$. With a probability of 0.90 and a default Cauchy $\sqrt{2}/2$ prior distribution for the alternative hypothesis, the BFDA indicated that we required a total sample size of 238 participants.[1] In total, 334 participants participated in Part 1 of our study. Of those 334 participants, 243 participants returned for Part 2. Thirteen participants were excluded because they failed four or more attention checks. None of the participants identified the true aim of the study. Hence, data of 230 participants were used for the data analysis. Participants received a monetary reward in the form of a voucher. All participants received the same monetary reward irrespective of their performance in the Sequential Dyadic Die-Rolling paradigm (max = 7 euro), even though they were informed that their monetary reward was based on their performance. Participants were recruited from KU Leuven via flyers, advertisements, and the SONA System.

The experiment was approved by the Social and Societal Ethics Committee from KU Leuven (G-2020-2151-R2[MAR]). The current experiment was a registered report that received In-Principle Acceptance at Applied Cognitive Psychology (Riesthuis, P., Otgaar, H., de Cort, A., Bogaard, A., & Mangiulli, I. (2022). Creating a false alibi leads to errors of commission and omission. Applied Cognitive Psychology.10.1002/acp.3838) Also, the materials and data are available on the OSF (https://osf.io/r7t35/).

6.1.2 | Materials

Sequential Dyadic Die-Rolling Paradigm (adapted)

The sequential dyadic die-rolling paradigm (Weisel & Shalvi, 2015) was adapted for the current experiment and was focused on the aligned outcomes condition. The adapted paradigm for the "strong-incentive to cheat" condition went as follows: Player A (i.e., computer) threw a die and reported it to Player B (actual participant). However, participants were told that they were playing the die rolling game with another participant. To ascertain that participants in both conditions were attentive to the task, hence remembering the reported die roll, they received a follow-up question about the reported number of Player A. Then Player B threw the die anonymously, remembered the outcome, and reported it back to Player A. This procedure was repeated 20 times. At the start of the experiment, participants in both conditions started with five euros each in their "bank". If participants reported the same number as Player A, there were no deductions from the five euros in the "bank". If they did not report the same number as Player A, 25 cents was deducted (20 x 0.25 = 5 euro; see Figure 1). Participants in the "weak-incentive to cheat" condition were informed that they had to throw the die, remember the outcome, and report it to Player A. To make the adapted paradigm also a game for participants in the "weak-incentive to cheat" condition, they were informed that if they reported the same number as Player A, then only Player A received 1 point. If they did not report the same number as Player A, then Player A received 0 points. This experiment was conducted online via Qualtrics permitting us to establish the ground truth of the actually thrown and reported die rolls by the participants. Using JavaScript, we created a die roll game in Qualtrics through which we could track what the participants actually threw and reported.

Autobiographical Memory Questionnaire

After a two-day delay, participants received six questions of the AMQ (Rubin et al., 2003; Kouchaki & Gino, 2016; see Appendix A). The AMQ measures recollection and belief in autobiographical memories via questions assessing visual imagery, auditory imagery, emotions,

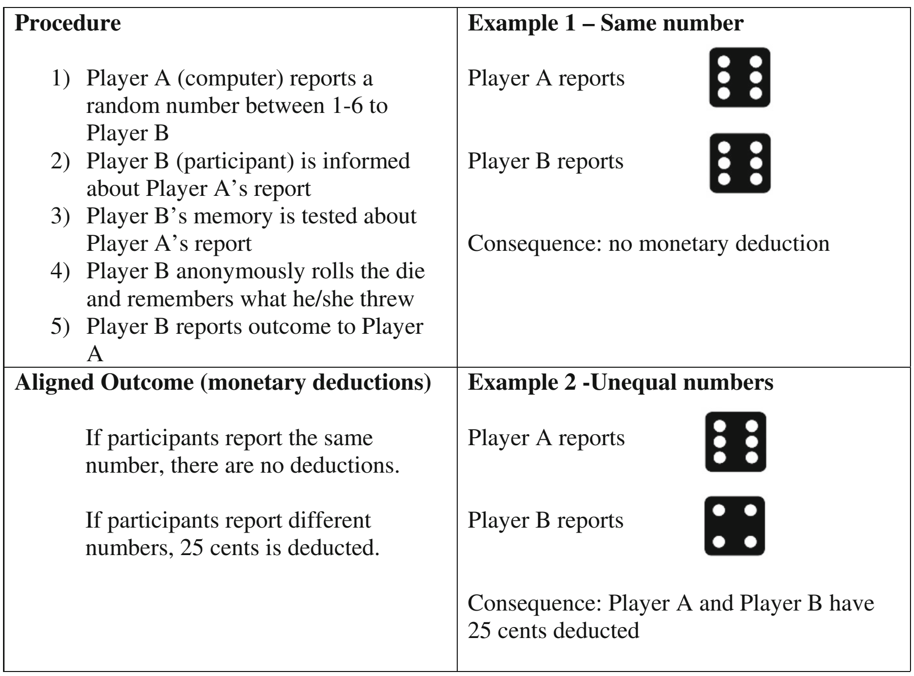

FIGURE 1 Procedure of the experiment

and exact knowledge regarding the memory. The questions (e.g., "As I think about the task, I can actually remember it") were rated on a 7-point Likert scale (1 = *strongly agree*, 7 = *strongly disagree*).

Specific Die Roll Memory Questionnaire

Along with the AMQ, the participants had to answer two estimation questions assessing the participants' memory for the die rolls (i.e., "how many times did you throw/report each number?"). Additionally, participants' memory for the color of the die when throwing and reporting the die rolls was tested (i.e., "what was the color of the thrown die?"; see Appendix B).

6.1.3 | Design and procedure

This experiment used a between subjects design with two conditions: "strong-incentive to cheat" ($n = 114$) versus "weak-incentive to cheat" ($n = 116$). The dependent variables were the 7-point Likert scale scores on the six questions of the AMQ and the amount of errors on the specific die roll memory accuracy questions. Participants were randomly assigned to either one or the other condition. The experiment was designed via Qualtrics and performed online. The experiment consisted of two parts. Part 1 was the adapted Sequential Dyadic Die-Rolling Paradigm. Part 2 took place after a two-day delay and consisted of two memory tests.

Before the experiment started, participants were requested to give their informed consent to participate in the study. All participants first answered some demographical questions and then checked whether the throwing die was fair (completely random, like a real die). To increase the feeling for participants that they were playing with another human being we asked them to enter a username. Moreover, they were told to wait until we connected them with another participant and after 15–30 s, participants were informed that they were going to play the die roll game with Jamie_1789 (i.e., computer). Then, Qualtrics randomly assigned them to either the "strong-incentive to cheat" or "weak-incentive to cheat" condition. Participants in the "strong-incentive to cheat" condition received the following instructions:

> You will play a die rolling game with Jamie_1789. Both you and Jamie_1789 have already received five euros to play the game – this money is in your "bank". The game is played as follows: Jamie_1789 will first anonymously roll a die and remember the number he/she threw. Jamie_1789 will report this number to you. Then you will be shown what Jamie_1789 reported. Subsequently, you will anonymously throw a die. You will have to remember what you threw. You will have to report this number. Jamie_1789 will be informed of your reported number. Performance on the die rolling task can lower the amount of money in your "bank" (see table below). If you report identical numbers, there will be no deductions of your five euros in the "bank"(for example, both Jamie_1789 and you reported the number 4). If you report a different number than Jamie_1789, then both of you will be deducted 25 cents of your already earned 5 euros. In total you will throw the die and report the number 20 times. We will start with 5 practice trials for you to understand the game. These practice trials have no consequences for your already earned 5 euros. After the practice trials the experiment will start. The die rolls are completely anonymous.

Participants in the "weak-incentive to cheat" condition received the following instructions:

> You will play a die rolling game with Jamie_1789. Both you and Jamie_1789 have already received five euros for participating in Part 1 of the experiment – this money is in your "bank". The game is played as follows: Jamie_1789 will first anonymously roll a die and remember the number he/she threw. Jamie_1789 will report this number to you. Then you will be shown what Jamie_1789 reported. Subsequently, you will throw anonymously a die. You will have to remember what you threw. You will have to report this number. Jamie_1789 will be informed of your reported number. Performance on the die rolling task can give Jamie_1789 points (see table below). If you report identical numbers, Jamie_1789 gets 1 point (for example, both you and Jamie_1789 reported the number 4). If you report a different number than Jamie_1789, then Jamie_1789 will receive 0 points. In total, you will throw the die and report the number 20 times. We will start with 5 practice trials for you to understand the game. These practice trials do not count yet for points. After the practice trials the experiment will start. The die rolls are completely anonymous."

Afterwards, participants were informed that they would receive a link after 48 h wherein they had to complete Part 2 of the experiment. Qualtrics automatically sent out the links after 48 h. Participants were informed that if they did not respond within 24 h of receiving the link, they were unable to take part in Part 2 of the study. To ensure that participants completed both parts of the study, participants were told that they would receive payment on completion of Part 2.

Part 2 took place 48 h after completion of Part 1. The second part of the experiment was also conducted online. Part 2 consisted of the six questions from the AMQ and four specific die roll memory questions. Participants were informed that for each specific die rolling memory question, they earned 50 cents for each correct answer. For the estimation questions, participants were told that they threw the die in total 20 times and their accuracy was based on how well they remembered the distribution of these 20 die rolls and that there was an accepted margin of error of 20%. The accuracy rewards were included to stimulate participants' accuracy and to encourage the reporting of truthful responses from memory.[2] Hence, in total participants were able to earn seven euros for completing the experiment. Participants had to answer 10 questions about their memory for the die rolls during the game in Part 1. Lastly, we asked the participants a question regarding the intent of the study (i.e., "In your opinion, what was the aim of the study?"). Afterwards participants were thanked and debriefed.

6.1.4 | Scoring of specific die roll memory errors

For the analysis on memory errors for the specific die rolls, we used two estimation questions of the specific die rolling questions (i.e., how many times did you report/throw each number?). The answers to the estimation questions were compared to the ground truth of how many times participants actually threw and reported each number. As explained above, we could track the ground truth for the thrown and reported die rolls for each participant individually. To examine the magnitude of the specific die roll memory errors, we calculated the difference in memory for the thrown or reported die rolls compared to what they actually threw or reported. For instance, if a participant threw the number "6" *six* times but indicated on the memory test that they remembered throwing the number "6" only *one* time, this would be an error of greater magnitude than when a participant remembered throwing the number "6" five times. Hence, the difference between what was actually reported or thrown and what was indicated on the memory task was used as the indicator for the magnitude of an error. For instance, if a participant threw number "6" *four* times but indicated on the memory task that he/she threw the number "6" only *two* times, then this was scored as *two* memory errors. We also asked participants about the color of the thrown and reported die roll via multiple choice questions and incorrect answers were counted as 1 memory error each. Participants could have a maximum of 82 errors on the two estimation and color of the die questions.

6.1.5 | Exclusion criteria

Participants were excluded if they (i) did not respond to the memory task within 24 h of sending the link; (ii) made four or more errors on the practice trials (before experiment starts); (iii) failed to correctly answer 4 out of the 20 attention checks throughout the experiment (i.e., "What did Jamie_1789 throw?"); and (iv) identified the true aim of the study.

7 | RESULTS

7.1 | Manipulation check

Before conducting the main statistical analyses, we first examined how many participants cheated in each condition ("strong-incentive to cheat" versus "weak-incentive to cheat") and how many times they did so. In total, there were 114 participants in the "strong-incentive to cheat" condition and 116 participants in the "weak-incentive to cheat" condition. Our results showed that 38% of participants (43/114) in the "strong-incentive to cheat" condition cheated to avoid punishment. Participants in the "strong-incentive to cheat" condition lied in total 384 times and on average 8.9 times. Thirty-five percent (40/116) of participants in the "weak-incentive to cheat" condition lied for prosocial reasons. In total, participants in the "weak-incentive to cheat" condition lied 177 times and on average 4.4 times. Of the participants who engaged in deceptive behavior, the majority of them (47/83; 57%) lied less than four times.

7.2 | Confirmatory analyses

7.2.1 | Unethical amnesia

To examine whether we replicated the unethical amnesia effect (Kouchaki & Gino, 2016), we first assessed the internal consistency of the AMQ scores. The Cronbach's Alpha and McDonald's Omega for the six items on the AMQ were 0.83 and 0.84, respectively. Hence, to examine whether participants in the "strong-incentive to cheat" condition had lower belief and recollection scores on the AMQ as compared with participants in the "weak-incentive to cheat", we used the average score across all six questions as our dependent variable.[3]

A directional Bayesian *t*-test with a default Cauchy √2/2 prior distribution revealed strong evidence for the null hypothesis $BF_{01} = 12.4$ ($BF_{10} = .08$). In other words, the estimated Bayes factor suggested that the data are 12.4 times more likely under the null than alternative hypothesis, meaning that being in the "strong-incentive to cheat" condition does not lead to lower belief and recollection scores on the AMQ compared with being in the "weak-incentive to cheat". Furthermore, a Welch one-tailed independent sample t-test showed that participants in the "strong-incentive to cheat" condition did not have statistically significantly lower belief and recollection scores ($M = 5.64$, $SD = .93$) as compared with participants in the "weak-incentive to cheat" condition ($M = 5.53$, $SD = .92$), $t\ (227.8) = -0.91$, $p = .82$, Hedges $g' = -0.12$ 95, 95% CI [0.34, ∞].

7.2.2 | Specific die roll memory errors

We conducted a directional Bayesian *t*-test with a default Cauchy √2/2 prior distribution to examine whether participants in the "strong-incentive to cheat" (vs. "weak-incentive to cheat" condition) would have more errors on the specific die roll memory questions. Our results yielded weak evidence in favor of the null hypothesis $BF_{01} = 5.1$ ($BF_{10} = 0.19$). That is, our estimated Bayes factor indicated that our observed data are 5.1 times more likely to occur under the null (than alternative) hypothesis, meaning that being in the "strong-incentive to cheat" condition did not impact the amount of errors on the specific die roll memory questions as compared with being in the "weak-incentive to cheat" condition. A Welch one-tailed independent sample *t*-test showed that participants in the "strong-incentive to cheat" condition ($M = 19.00$, $SD = 6.74$) did not have statistically significantly more errors on the specific die roll memory questions than participants in the "weak-incentive to cheat" condition ($M = 18.70$, $SD = 6.11$), t (225.02) = 0.36, $p = .36$, Hedges $g' = 0.05$, 95% CI [−0.17, ∞].

7.3 | Exploratory analyses

The results of our pilot data and the current experiment showed that participants in both the "strong-incentive to cheat" ($n = 43/114$) and "weak-incentive to cheat" ($n = 40/116$) condition lied. Hence, in the exploratory analyses, we examined whether participants that lied, irrespective of whether they were in the "strong-incentive to cheat" or "weak-incentive to cheat" condition, would have lower belief and recollection scores on the AMQ and more errors on the specific die roll memory questions as compared with truth-tellers in both conditions. Then, we further investigated these results by looking at the sub-conditions (i.e., liars in "strong-incentive to cheat" versus liars in "weak-incentive to cheat") to determine whether lying to avoid punishment or for prosocial reasons yielded different effects on memory.

7.3.1 | Unethical amnesia

A directional Bayesian t-test with a default Cauchy √2/2 prior distribution was conducted to examine the average belief and recollection scores on the AMQ between liars and truth tellers independent of their condition. Our analysis showed strong evidence in favor of the null hypothesis $BF_{01} = 14.2$ ($BF_{10} = 0.07$). In other words, our results suggest that the data are 14.2 times more likely under the null (than alternative) hypothesis, meaning that lying (vs. truth-telling) did not have an impact on the belief or recollection scores on the AMQ. A Welch one-tailed independent sample t-test also showed that liars ($M = 5.68$, $SD = 0.85$) did not have statistically significantly lower belief and recollection scores in comparison with truth-tellers ($M = 5.52$, $SD = 0.95$), t (186.32) = 1.29, $p = .90$, Hedges $g' = 0.17$, 95% CI [−∞, 0.40].

7.3.2 | Specific die roll memory errors

A directional Bayesian t-test with a default Cauchy √2/2 prior distribution showed strong evidence that liars made more errors on the specific die roll memory questions than truth-tellers, $BF_{10} = 23.2$ ($BF_{01} = 0.04$). That is, our estimated Bayes factor suggests that the data are 23.2 times more likely under the alternative (than null) hypothesis, meaning that lying led to more errors on the specific die roll memory questions than telling the truth. A Welch one-tailed independent sample t-test also showed that liars ($M = 20.54$, $SD = 5.46$), on average, had two more errors on the specific die rolling memory questions as compared with truth-tellers ($M = 17.89$, $SD = 6.73$), t (200.30) = −3.25, $p < .001$, Hedges $g' = -0.43$, 95% CI[−∞, −0.20] (see Figure 2).

7.3.3 | Punishment avoidance versus prosocial lying and memory

We conducted a Bayesian t-test with a default Cauchy √2/2 prior distribution to examine whether lying to avoid punishment ($n = 43$) led to more or less memory errors than lying for prosocial reasons ($n = 40$). Our estimated Bayes factor $BF_{01} = 4.2$ ($BF_{10} = .24$) indicated weak evidence for the null hypothesis. That is, the data are 4.2 times more likely under the null (than alternative) hypothesis wherein the reason for why people lie did not affect the amount of memory errors. In line with our Bayesian analyses, a Welch independent sample t-test showed that participants who lied to avoid punishment ($M = 20.72$, $SD = 5.45$) did not have statistically significantly more or less memory errors compared with participants who lied for prosocial reasons ($M = 20.35$, $SD = 5.53$), t (80.39) = 0.31, $p = .76$, Hedges $g' = 0.07$, 95% CI [−0.36, 0.50].

7.3.4 | Number of lies and memory

We also examined whether the number of lies made during the adapted Sequential Dyadic Die-Rolling paradigm (Part 1) was

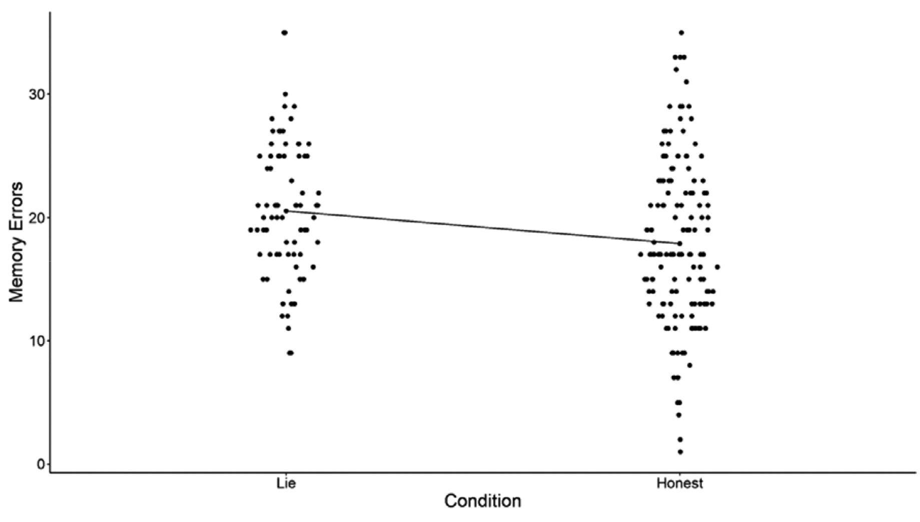

FIGURE 2 Memory errors for specific die roll memory questions. Each dot represents a single participant. Line connects group means

associated with the belief and recollection scores on the AMQ and the amount of specific die roll memory errors. Our estimated Bayes factors indicated weak evidence in favor of the null hypothesis and we did not find evidence for statistically significant correlation between the number of lies and scores on the AMQ, r (81) = −0.17, 95% CI [−0.38, 0.04], $BF_{01} = 2.19$ ($BF_{10} = 0.46$), $p = .12$. Moreover, we found no statistically significant correlation between the number of lies and specific die roll memory errors, r (81) = 0.08, 95% CI [−0.14, 0.29], $BF_{01} = 5.71$ ($BF_{10} = 0.18$), $p = .48$.

8 | DISCUSSION

In the current experiment, we examined the effects of self-generated deceptive behavior on memory. Participants were randomly assigned to either the "strong-incentive to cheat" or "weak-incentive to cheat" condition and then played an adapted Sequential Dyadic Die-Rolling paradigm. Participants in the "strong-incentive to cheat" were incentivized to lie to avoid punishment (financial penalty) while participants in the "weak-incentive to cheat" could lie for prosocial reasons (benefit for unknown co-participant). After a two-day delay, participants' memory was assessed through the AMQ (Rubin et al., 2003) and the through specific die roll memory questions.

In contrast to our predictions and previous research (Kouchaki & Gino, 2016), unethical amnesia did not emerge. Specifically, participants in the "strong-incentive to cheat" condition did not have lower belief and recollection for the die rolling event than participants in the "weak-incentive to cheat" condition. Importantly and in contrast to previous research, we had ground truth about participants' deceptive behavior and could examine whether we would observe unethical amnesia when only comparing deceptive versus honest participants. However, even when deceptive versus honest participants were compared, there was no evidence for unethical amnesia. One explanation for this might be that participants did not experience feelings of shame and/or uncomfortableness about their deceptive behavior. Kouchaki and Gino (2016; Experiment 6) demonstrated that when more feelings of shame and/or uncomfortableness were experienced, participants were motivated to forget their deceptive behavior, leading to lower their belief and recollection for the lied-upon event. It might the case that in our experiment such feelings of shame and/or uncomfortableness were not experienced because participants engaged in deceptive behavior not only to avoid punishment for themselves but also for the other participant (i.e., "strong-incentive to cheat" condition) or only for prosocial reasons (i.e., "weak-incentive to cheat" condition). Indeed, previous research has revealed that lying to help others (e.g., lying to give money to charity) lowered the moral conflict for people as compared with lying for selfish reasons (Cui et al., 2018). Hence, we might not have observed the unethical amnesia effect because participants were not motivated to forget the die rolling event (Anderson & Hanslmayr, 2014). In other words, participants might not have been actively trying to forget their past behavior because it did not affect their perceived self-image. Future studies could examine whether unethical amnesia is only observed when people experience feelings of shame and/or uncomfortableness about their deceptive behavior.

An alternative explanation for why we did not observe unethical amnesia is that the effect might not be as robust and reliable as previously thought. Indeed previous research (Stanley et al., 2018) has been unable to directly and conceptually replicate the findings of Kouchaki and Gino (2016). Moreover, Kouchaki and Gino (2016; Experiment 6) did not directly compare liars versus truth tellers because they compared participants in a likely-cheating condition with participants in a no-cheating condition. That is, although participants in the likely-cheating condition were incentivized to lie, it is possible, as observed in our experiment, that many participants remained honest. This casts doubt on whether the lower scores in belief and recollection for the event were caused by engaging in deceptive behavior.

Interestingly, our data showed that participants who lied tended to have, on average, two more errors on the specific die roll memory questions than honest participants. Previous research showed that forcing (Ackil & Zaragoza, 1998) or instructing (Riesthuis et al., 2022; van Oorsouw & Giesbrecht, 2008) participants to fabricate can adversely affect memory. Even though the current experimental design prevents us from establishing whether participants forgot what they threw and reported because of their lies (i.e., omission errors) or whether they misremembered their lies for the truth (i.e., commission errors), our results do highlight that self-generated lies undermine memory. Our results also suggest that similar effects are observed when participants self-generated deceptive behavior to avoid punishment or for prosocial reasons. Together with previous research (e.g., Ackil & Zaragoza, 1998; Li et al., 2022; Riesthuis et al., 2022), our results indicate that lying can elicit memory undermining effects, regardless of whether the participants were forced, instructed, or decided themselves to lie.

One explanation for why liars created more memory errors than honest participants can be derived from the memory and deception framework (MAD; Otgaar & Baker, 2018). The MAD postulates that different types of deceptive strategies such as false denials, feigning amnesia, and fabrication exert different mnemonic effects. In short, false denials and feigning amnesia tend to elicit errors of omission while fabrication leads to commission errors. The MAD framework additionally posits that lying requires more cognitive resources than telling the truth which might underpin the adverse effects of lying on memory (Walczyk et al., 2014). Specifically, it is assumed that the various deceptive strategies differ in terms of the cognitive resources required and these differences might underlie the various observed mnemonic effects. According to the MAD, false denials consume the least amount of cognitive resources and fabrication the most (Otgaar & Baker, 2018). One might assume that because liars in our study fabricated their reported die roll, it increased the cognitive resources needed to perform the task leading to more memory errors. Accordingly, a logical assumption would be that the more participants lied during the adapted Sequential Dyadic Die-Rolling paradigm, the more cognitive resources were required, and thus the more errors they would have on the specific die roll memory questions. However, we failed to find evidence that the number of lies was positively correlated with the amount of memory errors. Of course, the current study did not systematically manipulate levels of cognitive resources and could not establish the specific memory error (e.g., omission or commission error), and hence future research might further delve into the relationship between cognitive resources, lying, and memory (see also Battista et al., 2020, 2021).

Another interesting finding was that approximately 40 participants in each condition engaged in deceptive behavior. This implies that participants were similarly inclined to lie to avoid punishment as they were to lie for prosocial reasons. This is somewhat in contrast with the meta-analysis of Leib et al. (2021) showing that collaborative dishonesty tends to be higher when financial incentives are high. Moreover, previous research demonstrated that people are more willing to engage in deceptive behavior to avoid a loss than getting a reward (Schindler & Pfattheicher, 2017). However, a potential explanation is that participants in our control condition (e.g., "weak-incentive to cheat" condition) were more willing to lie as compared with control groups in other studies (e.g., Kouchaki & Gino, 2016) because they could lie for prosocial reasons without any personal negative consequences. Thus, our results suggest that lying for altruistic reasons when no personal negative consequences are involved might lead to similar levels of deceptive behavior as when participants are able to avoid punishment.

Although we showed that engaging in self-generated deceptive behavior had memory undermining effects, there are some caveats to mention. One issue is that a non-negligible number of participants who lied during Part 1 did not return for Part 2. As we wanted to replicate the unethical amnesia effect observed by Kouchaki and Gino (2016), we followed their procedure by administering the memory tests after a two-day delay. Future studies could reduce attrition of participants that engaged in deceptive behavior by testing everyone within a single session, which would also deliver additional information on whether the mnemonic effects of self-generated deceptive behavior remain with shorter delays. Another caveat is that we adapted a behavioral economics paradigm that incentivized participants to lie to avoid punishment to examine the effects of self-generated deceptive behavior on memory. As such, it is worth noting that the current experimental design is far removed from real life situations seen in legal proceedings.

9 | CONCLUSION

In summary, we found no evidence that self-generated lies motivated by punishment avoidance or prosocial reasons led to unethical amnesia. That is, our results suggest that engaging in deceptive behavior does not lead to lower belief and recollection for the experienced event. However, in line with previous research (e.g., Ackil & Zaragoza, 1998; Riesthuis et al., 2022), it seems that lying, irrespective of the reason why and how, exerts memory undermining effects.

FUNDING INFORMATION

The current paper has been supported by a C1 grant from KU Leuven (zkd5384) and a grant from the Research Foundation – Flanders (FWO; g0d3621n) awarded to Henry Otgaar. The funding did not play a role in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available on the Open Science Framework at https://osf.io/u2nhv/ (pilot study) and https://osf.io/r7t35/ (main experiment).

ORCID

Paul Riesthuis https://orcid.org/0000-0001-6520-2453
Henry Otgaar https://orcid.org/0000-0002-2782-2181

ENDNOTES

[1] From a frequentist perspective, a sensitivity analysis concluded that based on the planned sample size with 90% power, we are able detect an effect size as small as $d > 0.38$. However, it is beyond our resources to collect the sample size for our Bayesian data analysis for an effect size $d = 0.38$ ($N = 386$). However, we believe that our planned sample size ($N = 238$) allows us to find convincing evidence when the effect is indeed $d = 0.5$ or larger through the Bayesian and frequentist data analyses, while also able to detect smaller effects ($d = 0.38$) with high power (90%) using the frequentist approach.

[2] All participants received the accuracy reward, regardless of their scores.

[3] Average scores for belief and recollection were reverse scored to simplify the interpretation of the results.

REFERENCES

Ackil, J. K., & Zaragoza, M. S. (1998). Memorial consequences of forced confabulation: Age differences in susceptibility to false memories. *Developmental Psychology*, *34*, 1358–1372. https://doi.org/10.1037/0012-1649.34.6.1358

Ackil, J. K., & Zaragoza, M. S. (2011). Forced fabrication versus interviewer suggestions: Differences in false memory depend on how memory is assessed. *Applied Cognitive Psychology*, *25*, 933–942. https://doi.org/10.1002/acp.1785

Anderson, M. C., & Green, C. (2001). Suppressing unwanted memories by executive control. *Nature*, *410*, 366–369. https://doi.org/10.1038/35066572

Anderson, M. C., & Hanslmayr, S. (2014). Neural mechanisms of motivated forgetting. *Trends in Cognitive Sciences*, *18*, 279–292. https://doi.org/10.1016/j.tics.2014.03.002

Battista, F., Otgaar, H., Lanciano, T., & Curci, A. (2020). Individual differences impact memory for a crime: A study on executive functions resources. *Consciousness and Cognition*, *84*, 103000. https://doi.org/10.1016/j.concog.2020.103000

Battista, F., Otgaar, H., Mangiulli, I., & Curci, A. (2021). The role of executive functions in the effects of lying on memory. *Acta Psychologica*, *215*, 103295. https://doi.org/10.1016/j.actpsy.2021.103295

Chrobak, Q. M., & Zaragoza, M. S. (2008). Inventing stories: Forcing witnesses to fabricate entire fictitious events leads to freely reported

false memories. *Psychonomic Bulletin & Review*, *15*, 1190–1195. https://doi.org/10.3758/pbr.15.6.1190
Chrobak, Q. M., & Zaragoza, M. S. (2013). When forced fabrications become truth: Causal explanations and false memory development. *Journal of Experimental Psychology: General*, *142*, 827–844. https://doi.org/10.1037/a0030093
Conrads, J., Irlenbusch, B., Rilke, R. M., & Walkowitz, G. (2013). Lying and team incentives. *Journal of Economic Psychology*, *34*, 1–7. https://doi.org/10.1016/j.joep.2012.10.011
Cui, F., Wu, S., Wu, H., Wang, C., Jiao, C., & Luo, Y. (2018). Altruistic and self-serving goals modulate behavioral and neural responses in deception. *Social Cognitive and Affective Neuroscience*, *13*, 63–71. https://doi.org/10.1093/scan/nsx138
Drivdahl, S., & Zaragoza, M. (2001). The role of perceptual elaboration and individual differences in the creation of false memories for suggested events. *Applied Cognitive Psychology*, *15*, 265–281. https://doi.org/10.1002/acp.701
Hanba, J. M., & Zaragoza, M. S. (2007). Interviewer feedback in repeated interviews involving forced confabulation. *Applied Cognitive Psychology*, *21*, 433–455. https://doi.org/10.1002/acp.1286
Innocent Project. (2020). Alfred Dewayne Brown: Texas Death Row Exoneree, Featured in Netflix Series "The Innocence Files". https://www.innocenceproject.org/alfred-dewayne-brown-texas-death-row-exoneree-featured-in-the-innocence-files/
Kocher, M. G., Schudy, S., & Spantig, L. (2018). I lie? We lie! Why? Experimental evidence on a dishonesty shift in groups. *Management Science*, *64*, 3995–4008. https://doi.org/10.1287/mnsc.2017.2800
Kouchaki, M., & Gino, F. (2016). Memories of unethical actions become obfuscated over time. *Proceedings of the National Academy of Sciences of the United Sates of America*, *113*, 6166–6171. https://doi.org/10.1073/pnas.1523586113
Lee, M. D., & Wagenmakers, E. J. (2014). *Bayesian cognitive modeling: A practical course*. Cambridge University Press.
Leib, M., Köbis, N., Soraperra, I., Weisel, O., & Shalvi, S. (2021). Collaborative dishonesty: A meta-analytic review. *Psychological Bulletin*, *147*, 1241–1268. https://doi.org/10.1037/bul0000349
Li, Y., Liu, Z., & Liu, X. (2022). Who did I lie to that day? Deception impairs memory in daily life. *Psychological Research*, 1–11. https://doi.org/10.1007/s00426-021-01619-x
MacLeod, C. M. (1998). Directed forgetting. In J. M. Golding & C. M. MacLeod (Eds.), *Intentional forgetting: Interdisciplinary approaches* (pp. 1–57). Erlbaum.
Otgaar, H., & Baker, A. (2018). When lying changes memory for the truth. *Memory*, *26*, 2–14. https://doi.org/10.1080/09658211.2017.1340286
Otgaar, H., Howe, M. L., Memon, A., & Wang, J. (2014). The development of differential mnemonic effects of false denials and forced confabulations. *Behavioral Sciences & Law*, *32*, 718–731. https://doi.org/10.1002/bsl.2148
Pezdek, K., Lam, S. T., & Sperry, K. (2009). Forced confabulation more strongly influences event memory if suggestions are other-generated than self-generated. *Legal and Criminological Psychology*, *14*, 241–252. https://doi.org/10.1348/135532508X344773
Pezdek, K., Sperry, K., & Owens, S. M. (2007). Interviewing witnesses: The effect of forced confabulation on event memory. *Law and Human Behavior*, *31*, 463–478. https://doi.org/10.1007/s10979-006-9081-5
Possley, M. (2015). Alfred Brown. https://www.law.umich.edu/special/exoneration/Pages/casedetail.aspx?caseid=4702
Riesthuis, P., Otgaar, H., de Cort, A., Bogaard, A., & Mangiulli, I. (2022). Creating a false alibi leads to errors of commission and omission. *Applied Cognitive Psychology*, *36*, 936–945. https://doi.org/10.1002/acp.3982
Rubin, D. C., Schrauf, R. W., & Greenberg, D. L. (2003). Belief and recollection of autobiographical memories. *Memory & Cognition*, *31*, 887–901. https://doi.org/10.3758/BF03196443
Schindler, S., & Pfattheicher, S. (2017). The frame of the game: Loss-framing increases dishonest behavior. *Journal of Experimental Social Psychology*, *69*, 172–177. https://doi.org/10.1016/j.jesp.2016.09.009
Schönbrodt, F. D., & Stefan, A. M. (2018). BFDA: An R package for Bayes factor design analysis (version 0.3) [Computer software] https://github.com/nicebread/BFDA
Schönbrodt, F. D., & Wagenmakers, E.-J. (2018). Bayes factor design analysis: Planning for compelling evidence. *Psychonomic Bulletin & Review*, *25*, 128–142. https://doi.org/10.3758/S13423-017-1230-Y
Shu, L. L., Gino, F., & Bazerman, M. H. (2011). Dishonest deed, clear conscience: When cheating leads to moral disengagement and motivated forgetting. *Personality and Social Psychology Bulletin*, *37*, 330–349. https://doi.org/10.1177/0146167211398138
Stanley, M. L., Yang, B. W., & Brigard, F. D. (2018). No evidence for unethical amnesia for imagined actions: A failed replication and extension. *Memory & Cognition*, *46*, 787–795. https://doi.org/10.3758/s13421-018-0803-y
Van Oorsouw, K., & Giesbrecht, T. (2008). Minimizing culpability increases commission errors in a mock crime paradigm. *Legal and Criminological Psychology*, *13*, 335–344. https://doi.org/10.1348/135532507X228539
Walczyk, J. J., Harris, L. L., Duck, T. K., & Mulay, D. (2014). A social-cognitive framework for understanding serious lies: Activation-decision-construction-action theory. *New Ideas in Psychology*, *34*, 22–36. https://doi.org/10.1016/j.newideapsych.2014.03.001
Weisel, O., & Shalvi, S. (2015). The collaborative roots of corruption. *Proceedings of the National Academy of Sciences of the United States of America*, *112*, 10651–10656. https://doi.org/10.1073/pnas.1423035112
Wouda, J., Bijlstra, G., Frankenhuis, W. E., & Wigboldus, D. H. J. (2017). The collaborative roots of corruption? A replication of Weisel & Shalvi (2015). *Collabra: Psychology*, *3*, 27. http://doi.org/10.1525/collabra.97
Zaragoza, M. S., Payment, K. E., Ackil, J. K., Drivdahl, S. B., & Beck, M. (2001). Interviewing witnesses: Forced confabulation and confirmatory feedback increase false memories. *Psychological Science*, *12*, 473–477. https://doi.org/10.1111/1467-9280.00388

How to cite this article: Riesthuis, P., Otgaar, H., Hope, L., & Mangiulli, I. (2022). Registered report: The effects of incentivized lies on memory. *Applied Cognitive Psychology*, *36*(5), 1150–1161. https://doi.org/10.1002/acp.3986

APPENDIX A: AUTOBIOGRAPHICAL MEMORY QUESTIONNAIRE

Instructions: Please think back to the die throwing task you completed during Part1 of the study. The following questions ask you about that task (Kouchaki & Gino, 2016).
Please indicate your agreement with each of them.

1. As I think about the task, I can actually remember it.
   a. 1 = strongly agree, 7 = strongly disagree
2. As I remember the task, I can feel now the emotions that I felt then.
   a. 1 = strongly agree, 7 = strongly disagree
3. Overall, I remember this event.
   a. 1 = strongly agree, 7 = strongly disagree
4. My memory of this event is dim.
   a. 1 = strongly agree, 7 = strongly disagree

5. I remember how I felt at the time I just recalled.
   a. 1 = strongly agree, 7 = strongly disagree
6. I remember what I thought at the time of the event I just recalled.
   a. 1 = strongly agree, 7 = strongly disagree

APPENDIX B: SPECIFIC DIE ROLLING QUESTIONS

For the following questions, you will be rewarded for accuracy. This means that for every correct answer you will receive $0.50. There are four questions in total (4 x $0.50 = $2). Please respond honestly to all questions.

1. What was the color of the **thrown** die?
   a. Red
   b. Black
   c. Yellow
   d. White
2. How many times did you **throw** each number? (total = 20)
   a. 1 =
   b. 2 =
   c. 3 =
   d. 4 =
   e. 5 =
   f. 6 =
3. What was the color of the **reported** die?
   a. Red
   b. Black
   c. Yellow
   d. White
4. How many times did you **report** each number? (total = 20)
   a. 1 =
   b. 2 =
   c. 3 =
   d. 4 =
   e. 5 =
   f. 6 =

APPENDIX C: QUESTIONS USED IN PILOT STUDY

1. My die roll was completely anonymous—only I could know what I rolled
   a. 1 = strongly agree, 7 = strongly disagree
2. I played the die roll game with another participant
   a. 1 = strongly agree, 7 = strongly disagree
3. The throwing die was fair (completely random, like a real die)
   a. 1 = strongly agree, 7 = strongly disagree
4. The researchers checked whether I cheated during the die roll game
   a. 1 = strongly agree, 7 = strongly disagree
5. I cheated in the die rolling game
   a. 1 = strongly agree, 7 = strongly disagree