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Articles

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Melo aptikimas neuždelstose ir vėlesnėse apklausose po įvykio: piešinio mnemoninės technikos vaidmuo

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Abstract: Memory enhancing techniques, or mnemonics, are typically recommended in evidence-based investigative interviewing guidelines. In the current study, the use of a sketch mnemonic and its effect on the responses of truth tellers and liars was examined. Participants (. = 49) watched a mock intelligence operation video. They were instructed to tell the truth or lie about this operation in an interview immediately afterwards, and again after a two-week delay. In both interviews participants were requested to make a sketch of the place of the mock operation, and then to verbally describe the drawing. Results revealed that truth tellers reported more visual, spatial, temporal, and action details than liars in the immediate interview. Truth tellers also reported more spatial, temporal and action details than liars in the delayed interview. Truth tellers experienced a decline in reporting action details after the delay, whereas liars did not show a decline in reporting any details over time. Thus, truth-tellers showed patterns of reporting indicative of genuine memory decay, whereas liars produced patterns reflecting a 'stability bias'. Between-statement consistency was not different across veracity conditions.

Keywords: Deception, sketch, consistency, repeated interviewing, memory decay.

Summary: Prisiminimus palengvinančios technikos, arba mnemonika, įprastai įtraukiamos į įrodymais grįstas nusikaltimų tyrimo apklausų rekomendacijas. Eksperimento tikslas – nustatyti piešinio mnemoninės technikos įtaką teisingų ir melagingų pakartotinių parodymų pateikimui. Tiriamiesiems (teisingų parodymų, n = 25; melagingų parodymų, n = 24) buvo rodoma simuliacinės kriminalinės žvalgybos operacijos vaizdo medžiaga, o paskui jų buvo prašoma sakyti tiesą arba meluoti dviejų apklausų – nedelsiant ir praėjus dviem savaitėms po įvykio – metu. Abiejų interviu metu apklausiamieji buvo paprašyti nupiešti vietos, kurioje vyko žvalgybos operacija, schemą ir verbaliai apibūdinti piešinį. Analizuotos parodymų turinio detalės ir nuoseklumo tarp parodymų charakteristikos. Teisinguose pasakojimuose iš karto po įvykio nustatyta reikšmingai daugiau vaizdinių, erdvinių, laiko ir veiksmo detalių negu melaginguose pasakojimuose. Teisinguose parodymuose pakartotinėse uždelstose

apklausose taip pat buvo reikšmingai daugiau erdvinių, laiko ir veiksmo detalių negu melaginguose parodymuose. Tiesą sakantys tiriamieji pateikė mažiau veiksmo detalių parodymuose po dviejų savaičių negu pasakojimuose iš karto po įvykio; detalių skaičius melaginguose parodymuose abiejų apklausų metu reikšmingai nesiskyrė. Kitaip tariant, tiesą sakančiųjų atsakymuose labiau atsispindėjo natūralaus užmiršimo procesas negu meluojančiųjų atsakymuose tarp parodymų. Tiesą sakančių ir meluojančių asmenų informacijos pateikimo nuoseklumas tarp dviejų pasakojimų buvo panašus. Teorinės ir praktinės melo aptikimo implikacijos pateiktos straipsnyje.

Keywords: melo aptikimas, piešinio mnemonika, nuoseklumas, pakartotinės apklausos, užmiršimas.

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Obtaining a credible account is one of the main goals of investigative interviewing (Geiselman et al., 1984; Kebbel & Milne, 1998; Pansky & Nemets, 2012). However, legal professionals often raise questions about the credibility of an interviewee (witness, victim, suspect, or intelligence source) (Granhag & Strömwall, 2004; Volbert & Steller, 2014; Vrij, 2008). Deception research suggests that the *richness of detail* in a statement is one of the most diagnostic cues to credibility (DePaulo et al., 2003; Vrij, 2008, 2015), with truthful statements typically containing more details than deceptive statements. Whilst this difference in detail between truth tellers and liars occurs when people are interviewed immediately after experiencing an event (Vrij, 2005, 2008, 2016), the pattern of reporting may be different when people are interviewed after a delay. Truth tellers tend to forget information over time (Evans & Fisher, 2011; Lawson & London, 2015; Turtle & Yuille, 1994) and experience *the forgetting curve* (Ebbinghaus, 1885/1913). Recent research suggests that liars instead show a *stability bias* (Harvey, Vrij, Hope, Leal, & Mann, 2017), a metacognitive failure to correctly understand the degree to which memory can change over time (Kornell & Bjork, 2009). As a result, when truth tellers genuinely forget details and liars overestimate memory, both groups can become more similar in terms of the amount of information they provide after a delay, making the credibility assessment cue, richness of detail, less diagnostic (Harvey et al., 2017; McDougall & Bull, 2014; Vrij et al., 2009). In the current study, we examined the change in amount of detail reported over time by comparing immediate with delayed accounts across veracity conditions.

Memory-based deception relates to memory issues (e.g., effects of time delay on retrieval of information) experienced by truth tellers, and whether liars are able to mimic genuine memory patterns. There

are at least two reasons why it is important to examine memory-based deception in criminal interviewing contexts. First, in real life settings interviewees (witnesses, victims, suspects, or intelligence sources) are usually interviewed more than once (Pansky, Koriat, & Goldsmith, 2005; Wysman, Scoboria, Gawrylowicz, & Memon, 2014), and sometimes after long delay periods (Behrman & Davey, 2001; Read & Conolly, 2007). Second, a less detailed account as a result of decline in memory retrieval for original information can raise doubts about someone's truthfulness, because the amount of information provided by an interviewee is a frequently used cue for assessing credibility (Akehurst, Köhnken, Vrij, & Bull, 1996; Strömwall & Granhag, 2003).

Memory-enhancing techniques, also called *mnemonics,* could facilitate the retrieval of information even after long retention periods (Fisher & Geiselman, 1992). Mnemonic techniques have also been shown to be effective in detecting deceptive statements, because truth tellers and liars seem to respond to such mnemonics in different ways (Bembibre & Higueras, 2011; Hernández-Fernaud & Alonso-Quequty, 1997; Vrij et al., 2009). Although previous studies have addressed how mnemonic techniques affect truthful and deceptive accounts in single interviews, research on repeated and/or delayed statements is scarce. In this experiment we were interested in one mnemonic, making a *sketch.* Witnesses can initiate their own contextual retrieval cues when sketching the crime scene (Paulo, Albuquerque, & Bull, 2013). We examined how making a sketch affected immediate and delayed verbal accounts from truth tellers and liars. In addition, when repeated statements from the same interviewee have been considered, *consistency* between statements is an important cue for making credibility judgments (Granhag & Strömwall, 2001; Granhag, Mac Giolla, Sooniste, Strömwall, & Liu-Johnson, 2016; Vredeveldt, van Koppen, & Granhag, 2014). We also compared consistency between immediate and delayed accounts from truth tellers and liars.

To clarify how the sketch mnemonic was examined in the current study, we focused only on participants' verbal descriptions of the drawings they made. We considered that the analysis of verbal details rather than of the sketch itself had higher practical relevance. If we imagine an applied setting in which sketching during an interview would be used, it is more likely to expect that the interviewer would ask the interviewee to explain the drawing, than to expect that the interviewer would try to analyse and interpret the drawing him/herself without asking the interviewee to explain the drawing.

Sketching and Deception Detection

Mnemonic techniques are typically included in evidence-based investigative interviewing guidelines. Different mnemonics are an integral part of the Cognitive Interview (CI), an interview protocol that has been found to be more effective than standard interviewing techniques at eliciting accurate and complete accounts (Davis,

McMahon, & Greenwood, 2005; Fisher, Geiselman, & Amador, 1989; Memon, Meissner, & Fraser, 2010). Mnemonic techniques take into account two basic principles of human memory: (1) A memory trace has distinct features and the effectiveness of a retrieval may be dependent on the similarity between the retrieval cue and the encoded event (Bower, 1967; Flexser & Tulving, 1978); and (2) several retrieval paths to the encoded event may be available; therefore, information not accessible with one retrieval cue may be accessible with another (Tulving, 1974).

We examined the sketch technique for two reasons. First, sketching could have more practical value than some other mnemonics (for example, traditional *mental reinstatement of context*) in real life forensic applications. It can be less cognitively demanding for an interviewer to administer a sketch instruction than to formulate questions, and can be protective against incompatible, suggestive/leading questions or retrieval cues during interviews (Dando, Wilcock, & Milne, 2009; Vrij et al., 2010). In one study, the sketch instruction resulted in shorter interviews and, in terms of memory performance, was as effective as the mental reinstatement of context instruction, and more effective than a standard questioning procedure (Dando et al., 2009). In another study, a sketch produced less confabulations in interviewees' accounts than standard 'question-answer' interviewing approaches (Dando, Wilcock, Behnkle, & Milne, 2011). Similar results were found for a sample of alleged child victims of sexual abuse. Children in the drawing condition disclosed more central details about people, actions, times, and locations of the abusive events than children in the standard interviewing condition (Katz & Hershkowitz, 2010). The sketch mnemonic was also positively evaluated by practitioners. In one study, intelligence officers perceived sketching as one of the most effective components of the CI in eliciting information from sources (Rivard, Fisher, Robertson, & Mueller, 2014). Additionally, in another study most of police officers (appr. 68%) reported having used drawings at least once in their practice to determine veracity in a suspect interview (Deeb et al., 2018).

Second, sketching could be helpful in deception detection because truth tellers should benefit more from specific spatial memory enhancement techniques than liars. The sketch mnemonic should facilitate the retrieval of information for truth tellers. In contrast, liars may lack the imagination or be reluctant to reveal as much information as truth tellers because of the risk that it can be checked by the police (Vrij, Fisher, & Blank, 2017; Vrij, Fisher, Blank, Leal, & Mann, 2016). In addition, liars tend to plan interviews by anticipating certain questions and preparing answers to them. They may find an interviewer's request to draw unexpected and, therefore, cognitively demanding to provide detailed accounts after such a request (Vrij et al., 2009).

Previous research suggests that sketching aids in eliciting information about the event in question and leads to a better discrimination between truthful and deceptive accounts than standard questions (Vrij et al., 2010; Vrij et al., 2018; Vrij, Mann, Leal, & Fisher, 2012). A review of sketching studies has shown that, in general, this task can promote differences

between truth tellers and liars in terms of the amount of provided information (Mac Giolla, Granhag, & Vernham, 2017). Moreover, the recent studies have shown the benefits of using sketch in interpreter-based investigative interviews (Vrij et al., 2018; Vrij et al., 2019).

However, it is as yet unknown what type of information in a sketch will differentiate truth tellers from liars the most. In theory, the request to sketch a layout of a crime scene not only forces an interviewee to reveal visual details of objects and/or people, but also to indicate the spatial location of these objects/people (Vrij et al., 2012). Thus, truth-tellers' memory retrieval of visual or spatial information should be facilitated (Fisher & Geiselman, 1992). Regarding liars' accounts, sketching can create problems for them because sketching and describing specific objects at specific locations increases the risk of getting caught (Vrij et al., 2012). Therefore, liars may decide to avoid mentioning some visual and spatial details in their accounts.

The current experiment is an elaboration of Izotovas et al. (2018). In that study, three different mnemonic techniques (context reinstatement, sketch, or event-line) and their effects on the immediate and delayed statements of truth tellers and liars were examined. It was found that in each of three conditions immediate as well as delayed truthful statements contained more details than deceptive statements. However, in that study the immediate interview consisted of two parts, a free recall phase and a mnemonic phase. Therefore, it was unclear whether the differences between truth tellers and liars in the delayed statements were affected by the free recall, the mnemonic technique or both. In the current study, we directly tested the effects of a mnemonic technique (sketch) on the delayed statements of truth tellers and liars.

Sketching and consistency as a cue to deceit

Both laypeople and legal professionals believe that consistency is indicative of truth-telling and inconsistency indicative of lying (Bogaard, Meijer, Vrij, & Merckelbach, 2016; Granhag & Strömwall, 2000). However, research has shown that liars can be equally or even more consistent in their statements than truth tellers (Granhag & Strömwall, 2002; Strömwall & Granhag, 2005; Vredeveldt et al., 2014). This can be explained by the different strategies commonly used by truth tellers and liars during investigative interviews. The '*repeat vs reconstruct hypothesis'* illustrates the relationship between consistency and deception (Granhag & Strömwall, 1999). This hypothesis is based on two assumptions. First, liars believe that being consistent is important for making an honest impression. They are therefore keen to repeat their original story when interviewed again. Second, truth tellers are comparatively less concerned with being consistent (Hartwig, Granhag, & Strömwall, 2007; Hartwig, Granhag, Strömwall, & Doering, 2010). For each interview session, it is most likely that truth tellers simply try to remember the event and, due to the reconstructive nature of human memory, add, omit or alter details in a repeated retrieval attempt (Hartwig et al., 2007; Hartwig et al., 2010).

Deception research using sketches and how they affect consistency in truth tellers' and liars' accounts is limited. In one study, truth tellers and liars were interviewed about a lunch they supposedly had in a nearby restaurant (Leins, Fisher, Vrij, Leal, & Mann, 2011). They were asked to sketch the layout of the restaurant and to answer a few spatial questions. The consistency between verbal reports and sketches made by truth tellers and liars was examined. Liars where less consistent than truth tellers and more than 80% of truth tellers and 70% of liars were classified correctly based on their consistency scores (Leins et al., 2011). In another study, it was found that drawings elicited less consistent answers from pairs of deceptive suspects than from pairs of truthful suspects, whereas no difference in consistency was found in some verbal responses (Vrij et al., 2009). In another experiment, adolescent participants had to either tell the truth or lie in groups of three about an alleged event (Roos af Hjelmäster, Öhman, Granhag, & Vrij, 2014). The difference in consistency between truth tellers and liars was larger for the sketch task than for the verbal descriptions, and triads of liars were less consistent than triads of truth tellers.

It is important to consider that, depending on the interview style, consistency can be either a cue of deceit or a cue of truthfulness (Leins et al., 2010). When a passive interview style is employed (e.g. asking a suspect the same questions from one interview to another), liars are more consistent than truth tellers as a result of liars' strategies (e.g. planning interviewers' questions and foreseeing answers to them; Hartwig et al., 2007), and the nature of truth tellers' memory (Schacter, 1999). In contrast, active interview styles (e.g. asking unanticipated questions, changing interviewing modes from verbal to pictorial descriptions) constrains liars from using the 'repeat' strategy and typically induces inconsistent answers (Leins et al., 2011). Therefore, consistency becomes a diagnostic cue of credibility.

Statement characteristics

Details in the statements of truth tellers and liars were derived from the Reality Monitoring approach (RM; Johnson & Raye, 1981). Based on this approach, real memories are usually clearer, sharper, and more vivid than deceptive stories, which typically contain less detail and are vaguer and less concrete (Vrij, 2015).

For the current study, frequencies of different types of detail were compared: visual, spatial, temporal, and action details. Such details are often examined in deception research (Masip, Sporer, Garrido, & Herrero, 2005; Vrij, 2015). The nature of (in)consistency between truthful and deceptive statements was also compared. Reminiscences (details mentioned in a later, but not in a previous statement), repetitions (details repeated across statements) and omissions (details mentioned in a previous, but not in a later statement) as characteristics of between-statement consistency were analysed (Granhag & Strömwall, 2002),

which has been defined as consistency between different statements made by one person (Vredeveldt et al., 2014).

In this experiment, all participants made a sketch, which they subsequently described. We were interested in the differences between truth tellers and liars in the contents of their descriptions in immediate and delayed interviews. We expected truth tellers to report more visual, spatial, temporal, and action details than liars in the immediate accounts (Hypothesis 1). Our following two hypotheses were derived from previous findings (Izotovas et al., 2018). As truth tellers could sketch and report these details (i.e., have memory practice) in a sketch, we further predicted truth tellers to report more visual and spatial details than liars after a delay (Hypothesis 2). We expected truth tellers, but not liars, to show a memory decline in temporal and action details after a delay. Truth tellers would show a decline in such details because of a lack of practicing temporal and action details in sketch descriptions (Hypothesis 3). Regarding between-statement consistency characteristics, we considered our interviewing approach as passive. Although we requested participants to sketch the layout of an incident, only verbal descriptions of the sketches were examined. Moreover, participants were asked the same question twice. In line with the reasoning above, we predicted truth tellers to be less consistent than liars: to include the same number of repetitions, but more reminiscences and omissions than liars in the delayed interviews (Hypothesis 4).

Method

Participants. A total of 49 university students took part in the study. Their mean age was $M = 19.65$ years ($SD = 3.36$) and 79.6% were female. Participants were recruited via posters, flyers, the online participant pool system, and online advertisements on the University's staff portals. As the experiment focused on the verbal content of the statements, native English speakers were prioritised to take part. The majority of participants (93.9%) were English native speakers and the remaining participants were fluent in English. Participants were awarded with two course credits or £10 after they completed the experiment. In addition, all participants were entered into a draw to win a single prize worth £150 after completion of data collection for this study. The experiment was accepted by the Science Faculty Ethics Committee of the University.

Design. A 2 (Veracity: Truthful vs deceptive) X 2 (Time of Interview: Immediate vs delayed) experimental design was used with Veracity as between-subjects factor and Time of Interview as within-subjects factor. Dependent variables were visual, spatial, temporal, and action details. Interviewees were randomly assigned as truth tellers ($n = 25$) or liars ($n = 24$). All participants were interviewed on two occasions, immediately after the stimulus event and two weeks later. As not all participants were available exactly 14 days after the first interview, the delay period for the second interview varied between 12 and 18 days ($M = 13.90$, $SD = 0.82$, $Mode = 14$ (81.6% of cases). The delay period between truth tellers (M

= 13.84, *SD* = 0.55, 95% CI [13.61, 14.05]) and liars (*M* = 13.96, *SD* = 1.04, 95% CI [13.58, 14.43]) was not significantly different, t(47) = 0.50, p = .620, d = .14.

Materials. *Stimulus event.* Participants watched a video showing a simulated break-in [1] . They were instructed to take the role of an intelligence officer working undercover with another officer. They were told their task was to break into an apartment and secure some important information for intelligence gathering. This special task was recorded from the perspective of the participant who followed the other intelligence officer throughout the break-in. To minimise the possibility of liars telling an embedded lie (for example, by describing the apartment they genuinely lived in), all interviewees were told that the apartment they broke into was a staff room of a community centre.

The video, lasting five minutes, shows a man entering a basement floor from the outside of the building. He then walks about ten metres through the corridor and tries to break into one of the doors at the end of the corridor. After a couple of attempts to open the door, he walks into the room. The man in the video searches the room thoroughly and takes two mobile phones from a desk, some jewellery, a laptop, a driving licence, a debit card and some cash in Euros and dollars from a wallet. He then leaves the room with these items. As the man walks through the corridor on his way out, a neighbour witnesses him leaving. When the officer goes outside, he briefly looks around by the building exit. Finally, he leaves.

Procedure. *Pre-interview phase.* After watching the break-in video participants were randomly assigned to the truth telling or lying condition. Truth tellers were told that the break-in was successful and that they would be interviewed by a fellow agent to continue the intelligence investigation. They were asked to tell the truth during the interview about 1) the interior of the staff room in the video, and 2) what they took from there. Liars where also told that the break-in was successful. However, they were told that they would be interviewed by an agent of a hostile organisation and that their task was to create a convincing cover story because if the hostile officer came to know where exactly they broke in and exactly what was taken from the apartment, the entire investigation would be in danger. Therefore, liars were instructed to tell the hostile officer that they broke into a different staff room in a different community centre. They had to lie about 1) the interior of the apartment in the video, and 2) what they took from there. To increase participants' motivation to be convincing in the interviews, they were told that if they were convincing during the interview, they would receive two course credits or £10 and would only be entered in the draw to win £150 worth prize. Participants were also informed about the consequences for not being believed in the interviews. Specifically, they were told that if the interviewer thought that they did not report everything they remembered, they would only receive one course credit or £5, would be excluded from the draw, and would be asked to write a full statement of what happened in the video.

After the instructions to tell the truth or lie, participants were requested to prepare for the interview. They were given unlimited preparation time. After preparation, they were given a pre-interview questionnaire. Truth tellers and liars were requested to respond truthfully. In the questionnaire participants were asked to rate on 7-point scales their preparation for the interview. They were asked to indicate how well they were prepared (1 = *very poor,* 7 = *very good*) and how sufficient (1 = *insufficient,* 7 = *sufficient*); and complete (1 = *incomplete*, 7 = *complete*) their preparation was. These three preparation items were clustered into one variable, Preparation quality (Cronbach's alpha is .91 for the immediate and .93 for the delayed interviews). The pre-interview questionnaire also included questions about stress, motivation, and confidence the participants felt about being convincing in the upcoming interview. These answers were rated on 7-point scales (1 = *not at all,* 7 = *totally*).

Interviews. Sketch Task. One interviewer, blind to the aims of the study, stimulus material, and veracity conditions, questioned the participants. In the beginning of the immediate interview truth tellers and liars were asked to sketch the layout of the community centre they broke into. The participants made their drawing on an A3 sized blank sheet of paper. All participants were asked to use pencils; erasers were provided. They were requested to use as much space as they needed to sketch the scene as they remembered it. Participants were instructed to include as many details as possible about where different objects were in relation to other objects. They could also use labels and notes within their sketch to indicate the features of the scene or to indicate if they were not certain of something. Participants were given unlimited time to complete the sketch. After making the sketch, participants were asked to describe their sketch in as much detail as possible.

After the immediate interview all participants were told that the second part of the experiment would be in two weeks' time. When they came back for the second session, participants were again given the same sketch task, and, afterwards, asked to verbally describe their sketch.

Post-interview questionnaire. Participants were asked to fill out a post-interview questionnaire after the delayed interview only. The post-interview questionnaire included questions about what they thought the likelihood was of getting two credits or £10 and having to write a statement (1 = *not at all*, 7 = *very likely*). As previous research has found that active repetition of learned information can prevent memory decline (Bornstein, Liebel, & Sarberry, 1998), we also asked participants in an open-ended question how many times they had tried to remember the break-in (truth tellers)/cover story (liars) between the two interviews. Lastly, we asked participants about the extent to which they i) told the truth, and ii) lied during the interview. Participants indicated on 11-point Likert scales ranging from 0% (*not at all)* to 100% (*totally).* These two questions were asked twice to assess the truthfulness in both the immediate and delayed descriptions of sketch. As with the pre-interview

questionnaire, truth tellers and liars were requested to be honest with their responses.

After completing the post-interview questionnaire, all participants were thanked, fully debriefed, and paid £10 or given two credits for participation in the experiment. After full data collection, one participant was randomly selected as a lottery winner.

Coding. *Verbal details.* Interviews were transcribed verbatim. All statements were coded for the details provided by interviewees in the 1) immediate sketch description and 2) delayed sketch description. Each detail was counted once per description of sketch. For example, if the same word '*desk'* (or a synonym) was mentioned twice in one interview (and had the meaning of the same '*desk'*), it was counted only once. However, if the same detail was mentioned in the different interviews, it was counted separately. Four types of detail were coded: i) visual details: specific items/description of items seen by interviewee. For example, '*We*. found a *small*. *leather*. *wallet*.' contains four visual details; ii) spatial details: information about locations or spatial arrangements of people or objects. For example, 'There was a sofa on *the left handside*. *next to*. the door, and a table *in the middle* .' contains three spatial details; iii) temporal details: reference to the sequence of activities, their duration, or information when something happened: '*After*. we entered there and spent *fifteen minutes*. in a room, we *quickly*. ran through the corridor' contains three temporal details; and iv) action details: information about the actions carried out by people in the event: 'He *took*. a wallet, mobile phones, we then *moved*. to the kitchen area and *searched*. inside the cupboards' contains three action details. This coding system is derived from the Reality Monitoring (RM) approach (Johnson & Raye, 1981; Vrij, 2015).

Two coders carried out the coding. Both coders were trained by a senior member in the research lab. They received definitions and examples of the to-be-coded variables and were asked to code some practice statements. The trainer gave feedback on the coding and gave the coders a few more practice statements. The coders were given permission to start coding the study interviews when the trainer was satisfied with their coding of the practice statements.

The first coder, the first author of this study, coded all transcripts. The second coder, blind to the hypotheses, stimulus event, and veracity of the statements, coded a random sample of 12 interview scripts (24.5%) to measure reliability. Inter-rater reliabilities between the two coders for the frequency of detail in both (immediate and delayed) statements were measured via intraclass correlation coefficients (ICC). The ICC revealed satisfactory inter-rater values: .76, for visual details; .87, for spatial details; .63, for temporal details; and .83, for action details. As obtained ICC for temporal details is moderate, the results for this type of detail should be interpreted with caution.

Between-statement consistency. Consistency in the responses between the immediate and delayed verbal descriptions of sketch was measured. The details coded previously were used for consistency analysis. The total

amount of details (visual, spatial, temporal, and action details combined) was examined. Repetitions (details reported in both immediate and delayed interviews), reminiscences (details reported in the delayed interview but not in the immediate interview), and omissions (details reported in the immediate interview but not in the delayed interview) were analysed. For example, the statements *'my colleague found a Samsung cell phone on the wooden desk'* (immediate report) and *'my colleague found a phone and a laptop on the table'* (delayed report) would produce four repetitions (*my colleague, found, phone*, and *desk/table*), two omissions (*wooden,* and *Samsung*), and one reminiscence (*laptop*). The amount of contradictions, the fourth measure of consistency, was not examined in this study. Contradictions do not occur frequent enough in most experimental deception research to be used in the statistical analyses (e.g. Granhag & Strömwall, 2002; Granhag et al., 2016; Deeb et al., 2016).

The coders only coded reminiscences. Arithmetic calculations were used to obtain repetitions and omissions. Reminiscent details in the delayed interview were coded, if they were not present in the immediate interview. Repetitions were computed by deducting reminiscences from the total amount of details in the delayed interview and omissions were calculated by deducting repetitions from the total amount of details in the immediate interview.

Again, two coders were used for the consistency coding. The consistency training they received followed a similar format as the training they received for the details coding. The first author marked all transcripts and the second coder marked 11 interview scripts, 22%. We examined inter-rater reliability for reminiscences only because that was the only measure coded manually. The analysis revealed high ICC of .87 for reminiscences in the delayed vs. immediate reports.

Results

Manipulation checks

Mixed ANOVAs with Time of Interview as the within-subject factor and Veracity as the between-subjects factor were used for all the manipulation checks. Table 1 shows mean scores, standard deviations and confidence intervals for truth tellers and liars to the pre- and post- questionnaires.

Table 1
Means standard deviations and confidence intervals for the answers to preinterview and postinterview questionnaires by truthtellers and liars

Measure	Truth tellers			Liars		
	M	SD	95% CI	M	SD	95% CI
Motivation to convince the interviewer	6.04	0.72	5.77,6.30	5.96	1.00	5.52,6.39
Preparation quality	4.96	0.80	4.67,5.24	4.85	1.27	4.29,5.37
Preparation time (sec.)	198.85	98.27	165.56,234.03	207.34	78.82	174.87,243.26
Stress before the interview	3.39	1.33	2.90,3.93	4.35	1.37	3.77,4.96
Confidence to convince the interviewer	5.17	1.01	4.78,5.56	4.40	1.19	3.92,4.90
Likelihood to receive £10/2 credits	5.23	1.21	4.73,5.71	4.67	1.13	4.21,5.12
Likelihood to write a statement	3.46	1.48	2.86,4.06	4.17	1.31	3.63,4.65
Times thought about the event/story	2.19	1.27	1.73,2.67	3.13	1.67	2.48,3.76
Extent of truthfulness in the immediate interview	98.46	6.13	95.83,100.00	18.26	18.50	11.82,24.44
Extent of truthfulness in the delayed interview	98.92	6.24	94.49,99.11	17.50	19.39	10.45,24.46

There was a significant main effect of Veracity on self-reported stress levels, $F(1, 47) = 6.44$, $p = .014$, $d = 0.72$. Liars reported feeling a higher level of stress than the truth tellers did. There was also a significant main effect of Veracity on confidence in convincing the interviewer, $F(1, 47) = 7.54$, $p = .016$, $d = 0.65$. Truth tellers felt more confident than liars in their ability to convince the interviewer that they were telling the truth. A significant main effect of Veracity was found on how many times interviewees thought about the event/story before the second interview, $F(1, 46) = 3.41$, $p = .028$, $d = 0.63$)[2]. Liars thought more often about the event than truth tellers. There were also significant main effects of Veracity on extent of truthfulness during the immediate interview, $F(1, 47) = 52.10$, $p < .001$, $d = 5.8$, and the delayed interview, $F(1, 46) = 91.90$, $p < .001$, $d = 5.57$. In both interviews, truth tellers were more truthful than liars. All other main effects of Veracity were not significant, all F's < 9.14, all p's > .165, see Table 1.

A main effect of Time of Interview emerged only for preparation time, $F(1, 46) = 14.80$, $p < .001$, $d = 0.59$. Participants used more preparation time before the immediate interview ($M = 234.14$, $SD = 99.69$, 95% CI [208.54, 260.49]) than before the delayed interview ($M = 178.45$, $SD = 99.69$, 95% CI [154.14, 201.83]). All other main effects of Time of Interview were non-significant, all F's < 3.70, all p's > .060. All Veracity x Time of Interview interaction main effects were not significant, all F's < 1.45, p > .234.

An independent t test revealed no significant main effect of Veracity on incentive ratings. Truth-tellers were equally convinced as liars about getting a £10/2 credits reward, $F(1, 38) = 0.02$, $p = .10$, $d = 0.48$. Finally, an independent t test revealed no significant main effect of Veracity on the likelihood of writing a statement ratings, $F(1, 38) = 1.89$, $p = .10$, $d = 0.49$, see Table 1 (In the two latter analyses time of interview was not included as a factor as the question referred to the two interviews combined). In summary, the results showed that manipulations in this study were successful.

Verbal details in the immediate and delayed interviews

To examine whether the amount of information changed between the immediate and delayed interviews, mixed ANOVAs were carried out with Time of Interview as the within-subject factor and Veracity as the between-subjects factor. With visual details as dependent variable, there was a significant main effect of Veracity, $F(1, 47) = 6.73$, $p = .013$, $d = 0.74$, with truth tellers ($M = 106.56$, $SD = 46.58$, 95% CI [89.73, 126.19]) reporting more visual details than liars ($M = 75.79$, $SD = 35.31$, 95% CI [62.17, 91.80]). The main effect of Time of Interview, $F(1, 47) = 0.05$, $p = .817$, $d = 0.03$, and Veracity x Time of Interview interaction, $F(1, 47) = 3.95$, $p = .053$, $= .08$, were not significant. Simple effects analysis for Veracity revealed that truth tellers reported more visual details than liars in the immediate interview, whereas the difference was not significant in the delayed interview, see Table 2. The other simple effects for Veracity or Time of Interview did not reach significance.

Table 2

Details in the immediate and delayed sketch reports as a function of veracity condition

Detail	Truth			Lie			F	p	d
	M	SD	95% CI	M	SD	95% CI			
Immediate interview									
Visual	55.68	27.19	45.87,67.36	36.00	16.27	30.30,41.50	5.15	.004	0.88
Spatial	29.24	16.51	23.36,36.22	13.00	7.47	10.43,15.64	9.47	<.001	1.27
Temporal	7.60	9.69	4.28,11.90	1.25	1.87	.63,1.96	19.81	.003	0.91
Action	18.04	20.68	10.90,27.00	3.04	4.51	1.59,4.56	28.69	.002	1.00
Delayed interview									
Visual	50.88	20.90	43.55,58.92	39.79	22.38	32.11,48.47	.57	.079	0.51
Spatial	27.16	14.77	22.44,32.70	15.54	9.54	11.96,19.18	2.91	.002	0.93
Temporal	7.16	10.24	4.00,10.76	1.54	2.62	.57,2.70	9.91	.013	0.75
Action	14.80	16.32	9.39,21.20	3.88	4.91	2.00,6.04	13.12	.003	0.91

A significant main effect of Veracity emerged for reporting spatial details, $F(1, 47) = 15.97$, $p < .001$, $d = 1.15$. Truth tellers ($M = 56.40$, $SD = 30.47$, 95% CI [45.54, 68.92]) reported more spatial details than liars ($M = 28.54$, $SD = 15.73$, 95% CI [22.30, 35.50]). The main effect of Time of Interview was not significant, $F(1, 47) = 0.05$, $p = .820$, $d = 0.01$, but the Veracity x Time of Interview interaction effect, $F(1, 47) = 5.27$, $p = .026$, $= .10$, was significant. Simple effects showed that truth tellers reported more spatial details than liars in both the immediate and delayed interviews (Table 2).

A significant main effect of Veracity emerged for temporal details, $F(1, 47) = 8.50$, $p = .005$, $d = 0.84$. Truth tellers ($M = 14.76$, $SD = 19.74$, 95% CI [8.05, 23.86]) reported more temporal details than liars ($M = 2.79$, $SD = 3.91$, 95% CI [1.30, 4.39]). The Time of Interview main effect, $F(1, 47) = 0.04$, $p = .840$, $= .01$, and Veracity x Time of Interview interaction effect , $F(1, 47) = 1.00$, $p = .323$, $= .02$, were not significant. Simple effects revealed that truth tellers reported more temporal details than liars in both the immediate and delayed interviews (Table 2).

A significant main effect of Veracity emerged for action details, F(1, 47) = 10.78, p = .001, d = 0.98. Truth tellers (M = 32.84, SD = 36.47, 95% CI [20.12, 48.87]) mentioned more action details (M = 6.92, SD = 8.56, 95% CI [3.81, 10.21]) than liars. The Time of Interview main effect was not significant, F(1, 47) = 1.89, p = .176, d = .08, but the Veracity x Time of Interview interaction effect was significant, F(1, 47) = 5.42, p = .024 = .10. Simple effects revealed that truth tellers provided more action details than liars in both the immediate and delayed interviews, see Table 2.

In summary, as predicted in Hypothesis 1, truth tellers reported significantly more visual, spatial, temporal, and action details than liars in the immediate statements, with large Cohen's d effect sizes for independent samples ranging from 0.88 to 1.21. Truth tellers also reported significantly more spatial, temporal, and action details after a delay. The effect sizes samples were again large, ranging from 0.75 to 0.93. There was no difference between truth tellers and liars in the amount of visual details after a delay. Thus, Hypothesis 2 was supported for spatial details, but rejected for visual, temporal, and action details.

Hypothesis 3 predicted a memory decline in truth tellers for temporal and action details after a delay. Truth tellers showed a significant decline in reporting action details, F(1, 47) = 7.00, p = .045, d = .42 (Cohen's d for paired samples), but no difference in reporting visual, spatial, and temporal details emerged between immediate and delayed statements, all F's < 2.52, p's > .088, d's < 0.38. There was no difference between liars' immediate and delayed statements in the amount of any type of (visual, spatial, temporal, action) detail, all F's < 3.13, p's > .080, d's < 0.37. Thus, Hypothesis 3 was supported for action details, but rejected for temporal details.

Reporting patterns of different type of details over time in the statements of truth tellers and liars are shown in Figure 1. Although not significant (except for action details), truth tellers showed a tendency to report a lower amount of details in the delayed than in the immediate interviews. In contrast, liars showed a non-significant tendency to report more visual, spatial, temporal, and action details in the delayed than in the immediate interviews.

To confirm overall patterns of reporting details over time, we considered it important to examine the effects on total details across veracity groups. A mixed ANOVA was carried out with Time of Interview as the within-subject factor and Veracity as the between-subjects factor and total details as the dependent variable. There was a significant Veracity x Interview interaction main effect for total details, F(1, 47) = 6.30, p = .016 = .12. Truth tellers reported significantly more total details in the immediate statements (M = 110.56, SD = 70.87, 95% CI [86.57, 140.43]) than in the delayed statements (M = 99.96, SD = 58.79, 95% CI [79.58, 123.75]), t(24) = 2.26, p = .034, d = .45. Liars showed no difference in reporting total details between the immediate statements (M = 53.46, SD = 25.15, 95% CI [43.56, 62.96]) and delayed

statements (M = 60.75, SD = 34.13, 95% CI [47.77, 75.83]), t(23) = 1.36, p = .189, d = .28.

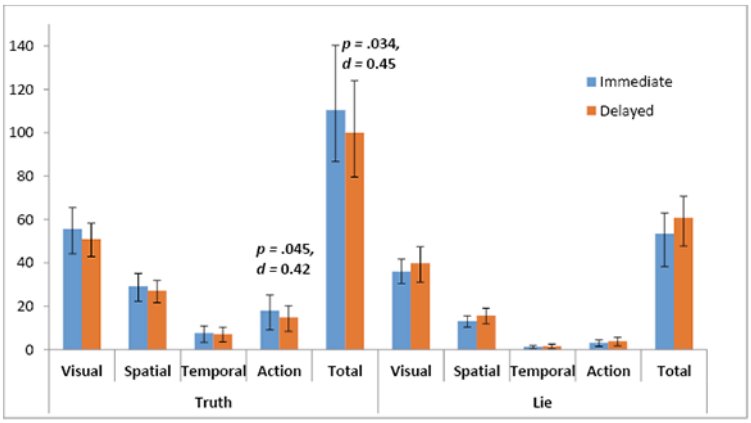

Figure 1
Total amount of different details with 95% confidence intervals in the immediate and delayed statements across veracity conditions

Consistency between the immediate and delayed interviews. An ANCOVA with Veracity as the between-subjects factor was conducted with reminiscent details as the dependent variable and amount of detail provided at the immediate interview as a covariate. The reason for including this covariate was that the number of reminiscent details in the delayed interview is related to the amount of detail provided in the immediate interview. That is, the more detail provided in the immediate interview, the less opportunity there is to add new additional detail in the delayed interview. The main effect of Veracity was not significant, F(1, 45) = 1.89, p = .176, d = .54. Truth tellers (M = 18.41, SD = 25.20, 95% CI [13.41, 23.76]) and liars (M = 30.71, SD = 36.20, 95% CI [17.46, 53.60]) provided a similar number of reminiscent details in the delayed interview.

The same ANCOVA with repetitions in the delayed interview as dependent variable and amount of detail provided at immediate interview as covariate did not result in a significant main effect of Veracity, .(1, 46) = 0.20, . = .654, . = .22. Truth tellers (*M* = 59.41, *SD* = 14.65, 95% CI [46.90, 73.28]) and liars (*M* = 55.43, *SD* = 21.07, 95% CI [43.12, 68.82]) reported a similar number of repetitions in the delayed interview.

The ANCOVA with omissions as the dependent variable and Total detail at the immediate interview as covariate showed no significant effect of Veracity either, .(1, 46) = 0.20, . = .654, . = .22. Truth tellers (*M* = 23.12, *SD* = 14.65, 95% CI [16.06, 30.37]) and liars (*M* = 27.17, *SD* = 21.07, 95% CI [20.28, 37.18]) omitted a similar number of details in the delayed interview [3] . Thus, Hypothesis 4 was not supported.

Discussion

Manipulation checks. The results showed that most of main manipulations were successful and were in line with deception literature

(DePaulo et al., 2003; Vrij et al.). That is, liars prepared before the interviews and did so not shorter than truth tellers. Participants were highly motivated to convince the interviewer. This is a critical requirement to elicit differences between truth tellers and liars (DePaulo et al., 2003). Finally, liars felt more stress than truth tellers indicating that deception is mentally challenging task (Vrij et al., 2017).

Hypotheses testing. In this experiment, we examined the effects of a sketch mnemonic on immediate and delayed statements of truth tellers and liars. Analysing the immediate descriptions of the sketch, we found that truth tellers reported significantly more visual, spatial, temporal, and action details than liars. This result is in line with previous findings showing that truth tellers, especially when interviewed immediately after an event, report more information than liars (Vrij, 2005, 2008, 2016).

In the delayed sketch descriptions, we found that truth tellers provided more spatial, but not more visual details than liars. Moreover, the statements of truth tellers were comparatively richer in terms of temporal and action details than the liars' statements.

Two conclusions can be derived from the findings for the delayed statements. First, the credibility cue richness of detail remained diagnostic after a delay (except for visual details). These findings differed from those obtained in some other studies (e.g., Harvey et al., 2017; Vrij et al., 2009) in which truth tellers did differ from liars in the amount of information provided when interviewed immediately, but not after a delay. Noteworthy, in those studies participants were interviewed only once, and no mnemonic was used. Thus, the presence of an immediate interview and/or the use of a mnemonic may have strengthened memory in truth tellers and, subsequently, made richness of detail a diagnostic cue to deceit even in delayed interviews.

Second, the absence of a difference in the amount of visual details across veracity conditions in the delayed interviews could be explained by different reporting strategies. Truth tellers might have been forthcoming in their delayed statements and simply told what they remembered. Liars might have found it easier to report more visual details than the other types of detail. Providing visual information is relatively safe as it does not give too many leads to investigators and implicate the interviewee. For example, liars can provide visual details that are typically found in a staff room e.g. information about furniture, kitchen utensils, or electric devices. Accounts with such information are less likely to contradict the factual evidence. However, reporting too many spatial, temporal or action details might have put liars at risk of revealing self-incriminating evidence. For example, information about locations of objects, specific times and/or activities can be potentially checked by investigators (e.g. CCTV records or asking neighbours who could have witnessed the event in question). It is known that liars tend to avoid reporting self-incriminating evidence (Granhag & Hartwig, 2008). More research is needed to support this explanation with more confidence.

In Hypothesis 2, we expected differences between truth tellers and liars for the amount of visual and spatial details only in the delayed interview.

However, truth tellers also reported more temporal and action details than liars after the delay. Immediate retrieval practice of these details could strengthen truth tellers' recall for temporal and action details after the delay. However, this explanation should be interpreted with caution because the study did not contain a control group.

We further found that truth tellers showed a significant decline in providing action and total details between the immediate and delayed interviews. Liars showed no decrease in reporting any type of details in this study. It supports the evidence that truth tellers experienced genuine decline in memory over time (Ebbinghaus, 1885/1913; Penrod et al., 1982; Schacter, 1999), whereas liars failed to take into account genuine memory decay and produced the reporting pattern reflecting a 'stability bias' (Harvey et al., 2017). Noteworthy, truth tellers demonstrated no decline in visual, spatial, and temporal details after a delay. It can be speculated that the decline in temporal details could happen because this type of information may be more difficult to retrieve from memory than the other details. For example, it could be challenging to remember specific actions of the event in question after the delay. Nevertheless, truth tellers still reported significantly more action details than liars after the delay. Closer observation of the number of temporal and action details reported by liars after the delay (Figure 1) shows that they provided only minimal amount of these details. It could be explained by the typical (avoidant) strategies used by liars ('keep the story simple') (Granhag & Hartwig, 2008).

Finally, there was no difference in between-statement consistency across veracity conditions. As in previous research (Granhag & Strömwall, 2002; Vredeveldt et al. 2014, Granhag et al., 2016), our experiment showed that truth tellers and liars were equally consistent in their statements. This finding is in contrast with the widely held stereotypical view that truth tellers are more consistent than liars (Bogaard et al., 2016). Two explanations can be derived from the lack of difference in consistency between truth tellers and liars in their repeated statements. First, truth tellers could not only add or omit, but also repeat a lot of details because their immediate and delayed statements were rich in detail, in general. Second, and in line with previous research (Leins, Fisher, & Vrij, 2012), liars may not experience difficulty in being consistent between their statements because a passive interviewing style (identical request of making a sketch during both interviews) was employed in this study. We did not change the modes of interview, therefore, liars were not constrained to use the 'repeat' strategy during the delayed interview.

Limitations and methodological considerations. Primarily, this study emphasised the quantity of details reported by truth-tellers and liars. We did not examine the quality of details in the accounts. Thus, there is a risk that truth-tellers could provide more details in their stories at the expense of the accuracy of those details. However, we believe truthful statements were not dramatically inflated by false details. First, witness memory research showed that immediate, non-suggestive

retrieval practice inoculated memory against inaccurate information at future repeated retrieval attempts (Gabbert, Hope, Carter, Boon, & Fisher, 2016; Pansky & Nemets, 2012). Second, consistency results showed that truth-tellers reported mostly repetitions compared to reminiscences in the delayed interview. Specifically, based on the premise that truth tellers more likely reported most of the details in the immediate interview correctly, it is reasonable to assume that they did the same by repeating the details in the delayed interview. Third, in the post-interview self-reported responses, liars, compared to truth tellers, not only indicated that they fabricated more details, but also the majority of their statements contained falsified details (Table 1). Nevertheless, the accuracy of the details in the veracity groups is relevant to examine in the further deception studies. Especially for the situations when a liar chooses the strategy of fabricating only a small part of the event in question (e.g., only the evidence that incriminates him/er) – a scenario that is plausible in the real world.

The majority of the study sample contained young female participants. Although we cannot think of theoretical reasons whether other groups would perform on the study tasks differently, a more representative sample would strengthen the findings of this experiment.

The rationale of using a two-week delay interval in this study is worthwhile to discuss. On the one hand, we considered that a shorter retention period (e.g., few days, or one-week) would not suffice to produce expected memory decay. On the other hand, an extended delay could cause practical issues, e.g., longer data collection time, or the availability of participants and/or research assistant(s) for the delayed interview.

The difference between the current experiment and Izotovas et al. (2018) was that in the current experiment we left out the immediate free recall. We still found that truth tellers were more detailed than liars after a delay, which shows that an initial free recall is not required for this effect. Still, we cannot say with certainty that the request to sketch caused the effect, it could also be the result of the retrieval practice associated with sketching. Research has shown that an immediate retrieval of information tends to strengthen episodic memory and facilitate later retrieval (Bjork, 1988; Shaw, Bjork, & Handal, 1995; Roediger & Karpicke, 2006). This confound is in our view not problematic because in interview settings the sketching procedure is introduced solely as a retrieval technique and serves no other purpose.

In addition, A3 paper format was chosen for sketching in the experiment. As this study was the elaboration of Izotovas et al. (2018), in which this format of the paper required, this was used for the sake of consistency. However, we speculate that large paper size should not corrupt deception detection. On the contrary, this condition could make the differences between truth tellers and liars even larger because possibilities for the additional retrieval cues would be created for them. This assumption deserves further investigation.

Further studies. In our experiment the first recall (the sketching) took part immediately after the participants witnessed the event. In real-life

investigations, however, the first interview often occurs a long time after the incident. Further studies should address the effect of the sketch mnemonic in discriminating between truthful and deceptive accounts in such situations.

Also, different type of details and how they change when reported repeatedly over time could be examined in future deception research using the sketch mnemonic. For example, someone could examine crime related vs. non-crime related details, or salient (central) vs. non-salient (peripheral) details in sketch descriptions of truth tellers and liars. An examination of such types of details could be especially relevant in investigative settings.

Furthermore, participants were given unlimited time to sketch and we did not measure the duration. Possible differences between truth tellers and liars with respect to time spent on sketching is worthwhile to investigate in the future.

Conclusions. This experiment provided additional evidence for previous research findings that the sketch mnemonic can be helpful in discriminating between truthful and deceptive accounts. The current experiment showed that truth tellers reported more information than liars, not only immediately after the event, but also in the delayed interviews. In investigative practices, the sketch technique can be a useful tool in making credibility inferences from repeated accounts, especially if the first interview takes place shortly after the incident in question. Further research about the usefulness of sketch mnemonic to detect deceit in the delayed interviews is needed.

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Notes

1 The video was used with the permission of the Lithuanian Criminal Police Bureau. The video was created by police practitioners and used at the investigative interviewing trainings for criminal police officers.

2 When this variable was introduced as a covariate in the analyses, there was no significant effect in the delayed statement on Total detail, $F(1, 44) = 1.93$, $p = .172$, Importar imagen = .04, Reminiscences, $F(1, 44) = 0.25$, $p = .620$, = .01, Repetitions, $F(1, 44) = 3.64$, $p = .063$, = .08, or Omissions, $F(1, 44) = 0.11$, $p = .744$, = .002.