

Expect the Unexpected? Variations in Question Type Elicit Cues to Deception in Joint Interviewer Contexts

DOMINIC J. SHAW^{1*}, ALDERT VRIJ¹, SHARON LEAL¹, SAMANTHA MANN¹,
JACKIE HILLMAN¹, PÅR ANDERS GRANHAG² and RONALD P. FISHER³

¹Psychology Department, University of Portsmouth, UK

²Psychology Department, University of Gothenburg, Sweden

³Psychology Department, Florida International University, US

Summary: We examined the effect of (i) a second interviewer's demeanour and (ii) asking expected and unexpected questions on cues to deception. We predicted that liars compared with truth tellers would provide more detail to expected questions and less detail to unexpected questions, particularly when the second interviewer is supportive. Liars prepare answers for expected questions, and a supportive interviewer will encourage them to provide more detail. By definition, liars have not prepared answers for unexpected questions, and their answers to such questions will be less detailed. Participants ($N = 168$) appeared before two interviewers: The first asked all the questions, and the second remained silent. The second interviewer exhibited either a supportive or a neutral demeanour. As predicted, liars provided more detail to expected questions and less detail to unexpected questions, particularly when the second interviewer was supportive. In conclusion, a supportive second interviewer elicits cues to deceit. Copyright © 2013 John Wiley & Sons, Ltd.

Suspects are frequently interviewed with two interviewers present in the room. For example, a survey amongst UK police officers revealed that 68% of interviews with juvenile suspects are conducted with more than one investigator present (Sim & Lamb, 2012). In addition, suspect interviews in human intelligence settings are also frequently carried out with two interviewers (Soufan, 2011). Research papers on using pairs of interviewers, outside the intelligence (or police) context, have revealed three advantages of this technique (Huber & Power, 1985; Kincaid & Bright, 1957). First, it is efficient as one interviewer can engage in conversation while the other can concentrate on recording answers accurately and completely. Second, when the interview becomes unstructured or when the first interviewer vigorously pursues one train of thought, a second interviewer can pick up on points missed by the first interviewer. Third, when analysing the interviews, the second interviewer can aid the recall of the first. Despite the frequent use of two interviewers, there is not much forensic research examining the effect of using a second interviewer on suspect's responses. In the present experiment, we examined which demeanour (being supportive or neutral) a second interviewer should adopt to maximise verbal differences between truthful and deceptive interviewees. We examined the effect of the second interviewer's demeanour on the answers to (i) questions that were in all likelihood anticipated and (ii) questions that were in all likelihood not anticipated.

THE EFFECT OF THE SECOND INTERVIEWER

Mann et al. (in press) are to our knowledge the only researchers to date to have examined the effect of a second interviewer on the verbal recall of truth tellers and liars. They found that truth tellers were more detailed than liars, particularly when the second interviewer displayed a supportive

demeanour (head nodding, smiling and an open posture). A supportive interviewer facilitates talking and encourages cooperative witnesses (e.g. truth tellers) to talk (Bull, 2010; Fisher, 2010; Memon, Meissner, & Fraser, 2010; Milne & Bull, 1999). For example, an experiment examining the effect of rapport on eyewitness recall of a dramatic videotaped event showed that participants in the 'rapport' interviewer-attitude condition recalled more correct, and the same amount of incorrect, information as participants in the 'neutral' and 'abrupt' conditions (Collins, Lincoln, & Frank, 2002). Talkative truth tellers raise the standard for liars, who also need to become more talkative to match truth tellers. Liars will not always be able or willing to do this. Liars may be unable to because they lack fantasy to fabricate additional detail (Köhnken, 1996; 2004), or they may be unwilling because they fear that the additional detail sounds implausible or that it increases the opportunity for interviewers to verify these details and discover that they are lying (Hartwig, Granhag, & Strömwall, 2007; Masip & Ces, 2011; Nahari, Vrij, & Fisher, 2012a, 2012b). In sum, a supportive second interviewer makes truth tellers, but not liars, more willing to talk, resulting in enhanced differences in the amount of detail truth tellers and liars provide when a second interviewer is present.

The questions used by Mann et al. (in press) originated from a previous study (Warmelink, Vrij, Mann, Leal, & Poletiek, 2011, published online), and were rated as unexpected by the participants. Unexpected questions require liars to provide unprepared, spontaneous answers. Spontaneous lies contain fewer details than spontaneous truthful stories (DePaulo, Lindsay, Malone, Muhlenbruck, Charlton, & Cooper, 2003; Masip, Sporer, Garrido, & Herrero, 2005; Sporer, 2004; Vrij, 2005; 2008), and as Mann et al. (in press) found, a supportive second interviewer enhances this difference between truth tellers and liars. The opposite effect, that liars provide more detail than truth tellers which is further enhanced by a supportive second interviewer, may occur when liars expect the questions and prepare answers to them. Observers pay attention to detail, and the richer an account is perceived to be, the more

*Correspondence to: Dominic Shaw, University of Portsmouth, Psychology Department, King Henry Building, King Henry 1 Street, Portsmouth, PO1 2DY, UK.
E-mail: dom.shaw@port.ac.uk

likely it will be believed (Bell & Loftus, 1989; Johnson, 2006; Johnson, Foley, Suengas, & Raye, 1988). Liars are aware that interviewers pay attention to detail when making veracity judgements and are therefore keen to provide details in order to make an honest impression (Nahari, Vrij, & Fisher, 2012a). As a result, liars may prepare a detailed alibi and will report it when the opportunity arises. This opportunity does arise when an expected question is asked, and a supportive second interviewer may encourage liars to recall all the information they have prepared. The result of this differential pattern of responses to expected and unexpected questions is that liars will give more detail than truth tellers when answering expected questions but less detail than truth tellers when answering unexpected questions and that this pattern will be exaggerated by the presence of a supportive second interviewer. In other words, the *difference in detail* between expected and unexpected questions will be larger in liars than in truth tellers, particularly in the supportive second interviewer condition (Hypothesis 1).

Questions can be unexpected for two different reasons. First, the content of the question can be unexpected. For example, Warmelink, Vrij, Mann, Jundi, and Granhag (2012) instructed participants to tell the truth or lie about their forthcoming flight and asked questions about the purpose of the trip, the planning of the trip, the transportation from the airport after arrival and about the core event of the trip. Participants reported that they had expected the questions about the purpose of the trip, whereas all the other questions were unanticipated. Second, the format of the question can be unexpected. For example, a request to *sketch* the layout of a restaurant or office is more unexpected than the request to *verbally recall* the layout of a restaurant or office (Vrij et al., 2009; Vrij, Mann, Leal, & Fisher, 2012), and being asked to recall an event in *reverse* (time) *order* is more unexpected than being asked to recall an event in *normal*, *chronological order* (Vrij, Leal, Mann, & Fisher, 2012). In the present experiment, we used the latter definition of unexpected questions and asked participants to describe the event in normal order (expected question) and in reverse order (unexpected question). Recalling an event in reverse order is not only unexpected, it is also particularly difficult for liars. Deceptive behaviour is likely to impact on two basic mechanisms in cognition: working memory and speed of processing (Bond, 2012). Answering in reverse order may be particularly taxing on these resources, as liars must retrieve real and imagined data from long-term memory into working memory (Baddeley & Hitch, 1974). This task also conflicts with our real-world knowledge of temporal sequence (Gilbert & Fisher, 2006; Münte, Schiltz, & Kutas, 1998; Kahana, 1996) and makes it more difficult to reconstruct the event from a schema (Geiselman & Callot, 1990). The reverse order instruction was originally used as a memory enhancing technique as part of the cognitive interview (Fisher & Geiselman, 1992). It has since been effectively applied in deception research both in the laboratory (Vrij et al., 2008; Vrij, Leal, Mann, & Fisher, 2012) and in the field (Evans, Houston, & Meissner, 2012; Zimmerman, Veinott, Meissner, Fallon, & Mueller, 2010).

In the present experiment, the second interviewer remained silent throughout the interview, because an

experienced UK police interviewer informed us that this is how two interviewers are normally used. Typically, one interviewer does the talking while the second interviewer mostly remains silent, sometimes taking notes. Mann et al. (in press), who also introduced a silent second interviewer, found that participants looked at the second interviewer for only 8% of the time. It sounds reasonable that the impact of a second interviewer will become stronger if participants pay more attention to the second interviewer. We therefore introduced the second interviewer as a 'senior investigator and expert in lie detection', a procedure also used in human intelligence interviews (Soufan, 2011), and thought that this may cause interviewees to pay more attention to the second interviewer. This introduction could well overshadow the effect that the speaking interviewer's demeanour has on the interviewee's responses. We therefore did not predict an effect of the speaking interviewer's demeanour on the interviewee's verbal recall; however, we manipulated the speaking interviewer's demeanour. Rather than using one demeanour (either neutral or supportive), we chose to introduce both demeanours as it results in a more complete picture of the effect of interviewers' demeanour on verbal responses.

TEMPORAL CONNECTIVES

Temporal connectives, words such as *before* and *after*, are used to form a temporal sequence of events. Kintsch and Mannes (1987) found that they play an important role in script generation. In their study, participants were asked to generate a script by describing what typically happens in three common situations: going to a restaurant, buying groceries and going to the doctors. Temporal connectives frequently occurred in the participants' accounts, and Kintsch and Mannes (1987) suggested that they act as retrieval cues, establishing the links between each new episode.

Kintsch and Mannes' (1987) experiment related to scripted events. In our experiment, participants organised a room for a forthcoming seminar, and we did not expect them to have carried out this task many times before. Therefore, the script that they use in the interview will not be of the same quality as a script created from a stereotyped event, such as buying groceries. However, this does not preclude any possible differences between truth tellers' and liars' recollections. Script generation from imagined events is likely to be different, because mental representations of false events are likely to be less coherent than those of truthful events (Duran, Hall, McCarthy, & McNamara, 2010). We examined the frequency of temporal connectives in responses to a reverse order question, and a distinction was made between normal ('and then') and reverse order ('before that') connectives. As we can expect liars to have a perceptually impoverished experience compared with truth tellers, they may have a weaker, less detailed script. And given that temporal connectives act as retrieval cues, liars may well use them less, owing to this weaker, less detailed script. Further, given the disorganised nature of their script, restructuring this information in reverse order may be particularly difficult for liars. This should reflect in their responses with connectives that do not cohere with a reverse order sequence. We therefore expect that liars will use fewer reverse order ('before that') connectives than truth tellers (Hypothesis 2).

METHOD

Participants

A total of 168 participants (57 males and 111 females) took part in the study. The sample comprised undergraduate students and university staff, with an average age of $M = 23.40$ years ($SD = 7.4$).

Design

To test the hypotheses, we used a 2 (Veracity: truth vs lie) $\times$ 2 (Silent Interviewer Demeanour: supportive vs neutral) $\times$ 2 (Speaking Interviewer Demeanour: supportive vs neutral) between-subjects design with the following four dependent variables: (i) the frequency of visual and spatial details in the normal order recollections; (ii) the frequency of visual and spatial details in the reverse order recollections; (iii) the frequency of normal order temporal connectives in normal order recollections; and (iv) the frequency of reverse order temporal connectives in reverse order recollections. We used the same design when examining participants' motivation, their perceptions about receiving an incentive or penalty and manipulation checks about the demeanour of the interviewer. For the manipulation check regarding expertise and for gaze patterns, different designs were used, and we will explain these when we report the analyses.

Procedure

Participants were recruited via posters and leaflets, and online via advertisements on the University's staff and student portals. Participants were invited to try to 'Fool an expert' in lie detection and were promised a £5 reward for convincing the expert. Although participants were informed that the reward was conditional on a good performance, all participants received £5 for taking part.

Upon arrival in the Psychology Department, the participants were greeted by the experimenter and taken to a quiet room close by. Participants signed an informed consent form and completed a pre-interview questionnaire that measured how motivated they were to perform well in the interview on a 5-point scale ranging from (1) 'Not at all motivated' to (5) 'Very motivated'. At this stage, participants were randomly allocated to either the truth ($N = 82$) or lying ($N = 86$) condition, and given instructions about their task.

Truth tellers' task was to prepare a room for a (mock) seminar (room A), which involved completing a few basic organisational tasks. The task was modified from Leins, Fisher, and Vrij (in press) and Leins, Fisher, Vrij, Leal and Mann (2011, Experiment 2). The experimenter explained that, owing to the absence of the individual who was supposed to prepare the room, the participant must now prepare the room instead.

Room A contained various objects relevant to a seminar, including three tables, four chairs (all varying in style and colour), a flip chart, a clipboard and attendance sheet, and seminar materials for four people (articles, pens and pads of paper). Before participants began the task, all items were organised according to a pre-determined and standardised plan of the room. The room was deliberately made to look as if it had been left disorganised from a previous

seminar to create a sense of realism. The seminar materials were located in an untidy pile at the far end of the tables, and the chairs remained in seemingly random locations around the room. All participants experienced the same disorganised layout of Room A before they completed their task.

On entering Room A, truth tellers were presented with a sheet of instructions detailing the order of the four organisational tasks to be completed. They were instructed that they had as much time as they needed to complete the tasks and that they should notify the experimenter that they had finished by knocking on the door they had entered through. The first of the four tasks was to complete the attendance sheet and place it on the low table in the corner of the room. Second, participants were instructed to place all of the chairs behind the two tables in the centre of the room and ensure that they were facing the flipchart. The final task involved sorting through the seminar materials; a pen, a pad of paper and one of each of the colour-coded journals were to be placed in front of each of the chairs.

After completing the tasks, truth tellers were briefed before being taken to the interview room:

'I have just been informed that someone has accessed and stolen some sensitive information from the University's servers, and I need you to have an interview to determine whether you know anything about this incident. It is the interviewers' task to determine whether you have done this. You will therefore be interviewed about your activities during the last 30 minutes.'

Before being taken to the interview suite, participants were reminded that they would receive £5 as a reward if they managed to successfully convince the expert that they were telling the truth. They were also told that they would have to write a statement about their activities in Room A if the interviewer would not believe them.

Liars' role in the study was broken down into two stages. Their main task was to 'illegally' copy some encrypted information from another room, Room B. The participant was first informed about this task: 'In Room B is a computer, and on the desktop of that computer is a file called "Delta". We would like you to make a copy of this file. Before you can do that you need to decrypt the file, and this involves entering a code. To do that, double click on the file and a small window will pop-up, prompting you for a password. That information is on this card (the experimenter shows the participant the card in the sleeve with all the materials in). There is also some basic information here about how to save a copy of the file using the USB stick provided. Room B will be locked, so you will need this key to enter the room.' The experimenter then explained that their alibi (in case anyone should question them) is that they were preparing Room A for a seminar and that someone else complicit in the crime would prepare the room on their behalf. After receiving this information, liars viewed Room A which enabled them to formulate an alibi. They were provided with the same sheet of instructions provided to truth tellers and were asked to imagine completing the organisational tasks and to memorise this information.

Liars were then led to Room B (located a short distance from Room A) to complete their primary task. On completion of their task, the experimenter set the scene for the interview to take place:

'I have just been informed that someone has accessed and stolen some sensitive information from the University's servers, and I need you to have an interview to determine whether you know anything about this incident. Just to reiterate, in this interview you are going to lie. You must deny that you (i) have been in Room B and (ii) that you have completed the task in Room B. Instead you are going to say that you prepared Room A. If you are asked anything about Room B, you have got to do your best to convince the interviewer that you know nothing about it.' Again, before being escorted to the interview suite, participants were reminded that they would receive £5 for convincing the expert and were further told that they would have to write a statement about their activities in room A if the interviewer did not believe them.

The interview

The interview schedule was broken down into two parts. One part focused on the alleged activities in Room A, and the other part on the alleged activities in Room B. We focus here on the questions that relate to Room A.

The questions were aimed at eliciting detailed spatial and temporal information. The interview commenced with a question we thought the participants would have expected: (1) 'Giving as much detail as possible, please describe all the things you did whilst inside Room A in the exact order in which you did them.' After some filler questions, the participants were then asked, (2) 'Please now describe, in reverse chronological order, exactly what you did in Room A?'

After the interview, participants completed a post-interview questionnaire that included three manipulation checks. First, participants rated the expertise of the interviewers from (1) novice to (7) expert. Second, the participants were asked to indicate on a 7-point scale whether each interviewer was (1) suspicious to (7) trusting, (1) unsupportive to (7) supportive and (1) negative to (7) positive. The questions were clustered into one 'supportive' index (for the silent interviewer, Cronbach's $\alpha = .88$, inter-item correlations $r = .700$; for the speaking interviewer, Cronbach's $\alpha = .89$, inter-item correlations $r > .673$). Third, participants were asked to mark which of the interview questions were unexpected by ticking a corresponding box.

The questionnaire also included questions about the likelihood of receiving £5 and the likelihood of having to write a statement [(1) not at all likely to (7) very likely].

Interviewer demeanour

In each interview, two female interviewers were present, a speaking interviewer and a silent interviewer. Each interviewer was either supportive or neutral. In the supportive condition, the interviewers tried to show the participants that they believed what they were saying. They achieved this by leaning forward, nodding and smiling when the participants answered. The interviewers also maintained an open posture

throughout the interview. These behaviours were selected as they are often associated with friendliness and empathy in communication research (Burgoon, 1991; Burgoon, Birk, & Pfau, 1990; Seay and Altekruze, 1979; Smith-Hanen, 1977). These same operationalisations were used by Mann et al. (in press). In the neutral condition, the interviewers kept an open posture but largely did not respond to the participant's answers. They were also conscious, however, of not appearing negative or disbelieving. The speaking interviewer introduced herself as a trainee interviewer, before mentioning that she was being accompanied by a senior investigator, who is an expert in lie detection. To make our manipulation more believable, the 'expert' interviewer was several years older than the 'trainee' and also dressed more formally.

Coding and data analysis

The interviews were videotaped, audiotaped and transcribed, and the verbal coding was based on the transcripts. A coder, blind to the hypotheses and experimental conditions, read each answer carefully and marked every detail the interviewee gave. These details were then classified as visual, spatial or neither. For example, the sentence 'I put the clipboard on the low table in the left hand corner' contains three visual details ('clipboard', 'low', and 'table'), two spatial details ('on' and 'left hand corner') and one other detail (put). A second coder, also blind to the hypotheses and experimental conditions, also coded spatial and visual details using a subsample of 37 transcripts (23%). The inter-rater reliability between the two coders for both the normal order question ($r = .85$) and the reverse order question ($r = .82$) was high. Comparisons of visual [$t(36) = -.546, p = .588$] and spatial [$t(36) = 1.071, p = .291$] details coded in the normal order question, and visual [$t(36) = 1.278, p = .209$] and spatial [$t(36) = .598, p = .554$] details coded in the reverse order question revealed no differences between the two coders' data.

To create the difference score, first, the total number of spatial and visual details observed in the normal order recall and reverse order recall questions was recorded, and two new variables were created with the sum number of these details in each question. Next, a new variable was created by taking away the sum number of visual/spatial details in the reverse order question from that of the normal order question. This new variable represents the difference in detail between the questions and is referred to as the 'difference score'. Inspection of these difference scores revealed that the data set contained nine outliers, that is, nine participants with an average difference score that fell plus or minus two standard deviations from the mean of the total sample (Field, 2005). Those nine participants were removed from our data set, a common procedure when dealing with outliers in statistical data (Field, 2005).

The first coder also rated the reverse order question for the temporal connectives 'and then' and 'before that'. 'And then' is considered to be a normal order phrase, and 'before that' is considered to be a reverse order phrase. For clarity reasons, we refer to these phrases as 'and then' and 'before that' in the Results section. The second coder also rated the temporal connectives in a subsample of 37 transcripts (23%). The inter-rater reliability between the two coders for 'and then' (.97) and 'before that' was also high (.98). Comparisons of normal order connectives [$t(36) = 2.021$,

$p = .051$] revealed no difference between the coders; however, there was a difference in the coding of reverse order connectives [$t(36) = 2.462$, $p = .019$]. Regarding the significant difference in reverse order connectives, the mean scores were small, and even a small difference amounts to a significant difference. The exceptionally high correlation ($r = .98$) indicates that the coding was reliable.

In order to check that participants took notice of the silent interviewer, all videos were coded subjectively for gaze duration towards the interviewers. A third coder, blind to the hypotheses and experimental conditions, rated the percentage of time the interviewee looked at either of the two interviewers or away from the interviewers on a percentage scale, with the three possible places the interviewee could be looking always summing up to 100%. For example, the rating could be '60% to the speaking interviewer, 20% to the silent interviewer and 20% elsewhere'. A fourth coder, also blind to the hypotheses and experimental conditions, also coded gaze duration using a subsample of 59 videos (37%). The inter-rater reliability between the two coders for gaze at the silent (.74) and speaking (.93) interviewers was high.

RESULTS

Motivation, incentive and penalty

Participants were motivated to do well in the experiment [$M = 4.08$, $SD = 0.75$] on a 5-point Likert scale, with 55% reporting that they were 'quite motivated' (score of 4) and 27% 'very motivated' (score of 5). An ANOVA with motivation as the dependent variable revealed no significant main or interaction effects (all F s < 1.38, all p s > .24), indicating that the participants' motivation levels were similar amongst the experimental conditions.

The ANOVA regarding the likelihood of receiving an incentive of £5 resulted in a main effect for Veracity, $F(1, 151) = 10.78$, $p < .001$, $\eta^2 = .067$, whereas all other main and interaction effects were not significant, all F s < 2.21, all p s > .14. Truth tellers ($M = 4.64$, $SD = 1.3$) more than liars ($M = 3.91$, $SD = 1.5$) were inclined to think that they would receive a £5 incentive.

The ANOVA regarding the likelihood of having to write an essay also resulted in a main effect for Veracity, $F(1, 151) = 10.98$, $p < .001$, $\eta^2 = .068$, whereas all other main and interaction effects were not significant, all F s < 2.49, all p s > .12. Liars ($M = 3.91$, $SD = 1.2$) more than truth tellers ($M = 3.29$, $SD = 1.2$) were inclined to think that they would be requested to write an essay. In sum, the participants were motivated to be convincing, and the incentive and penalty appeared realistic.

Manipulation checks: demeanour of interviewers, expertise of the interviewer and expectedness of the questions

An ANOVA with ratings of the *speaking* interviewer's demeanour as the dependent variable revealed significant main effects for Veracity, $F(1, 151) = 6.78$, $p = .01$, $\eta^2 = .04$, Silent Interviewer, $F(1, 151) = 27.67$, $p < .001$, $\eta^2 = .16$, and Speaking Interviewer, $F(1, 151) = 19.97$, $p < .001$, $\eta^2 = .12$. None of the interaction effects were significant, all F s < .68,

all p s > .41. In alignment with the experimental manipulation, the speaking interviewer was perceived as more supportive in the supportive speaking interviewer condition ($M = 5.07$, $SD = 1.1$) than in the neutral speaking interviewer condition ($M = 4.32$, $SD = 1.2$). In addition, truth tellers found the speaking interviewer more supportive ($M = 4.93$, $SD = 1.2$) than liars ($M = 4.48$, $SD = 1.1$). Finally, the speaking interviewer was perceived as more supportive when the silent interviewer was neutral ($M = 5.13$, $SD = 1.0$) than when the silent interviewer was supportive ($M = 4.23$, $SD = 1.3$).

An ANOVA with ratings of the *silent* interviewer's demeanour as the dependent variable revealed a significant main effect for Veracity, $F(1, 151) = 61.33$, $p < .001$, $\eta^2 = .29$, whereas all other main effects and interaction effects were not significant, all F s < 2.76, all p s > .10. Again, in line with our manipulation, the silent interviewer was perceived as more supportive in the supportive silent interviewer condition ($M = 5.22$, $SD = 1.3$) than in the neutral silent interviewer condition ($M = 3.67$, $SD = 1.32$).

A 2 (Veracity) $\times$ 2 (Silent Interviewer Demeanour) $\times$ 2 (Speaking Interviewer Demeanour) $\times$ 2 (Expertise of Interviewer) mixed ANOVA with Expertise of the Interviewer (speaking interviewer or silent interviewer) as the only within-subjects factor revealed a main effect for Expertise, $F(1, 140) = 16.13$, $p < .001$, $\eta^2 = .10$, whereas all other main and interaction effects were not significant, all F s < 2.17, all p s > .14. The silent interviewer was perceived as being more of an expert in lie detection ($M = 5.22$, $SD = 1.3$) than the speaking interviewer ($M = 4.66$, $SD = 1.1$).

A 2 (Veracity) $\times$ 2 (Silent Interviewer Demeanour) $\times$ 2 (Speaking Interviewer Demeanour) $\times$ 2 (Type of Question) mixed ANOVA with the Type of Question (normal order versus reverse order) as the only within-subjects factor and unexpectedness as the dependent variable revealed a significant main effect for Type of Question, $F(1, 151) = 189.29$, $p < .001$, $\eta^2 = .56$, whereas all other main effects and interaction effects were not significant, all F s < 3.60, all p s > .06. Only 9% ($SD = 28$) of the participants found the normal order question unexpected, whereas the majority of participants (68%, $SD = 47$) found the reverse order question unexpected.

In sum, both the speaking and silent interviewers were perceived as more supportive in the supportive interviewer conditions; the silent interviewer was considered more of an expert in lie detection than the speaking interviewer; and the reverse order question was more unexpected than the normal order question. This means that our manipulations were successful.

Gaze

A 2 (Veracity) $\times$ 2 (Silent Interviewer Demeanour) $\times$ 2 (Speaking Interviewer Demeanour) $\times$ 2 (Gaze at Interviewer) mixed ANOVA with Gaze at Interviewer (towards speaking interviewer or silent interviewer) as the only within-subjects factor and eye contact as the dependent variable revealed a significant main effect for Gaze at Interviewer, $F(1, 145) = 377.27$, $p < .001$, $\eta^2 = .72$.¹ Participants looked considerably more at the speaking interviewer ($M = 40.62\%$ of the time, $SD = 20.7$)

¹ The gaze patterns of eight participants could not be clearly seen on the videotapes, because of wearing glasses for example, and these participants were dropped from this analysis.

than at the silent interviewer ($M = 7.33\%$ of the time, $SD = 5.2$). In fact, 7.33% indicates that the participants hardly looked at the second interviewer. The Veracity main effect was also significant, $F(1, 145) = 5.40$, $p = .022$, $\eta^2 = .04$, as was the Veracity $\times$ Gaze at Interviewer interaction effect, $F(1, 145) = 4.95$, $p = .028$, $\eta^2 = .03$. The latter effect is the most informative of the two. Liars ($M = 44.30$, $SD = 21.7$) maintained more eye contact with the speaking interviewer than truth tellers ($M = 36.67$, $SD = 18.9$), $F(1, 151) = 5.31$, $p = .023$, $\eta^2 = .03$, whereas no difference emerged in maintaining eye contact with the silent interviewer between liars ($M = 7.46$, $SD = 6.0$) and truth tellers ($M = 7.21$, $SD = 4.2$), $F(1, 151) = .09$, $p = .768$, $\eta^2 = <.01$. All other main effects and interaction effects were not significant, all F s < 1.81 , all p s $> .18$.

Hypotheses testing

An ANOVA with the mean difference score as the dependent variable revealed a significant Veracity $\times$ Silent Interviewer Demeanour interaction effect, $F(1, 151) = 9.82$, $p = .002$, $\eta^2 = .06$. All other main effects and interaction effects were not significant, all F s < 1.14 , all p s $> .28$. Simple effect tests showed that liars obtained a significantly larger difference score ($M = 7.78$, $SD = 6.0$) than truth tellers ($M = 3.33$, $SD = 7.0$) when the silent interviewer was supportive, $F(1, 75) = 9.39$, $p = .003$, $\eta^2 = .11$. In contrast, when the silent interviewer was neutral, the difference scores of liars ($M = 4.54$, $SD = 7.0$) and truth tellers ($M = 6.73$, $SD = 6.6$) did not differ, $F(1, 80) = 2.24$, $p = .148$, $\eta^2 = .03$. This supports Hypothesis 1.

A larger difference score for liars than for truth tellers in the supportive interviewer condition can be caused by liars being more detailed than truth tellers in answering the (expected) normal order question (option 1), liars being less detailed than truth tellers in answering the (unexpected) reverse order question (option 2), or due to a combination of the two (option 3). In order to examine these three options, a 2 (Veracity) $\times 2$ (Type of Question) mixed ANOVA was carried out with Veracity as a between-subjects factor, Type of Question (normal order or reverse order) as a within-subjects factor and the total number of details as the dependent variable. The analysis only included the participants allocated to the supportive silent interviewer condition. The Veracity main effect was not significant, $F(1, 75) = .21$, $p = .649$, $\eta^2 < .01$, but the Question main effect was, $F(1, 75) = 58.66$, $p < .001$, $\eta^2 = .44$. Of most interest is the Veracity $\times$ Question interaction effect, which was also significant, $F(1, 75) = 9.39$, $p = .003$, $\eta^2 = .11$. Liars ($M = 23.88$, $SD = 8.8$) were more detailed than truth tellers ($M = 20.86$, $SD = 8.7$) when answering the (expected) normal order question and less detailed ($M = 16.10$, $SD = 8.1$) than truth tellers ($M = 17.53$, $SD = 7.2$) when answering the (unexpected) reverse order question. However, the difference between liars and truth tellers in the normal order question, $F(1, 75) = 2.27$, $p = .136$, $\eta^2 = .03$, and the reverse order question, $F(1, 75) = .66$, $p = .418$, $\eta^2 = .01$, was not significant. In other words, the significant difference score obtained between truth tellers and liars and described earlier was due to the combination of liars being more detailed in

answering the expected normal order question and less detailed in answering the unexpected reverse order question (option 3).

A MANOVA with the use of the phrases 'and then' and 'before that' as dependent variables revealed a significant Veracity main effect, $F(2, 150) = 3.53$, $p = .032$, $\eta^2 = .05$. All other main effects and interaction effects were not significant, all F s $< .53$, all p s $> .59$. Univariate tests showed that truth tellers ($M = 1.45$, $SD = 2.1$) said 'before that' more than liars ($M = 0.74$, $SD = 1.3$), $F(1, 158) = 6.87$, $p = .010$, $\eta^2 = .04$, supporting Hypothesis 2. Truth tellers ($M = 2.26$, $SD = 2.0$) and liars ($M = 2.18$, $SD = 2.0$) did not differ from each other in saying 'and then', $F(1, 158) = .06$, $p = .814$, $\eta^2 = <.01$.

The mean scores indicate that both truth tellers and liars used the phrase 'and then' more often than the phrase 'before that'. We computed the ratio between 'before that' and 'and then' (the frequency of using the phrase 'before that' divided by the frequency of using the phrase 'and then')² and carried out an ANOVA with this ratio as the dependent variable and Veracity as the factor. The analysis revealed a significant effect, $F(1, 159) = 4.03$, $p = .046$, $\eta^2 = .03$. Truth tellers' ratio was close to 1 ($M = 0.90$, $SD = 1.6$), indicating that they used the words 'and then' and 'before that' with similar frequency. Liars' ratio was close to .5 ($M = 0.49$, $SD = 0.9$), indicating that they used the words 'and then' on average twice as much as the word 'before that'.

DISCUSSION

In accordance with previous findings (Mann et al., in press), a supportive second interviewer effectively elicited cues to deceit. When the silent interviewer was supportive, we found that the difference in detail between expected and unexpected questions was significantly larger for liars than truth tellers. This was in part due to liars providing more detail in the expected question and fewer details in the unexpected question. The finding that liars provided more details is somewhat novel but not new: It was also found in two other studies in which the expected/unexpected questions approach was used (Lancaster, Vrij, Hope, & Waller, 2012; Warmelink et al., 2012). For example, in Warmelink et al., truth tellers and liars were interviewed about their alleged forthcoming trip. Expected questions about the purpose of the trip (e.g. 'What is the main purpose of your trip?') were followed by unexpected questions about transport (e.g. 'How are you going to travel to your destination?'), planning ('What part of the trip was easiest to plan?') and the core event ('Keep in mind an image of the most important thing you are going to do on this trip. Please describe this mental image in detail?'). Liars, compared with truth tellers, gave significantly more detail to the expected questions and significantly less detail to the unexpected questions. The same argument in the present study can be given to explain Warmelink et al.'s findings. When liars are presented with a question that they expect and have prepared an

² In case 'and then' was 0, we used the 'before that' score as the ratio score. For example, if the 'before that' score was '4', the ratio score was '4' etc.

answer for, they are motivated to give as much information as possible. In the current study, it appears that a supportive interviewer enhanced this finding.

A second reason for the larger difference in liars is that liars were less detailed than truth tellers when answering the unexpected reverse order question. Reverse order questions are likely to impact on two basic cognitive mechanisms: working memory and speed of processing. For liars, answering in reverse order requires retrieving real and imagined data from long-term memory into working memory, which may result in shorter, less detailed answers. Furthermore, liars cannot prepare for unexpected questions, which is likely to reduce the quality of their responses.

Our analysis of gaze behaviour replicated the findings of Mann *et al.* (in press) in three ways. First, participants looked more at the speaking interviewer than the silent interviewer, and liars looked more at the speaking interviewer than truth tellers. Second, both liars and truth tellers looked at the silent interviewer less than 10% of the time. Third, despite the fact that participants hardly looked at the second interviewer, they correctly noticed the second interviewer's demeanour, and their verbal responses were influenced by this demeanour. It sounds reasonable that a second silent interviewer will have more impact on participants' responses if participants pay more attention to him or her. In that respect, Mann *et al.* (in press) suggested that introducing the second interviewer as a 'senior investigator and expert in lie detection' (which we did in the present experiment) might increase the amount of time participants that would look at the second interviewer. This did not happen. Someone could argue that there was no reason for participants to look more at the second interviewer. The only activity of the second interviewer was displaying a certain demeanour (neutral or supportive), and this was correctly noticed by the participants. Other ways could be tested to increase the amount of time someone looks at a silent second interviewer. For example, the second silent interviewer could change his or her demeanour on a few occasions during the interview. That should keep the participants alert. Another possibility is to introduce the second interviewer half-way through the interview, as that may put more emphasis on the second silent interviewer.

The finding that the speaking interviewer's demeanour had no effect on participants' responses requires some explanation. Participants looked considerably more at the speaking interviewer and hardly looked at the silent interviewer at all. So why did the speaking interviewer's demeanour not have more effect on the participants' responses? We can provide two explanations. First, as reported in the introduction, we introduced the second interviewer as a 'senior investigator and expert in lie detection', and such an introduction could have caused participants to disregard or pay little attention to the speaking interviewer's demeanour. Second, the speaking interviewer also engaged in verbal communication with the interviewee. In other words, the speaking interviewer provided two sources of information: demeanour and speech. This second source of information (speech) may have diminished the effect of the first source (demeanour), as typically happens when interviewees are exposed to different sources of information (Patterson, 1995). In contrast, the silent interviewer's only interaction with participants was displaying a positive

demeanour. If the speaking interviewer's verbal interaction with participants acted as a distraction, then the silent interviewer's demeanour may have impacted more on participants' responses.

Our prediction that liars would use more reverse order temporal connectives was also supported. Liars used the connective 'before that' less often than truth tellers, whereas there was no difference for the 'and then' connective. Truth tellers' experience of the event they recalled during the interview was inherently different from liars' experience. As a result, truth tellers may have had a more coherent reverse order script of their activities, reflected in the increased use of reverse order temporal connectives. The finding relating to temporal connectives is new in deception literature and deserves further attention. Reliable cues to deceit are scarce, and arguably, there is no single reliable cue to deceit that we know of (DePaulo *et al.*, 2003; Vrij, 2008). It is important to examine why truth tellers use more temporal connectives than liars, and the explanation we gave (truth tellers have a more coherent script) could be examined in more detail. For example, participants should be quizzed post hoc on exactly how they reconstructed an event in reverse order and whether they deliberately used reverse order connectives.

Future research may benefit from encouraging interviewees to provide more temporal connectives in their responses. In Warmelink, Vrij, Mann, and Granhag (2013, Experiment 2), participants were interviewed on a ferry about their plans for the day. In a minor adjustment to the procedure, the experimenters introduced a specific time-prompt question: 'Please describe in as much detail as possible what your time-table is for today at your destination?' As a result, participants provided more time references in their responses, and this information increased detection efficiency. With this in mind, reverse order questions may yield more temporal connectives by asking for a more precise, step-by-step account of events.

In order to examine further the value of temporal connectives as a cue to deceit, the next logical step would be to conduct a deception detection study. In this scenario, participants would be exposed to the transcripts from the current study and make a veracity judgement based on the use of temporal connectives. This would indicate how many liars and truth tellers might be classified using criteria derived from our findings.

In sum, the present experiment and Mann *et al.* (in press) both showed that a second silent interviewer yields favourable effects when he or she shows a supportive demeanour, as it creates cues to deceit. The use of supportive interviewers has been recommended for some time in interviews with witnesses and victims (Bull, 2010; Fisher, 2010). There is growing evidence that it also could be useful when interviewing suspects.

REFERENCES

- Baddeley, A. D., & Hitch, G. J. (1974). Working memory. In G. H. Bower (Ed.), *The psychology of learning and motivation*. Vol. 8 (47–89). New York: Academic Press.
- Bell, B. E., & Loftus, E. F. (1989). Trivial persuasion in the courtroom: The power of (a few) minor details. *Journal of Personality and Social Psychology*, 56, 669–679.

- Bond, G. D. (2012). Focus on basic cognitive mechanisms and strategies in deception research (and remand custody 'wizards' to Harry Potter movies). *Journal of Applied Research in Memory and Cognition*, 1, 128–130.
- Bull, R. (2010). The investigative interviewing of children and other vulnerable witnesses: Psychological research and working/professional practice. *Legal and Criminological Psychology*, 15, 5–24.
- Burgoon, J. K. (1991). Relational message interpretations of touch, conversation distance, and posture. *Journal of Nonverbal Behaviour*, 15 (4), 233–259.
- Burgoon, J. K., Birk, T., & Pfau, M. (1990). Nonverbal behaviours, persuasion, and credibility. *Human Communication Research*, 17 (1), 140–169.
- Collins, R., Lincoln, R., & Frank, M. G. (2002). The effect of rapport in forensic interviewing. *Psychiatry, Psychology, and Law*, 9, 69–78.
- DePaulo, B. M., Lindsay, J. L., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological Bulletin*, 129, 74–118.
- Duran, N. D., Hall, C., McCarthy, P. M., McNamara D. S. (2010). The linguistic correlates of conversational deception: Comparing natural language processing technologies. *Applied Psycholinguistics*, 31, 439–462.
- Evans, J. R., Houston, K. A., & Meissner, C. A. (2012). A positive collaborative, and theoretically-based approach to improving deception detection. *Journal of Applied Research in Memory and Cognition*, 1, 122–123.
- Fisher, R. P. (2010). Interviewing cooperative witnesses. *Legal and Criminological Psychology*, 15, 25–38.
- Fisher, R. P., & Geiselman, R. E. (1992). *Memory enhancing techniques for investigative interviewing: The cognitive interview*. Springfield, IL: Charles C. Thomas.
- Geiselman, R. E. & Callot, R. (1990). Reverse and forward order recall of script based text. *Applied Cognitive Psychology*, 4, 141–144.
- Gilbert, J. A. E., & Fisher, R. P. (2006). The effects of varied retrieval cues on reminiscence in eyewitness memory. *Applied Cognitive Psychology*, 20, 723–739.
- Hartwig, M., Granhag, P. A., & Strömwall, L. (2007). Guilty and innocent suspects' strategies during interrogations. *Psychology, Crime, & Law*, 13, 213–227.
- Johnson, M. K. (2006). Memory and reality. *American Psychologist*, 61, 760–771.
- Johnson, M. K., Foley, M. A., Suengas, A. G., & Raye, C. L. (1988). Phenomenal characteristics of memories for perceived and imagined autobiographical events. *Journal of Experimental Psychology: General*, 117, 371–376.
- Kahana, M. J. (1996). Associate retrieval processes in free recall. *Memory & Cognition*, 24, 103–109.
- Kintsch, W., & Mannes, S. M. (1987). Generating scripts from memory. In van der Meer, E., Hoffman, J. (Eds.), *Knowledge aided information processing* (pp. 61–80). Oxford, England: North-Holland.
- Köhnken, G. (1996). Social psychology and the law. In G. R. Semin, & K. Fiedler (Eds.), *Applied social psychology* (pp. 257–282). London, Great Britain: Sage Publications.
- Köhnken, G. (2004). Statement validity analysis and the 'detection of the truth'. In P. A. Granhag & L. A. Strömwall (Eds.), *Deception detection in forensic contexts* (pp. 41–63). Cambridge, England: Cambridge University Press.
- Leins, D., Fisher, R., & Vrij, A. (in press). Drawing on liars' lack of cognitive flexibility: Detecting deception through varying report modes. *Applied Cognitive Psychology*.
- Leins, D., Fisher, R. P., Vrij, A., Leal, S., & Mann, S. (2011). Using sketch-drawing to induce inconsistency in liars. *Legal and Criminological Psychology*, 16, 253–265.
- Mann, S., Vrij, A., Shaw, D. J., Leal, S., Ewans, S., Hillman, J., Granhag, P. A., & Fisher, R. P. (in press). Two heads are better than one? How to effectively use two interviewers to elicit cues to deception. *Legal and Criminological Psychology*.
- Masip, J., & Ces, C. (2011). Guilty and innocent suspects' self-reported strategies during an imagined police interview. Paper presented at the 4th International Congress on Psychology and Law.
- Masip, J., Sporer, S., Garrido, E., & Herrero, C. (2005). The detection of deception with the reality monitoring approach: A review of the empirical evidence. *Psychology, Crime, & Law*, 11, 99–122.
- Memon, A., Meissner, C. A., & Fraser, J. (2010). The cognitive interview: A meta-analytic review and study space analysis of the past 25 years. *Psychology, Public Policy, & Law*, 16, 340–372.
- Milne, R., & Bull, R. (1999). *Investigative interviewing: Psychology and practice*. Chichester, England: John Wiley & Sons.
- Münste, T. F., Schiltz, K., & Kutas, M. (1998). When temporal terms belie conceptual order. *Nature*, 395, 71–73.
- Nahari, G., Vrij, A., & Fisher, R. P. (2012a). Does the truth come out in the writing? SCAN as a lie detection tool. *Law & Human Behavior*, 36, 68–76.
- Nahari, G., Vrij, A., & Fisher, R. O. (2012b). *Exploiting liars' verbal strategies by examining unverifiable details*. Manuscript under review.
- Patterson, M. L. (1995). Invited article: A parallel process model of nonverbal communication. *Journal of Nonverbal Behavior*, 19, 3–29.
- Seay, T. A., & Altekruze, M. K. (1979). Verbal and nonverbal behaviour in judgments of facilitative conditions. *Journal of Counseling Psychology*, 26, 108–119.
- Sim, M. P. Y., & Lamb, M. E. (2012). Police perceptions of interviews with juvenile suspects. Paper presented at the Annual Conference of the American Psychology-Law Society, Puerto Rico, 14–17 2012.
- Smith-Hanen, S. S. (1977). Effects of nonverbal behaviour on judged levels of counselor warmth and empathy. *Journal of Counseling Psychology*, 24, 87–91.
- Soufan, A. H. (2011). *The black banners: The inside story of 9/11 and the war against al-Qaeda*. New York: W. W. Norton & Company.
- Sporer, S. L. (2004). Reality monitoring and detection of deception. In P. A. Granhag & L. A. Strömwall (Eds.), *Deception detection in forensic contexts* (64–102). Cambridge, England: Cambridge University Press.
- Vrij, A. (2005). Criteria-based content analysis: A qualitative review of the first 37 studies. *Psychology, Public Policy, and Law*, 11, 3–41.
- Vrij, A. (2008). *Detecting lies and deceit: Pitfalls and opportunities*, second edition. Chichester: John Wiley and Sons.
- Vrij, A., Leal, S., Granhag, P. A., Mann, S., Fisher, R. P., Hillman, J., & Sperry, K. (2009). Outsmarting the liars: The benefit of asking unanticipated questions. *Law and Human Behavior*, 33, 159–166.
- Vrij, A., Leal, S., Mann, S., & Fisher, R. (2012a). Imposing cognitive load to elicit cues to deceit: Inducing the reverse order technique naturally. *Psychology, Crime, & Law*, 18, 579–594.
- Vrij, A., Mann, S., Fisher, R., Leal, S., Milne, B., & Bull, R. (2008). Increasing cognitive load to facilitate lie detection: The benefit of recalling an event in reverse order. *Law and Human Behavior*, 32, 253–265.
- Vrij, A., Mann, S., Leal, S., & Fisher, R. (2012b). Is anyone out there? Drawings as a tool to detect deception in occupations interviews. *Psychology, Crime, & Law*, 18, 377–388.
- Warmelink, L., Vrij, A., Mann, S., & Granhag, P. A. (2013). Spatial and temporal details in intentions: A cue to detecting deception. *Applied Cognitive Psychology*, 27, 1–138.
- Warmelink, L., Vrij, A., Mann, S., Jundi, S., & Granhag, P. A. (2012). The effect of experience and question expectedness on lying about intentions. *Acta Psychologica*, 141(2), 178–183.
- Warmelink, L., Vrij, A., Mann, S., Leal, S., & Poletiek, F. (2011, published online). The effects of unexpected questions on detecting familiar and unfamiliar lies. *Psychiatry, Psychology, and Law*.
- Zimmerman, L. A., Veinott, E. S., Meissner, C. M., Fallon, C., & Mueller, S. T. (2010). *Field training and testing of interview and elicitation methods (Final Report prepared under Contract W91CRB-09-C-0082 for US ARMY REDCOM Acquisition Center, Aberdeen Proving Ground, MD)*. Fairborn, OH: Klein Associates Division of Applied Research Associates.