

The Deterrence of Deception through Imposing Cognitive Load

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Abstract

In the present two experiments we examined whether imposing cognitive load, and making the interview setting more mentally taxing, can deter people from lying. Most liars will incorporate as much truth as possible into their story. When an interview setting becomes more difficult, this may result in refraining from lying altogether.

Eighty-three (Experiment 1) and 80 (Experiment 2) participants took part in a job interview, whereby participants in the experimental condition carried out a secondary task simultaneously. In Experiment 1, participants lied less in the experimental condition by mentioning job specification criteria they did not possess, but this finding was not replicated in Experiment 2.

Keywords: Lying, deception, deterrence, interviewing, cognitive load

'Imposing cognitive load' is an interview technique whereby interviewers make the interview setting more demanding through specific instructions such as asking the interviewee to recall the event in reverse (chronological) order (Evans, Michael, Meissner, & Brandon, 2013; Vrij et al., 2008), maintaining eye contact with the interviewer (Vrij, Mann, Leal, & Fisher, 2010) or to squeeze a spring-loaded handgrip for as long as possible (Debey, Verschuere and Crombez (2012). Research has demonstrated that this facilitates lie detection as liars find it harder than truth tellers to cope with these additional requests (Vrij, 2014; Vrij, Leal, Mann, Vernham, & Brankaert, 2015). In the present experiment, we examined whether imposing cognitive load can also deter people from lying. Cues to deceit have been examined in hundreds of studies (DePaulo et al., 2003) and dozens of studies have investigated whether cues to deceit can be elicited through using specific interview styles (Vrij & Granhag, 2012). However, to our knowledge, research into the deterrence of deception is scarce and no study to date has examined whether employing specific interview techniques can deter people from lying.

There is evidence from various sources that, in interview settings (rather than daily life situations), lying is more cognitively demanding than telling the truth. First, in real-life (videotaped) police/suspect interviews with interviewees suspected of murder, rape, and/or arson, liars displayed mainly cognitive cues to deceit (Mann, Vrij, & Bull, 2002). Second, police officers who saw a selection of these police interviews (but did not know when the suspects were lying or truth telling) reported that the suspects appeared to be thinking harder when they lied than when they told the truth (Mann & Vrij, 2006). Third, when completing self-reports after a deception experiment, liars indicated that they had to think harder than truth tellers (e.g., Hartwig, Granhag, Strömwall, & Kronkvist, 2006). Fourth, fMRI research has demonstrated that lying is more cognitively demanding than truth telling (Christ, Zan Essene, Watson, Brubaker, & McDermott, 2009).

Liars, who require more cognitive resources than truth tellers, will have fewer cognitive resources left over. If cognitive demand is further raised, which could be achieved by making additional requests, liars are less able than truth tellers to cope with these additional requests. Cognitive load can be imposed in numerous ways, including asking the interviewee to report an event in reverse order (Evans, et al., 2013), to maintain eye contact with the interviewer (Vrij, et al., 2010), to grip an object for some time (Debey, et al., 2012), or, when multiple interviewees are interviewed collectively, through forced turn taking (Vernham, Vrij, Mann, Leal, & Hillman, in 2014). These experiments revealed that imposing cognitive load elicits cognitive cues to deceit (e.g., lack of detail, consistency and plausibility, and a lower response rate) improving the opportunity to correctly classify truth tellers and liars.

Liars prefer to stay close to the truth, for example, preferring to embed their lie in an otherwise truthful story (Leins, Fisher, & Ross, 2013; Vrij, 2008). Liars do this as a result of several concerns they may have. They may be concerned that they lack the imagination to fabricate lies that are detailed enough and sound plausible enough; that their lies give away leads to investigators; or that they will forget the lies they have told (Nahari, Vrij, & Fisher, 2012; Vrij, 2008). With those concerns in mind, staying close to the truth by embedding a lie in an otherwise truthful event (e.g., describing a truthful experience but lying about when this experience took place) is a rational and logical option. These concerns, however, may be strengthened if the interview setting becomes more demanding. The result could be that interviewees stay even closer to the truth and, eventually, refrain from lying.

There are numerous settings where deterring people from lying is beneficial, perhaps even more so in situations where people find it acceptable to lie and frequently do so, despite the fact that lying could have detrimental effects. An example of such a setting is a selection interview. When undergraduate students were interviewed, 83% said they would lie in order to get a job (Robinson, Shepherd, & Heywood, 1998). These students said that it was wrong to lie to best friends but saw nothing wrong in lying to secure a job. They also thought that employers expected candidates to exaggerate qualities when applying. Lies told in selection interviews range from providing false details of personal skills and qualities to exaggerated experience and previous salary (Birkeland, Manson, Kisamore, Brannick, & Smith, 2006; King, 2006). In the present experiment

we examined whether we could deter people from lying in a job interview through imposing cognitive load.

We imposed cognitive load by asking interviewees in the imposing-cognitive-load condition to carry out two tasks at the same time. Doing two tasks simultaneously is more cognitively demanding than doing one task, as it requires dividing attention between the two tasks (Johnston, Greenberg, Fisher, & Martin, 1970; Smith, 1969). The job application interview in Experiment 1 consisted of a series of specific questions followed by one open-ended question that gave an adequate closure to the interview. We expected different results for the two types of question. It is relatively easy to lie to the specific questions (e.g., 'Do you have any postgraduate qualifications?') as the question gives a strong hint of what topic to lie about (e.g., postgraduate qualifications), and the answer can be short. It is relatively difficult however to lie to the open-ended question 'Given our person specification, what makes you suitable for this role and why should we give the job to you?') as the question does not contain a hint about what to lie about and requires a longer answer (Vrij, Mann, & Fisher, 2006). In addition, when short answers can be given, interviewees can separate the two tasks by first paying attention to one task (for example, to answer the specific question) followed by the other task (for example, responding to the multiple-choice task). This tactic is not possible when answering the open-ended question and in that situation the two tasks are more intertwined and, hence, more difficult to carry out. Given that lying to the specific questions is not so difficult, differences in lying between the imposing-cognitive-load and control conditions are unlikely to occur. Given that lying to the open-ended question is more difficult, we expect more interviewees to refrain from lying in the imposing-cognitive-load condition than in the control condition. In Experiment 2 we sought to replicate this finding regarding the open-ended question.

In alignment with our hypothesis van 't Veer, Stel and van Beest (2014) recently found that imposing cognitive load deters people from lying. In their study, participants rolled a die and reported the outcomes while under low or high cognitive load (memorizing a string of eight letters). The higher the score they reported, the more money they could earn. The reported outcomes under low cognitive load were significantly higher than those under high cognitive load, suggesting that the participants under low cognitive load lied to get a higher pay. Although the study showed that imposing cognitive load deters people from lying, it does not show that certain interview techniques lead to the same result, which was the topic of investigation in the current experiment.

Method

Participants

A total of 83 participants took part, of whom 49 (58%) were female. Their average age was $M = 28.01$ ($SD = 10.84$).

Procedure

Participants were recruited via online advertisements on the University's staff and student portals. As we wanted participants who dared to lie, the advertisement contained the heading 'Can you blag (con) your way into a top job?'

On arrival, the participants were first asked to honestly complete a pre-interview questionnaire measuring their qualifications and experience (GCSE results, A/As level results, under/postgraduate degree, study topic, other qualifications [e.g., driving, first aid, diving, aviation licenses], speaking foreign languages, and work experience including any managerial experience).

They were then told that they were going to take part in a role-play exercise and were going to apply for a job to become an MI5 agent, and that they would shortly be shown a person specification for this job. The participants were then told that this job specification asks for qualifications/experience beyond that of a typical undergraduate student, and that, in order to get shortlisted, they would need to lie or exaggerate their attributes as they currently stand. The participants were also told that the study investigated the use of some new interviewing software. The software is designed to automatically conduct an interview and assess whether the applicant is lying or telling the truth in his or her responses. The participants were then told that, if they truthfully responded to the questions, and the software believed their responses, they would receive £5, but most likely would not be shortlisted or selected for the job. If they exaggerated or embellished the truth, there is a chance that they would receive £10 if shortlisted, or even £15 if they are really good and get the job. But they would need to be convincing or they would run the risk of not fooling the software. Participants were informed that their responses would be audio-recorded but not video-recorded and that the software worked on speech and vocal content only.

The participants were then informed that, to start the interview, they would have to press a specific button on the computer and that they would then hear the questions to which they should respond orally.

Additional information was given to participants in the imposing-cognitive-load condition. They were told that being an MI5 agent requires effective ability to multi-task, and that they therefore would take part in a simultaneous memory task. In order to qualify for payment they would need to also pass the memory task without it affecting their performance in the interview. The memory task comprised reading a statement about their 'cover' as an agent, which they needed to memorize. Throughout the interview multiple-

choice questions would appear relating to the memorized information, which participants needed to answer within 10 seconds before the opportunity to answer disappeared. Participants were told not to delay responding to the interview questions, as this would affect whether the software judged them as truthful or not.

Participants were then shown the job specification and told they had as much time as they wanted to examine it. The person specification was for an MI5 account handler and included desired requirements that the participants were unlikely to possess (e.g., maths degree, Ph.D., fluent in many languages, living abroad, managerial experience). The interviewees in the control condition ($M = 2.93$, $SD = 1.30$, 95% CI [2.52, 3.34]) and imposing-cognitive-load condition ($M = 3.22$, $SD = 1.35$, 95% CI [2.81, 3.63]) actually possessed a similar number of requirements mentioned in the job specification, $F(1, 81) = 1.00$, $p = .32$, $d = .22$.

When the participant indicated that he or she was ready, the experimenter took the person specification from the participant, explained again briefly the instructions as appropriate for each condition, and started the laptop program. Each condition commenced with an initial screen with basic instructions about how to start the interview, which participants did once the experimenter had left the room. For control participants ($N = 43$) the interview commenced as soon as they pressed the start button. For experimental participants ($N = 40$) a vignette with the information they needed to memorise first appeared on the screen. This remained on the screen for three minutes (with a time-counter in one corner of the screen) which was plenty of time to memorise the information (this was established through pilot testing). Once the three minutes had elapsed, then the interview commenced for experimental participants as it had done for control participants. The vignette statement was about a person the agent supposedly knew and included detailed background information about how they had met and knew each other.

The job interview contained ten questions. Nine of those were specific questions and covered the same issues as mentioned in the job specification and the pre-interview questionnaire, which the participants completed at the beginning of the experiment (questions about their under/postgraduate degree, other qualifications [e.g., driving, first aid, diving, aviation license], speaking foreign languages, living abroad, job history, managerial experience). The final question was an open-ended question: 'Given our person specification, what makes you suitable for this role and why should we give the job to you?'

Participants in the control condition just answered the ten interview questions, whereas participants in the imposing-cognitive-load condition also had to answer the ten multiple-choice questions about the memorized information (within 10 seconds of it appearing on the screen), which appeared on the screen five seconds after each of the interview questions was asked (so participants were either listening still to the question being asked in the case of a long question, or were just commencing their response by the time the written multiple-choice question appeared on the screen). If participants did

not answer within the ten-second period, the multiple question and answer facility disappeared and their answer was recorded as 'inaccurate.'

After the interview, participants completed a post-interview questionnaire. In this questionnaire, they were first presented with a list of all the questions they had been asked in the interview and asked to what extent they had actually lied or told the truth to each one on 7-Point Likert scales ranging from [1] I told the truth completely to [7] I told an outright lie. This is called the 'Did lie' variable, and was, for the specific questions, the average score across the specific questions. They were then presented with the list of questions again preceded by the following text: 'Perhaps you intended to lie to a question and when it came to it, you instead told the truth? Or vice versa, perhaps you intended being truthful to a question and instead lied? Did you plan to tell the truth or lie to the following questions below that you were asked in the interview?' Answers were given on 7-point Likert scales ranging from [1] I did plan to tell the truth completely to [7] I did plan to tell an outright lie. This is called the 'Intention to lie' variable, and was, for the specific questions, the average score across the specific questions.

Participants were fully debriefed after the study, and, in this debriefing, it was explained to them that the 'interviewing software program' did not possess any complicated ability to detect lies as they had been led to believe; more that the data the program had collected would have to be analyzed and so all participants would receive the full award of £15 for their participation.

Coding. The interviews were audio-recorded and transcribed. One coder read the transcripts and recorded the qualifications the participant claimed to have when answering the specific questions. A second coder did this for a sample of 25 transcripts. The inter-rater reliability was high with Kappas ranging from .78 (e.g., fluent in foreign languages) to 1.00 (e.g., experience as a manager). The answers given to these specific questions were then compared with the answers given in the pre-interview questionnaire to determine whether the participant had been lying.

One coder also counted the number of qualifications the participants reported in the open-ended question about their suitability for the job. A second coder also did this for a sample of 25 transcripts. The inter-rater reliability (Kappa) was high and ranged from .83 (e.g., IT skills) to 1.00 (e.g., fluent in languages). The answer given to the open-ended question was then compared with the answers given in the pre-interview questionnaire to determine whether the participant had been lying.

We computed several variables. First, we examined the percentages of participants who lied (reported to possess at least one job criterion they did not possess) and told the truth (did not lie about any job criteria). Second, we calculated the number of lies participants told (number of job criteria they claimed to possess when they did not actually possess those criteria). Third, we calculated the percentage of lies they told (number of job criteria they falsely claimed to possess/ number of job criteria they falsely claimed to possess and number of job criteria they accurately claimed to possess).

The Method section describes in detail how the study was conducted, including conceptual and operational definitions of the variables used in the study. It is both conventional and expedient to divide the Method section into labeled subsections.

Results

Manipulation Check. The participants in the imposing-cognitive-load condition gave, on average, $M = 7.78$ ($SD = 1.73$) correct answers to the ten multiple-choice questions about the memory task. It took them, on average, $M = 7.27$ seconds ($SD = 3.19$) to answer such a question. These results indicate that participants paid serious attention to the multiple-choice task.

Table 1. *Results of Experiment 1 as a Function of Imposing Cognitive Load*

	Control			Imposing cognitive load						
Intention to lie (post-interview questionnaire, 7-point Likert scale)										
	M	SD	95% CI	M	SD	95% CI	F	p	d	
Specific questioning	3.57	1.34	3.09, 4.05	3.64	1.78	3.15, 4.12	.04	.845	.05	
Open-ended question	3.91	2.4	3.14, 4.53	3.91	2.4	3.20, 4.60	.02	.889	.05	
Did lie (post-interview questionnaire, 7-point Likert scale)										
Specific questioning	3.27	1.44	2.81, 3.74	3.64	1.60	3.16, 4.11	1.19	.279	.25	
Open-ended question	3.90	2.12	3.26, 4.55	3.93	2.16	3.27, 4.58	.002	.962	.01	
Percentage of participants who lied (deterrence to lie)										
	%			%			X ²	p	phi	
Specific questioning	95%			95%			.001	.980	.00	
Open-ended question	50%			24%			5.82	.016	.27	

Number of criteria mentioned, lied									
	M	SD	95% CI	M	SD	95% CI	F	p	d
Specific questioning	3.21	2.04	2.55, 3.88	3.36	2.26	2.70, 4.03	.10	.749	.07
Open-ended question	1.12	1.61	.71, 1.53	.49	1.00	.07, .90	4.57	.036	.54
Percentage of criteria lied about									
Specific questioning	.58	.25	.50, .65	.52	.24	.44, .60	1.10	.298	.16
Open-ended question	.35	.42	.24, .47	.18	.34	.06, .30	4.27	.040	.57

(Deterrence of) Deception. All the statistical results of the experiment are summarized in Table 1. The mean scores of the 'intention to lie' and 'did lie' variables (all between 3.27 and 3.93 on 7-point Likert scales) showed that participants reported a moderate intention to lie and reported that they did actually lie modestly during the interview. No differences between the control and imposing-cognitive-load conditions emerged for these two variables.

Regarding participants' actual behaviour, a 2 (Question Type) X 2 (Imposing Cognitive Load) ANOVA with the decision to lie as dependent variable revealed significant main effects for Question Type, $F(1, 81) = 108.18, p < .001, \eta^2 = .57$, and Imposing Cognitive Load, $F(1, 81) = 4.87, p = .03, \eta^2 = .057$, and a significant Question Type X Imposing Cognitive Load interaction effect, $F(1, 81) = 5.23, p = .025, \eta^2 = .06$. (See Lunney (1970) for a justification for using analysis of variance with a dichotomous dependent variable.) The interaction effect is the most informative effect and is therefore the only one we discuss. Simple contrasts tests (see Table 1) revealed that, in the specific questioning part of the interview, virtually all interviewees (95% in the control condition and 95% in the imposing-cognitive-load condition) reported at least one qualification they did not actually possess. In the open-ended question part of the interview, significantly fewer participants in the imposing-cognitive-load condition (24%) than in the control condition (50%) reported at least one qualification they did not actually possess.

Regarding the number of reported job criteria that the participant lied about in response to the open-ended question, simple contrasts tests (see Table 1) revealed that participants in the imposing-cognitive-load condition lied significantly less ($M = .49$) than participants in the control condition ($M = 1.12$). However, there was no difference in the number of lies told in the imposing-cognitive-load ($M = 3.36$) and control ($M = 3.21$) conditions in response to the specific questions. Regarding the percentages of lies participants told (number of lies/number of lies and truths) participants in the imposing-

cognitive-load condition told a significantly lower percentage of lies in answer to the open-ended question (18%) than participants in the control condition (35%). However, there was no difference in the percentage of lies told in the imposing cognitive load (52%) and control (58%) conditions in response to the specific questions.

Discussion

We examined whether imposing load in an interview setting deters people from lying. Imposing cognitive load yielded no success in the specific questioning part of the interview. Almost everyone (95%) lied to some extent when answering these specific questions. Of course, the participants knew that the interview was not real and so it could be argued that lying was condoned. Yet, the findings are in alignment with research showing that people are willing to lie in selection interviews and find it acceptable to do so. It is also in alignment with Ariely's (2012) conclusion that almost everyone is dishonest to achieve personal gain given the opportunity. The opportunity was certainly present as lying to one or more of the specific questions was not difficult.

Imposing cognitive load did deter people from lying when answering the open-ended question about the suitability for the job: Fifty percent of the interviewees lied in the control condition versus 24% in the imposing-cognitive-load condition. When we examined the number of lies the participants told, we found that participants in the imposing-cognitive-load condition reported fewer job criteria that they did not actually possess in answer to the open-ended question than participants in the control condition, again showing that imposing cognitive load deters people from lying. Importantly, participants in the imposing-cognitive-load condition also told a smaller percentage of lies than participants in the control condition, suggesting that deterring from lying did not happen at the expense of truth telling. Therefore, we can conclude that imposing cognitive load not only elicits cues to deceit and facilitates lie detection (as shown in previous studies), it also deters people from lying.

The participants' self-reports about their intention to lie and the actual lies they told did not show differences between the control and imposing-cognitive-load conditions. This is an interesting finding as it goes against what actually happened in the interview, as participants actually lied less in the imposing-cognitive-load condition than in the control condition. This raises the question of why participants lied less in the imposing-cognitive-load condition whereas their self-reports did not indicate this. Perhaps these self-reports were unreliable, which cannot be ruled out given well documented limits of people's introspective abilities (Nisbett, & Wilson, 1977). In case the self-reports were reliable, the findings suggest that lying less in the imposing-cognitive-load condition was not deliberate, which could have been the result of cognitive resources being too depleted to lie. One could argue that a non-deliberate deterrence is beneficial as it will make interviewees less likely to counteract the effect, as they do not realise that it is occurring. A non-deliberate deterrence also makes it less likely that interviewees will feel manipulated.

One methodological issue merits attention. The open-ended question always followed the specific questions. Although we felt that this suited the interview protocol well (the open-ended question gave a nice closure to the interview), we acknowledge that, for methodological reasons, it would have been better if some participants would have answered the open-ended question first. At present we cannot rule out that the significant effect on the open-ended question occurred because it followed the specific questions. We therefore re-ran the experiment but this time we only asked the open-ended question.

In Experiment 2 we also addressed the issue raised above as to why participants lied less in the imposing-cognitive-load condition. We asked them after the interview whether they thought about the job criteria during the interview, could still remember these criteria, forgot to lie, or found it too difficult to lie.

Method Experiment 2

Participants

The sample consisted of 80 students and staff members from the University of Portsmouth, 36 males and 44 females. Their average age was $M = 21.98$ years ($SD = 4.04$, range from 18 to 40). All participants provided written consent before taking part in the study.

Procedure

The Procedure was the same as used in Experiment 1 with one difference--the interview comprised a single question: "Given our person specification, what makes you suitable for this role and why should we give the job to you?" Participants responded verbally to this question by telling the truth or lying about their current attributes. For interviewees in the experimental condition, every five to twenty seconds a randomized multiple-choice question would pop-up relating to the information previously memorized in the vignette. These questions were shown on the computer screen whilst the participants answered the open-ended interview question about their suitability for the job as an MI5 Agent Handler. These multiple-choice questions each arose for a period of ten seconds, before they disappeared from the screen automatically.

The interviewees in the control condition ($n = 40$, $M = 2.45$, $SD = 1.68$, 95% CI [1.97, 3.00]) and imposing-cognitive-load condition ($n = 40$, $M = 2.95$, $SD = 2.06$, 95% CI [2.32, 3.61]) actually possessed a similar number of required criteria mentioned in the job specification, $F(1,78) = 1.414$, $p = .24$, $d = 0.27$.

After finishing the interview, participants completed a post-interview questionnaire. In this questionnaire they answered if, and if so to what extent, they had lied or told the truth about the requirements of the person specification on a 7-point Likert scale ranging from 1 (I told the truth completely) to 7 (I told an outright lie). Furthermore, participants were asked to what extent they had planned to tell the truth or lie about the desired criteria on the person specification prior to the interview, again on a 7-point Likert scale

ranging from 1 (I did plan to tell the truth completely) to 7 (I did plan to tell an outright lie). We also asked the participants to what extent they (i) thought about the job specification criteria while answering the open-ended question (on a scale ranging from 1 [never] to 7 [throughout]), and (ii) could actually remember these criteria during the interview (on a scale from 1 [not very well] to 7 [very well]). We finally asked the participants to what extent the statements “I had planned to tell some lies, but during the interview I forgot to report them” and “I had planned to tell some lies, but I found the interview setting too difficult to report them” applied to them, ranging from 1 (not at all) to 7 (very much so).

The same dependent variables as in Experiment 1 were computed: (i) The percentages of participants who lied (reported to possess at least one job criterion they did not possess) and told the truth (did not lie about any job criteria), (ii) The number of lies participants told (number of job criteria they claimed to possess when they did not actually possess those criteria), and (iii) The percentage of lies they told (number of job criteria they falsely claimed to possess/ number of job criteria they falsely claimed to possess and number of job criteria they accurately claimed to possess).

Results, Experiment 2

Manipulation Check. Interviewees in the imposing-load condition gave, on average, 6.93 (SD = 2.60) correct answers to the ten multiple-choice questions about the memory task. On average, the participants needed 5.69 (SD = 3.23) seconds to answer these questions. These results indicate that the participants paid serious attention to the multiple-choice questions.

Table 2. *Results of Experiment 2 as a Function of Imposing Cognitive Load*

	Control			Imposing cognitive load					
Intention to lie (post-interview questionnaire, 7-point Likert scale)									
	M	SD	95% CI	M	SD	95% CI	F	p	d
Open-ended question	3.38	1.58	2.89, 3.89	3.58	1.57	3.11, 4.07	.331	.566	.13
Did lie (post-interview questionnaire, 7-point Likert scale)									
Open-ended question	2.79	1.08	2.45, 3.14	2.93	1.25	2.55, 3.37	.264	.609	.12
Percentage of participants who lied (deterrence to lie)									
	%			%			X ²	p	phi
Open-ended question	95%			100%			2.05	.15	.16
Number of criteria mentioned, lied									
	M	SD	95% CI	M	SD	95% CI	F	p	d
Open-ended question	4.95	2.61	4.07, 5.71	4.80	2.39	4.11, 5.69	.07	.79	.06

Percentage of criteria lied about									
Open-ended question	.73	.25	.66, .81	.69	.22	.61, .76	.70	.40	.17
Self-Reports									
Thought about the job criteria throughout the interview	5.05	1.60	4.56, 5.53	4.65	1.49	4.16, 5.14	1.34	.25	.26
Can still remember the job criteria	3.32	1.49	2.87, 3.78	3.85	1.37	3.40, 4.31	2.69	.11	.38
Planning to lie, but forgot to lie	4.55	1.75	4.01, 5.09	4.20	1.68	3.66, 4.74	.83	.37	.20
Planning to lie, but found it too difficult to lie	3.60	1.88	3.05, 4.15	3.75	1.61	3.20, 4.30	.15	.70	.09

(Deterrence of) Deception. All the statistical results of the experiment are summarized in Table 2. One-way ANOVAs with Imposing Cognitive Load (absent or present) as the only factor were carried out on most of the dependent variables. The mean scores of the 'intention to lie' and 'did lie' variables (all between 2.79 and 3.58 on 7-point Likert scales) showed that participants reported a moderate intention to lie and reported that they did actually lie modestly during the interview. No differences between the control and imposing-cognitive-load conditions emerged for these two variables. This replicates the findings of Experiment 1.

Virtually all participants lied during the interview and a Chi-square analysis showed no difference in the decision to lie between the control and imposing-cognitive-load conditions. In terms of the number of lies and percentage of lies told, no differences emerged between the control and experimental conditions either, which means that the findings of Experiment 1 (imposing cognitive load deters people from lying) could not be replicated.

The self-reports revealed that the participants thought about the criteria during the interview and could (to some extent) remember them. The self-reports further suggest that participants did not find it too difficult to lie but sometimes forgot to do so. No differences emerged in the self-reports between the control and imposing-cognitive-load conditions.

Discussion

The main finding of Experiment 1, that imposing cognitive load deters people from lying, was not replicated in Experiment 2 where no differences emerged in the frequency of lying between the control and imposing-cognitive-load conditions. There are two possible explanations for this. First, for an open-ended question to yield a significant effect it should be asked after specific questions are asked or, second, the open-ended question finding in Experiment 1 is a spook result that cannot be replicated. In either case, it is probably too premature to conclude that imposing cognitive load is an effective way to deter people from lying in job interviews.

We believe that the theoretical assumption that imposing cognitive load will deter people from lying remains valid, also because Van 't Veer et al. (2014) found such an effect. A possible explanation for the lack of significant effects in our experiments is that participants found it too easy to lie, even in the imposing-cognitive-load condition. Indeed, the question that lying was 'too difficult' did not receive overwhelming support ($M =$ around 3.70 on a 7-point Likert scale) with no difference between the control and imposing-cognitive-load conditions. The idea that carrying out two tasks at once is more mentally taxing than carrying out each task individually is well established in the literature (Johnston, et al., 1970; Smith, 1969), thus adding a secondary task to the act of lying should have made lying more difficult. However, the act of lying was apparently not made difficult enough to deter people from lying. Thus, to yield significant effects the act of lying itself needs to be made more difficult. A straightforward way of doing this is asking participants to elaborate on their stories ('You say you speak three foreign languages, please say something in each of these three languages?').

Some methodological issues of the two experiments merit attention. First, we stated that participants honestly completed a pre-interview questionnaire. Of course, we can never be certain that they were completely honest but we have no reason to believe that they were not. At the initial stage of the study participants were not aware of the experimental design or what they would be asked to do during the study, so we have no reason to believe that they would be dishonest. Second, we did not have measures of cognitive load. Since it is well established that carrying out two tasks at once is more mentally taxing than carrying out each task individually we did not see the need to examine it in the present experiment. Future experiments could examine this, for example by using deception tasks that require immediate responses so that reaction times (a reliable measure of cognitive load, Verschuere, and De Houwer, 2011) can be measured. Third, participants knew that they were not really applying to work at MI5 and that this was role-play. Such role-play is very common in deception research. For example, in many studies participants are instructed to 'steal' money and then asked to deny it in an interview. Participants in such studies are well aware that if they fail to be convincing in their interview they will not be arrested for stealing money.

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References

- Ariely, D. (2012). *The (honest) truth about dishonesty*. London, England: HarperCollins Publishers.
- Birkeland, S. A., Manson, T. M., Kisamore, J. L., Brannick, M. T., & Smith, M. A. (2006). A meta-analytic investigation of job applicant faking on personality measures. *International Journal of Selection and Assessment, 14*, 317-335. Doi/10.1002/9780470742723
- Christ, S. E., Van Essen, D. C., Watson, J. M., Brubaker, L. E., & McDermott, K. B. (2009). The Contributions of Prefrontal Cortex and Executive Control to Deception: Evidence from Activation Likelihood Estimate Meta-analyses. *Cerebral Cortex, 19*, 1557-1566. Doi:10.1093/cercor/bhn189.
- Debey, E., Verschuere, B., & Crombez, G. (2012). Lying and executive control: An experimental investigation using ego depletion and goal neglect. *Acta Psychologica, 140*, 133-141. Doi:10.1016/j.actpsy.2012.03.004
- DePaulo, B. M., Lindsay, J. L., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological Bulletin, 129*, 74-118. Doi: 10.1037/0033-2909.129.1.74
- Evans, J. R., Michael, S. W., Meissner, C. A., & Brandon, S. E. (2013). Validating a new assessment method for deception detection: Introducing a Psychologically Based Credibility Assessment Tool. *Journal of Applied Research in Memory and Cognition, 2*, 33-41. Doi: 10.1016/j.jarmac.2013.02.002.
- Hartwig, M., Granhag, P. A., Strömwall, L., & Kronkvist, O. (2006). Strategic use of evidence during police interrogations: When training to detect deception works. *Law and Human Behavior, 30*, 603-619. Doi: org/10.1007/s10979-006-9053-9
- Johnston, W. A., Greenberg, S. N., Fisher, R. P., & Martin, D. W. (1970). Divided attention: A vehicle for monitoring memory processes. *Journal of Experimental Psychology, 83*, 164-171. Doi: 10.1037/h0028554
- King, B. (2006). *The lying ape: An honest guide to a world of deception*. Cambridge: Icon books.
- Leins, D., Fisher, R. P., & Ross, S. J. (2013). Exploring liars' strategies for creating deceptive reports. *Legal and Criminological Psychology, 18*, 141-151. Doi: 10.1111/j.2044-8333.2011.02041.x
- Lunney, G. H. (1970). Using analysis of variance with a dichotomous dependent variable - empirical study. *Journal of Educational Measurement, 7*, 263-269.

- Mann, S. & Vrij, A. (2006). Police officers' judgements of veracity, tenseness, cognitive load and attempted behavioural control in real life police interviews. *Psychology, Crime, & Law*, 12, 307-319. Doi:10.1080/10683160600558444
- Mann, S., Vrij, A., & Bull, R. (2002). Suspects, lies and videotape: An analysis of authentic high-stakes liars. *Law and Human Behavior*, 26, 365-376. Doi: 10.1023/A:1015332606792
- Nahari, G., Vrij, A., & Fisher, R. P. (2012). Does the truth come out in the writing? SCAN as a lie detection tool. *Law & Human Behavior*, 36, 68-76. Doi: 10.1007/s10979-011-9264-6
- Nisbett, R. E. & Wilson, T. D. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84, 231–259. Doi:10.1037/0033-295x.84.3.231
- Robinson, W. P., Shepherd, A., & Heywood, J. (1998). Truth, equivocation/concealment, and lies in job applications and doctor-patient communication. *Journal of Language and Social Psychology*, 17, 149-164. Doi: 10.1177/0261927X980172001
- Smith, M. C. (1969). Effect of varying channel capacity on stimulus detection and discrimination. *Journal of Experimental Psychology*, 82, 520-526. Doi: org/10.1037/h0028354
- Van 't Veer, A. E., Stel, M. & van Beest, I. (2014). Limited capacity to lie: Cognitive load interferes with being dishonest. *Judgment and Decision Making*, 9, 199-206. Doi.org/10.2139/ssrn.2351377
- Vernham, Z., Vrij, A., Mann, S., Leal, S., & Hillman, J. (2014). Collective interviewing: Eliciting cues to deceit using a turn-taking approach. *Psychology, Public Policy and Law*, 20, 309-324. doi.org/10.1037/law0000015
- Verschuere, B., & De Houwer, J. (2011). Detecting concealed information in less than a second: Response latency-based measures. In Memory detection: Theory and application of the Concealed Information Test. In B. Verschuere, G. Ben-Shakhar, & E. Meijer (Eds.), pp, 46–62. Cambridge, UK: Cambridge University Press.
- Vrij, A. (2008). *Detecting lies and deceit: Pitfalls and opportunities, second edition*. Chichester: John Wiley and Sons.
- Vrij, A. (2014). Interviewing to detect deception. *European Psychologist*, 19, 184-195 Doi: 10.1027/1016-9040/a000201

- Vrij, A., & Granhag, P. A. (2012). Eliciting cues to deception and truth: What matters are the questions asked. *Journal of Applied Research in Memory and Cognition, 1*, 110-117. Doi.org/10.1016/j.jarmac.2012.02.004
- Vrij, A., Leal, S., Mann, S., Vernham, Z., & Brankaert, F. (2015). Translating theory into practice: Evaluating a cognitive lie detection training workshop. *Journal of Applied Research in Memory and Cognition, 4*, 110-120. doi:10.1016/j.jarmac.2015.02.002
- Vrij, A., Mann, S., & Fisher, R. (2006). Information-gathering vs accusatory interview style: Individual differences in respondents' experiences. *Personality and Individual Differences, 41*, 589-599. Doi:10.1016/j.paid.2006.02.014
- 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. DOI 10.1007/s10979-007-9103-y.
- Vrij, A., Mann, S., Leal, S., & Fisher, R. (2010). "Look into my eyes": Can an instruction to maintain eye contact facilitate lie detection? *Psychology, Crime, & Law, 16*, 327-348. DOI 10.1080/10683160902776843