



# Accuracy of indirect method in detection of false intent

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**Purpose.** Two studies were conducted to assess of the accuracy of an indirect method used to detect lies about past behaviour and intentions.

**Methods.** In Experiment 1, participants ( $N = 123$ ) assessed the veracity (direct condition) or cognitive effort (indirect condition) of interviewees who had planned or taken part in mock academic misconduct and then lied or told the truth about their intentions or past activities. In Experiment 2, 33 participants assessed the veracity of interviews on true and false intentions answering a direct question and three indirect questions.

**Results.** As predicted, the indirect method was equally effective in detecting lies about past activities and intentions. The accuracy of this method was not reduced by asking direct and indirect questions together.

**Conclusions.** The experiments provided further evidence that the indirect method of detecting deception is accurate and can also be used to detect lies about intent.

There are situations in which it is important to be able to distinguish between true and false descriptions of intentions or plans. This is illustrated by cases where police questioned a person who went on to commit a crime or act of terrorism yet they had not recognized his or her criminal intent (Granhag, 2010; Sooniste, Granhag, Strömwall, & Vrij, 2016). Thus, a growing body of literature underlines the importance of assessing the accuracy of methods that detect lies about intentions and future activities while working on ways of increasing their accuracy (Mac Giolla, Granhag, & Vrij, 2015).

## ***Lying about past activities vs. lying about intentions***

It is only worth distinguishing between lies about intention or plans (see Szpunar, Spreng, & Schacter, 2014 for the discussion about types of prospection) and lies about past activities if there are differences in the accuracy with which they can be detected or in the cues to deception. Consistently, it has been shown that detecting lies about past activities is only marginally better than chance with accuracy around 54% in the meta-analyses of studies looking mainly at detection of lies about the past (Aamodt & Custer, 2006; Bond & DePaulo, 2006). It has been argued that the low

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accuracy is due to reliance on incorrect cues (Global Deception Research Team, 2006). However, a series of meta-analyses showed that the cues people report they use and the cues they actually use to judge veracity are not the same and raters tend to use reliable behaviours when they are available (Hartwig & Bond, 2011). Moreover, based on Brunswick's (1952) lens model technique, it was suggested that these are small behavioural differences between liars and truth-tellers that have more weighting into inaccurate detection. There has been much less research on behavioural cues concerning lies about intentions and on accuracy of detection of such lies. However, the first studies of this kind revealed that deceptive descriptions of intentions were less plausible and contained more contradictions with fewer spontaneous corrections than truthful descriptions (Vrij, Granhag, Mann, & Leal, 2011). Although true and false statements of intent were equally detailed (Vrij, Granhag, *et al.*, 2011; Vrij, Leal, Mann, & Granhag, 2011), subsequent studies have shown that there is a difference in the level of detail used in responding to unanticipated questions (Sooniste, Granhag, Knieps, & Vrij, 2013; Sooniste, Granhag, Strömwall, & Vrij, 2015; Sooniste *et al.*, 2016). False statements about future activities were also more abstract (Vrij, Mann, Jundi, Hope, & Leal, 2012) and liars made less use of mental imagery during planning of their actions (Knieps, Granhag, & Vrij, 2013).

Only a small number of studies have directly compared cues to deception in statements about the past and future activities and the accuracy with which the two types of deception were detected. Although physiological parameters such as skin conductance did not differentiate between participants who committed mock crimes and those who had only planned to do so, both groups of deceivers could be distinguished from truthful participants, who showed lower skin conductance responses (Meijer, Verschuere, & Merckelbach, 2010). These results are consistent with recent research showing that both imagining of future events and remembering of past events engage episodic memory and rely on similar cognitive and neural processes (Schacter, Addis, & Buckner, 2007; Schacter & Madore, 2016). Yet, when comparing behavioural cues, false descriptions of past activities were more detailed and more plausible than false descriptions of intentions (Vrij, Leal, *et al.*, 2011). Deceptive descriptions of past activities were less detailed and less plausible than the truthful descriptions; however, in the case of intentions, the plausibility of deceptive descriptions was lower but not the level of detail (Vrij, Granhag, *et al.*, 2011; Vrij, Leal, *et al.*, 2011). Nevertheless, it was easier to detect lies about future activities, with approximately 70% accuracy (Vrij, Leal, *et al.*, 2011). The authors suggested this was because senders could be better prepared to lie about their past activities as these interviews were more anticipated and people generally have more experience in lying about past actions than plans (Vrij, Leal, *et al.*, 2011).

### **Indirect lie detection**

Another set of studies on false descriptions of intentions assessed how accurate well-known deception detection techniques were when applied to this type of deception (Granhag & Mac Giolla, 2014). In accordance with the results described above, suggesting rather minute behavioural differences in senders falsely describing future and past activities, it was revealed that methods such as the strategic use of evidence (SUE) technique (Clemens, Granhag, & Strömwall, 2011), the concealed information test (CIT) (Meijer *et al.*, 2010), and the autobiographical implicit association test (aIAT) (Agosta,

Castiello, Rigoni, Lionetti, & Sartori, 2011) could be successfully used to detect false declarations of intent. In addition, Warmelink *et al.* (2011) showed that thermal imaging was no more accurate than interviews as a method of detecting false declarations of intent in airport screening.

Previous studies of deception detection have suggested that so-called indirect methods are a promising means of increasing the accuracy of lie detection (DePaulo & Morris, 2004; Granhag, 2006). Indirect methods involve asking observers to assess variables other than the senders' truthfulness, for example, whether they are 'thinking hard' (e.g., Ulatowska, 2014; Vrij, Edward, & Bull, 2001), or to describe their own emotions or cognitions when watching senders' statements (e.g., Evanoff, Porter, & Black, 2016; Landström, Granhag, & Hartwig, 2005, 2007). Such indirect judgements usually allow for more accurate differentiation between truthful and deceptive statements than direct judgements. Importantly, prior research on indirect methods of deception detection has investigated detection of lies about past activities (e.g., Landström *et al.*, 2007) or present opinions and feelings (e.g., Ulatowska, 2014).

Although the efficacy of the indirect method has been demonstrated repeatedly, further theoretical consideration is warranted (Granhag, 2006). One suggestion is that general indirect questions do not activate observers' stereotypical beliefs about deception cues and instead ensure that their attention is focused on more useful, diagnostic cues (Street & Richardson, 2015; Vrij *et al.*, 2001), while direct veracity judgements are based on multiple cues that are not all linked to deception (Hartwig & Bond, 2011; Street, Bischof, Vadillo, & Kingstone, 2016). A recent meta-analysis provided some support for this explanation showing that although most measures classed as indirect were less accurate than the direct method, many of these indirect questions were based on behaviours that are not diagnostic of deception (Bond, Levine, & Hartwig, 2015). Therefore, indirect questions about eye contact or nervousness would not focus attention on reliable cues to deception (DePaulo *et al.*, 2003). Another study suggested that the lack of accuracy when using indirect measures could stem from a mismatch between the type of lie and the indirect questions (Ulatowska, 2014).

### **The current study**

Investigating the accuracy of methods of detecting false declarations of intent and factors which enhance detection accuracy is important both from theoretical (Schacter *et al.*, 2007) and practical (Sooniste *et al.*, 2016) point of view. Although previous studies revealed that some of the techniques used to detect lies about past behaviour could also be used to detect lies about plans and intentions, there have been few direct comparisons of the accuracy of detection of lies about past and future behaviour (Vrij, Leal, *et al.*, 2011). Therefore, the purpose of this study was comparison of the accuracy with which deception about intentions and past activities can be detected. It is hypothesized that raters would distinguish more accurately between true and false statements about others intentions than between true and false statements about the past (Vrij, Leal, *et al.*, 2011). Another aim was assessment of accuracy when using the indirect method of deception detection applied to declarations of intent. Based on previous studies of lies about the past or present, it is hypothesized that the indirect method would lead to more accurate differentiation between truthful and deceptive statements than the direct method.

## EXPERIMENT I

### Method

#### *Participants*

One hundred and twenty-three undergraduate students from a Polish university (99.2% women; age:  $M = 19.67$ ;  $SD = 1.88$ ) participated in return for a course credit.

#### *Materials*

Forty-eight students from various universities were recruited via social media advertisements to take part in a lie detection procedure. They were informed that the procedure consisted of two phases and would take place at a university. In the first phase, participants were informed at the group meeting that they would be taking part in mock academic misconduct by falsifying an examination answer sheet. Participants were told they may be caught cheating and would be expected to lie or tell the truth about their intentions and/or deeds. Participants were also informed that their statements would be video-recorded for scientific purposes and, as compensation, they received a gift card worth approximately \$8. They were told they would receive an additional \$35 gift card if one was able to convince the interviewer of his or her veracity. After providing written, informed consent, the participants were asked to imagine they were taking an important examination and were required to answer three difficult general knowledge questions. Participants were also asked to check the correct answers for the questions when they returned home.

The second phase of the experiment took place two or 3 days after the mock examination. The participants returned to the phase one venue individually and were asked by the experimenter's confederate to imagine they had answered most of the questions incorrectly.<sup>1</sup> They were also informed that in a minute they would be approached by one of the students from their examination group (hereafter 'the student') who would encourage them to do something illicit. The participants were randomly assigned to two conditions. Half were asked to agree to the proposed misconduct and later, when asked, to deny having any intention of doing something wrong. Importantly, all these participants believed they would have to carry out the illicit act. The other half was asked to refuse to be involved in the misconduct and to tell the truth about their intentions.

Next, the student entered the room and asked the participant about the examination. When participants said that they had probably not passed the examination, the student informed them that they could exchange their answer sheet for the one with the correct answers because the professor had left the answer sheets unattended in a room in the building. The student then asked if the participant was interested in swapping answer sheets. Depending on which condition was presented, the participant refused to exchange the test or expressed his or her interest in exchanging it. If the participant expressed an interest in swapping answer sheets, the student provided him or her with the correct answers and gave him or her a new answer sheet to complete. The participant was asked to hide the answer sheet in a pocket and plan how to conduct the exchange. In

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<sup>1</sup> In fact, none of the participants provided correct answers for any of the questions.

both conditions, the student would notice as she was leaving that the doors had been ajar throughout the conversation. She then expressed her concern that they might have been overheard and warned the participant to prepare a plausible story to explain their discussion.

Next, a confederate entered the room and informed the participant that someone had overheard part of his or her conversation with the student and had notified the professor of the plan to exchange answer sheets. At this point, participants were reminded of their task (to lie or tell the truth about their intentions regarding the test) and were given 2 min to prepare for being questioned by the professor. When the professor entered the room, she told the participant that she had been informed that the participant was planning to exchange answer sheets for the test and wanted to discuss the matter. Interviews were videotaped, and all participants were asked six questions about their intentions: (1) 'Please describe in as much detail as possible what you were planning to do', (2) 'Please assess your performance on the exam', (3) 'Did you falsify your answer sheet?', (4) 'Were you planning to enter the room where the answer sheets are stored?', (5) 'Were you planning to swap your original answer sheet for a falsified one?', and (6) 'Are you telling the truth?'.

The next phase of the procedure involved only the participants who had prepared a false answer sheet and planned how to make the exchange ( $N = 26$ ). These participants were asked to go to the room where the tests were stored. Half the participants were told to find and swap their original answer sheet for the false one and, if asked, to lie about their deeds to faculty members but tell the truth to other students. The other half of the participants were told to enter and leave the room without exchanging the tests and to imagine they had changed their mind about falsifying their results. These participants were told that if asked, they should tell the truth to faculty members but lie to other students.<sup>2</sup>

As participants were leaving the room where the answer sheets were stored they were approached (in counterbalanced order) by a professor or by another student who expressed surprise at finding the participant alone in the room and told the participant that they wanted to talk about what the participant had just done. During these interviews, the participant was asked six questions similar to those given above, but in relation to their past activities when they were in the room with the answer sheets. Participants were expected to lie during one of the interviews and tell the truth during the other interview. For authenticity, actual students and faculty members played the confederate roles.

After their last interview, participants completed a post-experimental questionnaire in which they used a 7-point scale to rate their cognitive effort and stress during the procedure and their credibility during the interviews. Participants also completed a test of their beliefs about cues to deception (Ulatowska, 2017).<sup>3</sup>

Summing up, two types of interviews were recorded where the first consisted of 48 interviews about either truthful or deceptive intentions of falsifying a test. These interviews were conducted by a professor. The second round consisted of 26 interviews about past actions (i.e., exchanging the test) conducted by a professor where half of the interviews were truthful (senders did not exchange the test and truthfully described

<sup>2</sup> Participants were asked to justify lying to fellow students by imagining that they did not want to stand out from the group and be judged that they 'chickened out'.

<sup>3</sup> The results of post-experimental questionnaires are not discussed here.

their actions) and the other half was deceptive (senders exchanged the tests but denied it). Another set of 26 interviews were conducted by a student where half of these interviews were truthful (senders exchanged the test and truthfully described their actions) and the other half was deceptive (senders did not exchange the tests but claimed they did so).

For the purposes of this study, two sets of videos consisting of randomly chosen interview clips were prepared. The first set consisted of 12 statements about intentions from 12 different interviewees. The second set consisted of 12 statements about past activities from 12 different interviewees.<sup>4</sup> Half of the statements in each set were deceptive.

### Procedure

The participants in the main experiment were tested in groups of up to ten and were randomly assigned to one of the four conditions. In all conditions, participants were asked not to communicate with each other during the procedure and then presented with one set of 12 interviews. After viewing each of 12 statements, the participants answered a direct question 'Did the interviewee lie?' or an indirect question 'Did the interviewee have to think hard?' using 9-point scales (1 = definitely not to 9 = definitely). The indirect question was chosen as previous studies have consistently shown that lying is more cognitively demanding than truth-telling (Vrij, 2015 for a review) and this has been corroborated by studies of the indirect method of lie detection which have shown that the 'thinking hard' question distinguishes accurately between true and false responses (Ulatowska, 2014; Vrij *et al.*, 2001; review in Bond *et al.*, 2015).

### Results and discussion

A 2 (question type: direct vs. indirect)  $\times$  2 (deception type: future vs. past activities)  $\times$  2 (veracity of statement: truthful vs. deceptive) mixed design ANOVA was used to assess the effect of method on the accuracy of deception detection. Question type and type of deception were between-subjects factors, and veracity was a within-subjects factor.

There was a main effect of veracity,  $F(1, 119) = 7.02, p = .009, \eta^2 = .06$ . As expected, liars were assessed as more deceptive and having to think harder ( $M = 5.13; SD = 1.12$ ) than truth-tellers ( $M = 4.77; SD = 1.13$ ). There was also a main effect of deception type,  $F(1, 119) = 10.58, p = .001, \eta^2 = .08$  (intentions:  $M = 5.17; SD = 1.08$ , past activities:  $M = 4.69; SD = 1.11$ ) and a marginal interaction between veracity and question type,  $F(1, 119) = 3.52, p = .06, \eta^2 = .03$ . The simple effects analysis revealed that, in line with previous studies (see DePaulo & Morris, 2004), participants were only able to distinguish truthful statements ( $M = 4.60; SD = 1.11$ ) from lies ( $M = 5.20; SD = 1.07$ ) when the indirect method of deception detection was applied ( $p = .002$ ) and not when they were asked to assess senders' veracity directly ( $p = .590$ ; truth:  $M = 4.94; SD = 1.14$ , lie:  $M = 5.06; SD = 1.18$ ).

<sup>4</sup> To avoid potential bias caused by the effect of the interviewer's perceived power on interviewee's behaviour, only the interviews conducted by a professor were used.



There was no main effect of question type,  $F(1, 119) = 0.19, p = .66$ , and no interaction between question type and deception type,  $F(1, 119) = 2.05, p = .155$  or between veracity and deception type,  $F(1, 119) = 0.16, p = .69$ . However, simple effects analysis of the latter interaction revealed a significant difference between assessment of truthful and deceptive statements about intent ( $p = .028$ ) but not about past activity ( $p = .125$ ). This finding is in accordance with previous studies that showed better detection of lies about intentions than lies about past behaviour (Vrij, Leal, *et al.*, 2011).

Although there was no three-way interaction between veracity, question type, and type of deception,  $F(1, 119) = 0.57, p = .453$ , an exploratory simple effects analysis was conducted. As listed in Table 1, participants were only able to distinguish accurately between truthful and deceptive statements about both intentions ( $p = .035$ ) and past activities ( $p = .015$ ) based on the indirect method.

## EXPERIMENT 2

The accuracy of deception detection using indirect questions varies across studies (for a review, see Bond *et al.*, 2015). For example, when assessing statements about emotions and opinions of other people using indirect questions about a speaker's emotional ambivalence or confidence more accurate discrimination was made between truths and lies than when using the 'thinking hard' question (Ulatowska, 2014). It was suggested that the effectiveness of the indirect method could be somewhat dependent on the match between the subject of the lie and, thus, diagnostic behavioural cues available (Street & Richardson, 2015) and the type of presented question (Ulatowska, 2014). Hence, the second experiment was conducted to confirm the results of Experiment 1 and to test whether more specific indirect questions matched to the deception subject would be as accurate as the more general cognitive process-based 'thinking hard' question. A further purpose of Experiment 2 was to confirm that the accuracy of indirect lie detection did not decrease when direct and indirect questions were used together. A within-subjects design in which a single group of observers rated one sample of stimuli using both direct and indirect questions was used to provide an explicit comparison between the two methods of deception detection. This test has relevance to the practical application of the indirect method because lie detection professionals using the method would be fully aware of the purpose of the indirect questions (Ulatowska, 2010, 2014).

**Table 1.** Mean scores for the indirect and direct condition as a function of veracity and deception type in Experiment 1

Deception type	Method	Veracity	<i>M</i>	<i>SD</i>
Past behaviour	Direct	Truth	4.64	1.20
		Lie	4.59	1.00
	Indirect	Truth	4.44	1.00
		Lie	5.08	1.23
Future behaviour	Direct	Truth	5.19	1.04
		Lie	5.44	1.19
	Indirect	Truth	4.76	1.21
		Lie	5.31	0.90

## Method

### Participants

Thirty-three undergraduate students from a Polish university participated in the experiment (90.9% women; age:  $M = 20.97$ ;  $SD = 1.86$ ) in exchange for a gift card worth approximately \$8.

### Materials

The video set used in Experiment 1 that consisted of 12 interviews about future activities (intentions) was used again. Half of the statements were deceptive.

### Procedure

After viewing each statement, the participants answered four questions: one direct question 'Did the interviewee lie?' and three indirect questions: (1) 'Did the interviewee have to think hard?', (2) 'Did the interviewee actually plan to swap the answer sheets?', and (3) 'Do you think it is likely that the interviewee did actually swap the answer sheets?'. Participants responded to each question using a 9-point rating scale (1 = definitely not to 9 = definitely). The participants were tested in groups of up to 10 individuals and asked not to communicate with each other during the experiment.

## Results and discussion

A  $4$  (question type)  $\times 2$  (veracity of statement: truthful vs. deceptive) within-subjects ANOVA was conducted to assess the efficacy of different indirect questions in distinguishing between truthful and deceptive statements about intentions.

There were main effects of question type,  $F(3, 30) = 4.63$ ,  $p = .009$ ,  $\eta^2 = .32$ , and veracity,  $F(1, 32) = 54.83$ ,  $p < .001$ ,  $\eta^2 = .63$ . As expected, the ratings for liars ( $M = 5.71$ ;  $SD = 1.03$ ) were higher than those for truth-tellers ( $M = 4.64$ ;  $SD = 1.21$ ). There was an interaction between veracity and question type,  $F(3, 30) = 3.56$ ,  $p = .02$ ,  $\eta^2 = .26$ . Simple effects analysis for veracity revealed significant differences between assessments of liars and truth-tellers for all question types (all  $ps < .001$ ).

As shown in Table 2, when answering the direct question participants assessed liars as more deceptive than truth-tellers. Although the accuracy of the direct question was unexpected given the findings of previous comparisons about indirect and direct methods

**Table 2.** Mean scores for the indirect and direct questions as a function of veracity in Experiment 2

Question type	Veracity	<i>M</i>	<i>SD</i>
Direct	Truth	4.76	1.19
	Lie	6.03	1.19
Thinking hard	Truth	4.97	1.03
	Lie	5.71	0.66
Planning	Truth	4.77	1.29
	Lie	5.80	1.25
Accomplishing plan	Truth	4.03	1.33
	Lie	5.29	1.03



of deception detection, it is consistent with previous studies revealing more accurate detection of lies about intention than lies about past behaviour (Vrij, Leal, *et al.*, 2011).

As expected, truth-tellers were assessed as less likely than the liars to have actually planned to exchange the test and to have carried out their plan. Again, the indirect question about the sender's cognitive effort also discriminated between true and deceptive statements (Vrij *et al.*, 2001). Although all indirect questions differentiated significantly between truthful and deceptive statements, the difference between the scores for the liars and the scores for the truth-tellers was the greatest regarding the question about the probability of execution of the plans (1.26) and the smallest in the question about mental effort (0.74). In other words, deception subject-matched indirect questions (in this case questions about planning and realization of plans) discriminated accurately between true and false statements. This is consistent with previous studies (Ulatowska, 2014) and suggests that the indirect method is accurate when an observer is aware of the subject of potential deception but has no detailed information about the interview context (e.g., if unexpected questions were asked) or about reliable cues to deception (Bond *et al.*, 2015). Furthermore, and importantly from an applied perspective, asking the direct and indirect questions together did not decrease the accuracy of the latter. This result is consistent with previous studies (Ulatowska, 2010, 2014).

## GENERAL DISCUSSION

These experiments had two main purposes. The first was to advance the knowledge of the relative accuracy of lie detection regarding intentions compared alongside lies about past activities. The second was to assess the accuracy of the indirect method of deception detection as applied to false intentions.

The comparison of the accuracy with which truthful and deceptive statements could be differentiated (Experiment 1) revealed differences only in the case of statements about intentions. This finding is consistent with previous experiments suggesting that lies about intentions are easier to detect than lies about past behaviour (Vrij, Leal, *et al.*, 2011). It has been suggested that detection of lies about intentions is more accurate because liars are more prepared and more accustomed to lying about past behaviour than about intentions or plans (Vrij, Leal, *et al.*, 2011). The unexpected accuracy of the direct question in Experiment 2 provides some support for this argument; however, to improve understanding of the differences between the processes involved in lying about the past and future behaviour, the presence of behavioural cues to deception should be analysed.

These results also confirmed that assessments of whether or not someone is thinking hard could be used to distinguish between truth-tellers and liars. This finding is consistent with previous studies and suggests that deception engages complex cognitive processes (Vrij, 2015) and that this is evident in a set of subtle cues. It may be easier to detect these 'constellations of behaviour' (Bond *et al.*, 2015) or diagnostic cues (Street & Richardson, 2015) when answering questions related to cognitive processes rather than direct questions about veracity. The subtle behavioural differences between liars and truth-tellers that are generated by the increased cognitive effort of lying should be especially visible when suspected liars have to answer unanticipated questions (Landström *et al.*, 2007; Vrij *et al.*, 2001; Vrij, Granhag, *et al.*, 2011). It has also been shown that other types of indirect questions – questions which are based on the lie scenario – can be used to distinguish between false and genuine statements about intentions (Ulatowska, 2014).

Although all the indirect questions discriminated between truths and lies, Experiment 2 also revealed that the direct question enabled accurate detection of deception. As mentioned before, this result may have arisen because lies about intentions are generally easier to detect. Yet it may also be taken as support for Porter and ten Brinke's (2009) dangerous decisions theory which posits that accurate assessment of credibility may not be a matter of common sense or intuition and that lie detectors should be alert and think critically about biases such as subjective trustworthiness schemas (e.g., subjective cues to deception) when making assessments. It is possible that answering indirect questions in Experiment 2 prompted closer scrutiny of behaviour and a more critical approach to the subsequent direct question. In other words, participants who assessed the sender's cognitive effort activated valid diagnostic cue schemas, and this influenced their direct veracity decision. Furthermore, previous studies have suggested that familiarity with the context in which truths and lies are told influences the lie detection process (Blair, Levine, & Shaw, 2010; Reinhard, Sporer, Scharmach, & Marksteiner, 2011). Therefore, it is possible that student participants' familiarity with the subject of the interview (i.e., academic misconduct) allowed them to distinguish more accurately between true and false accounts of related intentions and actions. This possibility should be addressed in future studies with non-academic participants.

Conversely, the most important question addressed in this study was the relative accuracy of the indirect method of lie detection with respect to lies about past activities and intentions. The comparison revealed that the method is similarly accurate for the two types of deception. This is consistent with other studies showing that various lie detection techniques, traditionally used to detecting lies about the past or present, can be used to detect lies about intentions (Mac Giolla *et al.*, 2015) and may reflect a reliance on episodic memory for imagining future events as well as remembering past experiences as these tasks engage similar neural processes (Benoit & Schacter, 2015; Schacter & Madore, 2016; Schacter *et al.*, 2007). Other evidence that lying about the past and future behaviour involves similar processes comes from studies that revealed only slight discrepancies in behaviour when lying about the past and about intentions (Vrij, Granhag, *et al.*, 2011; Vrij, Leal, *et al.*, 2011).

### **Limitations and future directions**

To the author's knowledge, this study is the first to apply the indirect method of deception detection to detection of false statements of intent. Although it confirmed that indirect questions could be used to detect lies about intentions, more research is needed. First, for senders who planned to exchange the test, the procedure of video footage preparation consisted of two rounds of interviews – the interview about their intentions and, subsequently, the interview about their deeds (Vrij, Leal, *et al.*, 2011). Thus, the senders assessed in the 'past activity' condition had already been asked similar questions during the first round of interviews, and this could have influenced their behaviour. Although, as in previous studies (Vrij, Leal, *et al.*, 2011), detection of lies about intentions was more accurate than detection of lies about past behaviour, it could be a consequence of routine in senders during the second round of interviews that should be addressed in future studies. Second, the experiment used a specific lie scenario and tested participants who were familiar with the situation. This familiarity limits the generalizability of the findings. It would be useful to investigate whether the accuracy of indirect lie detection is also observable in different false declaration of intent scenarios (Knieps, Granhag, & Vrij, 2014). It would also be interesting to test teachers' ability to detect lies about the past and

intended academic misconduct for determination of the extent to which these findings can be generalized to real-life settings.

Third, as mentioned above, to obtain a fuller understanding of indirect deception detection as applied to lies about the past and planned behaviour, research determining whether it does indeed focus observers' attention on cues that are diagnostic of deception (Vrij *et al.*, 2001) is needed. Prospective analysis should include comparing behavioural cues available in senders' statements with veracity decisions made by observers which would contribute to our knowledge of verbal and non-verbal cues that could reveal lies about intentions and past activities.

## Conclusions

Although the theory underpinning indirect deception detection still needs further work (Granhag, 2006; Street & Richardson, 2015), the results of this study provide additional evidence for the efficacy of this method as well as contributing to an emerging line of research on extending lie detection methods to detection of lies about intentions (Granhag & Mac Giolla, 2014; Mac Giolla *et al.*, 2015). This research suggests that indirect methods are among the techniques that can be used to detect lies about future activities. This study additionally shows that the indirect method is not a panacea for deception detection issues and real-life application of the indirect method is still some way off. Nonetheless, further research in this area may improve our understanding of the reasons for the frequent failure of direct lie detection techniques. Requiring lie detectors to answer supplementary indirect questions may improve the accuracy of direct veracity decisions.

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