

This is the peer reviewed version of the following article: Roos af Hjelmsäter, E., Öhman, L., Granhag, P. A. and Vrij, A. (2014), 'Mapping' deception in adolescents: Eliciting cues to deceit through an unanticipated spatial drawing task. Legal and Criminological Psychology, 19: 179–188. doi: 10.1111/j.2044-8333.2012.02068.x, which has been published in final form at <http://onlinelibrary.wiley.com/doi/10.1111/j.2044-8333.2012.02068.x/full> . This article may be used for non-commercial purposes in accordance with [Wiley Terms and Conditions for Self-Archiving](#).

**“Mapping” children’s deception:
Eliciting cues to deceit through an unanticipated spatial drawing task**

Emma Roos af Hjelmsäter¹, Lisa Öhman¹, Pär Anders Granhag¹, & Aldert Vrij²

¹University of Gothenburg, Sweden.

²University of Portsmouth, UK.

Address correspondence to: Emma Roos af Hjelmsäter, Department of Psychology,
University of Gothenburg, PO Box 500, SE 40530 Gothenburg, Sweden. E-mail:
emma.roos@psy.gu.se

Acknowledgements: Thanks to Erik Adolfsson, Kristin Andersson, Maria Dellenmark-Blom, Lilith Edwinsson, Jasmina Ericsson, Susanne Holmstedt, Lukas Jonsson, Marizela Kljajic, Jessica Mattiasson, Moa Persson, Sara Svedlund, and Sven Pedersen for their assistance in the data collection. Franziska Clemens for drawing. Special thanks to all the children and teachers who participated. Portions of this research was presented at the SARMAC conference in New York, US, 2011.

Abstract

Purpose In this experiment we examined whether an unanticipated spatial task could increase the differences between lying and truth telling groups of children. In addition, we explored whether there are some elements of such a spatial task that elicit more diagnostic cues to deception than others.

Methods In groups of three, children ($N = 150$, aged 13-14) either experienced ('truth tellers') or imagined ('liars') an event. In subsequent individual interviews, the children were asked to provide both a general verbal description of the event (the anticipated task), and a spatial description by making marks on a sketch (the unanticipated task). Next, adults ($N = 200$) rated the degree of consistency between either the general descriptions or the spatial descriptions from the children in each triad.

Results No differences between liars and truth tellers were found when the interview task was anticipated (general verbal descriptions). In contrast, when the interview task was unanticipated (spatial markings), statements from truth telling triads were perceived as significantly more consistent than those of lying triads. Importantly, as predicted, the difference between lying and truth-telling triads only emerged for markings of salient (vs. non-salient) aspects of the event.

Conclusions The results suggests that (a) using spatial tasks may be a useful tool for detecting deception in children, but that (b) the assessment of credibility should only draw on the salient aspects of the unanticipated task.

"Mapping" children's deception:

Eliciting cues to deceit through an unanticipated spatial drawing task

Although children often appear innocent, they do lie and can do it convincingly (Vrij, 2002). There are only a few studies on adults' ability to detect children's lies, and the results show that their ability is only just above chance level (e.g., Jackson & Granhag, 1997; Vrij, 2008). Further, many crimes are committed in groups (van Mastrigt & Farrington, 2009), and children are more likely to commit crimes in groups than adults (Scott & Steinberg, 2008). Research on detecting lies in adults has found that lying pair members act differently compared to pairs of truth tellers (Driskell, Salas, Driskell, in press; Vrij et al., in press). Still, when it comes to detecting deception in children, most research published to date has used statements from single children only. To remedy these shortcomings, the present experiment focused on how to elicit cues to deception in groups of children.

Research has shown that, if the situation allows, observers often use the cue of statement consistency. There are at least four different forms of consistency. First, one may examine the consistency between the statement and other available evidence (Clemens et al., 2010). Second, if the statement is of sufficient length and substance, one can examine consistency or contradictions within the statement (e.g., Landström, Roos af Hjelmsäter, & Granhag, 2007). Third, suspects are most often interviewed repeatedly, allowing observers to examine inconsistencies between different statements (e.g., Granhag & Strömwall, 2001). Fourth, if there is more than one suspect, statements from different persons could be compared for consistency (e.g., Strömwall, Granhag, & Jonsson, 2003).

Both legal workers (Strömwall & Granhag, 2003) and lay persons (Granhag & Strömwall, 2000) appear to use the consistency cue, and assume that consistency implies truth and inconsistency implies deception. However, previous research has shown that deceptive

statements can be equally or even more consistent than truthful statements (Granhag, Strömwall, & Jonsson, 2003; Wagenaar & Dalderop, 1994). To explain this finding, Granhag and Strömwall (1999) introduced the so-called 'repeat vs. reconstruct' hypothesis. The hypothesis states that when interviewed repeatedly, the statements of liars will show a relatively high degree of repetition, as liars will try hard to remember what they have said in previous interviews. In addition, the hypothesis assumes that liars will be careful not to introduce new information in later statements. In contrast, the hypothesis predicts that truthful statements will follow the basic principles of 'reconstructive memory' (e.g., Baddeley, 1990), and therefore show a natural variation over repeated interviews. That is, some details will be lost and some details will be added. In essence, the 'repeat' part of the hypothesis was assumed to hold true for deceptive statements, whereas the 'reconstruct' part was assumed to hold true for truthful statements. Research has shown empirical support for this hypothesis (e.g., Granhag & Strömwall, 2001; Granhag & Strömwall, 2002; Granhag et al., 2003).

Co-offenders are aware of the importance of a planned story (e.g., Wagenaar & Dalderop, 1994). Therefore, according to the repeat vs. reconstruct hypothesis, groups of liars may repeat what is agreed on and not introduce new information. This will result in relatively high consistency between statements of liars. In contrast, groups of truth-telling suspects will try to reconstruct the to-be-remembered event from their memory, resulting in some degree of inconsistency due to the natural malleability of memory.

A new wave of research has shown that the 'repeat vs. reconstruct' hypothesis only holds true when liars and truth tellers are asked questions that are anticipated and when liars have planned their answers (e.g., Leins, Fisher, Vrij, Leal, & Mann, 2011; Vrij et al, 2009). For interviews including *unanticipated elements* the pattern of results is likely to be different. That is, for elements that are unanticipated, liars will not prepare a story, and thus inconsistencies may occur. Unanticipated elements can come in at least two different forms;

the *question as such* can be unanticipated (e.g., the suspect is asked for complications that occurred during the critical event) or the *response format* can be unanticipated (e.g., the suspect may be asked to draw a sketch of a room instead of providing a verbal description). In a recent study by Vrij and his colleagues (2009) these two unanticipated elements were combined. In this study pairs of liars and truth tellers were interviewed individually about an alleged visit to a restaurant. The conventional opening questions (e.g., "What did you do in the restaurant?") were anticipated, whereas the request to sketch the layout of the restaurant was not. Based on the overlap in the two pair members' sketches (consistency), 80% of the liars and truth tellers were classified correctly (the sketches were less alike for the pairs of liars than pairs of truth tellers), whereas on the basis of the conventional questions the pairs were not classified above chance level (for more on this, see Vrij, Granhag & Porter, 2010).

These findings thus suggest that spatial questions are unanticipated, and therefore they may be an effective lie detection tool. As drawings are a suitable way to examine spatial questions, the present experiment used a similar distinction as Vrij et al. (2009); general verbal questions vs. spatial drawings. In addition, the present experiment also examined whether it is the spatial drawing task *per se* that is effective, or whether some elements of such a spatial task are more diagnostic than others. We are not aware of any study to date that has explored this, and one aim of the present experiment was therefore to generate more detailed knowledge about the effectiveness of different aspects of the unanticipated spatial task.

The unanticipated question approach applies to *liars'* statements, predicting a variation in consistency due to an 'expectancy effect'. However, one might also expect differences in consistency for *truth tellers*. Salient aspects of an event will attract more attention and therefore be better remembered. Thus, for such aspects, truth tellers can draw on their memory and their statement are likely to be relatively consistent. On the contrary, non-salient

aspects of an event that attracts less attention will result in poorer memory. Therefore, for non-salient aspects inconsistency between statements can be expected also for truth tellers. Thus, the degree of consistency between truthful statements may vary due to natural 'memory effects'. We believe that it is important to consider the interaction between expectancy effects and memory effects. In the present experiment we explored whether the degree of saliency moderates the effectiveness of a spatial drawing task.

The Present Experiment

Previous research has studied how to detect deceit in pairs of children (Strömwall & Granhag, 2007), and the unanticipated question approach has shown promising results with children who lie individually (Liu et al., 2010). The present experiment extends previous research by combining these two elements. Specifically, we examined if an unanticipated spatial task could increase the differences between deceptive and truthful statements from groups of children. In addition, we sought to further explore the spatial task by including markings that varied in terms of saliency.

In the present study children acted in groups of three (triads). Half of the triads met and interacted with a man, and they later told the truth about this meeting. The remaining triads made up that they had met a man. Hence, in the interview they lied about the encounter. All children were then interviewed individually about the encounter. The interview included a general verbal task (the anticipated task) and a non-verbal spatial task (the unanticipated task).

First, we predicted that the liars would perceive the spatial task as more difficult than would the truth-tellers (Hypothesis 1). Further in line with the unanticipated question approach (e.g., Vrij et al., 2009; Vrij, Leal, et al., 2010) we hypothesized that differences between liars and truth tellers would be larger when the task was unanticipated (vs. anticipated). That is, we expected liars' and truth tellers' general answers to be rated as

equally consistent, whereas, we expected the truth-tellers' (vs. liars') answers to be perceived as more consistent for the spatial task (Hypothesis 2). To qualify this further, we expected that the truth-tellers' (vs. liars') answers would be perceived as more consistent for the salient aspects, whereas we expected no differences between liars and truth-tellers for the non-salient aspects (Hypothesis 3).

Method

The present experiment consisted of two phases. In the first phase, children were interviewed about an event they had either participated in, or imagined, in groups of three. In the interview the children were first asked to provide a general verbal description of the event, and then a spatial description (markings on a sketch). In the second phase, adults assessed the level of consistency between the three children's (a) verbal descriptions and (b) spatial markings.

Phase One: The Children

Participants. A total of 150 children (age = 13-14, 74 girls, 76 boys) from different schools in the Gothenburg area participated in the study. All children participated during a visit to the University of Gothenburg as a part of the International Science Festival in Gothenburg. Consent was collected from the parents as well as from the children.

The event. The triad members knew each other, as they were in the same class in school. Some triads were same-sex and some were mixed. All children were instructed to imagine that they were late for their appointment at the department. They were told to blame the delay on an encounter with a man by a statue located just outside the department. Half of the triads went to this statue and when they were there, they actually met a man (the "truth tellers"). The remaining triads imagined the encounter (the "liars"). The triads were randomly allocated to

either the lying condition or the truth-telling condition, and there were 25 groups in each veracity condition.

Half of the triads (the truth tellers) were asked to go to the statue outside the department. While the children were at the statue, they were approached by a man (a stranger) who asked them about a missing girl. He showed a photo of the girl and asked the children if they had seen her. When the children answered truthfully that they had not seen her, he took the photo and walked away in the opposite direction. The man was instructed (and had rehearsed) to come from the same direction, ask the same question, show the photo in the same way, and walk away into the same direction in each encounter. The children then returned to the department. The entire event lasted a few minutes and was supervised from a window by an experimenter who made sure that the children walked up to the statue, as they were instructed. The children were then told that they would now be interviewed individually about the encounter and that it was important that they were believed by the interviewer.

The remaining 25 triads (the liars) did not go to the statue. Instead, they were shown the statue from a window. Thereafter they were told to imagine that they were late for the appointment because they had forgotten the time. To stay out of trouble, they decided to make up a story about why being late. The triads were told to pretend that they were at the statue where they encountered a man who asked them about, and showed them a picture of, a missing girl. They were told that they would later be interviewed about the encounter and were given five minutes together to prepare their story. They were semi-guided, as they were shown the location, but were asked to invent the man's appearance and what he had said. They were instructed to try to convince the interviewer that they had met the man by the statue.

The interviews. All children were then interviewed individually about the encounter. The six female interviewers all had previous experience in interviewing children and were blind to

the veracity condition of the children. The interview consisted of two phases; a general phase with verbal questions about the event, and a spatial phase in which the children were required to mark aspects of the event on a sketch. In the general phase, the children were asked a predefined set of six directed, but open-ended questions (e.g., What did the man ask you? What was he wearing?). In the subsequent spatial phase, the children were presented with a sketch of the location (the statue and the area around the statue) and asked to mark, in different colours, six spatial aspects of the event that differed in terms of saliency. As the man was the main focus of the event, aspects concerning the man (the man's position and the man's enter and exit direction) were defined as salient. The positions of the children (the child's own position and the position of the two friends) were defined as non-salient aspects. Each interview was audio-recorded and lasted just a few minutes.

The questionnaire. After the interview, all children were given a questionnaire in which they were asked to rate the interview in terms of anticipation and difficulty. For each of the general and spatial questions they were asked to indicate on a 5-point scale the extent to which they had expected the question (from 1 = "yes, definitely", to 5 = "not at all") and to what extent they found the question difficult to answer (from 1 = "not difficult at all", to 5 = "very difficult").

Phase Two: The Adults

Participants. The adult participants were recruited at various departments at the University of Gothenburg. A total of 100 adults (47 % male, age 19-50, $M = 23.92$, $SD = 4.53$) rated the verbal answers. Yet another set of 100 adults (28 % male, age 18-58, $M = 25.62$, $SD = 6.89$) rated the markings. All volunteered to participate and without compensation.

The consistency questionnaires. As background information, the adults were told that children, in groups of three, are claiming to have met a man outside the department. Whether

they are telling the truth or not is not known. They were also informed that each child had been interviewed individually. Each questionnaire contained either the transcripts of the general phase of the interviews from the three children in one group, or the six markings of the spatial phase from the three children in one group. Each questionnaire was made in two copies so that each one was rated by two adults.

In the questionnaires for the general descriptions, the adult's task was to rate the degree of consistency between the three children's statements on a 7-point scale (from 1 = "not at all consistent" to 7 = "completely consistent"). Separate ratings were first made for the four main interview questions, and finally, to include the perception of aspects that were not covered by these four questions, an overall rating was made (in total five ratings).

In the questionnaires for the spatial descriptions, the adults rated the degree of consistency between the three children for each marking task (in total six ratings) on a 7-point scale (from 1 = "not at all consistent" to 7 = "completely consistent").

Results

The Children

Manipulation check. An analysis of the children's ratings showed that the spatial task was less anticipated ($M = 3.75$, $SD = 1.11$) than the general task ($M = 1.91$, $SD = 0.67$), $t(137) = 19.65$, $p < 0.01$, $d = 2.02$. This shows that the manipulation of anticipated/unanticipated tasks was successful.

Difficulty. The children rated the spatial task as being more difficult ($M = 2.24$, $SD = 1.09$) than the general task ($M = 1.89$, $SD = 0.59$), $t(134) = 4.14$, $p < 0.01$, $d = 0.40$. Moreover, in line with Hypothesis 1, liars rated the spatial task as being more difficult ($M = 2.49$, $SD = 1.30$) than did truth tellers ($M = 1.98$, $SD = 0.78$), $t(110.67) = 2.78$, $p < 0.01$, $d = 0.48$. There

was no significant difference between liars' ($M = 1.87, SD = 0.67$) and truth tellers' difficulty ratings ($M = 1.91, SD = 0.49$) for the general task, $t(127.52) = 0.42, p = 0.68, d = 0.07$.

The Adult's Consistency Ratings

General descriptions. To test whether veracity had an effect on the consistency ratings for the general phase, a MANOVA was conducted using the ratings of the five general descriptions as dependent variables. There was no significant main effect of Veracity, $F(5, 94) = 1.33, p = 0.26, \eta_p^2 = 0.07$. Thus, in line with Hypothesis 2, the results showed that there was no difference in perceived consistency between liars' and truth tellers' general verbal answers. For a detailed description of the data, see Table 1.

----- Insert Table 1 about here -----

Spatial descriptions. For the ratings of the six spatial markings, a MANOVA showed a significant multivariate main effect of Veracity, $F(6, 93) = 19.44, p < 0.001, \eta_p^2 = 0.56$. Truth tellers' markings were rated as more consistent than the markings made by the liars (see Table 2), supporting Hypothesis 2. Importantly, and as predicted, there was only a significant difference between liars and truth tellers for salient features. Univariate analyses showed that the truth tellers were perceived as more consistent than the liars for the markings of the position of the man [$F(1,98) = 58.63, p < .001, \eta_p^2 = .37$], enter direction [$F(1,98) = 32.32, p < .001, \eta_p^2 = .24$], and exit direction [$F(1,98) = 37.13, p < .001, \eta_p^2 = .27$]. For non-salient features no significant differences were found, thus supporting Hypothesis 3. For a detailed description of the data, see Table 2.

----- Insert Table 2 about here -----

Discussion

The present experiment showed that the spatial task was unanticipated, and that this increased the differences between the statements of deceptive and truthful groups of children.

Importantly, the results also showed that only some aspects of the spatial task produced cues diagnostic for deception, and thus, it is important to consider the degree of saliency of the different aspects included in a spatial task.

A substantial number of studies have shown that observers are poor at distinguishing deceptive from truthful accounts, from both adults and children (for a review see Bond & DePaulo, 2006). Hence, it is important to develop techniques that elicit cues that can be used to distinguish liars from truth-tellers. The present experiment used an unanticipated question approach to increase the differences in consistency between statements from groups of children. We used an interview that consisted of a general phase (the anticipated task), and a spatial phase (the unanticipated task). We found that the adults did not perceive any differences between liars and truth tellers in the anticipated task, which is in agreement with previous research showing that when participants have had the chance to prepare their statements, deceptive and truthful statements are similar in terms of consistency (Granhag et al., 2003; Strömwall & Granhag 2007). In contrast, when adults rated the consistency between children in the unanticipated marking task, differences between liars and truth tellers emerged, similar to what has been found by Vrij et al (2009) in their research with adults. The success of the unanticipated questions approach could be seen to be the result of 'expectancy effects'. That is, inconsistencies emerge between liars' statements because they do not expect, and thus not prepare for, the spatial questions.

Previous research has found that some unanticipated tasks (i.e., spatial questions and drawing requests) elicit more diagnostic cues to deception than others (i.e., temporal questions) (e.g., Vrij et al., 2009). A related, but previously unexplored, question is whether there are some elements of a spatial task that are more diagnostic than other elements. The present experiment demonstrated that differences between liars and truth tellers emerged only for *salient* features of the event, that is, the man's position and actions. These features were

central and constant during the event. Therefore, truth tellers may have had a good memory for these features, resulting in a comparatively high degree of consistency. However, as it was the man, and not the fellow children, that was the focus of the event, the children's positions may have been less memorable. Thus, for these *non-salient* features the truth tellers' statements were much more inconsistent. In other words, the consistency between truthful statements varied as a result of 'memory effects'. At the same time, the consistency between deceptive statements remained constant (i.e., low, in accordance to the expectancy effect). Taken together, the results of the present experiment have important implications because they suggest that it is not just the spatial task *per se* that yields diagnostic cues to deception, but that some aspects of a spatial task (the description of salient features) are more useful than others in eliciting differences between liars and truth tellers.

We have some suggestions for future studies within this area. First, in the present experiment the adult participants were asked to rate the consistency between the children's statements. As previous research has found that observers are not always able to make use of existing objective cues to deception (Clemens et al., 2010), in future studies participants could also be asked to assess veracity directly. Second, the present experiment used a rather simple spatial task (to place markings on an existing sketch). Future studies may investigate if the results hold also for self-generated drawings.

This experiment, as well as others (Strömwall & Granhag, 2007), show that children are skilled liars, in the sense that they are able to make up a good "cover story" even when they have only a short time to prepare. Thus, efficient methods are needed if one wants to detect children's lies. The results of the present experiment, as well as previous research (Vrij, Leal, et al., 2010), suggest that spatial tasks may be a useful tool when assessing both adults' and children's lies. A key finding of the present experiment is that in order to be effective, salient aspects should be the focus of the spatial task. Overall, in order for the unanticipated question

method to be an effective lie-detection tool, it is important to find tasks that the liars have not anticipated, but the truth tellers have a good memory for.

References

- Baddeley, A. (1990). *Human memory: Theory and practice*. Hove, UK: Lawrence Erlbaum.
- Bond Jr., C.F. & DePaulo, B.M. (2006). Accuracy of deception judgments. *Personality and Social Psychology Review*, *10*, 214-234. doi:10.1207/s15327957pspr1003_2
- Clemens, F., Granhag, P.A., Strömwall, L.A. Vrij, A., Landström, S., Roos af Hjelmsäter, E. & Hartwig, M. (2010). Skulking around the dinosaur: Eliciting cues to children's deception via strategic disclosure of evidence. *Applied Cognitive Psychology*, *24*, 925-940. doi:10.1002/acp.1597
- Driskell, J. E., Salas, E., & Driskell, T. (in press). Social indicators of deception. *Human Factors*.
- Granhag, P. A., & Strömwall, L. A. (1999). Repeated interrogations: Stretching the deception detection paradigm. *Expert Evidence*, *7*, 163-174. doi:10.1023/A:1008993326434
- Granhag, P. A., & Strömwall, L. A. (2000). Effects of preconceptions on deception detection and new answers to why lie-catchers often fail. *Psychology, Crime and Law*, *6*, 197-218. doi:10.1080/10683160008409804
- Granhag, P. A., & Strömwall, L. A. (2001). Deception detection based on repeated interrogations. *Legal and Criminological Psychology*, *6*, 85-101. doi:10.1348/135532501168217
- Granhag, P. A., & Strömwall, L. A. (2002). Repeated interrogations: Verbal and non-verbal cues to deception. *Applied Cognitive Psychology*, *16*, 243-257. doi:10.1002/acp.784
- Granhag, P. A., Strömwall, L. A., & Jonsson, A.-C. (2003). Partners in crime: How liars in collusion betray themselves. *Journal of Applied Social Psychology*, *33*, 848-867. doi:10.1111/j.1559-1816.2003.tb01928.x
- Jackson, J. L., & Granhag, P.A. (1997). Truth or fantasy: The ability of barristers and laypersons to detect deception in children's testimony. In J. F. Nijboer & J. M. Reintjes

- (Eds.), *New trends in criminal investigation and evidence* (pp. 213-220). Lelystad, The Netherlands: Koninklijke Vermande.
- Landström, S., Roos af Hjelmsäter, E., & Granhag, P. A. (2007). The camera perspective bias: A case-study. *Journal of Investigative Psychology and Offender Profiling*, *4*, 199-208.
doi:10.1002/jip.78
- 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.
doi:10.1348/135532510X501775
- Liu, M., Granhag, P. A., Landström, S., Roos af Hjelmsäter, E., Strömwall, L. A., & Vrij, A. (2010). "Can you remember what was in your pocket when you were stung by a bee?": Eliciting cues to deception by asking the unanticipated. *The Open Criminological Journal*, *3*, 31-36. doi:10.2174/1874917801003020031
- Scott, E. S., & Steinberg, L. (2008). Adolescent development and the regulation of youth crime. *The Future of Children*, *18*, 15-33. doi:10.1353/foc.0.0011
- Strömwall, L. A., & Granhag, P. A. (2003). How to detect deception? Arresting the beliefs on police officers, prosecutors and judges. *Psychology, Crime and Law*, *9*, 19-36.
doi:10.1080/10683160308138
- Strömwall, L. A., & Granhag, P. A. (2007). Detecting deceit in pairs of children. *Journal of Applied Social Psychology*, *37*, 1285-1304. doi:10.1111/j.1559-1816.2007.00213.x
- Strömwall, L. A., Granhag, P. A., & Jonsson A.-C. (2003). Deception among pairs: "Let's say we had lunch and hope they will swallow it!". *Psychology, Crime and Law*, *9*, 109-124.
doi:10.1080/1068316031000116238
- Van Mastrigt, S. B., & Farrington, D. P. (2009). Co-offending, age, gender and crime type: Implications for criminal justice policy. *British Journal of Criminology*, *49*, 552-573.
doi:10.1093/bjc/azp021

- Vrij, A. (2002). Deception in children: A literature review and implications for children's testimony. In H. L. Wescott, G. M. Davies, & R. H. C. Bull (Eds.), *Children's testimony: A handbook of psychological research and forensic practice* (pp. 175-194). Chichester, UK: John Wiley & Sons.
- Vrij, A. (2008). *Detecting lies and deceit: Pitfalls and opportunities*. (2nd edition). Chichester: John Wiley & Sons.
- Vrij, A., Granhag, P.A., & Porter, S. (2010). Pitfalls and opportunities in nonverbal and verbal lie detection. *Psychological Science In The Public Interest*, 11 (3), 89-121.
doi:10.1177/1529100610390861
- Vrij, A., Jundi, S., Hope, L., Hillman, J., Gahr, E., Leal, S., Warmelink, L., Mann, S., Vernham, Z., & Granhag, P. A. (in press). Collective interviewing of suspects. *Journal of Applied Research in Memory and Cognition*.
- 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 Behaviour*, 33, 159-166. doi:10.1007/s10979-008-9143-y
- Vrij, A., Leal, S., Mann, S., Warmelink, L., Granhag, P.A., & Fisher, R. P. (2010). Drawings as an innovative and successful lie detection tool. *Applied Cognitive Psychology*, 4, 587-594. doi: 10.1002/acp.1627
- Wagenaar, W. A., & Dalderop, A. (1994). *Remembering the zoo: A comparison of true and false stories told by pairs of witnesses*. Unpublished manuscript, Department of Experimental Psychology, Leiden University, The Netherlands.

Table 1. Mean scores (and standard deviations) of the adult's rating of the level of agreement between the children's general descriptions

	Truth tellers	Liars
	<i>M (SD)</i>	<i>M (SD)</i>
1. The man's intention	5.42 (1.51)	5.28 (1.31)
2. The man's appearance	4.32 (1.30)	4.34 (1.39)
3. The man's clothes	4.10 (1.09)	3.82 (1.59)
4. The girl's appearance	4.78 (1.17)	4.14 (1.68)
5. Overall rating	4.62 (1.07)	4.36 (1.29)

Table 2. Mean scores (and standard deviations) of the adult's rating of the level of agreement between the children's spatial markings

	Truth tellers	Liars	F(1, 98)	<i>p</i>	η_p^2
	<i>M (SD)</i>	<i>M (SD)</i>			
<i>Non-salient features</i>					
Position of child 1	3.50 (1.45)	3.30 (1.50)	.46	-	-.01
Position of child 2	3.82 (1.41)	3.26 (1.45)	3.82	-	.03
Position of child 3	3.60 (1.43)	3.12 (1.42)	2.83	-	.02
<i>Salient features</i>					
Position of the man	5.10 (1.15)	3.14 (1.40)	58.63	**	.37
Enter direction	4.48 (1.39)	2.78 (1.60)	32.32	**	.24
Exit direction	4.86 (1.65)	2.80 (1.73)	37.13	**	.27

Asterisks denote a significant difference between liars and truth tellers, ***p* < .01