

## “Look this way”: Using gaze maintenance to facilitate the detection of children’s false reports

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### **Abstract**

In two experiments, we investigated whether imposing a secondary task is an effective technique for detecting child deceit. First, 85 children aged 8 to 11 years old provided either a true or false report of a recent school event. At interview, some children were asked to gaze towards either the interviewer's face (IF) or a teddy bear's face (TF), whereas some children were given no gaze instruction. In both the IF and TF conditions, lie-tellers provided significantly fewer details than truth-tellers. A total of 192 adult evaluators then judged the credibility of 10 children's reports from one of the three ‘gaze’ conditions with and without guidance on level of detail. Evaluators discriminated truths from lies successfully when judging children instructed to look at IF, but not when children were asked to gaze towards TF. Evaluators who received guidance demonstrated better discrimination between true and false reports than evaluators who received no such information.

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2           Child deception research has focused on both the developmental origins of children's  
3 lie-telling behaviours, and the forensic implications of deceptive child testimonies going  
4 undetected (see Talwar & Crossman, 2012 for a review). Past research has painted a bleak  
5 picture: Children not only have the potential to lie in forensic interviews (Tye, Amato, Honts,  
6 Devitt & Peters, 1999), but, when the video-recordings of their statements are presented to  
7 legal professionals (e.g. police officers, judges), they experience great difficulty in  
8 uncovering false testimonies (Bala, Ramakrishan, Lindsay & Lee, 2014; Leach, Talwar, Lee,  
9 Bala & Lindsay, 2004). Thus, if children do decide to provide deceptive reports, then they  
10 could easily slip through the net resulting in miscarriages of justice that are damaging to both  
11 the victims and defendants (O'Donohue, Benuto & Fanetti, 2010). Clearly, more effective  
12 deception detection strategies are needed.

13           Cognitive processing is an important factor in deception (Zuckerman, DePaulo &  
14 Rosenthal, 1981), particularly for children whose growing cognitive abilities are closely  
15 related to their ability to maintain false reports (Talwar & Crossman, 2011). Indeed,  
16 children's development of global executive functioning (Gordon, Lyon & Lee, 2014) as well  
17 as their development of specific executive functions, such as inhibitory control, working  
18 memory, executive planning and forward search planning, significantly contribute to their  
19 ability to conceal incriminating information when questioned (Alloway, McCallum, Alloway  
20 & Hoicka, 2015; Evans & Lee, 2011; Talwar & Lee, 2008; Williams, Leduc, Crossman &  
21 Talwar, 2016). Furthermore, lie-telling proficiency follows the developmental patterns of  
22 cognitive processes, such as inhibitory control (Debey, De Schryver, Logen, Suchotzki &  
23 Verschuere, 2015). This suggests that child lie-tellers, who are still developing certain

24 cognitive skills that might facilitate their lie-telling, might be affected by any interview  
25 technique that impacts upon these skills.

26 Growing research into adult deception has highlighted cognitive lie detection (CLD)  
27 as a promising strategic tool. Based on the well-established premise that lying is more  
28 cognitively demanding than truth-telling (e.g. Christ, Essen, Watson, Brubaker &  
29 McDermott, 2009; Hartwig, Granhag, Strömwall & Kronkvist, 2006; Mann & Vrij, 2006),  
30 CLD manipulates cognitive load, which refers to information-processing demands (associated  
31 with attentional and working memory) (Block, Hancock & Zakay, 2010), and transforms it  
32 into a system variable (Vrij, 2015). As a result, CLD techniques exaggerate behavioural  
33 differences between truth-tellers and lie-tellers, ultimately leading to impressive  
34 improvements in correct judgements of truths (57% for standard approach to 67% for CLD  
35 approach) and correct judgments of lies (47% for standard approach, 67% for CLD) (Vrij,  
36 Fisher & Blank, 2015). By taxing these cognitive load further, CLD decreases lie-telling  
37 performance. Children should be particularly susceptible to the negative effects of increased  
38 cognitive demand because their developing cognitive abilities, which already reveal their  
39 deceit, would be put under further strain.

#### 40 **Imposing cognitive load**

41 Imposing cognitive load transforms the cognitive demand experienced by  
42 interviewees into a system variable through the addition of a secondary task (Vrij, 2015).  
43 Knowles (1963) proposed that each person has a limited pool of attentional resources that are  
44 differentially allocated to tasks according to difficulty. A difficult task, such as lie-telling,  
45 would draw more resources from this pool than a less difficult task, such as truth-telling. Lie-  
46 tellers would, therefore, have fewer resources (than truth-tellers) remaining if the pool were  
47 finite.

48           This asymmetry in the availability of cognitive resources for truth-tellers and lie-  
49 tellers has two consequences for lie-tellers when a secondary task is imposed. First, lie-  
50 tellers experience an overall increase in cognitive demand, working at or near to full  
51 attentional capacity. This means that lie-tellers exhibit more behavioural cues indicative of  
52 cognitive load compared to truth-tellers. Second, interference between the tasks may arise.  
53 When working at cognitive capacity, performance will depend on a person's ability to divide  
54 his or her attention in accordance with task demands. Attention can be flexibly allocated  
55 from moment to moment (Kahneman, 1973): As the secondary task becomes more difficult,  
56 additional resources can be allocated. If the tasks share a particular pool of resources, then  
57 diverting resources from the primary task to the secondary task should result in a trade-off  
58 (i.e. decreasing performance for the primary task and increasing performance for the  
59 secondary task).

60           Imposing cognitive load in order to detect deception could be particularly effective  
61 with a younger population whose ability to manage their attentional resources has not yet  
62 fully matured. Before the age of 11 years, children find it difficult to differentially allocate  
63 their attention in dual-task processing (Irwin-Chase & Burns, 2000). Furthermore, research  
64 has shown that the increase in cognitive load experienced, when moving from single tasks to  
65 dual-tasks, is greater for children than it is for adults (Karatekin, 2004). Although 10-year-  
66 olds can allocate their attention similarly to adults, their control over attention management in  
67 response to task difficulty is not yet fully developed. In the context of the current study, this  
68 suggests that child lie-tellers may overcompensate for the rising demands of a secondary task,  
69 diverting too many resources away from the primary task of lie-telling,, thus decreasing their  
70 performance on this task. It is also possible that children may prioritise the primary task,  
71 sacrificing their performance on the secondary task.

72 To date, two studies have examined the effects of cognitive lie detection techniques  
73 on children. Firstly, Liu et al. (2010) asked unanticipated questions of children aged 10 to 12  
74 years old about a non-experienced life event. They found that, compared to truth-tellers,  
75 child lie-tellers were more likely to respond to unexpected questions. Secondly, Saykaly,  
76 Crossman, Morris and Talwar (2016) imposed cognitive load by asking children to falsely  
77 allege or deny play with a certain toy using the 'reverse order' interview instruction. Their  
78 results revealed that reverse order recall made it harder for child lie-tellers to maintain their  
79 reports compared to child truth-tellers, suggesting that telling a story backwards does increase  
80 cognitive demands. In summary, both these studies indicated that, when children have to  
81 perform a secondary task (i.e. answering a difficult question) at the same time as maintaining  
82 their false reports, their ability to maintain the lie is negatively affected. In the current  
83 experiment, the secondary task, introduced at interview, was an instruction to maintain gaze  
84 with either the interviewer's face or a teddy bear's face. A secondary task that has yet to be  
85 investigated with children.

## 86 **Gaze maintenance**

87 Using a systematic approach, Glenberg, Schröder and Roberston (1998) demonstrated  
88 that as the cognitive demands (i.e. cognitive difficulty) of a task increase, adults naturally  
89 avert their gaze. This cognitive strategy of gaze aversion is functional, as adults performed  
90 better on moderately difficult questions when they disengaged from (i.e. closed their eyes),  
91 rather than engaged with (i.e. looked at the interviewer's nose), disruptive visual components  
92 in their environment. Looking towards a visual/social stimulus, therefore, interfered with  
93 their task performance when the cognitive demands of the task were moderate. This  
94 behavioural response to avoid cognitive overload has also been investigated with children.  
95 Doherty-Sneddon, Bruce, Bonner, Longbotham and Doyle (2002) compared gaze aversion  
96 behaviour in children aged 5 and 8 years old in response to easy (low cognitive load) and

97 difficult (high cognitive load) questions. Results revealed that the older children averted their  
98 gaze away from the questioner's face more frequently in response to rising question difficulty  
99 (i.e. cognitive effort), but that this gaze pattern was only observed for younger children and  
100 for certain types of questions. This suggests that gaze aversion is used as an overt response to  
101 cognitive effort more consistently with increasing age. In addition, there is evidence to  
102 support that the primary function of gaze aversion is to manage cognitive demands rather  
103 than as a response to social difficulty. Doherty-Sneddon and Phelps (2005) measured gaze  
104 aversion in 8-year-old children who were questioned either face-to-face or via live video link.  
105 Results revealed that question difficulty strongly influenced gaze aversion in both interview  
106 conditions. In the current study, it was anticipated that, as children's ages ranged from 8 to  
107 11 years old, they would attempt to use gaze aversion to reduce cognitive effort more so in  
108 the 'lie-telling' condition where cognitive load is higher than in the 'truth-telling' condition.  
109 Requiring interviewees to maintain gaze during questioning, as was the case for this study,  
110 would disable this coping mechanism for lie-tellers and maintain the increased cognitive  
111 demands of providing a false report. Furthermore, as maintaining gaze is not a natural  
112 behaviour, it would be necessary for interviewees in this experiment to intentionally remind  
113 themselves to comply with our gaze instruction, creating additional cognitive load.

114 In a previous study, maintaining eye contact was used to impose cognitive load on  
115 adult interviewees (Vrij, Mann, Leal, & Fisher, 2010). The researchers found that requiring  
116 eye contact elicited two cognitive cues (out of 14 cues) that discriminated lie-tellers from  
117 truth-tellers; namely, deceitful accounts contained fewer spatial details and were more  
118 chronological compared to truthful accounts. No significant differences were elicited  
119 between truth-tellers and lie-tellers when interviewees were given no 'eye contact'  
120 instruction. In terms of detection accuracy, the small difference in elicited cues only  
121 improved lie detection accuracy from 44% in the 'control' condition to 53% in the 'eye



146           The aim of Experiment 1 was to investigate whether an instruction to maintain gaze  
147 would exaggerate differences between children's true and false reports. With a view to the  
148 future practical value of this research, it was important to consider how appropriate an  
149 instruction to maintain gaze would be with a child population. As maintaining gaze has  
150 already been linked to anxiety (Vrij et al., 2010), asking a child to look at an interviewer's  
151 face may intimidate some interviewees. In this study, we instructed some of the children to  
152 look at a face stimulus considered to be less intimidating; a teddy bear's face. It should be  
153 noted that toys can be useful in child witness interviews (Wilson & Powell, 2001), and a  
154 teddy bear was chosen because it has a face and is non-gender specific.

155           In this experiment, we predicted that lie-tellers would experience more dual-task  
156 interference than truth-tellers when instructed to maintain gaze. That is, lie-tellers' ability to  
157 provide a detailed account would be more negatively associated with their level of gaze  
158 compliance, compared to truth-tellers (Hypothesis 1). Secondly, we anticipated that this  
159 dual-task interference would exaggerate subtle differences in level of detail between true and  
160 false reports. Thus, it was expected that child lie-tellers would provide reports that were  
161 significantly less detailed than those provided by child truth-tellers, and this difference in  
162 detail would be greater for children instructed to maintain gaze compared to children given  
163 no gaze instruction (Hypothesis 2).

## 164 **Method**

165           **Participants.** Eighty-five children (37 boys, 48 girls) aged 8 to 11 years old ( $M =$   
166 10.46 years,  $SD = .81$  years) were recruited from four primary schools in the United  
167 Kingdom. Participant information sheets were sent home to children's legal guardians who  
168 returned a signed written consent form. The general procedure was outlined to the children to  
169 obtain their verbal assent to participation, but they were naïve to the specific purpose of the



170 study and to the anticipated effect of maintaining gaze. All children, who were asked to lie,  
171 complied with the request to lie. Verification was sought from teachers that they had not  
172 taken part in the event that they were interviewed about. All children received a certificate  
173 and a stationery set in exchange for taking part.

174 **Procedure.** The experiment took place in two quiet areas of each school and  
175 involved the Principal Investigator (PI) who ran the study and a Research Assistant who  
176 conducted all interviews and was blind to the aims and hypotheses of the study. All children  
177 were tested individually.

178 The PI invited each child to take part in a short interview about a recent event at their  
179 school, thus events differed across schools. These events included a school sports day, a visit  
180 to the local cathedral, a school play, and a music concert. Children were randomly assigned  
181 to a Veracity condition within each year group in each school so that there were roughly  
182 equal numbers of truth-tellers and lie-tellers for each of the four events. Truth-tellers ( $n = 39$ ,  
183  $M_{\text{age}} = 10.28$  years,  $SD_{\text{age}} = .83$  years) were interviewed after they had experienced the event  
184 and were asked to provide a truthful recollection of what happened. Lie-tellers ( $n = 46$ ,  $M_{\text{age}}$   
185  $= 10.43$  years,  $SD_{\text{age}} = .81$  years), on the other hand, were interviewed about an event that  
186 they had not experienced and were asked to convince the interviewer that they had already  
187 taken part in the event, when in fact they had not. This is similar to the veracity allocation  
188 carried out by other researchers interested in eliciting false allegations from children (e.g.  
189 Akehurst, Köhnken & Höfer (2001); Brunet et al., 2013; Lyon, Malloy, Quas & Talwar,  
190 2008).

191 Within their veracity groups, children were also randomly assigned to a Gaze  
192 Instruction condition: Look at the interviewer's face (IF,  $n = 28$ ,  $M_{\text{age}} = 10.25$  years,  $SD_{\text{age}} =$   
193  $.80$  years) or Look at the teddy bear's face (TF,  $n = 29$ ,  $M_{\text{age}} = 10.52$ ,  $SD_{\text{age}} = .74$  years) or No

194 gaze instruction (Control,  $n = 28$ ,  $M_{\text{age}} = 10.32$  years,  $SD_{\text{age}} = .91$  years). The teddy bear was  
195 seated on the interviewer's lap throughout all interviews (i.e. for all conditions). Prior to the  
196 interview, children in the IF and TF conditions were instructed by the PI to maintain gaze  
197 with the relevant face stimulus as much as they possibly could throughout the interview (i.e.  
198 to look at it as much as they could remember to do so). All children then received a sheet  
199 listing general themes that they could tell the interviewer about (e.g. talk about who was  
200 there, what happened, when it happened). This does not constitute coaching as neither truth-  
201 tellers nor lie-tellers were told exactly what they should say and they did not rehearse their  
202 story with the PI. Providing children with these themes was anticipated to elicit longer  
203 statements, allowing for more cues to deceit to occur (Leal, Vrij, Warmelink, Vernham &  
204 Fisher, 2015; Vrij, 2015). All participants were given approximately three minutes to prepare  
205 themselves before the PI escorted them to the interview room. Before entering the interview  
206 room, children in the IF and TF condition were given a final reminder by the PI to maintain  
207 gaze with the relevant face stimulus. This was done out of earshot of the interviewer so that  
208 she remained blind to the aims and hypotheses of the study.

209         The interview protocol reflected the initial stages of a Cognitive Interview (Fisher &  
210 Geiselman, 1992): A rapport-building phase (that took place off-camera) was followed by  
211 two open-ended questions. First, an invitation to provide a free, uninterrupted narrative (e.g.  
212 tell me everything that happened when you took part in your school sports day), and then,  
213 secondly, a request, to all interviewees, to provide one additional piece of information about  
214 an aspect of the event that they had not already mentioned. No other questions were asked.  
215 All children were video-recorded, and their interviews later transcribed. All interviewees  
216 were asked the following question, which served as a manipulation check: Where were you  
217 instructed to look during the interview? The response options were 'interviewer's face',  
218 'teddy bear's face' or 'no instruction given'.

219           **Coding for detail.** Two independent coders rated the children's interview transcripts  
220 for number of details included. To make the coding more precise, all transcripts were coded  
221 for five different types of details; visual details (e.g. "white clay head" contains three visual  
222 details), auditory details (e.g. "the teacher told us to take deep breaths" contains one auditory  
223 detail), spatial details (e.g. "he stood behind the curtain" contains one spatial detail), temporal  
224 details (e.g. "at the end we left" contains one temporal detail), and action details (e.g. "we  
225 played football" contains one action detail). One coder coded all of the transcripts for the  
226 current study, whilst the second coder rated a random sample of 20 transcripts. Considering  
227 that general level of detail is a reliable indicator of veracity (DePaulo et al., 2003), total  
228 number of details was calculated for each interviewee, by adding together the scores for all  
229 five detail types. Intra-class correlation coefficients (ICCs) were calculated for the two  
230 coders. Inter-rater reliability was high, with all ICCs demonstrating high levels of agreement  
231 between coders (visual details, ICC = .96; auditory details, ICC = .98; spatial details, ICC =  
232 .94; temporal details, ICC = .96; action details, ICC = .92; and total number of details, ICC =  
233 .98).

234           **Coding for gaze maintenance.** To provide an objective measure of gaze behaviour,  
235 two different independent judges, using INTERACT 14.0 software (Mangold, 2015), coded  
236 all interviews (from start to end) for the amount of time (in seconds) that the child  
237 interviewees gazed towards the interviewer's face (IF) and the teddy bear's face (TF). The  
238 duration of these gaze patterns for both face stimuli were then added together to give the total  
239 number of seconds spent gazing at the IF and the TF for each child. Percentage of time spent  
240 gazing towards both the IF and the TF were calculated by taking the total number of seconds  
241 spent gazing towards each face stimuli, dividing it by the total length of the interview in  
242 seconds and multiplying it by 100. Percentage of time spent gazing elsewhere was calculated  
243 by adding together the percentages for IF and TF and subtracting this total from 100. First,

244 both raters coded 17 interviews (20% of the total) to check for inter-rater reliability. Inter-  
245 rater reliability was high for time spent looking at the interviewer's face ( $ICC = .99$ ) and at  
246 the teddy bear's face ( $ICC = .91$ ). Rater 1 then coded the next 40% of the video recordings ( $n$   
247  $= 34$ ) and Rater 2 coded the remaining 40% of the video recordings ( $n = 34$ ). Percentage of  
248 time spent gazing at each face stimulus was calculated for each child by dividing the time  
249 spent gazing at the stimulus (in seconds) by the total duration of the interview (in seconds)  
250 and multiplying the result by 100.

## 251 **Results**

252 **Manipulation checks.** All 85 children correctly indicated where they had been asked  
253 to look during the interview. To test level of compliance more objectively, two-way  
254 ANOVAs were performed with Veracity and Gaze Instruction as the between-subjects  
255 factors. These were conducted to investigate differences in percentage of time spent gazing at  
256 (a) the interviewer's face, (b) the teddy bear's face, and (c) elsewhere (i.e. towards neither  
257 face stimulus). Figure 1 displays the distribution of gaze behaviour across 'veracity'  
258 conditions and Figure 2 across 'gaze instruction' conditions.

259 In terms of gazing towards the interviewer's face, there was a significant main effect  
260 of Veracity,  $F(1, 79) = 5.78, p = .019$ . Children providing a false report ( $M = 45.80\%$ ,  $SD =$   
261  $22.41$ ) spent a higher percentage of their interviews looking at the interviewer's face than  
262 children providing a true report ( $M = 35.24\%$ ,  $SD = 23.72$ ),  $d = .46$ , 95% CI [.03, .89]. There  
263 was also a significant main effect of Gaze Instruction,  $F(2, 79) = 10.50, p < .001$ . Pairwise  
264 comparisons using Bonferroni adjustment showed that children instructed to look at the  
265 interviewer's face ( $M = 55.93\%$ ,  $SD = 24.97$ ) spent a greater portion of the interview gazing  
266 at the interviewer's face than children instructed to look at the teddy bear's face ( $M =$   
267  $31.61\%$ ,  $SD = 23.41, p < .001, d = .98$ , 95% CI [.42, 1.52], or given no gaze instruction ( $M =$

268 28.71%,  $SD = 17.49$ ,  $p = .001$ ,  $d = 1.04$ , 95% CI [.47, 1.59]). There was no difference  
269 between these latter conditions,  $p = 1.00$ . There was no significant interaction effect,  $F(2, 79)$   
270  $= 1.10$ ,  $p = .34$ .

271 In terms of gazing towards the teddy bear's face, there was no significant main effect  
272 of Veracity,  $F(1, 79) = .32$ ,  $p = .57$ . There was, however, a significant main effect of Gaze  
273 Instruction,  $F(2, 79) = 9.50$ ,  $p < .001$ . Pairwise comparisons using Bonferroni adjustment  
274 showed that instructing children to gaze at the teddy bear's face ( $M = 16.77\%$ ,  $SD = 18.77$ )  
275 resulted in a higher percentage of time looking at the teddy bear's face than instructing  
276 children to look at the interviewer's face ( $M = 5.22\%$ ,  $SD = 5.21$ ,  $p = .001$ ,  $d = .83$ , 95% CI  
277 [.29, 1.37]), or giving no gaze instruction ( $M = 4.66\%$ ,  $SD = 2.66$ ,  $p < .001$ ,  $d = .90$ , 95% CI  
278 [.35, 1.44]). There was no difference between these latter conditions,  $p = 1.00$ . There was  
279 no significant Veracity X Gaze Instruction interaction effect,  $F(2, 79) = .28$ ,  $p = .76$ .

280 Finally, in terms of gazing elsewhere, there was a significant main effect of Veracity,  
281  $F(1, 79) = 7.15$ ,  $p = .009$ . Truth-tellers ( $M = 56.66\%$ ,  $SD = 24.22$ ) spent a higher proportion  
282 of the interview looking elsewhere compared to lie-tellers ( $M = 44.48\%$ ,  $SD = 21.37$ ),  $d = .54$   
283 (95% CI [.10, .97]). There was also a significant main effect of Gaze Instruction,  $F(1, 79) =$   
284  $7.99$ ,  $p = .001$ . Pairwise comparisons using Bonferroni adjustment showed that children  
285 given no gaze instruction ( $M = 61.73\%$ ,  $SD = 17.74$ ) spent more time looking elsewhere  
286 compared to children instructed to look at the interviewer's face ( $M = 38.85\%$ ,  $SD = 24.21$ ),  
287  $p < .001$ ,  $d = 1.08$  (95% CI [.51, 1.64]). Percentage of time looking elsewhere did, however,  
288 not differ between children in the 'control' condition and those in the 'teddy bear's face'  
289 condition ( $M = 49.63\%$ ,  $SD = 22.61$ ),  $p = .10$ . There was also no significant difference in  
290 percentage of time spent gazing elsewhere between children in the 'interviewer's face'  
291 condition and child in the 'teddy bear's face condition,  $p = .20$ . There was no significant  
292 interaction effect,  $F(2, 79) = .80$ ,  $p = .45$ .

293 In sum, children were able to comply with the instruction to look at the interviewer's  
294 face or the teddy bear's face. That said, although our instructions did increase time spent  
295 gazing toward a specific face stimulus, overall compliance was relatively poor as the average  
296 participant complied with their gaze instruction for less than 50% of their interview.  
297 Furthermore, children in the 'teddy bear's face' condition only spent 16% of the time looking  
298 at their specified stimulus and just as much time looking at the interviewer's face and  
299 elsewhere as children in the 'control' condition. This lack of compliance may be because  
300 gazing at a static toy when responding to a person is an unnatural behaviour. It could also be  
301 because the location of the teddy bear was problematic; staring at the interviewer's lap may  
302 have seemed strange.

303 **Hypotheses-testing.** Preliminary analyses revealed no significant effects of child  
304 age, child gender, or specific activity reported (e.g. sports day, school trip) during the  
305 interview, on any of the dependent variables. The data for all participants were, therefore,  
306 combined for subsequent analyses.

307 *Dual-task interference.* We investigated whether lie-tellers experienced more dual-  
308 task interference than truth-tellers, when given the secondary task of maintaining gaze with  
309 either the interviewer's face or the teddy bear's face whilst being questioned. The  
310 'performance operating characteristic' (POC, Norman & Bobrow, 1975) of truth-tellers and  
311 lie-tellers was calculated separately for children in both 'gaze instruction' conditions. By  
312 calculating Pearson's correlations between the total number of details included in the  
313 interviewee's account (i.e. level of detail) and the time they spent gazing towards either the  
314 interviewer's or the teddy bear's face (i.e. level of gaze compliance), we were able to  
315 examine to what extent the two tasks interfered with one another. High levels of interference  
316 would be characterised by a strong negative correlation between performances on both tasks

317 (i.e. increasing compliance with the gaze instruction resulting in decreasing level of detail in  
318 responses).

319 First, when the secondary task required interviewees to look at the interviewer's face,  
320 findings revealed a weak, negative correlation for truth-tellers,  $r = -.28$ ,  $p = .40$ , and a small  
321 to moderate, positive correlation for lie-tellers,  $r = .39$ ,  $p = .16$ . Although these correlations  
322 are not significant, this may be due to the effect of a limited sample size. Following the  
323 suggestion of Ferguson (2009), we therefore looked at the effect size of these correlations as  
324 "effect sizes are resistant to sample size influence, and thus provide a truer measure of the  
325 magnitude of effect between variables" (p. 532). Interpreting these  $r$  values as effect sizes  
326 (Field, 2013), the data showed that there was a small effect for truth-tellers and a medium  
327 effect for lie-tellers. This suggests that there was mild interference between truth-tellers'  
328 ability to provide detailed answers and their compliance with the gaze instruction. However,  
329 it also shows that there was no interference for lie-tellers, whose level of detail in fact  
330 increased with their level of compliance with the gaze instruction. Second, when  
331 interviewees were instructed to look at the teddy bear's face, there was no correlation  
332 between level of detail and compliance with the gaze instruction for truth-tellers,  $r = -.04$ ,  $p =$   
333  $.91$ , nor for lie-tellers,  $r = .08$ ,  $p = .78$ .

334 *Level of detail.* Preliminary analyses showed that true reports ( $M = 750.79$ ,  $SD =$   
335  $670.31$ ) contained significantly more words than false reports ( $M = 508.33$ ,  $SD = 560.88$ ),  
336  $t(83) = 1.82$ ,  $p = .037$ ,  $d = .40$  (95% CI [-.37, .82]). As longer reports allow for more details  
337 to occur, length of statement would have an effect on our analysis of total detail. To take this  
338 effect into account, length of statement (in words) was entered as a covariate in our analyses.  
339 This is similar to previous work by Strömwall and Granhag (2005) when analysing reality  
340 monitoring scores.

341 First, a 2 (Veracity) x 3 (Gaze Instruction) ANCOVA was performed with total  
342 number of details as the dependent variable. There was a significant main effect of Veracity,  
343  $F(1, 78) = 8.44, p = .005$ , a significant main effect of Gaze Instruction,  $F(2, 78) = 3.16, p =$   
344  $.048$ , and a significant Veracity X Gaze Instruction interaction effect,  $F(2, 78) = 4.22, p =$   
345  $.018$ . Descriptive statistics for each of the experimental cells are displayed in Table 1.

346 Of interest for the hypotheses is the Veracity X Gaze Instruction interaction effect.  
347 Separate ANCOVAs were conducted: first, for each of the Gaze Instruction conditions with  
348 Veracity as the independent variable, and second, for each of the Veracity conditions with  
349 Gaze Instruction as the independent variable. When children were instructed to gaze at the  
350 interviewer's face, truth-tellers provided significantly more details compared to lie-tellers,  
351  $F(1, 25) = 8.53, p = .007, d = .92$  (95% CI [.13, 1.70]). Similarly, when children were  
352 instructed to look at the teddy bear's face, truth-tellers provided more details in their  
353 statements than lie-tellers,  $F(1, 26) = 5.88, p = .023, d = .83$  (95% CI [.058, 1.59]). Veracity  
354 did not have a significant effect on the number of details provided by children who were  
355 given no gaze instruction,  $F(1, 25) = .24, p = .63$ . Irrespective of whether they were  
356 providing a true report or a false report, children in the control condition included the same  
357 amount of detail.

358 For children who provided a truthful account, there was a significant effect of Gaze  
359 Instruction condition,  $F(2, 35) = 4.04, p = .026$ . Post-hoc testing using Bonferroni  
360 adjustment revealed that truth-tellers who looked at the interviewer's face provided more  
361 details than truth-tellers who were given no gaze instruction,  $p = .03, d = .48$  (95% CI [-.31,  
362 1.25]). There was no difference in quantity of detail between truth-tellers looking at the  
363 interviewer's face and those looking at the teddy bear's face,  $p = 1.00$ , and no difference  
364 between truth-tellers looking at the teddy bear's face and those in the control condition,  $p =$



365 .14. For children who provided a fabricated account, there was no significant effect of Gaze  
366 Instruction,  $F(2, 35) = .55, p = .58$ .”.

### 367 **Discussion**

368         The analysis of the association between providing a detailed account and complying  
369 with the gaze instruction revealed a small positive effect for lie-tellers in the ‘interviewer’s  
370 face’ condition. That is, the more the lie-tellers looked at the interviewer’s face the more  
371 details they gave. This was contrary to Hypothesis 1. Furthermore, the instruction to look at  
372 the teddy bear’s face did not elicit dual task interference for the lie-tellers nor for the truth-  
373 tellers. Our theoretical assumption posited that lie-tellers, who have a more cognitively  
374 demanding primary task compared to truth-tellers, would reach the limit of their resources  
375 when a secondary task was imposed (Knowles, 1963), and, therefore, experience a high level  
376 of dual-task interference (Kahneman, 1973). However, our analysis of lie-tellers’ dual-task  
377 interference does not support this theoretical assumption. Indeed, the positive relationship  
378 between level of detail and gaze compliance for lie-tellers instructed to look at the  
379 interviewer’s face completely contradicts our hypothesis. This could be due to the cognitive  
380 resources required for each task originating from separate (limited) resources. Multiple  
381 resource theory (Wickens, 2002) posits that tasks that are structurally dissimilar, such as  
382 answering interview questions (verbal) and maintaining gaze (visual/social), will interfere  
383 less. This may explain why imposing cognitive load through constructing/maintaining a lie  
384 (verbal) and telling the lie in reverse order (verbal) had greater success in previous studies  
385 (Saykaly et al., 2016; Vrij et al., 2008) because the two tasks use similar cognitive processes.

386         An alternative explanation could be that the effect of gaze maintenance on task  
387 performance can vary dependent on the relevance of the visual stimulus to the primary task  
388 (Doherty-Sneddon et al., 2001). It could be the case, in the current study, that child lie-tellers

389 instructed to look towards the interviewer's face found the information communicated by her  
390 face more task-relevant than truth-tellers. Lie-tellers, who are more concerned with  
391 appearing honest than truth-tellers (Vrij, 2015), might have monitored the interviewer's face  
392 for feedback on how their deception was being received and used this to modify their  
393 responses (e.g. to say more to appear honest). However, this tactic works to their  
394 disadvantage, as longer statements are more likely to contain cues to deceit (Vrij et al., 2015).  
395 This would particularly be the case for child interviewees who tend to reveal their deceit  
396 verbally (Talwar & Lee, 2002). Furthermore, these unanticipated findings might be  
397 explained by differences in children's developing cognitive capabilities that are associated  
398 with lie-telling ability, such as executive functioning (Talwar & Crossman, 2011). Child lie-  
399 tellers in our study may have had good working memory skills that allowed them to look at  
400 the interviewer's face whilst telling their false report. Future research should investigate  
401 whether the effects of imposing cognitive load are moderated by children's growing cognitive  
402 development.

403         Interestingly, truth-tellers instructed to look at the interviewer's face did experience  
404 some dual-task interference. This unexpected finding requires further investigation. As  
405 memory can be data-limited (i.e. limited by a person's ability to recall a past experience), it  
406 could be that factors other than gaze compliance influenced our child truth-tellers' ability to  
407 provide a detailed account. Finally, the absence of dual-task interference for children  
408 instructed to look at the teddy bear's face could be explained by the teddy bear's face not  
409 being as cognitively effortful to look at as the interviewer's face. As the teddy bear's face did  
410 not provide any relevant feedback, it was not necessary for the interviewees to monitor it for  
411 suspicion. Nevertheless, we suggest caution in interpreting these correlations due to their  
412 non-significant nature.

413 Irrespective of the findings for dual-task interference, significant differences in level  
414 of detail between child truth-tellers and child lie-tellers were only elicited when a secondary  
415 task was imposed. For children instructed to look at the interviewer's face, these findings are  
416 in line with previous work with adults (Vrij et al., 2010), which has also found exaggerated  
417 behavioural differences between truths and lies when gaze was maintained. For children  
418 instructed to look at the teddy bear's face, these findings extend current knowledge and  
419 demonstrate that gazing towards a non-human stimulus could act as a less threatening, but  
420 still effective, substitute in practice. Although exaggerated differences occurred when a dual-  
421 task was imposed, it remains unclear from a theoretical standpoint why this was the case.  
422 The dual-task processes involved in providing a narrative and maintaining gaze require  
423 further examination to understand the theory behind this effect. Indeed, further probing of  
424 the significant interaction suggests that using different gaze instructions does not have an  
425 effect on false reports but rather has an effect on true reports. Thus, these exaggerated  
426 differences could be due to gaze maintenance facilitating longer truthful accounts rather than  
427 inhibiting false accounts. Our findings suggest that the request to look at the interviewer's  
428 face elicited true reports that were significantly more detailed than when no gaze instruction  
429 was provided. This may be due to the demeanour of our interviewer; supportive interviewers  
430 have been shown to elicit longer reports (Vrij, 2015). However, it is not within the scope of  
431 this research to draw any firm conclusions regarding these results. Furthermore, these  
432 findings should be interpreted with caution. Due to small experimental cell sizes, there is a  
433 risk of Type I error. This study, therefore, requires replication with a larger sample size to  
434 verify that the interaction effect remains significant.

435 In this study we were not able to examine the memory accuracy of the truth-tellers'  
436 detailed reports. Based on the information provided by the schools, we were only able to  
437 establish whether the children had taken part in the events or not, but, due to the scope of the

438 events, we were unable to capture all of the information regarding the events to code for  
439 correct and incorrect details. Future research is required to explore the relevance and  
440 accuracy of the reports provided by truth-tellers in the 'gaze instruction' conditions to  
441 understand the specific benefits of eliciting more details in true reports.

442         In the current study the interview protocol was short and non-elaborative. Using  
443 open-ended questions did allow us to go beyond the majority of past research, which has  
444 primarily focused on forced-choice questions using temptation resistance paradigms, to  
445 examine how gaze maintenance would affect children's longer narratives. However, this  
446 does not reflect interview protocols in real-life police investigations with child witnesses,  
447 where a variety of question types are used. We can, therefore, not generalize these findings  
448 to a whole police interview, but only to the beginning of the police interview where an  
449 uninterrupted free narrative is requested. Finally, our study represents a 'best case scenario'  
450 in which a child provides a long narrative. As we reduced our interview protocol to focus on  
451 two open-ended questions, it was important to facilitate long responses by providing all of the  
452 children with examples of the type of information they could provide and some time to  
453 prepare. Child witnesses typically provide shorter statements than both their adolescent and  
454 adult counterparts (Jack, Leov & Zajac, 2014); this may be due to them not knowing what  
455 level of detail is required at interview (Lamb, Orbach, Hershkowitz, Esplin & Horowitz ,  
456 2007). Future research should continue to test the generalizability of these findings by using a  
457 procedure where no examples are provided.

458         Despite the exaggerated difference in level of detail elicited between child truth-  
459 tellers and child lie-tellers in the dual-task gaze condition (compared to the single-task  
460 control condition), the major concern still remained whether evaluators would be able to  
461 discriminate between lie-tellers and truth-tellers more effectively when child interviewees

462 were instructed to maintain gaze compared to when no gaze instructions were given. We  
463 investigated this issue in Experiment 2.

## 464 **Experiment 2**

465 In Experiment 2, we tested the prediction that evaluators would discriminate better  
466 between truth-tellers and lie-tellers instructed to maintain gaze, than truth-tellers and lie-  
467 tellers who were given no gaze instruction (Hypothesis 3).

468 We also examined whether telling evaluators that truth-tellers provide more detail in  
469 their reports than lie-tellers would improve discrimination accuracy. Previous research into  
470 training to improve lie detection has shown that informing evaluators about empirically-  
471 supported verbal cues to deceit has the largest effect on their detection accuracy (Hauch,  
472 Sporer, Michael & Meissner, 2014). Overall, level of detail has been found to be a key  
473 indicator of veracity (DePaulo et al., 2003). It is also one of the general characteristics coded  
474 for in Criteria-Based Content Analysis (Steller & Köhnken, 1989) that has received the most  
475 support for distinguishing between child truth-tellers and child lie-tellers in the predicted  
476 direction (Vrij 2005). It was, therefore, anticipated that evaluators who received this  
477 guidance regarding detail would demonstrate better discrimination than evaluators who  
478 received no guidance (Hypothesis 4). It was further predicted that an improvement in  
479 discrimination, as a result of guidance, would be most pronounced when judging the  
480 credibility of children instructed to maintain gaze, due to a greater difference in detail being  
481 elicited in these conditions in Experiment 1 (Hypothesis 5).

482 Successful discrimination depends on whether evaluators can interpret behavioural  
483 cues correctly. It was, therefore, important to recognise that gaze aversion can be perceived  
484 as a strong indicator of deception (Global Deception Research Team, 2006), even though this  
485 cue is non-diagnostic (DePaulo et al., 2003). We could not rule out the possibility that gaze

486 behaviour perceived to be somewhat 'strange' might impact on evaluators' judgments of  
487 credibility. Half of the evaluators were, therefore, played visual-audio clips of the children's  
488 interviews, and the other half were played audio-only clips. We anticipated that evaluators  
489 who watched the visual-audio presentations displaying the gaze maintenance behaviour  
490 would demonstrate a truth bias because gaze maintenance might be interpreted as a sign of  
491 truthfulness (Vrij et al., 2010) (Hypothesis 6).

## 492 **Method**

493 **Participants.** A sample of 192 adult evaluators (89 males, 103 females) with an age  
494 range of 18 to 76 years ( $M = 27.14$  years,  $SD = 11.71$  years) was recruited. One hundred and  
495 ten participants (52% of the total sample) were undergraduate students who received 0.5  
496 course credit for their participation. The further 82 participants were members of the general  
497 public recruited via convenience sampling. The non-student participants were not  
498 compensated for their participation.

499 **Interview clips.** A total of 30 interview clips were selected from the sample of 85  
500 children in Experiment 1. There were ten clips per 'Gaze Instruction' condition; within each  
501 of those three sets of ten clips, there were five truth-tellers and five lie-tellers. In the first  
502 round of the interview clip selection process, all recordings that contained noise interference  
503 (e.g. school bell, road traffic) were excluded ( $n = 20$ ). Second, clips in which the first free  
504 recall lasted longer than 300 seconds were removed ( $n = 7$ ). This criterion was chosen to  
505 limit the total duration of the study (50 minutes maximum), reducing potential fatigue effects  
506 on evaluators' performance. The remaining 58 clips were divided by Gaze Instruction  
507 condition (IF,  $n = 22$ ; TF,  $n = 16$ ; CONTROL,  $n = 20$ ), and five truth-tellers and five lie-  
508 tellers were randomly selected for each condition. The final thirty clips were edited down so  
509 that they only contained the child interviewee's first free recall. This selection process

510 resulted in an even distribution of gender (3 boys to 2 girls, or 2 boys to 3 girls) in each  
511 Veracity x Gaze Instruction cell, except for the false reports in the 'control' condition, which  
512 were all provided by boys. It was not anticipated that this would bias results as no response  
513 bias has been previously found for adults judging boys' credibility (Talwar, Crossman,  
514 Gulmi, Renaud & Williams, 2009). Interview clips lasted from 53 seconds to 239 seconds  
515 ( $M = 135.67$  seconds,  $SD = 56.16$  seconds). A 2 (Veracity) x 3 (Gaze Instruction) ANOVA  
516 was performed to ensure that there were no significant differences in length of clip across  
517 conditions. There was no significant main effect of Veracity,  $F(1, 24) = .13, p = .72$ , no  
518 significant main effect of Gaze Instruction,  $F(2, 24) = .05, p = .96$ , and there was no  
519 significant Veracity X Gaze Instruction interaction effect,  $F(2, 24) = .62, p = .55$ . For each  
520 'gaze instruction' condition, four random rotations of the ten clips were created to reduce  
521 order effects.

522         **Guidance on detail.** Evaluators who received guidance were provided with a sheet  
523 stating that truth-tellers provided more detail overall in their accounts compared to lie-tellers,  
524 as this has been reported in previous deception research (DePaulo et al., 2003) and was also  
525 found in Experiment 1. To help evaluators understand what the experiment meant by the  
526 term 'detail', five different types of detail were presented in a table. For each type of detail, a  
527 description and an example of that detail were provided (i.e. 'visual detail refers to what the  
528 interviewee said that they saw. For example, a red hat contains two visual details').  
529 Participants were advised to refer back to the guidance sheet as much as they found useful  
530 when watching/listening to the interview clips and were able to ask the experimenter for  
531 clarification on these types of detail before and during the experiment.

532         **Procedure.** The study took place in a quiet environment with few distractions. In  
533 order to prevent evaluators from working on the assumption that they would be presented  
534 with equal numbers of truth-tellers and lie-tellers, two steps were taken. First, participants

535 were informed that they would be asked to evaluate the veracity of twelve child interviews in  
536 turn (actually they only evaluated ten clips in total). Second, they were told that it was just as  
537 likely for a child to be telling the truth as it was for them to be telling a lie..

538 First, evaluators were randomly assigned to a Gaze Instruction condition. That is,  
539 they judged the credibility of ten interview clips (five truth-tellers and five lie-tellers) from  
540 only one of the Gaze Instruction conditions in Experiment 1 (IF vs. TF vs. Control).  
541 Evaluators who were provided with guidance on detail received this at the beginning of the  
542 experiment. Half of the evaluators watched all of the interview clips in visual-audio format,  
543 whilst the other half listened to all interview clips in audio-only format. Participants who  
544 watched visual-audio presentations of the interviewees in the 'interviewer's face' and the  
545 'teddy bear's face' conditions were informed that the child interviewees had been asked by  
546 the experimenter to direct their gaze during the interviews. Evaluators then watched and/or  
547 listened to the clips, one at a time, via a computer. Headphones were provided. To record  
548 their credibility judgments, evaluators were given a hard copy answer booklet. Following  
549 each interview clip, evaluators were asked to decide if the child interviewee was lying or  
550 telling the truth.

551 Participants' dichotomous judgments (truth or lie) for each clip were used to measure  
552 hits (proportion of deceitful clips correctly identified as deceitful) and false alarms  
553 (proportion of truthful clips incorrectly identified as deceitful) for subsequent signal detection  
554 analysis.

## 555 **Results**

556 **Accuracy.** Overall accuracy ( $M = 51.72\%$ ,  $SD = 16.23$ ) was not significantly  
557 different from chance,  $t(191) = 1.47$ ,  $p = .14$ , but truth accuracy ( $M = 60.62\%$ ,  $SD = 20.56$ )  
558 was significantly above chance,  $t(191) = 7.16$ ,  $p < .001$ ,  $d = .52$  (95% CI [.37, .67]), and lie  
559 accuracy ( $M = 42.81\%$ ,  $SD = 21.23$ ) was significantly below chance,  $t(191) = -4.69$ ,  $p < .001$ ,



560  $d = .34$  (95% CI [.19, .48]). When evaluators judged the credibility of children instructed to  
561 look at the interviewer's face ( $M = 58.91\%$ ,  $SD = 16.44$ ), they performed significantly better  
562 than chance,  $t(63) = 4.33$ ,  $p < .001$ ,  $d = .54$  (95% CI [.28, .80]). When judging children  
563 instructed to look at the teddy bear's face ( $M = 47.97\%$ ,  $SD = 15.45$ ) or children given no  
564 gaze instruction ( $M = 48.28\%$ ,  $SD = 14.54$ ), they were no better than chance ( $ps > .05$ ).  
565 Moreover, when evaluators were guided to look out for differences in detail ( $M = 53.96\%$ ,  $SD$   
566  $= 17.07$ ), they were better than chance,  $t(95) = 2.27$ ,  $p = .025$ ,  $d = .23$  (95% CI [.03, .43]), but  
567 not when no guidance was provided ( $M = 49.48\%$ ,  $SD = 15.11$ ),  $t(95) = -.34$ ,  $p = .74$ .

568 **Signal detection analysis.** The application of signal detection theory to deception  
569 detection research has been largely recommended because it provides an opportunity to  
570 measure two conceptually different parameters of accuracy (Meissner & Kassin, 2002);  
571 *discrimination accuracy* - ability to discriminate lie-tellers from truth-tellers (in this  
572 experiment, referred to as  $d'$ ), and *response bias* - tendencies to favour a particular response  
573 (truth or lie) (in this experiment, referred to as  $\beta$ ). Means and standard deviations for  
574 discrimination accuracy and response bias across all conditions are displayed in Table 2.

575 **Discrimination accuracy.** A 3 (Gaze Instruction) x 2 (Guidance Provision) ANOVA  
576 was performed with participants' sensitivity scores ( $d'$ ) as the dependent variable to examine  
577 their ability to discriminate between truth- and lie-tellers.

578 First, there was a significant main effect of Gaze Instruction,  $F(2, 180) = 10.84$ ,  
579  $p < .001$ . Post-hoc analyses using Bonferroni adjustment revealed that evaluators  
580 discriminated better between children's truthful and deceptive accounts when the  
581 interviewees were instructed to look at the interviewer's face compared to when the  
582 interviewees were instructed to look at the teddy bear's face,  $p < .001$ ,  $d = .66$  (95% CI [.30,  
583 1.02]), and when the interviewees were given no particular gaze instruction,  $p < .001$ ,  $d = .67$

584 (95% CI [.32, 1.03]). Evaluators' performance did not differ significantly between those  
585 instructed to look at the teddy bear's face and for those given no instruction ( $p = 1.00$ ).

586 Second, there was a significant main effect of Guidance Provision,  $F(1, 180) = 4.20$ ,  $p$   
587  $= .042$ . Pairwise comparisons using Bonferroni adjustment showed that evaluators who  
588 received guidance discriminated better between veracity groups than evaluators who received  
589 no guidance,  $d = .27$  (95% CI [-.014, .55]).

590 Finally, there was a significant Gaze Instruction X Guidance Provision interaction  
591 effect,  $F(2, 180) = 4.88$ ,  $p = .009$ . We performed univariate analyses to test the effect of  
592 providing guidance within each Gaze Instruction condition. There was a significant main  
593 effect of Guidance Provision for evaluators judging the credibility of child interviewees  
594 instructed to look at the teddy bear's face,  $F(1, 62) = 12.10$ ,  $p = .001$ . For evaluators in the  
595 'teddy bear's face' condition, those who received guidance ( $M = .22$ ,  $SD = .76$ ) were able to  
596 discriminate better than those who received no guidance ( $M = -.38$ ,  $SD = .63$ ),  $d = .87$  (95%  
597 CI [.35, 1.38]). There was no significant main effect of Guidance Provision for evaluators  
598 assigned to the 'interviewer's face' condition,  $F(1, 62) = 1.27$ ,  $p = .26$ , or the 'control'  
599 condition,  $F(1, 62) = 1.15$ ,  $p = .29$ . There were no other significant interaction effects ( $p$ -  
600 values  $>.05$ ).

601 In a second level of analysis,  $d'$  values were compared to 0 (no ability to differentiate  
602 between children's truths and lies) using one-sample  $t$  tests. With regard to Gaze Instruction,  
603 evaluators could reliably discriminate child truth-tellers from child lie-tellers in the  
604 'interviewer's face' condition,  $t(63) = 4.32$ ,  $p < .001$ ,  $d = .54$  (95% CI [.28, .80]), but not in the  
605 'teddy bear's face' condition,  $t(63) = -.87$ ,  $p = .39$ , nor the 'no gaze instruction' condition,  
606  $t(63) = -.87$ ,  $p = .38$ . For Guidance Provision, evaluators were able to discriminate reliably  
607 when provided with guidance,  $t(95) = 2.30$ ,  $p = .024$ ,  $d = .23$  (95% CI [.03, .44]), but not  
608 when guidance was withheld,  $t(95) = -.20$ ,  $p = .84$ .

609 Finally, we compared  $d'$  scores to 0 for the significant interaction between Gaze  
610 Instruction and Guidance Provision. When evaluators judged the credibility of children  
611 instructed to look at the interviewer's face, they were able to discriminate lie-tellers from  
612 truth-tellers whether guidance was provided ( $M = .55$ ,  $SD = .85$ ),  $t(31) = 3.63$ ,  $p = .001$ ,  $d =$   
613  $.64$  (95% CI [.26, .1.02]), or not ( $M = .32$ ,  $SD = .75$ ),  $t(31) = 2.43$ ,  $p = .021$ ,  $d = .43$  (95% CI  
614 [.063, .79]). For children instructed to look at the teddy bear's face, evaluators were not able  
615 to discriminate between children's truths and lies when provided with guidance ( $M = .22$ ,  $SD$   
616  $= .76$ ),  $t(31) = 1.65$ ,  $p = .11$ , nor when there was no guidance provision ( $M = -.38$ ,  $SD = .63$ ),  
617  $t(31) = -3.46$ ,  $p = .002$ ,  $d = .61$  (95% CI [.23, .98]). That is, evaluators labelled the groups  
618 incorrectly (i.e. they tended to label lie-tellers as truthful and truth-tellers as deceitful).  
619 Finally, when children were given no gaze instructions, evaluators were not able to  
620 discriminate truthful from fabricated reports, with guidance provision, ( $M = -.17$ ,  $SD = .78$ ),  
621  $t(31) = -1.25$ ,  $p = .22$ , or without guidance provision, ( $M = .018$ ,  $SD = .64$ ),  $t(31) = .16$ ,  $p =$   
622  $.88$ .

623 **Response bias.** Participants' response bias ( $\beta$  scores) was investigated to see whether  
624 they tended to identify children as lie-tellers or truth-tellers in any particular condition. A  
625 three-way ANOVA, with Gaze Instruction, Guidance Provision and Modality of Presentation  
626 of the clips as between-subjects factors, revealed significant main effects of Gaze Instruction,  
627  $F(2, 180) = 5.05$ ,  $p = .007$ , and Modality of Presentation,  $F(1, 180) = 6.55$ ,  $p = .011$ . First,  
628 responses were more biased when judging the credibility of children instructed to look at the  
629 interviewer's face ( $M = 1.21$ ,  $SD = .49$ ) compared to children instructed to look at the teddy  
630 bear's face ( $M = 1.02$ ,  $SD = .37$ ),  $p = .020$ ,  $d = .46$  (95% CI [.10, .81]), and children given no  
631 particular gaze instruction ( $M = 1.01$ ,  $SD = .38$ , 95% CI [.92, 1.11]),  $p = .019$ ,  $d = .45$  (95%  
632 CI [.10, .80]). Response bias did not significantly differ between evaluators judging child  
633 credibility in the latter two gaze conditions ( $p = 1.00$ ). Second, evaluators demonstrated

634 more bias in the 'audio-only' condition ( $M = 1.16$ ,  $SD = .48$ ) than in the 'video-audio'  
635 condition ( $M = 1.01$ ,  $SD = .35$ ),  $d = .36$  (95% CI [.07, .64]). There was no significant main  
636 effect of Guidance Provision and there were no significant interaction effects ( $p$ -values  $>.10$ ).

637 Using one-sample  $t$  tests, each  $\beta$  was compared to 1 (no bias). In signal detection  
638 theory,  $\beta$  values below 1 signify a tendency to respond *yes* (or *lie* in the current study),  
639 whereas values above 1 signify a tendency to respond *no* (or *truth* in the current study;  
640 Stanislaw & Todorov, 1999). Therefore, the subsequent analyses examined the existence and  
641 the nature of the bias. With regard to Gaze Instruction, evaluators who judged the credibility  
642 of children instructed to look at the interviewer's face were significantly biased to respond  
643 'truth',  $t(63) = 3.46$ ,  $p = .001$ ,  $d = .43$  (95% CI [.18, .69]), whereas no significant response  
644 bias was found for evaluators who judged children instructed to look at the teddy bear's face,  
645  $t(63) = .35$ ,  $p = .73$ , nor for evaluators who judged children in the 'no gaze instruction'  
646 condition,  $t(63) = .30$ ,  $p = .77$ . In terms of Modality of Presentation, evaluators in the 'audio  
647 only' condition displayed a significant truth bias,  $t(95) = 3.18$ ,  $p = .002$ ,  $d = .33$  (95% CI [.12,  
648 .53]), whereas evaluators in the 'video-audio' condition showed no bias,  $t(95) = .17$ ,  $p = .87$ .

## 649 Discussion

650 Instructing child interviewees to maintain gaze with the interviewer's face enabled  
651 evaluators to discriminate between true and false reports to a better degree than when no  
652 instruction was given, (in spite of a significant truth bias). However, discrimination accuracy  
653 was not affected when child interviewees were instructed to gaze towards the teddy's bear  
654 face. Thus, Hypothesis 3 was partially supported. The ability to accurately detect deception  
655 for evaluators rating children instructed to gaze at the interviewer's face may be due to  
656 differences in details provided by child truth-tellers and child lie-tellers. The cognitive lie  
657 detection approach posits that the ability to discriminate between truths and lies should  
658 increase with the activation and exaggeration of cognitive behavioural differences (Vrij,

659 2015). Considering that significant behavioural differences were elicited for both children  
660 instructed to look at the interviewer's face and children instructed to look at the teddy bear's  
661 face, it is possible that the exaggeration of these cues might need to reach a certain threshold,  
662 beyond which they become more apparent to an evaluator. It is possible that this threshold  
663 was only reached when child interviewees were instructed to look at the interviewer's face, in  
664 turn, facilitating evaluators' credibility judgments, but the threshold was not met when the  
665 children were asked to look at the teddy bear's face.

666 Informing evaluators that truth-tellers provide more detailed reports compared to lie-  
667 tellers did improve their ability to detect deception, thus supporting Hypothesis 4. However,  
668 it is difficult to conclude to what extent evaluators applied this guidance to the interview  
669 clips. Although training in verbal content cues is recommended because it leads to the  
670 highest training effects, it is also important to note that false information regarding cues to  
671 deceit can work as effectively as true information (Hauch et al., 2014). To encourage  
672 evaluators to engage more with the guidance and base their final credibility judgments on this  
673 specific information, it would be better to use methods such as the Psychologically Based  
674 Credibility Assessment Tool (Evans, Michael, Meissner & Brandon, 2013) that include the  
675 rating of diagnostic cues in the final credibility assessment.

676 Contrary to Hypothesis 5, the provision of guidance was not more beneficial when  
677 judging children who were instructed to maintain gaze compared to those in the 'control'  
678 condition. Indeed, the only benefit of providing guidance was that it protected evaluators in  
679 the 'teddy bear's face' condition from incorrectly labelling child veracity. As children in this  
680 condition were neither maintaining eye contact, nor free to look where they wished, their  
681 'strange' gaze behaviour of looking at the interviewer's lap might have been interpreted  
682 incorrectly as suspicious. Directing evaluators' attention towards what the child was saying,  
683 through the use of our guidance, and encouraging them to base their credibility judgments on

684 the child's verbal behaviour, may have detracted from the misinterpretation of their 'strange'  
685 gazing towards the teddy bear.

686 Finally, although we predicted in Hypothesis 6 that evaluators who watched the  
687 visual-audio presentations displaying the gaze maintenance behaviour would demonstrate a  
688 truth bias, this was not the case. This lack of truth bias might be due to evaluators  
689 interpreting gaze maintenance behaviour differently from that suggested by the general  
690 deception literature. On the one hand, gaze aversion is believed to be a cue to deceit (Global  
691 Deception Research Team, 2006), but, on the other hand, nonverbal behaviour that deviates  
692 from the expected norm, such as staring, can also be perceived to be 'fishy' (Bond et al.,  
693 1992). It is not known to what extent gaze behaviour influenced evaluators' judgments, or  
694 how much suspicion evaluators attached to this nonverbal cue; however, the lack of bias  
695 might suggest that opposing interpretations may have cancelled each other out. Alternatively,  
696 informing evaluators that children had been instructed to divert their gaze may have made  
697 them more aware of their own bias.

698 For the current study evaluators were exposed to ten interview clips. This may have  
699 led to evaluators comparing cues and information across interviews. In real police  
700 investigations and court proceedings, it is likely that these comparisons will occur between  
701 children's statements, adult's statements and physical evidence. Future research should try to  
702 replicate this scenario to understand how a police officer or juror might judge the credibility  
703 of a child both in isolation and in comparison to other sources.

#### 704 **General Discussion**

705 We conducted the first empirical investigation exploring the use of gaze maintenance  
706 to detect deception in child witnesses during investigative interviews. Similar to Vrij et al.  
707 (2010), we predicted that the interview strategy would magnify differences in level of detail

708 between children's true and false reports. We also expected that the exaggeration of this cue  
709 would facilitate evaluators' ability to discriminate children's lies from truths.

710         The present findings show that gaze maintenance can be effective for determining the  
711 credibility of child witnesses. In Experiment 1, lie-tellers provided significantly fewer details  
712 in their reports compared to truth-tellers but only when they were instructed to look towards  
713 either the interviewer's face or a teddy bear's face. No significant difference was elicited  
714 when a secondary task was absent. In Experiment 2, we found that the exaggeration of this  
715 diagnostic cue facilitated evaluators' discrimination accuracy, but this was only when  
716 children were instructed to look at the interviewer's face.

717         Theoretically, the effect of imposing a secondary task on interviewee performance  
718 remains unclear. The findings of Experiment 2 make it difficult to discern whether the  
719 secondary task had any negative impact on truth-tellers' memory or whether lie-tellers  
720 experienced any additional cognitive load. The latter issue may be due to the nature of the  
721 secondary task in this study and the difficulty in pinning down the exact cognitive  
722 mechanisms involved. As previously mentioned, the development of certain cognitive skills  
723 is closely linked to children's proficiency to tell and maintain lies (Talwar & Crossman,  
724 2011). It may therefore be wise, in future, to provide cognitive measures of the specific  
725 executive functions that the imposed secondary task aims to affect to be able to establish  
726 whether (a) there is a link between these cognitive skills and the performance on the tasks,  
727 and (b) whether children's ability to perform these cognitive skills predicts the effectiveness  
728 of imposing cognitive load. When testing dual-task methodologies, it would also be  
729 beneficial to obtain baseline measures of an individual's performance on single tasks (Task A  
730 only and Task B only) to which their performance on a dual-task (Tasks A and B  
731 simultaneously) could be compared.

732 Our findings provide further support for the practical value of manipulating cognitive  
733 load as a potential means for discriminating between children's true and false reports. In  
734 particular, the results demonstrate that the effects of imposing cognitive load are not limited  
735 to asking children to tell their stories backwards. This is beneficial because Saykaly and  
736 colleagues (2016) found that reverse order recall can adversely affect the accuracy of both  
737 truthful and deceptive statements, suggesting that it might not be helpful in real police  
738 investigations. In our study, requiring child interviewees to perform the secondary task of  
739 maintaining gaze had a positive effect on truth-tellers, eliciting more information from them  
740 than when no gaze instruction was given. This finding is in line with the primary goal of any  
741 investigative interview, which is to extract as much information as possible from the  
742 interviewee. This finding could be due the interviewer's supportive demeanour, which has  
743 been found with adults to elicit more details from truth-tellers than lie-tellers (Mann et al.,  
744 2013). Further investigation is required to determine whether it is the combined effect of a  
745 gaze maintenance instruction to witnesses and supportive interviewer behaviour that helps  
746 truth-tellers but not lie-tellers, rather than the technique on its own.

747 A practical limitation of using gaze maintenance with child interviewees may be its  
748 appropriateness in certain contexts. Maintaining gaze with an authoritative figure, such as a  
749 police officer, might be an intimidating task for children. Although none of the children  
750 instructed to look at the interviewer's face reported any discomfort, the average child did not  
751 maintain gaze for more than half of their interview. A recent school event is far less  
752 traumatic to talk about than incidents of physical and/or sexual abuse, which can be the main  
753 focus of police investigations involving child witnesses. Future research must examine the  
754 scope of the beneficial effects elicited in this study and balance them with potential  
755 discomfort in certain contexts. As such, the preliminary findings relating to an instruction to  
756 concentrate on the less intimidating teddy bear (or similar) should be extended.



757 Maintaining gaze, particularly with an interviewer's face, is an effective strategy for  
758 judging the credibility of children. Future research should continue to explore the application  
759 of dual-task processing to child interviews by examining strategies that target children's  
760 under-developed executive functioning, with a view to creating more appropriate secondary  
761 tasks for this potentially sensitive context.

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941 Table 1

*Mean and Standard Deviations for Total Number of Details as a Function of Veracity and Gaze Instruction*

	<u>True Report</u>		<u>False Report</u>		<u>Total</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Interviewer's face	178.77	152.50	79.00	42.91	125.32	117.72
Teddy bear's face	152.46	86.93	92.94	56.81	119.62	76.65
Control	117.15	99.39	114.80	119.17	115.89	108.42
Total	95.52	79.27	149.46	116.21	120.27	101.03

Table 2

*Discrimination Accuracy ( $d'$ ) and Response Bias ( $\beta$ ) as a Function of Gaze Instruction, Guidance Provision and Modality of Presentation*

	$d'$		$\beta$	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
<b>Gaze Instruction</b>				
Look at interviewer's face	.43***	.80	1.21**	.49
Look at teddy bear's face	-.08	.75	1.02	.37
No instruction (control)	-.08	.71	1.01	.38
<b>Guidance Provision</b>				
Yes	.20*	.84	1.12	.48
No	-.02	.73	1.05	.36
<b>Modality of Presentation</b>				
Video-audio	-.04	.77	1.01	.35
Audio only	.22**	.80	1.16**	.48

*Note.* Statistical tests compared  $d'$  to 0 and  $\beta$  to 1.

\*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

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