

# Let's lie together: Co-presence effects on children's deceptive skills

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## Abstract

A person's expressive behavior is different in situations where he or she is alone, or where an additional person is present. This study looks at the extent to which such physical co-presence effects have an impact on a child's ability to deceive. Using an experimental digitized puppet show, truthful and deceptive utterances were elicited from children who were interacting with two story characters. The children were sitting alone, or as a couple together with another child. A first perception study in which minimal pairs of truthful and deceptive utterances were shown (vision-only) to adult observers revealed that the correct detection of deceptive utterances is dependent on whether the stimuli were produced by a child alone or together with another child (both being visible). A second perception study presented participants with videos from children of the couples condition that were edited so that only one child was visible. The study revealed that the deceptive utterances could more often be detected correctly in the more talkative children than in the more passive ones.

## 1 Introduction

Deceiving others is not always easy. Past research has shown that various factors can have a detrimental effect on a person's deceptive skills, as it may matter whom one tries to deceive, what kind of lie is being produced, and under what circumstances a lie is elicited (DePaulo, Lindsay, Malone, Muhlenbruck, Charlton, & Cooper 2003). The current study wants to explore whether the behavior of a deceiver is influenced by co-presence effects: i.e., is there an

essential difference between a deceiver who is solely responsible for the lie he or she is producing, and someone who shares the responsibility for the deceit with another person who is physically present. We investigate such questions in data produced by children around the age of 5, and focus in particular on possible nonverbal cues to deception. As such, the current investigation fits with other studies on deceptive skills of children, given that these skills may reveal important aspects of a child's cognitive development. Indeed, telling a lie is often claimed to be mentally more demanding than telling the truth, and also presumes that one is able to understand and manipulate another person's perspective on a given state of affair. Given this, the study of lies has been thought to be potentially useful as a means to learn more about how growing children develop their metacognitive skills (e.g. Talwar, Lee, Bala, & Lindsay, 2004; Talwar, Murphy, & Lee, 2007).

Previous researchers have often explored someone's deceptive skills by running perception experiments in which independent observers have to judge in recordings of speakers whether a person is telling the truth or not. The current study explores whether the detection of a lie is different when an observer has to judge the recording of a person who is alone, or of a person who produces a lie together with another person. From the literature, it is not immediately clear whether co-presence effects are likely to maximize or diminish the perceived difference between truth and deceit. On the one hand, one could hypothesize that the presence of another person may make it easier for an observer to detect whether someone is telling the truth or not. Such an expectation could be based on studies that suggest that

people contaminate each other's expressive behaviour, such that their facial and other nonverbal cues become more pronounced and more clearly interpretable for observers as cues to deception. In a study with game-playing children (Shahid, Kraemer, & Swerts 2008), to give an example, it was found that observers tend to find it easier to determine whether a child had won or lost a card guessing game, when it was playing together with another child, compared to a situation in which it was playing the game alone. That result is reminiscent of work on gesturing, where it is often reported that speakers become more expressive when they are directly being observed by someone else. Bavelas, Gerwing, Sutton, and Prevost (2008), for instance, found that speakers gesture more and with a larger amplitude if they are engaged in a face-to-face interaction, compared to a telephone conversation or in a setting where they talk to an answering machine. Similar findings were reported by Mol, Kraemer, Maes, and Swerts (2009).

On the other hand, findings that indicate that people become more expressive in the presence of other people may not generalize to all situational contexts, and may sometimes even be opposite to what was described above. For instance, Lee and Wagner (2002) analysed video recordings of women who were speaking about a positive or a negative experience either in the presence of an experimenter or alone. They found that women were more expressive about positive emotions when another person was present, whereas the negative emotions were less clearly expressed when someone else was present. These results show that social context can have different kinds of effects on a person's nonverbal behavior depending on a speaker's specific state of mind. This begs the question as to what happens when people are trying to deceive another person, and whether possible nonverbal correlates of their deceptive behavior become more pronounced or rather more diminished in contexts where they are alone, or physically co-present with other people. Moreover, from a perceptual perspective, it is not clear whether an observer would profit from the fact that he or she has to judge the truthfulness of only one person or of more than one person simultaneously. It could be that the exposure to multiple persons would make it easier for an observer because of having access to more resources to de-

cide about truth or lie. But it could also be the case that the mere fact that an observer would have to judge multiple people at the same time would make the task of detecting deception more challenging than in the case where only one person is speaking, because it might be that subtle correlates of deception would escape the observer's attention.

Given the overall aim to investigate the effect of physical co-presence on a child's deceptive behavior, this study also explores whether the child's specific role in a situational context is of importance for the correct detection of deception. It has of course already been known for a few decades that a person's personality may matter, for instance in that extraverts tend to show more correlates of deception than introvert people (e.g. Bradley & Janisse 1981). Also, previous work suggests that more dominant people exhibit different kinds of nonverbal behaviour than followers (Tiedens & Fragale 2003). In line with this observation, we will look at children who are passive or active in a setting, and see whether that difference has repercussions for lie detection. On the one hand, active children in being more involved in the interaction may increase the likelihood of showing nonverbal cues to deception. On the other hand, it may be that the more passive children may reveal such cues more clearly, as a result of their belief that the observer's focus of attention is directed towards the more active child, so that they leak more cues to deception.

The current research consists of two perception experiments. Experiment 1 investigates whether correlates of a child's deceptive behaviour are different for situations in which the child is either alone or co-present with another child. Experiment 2 looks at differences between participants within an interaction, in particular comparing children who are very active and talkative versus those who take less initiative. We only focus on visual cues (from which auditory features are removed), given that earlier work (Ecoff, Ekman, Mage & Frank 2000) has shown that observers can more accurately detect deception when they only have to focus on one modality (compared to tests with multimodal stimuli).

## **2 Interactive elicitation procedure**

To obtain truthful and deceptive utterances from children, a new elicitation procedure was used,

based on a computerized version of an animated puppet show. In the set-up, child participants are seated in front of a computer screen on which they see a story that unfolds. While the story is actually controlled by the experimenter (whom the child cannot see), the child is given the impression that some crucial actions of 2 main characters depend on the input of the child participant. During the interaction, the video and speech of the child are being recorded with a camera that is positioned on the top of the computer screen to which the child is looking. In this way, the recordings capture the faces and upper part of the chest (frontal view) of the child participants.



Figure 1: A few visual materials of scenes used in the interactive puppet show

The show starts with a longer part in which a narrating voice introduces 2 main characters, a prince (the good guy) and a dragon (the bad guy), to the participating child, in a typical fairy-tale

plot. The narrator explains to the child that a bad dragon has been terrorizing a far-away country. Luckily, Prince Peter has come up with a plan to capture the dragon, for which he needs the help from the child. The narrator explains that the person who catches the dragon, receives a reward (a bag of gold) from the king. In order to increase the child's level of engagement, an actual bag of gold (actually, chocolate coins wrapped in goldish-looking paper) is clearly shown on a table in the visual field of the participant. Then the interactive part starts in which child utterances are elicited from exchanges with the 2 main characters of the story, the prince and the dragon. The interactive part contains 2 central scenes designed to elicit minimal pairs of truthful and deceptive utterances from children to be used in a perception test later on. As will become clear below, deceptive utterances are elicited from a child's interaction with the dragon, and the truthful ones from interactions with the prince.

First, the prince appears, and asks the child for its name, mainly to ensure that the latter becomes aware that it can interact with the story character. After this, the prince tells the child that he wants to capture the dragon, and needs the child's help. He tells the child that he will hide behind a tree (shown on the left of the screen), and that, if the dragon appears, the child needs to tell the dragon that the prince has entered the castle (shown on the right of the screen). Then he hides behind the tree, after which the dragon appears on stage and asks the child where the prince is. The child typically replies with a deceptive phrase like "in the castle" (first deceptive response), after which the dragon expresses some disbelief about this response, and repeats the earlier question, so that the child needs to repeat the earlier response (second deceptive response). Then, the dragon leaves, enters the castle, after which the prince appears again. He tells the child he believes he has heard the dragon, and asks where the dragon is, to which a child typically responds with a truthful "in the castle" (first truthful response). The prince says he cannot believe that response, so asks the child to repeat its truthful utterance (second truthful response). Given that both the deceptive and truthful scene contain a repeat, we obtain 4 versions from every participating child of the utterance "in the castle" (or equivalent phrases like "in the tower", or "in the church"): first and second at-

tempts of truthful and deceptive utterances. Figure 1 depicts some representative scenes from the story.

We obtained minimal pairs (truthful and deceptive variants of the utterance “in the castle”) from 38 children (18 boys; 20 girls), who had volunteered for the experiment with written consent from their parents and/or primary caretakers. The average age of these children was 5 years and 7 months (minimum: 4 years and 10 months; maximum: 6 and 4 months) in addition, we collected recordings for 10 pairs of children who did the same task as the singles, but sitting next to each other and both facing the screen. Their average age was 5 years and 5 months (minimum: 4 years and 3 months; maximum: 6 and 9 months). Note that the task given to the pairs of children was the same as the one given to the children sitting alone. It was interesting to note that there was essentially no interaction between two participants in the pairs condition, and that they basically only responded to questions and instructions from the story characters. We did observe, however, that within these pairs, there tended to be a division of labor, in that one of the children would typically take the initiative and talk to the story characters, while the other would be more passive.

### 3 Experiment 1: singles vs. couples

The first experiment explores whether there is a difference in the extent to which lies can be detected in children who are interacting alone with some story characters, versus children who are doing a similar task together with another child.

#### 3.1 Method

##### 3.1.1 Stimuli

The stimuli consisted of the children’s responses to either the prince (truthful) or the dragon (deceptive), where some of the children were interacting alone, and some were interacting in couples. As said above, stimuli were presented as video-only materials, so with the sound removed.

##### 3.1.2 Participants

The data for the singles condition were collected in an earlier study, and came from 20 observers (Swerts 2011). In addition, 121 participants took part in the couples condition of the ex-

periment, as partial fulfillment to get course credits.

##### 3.1.3 Procedure

Observers were presented with pairs of video recordings, i.e., a truthful and a deceptive utterance of either a single child, or similar clips in which 2 children are visible who are sitting next to each other. Pairs of recordings were either comparing the children’s first time they had responded to a question from the prince or the dragon, or pairs of utterances of their second responses to those characters. Note that pairs of stimuli shown to observers were always produced by the same child. Stimuli were presented in a group experiment, although each participant had to perform the test individually (paper-and-pencil test). The task given to observers was to guess by forced choice which of the 2 clips they saw contained a child’s deceptive utterance. The order of presentation of the truthful and deceptive utterance within a pair, and of the pairs within the larger test was fully randomized.

#### 3.2 Results

The observer responses were analysed with a repeated measures ANOVA with the percentage correct detection of deceptive utterances for all stimulus pairs per observer as dependent variable, and with attempt (2 levels: first attempt, second attempt) and order (2 levels: deceptive utterance shown first, deceptive utterance shown second) as within-subject factors, and presence (2 levels: alone, together) as between-subject factors. Table 1 reveals that, while the main effects of presence and attempt are not significant, there is a significant effect of presentation order on the observers’ likelihood to correctly detect the deceptive utterance: deceptive utterances could more easily be detected correctly if they were shown after the truthful utterance, rather than the other way around. In addition, we found a significant 2-way interaction between attempt and presence ( ), which can be explained by the data shown in table 2. As can be seen, for the alone condition, observers tend to find it easier to detect the deceptive utterance in pairs of second interactions with the story characters, than in the first interactions. However, for those stimuli taken from children being together, there appears to be no difference between

Table 1: Percentage correct detection of deception (mean, standard error, 95% intervals) and F-statistics for different levels of experimental factors

Factor	Level	Correct detection	F-stats
Presence	Alone	58.0 (.24, 53.1 – 62.8)	
	Together	60.6 (.10, 58.7 – 62.6)	
Attempt	First	57.4 (.18, 53.9 – 61.0)	
	Second	61.2 (.17, 57.8 – 64.6)	
Order	Deception first	53.2 (.18, 49.6 – 56.8)	
	Deception second	65.4 (.18, 61.8 – 68.9)	

Table 2: Percentage correct detection of deception (mean, standard error) for speakers in alone or couples condition as a function of order of speaker attempt

Presence	Attempt	
	First	Second
Alone	52.3 (.33)	62.7 (.32)
Together	61.6 (.14)	59.7 (.13)

first and second attempts.

### 3.3 Discussion

While the experiment did not reveal a main effect of co-presence on the detection of deception, that factor turned out to be important in a 2-way interaction with attempt. This significant interaction may be explained by ceiling effects that are only true for the condition in which 2 children were being observed, but appear to be absent in the alone condition. That is, in the alone condition, the probability to correctly detect a lie appears to depend on whether observers were seeing a first or second attempt of a child interacting with the story characters. As table 2 reveals, during a second attempt, a single child was more likely to show correlates of deceptive behavior compared to its first attempt. That effect may be due to the fact that during a second attempt a child is more consciously aware of the fact that it tries to deceive which may have the ironic counter-effect that more cues to deception are leaked, as it tries harder than the first time (Swerts 2011; see also Wardlow Lane et al. 2006). However, in the together condition, it appears not to matter whether the children were interacting for the first or sec-

ond time; rather, the results appears to be around 60% correct detection both during first and second attempts. Compared with related studies in this area of research (e.g. DePaulo, Lindsay, Malone, Muhlenbruck, Charlton, & Cooper, 2003), this percentage is high, so that some ceiling effects may come into play: the correct detection for first attempts is already so high that it is hard to get even better results during second attempts. While experiment 1 has provided some evidence that detection of deceit is affected by co-presence effects, it remains unclear whether observers were able to extract cues to deception from both children in the together condition or whether they were especially paying attention to certain types of children. More specifically, informal observations of the video clips suggested that some children were playing a more active role in the interactions than other children.

## 4 Experiment 2: active vs. passive children

Experiment 2 explores to what extent differences between the child participants (talkative vs. silent ones) may influence an observer’s ability to find a deceptive utterance.

### 4.1 Method

#### 4.1.1 Stimuli

The stimuli showed children from the couples condition of experiment 1, except that the clips only showed 1 child (zoomed in so that the other child was not visible). As discussed above, when two children were placed next to each other to interact with the prince and the dragon in the story, there tended to be one child who was more active

Table 3: Percentage correct detection of deception (mean, standard error, 95% intervals) and F-statistics for different levels of experimental factors

Factor	Level	Correct detection	F-stats
Speaker	Passive	50.4 (.18, 46.8 – 54.0)	
	Active	62.0 (.15, 59.1 – 64.9)	
Order	Deception first	47.3 (.18, 43.7 – 50.9)	
	Deception second	65.1 (.16, 61.9 – 68.3)	

than the other when addressing the story characters. For the purpose of the current experiment, we distinguished between children who were labeled “active” as those who had been speaking in both the truthful and deceptive utterance, versus the “passive” ones as those who had been silent in at least one of the two. In doing so, we obtained 13 active and 7 passive children. Also, given that we were only interested in the effect of passive vs active children and to reduce the time it took to complete the experiment, we decided to only use stimuli from the second attempts of the children to produce a truthful or deceptive utterance.

#### 4.1.2 Participants

In total, 93 participants took part in the experiment, as partial fulfillment to get course credits. None of them had participated in any of the perception tests of experiment 1.

#### 4.1.3 Procedure

The procedure of this experiment was exactly the same as the one used for experiment 1.

#### 4.2 Results

The data were again analysed with a repeated measures ANOVA with the percentage correct detection of deceptive utterances for all stimulus pairs per observer as dependent variable, and with order (2 levels: deceptive utterance shown first, deceptive utterance shown second) and speaker role (2 levels: active, passive) as independent within-subject factors. As shown in table 3, both speaker type and presentation order had a significant effect on correct detection of the deceptive utterance, such that observers found it easier to detect the lies in the more active speakers, and in those pairs in which the deceptive utterance was presented as the second one in a pair (see also experiment 1). Interestingly, the interaction be-

Table 4: Percentage correct detection of deception (mean, standard error) for passive and active speakers as a function of order of deceptive utterance

Speaker	Deceptive utterance	
	shown first	shown second
Passive	39.8 (.27)	61.0 (.27)
Active	54.8 (.22)	69.2 (.18)

tween order and speaker role was not significant ( ). As table 4 reveals, the 2 effects of speaker role and order are additive.

#### 4.3 Discussion

Experiment 2 has shown that the likelihood of correctly detecting whether a child is deceiving or speaking the truth depends on how active it is within a specific social context. That is, when it takes the initiative of responding to the story characters and is being relatively talkative, then this level of engagement makes it easier for an observer to decide whether or not the child is producing a lie. Further research is needed to find out why exactly it is that detection of deception is easier when people have to judge more active participants. One reason could be that children who are more active are also more expressive, which increases the chances that specific cues to deception are leaked to an observer. Such an explanation would be compatible with earlier findings that the accuracy with which lies can be detected correctly varies for deceivers who have different personalities. More specifically, it has been shown that, when comparing introvert with extravert people, it is generally easier to detect the lies in the latter group (Bradley & Janisse, 1981).

In the current set-up of the experiment, the chil-

dren were not explicitly given any explicit roles in the story, for instance, in that one of them would be asked to be silent, while the other would be given the instruction to take initiative with the characters of the story. Rather, their level of engagement within the interactive story occurred spontaneously in the course of the interaction, which was thought to guarantee that their interaction was relatively natural. In future work, however, it could be worthwhile to make a participants' active or passive role within the discourse more explicit to the child and also measure aspects of their personality. This would help to decide whether the detection of deception is due to the fact that some children are more active, or to the fact that some children are more extravert, or to a combination of these factors.

## 5 General discussion

The current study revealed that deceiving children are affected by co-presence effects. Experiment 1, in which minimal pairs of truthful and deceptive utterances were shown (vision-only) to adult observers, brought to light that the correct detection of deceptive utterances is dependent on whether the stimuli were produced by a child alone or together with another child. This result reminds one of some practices in typical investigations of a committed crime, where it is general practice to confront various suspects with each other. Usually, the goal of letting multiple suspects meet is to confront them with each other's statements from earlier police interrogations during which they were separately interviewed independently from each other. If these earlier sessions has let to inconsistencies between the statements of the different suspects, it might be interesting to see how suspects react when they are exposed to each other's claims in a face-to-face situation. Ideally, such a confrontation might help to let one of them confess, or admit that an earlier claim was false. Obviously, the story paradigm used in the production experiment to elicit truthful and deceptive utterances is different from such a police case, but it does show that presence effects may maximize the differences between truth and deceit.

This result appears to be compatible with the idea that the presence of another person increases a liar's social awareness, which in turn might have a detrimental effect on that person's deceptive skills. Such an effect could be similar to the re-

ported effect of an increased mental load on deceptive behaviour: lying is generally assumed to be more cognitively demanding than truth telling (e.g. DePaulo, Lindsay, Malone, Muhlenbruck, Charlton, & Cooper 2003; Vrij, Fisher, Mann, & Leal 2006), given that liars have to monitor more tasks than truth telling people, such as inventing facts and controlling their behaviour while interacting with another person. Consequently, techniques that increase cognitive load, e.g. asking people to tell a story in reverse order (Vrij, Mann, Fisher, Leal, Milne, & Bull, 2008) or instructing them to maintain eye contact with an interviewer (Vrij, Mann, Leal, & Fisher 2010), tend to lead to the effect that deception becomes more easily observable. Under conditions of such increased cognitive load, deceivers supposedly have less resources to monitor their behavior, so that they leak cues that others may pick up as indicators of deception. Similarly, an increased social awareness because of the mere presence of another person could possibly lead to leaking more cues to lies.

The second perception experiment presented participants with videos from children of the couples condition that were edited so that only one child was visible. The study revealed that the deceptive utterances could more often be detected correctly in the more talkative children compared to the more passive ones. It remains to be seen whether these results are due to the fact that the higher probability of correctly detecting deception in the more active children is due to the fact that their higher level of engagement makes them more expressive and more likely to leak cues to deception, or because these more active children have a more extravert personality that has been shown to show more cues to deception than more introvert children (Bradley & Janisse, 1981).

And finally, we found an additional order effect, as deceptive utterances can more often be detected correctly when they are presented as the second in a pair, as opposed to when they are presented as the first ones. This effect, in line with previous observations by O'Sullivan et al (1988), could be related to what is known as the truth bias in the literature on deception, which refers to "an a priori belief, expectation, or presumption that reflects the oft-observed tendency to assume communicators are truthful most of the time" (e.g. Burgoon et al. 2008, p. 575). Accordingly, this could possibly lead to the effect that an initial ut-

terance is first processed as being truthful, and revised if an utterance contains counter-evidence to this effect. Therefore, given that the truthful utterances are more in line with default expectations of an observer, it would become more easy to detect the deceptive utterance as the more marked and deviant case, if it is presented after the truthful one.

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