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Automated decoding of facial expressions reveals marked differences in children when telling antisocial versus prosocial lies



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ABSTRACT

The current study used computer vision technology to examine the nonverbal facial expressions of children (6–11 years old) telling antisocial and prosocial lies. Children in the antisocial lying group completed a temptation resistance paradigm where they were asked not to peek at a gift being wrapped for them. All children peeked at the gift and subsequently lied about their behavior. Children in the prosocial lying group were given an undesirable gift and asked if they liked it. All children lied about liking the gift. Nonverbal behavior was analyzed using the Computer Expression Recognition Toolbox (CERT), which employs the Facial Action Coding System (FACS), to automatically code children's facial expressions while lying. Using CERT, children's facial expressions during antisocial and prosocial lying were accurately and reliably differentiated significantly above chance-level accuracy. The basic expressions of emotion that distinguished antisocial lies from prosocial lies were joy and contempt. Children expressed joy more in prosocial lying than in antisocial lying. Girls showed more joy and less contempt compared with boys when they told prosocial lies. Boys showed more contempt when they told prosocial lies than when they told antisocial lies. The key action units (AUs) that differentiate children's antisocial and prosocial lies are blink/eye closure, lip pucker, and lip raise on the right side. Together, these findings indicate that children's facial expressions differ while telling antisocial versus prosocial lies. The reliability of CERT in

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detecting such differences in facial expression suggests the viability of using computer vision technology in deception research.

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Introduction

Lying is a typical developmental phenomenon in children (Ahern, Lyon, & Quas, 2011; Darwin, 1877; Hartshorne & May, 1928; Lewis, Stanger, & Sullivan, 1989; Talwar & Crossman, 2011; Talwar & Lee, 2008; see Lee, 2013, for a review). Children tell lies as early as 2-years-old (Evans & Lee, 2013) and their ability to tell convincing lies improves with age. Whereas 2- to 5-year-olds often stumble during lie-telling and reveal their dishonest behavior, they often become sophisticated lie-tellers by 6 years of age (see Lee, 2013, for a review). Just like adults, children also tell different kinds of lies. Antisocial lies are lies told to conceal a misdeed (e.g., denying cheating in a game; Bussey, 1999; Fu, Evans, Xu, & Lee, 2012; Polak & Harris, 1999; Talwar & Lee, 2008). In contrast, prosocial lies, or “white lies,” are lies told to spare another’s feelings (e.g., claiming to like a disappointing gift; Bussey, 1999; Saarni, 1989; Talwar & Crossman, 2011; Talwar, Murphy, & Lee, 2007). Because antisocial and prosocial lies serve different interpersonal functions, children must learn how to tell these different types of lies according to different social contexts.

Nonverbal behavior during deception

Lying is a multidimensional act. Telling a lie involves expressing a verbal statement that is inconsistent with the truth. To be convincing, the lie-teller must also convey an emotion that matches the social context of the lie being told. This is because different social contexts call for different display rules about how people should express their overt emotions (Bussey, 1999; Davis, 1995; McDowell, O’Neil, & Parke, 2000; Talwar, Crossman, Williams, & Muir, 2011; Tobin & Graziano, 2011). Thus, when telling antisocial or prosocial lies in a social context, children must learn to display the appropriate emotions consistent with the display rules for this social context. Just as adults do, children must adjust their nonverbal behaviors while lying to match their verbal statements told in antisocial or prosocial lying contexts. In particular, the display rules for telling an antisocial lie are different from the display rules for telling a prosocial lie. For example, a child who uses an antisocial lie to cover up his or her own transgression must conceal any facial expressions that could convey guilt for committing the misdeed and must instead simulate expressions of innocence (Lewis et al., 1989; Polak & Harris, 1999; Talwar & Lee, 2002a; Talwar et al., 2011). Conversely, a child who uses a prosocial lie to falsely claim to like a disappointing gift must conceal his or her feelings of disappointment and instead express gratitude toward the gift-giver (Saarni, 1989; Talwar, Murphy, et al., 2007; Talwar et al., 2011).

Considering that each type of lie requires the lie-teller to convey or suppress different emotions, it is likely that the facial expressions of children telling an antisocial lie differ from those of children telling a prosocial lie, but this has not been empirically tested. Prior research has only examined children’s nonverbal behaviors associated with antisocial and prosocial lying separately. Thus, it is currently unknown whether children aged 6 to 11 years have developed the ability to differentiate between the display rules of lies told in antisocial contexts from lies told in prosocial contexts. Examining this issue will provide important insights about children’s developing ability to manipulate their nonverbal behaviors according to the demands of different social contexts.

Prior researchers have identified that several nonverbal behaviors occur when children tell lies. In an examination of antisocial lies, Lewis and colleagues (1989) recorded 3-year-olds lying about peeking at a toy they were asked not to look at. Researchers then reviewed recorded videos of the session in normal and slow motion to analyze children’s facial expressions. They found that children who lied about peeking smiled more often than children who did not peek at the toy and, therefore, did not

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