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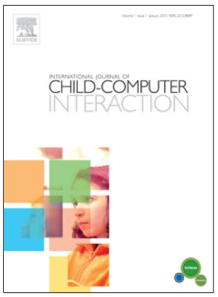

A perceptual and behavioral analysis of facial cues to deception in interactions between children and a virtual agent

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ACCEPTED MANUSCRIPT

A perceptual and behavioral analysis of facial cues to deception in interactions between children and a virtual agent

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ABSTRACT

This study focused on the facial expressions that children exhibit while trying to deceive a virtual agent. An interactive lie elicitation game was developed to record children's facial expressions during deceptive and truthful utterances. Our participants did this task either alone or in the presence of peers. A manual method and an automatic recognition approach were used to examine facial expressions and facial action units (AUs). Results show that the facial expressions of deceivers differ from those of truth-tellers: most clearly, they try to cover their lie as they smile significantly more often than truthful children. Moreover, co-presence enhances children's facial expressive behavior and the number of deceptive cues. To understand whether such features serve as cues for deception detection, using data from children playing alone or together with another child, a perception test was carried out to examine observers' ability to distinguish young deceivers from truth-tellers. Results show that observers found it easier to discriminate between deceivers and truth-tellers who had played the game in the co-present condition. Our research thus shows that virtual agents can be used as tools to elicit lies in a playful manner, which would be relevant for developmental, educational and behavioral analyses of deceit in growing children.

Keywords

child-virtual agent interaction; lying behavior; nonverbal communication; facial expressions; children

1. INTRODUCTION

In the last decade, the use of socially intelligent agents has increased substantially, especially in the life of growing children. Because of the social nature of these agents, research-driven solutions are emerging, e.g. in order to promote vocabulary learning [1], to stimulate science curiosity in classrooms [2], to explore social bonding between children and social robots [3], or to study turn-taking in a game situation [4]. There has also been a more specific interest to use such agent in health related areas, such as in interactive animations to support families that have children under-go cancer treatment [5], or to the development of applications that help autistic children in training their social and learning skills [6], [7]. Given such implementations, socially intelligent agents are designed to build relations with children and to bring an added value to their life. However, the wide-ranging use raises the question regarding the nature of the relationship children can build with their artificial partners, and the mutual trust children experience in their interactions with them. As a matter of fact, artificial deceptiveness [8], from the child to the robot, and vice versa, raises several concerns, in as far as social robots can influence the way children behave and see the world [9]. An interesting issue regards the extent to which children feel their addressee can judge the child's mental state, and whether they perceive a difference in that respect between human and artificial partners. Also, as we argue below, if we understand better how children experience their relation

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