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Detecting digital chameleons

Jeremy N. Bailenson [a,*], Nick Yee [a], Kayur Patel [b], Andrew C. Beall [c]

[a] Department of Communication, Stanford University, Stanford, CA 94305, United States
[b] Department of Computer Science, Stanford University, United States
[c] Department of Psychology, University of California, Santa Barbara, United States

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Abstract

Conversations are characterized by an interactional synchrony between verbal and nonverbal behaviors [Kendon, A. (1970). Movement coordination in social interaction: some examples described. *Acta Psychologica*, 32(2), 101–125]. A subset of these contingent conversational behaviors is direct mimicry. During face to face interaction, people who mimic the verbal [Giles, H., Coupland, J., & Coupland, N. (1991). Accommodation theory: Communication, context, and consequence. In Giles, H., Coupland, J., & Coupland, N. *Contexts of accommodation. Developments in applied sociolinguistics*. Cambridge: Cambridge University Press] and nonverbal behaviors [Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: the perception-behavior link and social interaction. *Journal of Personality and Social Psychology*, 76, 893–910] gain social advantage. Most research examining mimicry behavior in interaction examines 'implicit mimicry' in which the mimicked individual is unaware of the behavior of the mimicker. In this paper, we examined how effective people were at explicitly detecting mimicking computer agents and the consequences of mimic detection in terms of social influence and interactional synchrony. In Experiment 1, participant pairs engaged in a "one-degree of freedom" Turing Test. When the computer agent mimicked them, users were significantly worse than chance at identifying the other human. In Experiment 2, participants were more likely to detect mimicry in an agent that mirror-mimicked their head movements (three degrees of freedom) than agents that either congruently mimicked their behaviors or mimicked those movements on another rotational axis. We discuss implications for theories of interactivity.

Keywords: Embodied agents; Social interaction; Virtual reality; Turing test

* Corresponding author. Tel.: +1 650 723 0701; fax: +1 650 723 2472.
E-mail address: Bailenson@Stanford.edu (J.N. Bailenson).

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1. Introduction

Previous research has shown that people are uniquely influenced by others who mimic their language (Giles, Coupland, & Coupland, 1991; Van Baaren, Holland, Steenaert, & van Knippenberg, 2003) or their gestures (Chartrand & Bargh, 1999) during social interaction. Moreover, recent research has extended these findings to computer agents: voice synthesizers that mimic vocal patterns (Suzuki, Takeuchi, Ishii, & Okada, 2003) as well as embodied agents in immersive virtual reality that mimic nonverbal behavior (Bailenson & Yee, 2005). Given the growing prevalence of digital conversational agents in educational software (Graesser et al., 2003), internet applications (Yee, 2006), communications systems (Cassell, 2001), entertainment (Konijn & Hoorn, 2004), and devices such as cellular phones and personal data assistants, the potential use of algorithmic mimicry strategies in software agents is extraordinary. The goal of the current research is to (1) understand and explore how astute people are in detecting *digital chameleons*, agents who utilize mimicry algorithms, and (2) examine the implications of explicit mimicry detection in terms of social perceptions of the mimickers. While previous research has demonstrated the advantages of implicit mimicry, as far as we know this is the first study to report results from the explicit detection of various types of mimicry.

1.1. Interactional synchrony in discourse

In early research of verbal and nonverbal behavior, Kendon (1970) recorded and closely analyzed filmed interactions in slow motion. In these video analyses, Kendon noted and recorded every "minimally perceptible change" of each body part along a multilayered time-line. These meticulous analyses revealed three kinds of synchrony. First, the points of change in the movement of separate body parts of the same individual coincided. Second, these changes in multiple body parts coincided with changes in speech of that individual. For example, larger body movements coincided with sentences and phrases, while smaller body movements coincided with syllabic or sub-syllabic changes. The final type of synchrony is *interactional synchrony:* The extent to which, in a dyadic interaction, the points of change of person A are in synchrony with the points of change in person B. Interactional synchrony was found to occur from the sub-syllabic level to the word level. In other words, synchrony at the phrase or sentence level was less consistent than at the word level or below.

Kendon argued that interactional synchrony functions as the regulator of the "delicate coordination of expectancies among participants," (Kendon, 1970, p. 76) and suggested that interactional synchrony impacts credibility, persuasion, and trust in interactions by managing expectancies among participants. In essence, synchrony results when people's behaviors are strategically contingent upon one another. One of the most obvious examples is direct mimicry – when one person directly repeats a verbal or nonverbal action in conversation.

1.2. Implicit mimicry in verbal and nonverbal behavior

It seems almost second nature that, without being aware of doing so, people mimic one another in social situations; this phenomenon occurs with laughter (Provine, 1992), eating habits (Johnston, 2002), mood (Neumann & Strack, 2000), and verbal behavior (Cappella