Cognitive mechanisms for imitation and the detection of imitation in human dyadic interactions

Antonia F. de C Hamilton (a.hamilton@ucl.ac.uk)
Institute of Cognitive Neuroscience, University College London
Alexandra House, 17 Queen Square, London, WC1N 3AR

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Introduction

Imitation is a ubiquitous human behavior which has been linked to both social learning and social bonding (Uzgiris, 1981). Here, we examine how imitation is used in the context of social affiliation, with a particular focus on the unconscious mimicry of body postures or gestures which are sometimes referred to as the 'chameleon effect' (Chartrand & Bargh, 1999). The 'social glue' hypothesis of mimicry claims that mimicry behavior has a key causal role in social affiliation (Lakin, Jefferis, Cheng, & Chartrand, 2003; van Baaren, Janssen, Chartrand, & Dijksterhuis, 2009). For example, if Anna mimics an action by Bert (without awareness in either), the theory claims that Anna sends a prosocial signal to Bert and Bert receives that information (Wang & Hamilton, 2012).

A correlational relationship between increased bodily mimicry in dyadic interactions and positive ratings of the interaction has been repeatedly observed (Pentland, 2008). However, direct experimental evidence that mimicry has a social signaling role remains weak. Two major types of evidence can show if an action functions as a social signal – first, does the sender's behavior change depending on who can see the signal? and second, does the receiver act on the signal? This talk will examine recent evidence for each of these, and will thus test the social glue hypothesis of mimicry.

Is mimicry changed by who can see?

Several studies suggest that mimicry is enhanced when another person makes eye contact and can receive a signal from the mimicker (Bavelas, Black, Lemery, & Mullett, 1986; Wang, Newport, & Hamilton, 2011). Here I will focus on three recent studies which show how mimicry in children and adults is modulated by the gaze behaviour of an observer. First, we report that children performing an overimitation task (similar to Marsh, Ropar, & Hamilton, 2014) show more imitation behaviour when observed by an adult than when the adult turns her back (Marsh & Hamilton, n.d.). Second, we show that rapid hand action mimicry is enhanced when the participant is observed at the time of response, but not if the observer's gaze is occluded just before the response (Wang & Hamilton, 2013). In a third study, we asked dyads to complete a leader-follower task where the leader demonstrated a movement sequence and we measured how closely the follower copied the kinematics of the sequence despite not being instructed to do so. We find that followers imitate with higher fidelity when the leaders eyes are open than when they are closed (Krishnan-Barman & Hamilton, n.d.), matching the predictions of the signaling hypothesis.

Together, this series of studies provides clear evidence that the production of mimicry behavior varies according to whether the mimicry can be seen by another person or not. This is true across children, adult reaction time studies and adult dyadic interactions. These results are compatible with the idea that senders are producing mimicry as a social signal, in order to convey information to another person.

Is mimicry detected by receivers?

For mimicry to function effectively as a signal, the message must be send and also received. That is, Bert must (on some level) detect that Anna is mimicking his action and respond to that signal. It is hard to find strong evidence for this, partly because it is not an easy experiment to implement. Most approaches require that a confederate should mimic or not-mimic the actions of a participant in a well-controlled manner. While some studies report positive effects (Chartrand & Bargh, 1999; Müller, Maaskant, van Baaren, & Dijksterhuis, 2012), others report mixed results or null effects (van Swol, 2003; Verberne, Ham, Ponnada, & Midden, 2013). A full review of these results is provided in (Hale & Hamilton, 2016a).

We propose that the most rigorous way to test the hypothesis that being mimicked leads to a positive social effect is to use virtual reality. In virtual reality mimicry, the experimenter has full control of the interaction and can ensure that mimicry (and only mimicry) is the factor which differs between experimental conditions, and that all participants receive a consistent experience. An early virtual reality study reported positive effects of being mimicked in VR (Bailenson & Yee, 2005). We recently extended this result and examined how participants respond to being mimicked or not by a virtual character from their own culture or a different culture. In a pre-registered study with a large sample size, we find that mimicry of head motion which is not detected by participants has no impact on rapport or trust (Hale & Hamilton, 2016b).

Several factors could account for this null result. First, we examined only mimicry of head motion, and mimicry of other motion features (e.g. gesture or posture) might lead to larger effects. Second, imperfections in the VR itself might negate any positive social effects, through similar VR systems can replicate many other psychological phenomena. Finally, it is possible that being mimicked is not implicitly detected as a social signal, arguing against the social signaling interpretation of mimicry.

Conclusions

The present data suggests that the production of mimicry depends on who can see, but it is not yet clear if receivers respond positively to mimicry. This means that the role of mimicry as a social signal is not yet firmly established. We suggest that acquiring high-resolution motion capture data to better establish how dyads use mimicry will also enable the creation of better VR mimicry. This can provide a more definitive test of the claim that mimicry is used as a signal of social affiliation.

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