

# Virtual Peacemakers: Mimicry Increases Empathy in Simulated Contact with Virtual Outgroup Members

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## Abstract

This research examined virtual–human interactions as a new form of simulated contact between members of groups in conflict. A virtual human representing an outgroup member (a Palestinian) interacted with 60 Jewish Israeli participants in an experimental study. We manipulated postural mimicry by the virtual interaction partner during a conversation about a sensitive conflict issue. Mimicry increased empathy toward the Palestinians, irrespective of participants' feelings toward the Palestinians prior to the experiment. Further, mimicked participants who reported a priori negative feelings toward Palestinians expressed more sympathy toward their Palestinian virtual interaction partner, rated themselves as closer to him, and perceived the interaction as more harmonious compared to participants in a counter-mimicry condition. The results underscore the impact of mimicry on intergroup interactions, especially on individuals who harbor negative feelings toward the outgroup. The use of virtual–human interactions in obtaining this effect reveals the still widely unexplored potential of technology-enhanced conflict resolution.

## Introduction

CONFLICTS BETWEEN SOCIAL, ETHNIC, and racial groups sadly exist in many places in the world. In the past 60 years, research based on Allport's<sup>1</sup> contact hypothesis has demonstrated that under the right conditions, contact may reduce intergroup bias and foster harmonious intergroup relations. The contact hypothesis has received considerable empirical support in a variety of contexts (see Al Ramiah and Hewstone<sup>2</sup> for a review).

Because of the inherent difficulty in creating conditions for positive intergroup contact among members of groups engaged in conflict, contact theory has been extended to indirect forms of contact. Indirect contact is an attractive alternative in areas of protracted, violent conflict where individuals lack the opportunities or the motivation for direct contact. Crisp and Turner<sup>3</sup> showed that even *imagined* contact can be effective to reduce intergroup bias under some circumstances (see Miles and Crisp<sup>4</sup> for a meta-analysis). There are, however, doubts as to whether simply pretending to meet with an outgroup member would erase the psychological foundations of violent conflict.<sup>2,5</sup>

The current paper proposes an alternative approach to simulating intergroup contact. Rather than having people imagine being in a situation of contact, we can actually put them in contact—within a virtual reality simulation, with virtual humans as representatives of the outgroup. Virtual agents (i.e.,

computer-controlled avatars) make it possible to create an interactive and realistic contact situation by simulating both verbal and nonverbal aspects of human communication. This opens the opportunity to apply persuasion techniques in the design of a virtual agent's communicative behavior, with an intentional attempt to change the interaction partner's attitudes or behavior.<sup>6</sup> We focus on mimicry as a prominent example of nonverbal persuasion in the current paper, and explore its potential to achieve positive social influence in simulated intergroup contact with a virtual counterpart.

In human interactions, people tend to mimic each other's body postures, gestures, and facial expressions automatically. Research has shown that mimicry is positively related with empathy<sup>7</sup> and liking.<sup>8</sup> Mimicry not only results in more positive evaluations of the interaction partner, but also interpersonal interactions in which mimicry occurs tend to be perceived as smoother and more harmonious.<sup>9</sup> However, the rate of mimicry has been found to be low during interactions with disliked others,<sup>10</sup> such as outgroup members<sup>11</sup> and stigmatized people.<sup>12</sup> Highly prejudiced individuals in particular are less likely to mimic the behaviors of outgroup members.<sup>13</sup>

Inzlicht et al.<sup>14</sup> claimed that if prejudice against an outgroup reduces mimicry, the reverse might also be possible. They instructed non-Black participants to either mimic or merely observe the actions of black or white actors in a video that shows them drinking from a glass of water. Mimicking black actors reduced implicit prejudice against blacks more

than mere observation, but failed to generate an advantage regarding explicit measures of racial prejudice.

In a study by Yabar and Hess,<sup>15</sup> participants recalled a sad autobiographical event in the presence of a North African (outgroup) or French Canadian (ingroup) confederate who either displayed sad or neutral facial expressions. The North African confederate who expressed empathy through congruent facial mimicry received higher ratings of liking than when the same person did not mimic. However, these effects were limited to the particular interaction partner and did not generalize to the outgroup as a whole.

Stel et al.<sup>10</sup> experimentally manipulated a priori liking of a neutral target by describing him as either an honest or a dishonest person. Participants were instructed to either mimic or not mimic the behaviors that the (liked or disliked) actor displayed in a video (e.g., playing with pen, rubbing face). In contrast to previous findings, mimicking an a priori disliked person did not increase liking, whereas mimicking an a priori liked person resulted in increased liking of that person.

The current research aims to shed light into the complex relationship between mimicry, liking, and empathy in intergroup settings that has yielded such inconsistent results. Particularly, we investigate whether mimicry by a virtual outgroup member can increase empathy and liking in the human counterpart toward the group that the virtual interaction partner represents.

Behavioral mimicry has been used as a design strategy in a number of previous works in order to make virtual agents appear more realistic and believable (i.e., humanlike),<sup>16</sup> and as a means to gain social influence,<sup>17</sup> facilitate task cooperation,<sup>18</sup> and establish rapport with a human interaction partner.<sup>19</sup> Some have implemented complex multimodal mimicry mechanisms, including postural mirroring and mimicry of certain head gestures,<sup>19</sup> while others showed that even simple forms of mimicry such as imitating head movements<sup>17</sup> can be effective.

Bailenson and Yee<sup>17</sup> designed a virtual agent that delivered a persuasive speech while mimicking participants' head movements with a 4 second delay or displaying prerecorded head movements. Mimicking agents were rated as more likeable and were more persuasive than nonmimicking agents. However, this effect was only found when participants did not detect the mimicry manipulation,<sup>20</sup> and whether agent mimicry leads to increased liking and trust appears to be task dependent.<sup>18</sup> Other studies that evaluated the social impact of virtual mimicry included additional rapport-enabling strategies, such as backchannel communication and positive feedback.<sup>19,21</sup> It is unclear to what extent the positive effects reported in these studies can be attributed to the agent's mimicry behavior.

Despite sparse empirical evidence, the few available studies clearly point to the still unexplored potential of employing agent-based mimicry in simulated intergroup interactions. We conducted an experiment in order to test whether virtual mimicry leads to the expected benefits in simulated contact situations between members of groups in protracted conflict where mimicry would naturally be inhibited.

## Method

### Participants

Sixty male, Jewish Israeli students, aged between 21 and 45 years ( $M=25.44$ ,  $SD=3.76$ ) were recruited from social

science departments in an Israeli university, and participated in the experiment for credit or payment (60 NIS—about \$15). They were randomly assigned to a mimicry condition or a counter-mimicry condition, with 30 participants in each condition. Due to technical problems during the experiment, data from three participants were missing, resulting in a total of 57 participants (27 in the counter-mimicry condition and 30 in the mimicry condition).

### Materials and methods

We designed a virtual character called Jamil who represents an outgroup member (i.e., a Palestinian) for our target group (i.e., Jewish Israelis). The Jamil avatar was purchased from the Rocketbox libraries<sup>22</sup> that offers realistic humanoid characters. Jamil was displayed in human size on a back-projected large screen (182 × 256 cm), using a 3D ViewSonic 120Hz screen refresh rate projector (model PJD6381) at 1280 × 768 resolution, and Nvidia 3D Vision shutter glasses for active stereoscopic display. Participants were asked to sit on a chair positioned about 150 cm from the screen. The three-dimensional stereoscopic projection made Jamil appear to sit opposite them in a virtual extension of the physical room (see Fig. 1).

Jamil's voice was provided by an Arab Israeli volunteer who speaks Hebrew fluently but with an Arabic accent. The speech was prerecorded and divided into five segments. A set of prerecorded animations was used to mimic or counter-mimic participants' sitting postures. The animations include four arm positions (arms in lap, arms crossed in front of chest, left arm up, and right arm up), and seven leg positions (legs parallel with both feet on the floor, feet crossed at ankles with legs stretched out or bent, legs crossed with right (left) knee over left (right) knee, and right (left) ankle over left (right) knee). The speech sequence and posture shifts were controlled via the Unity 3D game engine.

Participants filled in an online demographic questionnaire about 2 weeks before the experiment. This questionnaire also contained a measure of a priori liking of the outgroup.<sup>23</sup> In the experimental session, they engaged with Jamil in a pseudo-natural conversation about the Israeli-constructed security fence on the West Bank—a controversial topic in the Israeli-Palestinian conflict. Jamil describes the difficulties of Palestinians' life caused by the separation fence. He presents

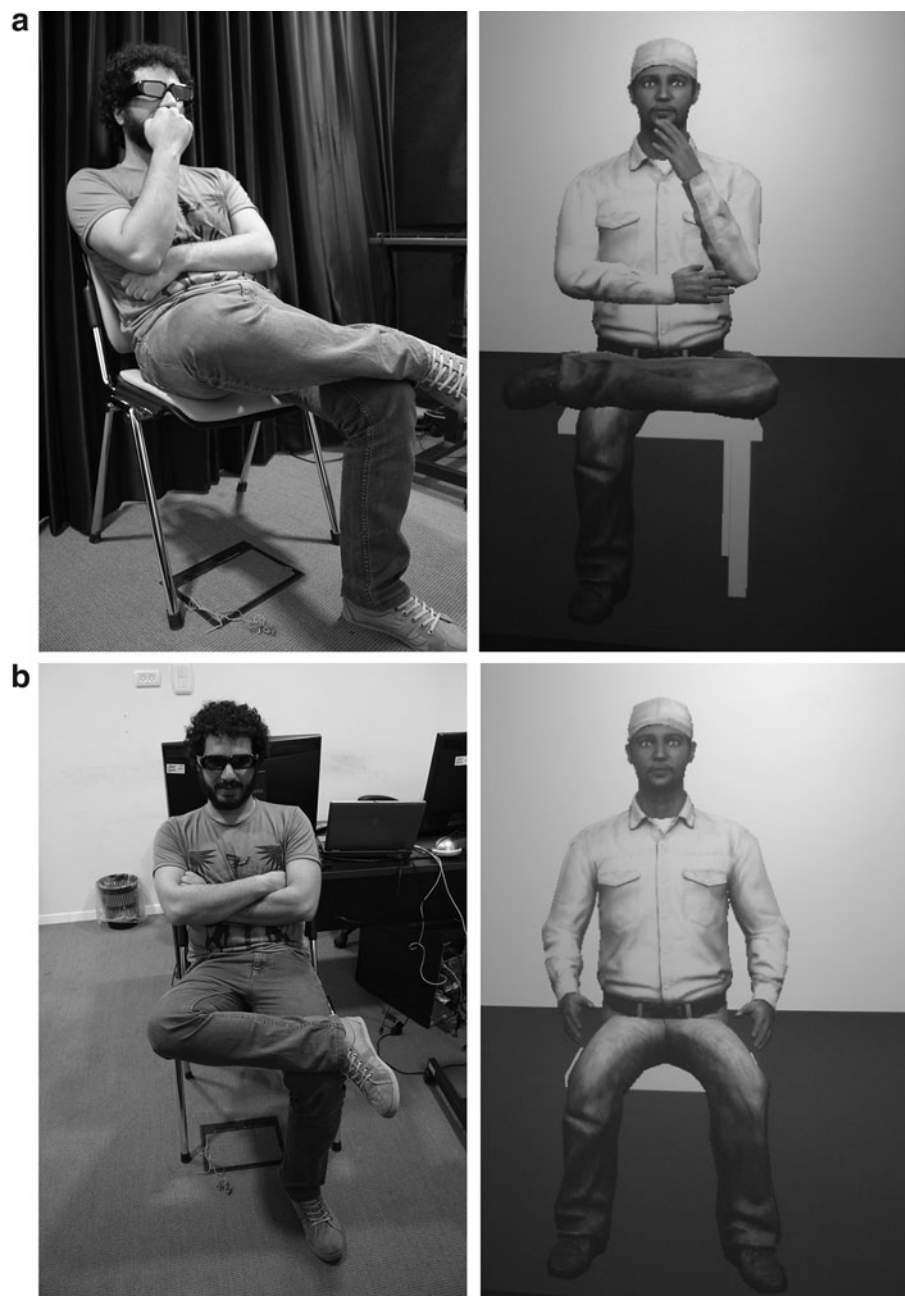


FIG. 1. Experimental setup.

an authentic viewpoint and is relatively moderate in his argumentation. Example statements include: “I think the security fence goes against the basic rights of the Palestinian citizens living on the other side.” “Putting up the fence is a bad idea and I don’t think we’ll see a difference in the relations if we keep putting up checkpoints and fences between the nations.” “You have to understand, the Palestinians are living in prison. Their movement is restricted and they can’t travel between cities as they would like to.” These statements are based on arguments by Arab participants in another face-to-face experiment with Jewish participants on the same topic (Hirschberger G, Shani-Sherman T, Hasler BS, and Pyszczynski T. Physiological, behavioral and experiential aspects of interactions between Israelis and Palesti-

nians. Unpublished data. Interdisciplinary Center Herzliya, Herzliya, Israel, 2014). The arguments are presented in a positive tone of voice, which according to Crisp et al.<sup>24</sup> is a critical factor for simulated contact to bring about positive effects. Participants were instructed to respond to Jamil after each speech segment. They were told to reflect on Jamil’s statements and state their own opinion on the subject. However, they were aware that he did not understand what they were saying.

Whenever the participant changed his sitting posture during the conversation, Jamil either mimicked or counter-mimicked his movement depending on the experimental condition to which he had been assigned (see Fig. 2). In the mimicry condition, Jamil adopted the same posture 4–5



**FIG. 2.** Experimental conditions: (a) mimicry condition, (b) counter-mimicry condition.

seconds after the participant. In the counter-mimicry condition, Jamil did the opposite (e.g., when the participant crossed his legs, Jamil would uncross his legs). We chose a counter-mimicry condition instead of a “no mimicry” condition in order to avoid Jamil mimicking participants’ postures by chance if his posture shifts were randomized. Hence, the current experimental manipulations contrast posture congruence (mimicry) versus posture incongruence (counter-mimicry), while the pace of posture shifts remains constant across the conditions.

Although it would be technically possible to automate the mimicry mechanism, Jamil’s posture shifts were manually controlled by the experimenter who sat in a separate room and monitored participants’ postures through a live video feed. When the participant changed his posture, the experimenter triggered the corresponding posture shift in the Jamil avatar according to the experimental condition. The experimenter also controlled the speech segments. When the participant finished responding to Jamil’s statement, the experimenter played the next speech segment. After the interaction, participants filled out a questionnaire containing the dependent variables.

### Measures

**Empathy.** Expressions of empathy were counted by two independent coders based on transcripts of participants’ verbal responses to Jamil, resulting in a high level of interrater reliability (Cronbach’s  $\alpha=0.92$ ). The coders were instructed to count each sentence in which the participant expressed empathy toward the Palestinian suffering caused by the security fence. The two coders’ mean empathy count was used for statistical analysis. Both cognitive and affective components of empathy were counted as empathic responses, including expressions of understanding and perspective taking, as well as feelings for the other. Examples include: “I understand what the fence does.” “I understand the implications.” “I agree with you that the fence makes you feel strangled.” “I agree with you that it hurts your rights.” “I saw the suffering that it causes.” “I agree with you. It looks very bad, it feels bad.” “As you say, you feel jailed, it’s true.” Such verbal measures of empathy have been previously used in studies on virtual-human interactions,<sup>25,26</sup> as well as on human empathic communication.<sup>27,28</sup>

**Sympathy.** This was measured using a single item, asking how sympathetic Jamil is (in Hebrew translation). Responses to this item were provided on a 7-point Likert scale (1 = “not at all”; 7 = “very much”). Such single-item ratings have been used in previous mimicry studies that assessed sympathy for the mimicking interaction partner.<sup>8</sup>

**Self-other overlap.** A series of pairs of circles with increasing overlap (1 = “no overlap”; 5 = “almost complete overlap”) was used as a measure of similarity or closeness to the interaction partner. The two circles were labeled with “I” and “Jamil.” Higher scores indicate greater feelings of similarity/closeness to Jamil. This measure was adapted from Aron et al.’s<sup>29</sup> Inclusion of Other in the Self (IOS) scale. This pictographic single-item measure has been previously used in mimicry studies to assess how close or similar participants feel to a particular outgroup member.<sup>15</sup>

**Interaction harmony.** This was measured using a single item, asking how harmonious the interaction with Jamil was (in Hebrew translation). Responses to this item were provided on a 9-point Likert scale (1 = “not at all”; 9 = “very much”). Such single-item ratings have been used in previous studies to assess the effect of mimicry on interaction smoothness/harmony.<sup>8</sup>

**Outgroup affect.** An adapted version of the Feeling Thermometer<sup>23</sup> was used as a pre/post measure of outgroup affect. Participants were requested to indicate on a graphical scale how warmly they felt toward Palestinians, ranging from very negative feelings (0° = “extremely cold”) to very positive feelings (100° = “extremely warm”). The instruction specified that the question refers to Palestinians in general, and not to any particular individual that they might know personally. The Feeling Thermometer has been used in previous mimicry studies to assess general feelings toward outgroups.<sup>15</sup>

### Results

The duration of the conversation with Jamil did not differ significantly between the mimicry condition ( $M=3.74$  minutes,  $SD=57.79$  seconds) and the counter-mimicry condition ( $M=3.45$  minutes,  $SD=51.5$  seconds),  $t(55)=1.24$ ,  $p=0.22$ . There was also no significant difference regarding the number of posture shifts in the mimicry condition ( $M=1.77$ ,  $SD=2.1$ ) and the counter-mimicry condition ( $M=1.11$ ,  $p=1.78$ ),  $t(55)=1.27$ ,  $p=0.21$ .

To examine the effects of mimicry and a priori liking of Palestinians on responses to the Palestinian avatar, a series of linear regressions were performed with the dummy coded mimicry condition (0 = counter-mimicry; 1 = mimicry), the standardized thermometer scores, and their product as the factors.

The analysis on the empathy codes revealed a significant effect of the mimicry condition,  $\beta=0.40$ ,  $p=0.002$ , such that mimicked participants displayed more empathy toward Palestinian suffering compared to the counter-mimicry condition. There were no significant effects of a priori liking on empathy,  $\beta=0.12$ ,  $p=0.52$ , and no significant interaction between mimicry and a priori liking,  $\beta=0.03$ ,  $p=0.87$ . Thus, mimicry increased the expression of empathy irrespective of participants’ level of a priori liking of the outgroup.

The regression on sympathy revealed a significant effect of a priori liking,  $\beta=0.62$ ,  $p=0.001$ , which was moderated by the expected liking-condition interaction,  $\beta=-0.49$ ,  $p=0.007$ . Simple slope analyses revealed that mimicry increased sympathy toward Jamil, but only among participants who expressed low a priori liking of Palestinians,  $\beta=0.55$ ,  $t(53)=3.17$ ,  $p=0.003$ , not among those who reported high initial levels of liking,  $\beta=-0.13$ ,  $t(53)=-0.78$ ,  $p=0.44$ .

The regression on self-other overlap (adaptation of the IOS measure) revealed a significant effect of a priori liking,  $\beta=0.82$ ,  $p<0.001$ , which was moderated by the expected liking-condition interaction,  $\beta=-0.45$ ,  $p=0.006$ . Simple slope analyses revealed that mimicry increased self-other overlap between the participant and Jamil, but only among participants who expressed low a priori liking of Palestinians,  $\beta=0.49$ ,  $t(53)=3.15$ ,  $p=0.003$ , not among those who reported high levels of initial liking,  $\beta=-0.14$ ,  $t(53)=-0.91$ ,  $p=0.37$ .

The regression on interaction harmony revealed a significant effect of a priori liking,  $\beta=0.47$ ,  $p=0.02$ , which was moderated by a marginally significant liking-condition



interaction,  $\beta = -0.37$ ,  $p = 0.05$ . Simple slope analyses indicated that mimicry marginally increased perceived interaction harmony among participants reporting low a priori liking of Palestinians,  $\beta = 0.35$ ,  $t(53) = 1.92$ ,  $p = 0.06$ , but not among participants high in initial liking,  $\beta = -0.17$ ,  $t(53) = -0.90$ ,  $p = 0.37$ .

The regression on the posteriori thermometer revealed only a main effect for a priori feelings,  $\beta = 0.89$ ,  $p < 0.001$ . There was no significant effect of mimicry,  $\beta = 0.06$ ,  $p = 0.39$ , and no significant interaction,  $\beta = -0.02$ ,  $p = 0.82$ .

## Discussion

The current research provides initial evidence for the efficacy of simulating contact with virtual outgroup members as a new approach to intergroup conflict reduction. Our results show that subtle modifications in the virtual interaction partner's nonverbal behavior, such as implicit postural mimicry, are capable of increasing empathy in the human participant. This effect was found in the context of the Israeli-Palestinian conflict that is characterized by a long history of violence and deep-rooted hatred between the two sides.<sup>30</sup> Importantly, our empathy measure is based on the Israeli participants' reaction to the plight of the Palestinians and not to the avatar. Mimicked participants also perceive the interaction as more harmonious, feel greater sympathy toward the virtual outgroup member, and rate themselves as closer to him. It is particularly notable that these effects are observed among participants who initially reported a low level of liking of the outgroup.

These findings suggest that simulated contact with virtual outgroup members may provide a key for repairing intergroup relationships in the real world. However, in order for these virtual peacemakers to be successful, the positive effects of the interaction need to generalize to the entire outgroup population. In the current study, participants' ratings pertain only to the particular interaction partner, and it is not clear whether the reparative effect of mimicry generalizes to the outgroup as a whole. However, as previous research has shown, generalization of mimicry effects beyond the immediate interaction context is possible.<sup>31</sup> This is also indicated by our finding that mimicry increases empathy toward the Palestinians, and that this effect is robust and takes place regardless of initial feelings toward the Palestinians. On the other hand, our mimicry manipulation failed to increase liking toward the Palestinians on the thermometer measure.

One possible explanation for these discrepant results is that empathy is an implicit measure derived from participants' speech, whereas the thermometer measure is explicit. It is possible that participants in the mimicry condition were starting to have more positive feelings toward Palestinians without being fully cognizant of this change, or the explicit measures may simply not be sensitive to our manipulation.

Future research needs to address the issue of how to achieve the desired generalization effects. Different styles of mimicry (i.e., what and how the virtual agent mimics) may be examined, including other dialog facilitation strategies (e.g., positive feedback) in order to optimize the impact of the virtual encounter. Future studies should also investigate the critical real-life impact of these virtual experiences regarding a change toward more peaceful attitudes and behaviors in face-to-face encounters with outgroup members.

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