

Social Interaction in Collaborative Virtual Environments

<p>What if?</p> <p>What if it were possible to study, say, a meeting, by altering key features or each of the participants to see how they and the others respond to such a change. for instance, to what degree is our response to another person influenced by how much they look or act like us?</p>	<p>Applications</p> <ul style="list-style-type: none"> • Education. • Collaboration. • Productivity.
<p>Research</p> <p>Collaborative Virtual Environments (CVEs) are communication systems in which multiple interactants share the same digital space, despite occupying remote physical locations. In a CVE, tracking technology monitors the movements and behaviors of individual interactants and then renders those behaviors within the CVE via dynamic digital representations or avatars. In other words, in a CVE, people interact via digital representations of each other. CVEs enable Transformed Social Interaction (TSI), whereby an experimenter may alter one or more crucial features of each participant's avatar, leaving all other features unchanged. This facilitates a much finer grained study of the dynamics of social interaction than can be carried out with other, more traditional techniques.</p> <p>--> More below</p>	<p>People and Partners</p> <p>Dr. Jeremy Bailenson Dept of Communication</p> <p>Nick Yee Dept. of Communication</p>

Research

Collaborative Virtual Environments (CVEs) are communication systems in which multiple interactants share the same digital space, despite occupying remote physical locations. In a CVE, tracking technology monitors the movements and behaviors of individual interactants and then renders those behaviors within the CVE via dynamic digital representations or avatars. In other words, in a CVE, people interact via digital representations of each other. These digital representations can be controlled by keyboards or joysticks, or alternatively people can be tracked naturalistically by optical sensors, mechanical devices, and cameras.

Because verbal and nonverbal actions are tracked and then rendered (as opposed to directly transmitted as in a videoconference), a CVE

control system can be designed to render a specific subset of interactants' nonverbal behaviors strategically; for example, by filtering or amplifying selected behaviors, or even by rendering nonverbal behaviors that interactants have not performed.

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One example of TSI in collaborative environments is called augmented gaze, a transformation that allows mutual gaze unconstrained by the limits of physical person-to-person contact. Because the virtual world must be rendered individually for each of the interactants, it therefore can be rendered differently to each interactant. For instance, a given interactant's gaze can be directed at more than one person simultaneously.

Previous research on TSI has demonstrated that an interactant who employs this augmented gaze elicits the attention of other collaborators more effectively than one who employs natural gaze.

Another example of TSI is Identity blending. Previous research has demonstrated that similarity is one of the most significant factors in persuasion. In one pilot study, individuals read an advertisement from a candidate who absorbed 40 percent of their own identity from a photograph. This study demonstrated that 1) an extremely small percentage of people notice their own face morphed into a candidate's, and that 2) candidates morphed towards the self were more persuasive than candidates morphed towards other unfamiliar undergraduates.

The current project seeks to understand facial nonverbal mimicry. Specifically, participants will engage in collaborative, interactive tasks in a CVE in which they hear and see digital avatars of one another. One or more interactants will mimic the facial expressions of the others.

Tasks studied will include:

- Online tutoring
- Group training simulations
- Problem solving tasks
- Social interactions and role playing

Experimental questions will include:

- How many facial points need to be tracked?
- Should the collaborators be made aware of the mimicking (i.e., explicit vs. implicit TSI)?
- How literal should the mimic be (i.e., an exact mirror, or a general tendency to mimic)?
- Is mimicking a better strategy for certain types of collaborations (i.e. social interactions) than other types (i.e. distance learning)?

Given previous research on this topic, the expected hypothesis is that mimicking should increase the smoothness of collaborations, but more so when it is subtle and undetected.

Applications **Education.** One of the larger issues surrounding distance learning the ability of the teacher to capture the attention of a number of students simultaneously. With TSI, each student could have her own personalized teacher who gestures towards her in a completely interactive manner (i.e., nonverbal behavior of the teaching agent is driven by some type of a mimic algorithm). Given the findings of previous research, students should like these teachers more, should pay attention to them more, and should learn more.

Collaboration. Videoconferences are unpopular for a number of reasons (e.g., delay, lack of eye contact). However, CVEs using avatars have the potential to be utilized much more effectively than telephone or videophone collaborations.

Productivity. One problem with current CVEs is the necessity of clunky, cumbersome head-mounted displays, shutter glasses, and other things that one must wear in order to interact remotely. The face-tracking solution proposed here is that there is no need to wear cumbersome equipment, or markers on the face that rob the user of vanity. The video-based tracking equipment is completely unobtrusive. Consequently, collaborations using this tracking system should be more conducive towards near-term use in business and productivity contexts.

URL <http://www.stanford.edu/group/vhil/>