

Do a Robot's Eyes Change a Human's Speech?

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It is well established that people's eye gaze behavior provides important communicative cues during dialogue. For instance, it can be meaningful whether an individual is staring at their interlocutor or away from them at any given point in the conversation. Three main functions have been attributed to the act of looking away from one's interlocutor during an interaction—a behavior called gaze aversion [1]. The first function is cognitive load management: people tend to look away from their partner when under higher cognitive load [2]. Gaze aversion also serves to regulate turn-taking dynamics, such as by indicating moments of turn shifts [3]. Finally, it serves to regulate intimacy expressions between the interlocutors [4].

The importance of gaze behavior in communication has driven social robotics researchers—a growing field of robotics—to start investigating its role in human-robot interactions (HRI). For instance, Andrist et al. [1] observed that robots producing gaze aversion (as opposed to those not producing it) were perceived by their human interlocutors as more intentional and thoughtful. They were also better at managing the conversational floor.

The main objective of this project is to investigate whether a robot's gaze aversion behavior during a conversation with a human influences (a) the extent to which the person converges phonetically to the robot's speech and (b) the person's own eye gaze behavior.

We recorded data from 33 participants (32 male; one of unlisted gender identity) between 21 and 56 years of age ($M: 30.55$; $SD: 8.07$). Each one interacted with two Furhat robots [5] in a counterbalanced within-subjects design. One of the robots stared at the participants throughout the interaction without moving its eyes (the unnatural condition) while the other regularly moved their eyes away from and towards the participants following Mishra and Skantze's [6] architecture—i.e., more similarly to what a human would do (the human-like condition).

During the conversations, which followed a Wizard-of-Oz paradigm, the robots asked six questions to the participants; after the participants' answer, the robots gave their own answer to the question before proceeding to the next one. The questions were taken from [7, 8] (e.g., *What are your views on pop music?*, *What would constitute a perfect day for you?*). The participants were native speakers of one or two of 18 different languages, and all the tasks took place in English. The participants also produced baseline speech recordings—free speech about a prompted topic—before each interaction. Besides the participants' speech, we also recorded their eye movements.

Our first hypothesis is that (a) the robots' more human-like gaze behavior will create smoother and more “pleasant” interactions—assessed through self-rated questionnaires—[1], which will lead participants to entrain phonetically to the robot producing eye movements more than to the one with no movements (cf. Communication Accommodation Theory [9]). We also hypothesize that (b) participants will produce longer and more frequent gaze aversions during the interaction with the robot that stares constantly at them, as a way to regulate intimacy [4].

The preliminary results of the experiment will be reported.

References

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