

Speech Rate Convergence in Spontaneous Conversation

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Features of interlocutors' speech become more similar over the course of a conversation (Giles & Ogay, 2007). This convergence exists at the lexical (Garrod & Anderson, 1987), syntactic (Branigan et al., 2000), acoustic (Natale, 1975), and rhythmic (Tarr et al., 2014) level. Previous work has found speech rate convergence in scripted conversations and conversations with a confederate (e.g., Tierney, Patel, & Breen, 2018). We investigated speech rate convergence in spontaneous, non-scripted conversations to test two theories of linguistic convergence. The Communication Accommodation Theory (CAT) posits that individuals adjust communicative behaviors to increase or decrease social distance in the context of an interaction (Giles & Ogay, 2007). In this framework, convergence of rhythmic features serves as an indicator of greater social affiliation. The Interactive Alignment Model (IAM) suggests that speech convergence occurs to facilitate comprehension (Garrod & Pickering, 2015). As speech features become more aligned, interlocutors better understand the semantic content of utterances. Both CAT and IAM predict that speech rates converge within real-world interactions when speakers are positively affiliated. However, CAT specifically predicts that divergence occurs when speakers have competing sociocultural affiliations. We tested whether convergence is modulated by social factors, as predicted by CAT or whether it occurs universally, independent of affiliation, as predicated by IAM. Dyads ($N=56$) engaged in conversations in which we manipulated awareness of interlocutors' beliefs on politically loaded statements.

Each participant first performed a three-minute monologue describing their favorite trip. Then, interlocutors engaged in six conversations. Before each conversation, each participant was asked to respond to a statement which was either political (e.g. "Abortion is morally wrong in most cases") or neutral (e.g. "Pineapple belongs on pizza"). Using cards marked "Agree" or "Disagree", participants were asked to indicate, in full view of their partner, how their opinions or beliefs aligned with the statement. After this selection process, dyads were told to discuss a case study describing an apolitical dilemma to arrive at a solution. They completed this process six times, and the number of times their opinions differed on the statements was counted as the polarization score. Participants then completed a questionnaire that probed their honesty on statement responses. Speech was recorded throughout the task, and speech rates were measured using a beat-tracking algorithm in MATLAB (Schultz et al., 2016).

All speakers changed their speech rate in the conversations compared to the monologue (see Figure 1a). The speech rates of interlocutors also converged over the course of dialogues and significantly differed from baseline speech rate differences in monologues in the final half of the conversation (see Figure 1b). Cross-correlational analyses were used to assess how speech rates of conversational partners covaried over the course of the entire conversation. These revealed moderate positive correlations between patterns of speech rate within dyads (Mean $r = 0.35$, $SD = 0.08$).

Exploratory comparisons revealed greater convergence in dyads with high agreement (i.e., agreement in 5 or more conversations), independent of whether statements were political or apolitical (see Figures 2a and 2b). Exploratory analyses also revealed that dyads containing a speaker who was dishonest converged less than honest dyads (see Figure 2c), and same-sex dyads converged less than opposite-pair dyads (see Figure 2d). These findings suggest that social factors can modulate the degree of convergence, as predicted by CAT. However, speech rate convergence occurred across all conditions, a result more in line with the IAM than the CAT, which predicts divergence when speakers have competing opinions.

Overall, these findings suggest that speech rate convergence manifests regardless of conversational topic but may vary as a function of social factors, lending support to both CAT and IAM. To the knowledge of the authors, this is the first study to demonstrate speech rate convergence in spontaneous, non-scripted speech.

Figures

Deviation from baseline and speech rate convergence

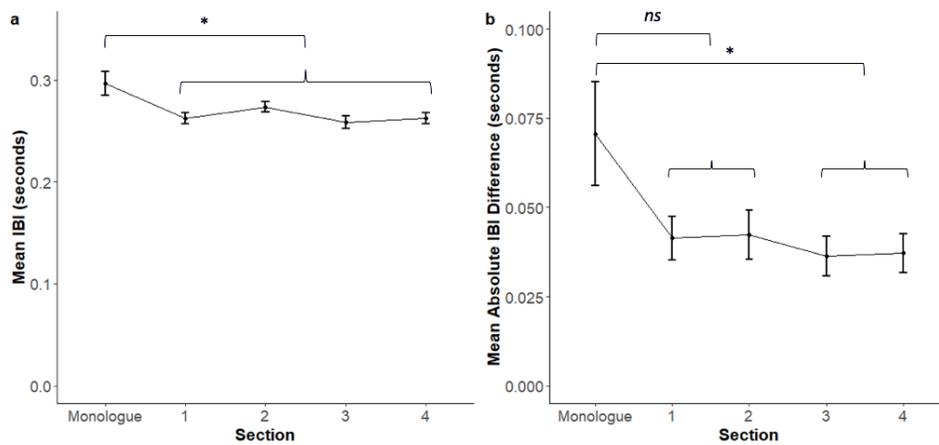


Figure 1. a) Mean inter-beat intervals (IBIs) in the monologue and across dialogue sections 1 to 4, and b) Mean IBI difference within dyads for the monologue and across dialogue sections 1 to 4. Error bars represent standard error of the mean.

Sociopolitical influences of speech rate convergence

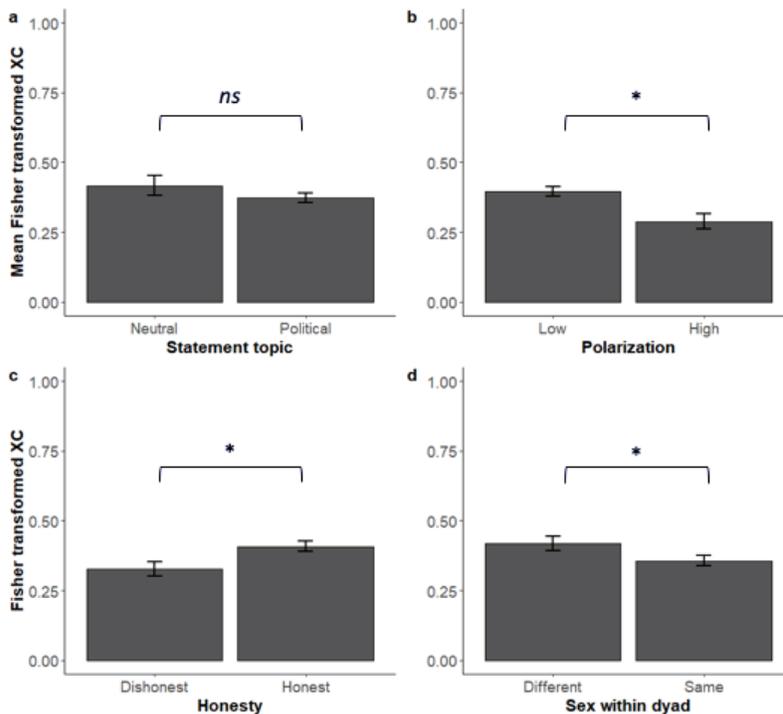


Figure 2. Fisher transformed cross-correlation coefficients between a) statement topics, b) polarization, c) dyads containing at least one dishonest individual and honest dyads, and d) dyads containing members of opposite sexes (different) or the same sex (same). Error bars represent standard error of the mean.