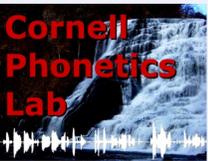


# PHONETIC CONVERGENCE IN MULTIPLE FEATURES

CHELSEA SANKER CAS443@CORNELL.EDU CORNELL UNIVERSITY 4pSC27



## Introduction

- **Convergence** is the phenomenon in which individuals' behavioral and linguistic characteristics become more similar to characteristics of their partners' behaviors and speech during interaction.
- Convergence is found in many features of speech and other behaviors, including e.g. vowel features, pitch, speech rate, and turn-taking behaviors.
- **Objective:** Correlations among eight features across pairs of interlocutors: F1, F2, vowel duration, pitch, intensity, turn duration, pause duration within turns, and pause duration between speakers.

## Hypotheses

**Hypothesis 1:** Correlation in convergence across features.

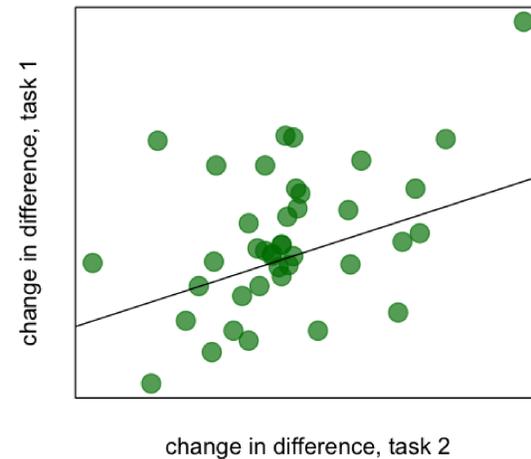
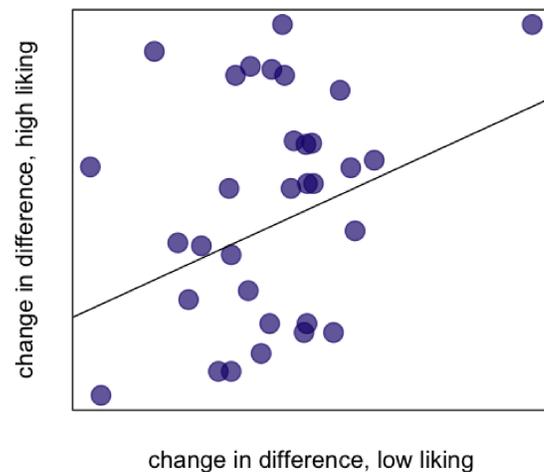
**Hypothesis 2:** Correlation in convergence across tasks.

## Methodology

- Phonetic measurements from 8 pairs of female speakers of English, ages 18-22
- 4 high-liking pairs; 4 low-liking
- Task 1: trivia questions
- Task 2: undirected conversation

## Correlation by Individual and by Task

**Figure 1:** Correlation for convergence in pairs with the same individual;  $R = 0.33$ ,  $p = 0.05$



**Figure 2:** Correlations for convergence in different tasks;  $R = 0.42$  for non-turn-taking features,  $p = 0.041$ . With turn-taking features,  $R = -0.22$ .

## Selected References

Babel, M. (2012). Evidence for phonetic and social selectivity in spontaneous phonetic imitation. *Journal of Phonetics*, 40, 177-189.

Giles, H., Coupland, J., & Coupland, N. (1991) *Contexts of accommodation: Developments in applied Sociolinguistics*. Cambridge: Cambridge University Press.

Giles, H., Taylor, D., & Bourhis, R. (1973). Towards a theory of interpersonal accommodation through language: some Canadian data. *Language in Society*, 2, 177-192.

Goldinger, S. (1998) Echoes of echoes? An episodic theory of lexical access. *Psychological Review*, 105, 251-279.

Gregory, S., Jr., & Hoyt, B. (1982). Conversation partner mutual adaptation as demonstrated by Fourier series analysis. *Journal of Psycholinguistic Research*, 11(1), 35-46.

Pardo, J. (2006). On phonetic convergence during conversational interaction. *Journal of the Acoustical Society of America*, 119, 2382-2393.

Street, R., Jr. (1984). Speech convergence and speech evaluation in fact-finding interviews. *Human Communication Research*, 11(2), 139-169.

## Correlations by Feature

Little correlation convergence in different features for each pair; no trend for correlations to be positive or negative. Only three significant correlations, all with task-related or physiological explanations.

	F2	Vowel Duration	Intensity	F0	Turn Duration	Cross-Turn Pause Duration	In-Turn Pause Duration
F1	-0.17	-0.09	0.3	-0.14	-0.15	0.32	0.25
F2		0.19	-0.1	0.35*	0.26	0.1	-0.27
Vowel Duration			0.29	-0.09	0.05	-0.08	-0.07
Intensity				-0.16	-0.29	0.16	-0.02
F0					0.47***	0.03	-0.3
Turn Duration						0.27	-0.07
Cross-Turn Pause Duration							0.49***

**Table 1:** Correlations for difference in partners' means through all time periods

- Correlation between within-turn pause duration and turn switching pause duration is due to all speakers' decreasing pause duration over time.
- Correlation between partners' pitch and F2 is due to a change-independent correlation between F2 and pitch ( $R = 0.061$ ,  $p = 1.4E-06$ ).
- Correlation between partners' average pitch and turn duration is due to absolute correlation between pitch and turn duration:  $R = 0.1$ ,  $p = 8.8E-11$ .

## Conclusions

- Positive correlation between a pair's convergence in a feature in different tasks
- Positive correlation between convergence in pairs containing the same individual
- Lack of correlation between a pair's convergence in different features
- Perhaps resulting from different salience of features to different listeners

## Future Directions

- **Additional Results:** Patterns of individual change correlated across tasks and between partners; trend of positive correlations between features.
- **Future Work:** Individual variation in convergence: recording each individual in several pairs and in different tasks. Clearer individual tendencies? Connected to ratings of partner cooperativeness/likeability?
- **Future Work:** Connections between individual tendency to converge in a feature and to use that feature as a cue for identifying sounds or speakers. Effects of altering or obscuring that cue as compared to others?

Presented at the 169th Meeting of the Acoustical Society of America, Pittsburgh Pennsylvania, 2015

## References

- [1] Babel, M. (2012). Evidence for phonetic and social selectivity in spontaneous phonetic imitation. *Journal of Phonetics*, 40, 177-189.
- [2] Babel, M., & Bulatov, D. (2011). The role of fundamental frequency in phonetic accommodation. *Language and Speech*, 55(2), 231-248.
- [3] Bane, M., Graff, P., & Sonderegger, M.. (2010/2014). Longitudinal phonetic variation in a closed system. *Proceedings of the 46th Annual Meeting of the Chicago Linguistics Society*, 43-58.
- [4] Bernieri, F, & Rosenthal, R. (1991). Interpersonal coordination: Behavioral matching and interactional synchrony. In R.S. Feldman & B. Rime (Eds.), *Fundamentals of nonverbal behavior* (pp. 401-432). Cambridge: Cambridge University Press.
- [5] Dijksterhuis, A., & Bargh, J. (2001). The perception-behavior expressway: Automatic effects of social perception on social behavior. *Advances in Experimental Social Psychology*, 33, 1-40.
- [6] Garrod, S., & Doherty, G. (1994). Conversation, co-ordination, and convention: An empirical investigation of how groups establish linguistic conventions. *Cognition*, 53, 181-215.
- [7] Giles, H., Coupland, J., & Coupland, N. (1991) *Contexts of accommodation: Developments in applied Sociolinguistics*. Cambridge: Cambridge University Press.
- [8] Giles, H., Taylor, D., & Bourhis, R. (1973). Towards a theory of interpersonal accommodation through language: some Canadian data. *Language in Society*, 2, 177-192.
- [9] Goldinger, S. (1998) Echoes of echoes? An episodic theory of lexical access. *Psychological Review*, 105, 251-279.
- [10] Goudbeek, M., & Scherer, K. (2010). Beyond arousal: Valence and potency/control in the vocal expression of emotion. *Journal of the Acoustical Society of America*, 128(3), 1322-1336.
- [11] Gregory, S., Jr., & Webster, S. (1996). A nonverbal signal in voices of interview partners effectively predicts communication accommodation and social status perception. *Journal of Personality and Social Psychology*, 70(6), 1231-1240.
- [12] Hazan, V., & Rosen, S. (1991). Individual variability in the perception of cues to place contrasts in initial stops. *Perception & Psychophysics*, 49(2), 187-200.
- [13] Nelson, T., & Narens, L. (1980). Norms of 300 general-information questions: Accuracy of recall, latency of recall, and feeling-of-knowing ratings. *Journal of Verbal Learning and Verbal Behavior*, 19, 338-368.
- [14] Pardo, J. (2006). On phonetic convergence during conversational interaction. *Journal of the Acoustical Society of America*, 119, 2382-2393.
- [15] Street, R., Jr. (1984). Speech convergence and speech evaluation in fact-finding interviews. *Human Communication Research*, 11(2), 139-169.
- [16] Street, R., Jr., & Giles, H. (1982). Speech Accommodation Theory: A social cognitive approach to language and speech behavior. In M. Roloff & C. Berger (Eds.), *Social cognition and communication* (pp. 193-226). Beverly Hills: Sage Publications.
- [17] Van Hoof, S., & Verhoeven, J. (2011). Intrinsic vowel F0, the size of vowel inventories, and second language acquisition. *Journal of Phonetics*, 39, 168-177.
- [18] Yu, A. (2013). Individual differences in socio-cognitive processing and the actuation of sound change. In A. Yu (Ed.), *Origins of sound change: Approaches to phonologization* (201-227). Oxford: Oxford University Press.