

The Brooklyn Multi-Interaction Corpus for Analyzing Variation in Entrainment Behavior

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Introduction

- **Entrainment:**
 - Human tendency to adapt to interlocutors to become more similar
- **Affects various features:**
 - Lexical choice (Brennan & Clark, 1996)
 - Syntactic structure (Reitter et al., 2006)
 - Acoustic-prosodic features (Levitan & Hirschberg, 2011)
- **Correlates with desirable conversation outcomes:**
 - Task success (Reitter & Moore, 2007)
 - Naturalness (Nenkova et al., 2008)
 - Rapport (Lubold & Pon-Barry, 2014)
 - Perceived trustworthiness or likability of Spoken Dialog Systems (Levitan et al., 2016; Metcalf et al., 2019)

Variation in Entrainment

- Degree and valence of entrainment vary substantially by speaker and context (Lubold & Pon-Barry, 2014; Pardo et al., 2018; Weise et al., 2019)
- Several theories broadly explain the behavior (Giles et al., 1991; Chartrand & Bargh, 1999; Pickering & Garrod, 2004)
- BUT: Exact mechanisms governing emergence still poorly understood
- This hinders practical application
- Example: User preference for entraining or *disentraining* avatar with unclear reason (Levitan et al., 2016)

B-MIC Overview

- Designed for 12 groups of four participants each
- Six dyadic interactions per participant:
 - Three task-oriented, 15 minutes each
 - One task-oriented with a “wizarded” dialogue interface
 - Two open conversations, 10 minutes each
- Demographic information and psychological questionnaires for each participant
- Segmented, transcribed, annotated for perceived acoustic outliers and emotion

Objects Game

Describe the location of the blinking image.



- Based on objects game of Columbia Games Corpus (Beňuš et al., 2007)
- Object placement tasks, scored
- 14 tasks per session, one minute each
- Players go back and forth describing
- Three sessions per participant
- One session with “computer” (WOZ)

Conversations

- Two conversations on given topics per participant
- Two hypotheticals chosen from Fisher Corpus (Cieri et al., 2004):
 - Starting your own business
 - Going back in time to change something you had done
- 10 minutes per topic

Questionnaires

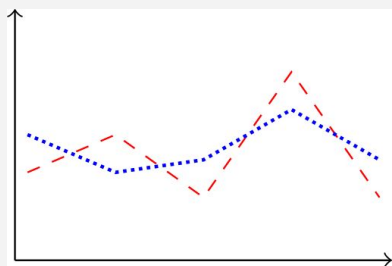
- Participants fill out four psychological questionnaires
 - Marlowe-Crowne Social-Desirability Scale (Marlowe & Crowne, 1961)
 - Perspective-taking subscale of the Interpersonality Reactivity Index (Davis, 1983)
 - Ten Item Personality Inventory (Gosling et al., 2003)
 - Reading the Mind in the Eyes Test (Baron-Cohen et al., 2001)
- Associated with entrainment in past research, for instance:
 - MS-SDS by Natale (1975)
 - IRI-PT by Chartrand & Bargh (1999)

Comparison with other corpora

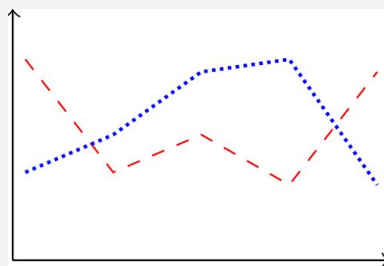
	Characteristics				
	#sessions per subject	types of sessions	speech baseline	personality data	emotion annotation
Switchboard Corpus (Godfrey and Holliman, 1993)	1-32	free conversation	No	No	No
Columbia Games Corpus (Beňuš et al., 2007)	1-2	task-oriented	No	No	No
SibLing Corpus (Kachkovskaia et al., 2020)	5	task-oriented	No	No	No
Montclair Map Task Corpus (Pardo et al., 2018)	2	task-oriented & speech shadowing	Yes	No	No
B-MIC	5	task-oriented & free conversation	Yes	Yes	Yes

Preliminary analysis, methods

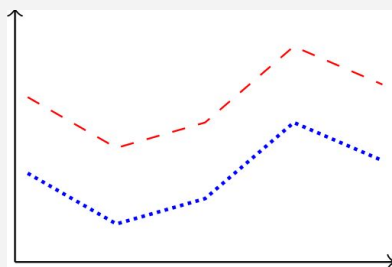
- Five acoustic-prosodic measures (Levitan & Hirschberg, 2011)



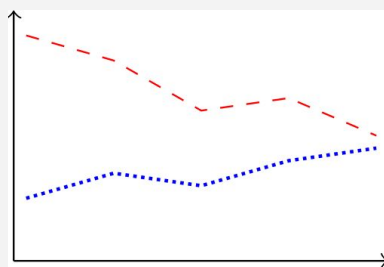
Local similarity



Global similarity



Synchrony



G./L. convergence

- Apply these
 - ... to the B-MIC games
 - ... to the B-MIC conversations
 - ... to the Objects Games of the Columbia Games Corpus for eight standard acoustic-prosodic features

(four out of 12 B-MIC groups so far)

Preliminary analysis, results

	B-MIC games			B-MIC conversations			Columbia Games Corpus		
	+	-	+/-	+	-	+/-	+	-	+/-
global similarity	0%	0%	n/a	25%	25%	n/a	0%	0%	n/a
global convergence	0%	0%	n/a	0%	0%	n/a	0%	0%	n/a
local convergence	4.2%	8.3%	4.2%	6.2%	37.5%	0%	25%	8.3%	16.7%
local similarity	20.8%	0%	0%	0%	12.5%	0%	16.7%	0%	0%
synchrony	29.2%	12.5%	25%	12.5%	37.5%	0%	33.3%	0%	0%

→ Conversational and speaker states are of critical importance
(maybe more than speaker traits)

Thanks!

Questions?

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