Investigating the Relationship between First Language Speech and Second Language Fluency Development

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Introduction

Well, i- i- i- in my own life I'd- I'd break it up in stages, when uh I had a difficult youth. Uh my father wasn't in the house, uh I've written about this, uh there- uh uh you know there were times where uh I've experimented with drugs, and I drank, uh yeah in my teenage years, and wh- what I trace this to is uh a certain selfishness on my part, I- I was so obsessed with me, and you know the- the reasons that I might be dissatisfied, that I- I- w- I couldn't focus on other people. And uh y-you know I think the process for me of growing up was to recognize that it's not about me, it's about ...

it's about- absolutely, so- so- but- but look, you know, th- the uh wh- when I uh wh- when I find myself um taking the wrong step, I think a lot of the times it's because I'm trying to protect myself, instead of trying to do God's work. And- and- an- and so that I think is- is my own failure
Overview

- Hesitation phenomena
  - Overview
  - HP in L2 speech
- Crosslinguistic Corpus of Hesitation Phenomena
  - Description
  - Results
- HP Developmental Trajectory
- Accessing the CCHP
Overview of types of HP

• Long investigative history

• Types
  – Silent pauses (SP): longer than 0.3-1.0 sec
  – Filled pauses (FP): *uh/um* in English, *e-to/ano-* in Japanese
  – Lengthenings: prolongation of one or more syllables
  – Repeats/restarts: repetition of a sequence of words
  – False starts: beginning of an utterance that is abandoned
  – Self-corrections: a sequence of words that repairs an immediately preceding sequence
Levelt's model of speech production

- Levelt 1983, 1989
- Two perceptual loops: internal and external
- Loops detect speech errors and initiate repair sequences
- Sequence: *reparandum*, *editing phase*, and *repair*
- In this system, all HP are part of a repair procedure: e.g., pauses as part of editing phase, self-corrections as repairs
- Extended for L2 speech by Kormos 1999, 2000
Leveltian Account of Speech Repairs

(Levlt 1983, 1989)

th- the uh wh- when I uh wh- when I find myself

reparandum editing phase repair

I w- ∅ I couldn't focus on other people.

reparandum editing phase repair

what I trace this to is ∅ uh a certain selfishness

reparandum editing phase repair

Shriberg (1994): Complex sequences (e.g., with multiple repairs) are possible.
HP in L2 production

  - SP duration and rate: higher proficiency → shorter and fewer silent pauses
  - FP rate: higher proficiency → fewer filled pauses
  - Distribution: low and high proficiency speakers show different distribution of HP use
  - Differences between read and spontaneous speech

• Related
  - Speech rate: higher proficiency → faster rate
  - Mean length of runs: higher proficiency → longer runs
HP in L2 production

• As a whole, work has been quite comprehensive.
• However, individual works are limited in that many do not take individual variation (cf., de Leeuw 2007) into account.
• Gradually, more studies are including L1 observations.
  – Derwing et al (2009) and Cox and Baker-Smemoe (2012) observed that both speech rate and pause rate in L1 and L2 production are correlated.
• The current research is designed to contribute to greater understanding of the influence of L1 hesitation on L2 hesitation.
Fluency

- Segalowitz (2010) taxonomy of fluency types
  - Cognitive fluency (in speech planning)
  - Utterance fluency (in speech production/articulation)
  - Perceived fluency (from listener's perspective)

- De Jong et al (Forthcoming) investigated relationship between cognitive fluency and utterance fluency.

Research Questions

- What is the relationship between hesitation patterns in L1 and L2 speech?
  - What is the relationship between utterance fluency and perceived fluency?
- What is the developmental trajectory of HP use in L2?
Crosslinguistic Corpus of Hesitation Phenomena – pilot (CCHPp)

- Participants: L2 learners of varying proficiency levels
- Elicitation tasks
  - Spontaneous speech: picture description, topic narrative
  - Reading aloud
  - Performed in both L1 and L2
- Demographic information: age, gender, L2 proficiency (self-reported TOEIC score)
- Annotation
  - Transcripts, HP, word & pause intervals
  - Two annotators, one checker
- Native speaker (N=16) ratings of fluency for L2 speech
CCHPp Results: Basic Statistics

- Participants: 10 Japanese L1, English L2 speakers
- Fully annotated parts of corpus
  - 7,237 tokens (words)
  - 71.7 minutes
- Spontaneous speech
  - 4,191 tokens
  - 47.7 minutes
- Read speech
  - 3,046 tokens
  - 24.0 minutes
- 1,420 silent pauses
- 456 filled pauses
- 203 self-corrections
- 70 repeats
- 8 false starts
CCHPp Results: Analysis

Factors

- speech rate
- mean SP duration
- SP rate (per 100 tokens)
- SP rate (per minute)
- mean FP duration
- FP rate (per 100 tokens)
- FP rate (per minute)
- mean length of runs

- Data collapsed by participant and L1-L2 difference was calculated
- Factors correlated with:
  - L2 Fluency Rating
  - TOEIC score
- Stepwise linear regression to find optimal combination of factors
- Data evaluated by:
  - spontaneous speech
  - reading aloud
CCHPp Results: Spontaneous Speech

L2 Fluency Ratings ($R^2 = 0.82$)
- Speech Rate (42%)
- SP Duration (22%)
- Mean Len Runs (21%)

TOEIC Scores ($R^2 = 0.82$)
- FP Duration (41%)
- Silent pause rate (per minute) (15%)
- Mean Len Runs (33%)
CCHPp Results: Reading Aloud

L2 Fluency Ratings ($R^2 = 0.77$)

- Silent pause rate (per minute)
  - English
  - Japanese
  (47%)

- Silent pause rate (per 100 tokens)
  - English
  - Japanese
  (23%)

- Mean length of runs (tokens)
  - English
  - Japanese
  (15%)

TOEIC Scores ($R^2 = 0.61$)

- Speech rate (tokens per minute)
  - English
  - Japanese

Speech Rate (66%)
CCHPp Results: Summary

**Spontaneous Speech**
- Speech rate
- Mean SP duration
- SP rate (per 100 tokens)
- Mean FP duration
- Mean length of runs

**Reading aloud**
- Fluency
- TOEIC

*At variance with Derwing et al (2009)*

Consistent with De Jong and Perfetti (2011).

Possible application for automated fluency measurement

Not included in models (insufficient data)
Crosslinguistic Corpus of Hesitation Phenomena (CCHP)

- Participants: L2 learners of varying proficiency levels
- Elicitation tasks
  - Spontaneous speech: picture description, topic narrative
  - Reading aloud
  - Performed in both L1 and L2
- Demographic information: age, gender, L2 proficiency (standardized test scores, experience abroad, self-assessment)
- Annotation
  - Transcripts, HP, word & pause intervals
  - Two annotators, one checker
CCHP Results: Basic Statistics

- Participants: 25 Japanese L1, English L2 speakers
- Full corpus
  - 42,972 words
  - 8 hrs, 9 min
- Spontaneous speech
  - 27,416 words
  - 6 hrs, 12 min
- Read speech
  - 15,556 words
  - 1 hr, 57 min
- 11,091 silent pauses
- 2,404 filled pauses
- 1,080 self-corrections
- 309 repeats
CCHP Results: Analysis

- Used spontaneous speech data only.
- Extracted counts for speech rate, silent pauses, filled pauses, repeats, and self-corrections.
- Performed repeated measures ANOVA
  - (between) L2 Proficiency as numerical variable, estimated from test scores, experience abroad, self-assessment
  - (within) Language as categorical variable: Japanese, English
- Used $\alpha = 0.05$ for significance testing (marked with ★).
CCHP Results: Speech Rate

Consistent with Derwing et al (2009) and Cox and Baker-Smemoe (2012)
CCHP Results: Silent Pauses

Consistent with Derwing et al (2009) and Cox and Baker-Smemoe (2012)
CCHP Results: Filled Pauses

Filled Pause Rate (per min)

Filled Pause Rate (per word)

Interaction

L2 Competence
Repeats are uncommon in Japanese (Fox et al 1996)
CCHP Results: Self-corrections

Self-correction Rate (per min)

- English
- Japanese

Self-correction Rate (per word)

- English
- Japanese

L2 Competence
CCHP Results: Other Repair Measures

Mean Num Repair Attempts

Mean Num Editing Terms

L2 Competence
Summary

- Recent studies of L2 speech performance are taking L1 speech performance more and more into account.
- The Crosslinguistic Corpus of Hesitation Phenomena allows us to account for L1 factors in the study of L2 hesitation patterns.
- Results show that learners' use of filled pauses change with increased proficiency, independent of L1 speech factors.
- Results show that speakers at all proficiency levels use more repeats.
- Results suggest that other aspects of L2 hesitation use correlate with that of L1.
Assembling a larger (N=30), public version of the Crosslinguistic Corpus of Hesitation Phenomena is ongoing. When complete, audio files and annotated transcripts will be available for free download. Some files are already available for download: http://www.filledpause.com/chp/cchp
Future Work with CCHP

- Deeper annotation
  - Syntactic structure
  - Part-of-speech information
  - Syllable and phoneme intervals
  - (F1,F2) measurements
- More speakers
- More L1-L2 combinations
Future Work based on CCHP

- Automatic L2 fluency evaluation
- Real-time fluency feedback tool
References


