Understanding second language fluency development: Comparisons with first language speech and with listener perceptions

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13 March 2015

This research is partially supported by a Waseda University Grant for Special Research Projects (#2011B-152) and a Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) Grant-in-Aid (#24520661)

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, a-nd 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

Barack Obama (August, 2008); Saddleback Presidential Forum

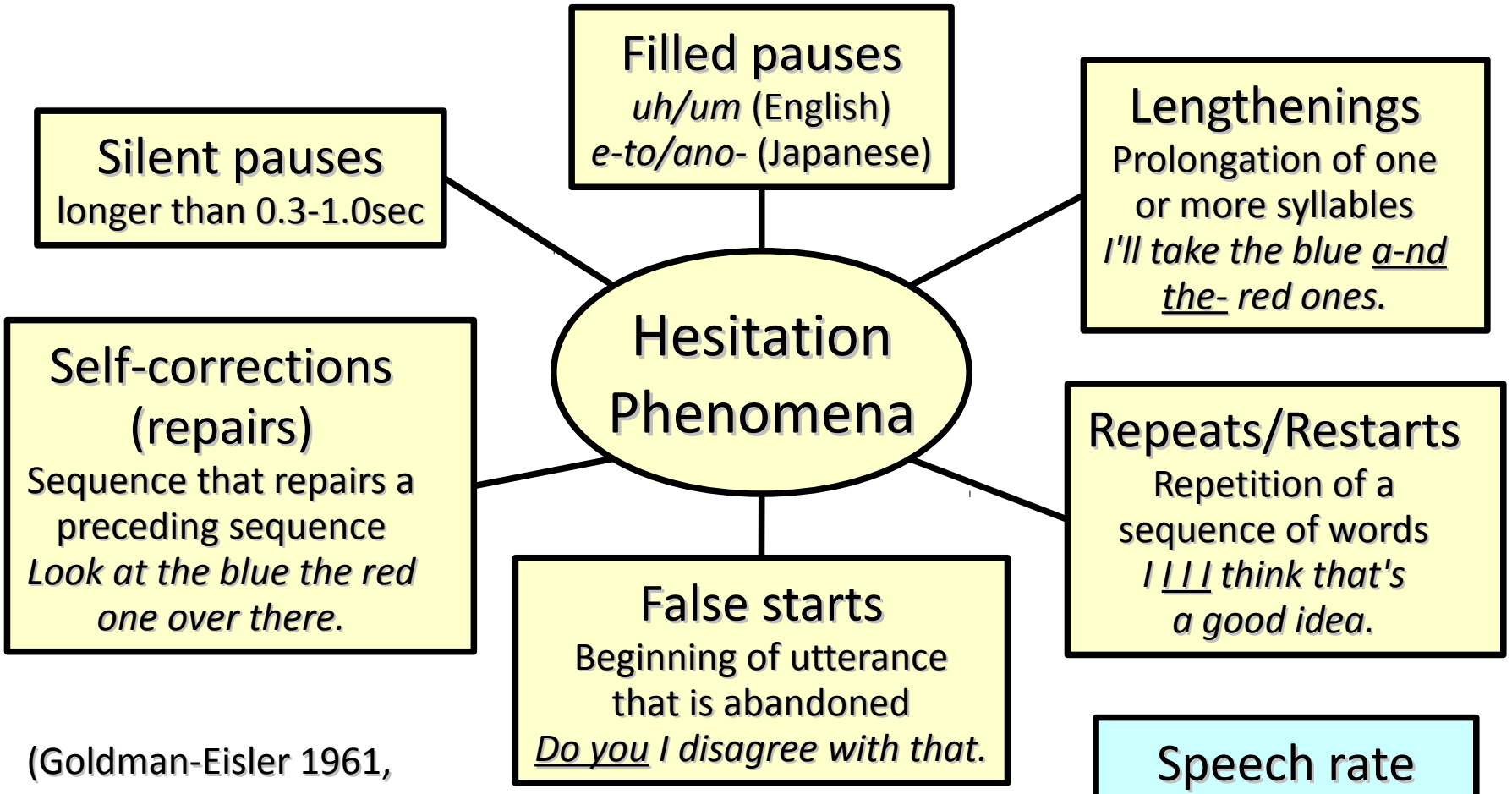
Overview

- Hesitation phenomena in speech
  - Overview
  - In L2 speech
- Crosslinguistic Corpus of Hesitation Phenomena
  - Description
  - Results
- L2 Developmental Trajectory (relative to L1)
- Hearer perception of fluency (relative to trajectory)
- Accessing the CCHP

Fluency

- Scope of fluency
  - Broad: speak a language proficiently
  - Narrow: speak smoothly with minimal but natural hesitation
- Segalowitz (2010): levels of fluency
  - Cognitive fluency: ease of mental preparation
  - Utterance fluency: smoothness of articulation
  - Perceptual fluency: hearer's view of smoothness
- De Jong et al (2012) investigated relationship between cognitive fluency and utterance fluency.
  - L2 speech rate related to cognitive fluency
  - L2 Silent pause duration only weakly related

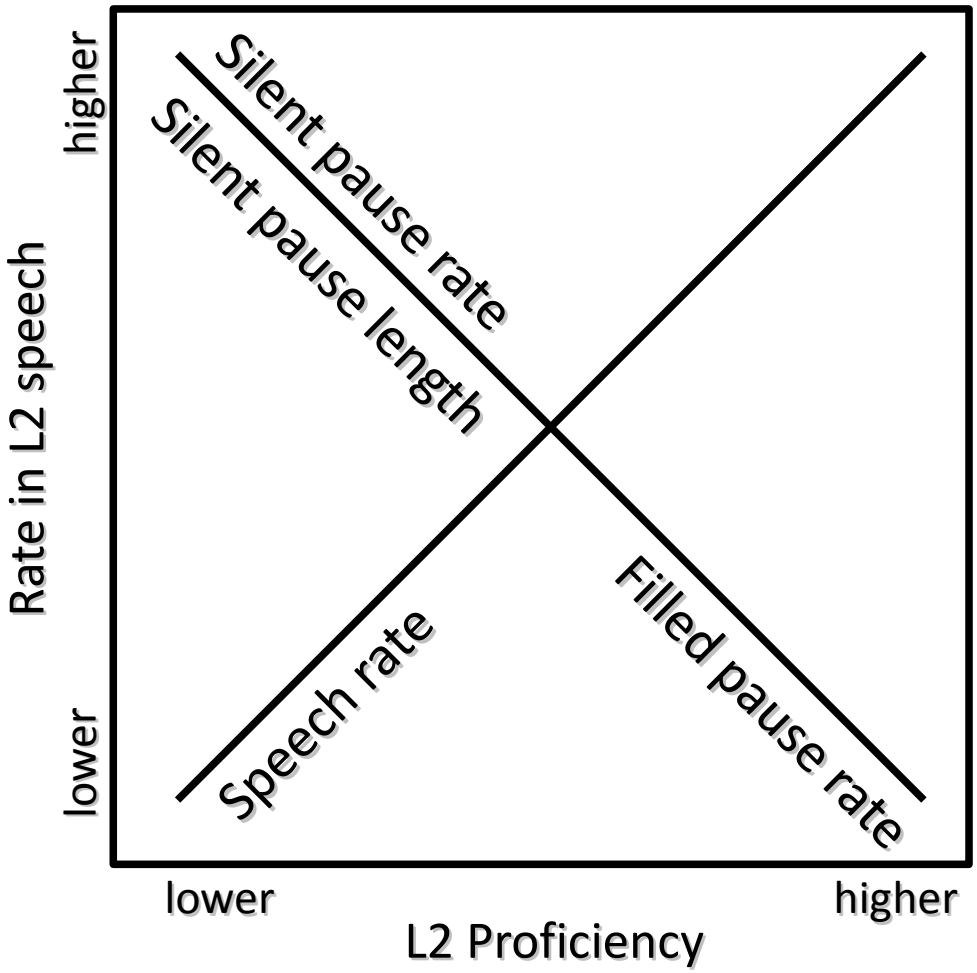
Observations of fluency: Hesitation phenomena



(Goldman-Eisler 1961, Levelt 1983, 1989, Maclay and Osgood 1959, Rochester 1973, inter alia)

(Cucchiarini et al 2010)

Hesitation phenomena in L2 production



(Cucchiarini et al 2010, Kormos and Dénes 2004, Riazantseva 2001, Rieger 2003, Tavakoli 2011, Trofimovich and Baker 2006, 2007, Wu 2008)

Hesitation phenomena in L2 production

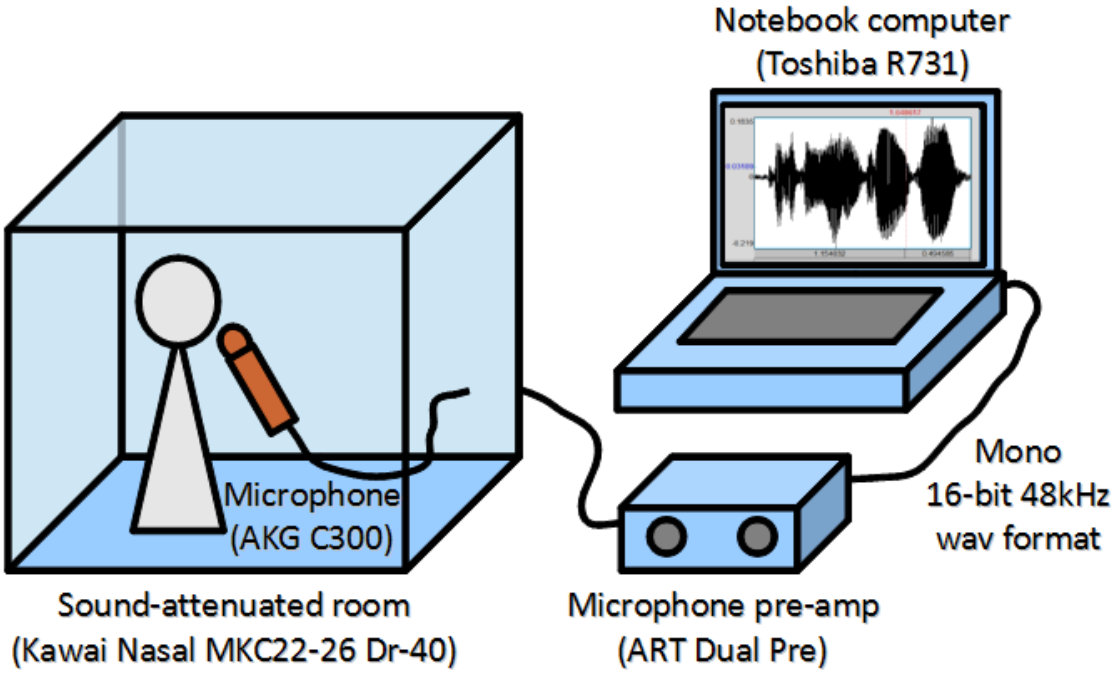
- As a whole, work has been quite comprehensive.
- However, individual works are limited in that many do not take individual variation into account (cf., de Leeuw 2007).
- Gradually, more studies are including L1 observations.
  - Derwing et al (2009) and Cox and Baker-Smemoe (2012) observed that both speech rate and pause rate in L1 and L2 production are correlated.
  - De Jong et al (2015) found measures of L2 articulation rate were more meaningful when "corrected" for L1 speech patterns.
- The current research is part of a project designed to contribute to greater understanding of the relationship between L1 hesitation patterns and L2 hesitation patterns.

Research questions

- What is the relationship between hesitation patterns in L1 and L2 speech?
- What is the developmental trajectory of the use of hesitation phenomena in L2?
- What is the relationship between hesitation patterns in L2 speech and hearer's perception of fluency?

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



Crosslinguistic Corpus of Hesitation Phenomena (CCHP)

- Demographic information: age, gender, L2 proficiency (standardized test scores, experience abroad, self-assessment)
- Annotation
  - Transcripts, HP, word & pause intervals
  - Two annotators, one checker

```
<UTTERANCE>
 <T>in</T>
 <T>America</T>
 <T FILLED-PAUSE="yes">uh</T>
 <T>there's</T>
 <T>a</T>
 <T FILLED-PAUSE="yes">uh</T>
 <T>very</T>
 <T>famous</T>
 <T FILLED-PAUSE="yes">uh</T>
 <T>and</T>
 <T>loved</T>
 <T FILLED-PAUSE="yes">uh</T>
 <T>basketball</T>
 <RP>
  <O>
   <T>cl#</T>
  </O>
  <T FILLED-PAUSE="yes">uh</T>
  <E>
   <T>association</T>
  </E>
 </RP>
 <T>which</T>
 <T>is</T>
 <T>called</T>
 <T>NBA</T>
 <T>National</T>
 <T>Basketball</T>
 <T>Association</T>
 <T>I</T>
 <T>think</T>
</UTTERANCE>
```

CCHP Results: Basic Statistics

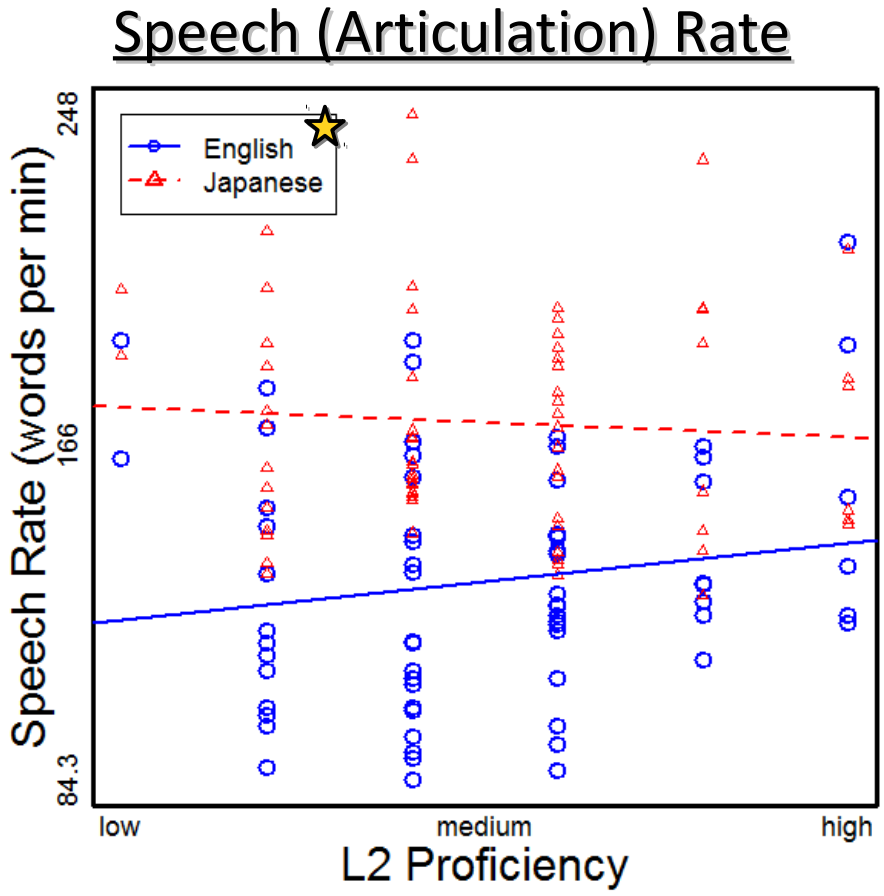
- Participants: 36 Japanese L1 / English L2 speakers
- Full corpus
  - 62,632 words
  - 11 hrs, 31 min
- Spontaneous speech
  - 40,296 words
  - 8 hrs, 43 min
- Read speech
  - 22,336 words
  - 2 hr, 48 min
- Transcriber agreement
  - 91.5%

- 15,837 silent pauses
- 3,516 filled pauses
- 1,689 self-corrections
- 518 repeats

CCHP Results: Analysis

- Used spontaneous speech data only.
- Computed rates of speech, silent pauses, filled pauses, repeats, and self-corrections for each recording.
- 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 ☆).

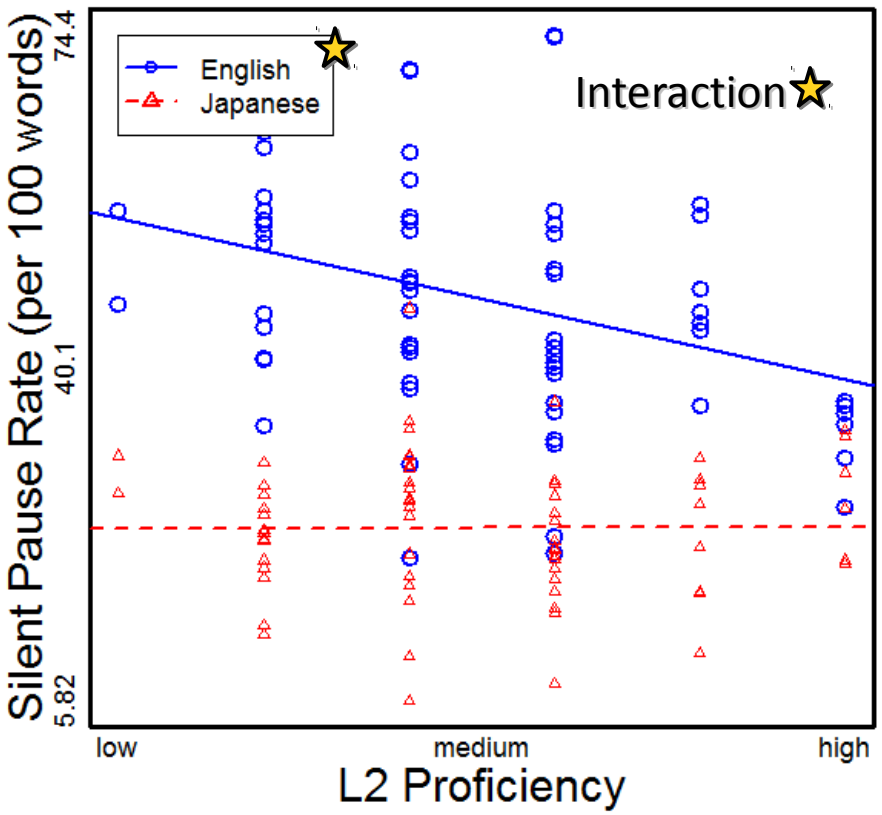
CCHP Results: Speech Rate



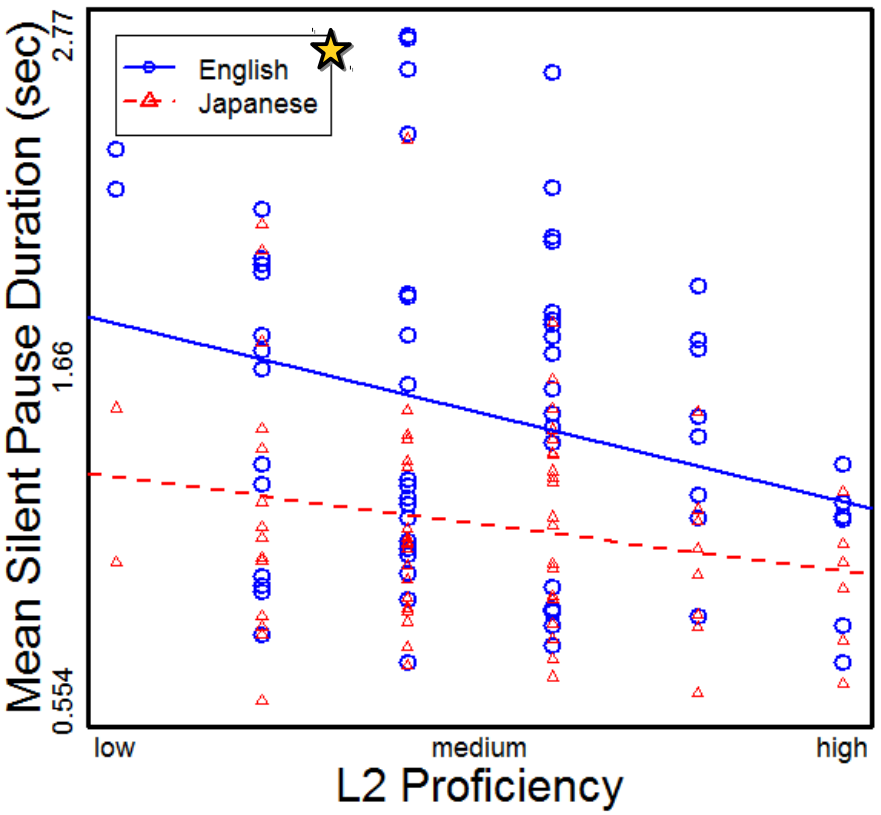
Consistent with Derwing et al (2009) and Cox and Baker-Smemoe (2012)

CCHP Results: Silent Pauses

Silent Pause Rate

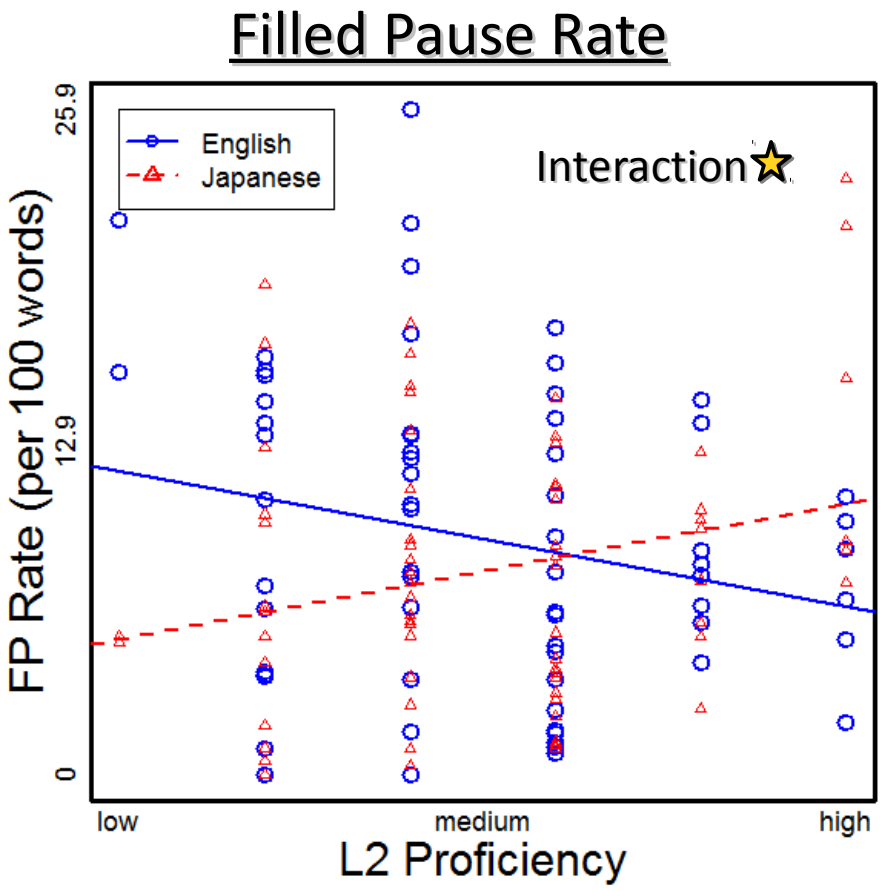


Silent Pause Duration

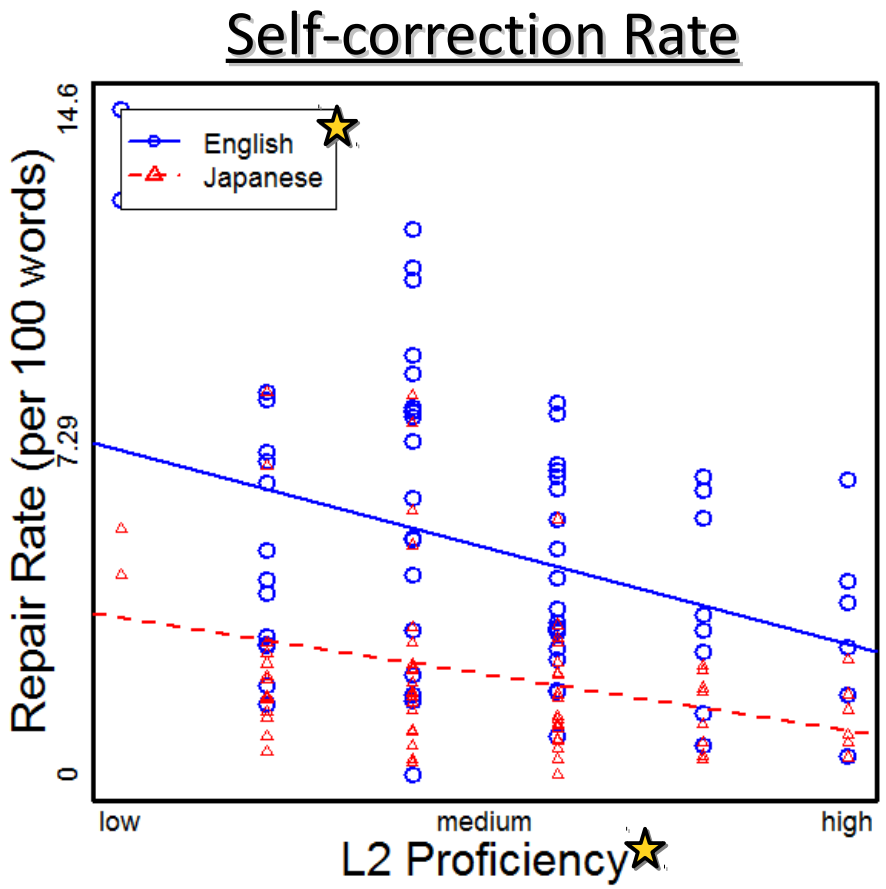


Contra Derwing et al (2009) and
Cox and Baker-Smemoe (2012)

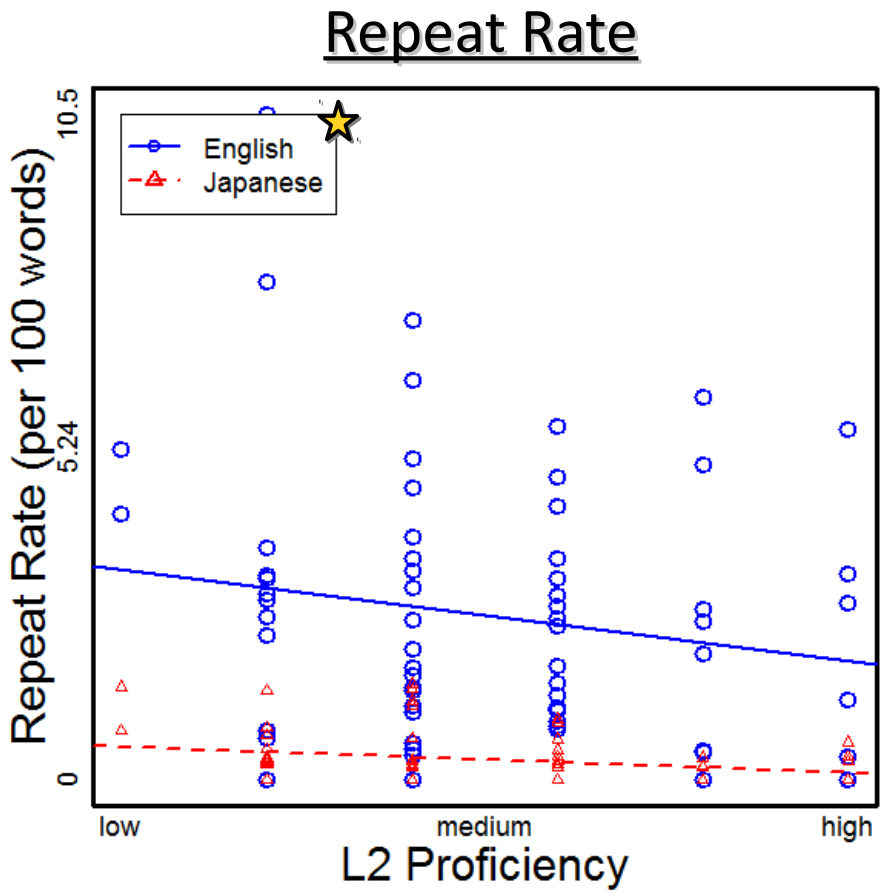
CCHP Results: Filled Pauses



CCHP Results: Self-corrections

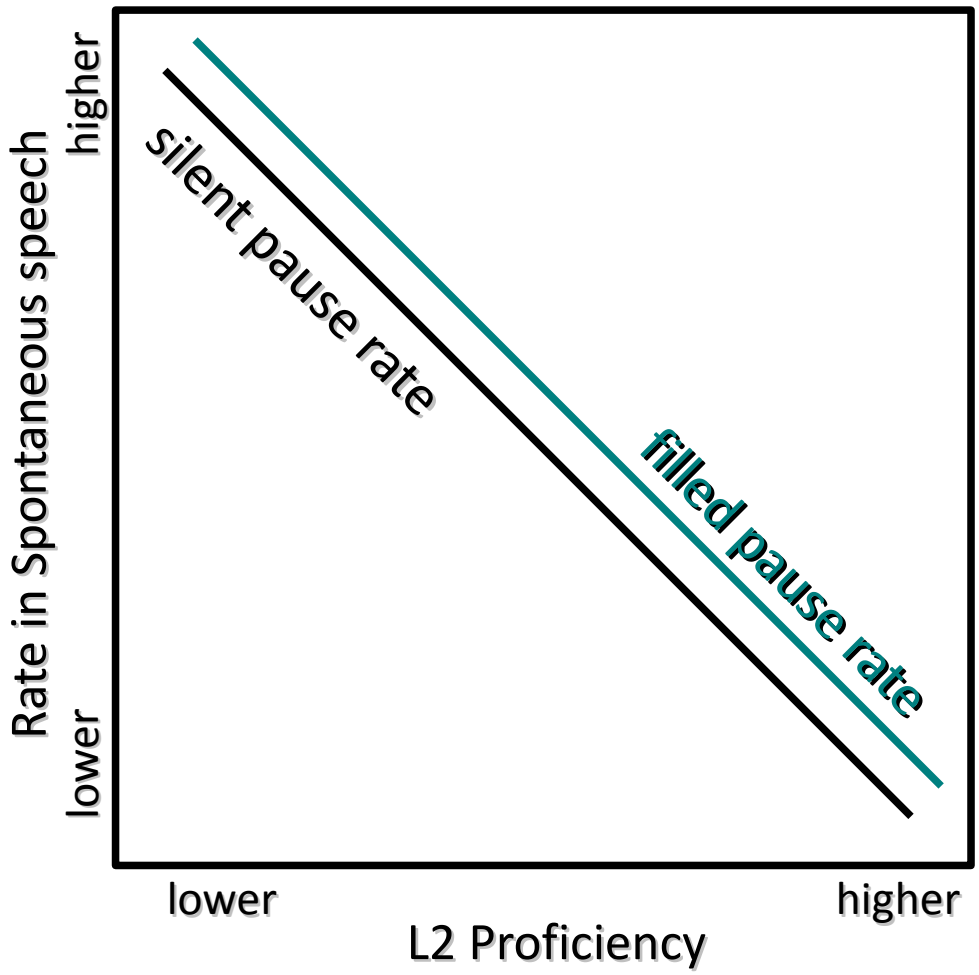


CCHP Results: Repeats



Repeats are uncommon in Japanese (Fox et al 1996)

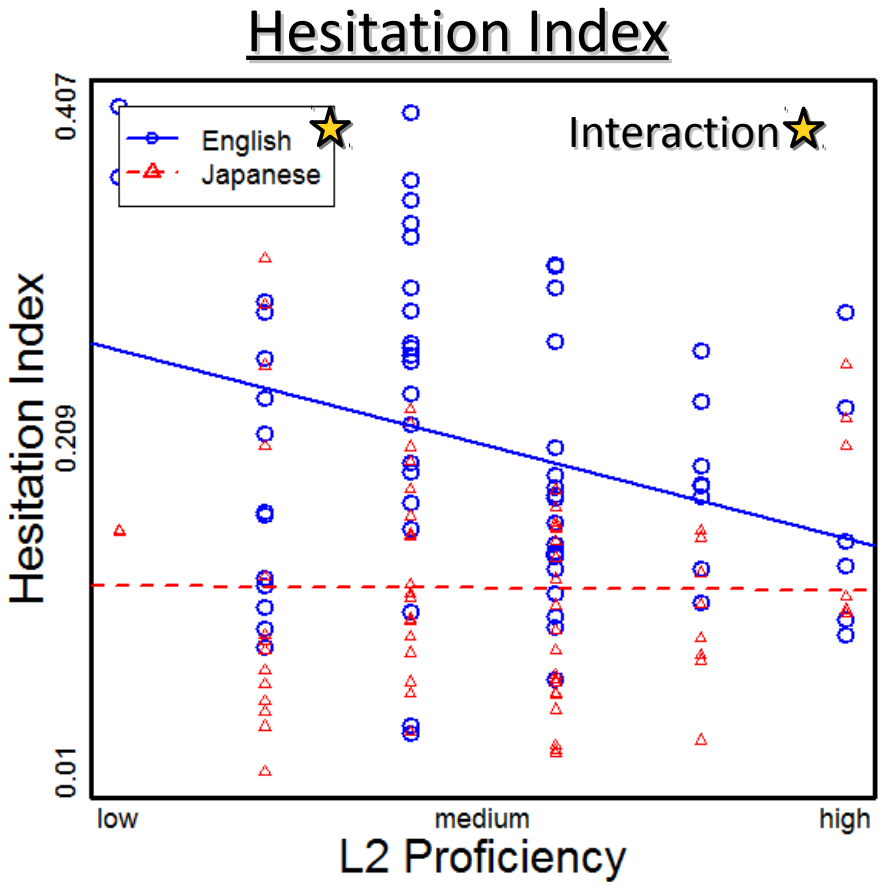
Developmental Trajectory



To-do:

- Filled pause duration
- Lengthenings
- Repair type distribution
- Structural distribution
- Syllable counts

CCHP Results: Hesitation Index



Is the HP developmental trajectory just a proxy measure for hesitation index?

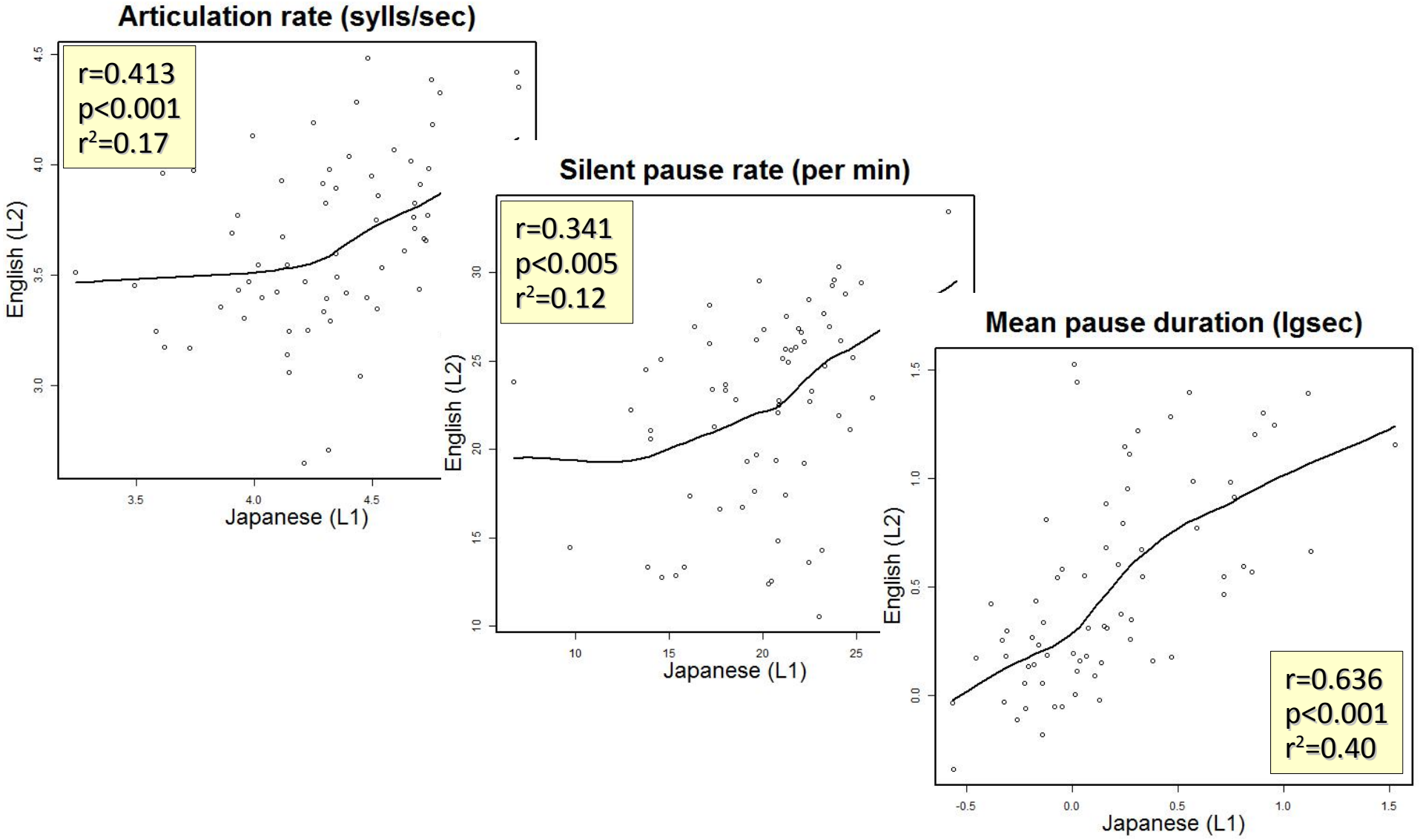
$$Hesitation\ Index = 1 - \frac{Number\ of\ essence\ words}{Number\ of\ spoken\ words}$$

Where "essence" is what the speaker intended to say.

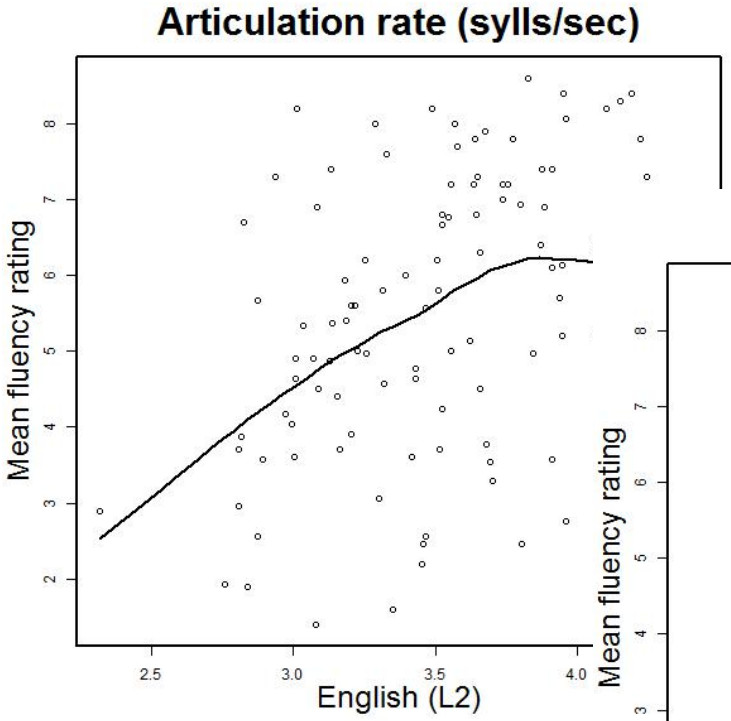
L1-L2 Utterance Flu. vs. Perceptual Flu.

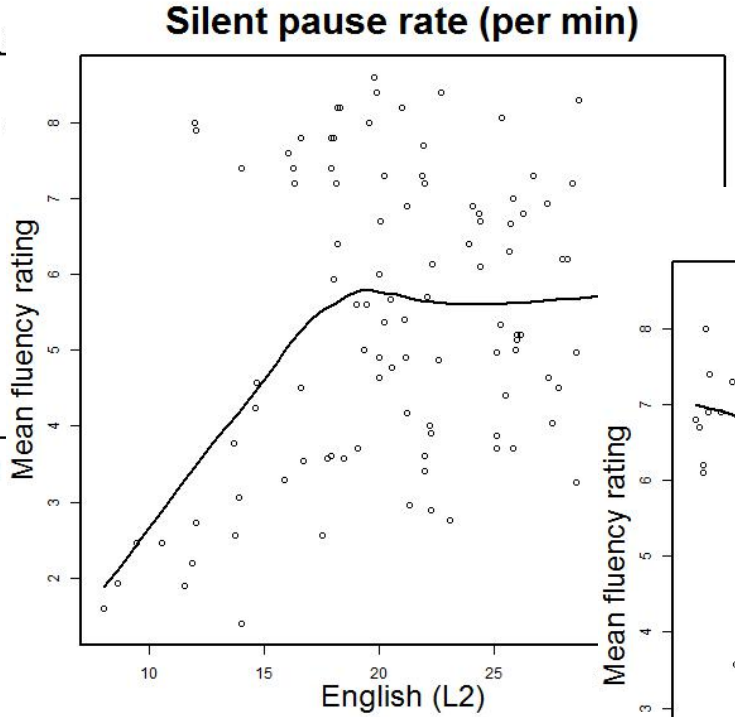
- Aim:
  - Review findings of L1 vs. L2 comparison of utterance fluency.
  - Examine which utterance fluency characteristics correlate with perceptions of fluency by hearers.
- L1-L2 utterance fluency factors measured with praat script (Quené et al 2011)
- Perceptual fluency
  - Fluency ratings (1=low … 9=high) obtained via Amazon Mechanical Turk
  - Obtained fluency ratings on 7 30-second clips of L2 speech from all corpus participants.
  - Used attention checks and background monitoring of audio player activity to check that instructions were followed.

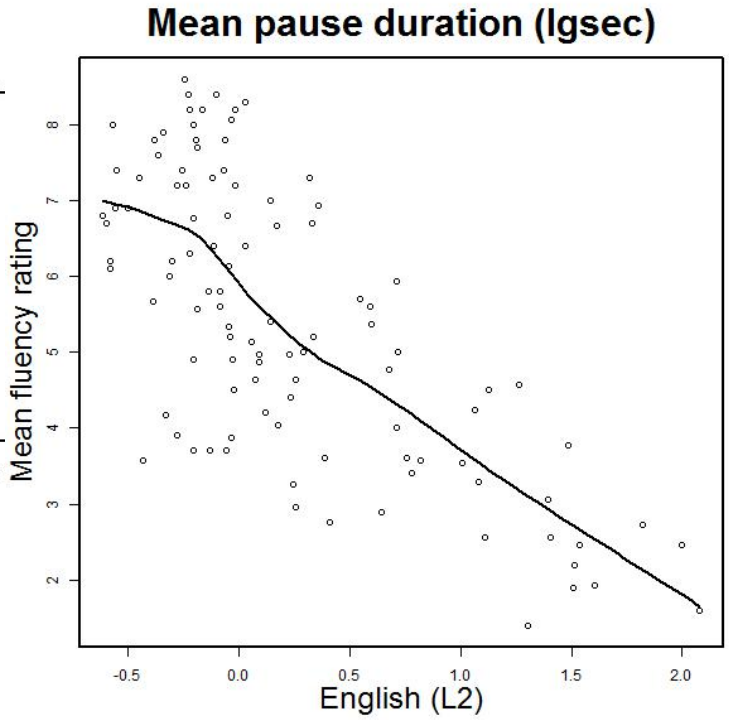
L1-L2 Utterance Fluency



Utterance Fluency vs. Perceptual Fluency

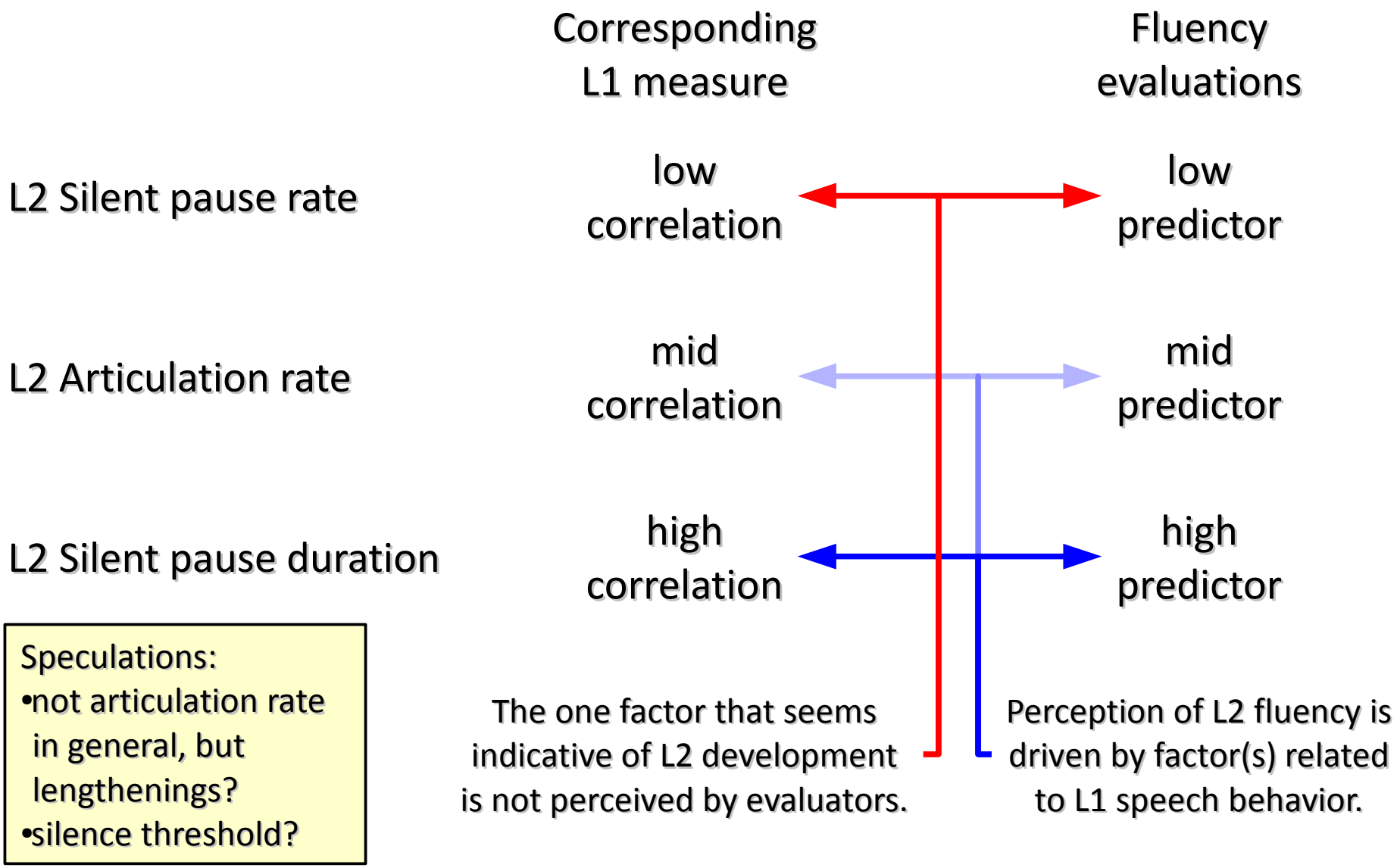






	Est.	Std. Error	t	p
(Intercept)	2.1831	1.0524	2.074	<0.05
Articulation rate	1.0268	0.2997	3.426	=0.001
(Log) mean silent pause duration	-0.6138	0.0861	-7.130	<0.001
Adjusted R2 = 0.4638; F(2,67) = 30.84, p<0.001				

L1-L2 Utterance Flu. vs. L2 Perceptual Flu.



Future Work with CCHP

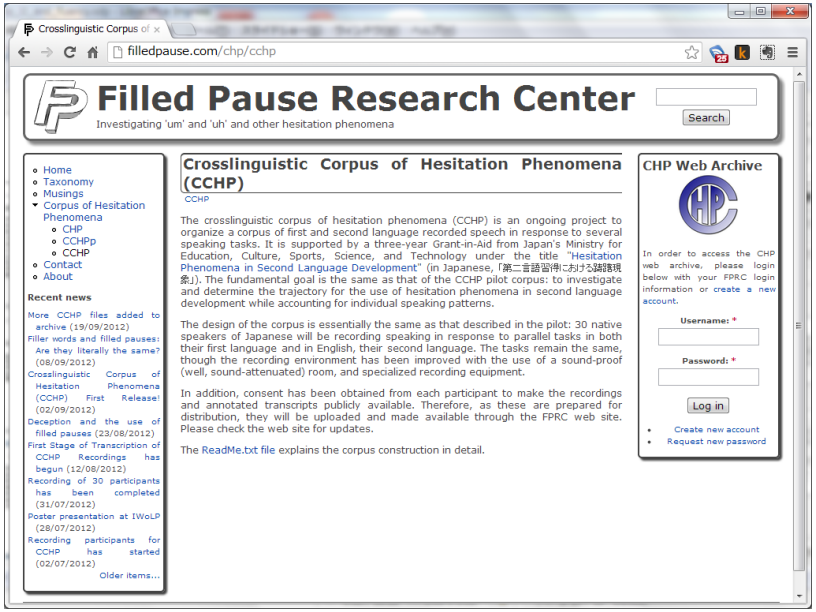
- Deeper annotation
  - Syntactic structure
  - Part-of-speech information
  - Syllable and phoneme intervals
  - (F1,F2) measurements
- More speakers
- More L1-L2 combinations
  - Taiwan Chinese L1 – English L2
  - English L1 – French L2
  - English L1 – Spanish L2
  - Korean L1 – English L2

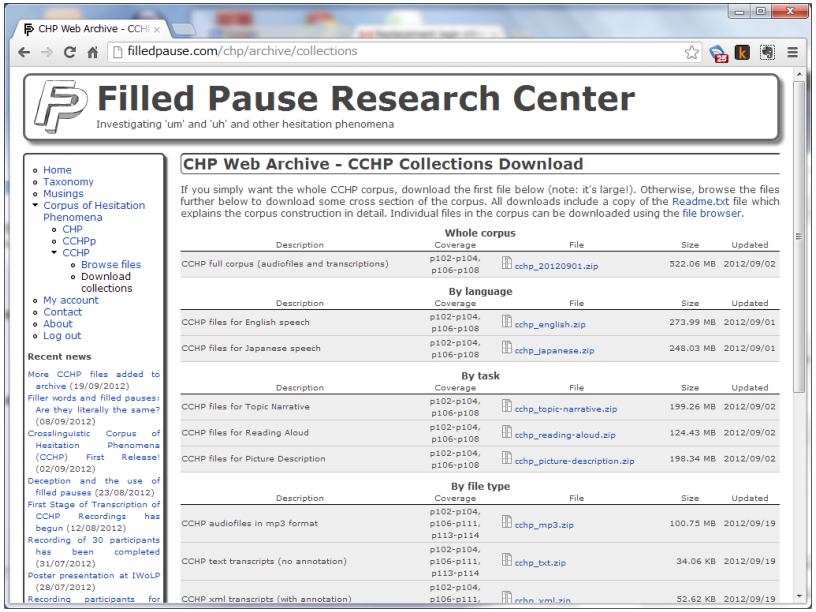
Summary

- 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 speech patterns.
- Results show that for utterance fluency, silent pause and filled pause rate indicate learners' L2 proficiency.
  - Other L2 hesitation phenomena correlate with those of L1.
- Fluency raters, however, seem to rely on speech rate and mean pause duration instead.

CCHP Public Corpus

- Assembling a 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





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