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

Ralph L. Rose
<rose@waseda.jp>

Center for English Language Education (CELESE)
Waseda University Faculty of Science and Engineering

Acknowledgments
Hiroaki Suzuki, Junichi Inagaki, Masayuki Motoori, & Yukikatsu Fukuda

ELiTU: Experimental Linguistics Talks
Utrecht University, the Netherlands
March 26, 2013

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

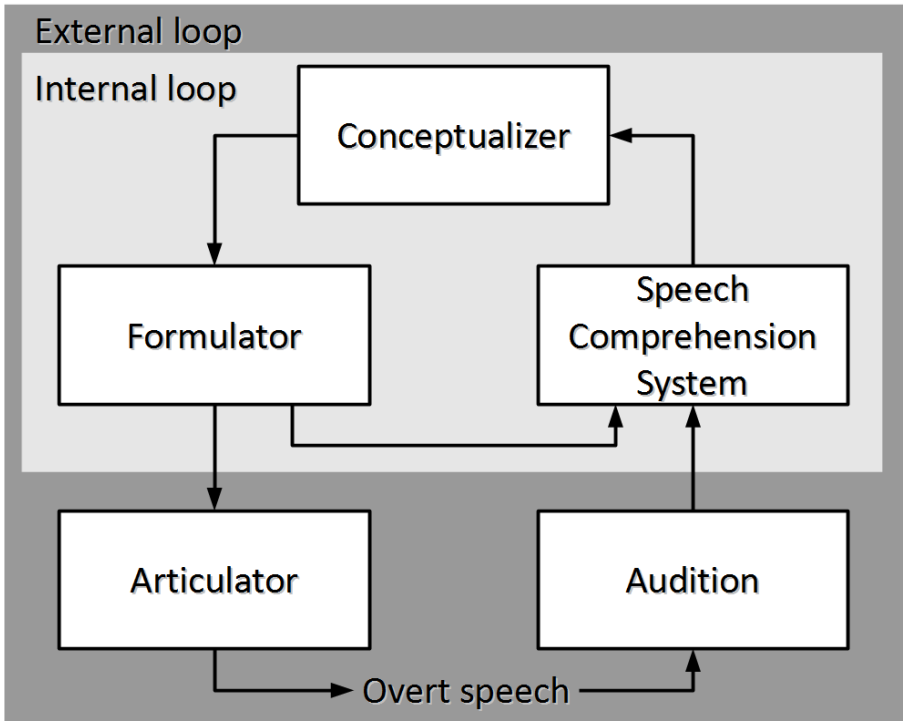
- Hesitation phenomena
  - Overview
  - HP in L2 speech
- Crosslinguistic Corpus of Hesitation Phenomena
  - Description
  - Results
- HP Developmental Trajectory
- Accessing the CCHP

Overview of types of HP

- Long investigative history
  - Goldman-Eisler 1961, Levelt 1983, 1989, Maclay and Osgood 1959, Rochester 1973, inter alia
- 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

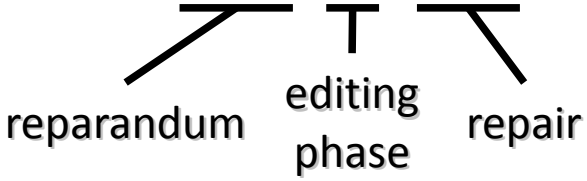
- Levelt 1983, 1989
- Two perceptual loops: internal and external
- Loops detect speech errors and initiate repair sequences
- Sequence: *reparandum*, *editing phase*, and *repair*
- In this system, all HP are part of a repair procedure: e.g., pauses as part of editing phase, self-corrections as repairs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



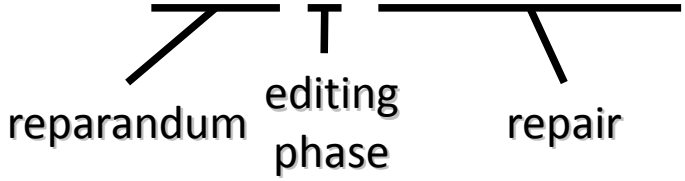
Leveltian Account of Speech Repairs

(Levelt 1983, 1989)

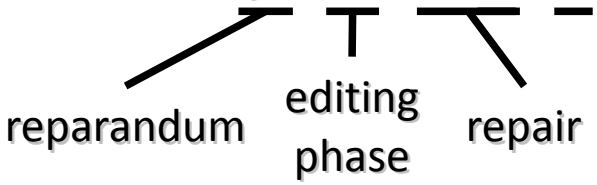
th- the uh wh- when I uh wh- when I find myself



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



what I trace this to is Ø uh a certain selfishness



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

HP in L2 production

- Findings (Cucchiarini et al 2010, Kormos and Dénes 2004, Riazantseva 2001, Rieger 2003, Tavakoli 2011, Trofimovich and Baker 2006, 2007, Wu 2008)
  - 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.
- De Jong and Perfetti (2011) – Nation's (1989) 4/3/2 technique leads to improved utterance fluency in short and long term.

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

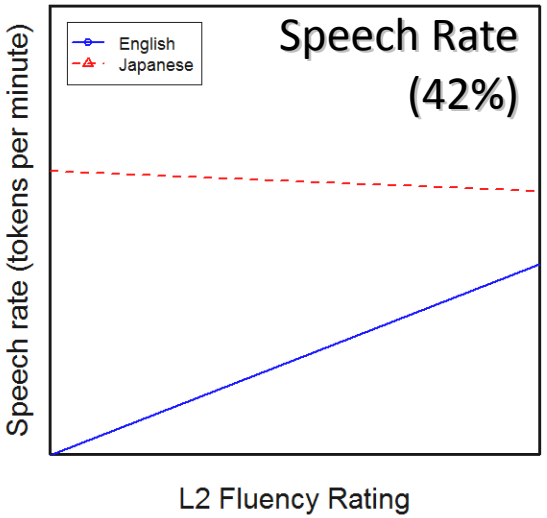
Factors

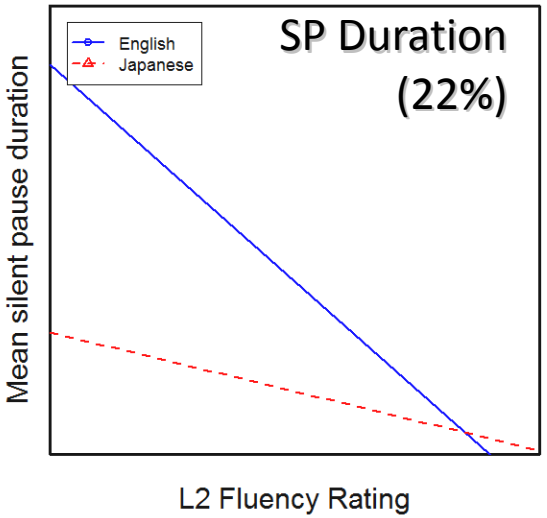
- speech rate
- mean SP duration
- SP rate (per 100 tokens)
- SP rate (per minute)
- mean FP duration
- FP rate (per 100 tokens)
- FP rate (per minute)
- mean length of runs

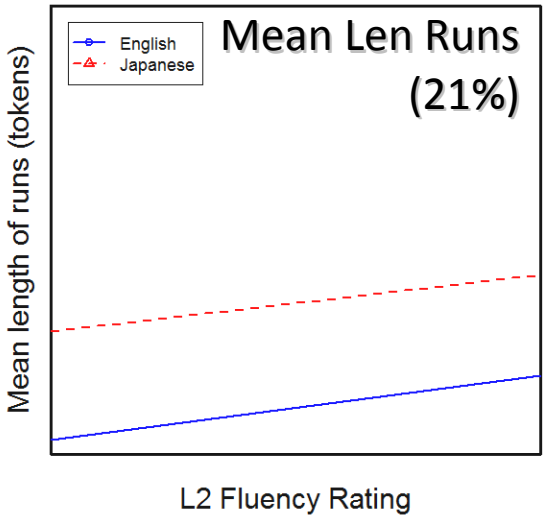
- Data collapsed by participant and L1-L2 difference was calculated
- Factors correlated with:
  - L2 Fluency Rating
  - TOEIC score
- Stepwise linear regression to find optimal combination of factors
- Data evaluated by
  - spontaneous speech
  - reading aloud

CCHPp Results: Spontaneous Speech

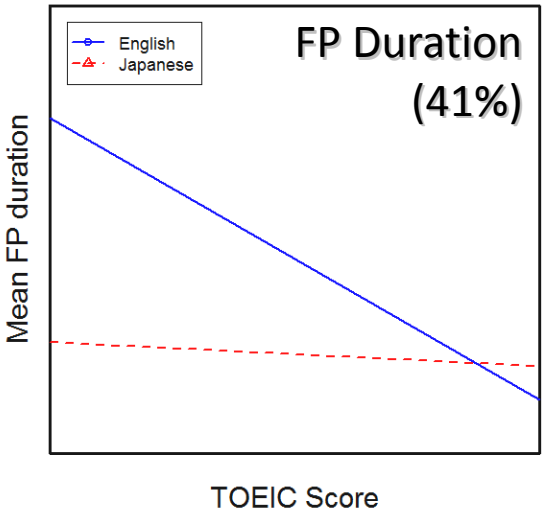
L2 Fluency Ratings ($R^2 = 0.82$)

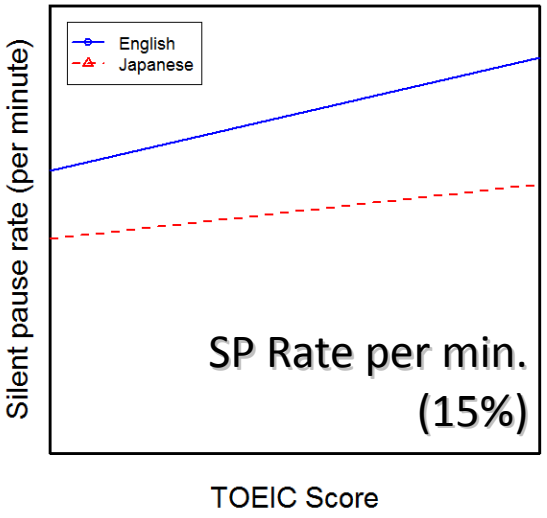


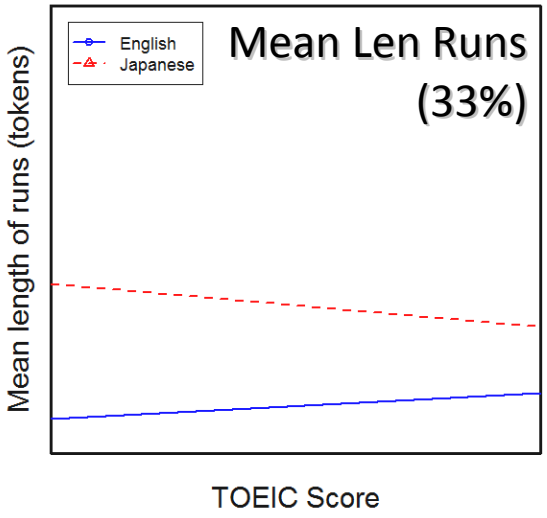




TOEIC Scores ($R^2 = 0.82$)

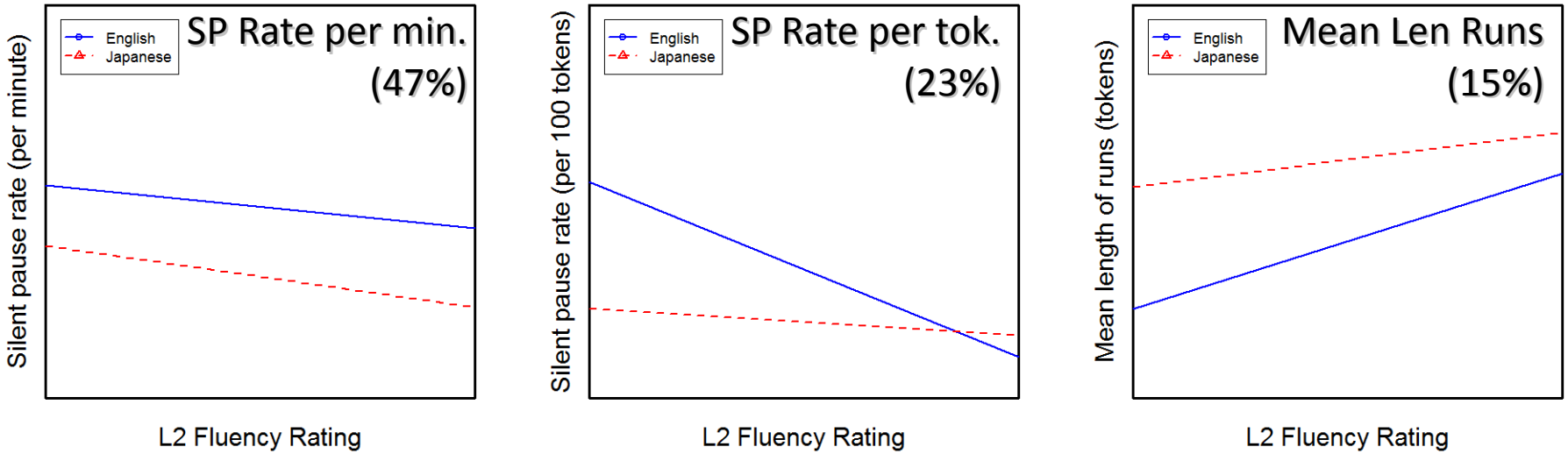




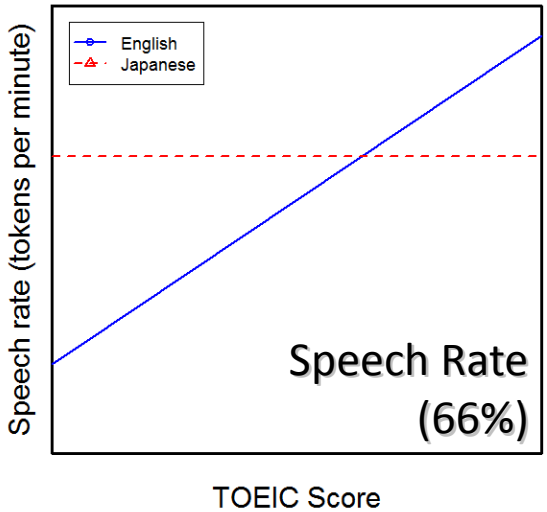


CCHPp Results: Reading Aloud

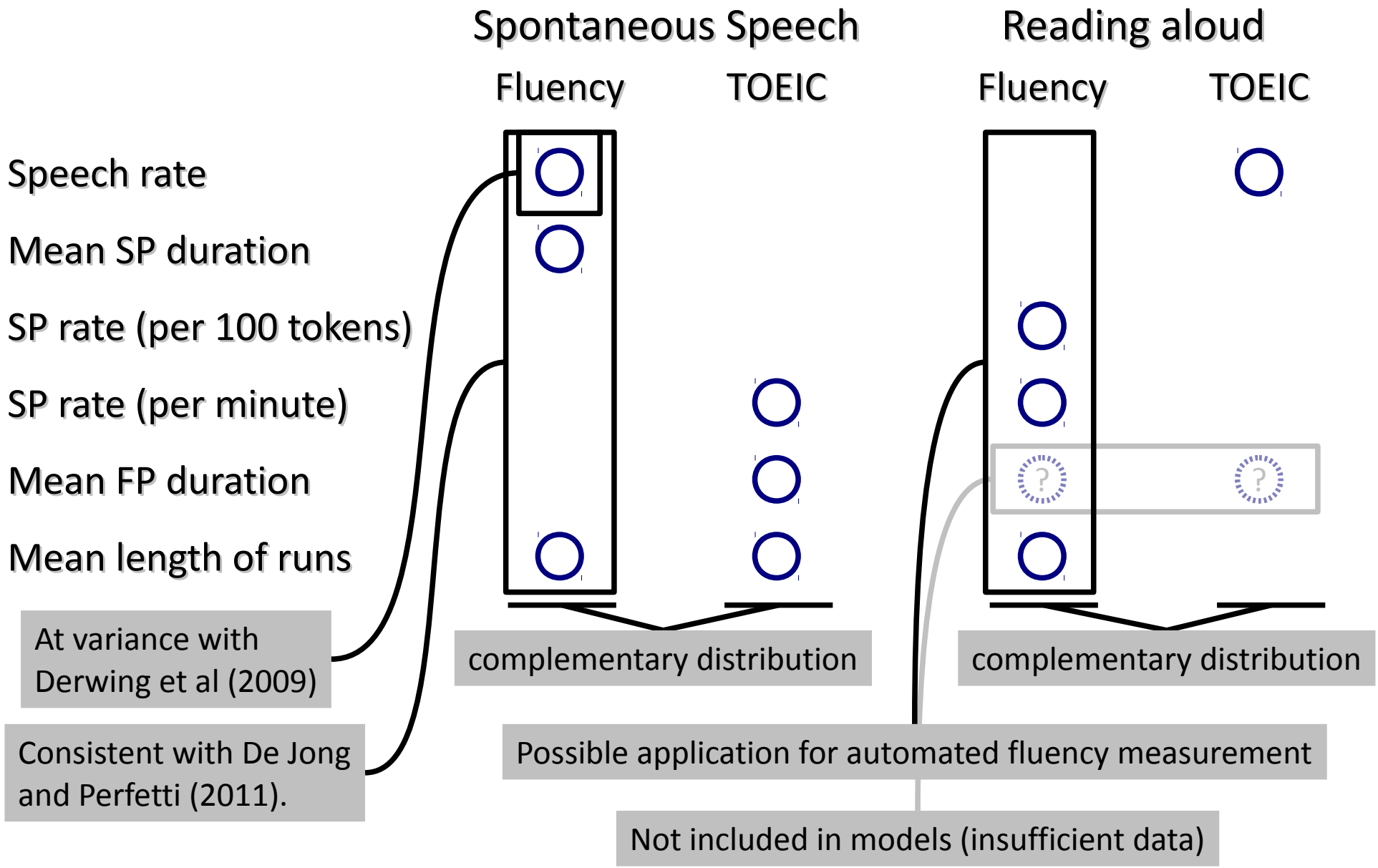
L2 Fluency Ratings ($R^2 = 0.77$)



TOEIC Scores ($R^2 = 0.61$)



CCHPp Results: Summary



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

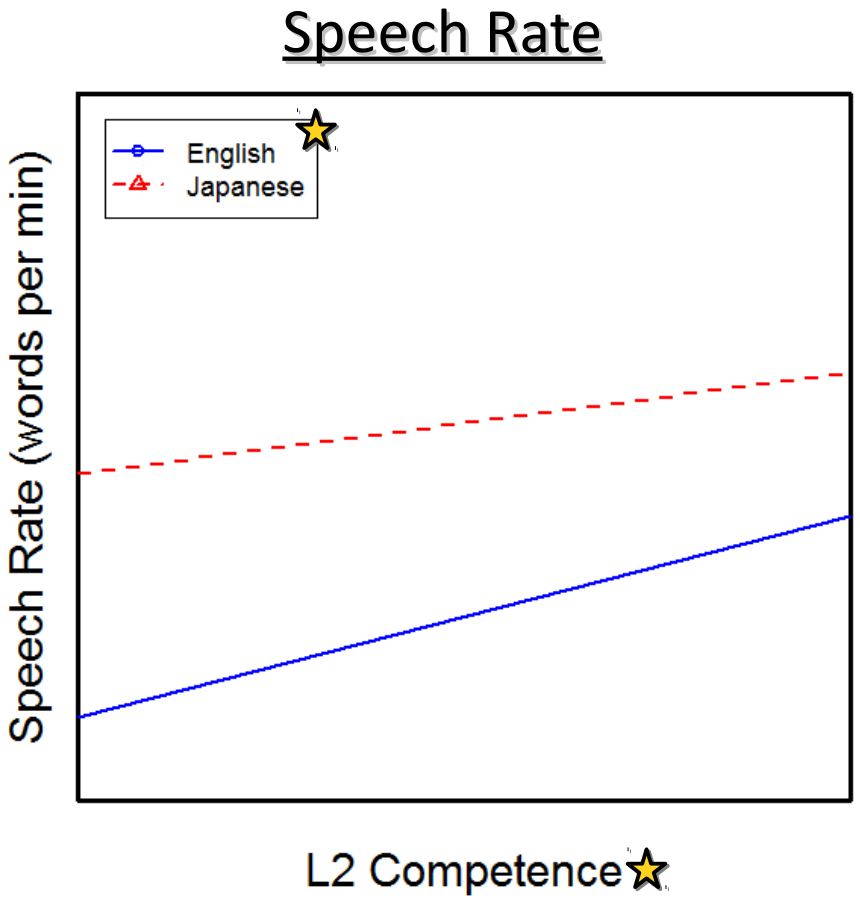
- Participants: 25 Japanese L1, English L2 speakers
- Full corpus
  - 42,972 words
  - 8 hrs, 9 min
- Spontaneous speech
  - 27,416 words
  - 6 hrs, 12 min
- Read speech
  - 15,556 words
  - 1 hr, 57 min

- 11,091 silent pauses
- 2,404 filled pauses
- 1,080 self-corrections
- 309 repeats

CCHP Results: Analysis

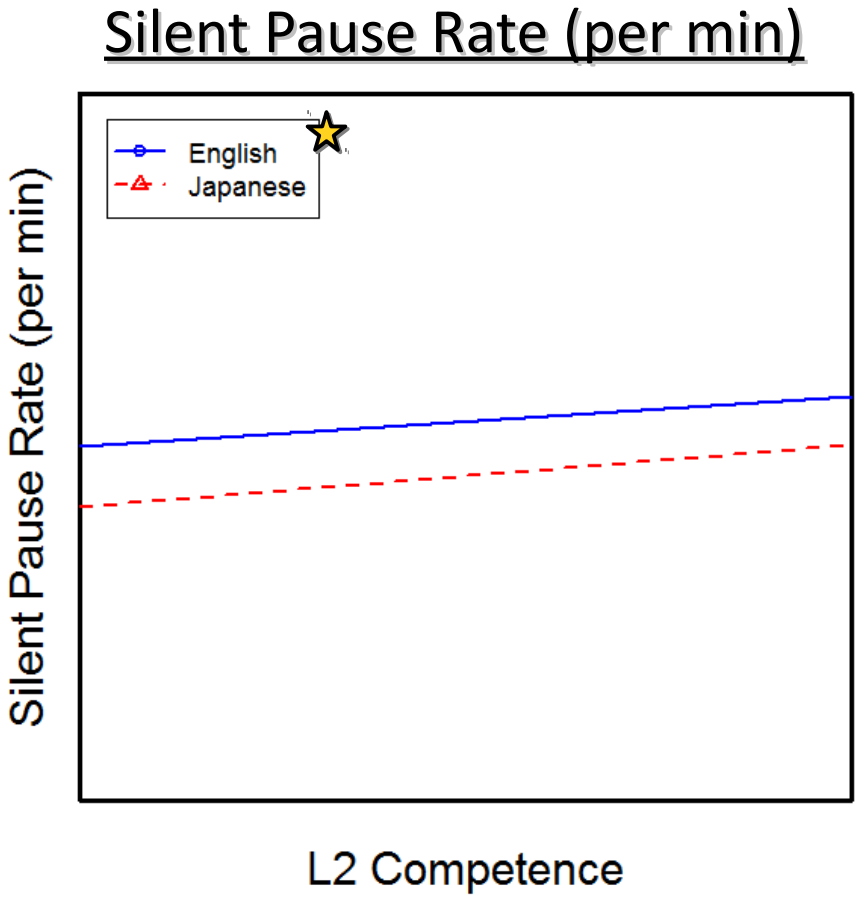
- Used spontaneous speech data only.
- Extracted counts for speech rate, silent pauses, filled pauses, repeats, and self-corrections.
- Performed repeated measures ANOVA
  - (between) L2 Proficiency as numerical variable, estimated from test scores, experience abroad, self-assessment
  - (within) Language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

CCHP Results: Speech Rate



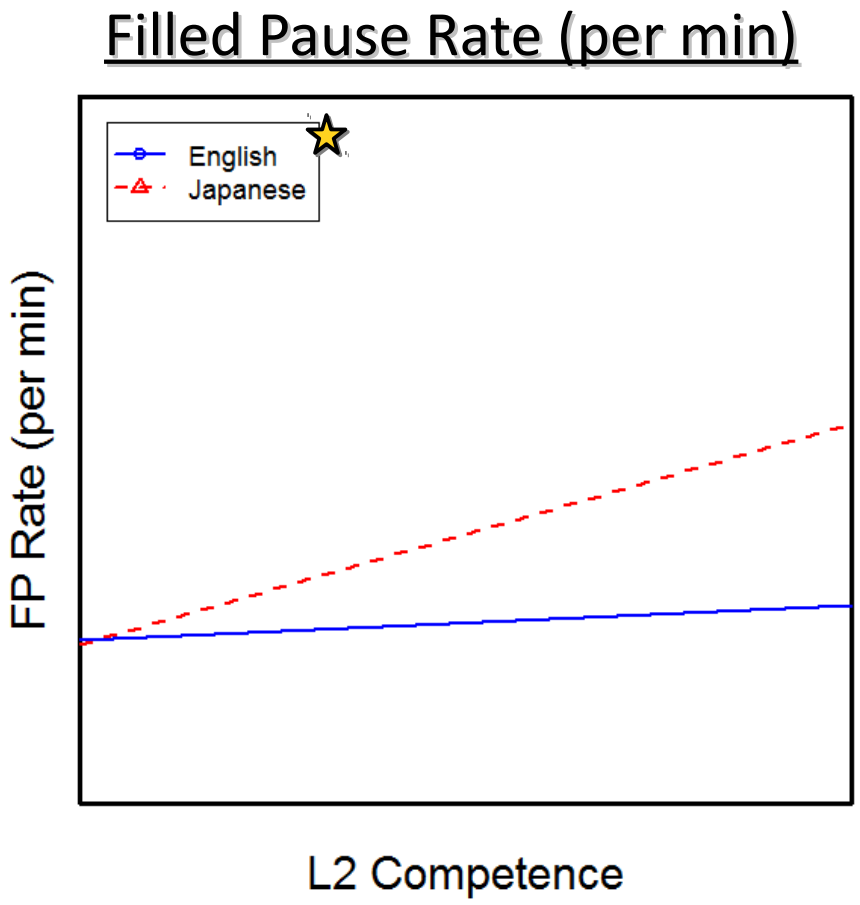
Consistent with Derwing et al (2009) and Cox and Baker-Smemoe (2012)

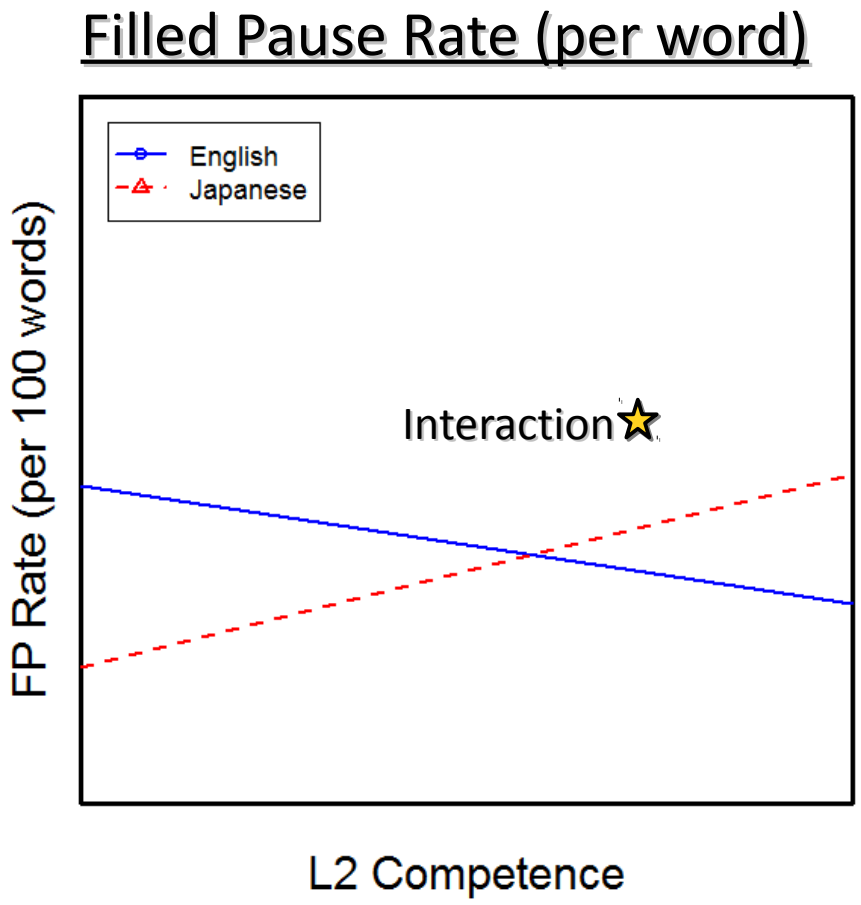
CCHP Results: Silent Pauses



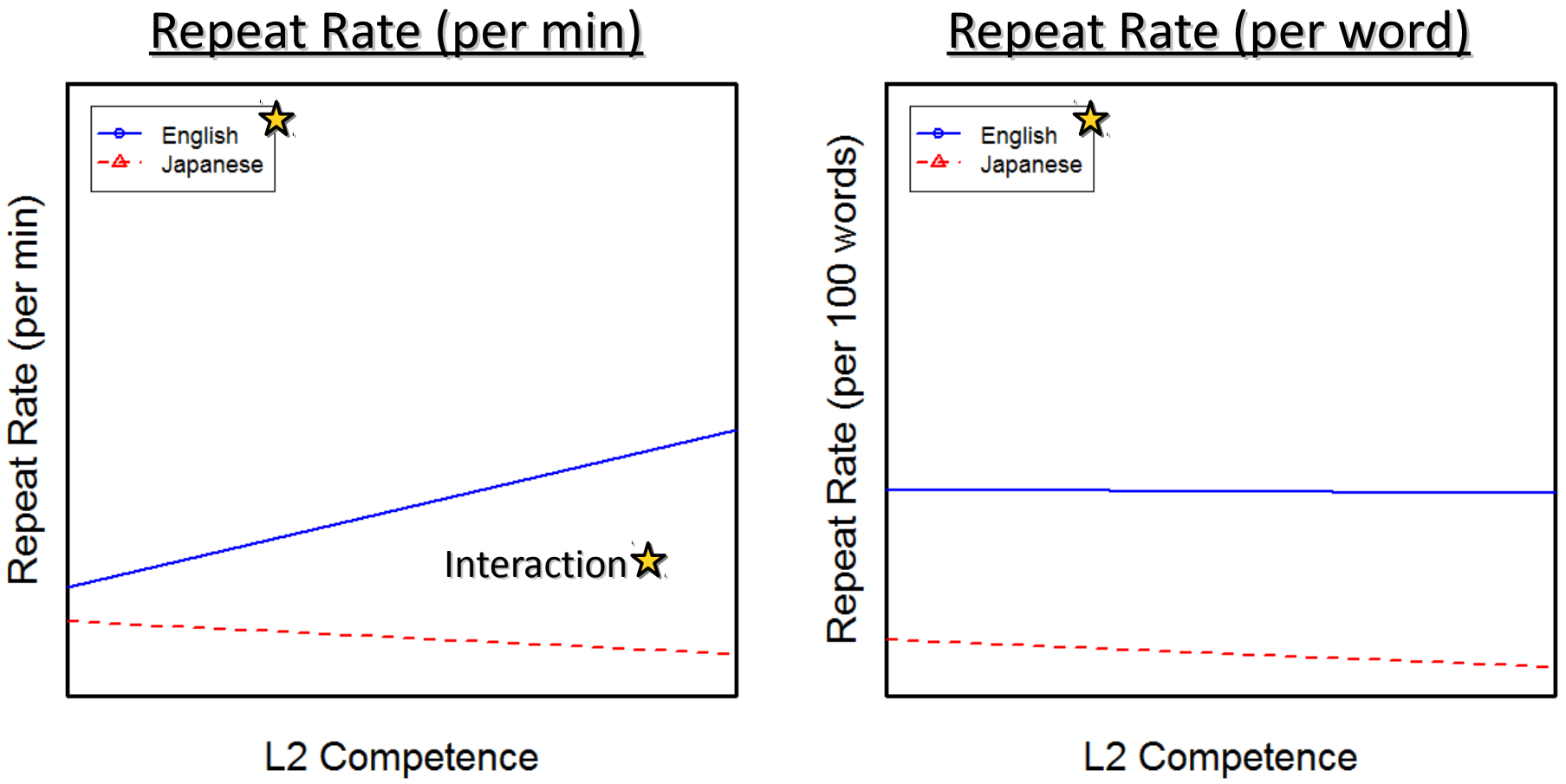
Consistent with Derwing et al (2009) and Cox and Baker-Smemoe (2012)

CCHP Results: Filled Pauses



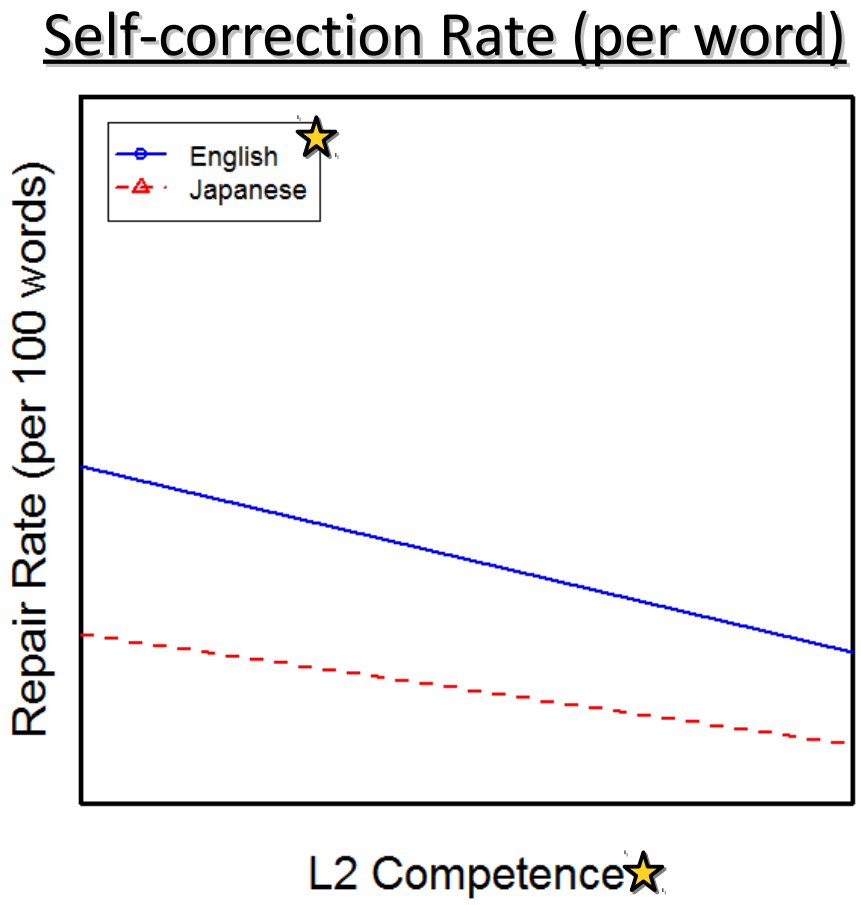


CCHP Results: Repeats



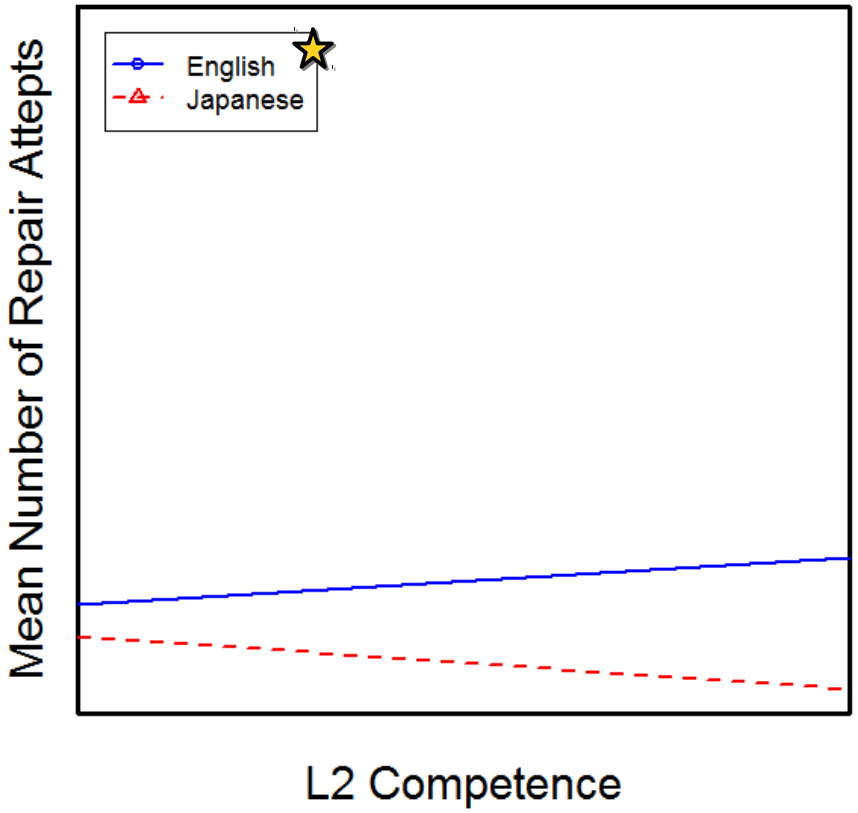
Repeats are uncommon in Japanese (Fox et al 1996)

CCHP Results: Self-corrections

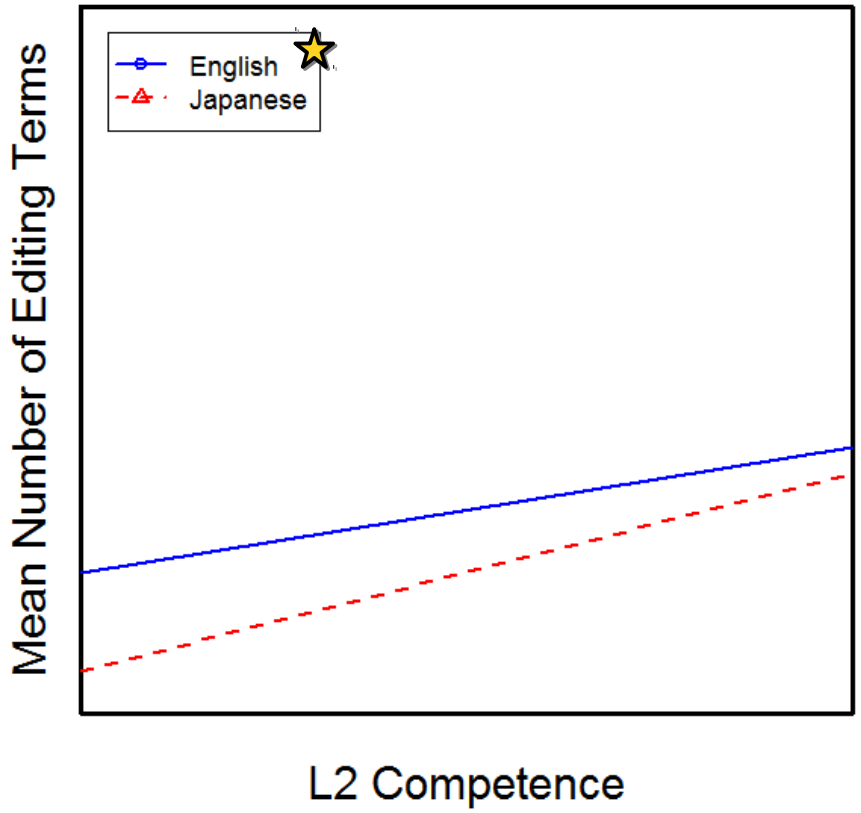


CCHP Results: Other Repair Measures

Mean Num Repair Attempts



Mean Num Editing Terms

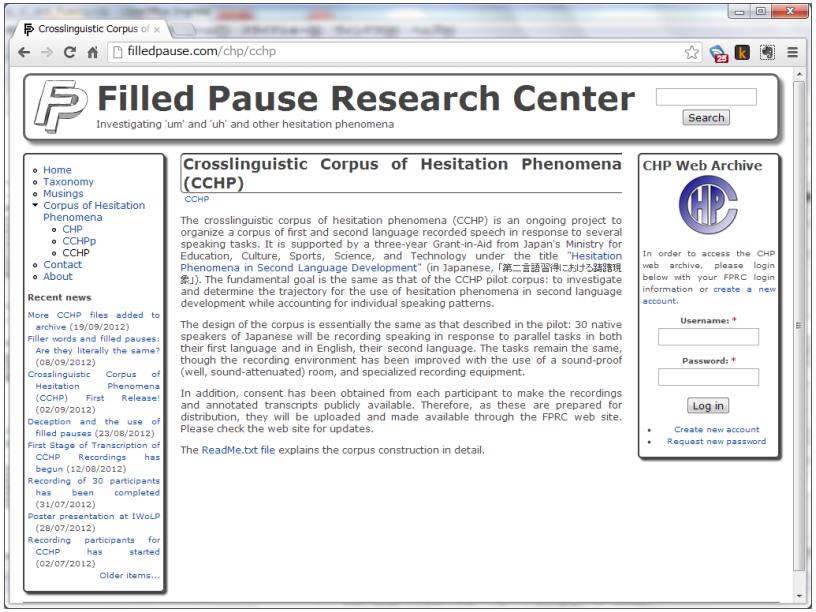


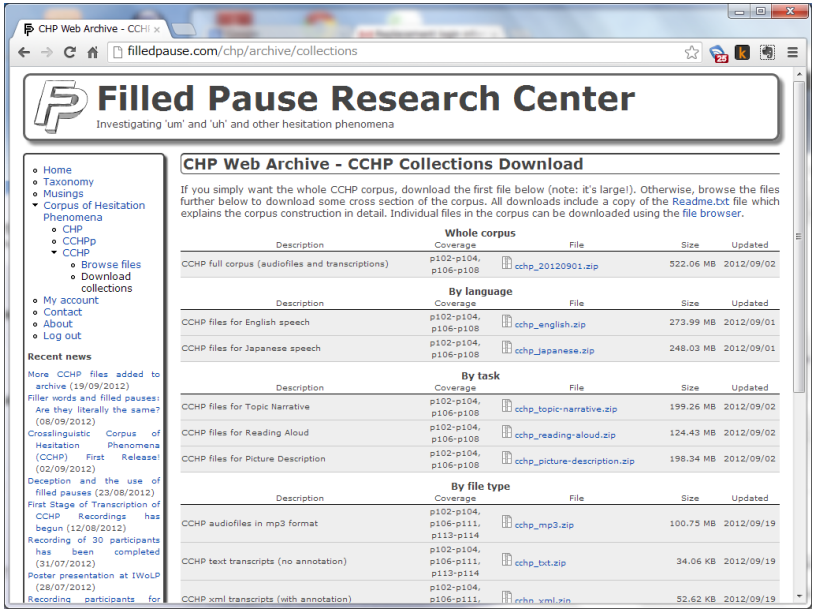
Summary

- 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.

CCHP Public Corpus

- 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

Cox, T. and Baker-Smemoe, W. (2012). The relationship between L1 fluency and L2 fluency across different proficiency levels and L1s. Presentation at Workshop Fluent Speech (Utrecht University, The Netherlands).

Cucchiarini, C., van Doremalen, J., & Strik, H. (2010). *Fluency in non-native read and spontaneous speech*. Paper presented at Proceedings of Disfluency in Spontaneous Speech (DiSS) and Linguistic Patterns in Spontaneous Speech (LPSS) Joint Workshop.

de Leeuw, E. (2007). Hesitation markers in English, German, and Dutch. *Journal of Germanic Linguistics, 19*(2), 85-114.

De Jong, N. and Perfetti, C. A. (2011). Fluency Training in the ESL Classroom: An Experimental Study of Fluency Development and Proceduralization. *Language Learning*, 61(2), 533–568.

De Jong, N., Steinel, M. P., Florijn, A., Schoonen, R., & Hulstijn, J. H. (Forthcoming). Linguistic skills and speaking fluency in a second language. *Applied Psycholinguistics*.

Derwing, T. M., Munro, M. J., Thomson, R. I., & Rossiter, M. J. (2009). The relationship between L1 fluency and L2 fluency development. *Studies in Second Language Acquisition, 31*(4), 533-557.

Fox, B., Hayashi, M., and Jasperson, R. (1996). Resources and repair: A cross-linguistic study of syntax and repair. In Ochs, E., Schegloff, E., and Thompson, S. (eds). *Interaction and Grammar*. Cambridge University Press, Studies in Interactional Sociolinguistics, volume 13: pages 185-237.

Goldman-Eisler, F. (1961). A comparative study of two hesitation phenomena. *Language and Speech, 4*(1), 18-26.

Kormos, J. (1999). Monitoring and self-repair in L2. *Language Learning*, 49(2), 303-342.

Kormos, J. (2000). The role of attention in monitoring second language speech production. *Language Learning*, 50(2), 343-384.

Kormos, J. & Dénes, M. (2004). Exploring measures and perceptions of fluency in the speech of second language learners. *System*, 32(2), 145-164.

Levelt, W. J. M. (1983). Monitoring and self-repair in speech. *Cognition, 14*(1), 41-104.

Levelt, W. J. M. (1989). *Speaking: from intention to articulation*, MIT Press, ACL-MIT Press series in natural-language processing.

Maclay, H., & Osgood, C. (1959). Hesitation phenomena in spontaneous English speech. *Word, 15*, 19-44.

Nation, P. (1989). Improving speaking fluency. *System*, 17(3), 377–384.

Riazantseva, A. (2001). Second language proficiency and pausing a study of Russian speakers of English. *Studies in Second Language Acquisition, 23*(4), 497-526.

Rieger, C. L. (2003). *Disfluencies and hesitation strategies in oral L2 tests*. Paper presented at Proceedings of DiSS '03, Disfluency in Spontaneous Speech Workshop.

Rochester, S. (1973). The significance of pauses in spontaneous speech. *Journal of Psycholinguistic Research, 2*(1), 51-81.

Segalowitz, N. (2010). *Cognitive bases of second language fluency*. Routledge.

Shriberg, E. (1994). Preliminaries to a theory of speech disfluencies, Doctoral dissertation. University of California, Berkeley.

Tavakoli, P. (2011). Pausing patterns: differences between L2 learners and native speakers. *ELT Journal, 65*(1), 71-79.

Trofimovich, P., & Baker, W. (2006). Lea,rning second language suprasegmentals: Effect of L2 experience on prosody and fluency characteristics of L2 speech. *Studies in Second Language Acquisition, 28*, 1-30.

Trofimovich, P., & Baker, W. (2007). Learning prosody and fluency characteristics of second language speech: The effect of experience on child learners' acquisition of five suprasegmentals. *Applied Psycholinguistics, 28*(2), 251-276.

Wu, C.-H. (2008). *Filled pauses in L2 Chinese: A comparison of native and non-native speakers*. Paper presented at Proceedings of the 20th North American Conference on Chinese Linguistics (NACCL-20), Columbus, Ohio.