Temporal Variables in First and Second Language Speech and Perception of Fluency

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Fluency

- Segalowitz (2010): levels of fluency
  - Cognitive fluency: ease of mental preparation
  - Utterance fluency: smoothness of articulation
  - Perceptual fluency: hearer's view of smoothness

  - L2 speech rate related to cognitive fluency
  - L2 Silent pause duration weakly related
Observations of utterance fluency: Temporal variables

Silent pauses
- longer than 0.3-1.0 sec

Self-corrections (repairs)
- Sequence that repairs a preceding sequence
  *Look at the blue the red one over there.*

Filled pauses
- *uh/um* (English)
- *e-to/ano-* (Japanese)

Lengthenings
- Prolongation of one or more syllables
  *I'll take the blue *and* the red ones.*

False starts
- Beginning of utterance that is abandoned
  *Do you I disagree with that.*

Repeats/Restarts
- Repetition of a sequence of words
  *I I I I think that's a good idea.*

Speech rate
- by word, by syllable, with/without pauses

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

(Cucchiarini et al 2010)
Temporal variables in L2 production

Temporal variables in L2 production

- As a whole, work has been quite comprehensive.
- Lack of L1-L2 data from same speaker (cf., Cutler plenary)
- 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.
- Aim of the present research: Examine which utterance fluency characteristics correlate with perceptions of fluency by hearers.
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
- **Annotation**
  - Transcripts, HP, word and pause intervals
  - Two annotators, one checker

Example 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 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>
```

CCHP: Basic Statistics

- Participants: 36 Japanese L1 / English L2 speakers
- L1-L2 utterance fluency factors measured with Praat script (Quené et al 2011)

<table>
<thead>
<tr>
<th></th>
<th>Word count</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read speech</td>
<td>22,336</td>
<td>2 hr, 48 min</td>
</tr>
<tr>
<td>Spontaneous speech</td>
<td>40,296</td>
<td>8 hr, 43 min</td>
</tr>
<tr>
<td>Total</td>
<td>62,632</td>
<td>11 hr, 31 min</td>
</tr>
</tbody>
</table>

Transcriber agreement = 91.5%
L1-L2 Utterance Fluency

Pause duration > Articulation rate > Pause rate

Predictive of L2 proficiency
L2 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.
Utterance Fluency vs. Perceptual Fluency

<table>
<thead>
<tr>
<th></th>
<th>Est.</th>
<th>Std. Error</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>2.1831</td>
<td>1.0524</td>
<td>2.074</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Articulation rate</td>
<td>1.0268</td>
<td>0.2997</td>
<td>3.426</td>
<td>=0.001</td>
</tr>
<tr>
<td>Mean pause duration</td>
<td>-0.6138</td>
<td>0.0861</td>
<td>-7.130</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Adjusted $R^2 = 0.4638$; $F(2,67) = 30.84$, $p&lt;0.001$</td>
<td></td>
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</table>
Summary and Implications

- Results show that for utterance fluency, silent pause rate is most indicative of learners' L2 proficiency.
  - Other L2 temporal variables correlate with those of L1.
- Fluency raters, however, seem to rely on articulation rate and silent pause duration instead.
- Implications for pedagogy
  - Raise awareness among L2 fluency raters of which temporal variables are truly indicative of L2 proficiency development.
  - Train speakers to speak faster and use shorter pauses.

<table>
<thead>
<tr>
<th>Silent pause duration</th>
<th>Articulation rate</th>
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<td>Strongest influence on perception of fluency</td>
<td></td>
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<th>Silent pause rate</th>
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<tbody>
<tr>
<td>Best predictor of L2 Proficiency</td>
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</table>
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
References


