The development of comprehensible speech in L2 learners

Effects of explicit pronunciation instruction on segmentals and suprasegmentals

Joshua Gordon and Isabelle Darcy

American Association of Applied Linguistics Conference
Boston,
March 26, 2012
Non-native pronunciation

• Affects all domains of L2 phonology
  o **Segmentals** (e.g., Caramazza et al., 1973; Munro, 1993; Hillenbrand & Flege, 1986; Munro & Derwing, 2008)
  o **Suprasegmentals** (e.g., Field, 2005; Munro, 1995; Tajima, Port, & Dalby, 1997; Trofimovich & Baker, 2006)

• Contributes to perception of foreign accent, to lower intelligibility and lower comprehensibility (Kang, Rubin, & Pickering, 2010; Munro, 1995)

• Debate: are suprasegmentals more important than segmentals to reduce foreign accent and improve comprehensibility? (Anderson-Hsieh et al., 1992; Derwing & Munro, 1997)
Acquisition of L2 phonology

• Naturalistic acquisition is modulated by
  
  o L1 Transfer (Munro, 1993; Trofimovich & Baker, 2006)
  
  o Amount of experience / length of residence
    (Bohn & Flege, 1992; Flege, Bohn & Jang, 1997; Munro & Derwing, 2008; Derwing, Munro & Thompson, 2007)
  
  o Amount of L2 use (Flege, Frieda and Nozawa, 1997; Guion, Flege, Liu, & Yeni-Komshian, 2000)
  
  o Age of learning (Guion, 2005; Lee, Guion & Harada, 2006)

• Improvement has also been observed in short-term laboratory training studies
Laboratory Training Studies

• Perception and production of segmentals: English /r/ and /l/ by L1-Japanese speakers (high variability training) (Bradlow, Akahane-Yamada, Pisoni, & Tohkura, 1997)

Laboratory Training Studies

• Interpretation of sentence meaning: Improved in L2 learners of English by directing their attention to and raising their awareness of prosodic features of the L2 during training (Pennington and Ellis, 2000; Noticing Hypothesis: Schmidt 1990, 2001)

• Possible role of explicit instruction in pronunciation teaching
L2 Pronunciation Teaching

• Some studies suggest that explicit instruction yields larger phonetic improvement over non-explicit instruction (e.g., Lord, 2005)

• At the same time, there is a trend towards a communicative methodology (e.g. Celce-Murcia, Brinton, & Goodwin, 1996; Hinkel, 2006)

• Communicative framework is often perceived as conflicting with explicit pronunciation instruction
  - Pronunciation instruction often “disconnected” from the rest of language instruction (Derwing & Foote, 2011; Darcy, Ewert & Lidster, in press)
L2 Pronunciation Teaching

- Extensive research on the acquisition of L2 phonological features
- But its influence on second and foreign language instruction seems to be minimal (Derwing & Munro, 2005; Levis, 1999)
- Only few studies have examined L2 classroom contexts to test how to apply some of the findings of laboratory studies in L2 phonology to pronunciation instruction (e.g. Derwing, Munro, & Wiebe, 1998)
Challenges in L2 Pronunciation Teaching

• **Challenge 1**: How to integrate explicit pronunciation instruction in ESL communication/speaking classes?

• **Challenge 2**: Which pronunciation features yield the most benefit for comprehensible speech?

• **Challenge 3**: Can improvement be seen in a short-period of time?
The Current Study
Research Questions

• Does short-term *explicit* pronunciation instruction yield larger comprehensibility increases than *non-explicit* instruction?

• Does instruction in *suprasegmental* features yield larger comprehensibility increases than instruction in *segmental* features?
“Explicit” vs. “non-explicit”

• Targeting both instruction and feedback:
  o + / - Attention on error (and not meaning)
  o + / - Statement of difficulty and error
  o + / - Delineation of the target and error
  o + / - Means of correction
Method

• 3 groups given pronunciation instruction for 3 weeks
  o 30 learners of varied L1 backgrounds (Arabic, Turkish, Korean, and Japanese, Portuguese, French, Russian)
  o Speaking classes in a large ESL program (Intensive English Program)
  o Duration of treatment: 75 minutes per week, split over 3 days (total : 225 minutes of instruction)
  o Teachers implement materials in intact classrooms

• Pre- and posttest
  o Learners were audio-recorded individually before and after the treatment

• Comprehensibility Ratings
  o Obtained from native speakers to assess pronunciation improvement
Method

- 3 experimental (treatment) conditions
  - Explicit, Segmentals: vowels /i, ï, æ, and ɛ/
  - Explicit, Suprasegmentals: rhythm, stress related vowel reduction, linking, intonation
  - Non-explicit: no explicit instruction, with a combination of the same materials as other groups
# Treatment

<table>
<thead>
<tr>
<th>Instructional Stages and Techniques</th>
<th>Group 1 Suprasegmentals</th>
<th>Group 2 Segmentals</th>
<th>Group 3 Non-explicit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Presentation</strong></td>
<td>Introduction</td>
<td>Introduction</td>
<td>Introduction</td>
</tr>
<tr>
<td>Visual aids</td>
<td>Explicit instruction</td>
<td>Explicit instruction</td>
<td>Pronunciation</td>
</tr>
<tr>
<td>Oral introduction of topic</td>
<td>and analysis of</td>
<td>and analysis of</td>
<td>practice announced,</td>
</tr>
<tr>
<td></td>
<td>suprasegmental</td>
<td>segmental</td>
<td>with no explicit</td>
</tr>
<tr>
<td></td>
<td>features</td>
<td>features</td>
<td>instruction</td>
</tr>
<tr>
<td><strong>Practice</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom-up skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recognition tasks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Discrimination tasks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimal pair drills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis of words and phrases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading short passages</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top-down skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluency activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Let’s look at some examples

• Explicit, segmental
• Explicit, suprasegmental
• Non-explicit
Pronouncing American English

Vowels /i/ and /ɪ/
Vowels /i/ and /ɪ/ are different. The appropriate pronunciation of these two sounds marks differences in many English words. For example:

Peel

Pill

Jean (name)

Gin

Segmental
Vowels /ɪ/ and /i/: Vowels /ɪ/ and /i/ are different in tenseness. Vowel /ɪ/ is tense and vowel /i/ is lax. This creates differences in the following words (and in many others):

<table>
<thead>
<tr>
<th>/ɪ/</th>
<th>/i/</th>
</tr>
</thead>
<tbody>
<tr>
<td>feet</td>
<td>fit</td>
</tr>
<tr>
<td>heat</td>
<td>hit</td>
</tr>
<tr>
<td>scene</td>
<td>sin</td>
</tr>
<tr>
<td>leak</td>
<td>lick</td>
</tr>
<tr>
<td>green</td>
<td>grin</td>
</tr>
</tbody>
</table>
Vowel Chart of American English

Figure 4.1 The NAE vowel quadrant and sagittal section of the mouth

Segmental
Listen to the pronunciation of the following words. Pay special attention to the sound /i/. Repeat after your instructor:

-piece  -geek  -she
-beat   -meet   -lead
-read   -speed  -bleed
-brief  -clean  -bee

Segmental
Pronouncing American English

Stress & Rhythm in English

Suprasegmental
• Syllables and words in English contain “stress.” This means that some syllables in a word (or some words in phrases and sentences) are pronounced longer, louder, and higher.
• Stress can make a difference in the meaning of words and phrases. For example:

  - *REcord* to *reCORD*
  - The *WHITE* House
  - A white *HOUSE*

Suprasegmental
Stress in English

Words in English contain “stress.” This means that some syllables in a word are pronounced longer, louder, and higher. Examples:

FAther    sTIlness    forGET
SISter    adVANtage   obTAIN
BEtter    disCOver   baLOON

Suprasegmental
Stress in English

Just like in syllable words, some phrases and sentences are also pronounced longer, higher, and louder. Notice how all the following words, phrases and sentences are pronounced at a similar rate. Listen and repeat.

feeling     believe
Did it!     You did?
Peel them     It leaks

impatient     guarantee
I see you.     Have some fish.
We hit it.     Where’s the beef?

Suprasegmental
Pronouncing American English

Non-explicit
Listen & Repeat

Listen to the pronunciation of the following words pronounced by your instructor. Listen first, then repeat.

father  stillness  forget
piece   geek     beat
sister  advantage  obtain
brief   clean     bee
better  discover  balloon

Non-explicit
## Instructional Stages and Techniques

### Group 1: Suprasegmentals
- **Presentation**
  - Introduction
  - Explicit instruction and analysis of suprasegmental features
- **Practice**
  - Guided practice on:  
    - Rhythm
    - Stress & reduction
    - Linking
    - Intonation
- **Production**
  - Communicative tasks:
    - Pair discussion
    - Group discussion
    - Role plays
    - Information gap activities

### Group 2: Segmentals
- **Presentation**
  - Introduction
  - Explicit instruction and analysis of segmental features
- **Practice**
  - Guided practice on:  
    - Individual vowels
    - Vowel articulation
    - Vowel contrasts
    - Minimal pairs
- **Production**
  - Communicative tasks:
    - Pair discussion
    - Group discussion
    - Role plays
    - Information gap activities

### Group 3: Non-explicit
- **Presentation**
  - Introduction
  - Pronunciation practice announced, with no explicit instruction
- **Practice**
  - Classroom drills on words, sentences and phrases.
- **Production**
  - Communicative asks:
    - Pair discussion
    - Group discussion
    - Role plays
    - Information gap activities
# Participants

<table>
<thead>
<tr>
<th>Group</th>
<th>Condition</th>
<th>N</th>
<th>TOEFL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speakers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1: Learners</td>
<td>suprasegmental</td>
<td>12 (4)</td>
<td>499.41</td>
</tr>
<tr>
<td>2: Learners</td>
<td>segmental</td>
<td>8 (4)</td>
<td>514.22</td>
</tr>
<tr>
<td>3: Learners</td>
<td>non explicit</td>
<td>10 (4)</td>
<td>484.85</td>
</tr>
<tr>
<td>Native speakers</td>
<td>baseline</td>
<td>10 (4)</td>
<td></td>
</tr>
<tr>
<td><strong>Listeners</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Native speakers</td>
<td>comprehensibility rating</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>
Data Collection

• Delayed Sentence-Repetition Task (e.g., Guion, Flege, Liu, & Yeni-Komshian, 2000; Ratner, 2000; Trofimovich & Baker, 2006)
  o Prompt: “Have you seen Paul around?”
  o Response: He was in the lab working.
  o Prompt: “Have you seen Paul around?”
  ➢ Learner repeats the response

• Sentences from pre- and post-test randomly presented to native judges
Speech samples

- Sentences were the same for all groups
  - Example: He was in the lab working
- Pre-test = 24 sentences
- Post-test = 48 sentences
  - 24 sentences (same as pre-test)
  - 24 new sentences (to verify improvement)
- Selected for analysis: 24 sentences per participant (8 pre + 16 post) that were correctly produced
- 4 participants in each group remained (who did both pre- and post, AND got the full training, AND produced 24 sentences correctly)
  - 12 L2 participants
  - 4 L1 English native speakers included in the sample
Rating Task

• Comprehensibility ratings

• 9-point Likert Scale (Derwing & Munro, 1997; Munro & Derwing, 1995).
  
  1 = extremely easy to understand
  9 = impossible to understand

• Inter-rater reliability coefficient was very high (Cronbach’s alpha: .92)
Results
Effect of treatment

Learners only:

- Marginal improvement from pre- to post: $p = .072$
- Group difference: $p > .2$
- Strong interaction between test and group: $p < .001$

<table>
<thead>
<tr>
<th>Mean Rating</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>4.4</td>
<td>0.18</td>
</tr>
<tr>
<td>Posttest</td>
<td>4.2</td>
<td>0.57</td>
</tr>
</tbody>
</table>

- performance on pre- and post test varied as a function of the treatment
Repeat vs. New sentences

- Post-test: No difference in ratings between "new" and "repeat" sentences

- No effect of repeat vs. new \((F(1, 12.8) < 1, p > .6)\)
Discussion of Results
Discussion of Results

• RQ1 Explicit vs. Non-explicit
  - Yes: Explicit phonetic instruction benefits L2 learners (Derwing, Munro, & Wiebe, 1998; Elliot, 1997; Lord, 2005; see also Couper, 2003)
  - BUT: In specific cases only?
  - Differences in focus of instruction (Segmental vs. Suprasegmental) yield different outcomes

• RQ2 Segmentals vs. Suprasegmentals?
  - Yes, suprasegmental instruction yields rapid improvement in comprehensibility
Segmental vs. Suprasegmental

• Segmental group seems to become less comprehensible
• Range effect?
• Limited scope of the vowel training compared to the suprasegmental training?
• Different learning curve of segmentals vs. suprasegmentals?
Implications for teaching pronunciation
Implications for classroom instruction

• Explicit phonetic instruction on suprasegmental (global) features of pronunciation seems to work best in a short-term experiment (see Derwing, Munro & Wiebe, 1998)

• The learners in the non-explicit group did not significantly improve between pre- and posttest (marginal). Nevertheless, they maintained their rating
  o Perhaps slower improvement?
Implications for classroom instruction

- It appears that when explicit instruction is focusing on segmental (local) features, such as vowels only, increased attention to this specific feature (to the exclusion of others) may slow down pronunciation improvements in the short term (see also Schmidt, 1990, 2001; Derwing, Munro & Wiebe 1998)

- We argue that an explicit pronunciation curricular component in oral communication classes, paying attention to both segmental AND suprasegmental pronunciation features, can significantly improve comprehensibility, even in a short time (Darcy, Ewert and Lidster, in press)
Thank you!

Questions and comments?

idarcy@indiana.edu
jgordonz@indiana.edu

Thanks to our teachers Rebecca Mahan, Denise Shettle and Valerie Cross, and to Doreen Ewert, Ryan Lidster, the Second Language Psycholinguistics Lab Members, Kathleen Bardovi-Harlig and the Department of Second Language Studies at Indiana University


Darcy, Ewert & Lidster (in press) Bringing pronunciation instruction back into the classroom: An ESL Teachers' pronunciation "toolbox" In J. Levis & K. LeVelle (Eds.), *Proceedings of the 3d Pronunciation in Second Language Learning and Teaching Conference*, Iowa State University, Sept. 2011


References


References


<table>
<thead>
<tr>
<th>GROUP 1</th>
<th>PARTICIPANT</th>
<th>NATIVE LANGUAGE</th>
<th>U.S. LOR</th>
<th>Length of learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>„supra-segmental“</td>
<td>G1P01</td>
<td>Korean</td>
<td>2 months</td>
<td>13 years</td>
</tr>
<tr>
<td></td>
<td>G1P02</td>
<td>Turkish</td>
<td>8 months</td>
<td>8 months</td>
</tr>
<tr>
<td></td>
<td>G1P03</td>
<td>Arabic</td>
<td>5 months</td>
<td>10 years</td>
</tr>
<tr>
<td></td>
<td>G1P04</td>
<td>Turkish</td>
<td>8 months</td>
<td>7 months</td>
</tr>
<tr>
<td></td>
<td>G1P05</td>
<td>Arabic</td>
<td>6 months</td>
<td>(information not given)</td>
</tr>
<tr>
<td></td>
<td>G1P08</td>
<td>Turkish</td>
<td>7 months</td>
<td>1 year</td>
</tr>
<tr>
<td></td>
<td>G1P11</td>
<td>Japanese</td>
<td>3 months</td>
<td>7 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GROUP 2</th>
<th>PARTICIPANT</th>
<th>NATIVE LANGUAGE</th>
<th>U.S. LOR</th>
<th>Length of learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>„segmental“</td>
<td>G2P01</td>
<td>Portuguese</td>
<td>2 months</td>
<td>6 years</td>
</tr>
<tr>
<td></td>
<td>G2P02</td>
<td>French</td>
<td>7 months</td>
<td>8 years</td>
</tr>
<tr>
<td></td>
<td>G2P03</td>
<td>Russian</td>
<td>1 month</td>
<td>3 years</td>
</tr>
<tr>
<td></td>
<td>G2P04</td>
<td>Arabic</td>
<td>5 months</td>
<td>10 years</td>
</tr>
<tr>
<td></td>
<td>G2P05</td>
<td>Korean</td>
<td>1 year</td>
<td>5 years</td>
</tr>
<tr>
<td></td>
<td>G2P06</td>
<td>Japanese</td>
<td>6 years</td>
<td>21 years</td>
</tr>
<tr>
<td></td>
<td>G2P07</td>
<td>Korean</td>
<td>9 months</td>
<td>5 years</td>
</tr>
<tr>
<td></td>
<td>G2P08</td>
<td>Japanese</td>
<td>9 months</td>
<td>4 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GROUP 3</th>
<th>PARTICIPANT</th>
<th>NATIVE LANGUAGE</th>
<th>U.S. LOR</th>
<th>Length of learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>„NON-EXPLICIT“</td>
<td>G3P01</td>
<td>Arabic</td>
<td>5 months</td>
<td>10 years</td>
</tr>
<tr>
<td></td>
<td>G3P03</td>
<td>Korean</td>
<td>1 week</td>
<td>6 years</td>
</tr>
<tr>
<td></td>
<td>G3P04</td>
<td>Korean</td>
<td>1 month</td>
<td>10 years</td>
</tr>
<tr>
<td></td>
<td>G3P05</td>
<td>French</td>
<td>6 months</td>
<td>8 years</td>
</tr>
<tr>
<td></td>
<td>G3P06</td>
<td>Turkish</td>
<td>7 months</td>
<td>7 years</td>
</tr>
<tr>
<td></td>
<td>G3P07</td>
<td>Arabic</td>
<td>5 months</td>
<td>3 years</td>
</tr>
<tr>
<td></td>
<td>G3P08</td>
<td>Arabic</td>
<td>1 year</td>
<td>1 year</td>
</tr>
</tbody>
</table>