Cross-linguistic Perception of Multi-Talker Foreign Accents in Spontaneous Speech

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Variability in Speech

- Much variability in speech
  - Talker’s gender, age, and different aspects of language background

- Listeners perceive and use differences in communication

- Accent variability
  - Communication between speakers of different language backgrounds
Accent Variability

- **Speech intelligibility**
  - Regional dialect (e.g., Clopper & Bradlow, 2008)
  - Foreign-accented speech (e.g., Lane, 1963)

- **Identification of the accent**
  - Sensitivity to variability
  - Perceptual similarity of accents
  - Additional talker variability in natural speech
  - Experience
Perception of Foreign Accents

- Sensitive to foreign accents in native language

- Detect or rate foreign accents (e.g., Flege et al., 1995; Yeni-Komshian et al., 2000)

- Categorize talkers by native language (Vieru-Dimulescu & Boula de Mareüil, 2007)
  - Languages with similar sound inventories more confusible
Non-native Listeners

- Sensitive to accent variability in second language

- Detect or rate foreign accents (e.g., Munro et al., 2006; Mackay et al., 2006)
  - Influenced by shared native language

- Categorization tasks
  - Regional dialects of American English (Clopper & Bradlow, 2009)
  - World varieties of English (Sullivan and Karst, 2006)
    - Sensitive to exposure to varieties
Linguistic Experience

- Experience affects the perceived similarity among regional dialects
  - Residential history (Clopper & Pisoni, 2004a; Clopper & Pisoni, 2006)
  - Geographic mobility (Clopper & Pisoni, 2004b; Clopper & Pisoni, 2006)

- More experience with a variety or varieties
  - Results in easier identification and greater perceived distinctiveness among varieties
The Current Study

- Explore the perceptual structure of foreign accents by native and non-native English listeners

**Experiment 1**
- Can native English speakers make consistent judgments about the similarity of foreign accents?

**Experiment 2**
- Can non-native speakers of English make consistent judgments about the similarity of foreign accents?
- How does experience influence the perceived similarity of foreign-accents?
Experiment 1

Accent rating task
- Native listeners rated the similarity of the voices of a set of non-native talkers

Questions
- Will judgments of talker origin reflect the native language background of the talkers?
- Are listeners able to perceive talkers with the same native language as being from the same country more often than talkers with different native languages?
Exp 1: Listeners

- 31 (ages 18-22) monolingual native speakers of American English
- Average 2 months abroad and 2 countries visited
Exp 1: Talkers and Materials

Talkers
- 220 talkers from the CSLU Foreign Accented English Corpus (Lander, 2002)
- 22 (11M, 11F) native speakers of Arabic, French, German, Hindi, Italian, Korean, Mandarin, Russian, Swedish, and Tamil
- Moderate to heavy accents

Materials
- Short utterance selected from longer recording
  - Content of the sentence highly variable
Exp. 1: Procedure

- Listeners rate how likely the two talkers were from the same country on a scale from 1 (‘very unlikely’) to 7 (‘very likely’)

| Talker 1 (1000 ms) | Talker 2 | RESPONSE (1-7) |

- Two Blocks (Male only and Female only)
- Total of 2 (1/1) judgments for all possible pairs of 10 accents
  - Total of 110 trials
    - 90 (45/45) ‘Different Accent’ trials
    - 20 (10/10) ‘Same Accent’ trials
Similarity Ratings

- Listeners gave significantly higher similarity ratings for Same Accent pairs than Different Accent pairs ($t(30) = 7.55, p < .001$)
Exp. 1: Perceived Similarity

- Sensitive to some expected and unexpected sound-based similarities
- May be influenced by other factors
  - Accentedness of individual talkers
  - Materials
Exp. 1: Summary

- Listeners made judgments of talker similarity based on country of origin and foreign accent
  - Ratings
  - Clustering

✓ Native listeners were sensitive to cross-talker foreign accent variation in natural speech
Experiment 2

Accent rating task
  • Non-native listeners rated the similarity of the voices of a set of non-native talkers

Questions
  • Will non-native listeners’ judgments of talker origin reflect the native language background of the talkers?
  • How is the perceived similarity of the accents affected by the linguistic history of the listener?
Exp 2: Listeners

- Korea
  - 18 (ages 18-37) native speakers of Korean
  - Ave. 2.7 yrs in US (2.8 total abroad) and 3 countries visited

- China
  - 9 (ages 19-26) native speakers of Mandarin and Cantonese
  - Ave. 1.9 yrs in US (2.1 total abroad) and 2 countries visited

- India
  - 9 (ages 19-28) native speakers of Hindi, Bengali, and Marathi
  - Ave. 3.6 yrs in US (3.7 total abroad) and 2 countries visited
Exp 2: Talkers, Materials, Procedure

Talkers (Same as Experiment 1)
• 22 (11M, 11F) native speakers of Arabic, French, German, Hindi, Italian, Korean, Mandarin, Russian, Swedish, and Tamil from the CSLU Foreign Accented English Corpus (CSLU, 2002)

Materials (Same as Experiment 1)
• Short sentences taken from spontaneously produced speech

Procedure (Same as Experiment 1)
• Similarity rating task (1-7)
Similarity Ratings

- All groups gave significantly higher similarity ratings for Same Accent pairs than Different Accent pairs (all p’s <= .01)
Ratings: Same Accent Trials

- Familiar accents heard as more similar to each other than unfamiliar accents (* p <= .01)
Ratings: Different Accent Trials

- Familiar accents generally heard as more distinct than other accents by non-native groups
  (* p <= .01)
Exp. 2: Experience and Perceptual Similarity

Arabic ─── French
  ||
Italian ─── Russian
  ||
German ─── Swedish
  ||
Korean ─── Mandarin
  ||
Hindi ─── Tamil

US
Exp. 2: Experience and Perceptual Similarity
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- Not all accents were equally distinctive
  - Indian accents

- Effect of experience
  - Non-native listeners also found their own foreign accents to be very distinctive
Exp. 2: Summary

- Listeners made judgments of talker similarity based on country of origin and foreign accent
  - Ratings
  - Clustering

✓ Non-native listeners were sensitive to cross-talker foreign accent variation in natural speech

✓ Country of origin influenced perception of foreign accents
Discussion

- Both native and non-native listeners were sensitive to foreign accent variation in spontaneous speech
  - Consistent across multiple talkers and content
  - Sensitive to different degrees of distinctiveness

- Perception of foreign accents influenced by previous experience
  - Differences in similarity spaces
  - Shared or familiar accents
Conclusion and Future Directions

- Perceptual structure of foreign accents
  - Acoustics-dependent
    - Distinctiveness of features
  - Listener-dependent
    - Listeners’ linguistic experience

- Other issues
  - Perceived similarity?
    - Strength of accent
  - Experience?
    - Native language effect or familiar accent effect
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References


