

## The role of linguistic competence in cross-linguistic speaker identification

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## The Big Question

- Do the properties of speech that listeners use to identify a talker's voice vary from language to language?
- To put it another way: does your "voice" sound the same, no matter what language you are speaking?

## What makes your voice sound like your voice?

- Indexical properties of speech (Abercrombie 1967)
  - Physical Characteristics
    - age, gender, size and shape of the vocal tract
  - Group Membership
    - regional/dialect, social status
  - Emotional and Mental State
    - fatigue, excitement, anger, suspicion, health, rate

## The Formalist View

- The indexical properties of speech are "extra linguistic." (Abercrombie, 1967)
  - The linguistic and indexical properties of speech are independent of one another.
- Speech perception must filter out indexical properties in order to extract the linguistic message. (Halle, 1985)
  - = Talker normalization

## The Integrated View

- The linguistic and indexical properties of speech remain integrated in speech perception.
  - Talker-specific information is not normalized away.
- This view is consistent with models of speech perception which preserve fine grained acoustic details of speech (Klatt, 1979; Johnson, 1997).

## The Evidence, part 1

- Talker knowledge facilitates linguistic processing
  - Mullenix & Pisoni (1990): Speeded Classification
  - Palmeri, Goldinger, & Pisoni (1993): Recognition Memory
  - Nygaard, Sommers, & Pisoni (1994): Word Recognition

## The Evidence, part 2

- Linguistic knowledge facilitates talker identification
  - Thompson (1987)
    - English > Spanish-accented English > Spanish
  - Goggin, Thompson, Strube, and Simental (1991)
    - English, German, bilingual listeners
    - familiar > unfamiliar
  - Sullivan & Schlichting (2000)
    - L2 learners of Swedish > no knowledge of Swedish

## A stronger test of Independence

- Evidence indicates that indexical and linguistic properties remain integrated in perception.
- Note: in previous research, both language and talkers were changed between listening conditions.
- Q: What happens when the language changes but the talkers remain the same?
  - And what role does language familiarity play?

## The Experimental Plan

- Train listeners to identify the voices of bilingual talkers.
  - Stimuli in one language only.
  - Extended training (four hours over four days).
- Test generalization across languages
  - Can listeners identify the same talkers while they are speaking in the other language?

## Competing Hypotheses

- Formalist view: complete transfer of talker knowledge across languages should occur.
- Integrated view: transfer of talker knowledge across languages should be incomplete or impossible.
  - Previous evidence also suggests better talker identification accuracy for familiar language

## Materials

- 10 L1 German/L2 English talkers
  - 5 male, 5 female
  - Similar dialect
  - Similar in perceived nativeness
- These talkers produced:
  - 360 CVC English words (e.g. buzz, cheek)
  - 360 CVC German words (e.g. hoch, Rahm)

## Listeners

- 40 L1 English listeners
  - 20 were trained on English stimuli only
  - 20 were trained on German stimuli only
- No knowledge of German
- Had to show evidence of learning
  - >40% accuracy on half of the testing sessions

## Procedure: Training

- 4 days of training
  - Either English or German
- 2 sessions per day (~30 min each)
- Each session involved:
  - Familiarization: same 5 words for each speaker
  - Re-familiarization: same word from each speaker
  - Training: 10 words/talker, heard twice
    - With feedback
  - Testing: 10 words/speaker
    - No feedback

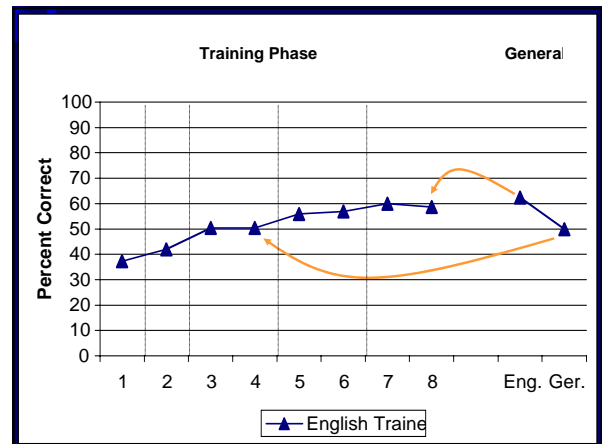
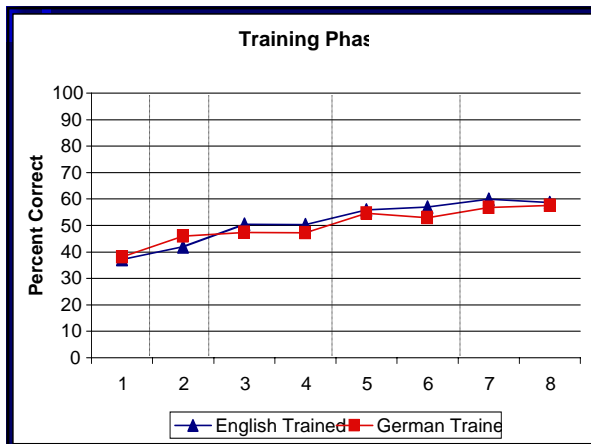
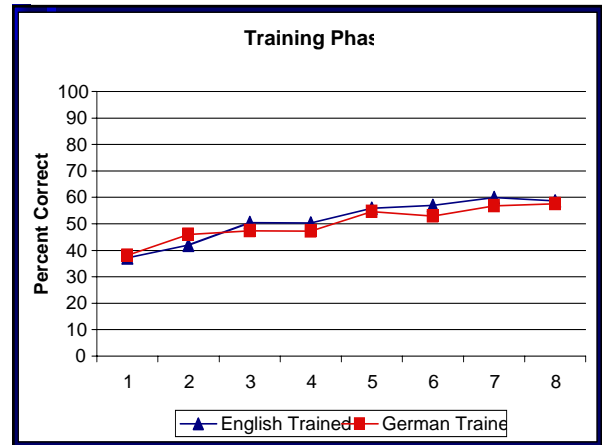
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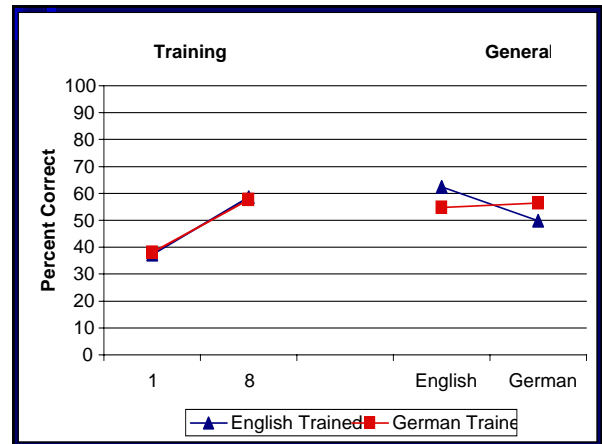
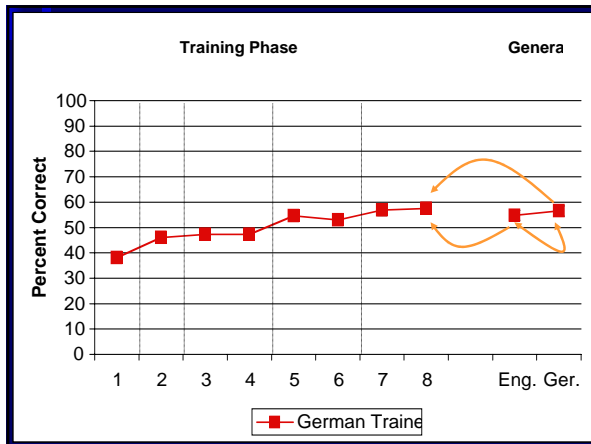
Who spoke that word?

Thomas	Lisa
Alex	Julia
Robert	Erika
Peter	Heidi
Michael	Anne

## Procedure: Generalization

- 5<sup>th</sup> day
- Familiarization: 3 words
- Re-familiarization: 1 word
- Testing: (both languages)
  - 10 novel words/speaker in each language
  - blocked by language
  - counterbalanced for which language was first





## Conclusions

- Knowledge of bilinguals' voices can generalize across languages
- Training language interacts with generalization. (Effect of language)
- Listeners learn at the same rate regardless of their training language (No effect of language).

## Discussion

- Results indicate that some indexical properties are language specific, while others are language independent.
  - These results support the integrated view of speech perception.
- Listeners' familiarity with the languages in question plays an important role; it is easier for listeners to generalize talker knowledge to a familiar language.

## Future Directions

- Different training materials
  - Other languages (e.g., Mandarin)
  - Whole sentences
- Different listeners
  - Native German listeners
  - L2 German learners
- Transfer Task
  - English word recognition with English-trained and German-trained listeners
  - Does knowledge of talker voices facilitate the perception of *linguistic* information across languages?

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