Extrinsic talker normalization facilitates speech perception via rapid accumulation of talker-specific phonetic detail

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Summary

- Extrinsic talker normalization facilitates speech perception by using talker-specific information to recalibrate the perceptual system.
- We investigated how the accumulation of talker-specific phonetic detail and perceptual recalibration over time impacts the facilitatory effect of talker normalization.
- Orthogonal interference of indexical variability on speech processing has been demonstrated such that talker variability introduces delay in identifying spoken words.
- Orthogonal interference of indexical variability was greatest in the no-carrier condition, less in the short-carrier condition, and least in the long-carrier condition.
- Extrinsic talker normalization facilitates speech processing via rapid accumulation of talker-specific detail.
- Interference of indexical variability in the low-information carrier condition was not different from the high-information carrier condition, when the lengths of low-information and high-information carriers were matched.

Methods

Participants

- Native English-speaking adults (N=24 in each experiment) with no known or suspected speech, language or hearing impairments.
- Participants who completed Experiment 1 did not participate in Experiment 2.

Analysis

- Response times were analyzed using linear mixed-effects models with fixed factors including indexical variability and carrier lengths and random effects terms of within-participant slopes for indexical variability and carrier length and random intercepts for participants.

Experiment 1

Stimuli

- Target words (“boot”, “boat”) and varying lengths of carrier phrases were recorded by 4 native speakers of American English (2 male, 2 female).

Results

- Word identification accuracy was at ceiling (99% ± 2%).
- Orthogonal interference of indexical variability was present in all three conditions.
- The facilitatory effect of extrinsic talker normalization varied as a function of the amount of talker-specific information given before the target word.
  - Interference by indexical variability was significantly greater in the no-carrier condition than in both the short-carrier condition (p < 0.01) and the long-carrier condition (p < 1.7 x 10^-8).
  - Interference by indexical variability was significantly greater in the short-carrier condition than in the long-carrier condition (p < 0.01).

Experiment 2

Stimuli

- Target words (“boot”, “boat”) and carrier phrases were recorded by 4 native speakers of American English, the same as those who recorded for Experiment 1.

Results

- Word identification accuracy was at ceiling (99% ± 2%).
- Orthogonal interference of indexical variability was significant in all three conditions.
- The time for perceptual recalibration, but not the amount of information given before the target word, had a significant effect on the orthogonal interference of indexical variability.
  - Interference of indexical variability was significantly greater in low-information carrier condition than in low-information carrier condition (p < 7.2 x 10^-8) and high-information carrier condition (p < 6.9 x 10^-1).
  - Interference of indexical variability in low-information carrier condition was not significantly different from that in high-information carrier condition (p > 0.50).

References

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