

Effect of training modality on foreign-accent adaptation in older adults

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Perceptual Adaptation



Adaptation:

Speech that is (initially) of poor intelligibility becomes more intelligible over exposure time

Adaptation has been shown to occur with

- * time-compressed speech
- * noise-vocoded (spectrally shifted) speech
- * (foreign) accented speech

Which mechanisms underlie perceptual adaptation?

Shortlist-B model of spoken-word recognition (Bayesian model)
perceptual evidence for a phoneme weighed against prior probability of this realisation of the phoneme

Accent exposure and recognition of some words
→ listeners will adjust their phonetic categories
→ to alter these prior probabilities

Perceptual adaptation claimed to be:
attention-weighting process in which listeners tune their attentional resources toward relevant features of the signal and away from irrelevant ones

Which mechanisms underlie perceptual adaptation?

Predictors for amount/speed of accent adaptation?

Attention?

Memory?

Linguistic skills?

Hearing?

Adaptation and presentation modality

Kawase et al. (2009): Noise-vocoded speech

Faster adaptation when participants were presented with audiovisual rather than auditory-only input

Same audiovisual benefit for adaptation to accented speech?

Research questions

Steeper adaptation curve for audiovisual presentation than auditory-only presentation?

Predictors for accent adaptation?

Unfamiliar accent

Accent: artificial accent

- Equally unfamiliar to all participants
- Have one talker produce both standard Dutch (voice familiarisation) and accented speech

All long vowels replaced by short and v.v.

Diphthongs replaced by monophthongs

Raaten hebben taanden

Beweggieng ies gut vor je gezondheid

Experimental task

Speeded sentence verification task

Raaten hebben taanden

TRUE (rats have teeth)

Biesschoopen addemen dor kiwwen

FALSE (bishops breathe through gills)

→ Accuracy and RTs as dependent measures

Participants

66 older adults

Assigned to either modality group (auditory or auditory-visual)

Auditory group

N=33 (14 male), average age 74 years

Auditory-visual group

N= 33 (11 male), average age 73 years

Participant characteristics

- Age
- Hearing sensitivity (tone audiogram)

Attentional measures

- Attention-switching control (Trail-Making Test)
- Selective attention (flanker task)

Memory measures

- Auditory short-term memory (nonword repetition task)
- Working memory (digit span backwards)

Linguistic measure

- Vocabulary knowledge (multiple choice test)

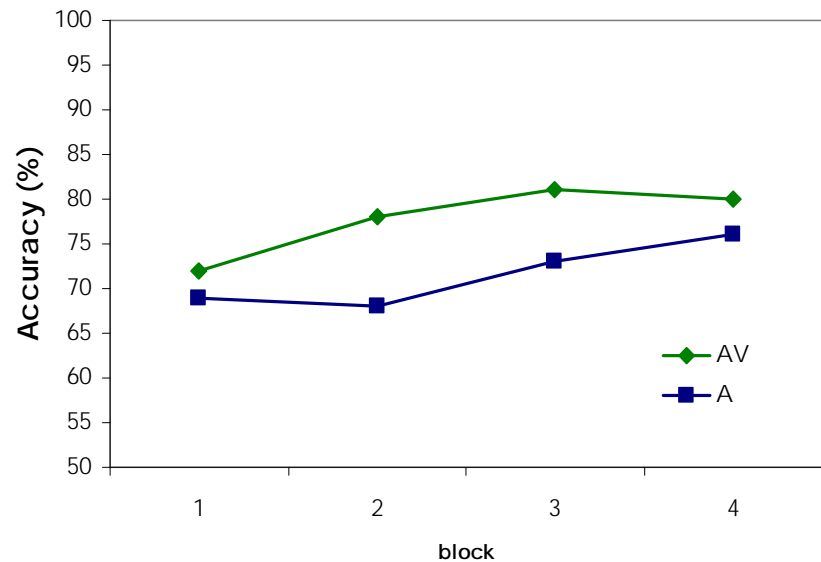
RESULTS

Accuracy

Score AV > A

Adaptation effect over blocks

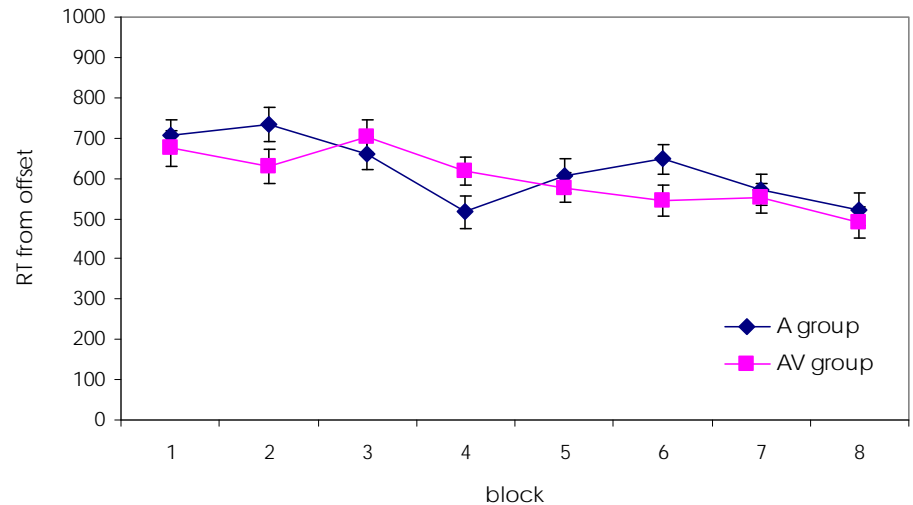
A and AV: overall similar amount of adaptation



RTs

Faster over blocks

No modality effect



Individual results

Predictors for accent perception:

- hearing loss (acc << & RTs >>)
- age (RTs >>)
- auditory short-term memory (acc >>), working memory (acc >>)
- vocabulary knowledge (RTs <<)

Predictors for accent adaptation:

- *Selective attention*: attentional skills better, accuracy improvement >>
- *Vocabulary knowledge*: vocab better, accuracy improvement >>

Modality effects

- General audiovisual benefit on performance
- But not on adaptation

Due to

- Older adults' visual abilities?
- Accent instead of acoustic degradation?
- This particular accent (only vowel changes)?

Predictors and mechanisms

- Hearing sensitivity and memory measures important for speech perception ability
- Support for account that perceptual adaptation requires attentional abilities
- Role for linguistic knowledge in adaptation (perhaps better able to get at accent systematicity)