Implicit Learning of Nonnative Speech Stimuli

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1. Study Goals

Previous studies have induced adult learning of nonnative natural speech stimuli using explicit instructions and feedback. Here, twelve Greek adults were exposed to a Hindi phonetic contrast for six sessions, in which they were unaware of the phoneme distinctions and the phonemes had no relevance to their explicit task…

2. Implicit Training…

On each trial, participants heard two **retroflex** and two **dental** sounds, in random order…

On a typical trial, participants listen to two identical Hindi syllables beginning with **dental** sounds…

…and then, to two more syllables, which differ only in **intensity**, beginning with **retroflex** sounds…

[ta:] 250 ms [ta:] 500 ms [ta:] 250 ms [ta:] + 2 dB

…the explicit task is to report which pair differs in **intensity**…

…while the implicit learning goal is the **dental-retroflex** distinction

3. Hypothesis

A model of task-relevant and task-irrelevant learning[1] predicts that irrelevant stimulus features that are systematically paired with target features are learned due to diffuse reward and learning signals elicited upon successful task performance. Our hypothesis is that the systematic pairing of the target feature (**intensity difference**)…

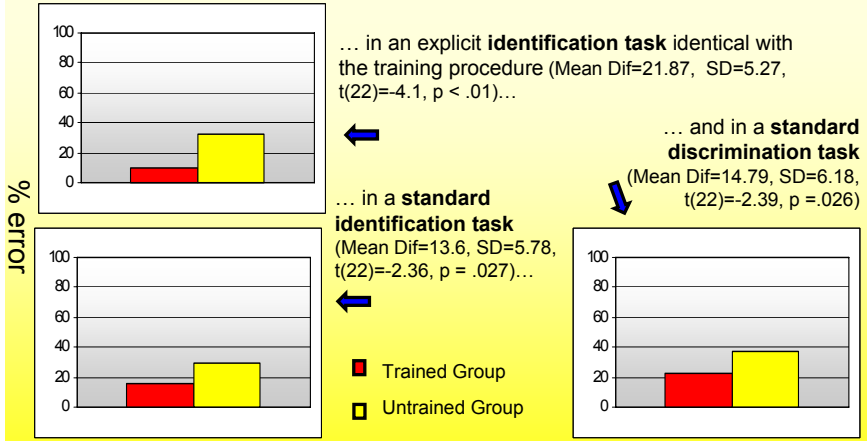
[ta:] 250 ms [ta:]

…**with the retroflex sounds will result in learning of the new sounds**

[1]Seltz, A R. & Watanabe, T. (2005). A unified model for perceptual learning, *Trends in Cognitive Sciences, 9*, 329–334.

4. Results…

Implicit learning was assessed *directly*, by testing subjects on explicit identification and discrimination of trained and untrained stimuli, from the trained and a novel speaker. The trained group outperformed an untrained group…



… in an explicit **identification task** identical with the training procedure (Mean Dif=21.87, SD=5.27, t(22)=-4.1, p < .01)…

… in a **standard identification task** (Mean Dif=13.6, SD=5.78, t(22)=-2.36, p = .027)…

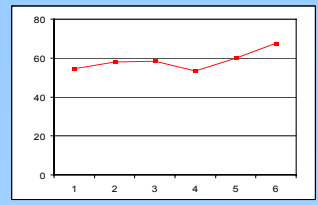
… and in a **standard discrimination task** (Mean Dif=14.79, SD=6.18, t(22)=-2.39, p =.026)

…However, when tested with a novel speaker they had the same performance with the untrained group (Standard identification task: Mean Dif=2, SD=3.26, t(22)=.61, p=.54, ns, Standard discrimination task: Mean Dif=1.45, SD=2.8, t(22)=.52, p=.608, ns)

Implicit learning of nonnative natural speech stimuli without task awareness and feedback is possible. However, to achieve generalization, **variability** during training is required.

Implicit learning was also assessed *indirectly*…

Unbeknownst to the participants, in each session during implicit training there were some **test trials**, in which both sounds within each pair were identical, that is, **there was no intensity difference…**



We expected that, as listeners learn implicitly the intensity-retroflex pairing during training, they would tend to choose the retroflex pair on test trials…

Mean tendency to report the retroflex pair increased during training (F(5,11)=4.78, p=.001) and from first to last session (mean dif = 12.9, SD= 18.6, t(11)=2.4, p= .03)

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