Enhancing perceptual learning of a practiced target task by practicing an irrelevant task

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Introduction

Observers can improve their ability to discriminate between stimuli with practice. In most cases, such improvements occur only if the observer practices the to-be-learned (target) task. However, there has been no consideration of whether it is necessary to practice the target task throughout the entire course of training. Here we report evidence that it is not.

We compared learning on a target auditory frequency-discrimination task across listeners who were trained either only on frequency discrimination, only on duration discrimination, or on combinations of the two, using the same standard stimulus in all cases. The results indicate that training on duration discrimination can contribute to learning on frequency discrimination when both tasks are trained within the same training session.

Training Regimens

<table>
<thead>
<tr>
<th>Regimen</th>
<th>Training Phase</th>
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<tbody>
<tr>
<td>F: Freq Disc</td>
<td>Daily Trial Distribution (repeated 6-10 days)</td>
<td>F: Freq Disc</td>
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<tr>
<td>D: Dur. Disc</td>
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<td>D: Dur. Disc</td>
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<td>8 F360</td>
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<td>8 FD720-0 hr</td>
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<td>8 FD720-4 hr</td>
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<tr>
<td>6 D900</td>
<td>D: 900 Trials</td>
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<td>8 F900</td>
<td>F: 900 Trials</td>
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<td>10 CON</td>
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Results: Trained Condition

Training on duration discrimination contributed to learning on frequency discrimination, but only when the duration trials immediately followed the frequency trials (FD720-0hr). This regimen yielded as much learning as when the duration trials were replaced with an even greater number of frequency trials (F900).

Results: Untrained Duration

The groups who learned on the target condition generalized their learning to a stimulus with the trained frequency (1 kHz), but an untrained duration (50 ms).

Results: Untrained Frequency

None of the groups learned with a standard that had an untrained frequency (4 kHz), even with the trained duration (100 ms).

Conclusions and Discussion

- Training on a non-target task can enhance learning on a target task when observers practice on both tasks.
  - Specifically, practice on duration discrimination enhanced improvements on frequency discrimination when both tasks were trained using the same standard stimulus.
  - The simple transfer of learning from duration to frequency discrimination cannot explain this result, because listeners trained only on the duration task did not improve on the frequency task.
  - Rather, it appears that attention to the frequency task activated a state in which additional exposures to the trained stimulus facilitated learning even when attention was focused on the duration task.
  - This observation of learning enhancement contradicts the commonly held assumption that only trials on which the observer is attending to the target task contribute to perceptual learning on that task.

- To receive the benefit from practicing the non-target task, both the target and non-target tasks must be practiced within a restricted time window.
  - The enhanced learning on frequency discrimination resulting from training on duration discrimination disappeared when the duration trials were presented 4 hours after the frequency trials.
  - This result suggests that the enhanceable-learning state activated by training on frequency discrimination decays with time.

General Method

Standard Stimulus used for Training
- f = 1 kHz, t = 100 ms

Procedure
- two-interval, forced choice, with feedback
- adaptive, 3 down/1 up (79.4% correct)
- 60 trials per threshold estimated

Analyses
- separate ANCOVAs for each group of trained listeners vs. controls
- pre-training threshold as the covariate
- post-training threshold (in log f) as the dependent variable

Footnotes


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