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TITLE: Is Perceptual Learning Caused by Attentional Spotlighting or Representational Change?

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INTRODUCTION: Humans learn to make perceptual discriminations more effectively when the task begins at a low difficulty then gradually increases to a high difficulty (Mercado et al, 2008). This is known as progressive training. One theory (attentional spotlighting) of why this occurs suggests that low difficulty discrimination events help the learner know which dimensions to pay attention to (Pashler & Mozer, 2013). However, another theory (representational differentiation) suggests that progressive training is advantageous because it helps the learner to slowly differentiate their perceptual representations enhancing discrimination (Church et al, 2013). Attentional spotlighting predicts that any easy contrast that highlights the dimension of interest will produce the effect. The progression is not important. Representational differentiation predicts that having discriminable contrasts that are closer to the final tested contrast will better aid differentiation.

PURPOSE: We wanted to pit these two theories against each other by examining training that only consists of one easier training contrast that is either maximally easy (highlighting the contrast of interest) or of medium difficulty (discriminable but closer to the difficult testing contrast).

METHOD: Participants were asked to discriminate the rate of birdsongs for four blocks of 60 trials. One of the birdsongs had an up sweeping pitch and the other was down sweeping. In the first block, the participants heard an easy discrimination for one of the birdsongs and a medium difficulty discrimination for the other. In the final three blocks, participants were tested with equally difficult discriminations for both. Which birdsong received the easy versus the medium training was counterbalanced across participants.

RESULTS: Participants were better able to discriminate the difficult contrast for the birdsong that had the medium difficulty training block, regardless of whether it was the up sweeping or down sweeping song.

CONCLUSION: These results support the theory of representational differentiation and are inconsistent with the theory of attentional spotlighting. This supports the idea that progressive training helps to slowly change the way that perceptual information is represented to allow better differentiation, and it rules out the idea that the advantage of progressive training is caused solely by highlighting the relevant dimension.

KEYWORDS: auditory discrimination, auditory stimulation, easy-to-hard effect, perceptual learning