



Latent interference of task-related knowledge on learning transfer

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Learning transfer has been a subject of interest in psychology since the cognitive science revolution. Shank even qualified learning transfer as the essence of understanding (Dehn & Shank, 1982). The problem with past studies on transfer is their inconsistent results: some studies found some learning transfer while other found no trace of it. The reason for this inconsistency might be that learning is not a whole but an aggregate of parts.

Hypothesis

The present study was designed to test this hypothesis. We parted learning into two distinct components: task-related and stimulus-related. We postulated that those two components have different transfer properties.

Methodology

Material: Two different sets of stimuli were used: the first set was composed of Gabor patches while the second was composed of radial spirals. The stimuli used are shown in Figure 1.

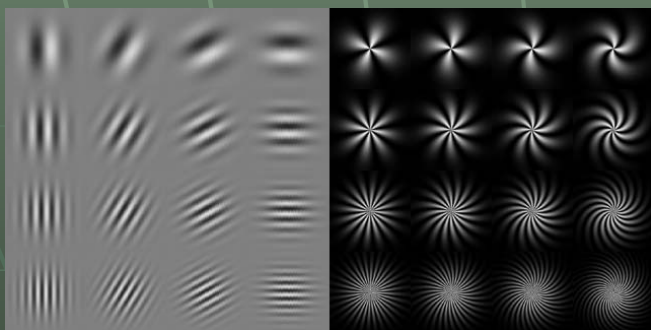


Figure 1. Stimuli used in the experiment

Procedure: Two tasks were used: a visual search task (vs) and a XOR categorization task (cat). Each task could be executed with each set of stimuli. Participants were randomly assigned to one of the four resulting conditions (vs x Gabor, vs x spirals, cat x Gabor and cat x spirals). After extensive training, all subjects

transferred to the categorization task using Gabor patches. We thus had one group of participants which transferred stimulus-related knowledge, one group who transferred task-related knowledge and two controls: one which kept the same task and the same stimuli while the other changed both task and stimulus-set.

Results

All the following response times analysis were conducted on correct responses for which the stimulus was present (hits on visual search task; "A" responses for the categorization task). The learning curves are shown on Figure 2.

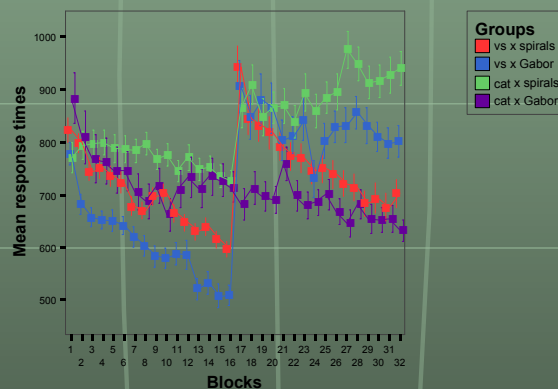


Figure 2. Mean response times averaged by groups.

As can be seen on Figure 2, all response times were degraded at transfer (block 17) except for the control group where nothing changed. In order to compare transfer performances with an unbiased group who learned cat x Gabor as a first task, we plotted the transfer phase of each of the transferring groups with the learning phase of the control group who learned cat x Gabor. This plot is shown on Figure 3.

Analyses of variance (ANOVA) shows an interaction between tasks, stimuli and sessions. The group which previously learned the task but changed stimuli (cat x spirals) was significantly slower in session three and four (blocks 9 to 16) than the control group (cat x Gabor).

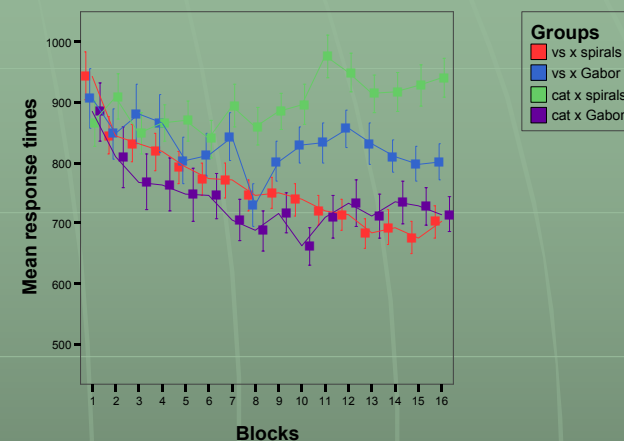


Figure 3. Mean response times at transfer averaged by groups except for cat x Gabor for which it is their training phase.

We fitted the best-fitting power curves to the data and conducted similar analyses on the estimated parameters. The results were consistent: the estimated asymptote of the group which already knew the task was significantly higher than the control group. Moreover, the estimated amplitude of this same group was significantly smaller than the control. Those results shows a lack of improvement for response times.

Conclusion

The results of the present experiment are two-folded. First, the main reason for the inconsistency in previous transfer study results is the length of the transfer phase: most study used only one block of transfer while we used sixteen. Second, we found some latent interference of task-related knowledge which was only visible after nine blocks of transfer. These results suggest that transfer must be studied for as long as training in order to be fully informative.

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