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Markus Grüner • Florian Goller • Ulrich Ansorge

Faculty of Psychology, Department of Basic Psychological Research and Research Methods

markus.gruener@univie.ac.at http://homepage.univie.ac.at/markus.gruener

The emergence of top-down search templates: Instruction vs. reinforcement learning

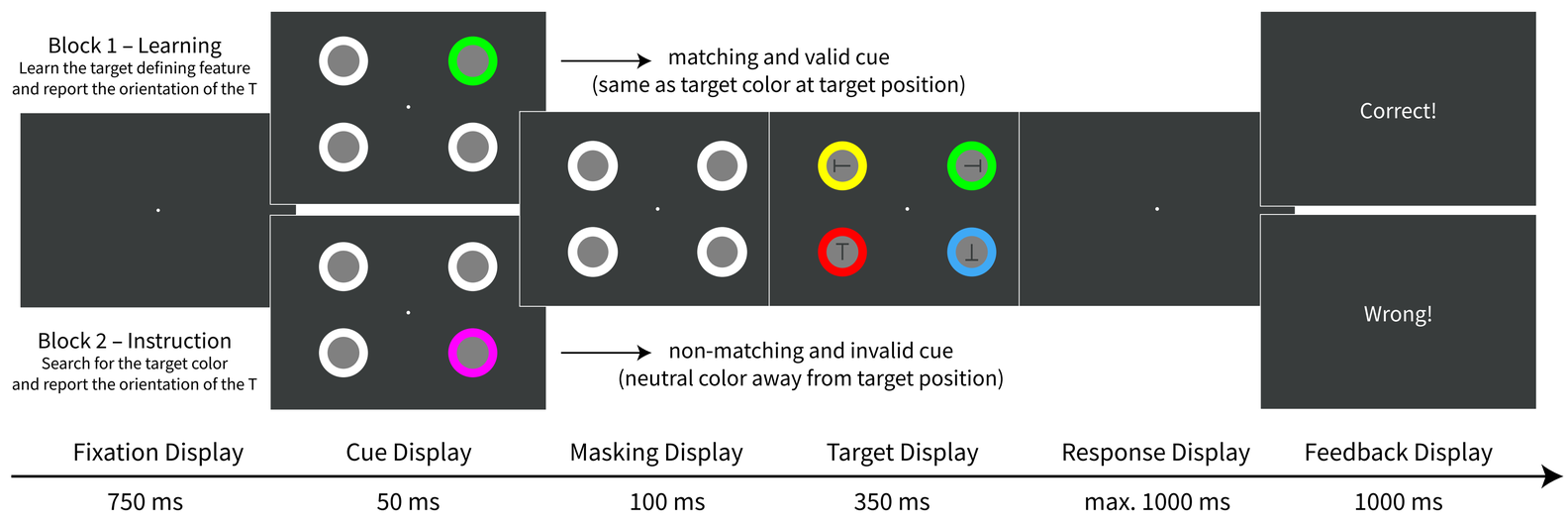
Outside of the laboratory, visual search is rarely based on instructions, but on learning the features of a target.

Instead of following instructions, our participants learned the target-defining feature via reinforcement learning.

In Block 1, participants had to learn the target-defining feature.
In Block 2, we instructed them to search for the previously learned feature.

The cues were either matching (same color as the target) or non-matching (neutral color), and presented at the same position as the target (valid) or at a different position (invalid).

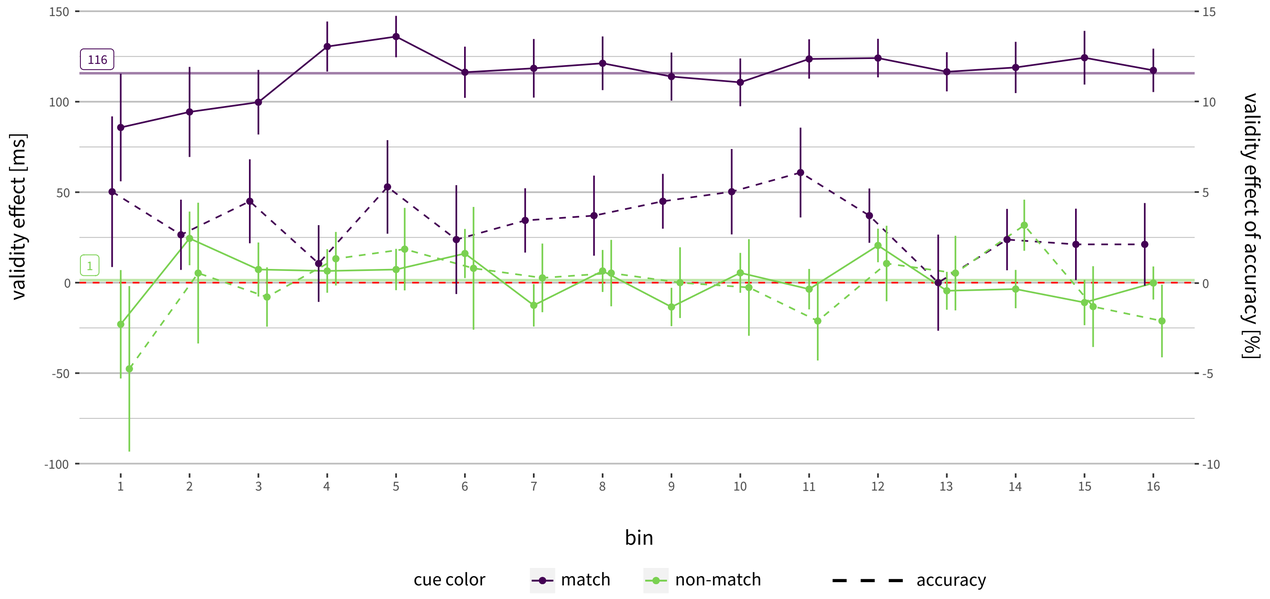
N = 21	learning and instruction block	
cue / target	matching	non-matching
valid	96 Trials	96 Trials
invalid	288 Trials	288 Trials



We used the mean reaction times of correctly answered trials to calculate the validity effect of reaction times (mean reaction time in valid trials compared to invalid trials) and accuracy (mean accuracy in valid trials compared to invalid trials).

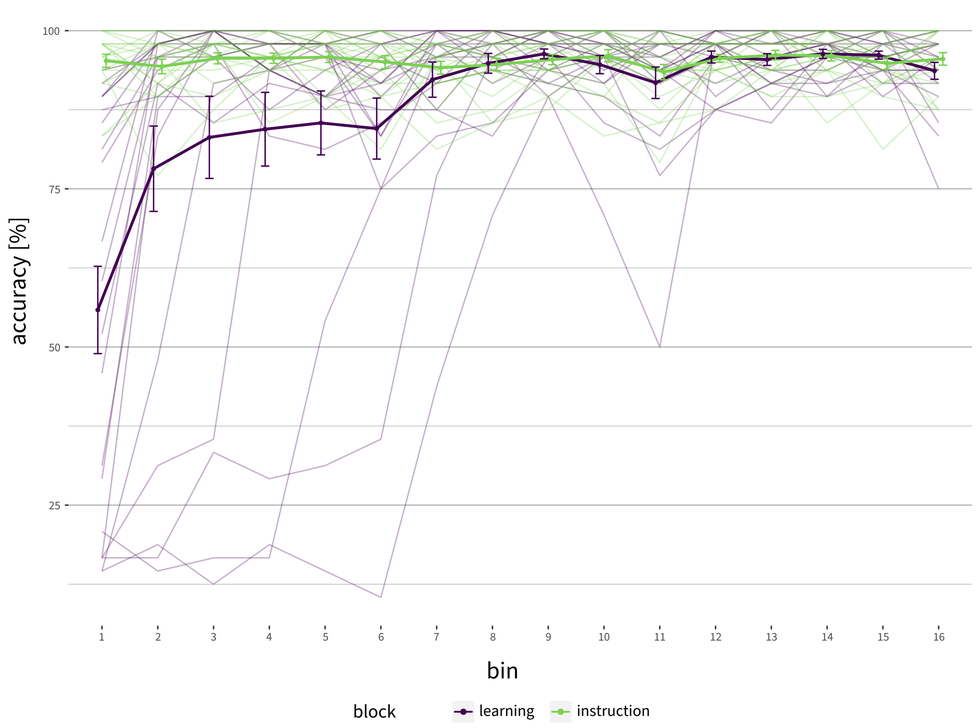
The trials in both blocks were divided into 16 bins consisting of 48 trials. Each bin consisted of 6 valid matching and non-matching trials and 18 invalid matching and non-matching, randomized within each bin.

Validity Effect for Reaction Times and Accuracy in the **Learning Block**

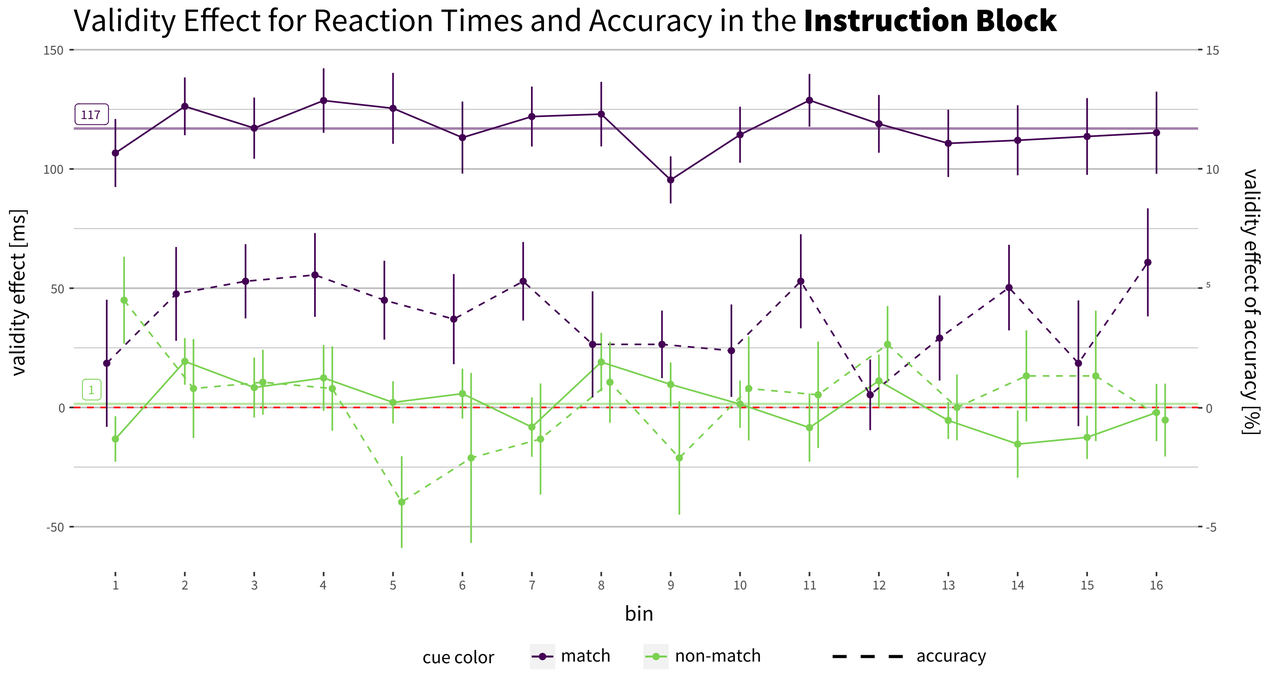


Accuracy over Time in the Learning and Instruction Block

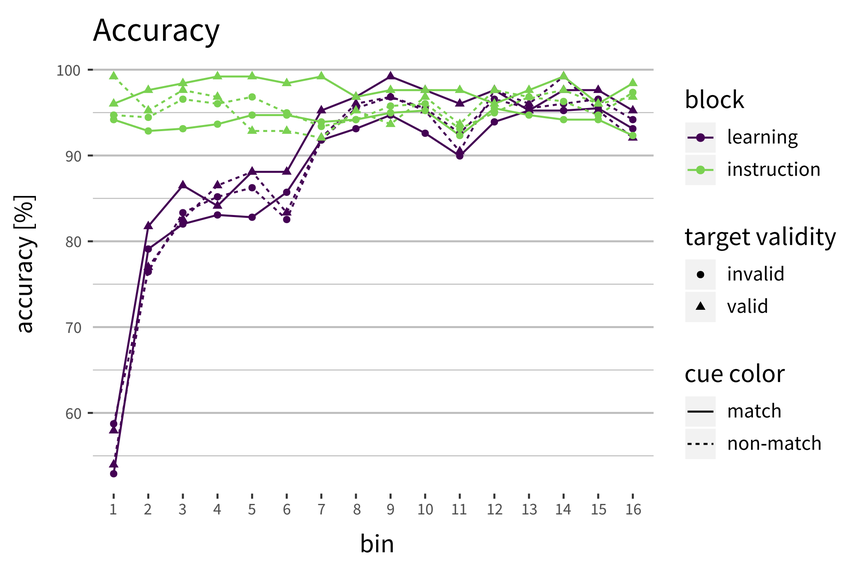
Collapsed over cue color and target validity.



Validity Effect for Reaction Times and Accuracy in the **Instruction Block**



Accuracy



Matching cues elicited validity effects, while non-matching cues did not.

Most participants learned the target feature quickly, and with raising accuracy, the validity effect increased until reaching the same level as in the instruction block.

In the instruction block, the validity effect was immediately present.

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