

# *Don't underestimate the Force: Learning to have a hunch in visual search*

Jeremy Wolfe and Yoana Kuzmova

## Abstract

Experts at specialized search tasks, such as baggage security or breast cancer screening, sometimes report an immediate intuition that a target (e.g., weapon or tumor) is present, even when they cannot immediately localize it. Search is still required for confirmation. This hunch seems to be based on implicit perception of some statistical regularity in the image. In order to study this phenomenon experimentally, we had observers search for a T among Ls. On valid target present trials, letter size varied systematically across the display (large at center, smaller in periphery). On valid target-absent trials, letter size varied unsystematically. On invalid trials, this size cue was reversed. Cues were 90% valid.

We measured RT while 24 naïve observers performed 1000 learning trials with unlimited exposure. Additional, 100 trial pre- and post-learning blocks measured accuracy for 250 ms “glimpses” of the display. We defined “learner” (n=6), “non-learner” (n=7), “intermediate” (n=5) groups based on whether observers became significantly faster on valid than invalid target-absent trials during learning (6 observers with high errors on learning trials were excluded). Performance across groups was otherwise similar. Debriefing showed no evidence of explicit size cue learning. Nevertheless, learners improved significantly from pre-test glimpses ( $d' = 0.6$ ) to post-test glimpses ( $d' = 1.2$ ,  $t(5) = 4.9$ ,  $p < 0.01$ ), while non-learners did not ( $d' = 0.7 - 0.8$ ). Intermediate observers were intermediate ( $d' = 0.5 - 0.9$ ). Our learners became better at telling target-present from target-absent trials in a glimpse, without knowing why. Note that this “hunch” is different from contextual cueing. In contextual cueing, observers learn that THIS display always contains a target at THIS location. Our observers learn that a CLASS of displays is likely to contain a target. This ability could be of general use (e.g. knowing that this type of landscape is likely to contain food) and may underpin the first-glimpse hunches of experts.