Slope analysis

Although we did not have specific predictions of adaptation and attention effects on the slope of the psychometric function, we tested for such effects in a 3-way repeated measures ANOVA (2 adaptation speeds, 2 adaptation conditions, and 3 cue conditions) separately for each experiment.

For Experiment 1, there was a main effect of adaptation condition \((F(1,5)=84.85, p<0.0001; \eta^2=0.95)\), reflecting steeper slopes in the Test adapted than in the Standard adapted condition, and a main effect of the cue \((F(2,10)=8.97, p<0.01; \eta^2=0.64)\), slopes were shallower in the Test cued condition. There was no main effect of adaptation speed \((F(1,5)=1.14, p>0.1; \eta^2=0.19)\). Neither the 3-way interaction \((F(2,10)=0.82, p>0.1; \eta^2=0.14)\) nor any of the 2-way interactions were significant (adaptation speed x adaptation condition: \(F(1,5)=4.18, p<0.1; \eta^2=0.46\); adaptation speed x cue condition: \(F(2,10)=1.17; \eta^2=0.19\); adaptation condition x cue condition: \(F(2,10)=0.17; \eta^2=0.03\) both \(p>0.1\)).

For Experiment 2, there was a main effect of adaptation condition \((F(1,5)=7.44; p<0.05; \eta^2=0.60)\), and a main effect of the cue \((F(2,10)=8.30; p<0.01; \eta^2=0.62)\), but no main effect of adaptation speed \((F(1,5)=1.86; p>0.1; \eta^2=0.27)\). Neither the 3-way interaction \((F(2,10)=0.53; p>0.1; \eta^2=0.10)\) nor any of the 2-way interactions were significant (adaptation speed x adaptation condition: \(F(1,5)=2.98; \eta^2=0.37\); adaptation speed x cue condition: \(F(2,10)=0.95; \eta^2=0.16\); both \(p>0.1\); adaptation condition x cue condition: \(F(2,10)=3.67; p<0.1; \eta^2=0.42\)).

A possible explanation for the different slopes in the Standard and Test adapted conditions might be that adaptation moves the psychometric function to different speed ranges; that is, it covers a range of slower speeds in the Standard adapted condition and a range of faster speeds in the Test adapted condition. Because slower speeds are more difficult to discriminate (De Bruyn & Orban, 1988; McKee, Silverman, & Nakayama, 1986; Orban, Van Calenbergh, De Bruyn, & Maes, 1985), the slope in the Standard adapted condition might be shallower.

Eye positions

Eye positions were measured using an infrared eye tracker (EyeLink CL, SR Research, Kanata, Ontario, Canada) with 1000 Hz sampling rate in the main experimental sessions. Eye positions were analyzed offline. A subset of the eye position data could not be measured/analyzed (12 out of 240 blocks, i.e. 5% of the data). For analysis, raw data were converted to eye position in degrees of visual angle. Eye position samples around the time of blinks (100 ms preceding and following a blink) were excluded from further analysis. The mean eye position during the fixation interval at the beginning of each trial served as a baseline and was subtracted from the mean eye position in each following interval (adaptation, ISI 1, cue presentation, ISI 2, stimulus presentation) to compensate for any slow drift in the measurements during each block. A standard Eyelink detection algorithm was used to detect saccades (combined velocity (30º/s) and acceleration criterion (8000º/s²)).

The mean eye position and standard deviation across all trials in X- and Y-direction was calculated for each observer (relative to baseline). Two observers in Experiment 1 and
one observer in Experiment 2 were excluded from all further analysis because one or more of these values exceeded 1.5° visual angle. For all further analyses, we combined the data of the remaining observers into one ‘super-observer’ for each Experiment. Mean eye position and standard deviation were X=-0.06°, 0.46°; Y=0.15°, 0.77° in Experiment 1 and X=-0.02°, 0.40°; Y=0.17°, 0.87° in Experiment 2. Saccade frequency was 2.51 and 2.71 per trial in Experiments 1 and 2, respectively. We were only interested in saccades during the interval between cue onset and stimulus offset, because they could have influenced perceived speed of the Test and Standard stimuli. Saccade frequency during this interval was extremely low (0.02 and 0.01 per trial in Experiment 1 and 2, respectively).

We tested if eye positions during the Test and Standard presentation systematically varied with cue location. For each experiment, we conducted two separate ANOVAs for X- and Y-positions. For both experiments, there was no significant difference in either X- or Y-positions (Experiment 1: $F_X(2,13516)=0.37; p_X>0.1; \eta_X^2=0.00006$ and $F_Y(2,13516)=0.29; p_Y>0.1; \eta_Y^2=0.00004$; Experiment 2: $F_X(2,15669)=0.79; p_X>0.1; \eta_X^2=0.0001$ and $F_Y(2,15669)=1.30; p_Y>0.1; \eta_Y^2=0.0002$). Eye positions for the three cue conditions in the Test and Standard interval are shown in Supplementary Figure 1.

Supplementary Figure 1: Eye positions in Test and Standard interval. A: Overlay of eye position samples of the ‘super-observer’ in Experiment 1 for the three cue conditions. Brightness in the three luminance channels represents proportion of eye position samples in each bin for each cue condition (red: cue left, green: neutral, blue: cue right); overlay of different cue conditions results in mixture of colors with white indicating that an equal proportion of eye position samples in each of the three cue conditions occurred. (Colored pixels are hardly visible because of the large degree of overlap among the three cue conditions.) White circles represent Test and Standard locations. Inset depicts a magnification of the central 4°. B: Overlay of eye position samples of the ‘super-observer’ in Experiment 2. Same format as A.
References

