

Method

Participants

Fourteen upper division psychology undergraduates (6 men, 8 women) at San Jose State University participated in an 18-minute experimental session in partial fulfillment of a course requirement. All subjects reported normal or corrected-to-normal vision.

Stimuli

All stimuli were presented using a Dell 30 inch flat screen monitor at a viewing distance of approximately 75 cm without the aid of a chin-rest. All colors are described herein using a 24-bit RGB color space. The visual stimuli presented consisted of a fixation cross, a cue, and a target. The fixation cross was a black asterisk (RGB 0, 0, 0) centered on the monitor screen. The cue was either a horizontal or vertical black frame measuring 3.5 cm by 9 cm with a three pixel black border (RGB 0, 0, 0) also centered on the monitor screen. The target was one of two colored boxes within the cue frame, either a fully saturated green (RGB 0, 255, 0) utilized for the 'go' trials or a fully saturated blue (RGB 0, 0, 255) utilized for the 'no-go' trials. The background color for all aforementioned stimuli was white (RGB 255, 255, 255).

Procedure

The experimental task was a 'go/no-go' task. Participants were instructed to discriminate between a green target (denoting a 'go' trial) and a blue target (denoting a 'no-go' trial). 'Go' trials required that participants respond by momentarily releasing a response key that otherwise they were depressing for the duration of each experimental block of trials. 'No-go' trials required that participants continue to depress the response key without release for the duration of the trial. Participants were aware that both response times (as measured by the latency to release the response key after presentation of the colored target) and error rates (as measured by incorrectly

responding to an individual trial) were recorded and that both speed and accuracy were important.

The experimental apparatus was comprised of a dimly lit individual testing laboratory equipped with a PC-compatible microcomputer running the E-Prime 2.0 Professional application suite (Schneider, Eschman, & Zuccolotto, 2008). Testing was conducted individually without supervision.

Each trial was comprised of the following events: a fixation cross presented for 800 ms, a blank background for 500 ms, a cue presented for one of five different stimulus onset asynchronies (SOAs) (150, 250, 350, 450, or 550 ms), a colored target presented until a response was recorded (up to a maximum duration of 1,000 ms; failures to respond to a 'go' trial within 1,000 ms were considered an incorrect response), and finally textual feedback presented for 700 ms. Textual feedback consisted of the response time in milliseconds displayed in green Courier New typeface if the participant correctly responded to a trial (e.g. "356 ms"), or the word "Incorrect" displayed in red Courier New typeface if the participant incorrectly responded to a trial. Proper failure to respond to a 'no-go' trial resulted in a response time of "000 ms" for the purposes of feedback.

The experimental session was composed of five blocks of 50 trials each, for a total of 250 trials. Each trial block was delimited with a 30 second timed break; the termination of the timed break was signaled with both an auditory and visual warning. The first block of 50 trials was for practice purposes and was not included for data analysis. Each block of 50 trials was composed of 25 'go' trials (utilizing green targets) and 25 'no-go' trials (utilizing blue targets). The 25 'go' trials used vertical cues and targets for 20 trials, and horizontal cues and targets for 5 trials; whereas, the 25 'no-go' trials used horizontal cues and targets for 20 trials, and vertical cues and

targets for 5 trials. Each of the five different SOAs were distributed evenly amongst each block of trials (i.e. each of the five SOAs represented 20% of the total trials within a block). All trial conditions, including cue validity (valid/invalid), trial state ('go/no-go'), and duration of SOA were randomized within each trial block. Thus the experiment consisted of a 5x2x2 within-subject factorial design (i.e. SOA, cue validity, and trial state).

Results

Accuracy and reaction time data were analyzed separately using a 5x2x2 within-subject factorial ANOVA. The conditions were: SOA with five levels, cue validity with two levels, and trial state with two levels. Accuracy was measured for all trials, whereas measures of reaction time were limited to only correct responses in 'go' trials equal to or less than 1,000 ms. The valid level was when the 'go' trials were paired with vertical cues and targets, or the 'no-go' trials were paired with horizontal cues and targets. The invalid level was when the 'go' trials were paired with horizontal cues and targets, or the 'no-go' trials were paired with vertical cues and targets. The task was to discriminate 'go' trials from 'no-go' trials. Prior to data analyses, two participants (one man and one woman) were excluded due to evidence of a failure to perform the experimental task (i.e. one or more cells of the design revealing accuracies of approximately 50% or lower).

Reaction Time

There was a significant main effect of cue validity for reaction time in 'go' trials. The mean response time for valid cues (312 ms) was faster than the mean response time for invalid cues (327 ms) by 15 ms, $t(11) = -2.64, p = .023$. The mean response times are shown in Figure 1.

Accuracy

Trial state showed a significant main effect on accuracy. The mean accuracy for 'go' trials (99.6%) was greater than the mean accuracy for 'no-go' trials (97.1%) by 2.5%, $F(1,11) = 5.85$, $p = .034$. Conversely, cue validity showed an insignificant main effect on accuracy in that the mean accuracy for valid cues (99%) was only slightly greater than the mean accuracy for invalid cues (97.7%) by 1.3%, $F(1,11) = 2.26$, $p = .16$ (ns). Similarly, the interaction effect of trial state and cue validity was also insignificant given the mean accuracy for 'go' trials, in both cue validity levels (99.6%) is similar to the mean accuracy for 'no-go' trials, with either valid cues or invalid cues (98.3% and 95.8% respectively), $F(1,11) = 2.12$, $p = .17$ (ns); nor did mean accuracy for 'no-go' trials differ significantly between cue validity levels, $t(11) = 1.57$, $p = .145$ (ns). Figure 2 illustrates the accuracy data.

References

Schneider, W., Eschman, A., & Zuccolotto, A. (2008). E-Prime (2.0 Professional)

[Computer software]. Sharpsburg, PA: Psychology Software Tools, Inc.

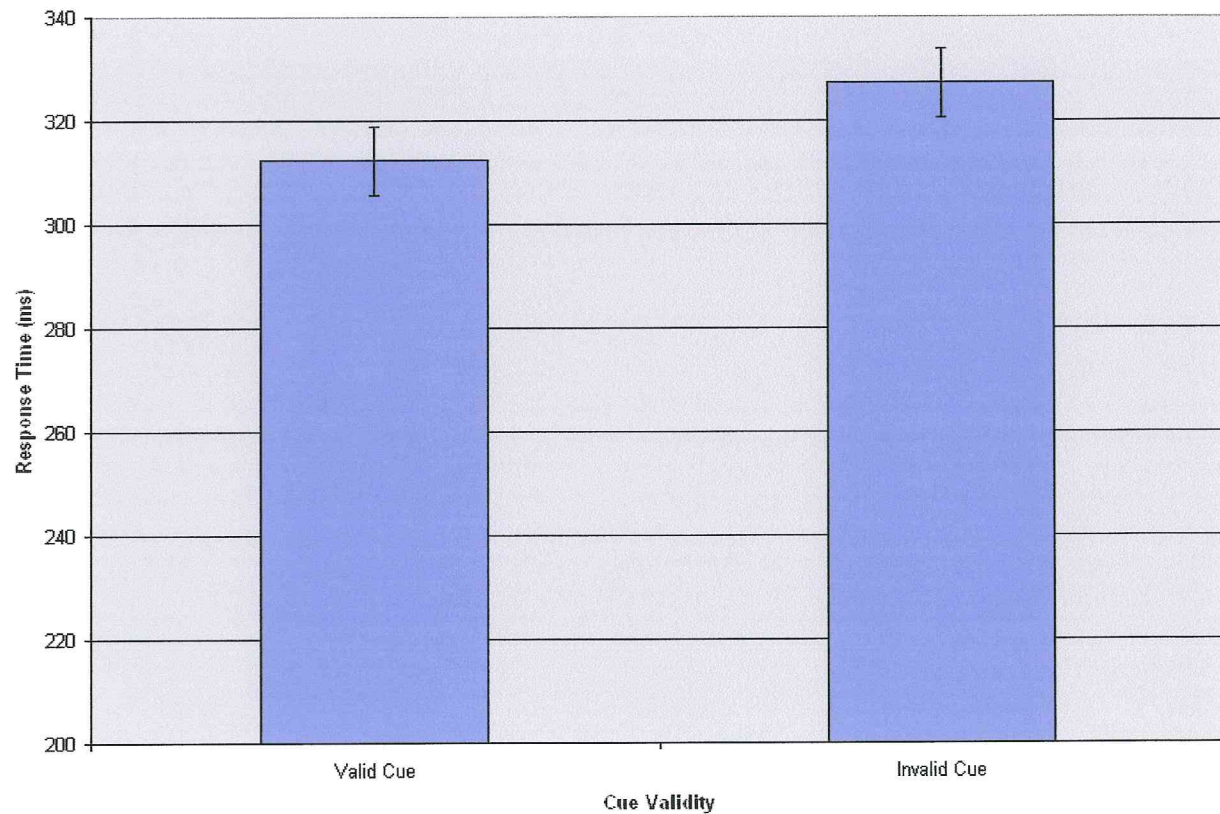


Figure 1. Mean response time (ms) for valid and invalid cues, limited to correct responses in 'go' trials equal to or less than 1,000 ms. Standard errors are represented in the figure by the error bars attached to each column.

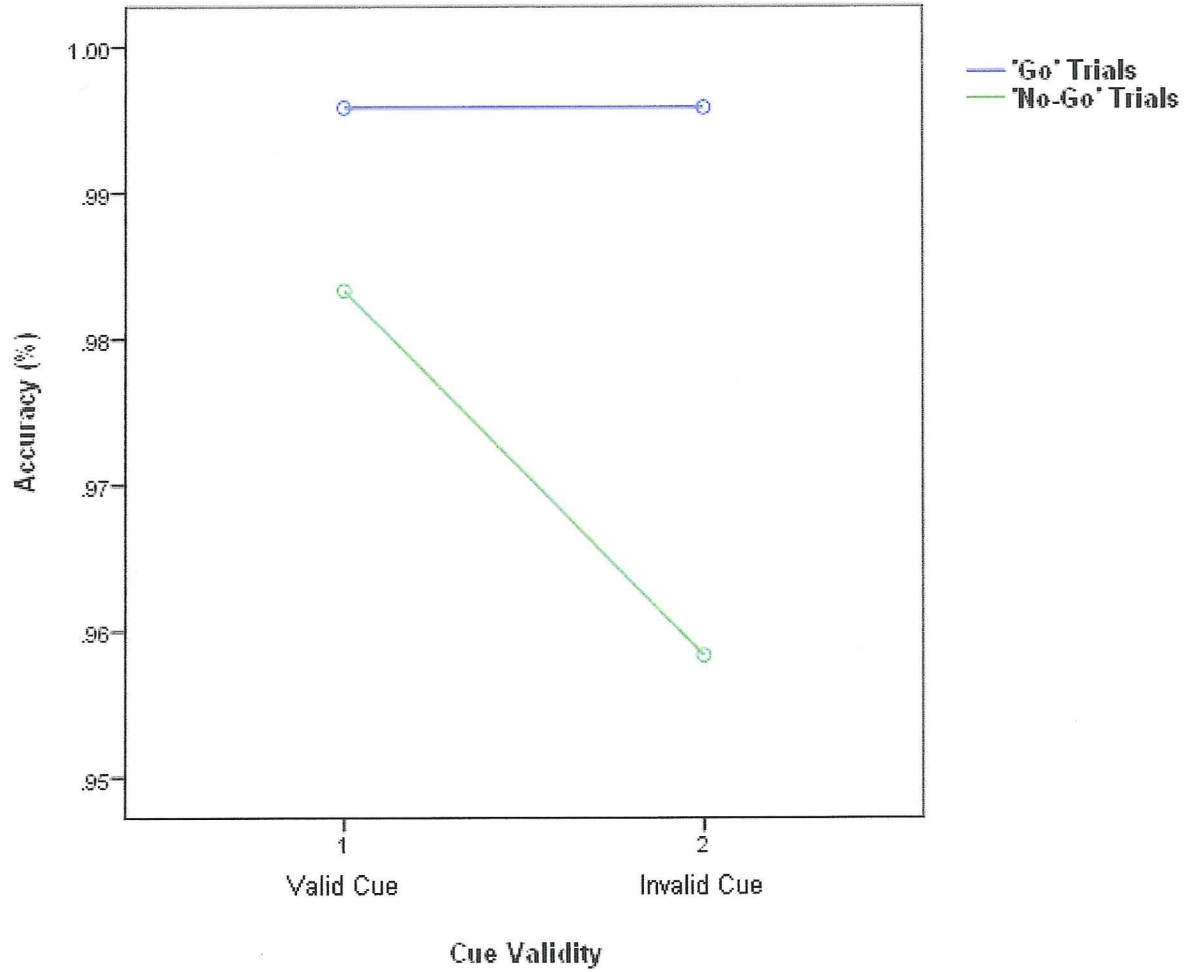


Figure 2. Mean accuracy (correct responses as a percentage of total responses) for valid and invalid cues, for both 'go' and 'no-go' trial states.