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Congruent acoustic stimuli increase the proportion of correct responses in an inspection time paradigm

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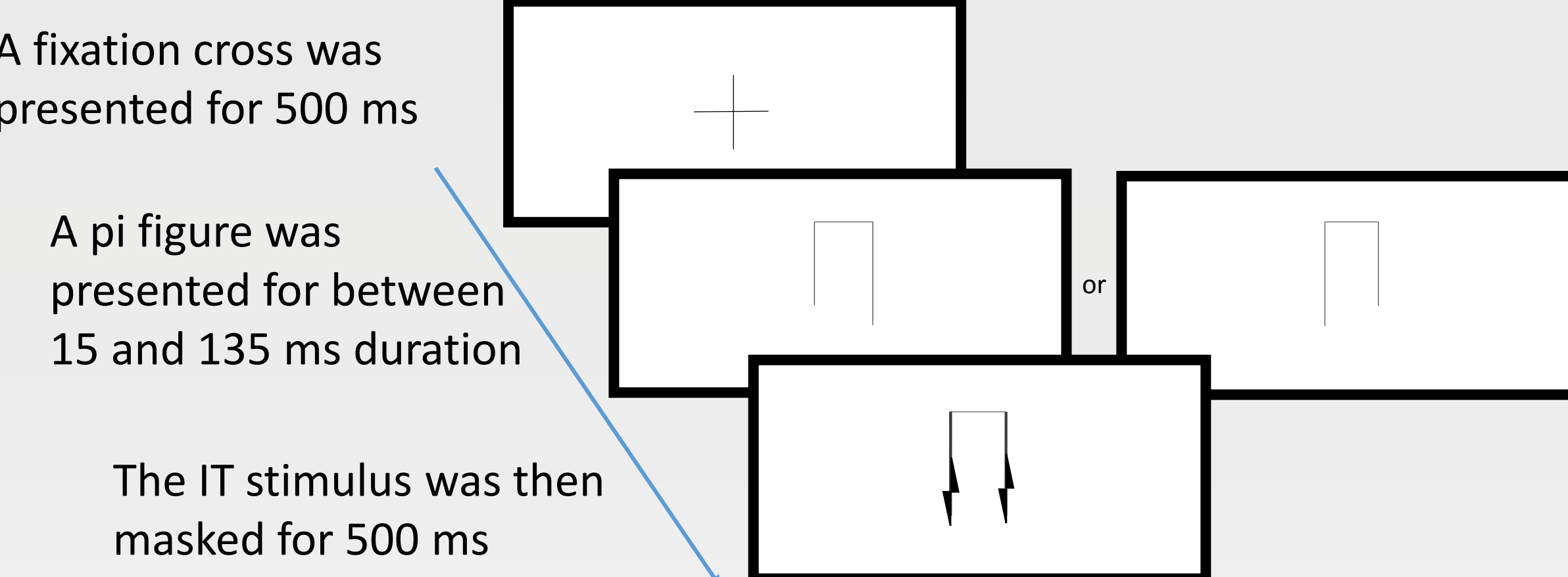
Background and Rationale

- Inspection time (IT) is a measure of the amount of time required to accurately identify a "pi" figure with differing leg lengths that is briefly presented (e.g., 15-150 ms) and then backward masked to prevent further visual processing¹.
- In reaction time (RT) paradigms an irrelevant accessory stimulus has been shown to affect a participant's RT (e.g., Simon effect)²; however, the origin of this effect is unclear.
- This study examined whether the presentation of spatially congruent/incongruent acoustic stimuli, that are irrelevant to the task, would alter perceptual processing of visual stimuli.

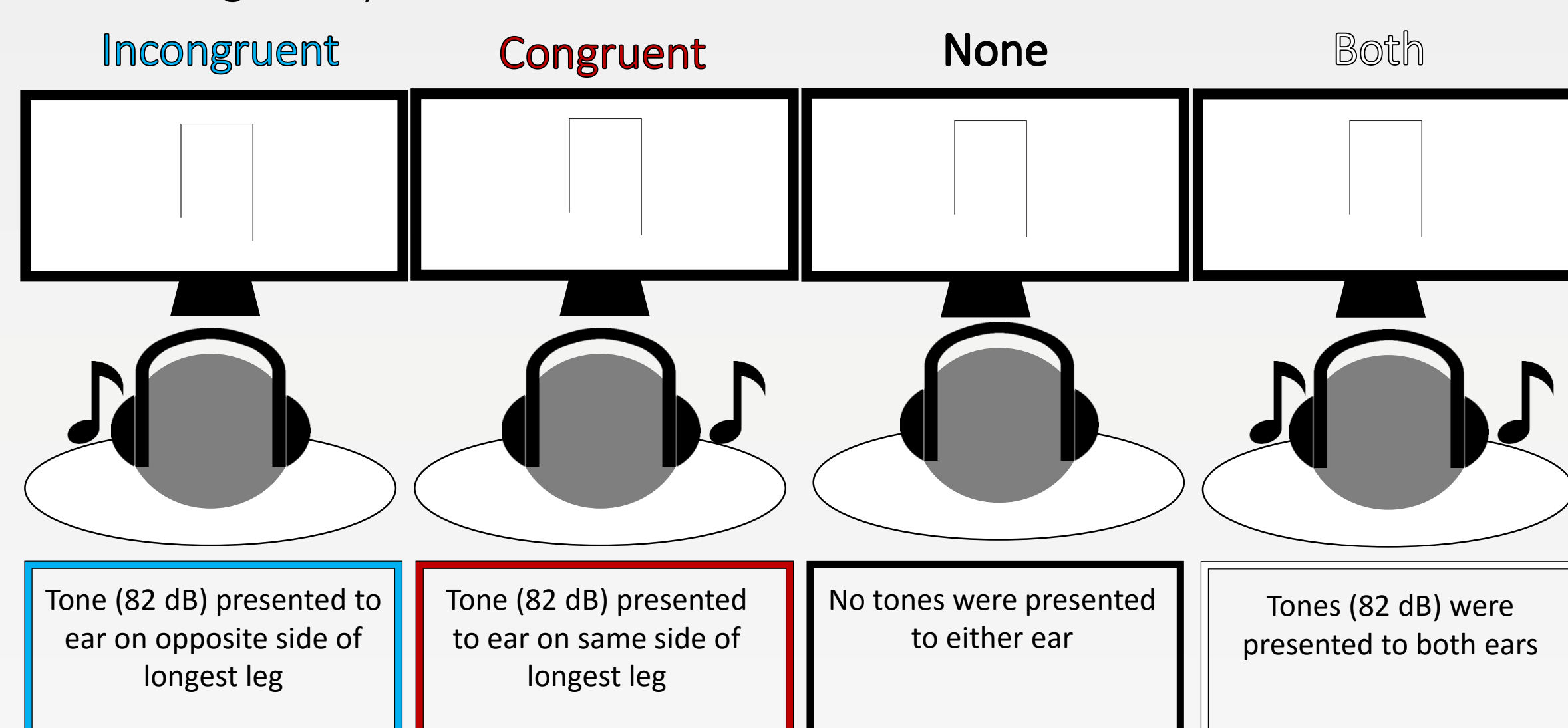
Question: Can spatially congruent or incongruent acoustic stimuli impact visual discrimination?

Methods

1. Participants (N=10) performed the following IT task:

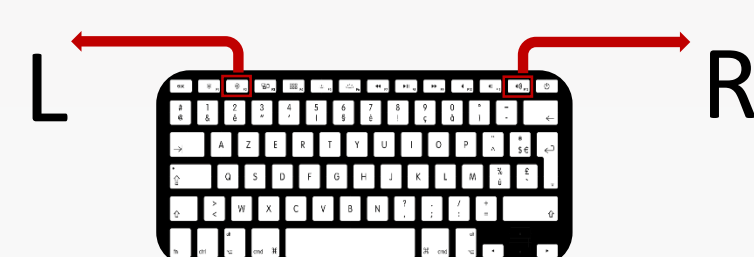


2. Four congruency conditions:



A 1000 Hz tone (82 dB) was presented simultaneous with the visual stimulus for 15 ms via headphones

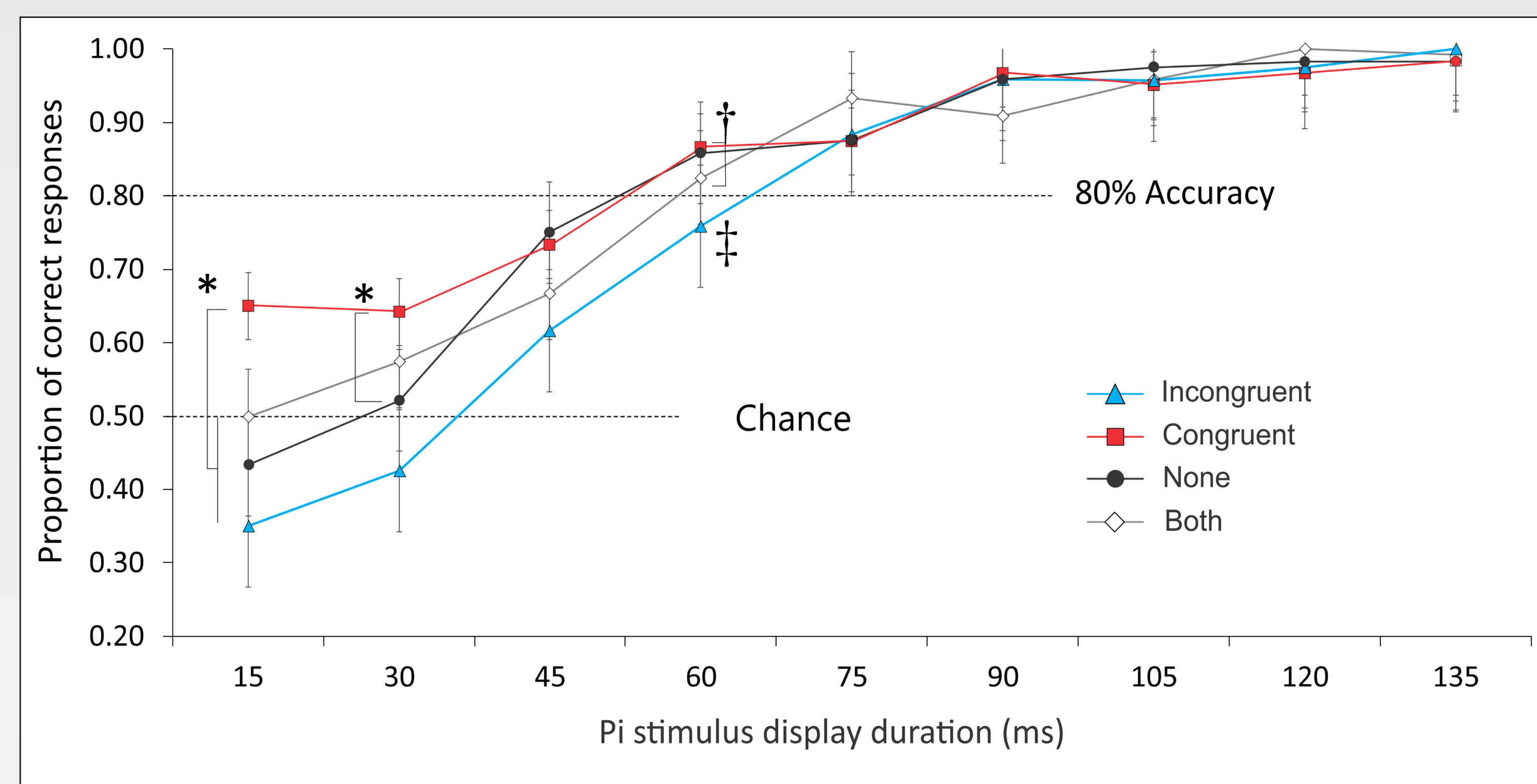
3. Participants manually responded via keypress to indicate which leg of the pi figure was longer:



Analysis

A 4 (congruency) x 9 (duration) Repeated Measures ANOVA was used to investigate the proportion of correct responses. Paired t-tests were used to examine differences within durations. Chi-square analyses were used to determine where proportions of correct responses were greater than chance.

Results



- Congruent** stimuli resulted in a significantly higher rate of correct responses at the two shortest visual presentation times (interaction effect, $F(24,216) = .204$, $p = .004$).
- Incongruent** stimuli required a longer presentation duration to achieve a correct response rate greater than chance as compared to all other congruency conditions (χ^2 critical = 3.84).

Discussion

- At the shortest display durations participants were more likely to respond to the side of the acoustic stimulus although it provided no informational benefit. Several possibilities exist for this pattern of results:
- Participants may have voluntarily chosen the side corresponding to the acoustic stimulus because that was the only available information.
- Alternatively, the acoustic stimulus may have automatically activated the corresponding response to a higher degree by providing additional lateralized neural activation.
- When little visual information is available the auditory system may be assigned more weight, resulting in increased neural accumulation³ from irrelevant information.



References.

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- Simon JR, Rudell AP. Auditory S-R compatibility: the effect of an irrelevant cue on information processing. *Journal of Applied Psychology*, 1967; 51:300-304.
- Vickers D. Evidence for an accumulator model of psychophysical discrimination. *Ergonomics*, 1970; 13:37-58.