

## The Effect of Preparatory Motion and Visual vs. Audio Cues on Response Time

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### ABSTRACT

In many sports, athletes must perceive and interpret information quickly and effectively to provide sufficient time to plan and execute subsequent movements (Filipic et al., 2009). Preparatory movements in discrete motor skills may improve such performance by enhancing processes such as the stretch-shortening response (Bernardi et al., 1998). For example, in a tennis service return, athletes have incorporated a preparatory small vertical jump (referred to as a “split step”) to reduce reaction time (Filipic et al., 2017). Such preparatory movements are now being used by baseball and softball position players in an attempt to improve their fielding response. Supporting evidence for using such techniques is limited with no objective data reported. **PURPOSE:** The purpose of this study was to determine the effect of using a preparatory hopping motion on performance of lateral movements. **METHODS:** A convenience sample of 24 collegiate students ( $19.95 \pm 1.12$  years,  $1.68 \pm 0.79$  m,  $71.7 \pm 15.7$  kg), agreed to participate and provided informed consent. Each participant completed ten movement trials. Upon receiving either a visual or audible cue, participants moved 1.52 m (5 ft), either right or left, to press a response button. Movement direction was not considered as an independent variable but balancing trials between directions was used to simulate realistic conditions. Response time, defined as the time from cue presentation to button press, was measured as the dependent variable using a computerized system. Five trials each were performed with and without the preparatory movement and for the two cue conditions. The order of presentation was randomized between participants. A 2x2 (Cue x Preparatory Movement) repeated measures ANOVA was used to analyze the data. **RESULTS:** The mean (sd) fastest response time (ms) for participants performing no-hop preparatory motion with visual and audio cues was 814 (218) and 1203 (195) respectively while the mean (sd) fastest response time (ms) for participants performing the hop preparatory motion with visual and audio cues was 707 (238) and 1137 (257) respectively. There was no significant interaction between preparatory motion and type of cue ( $F_{(1,23)} = .497$ ,  $p > 0.05$ ). The hop preparatory motion significantly decreased response time ( $F_{(1,23)} = 7.829$ ,  $p < 0.05$ ) by 87 ms (8.6%). Responding to a visual cue decreased response time ( $F_{(1,23)} = 173.875$ ,  $p < 0.01$ ) by 409 ms (34.9%). **CONCLUSION:** These data suggest that use of a preparatory motion prior to making a lateral movement is effective at improving response time. Furthermore, this effect appears to be stronger when responding to a visual cue. Based on these findings, if a fielder can perform this skill to decrease their response time, they may improve their chances of successfully fielding a hit ball.