INTRODUCTION

- It has been thought that eye height helps determine shoulder width through an eye height: shoulder width ratio \(^1\).
- It remains unclear as to whether changes to both of these body dimensions influence our integrations between perceiving and acting within an environment.
- Critical Point (CP) is defined as the moment in which the individual is inclined to change their actions based on their action capabilities for a given environment \(^2\).
- The purpose of this experiment is to investigate the changes, if any, that altered body dimensions have on CP.
- Medial lateral center of mass at time of aperture crossing (ML COM @ TOC) reveals where the body is in space when crossing the aperture; changes in these values across conditions would indicate a change in CP.

METHODOLOGY

Participants
- \((N=16; 18-25\text{ years}; height=172.3\text{cm}, width=46.2\text{cm})\)
- Optotrak system collected kinematics (60Hz)
- HTC Vive Pro headset simulates a VR helmet

Paradigm
- Aperture crossing at 6 widths (0.8-1.8x shoulder width) in four conditions:
  - Normal (no changes) Wide (hold 60 cm bar at navel) Tall (height. increase) Both (hold bar + heightt. increase)

Analysis
- ML COM @ TOC (cm; ML spatial requirements)
- AP point of deviation (AP POD; AP spatial requirements)
- Approach speed (cm/s) prior to crossing aperture
- Repeated measures ANOVA (condition x aperture width)

RESULTS

- Eye height: shoulder width ratio is relatively robust.
- Participants adapted quickly to changes in width (i.e., no change in CP) most likely because of proprioceptive inputs \(^3\).
- Altering eye height has significant effects on one’s perception of shoulder width such that aperture crossing was affected.
- The effect of changes to eye height is not due to an order effect because CP returned to normal during “Both” condition.
- Proprioception alone can be sufficient to quickly adapt to changes in shoulder width.
- Hockey players may be required to adapt to changes in both height (skates) and width (shoulder pads).
- The central nervous system heavily relies on the visual system to perform perception-action integration. Damage to the visual system could severely impair one’s ability to successfully navigate apertures.

DISCUSSION & IMPLICATIONS

- Critical Point (CP) is defined as the moment in which the individual is inclined to change their actions based on their action capabilities for a given environment.
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REFERENCES