P1-G-46

Gaze diversion affects cognitive and motor performance in young adults when stepping over obstacles.

Does it matter where you look during obstacle crossing?

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INTRODUCTION

- Visual information of an obstacle allows a person to step over it safely [1].
- Gaze is frequently diverted, which may impair the ability to gather visual information about obstacles since the same perceptual system (vision) is being used, called *structural interference*.
- Gaze diversion should only affect performance if the location of the gaze restricts the gathering of visual information relevant to the task.

PURPOSE

- The purpose of this study was to determine how gaze diversion affects young adults while standing versus during obstacle crossing.

METHODS

1. 17 young adults (20.9 ± 1.9 yrs.)
2. Two tasks: standing, walking and stepping over an obstacle [Figure 1]
3. Gaze diversion: on the obstacle, at eye level away from the obstacle [Figure 1]
4. Five conditions with 20 trials for each condition

[1] Hollands et al. In Locomotion and Posture in Older Adults, 2017.
[2] Miyasike-daSilva McIlroy, Exp Brain Res, 234(11), 3233-43, 2016.
[3] Heijnen et al, Exp Brain Res, 223(2), 219-31, 2012.

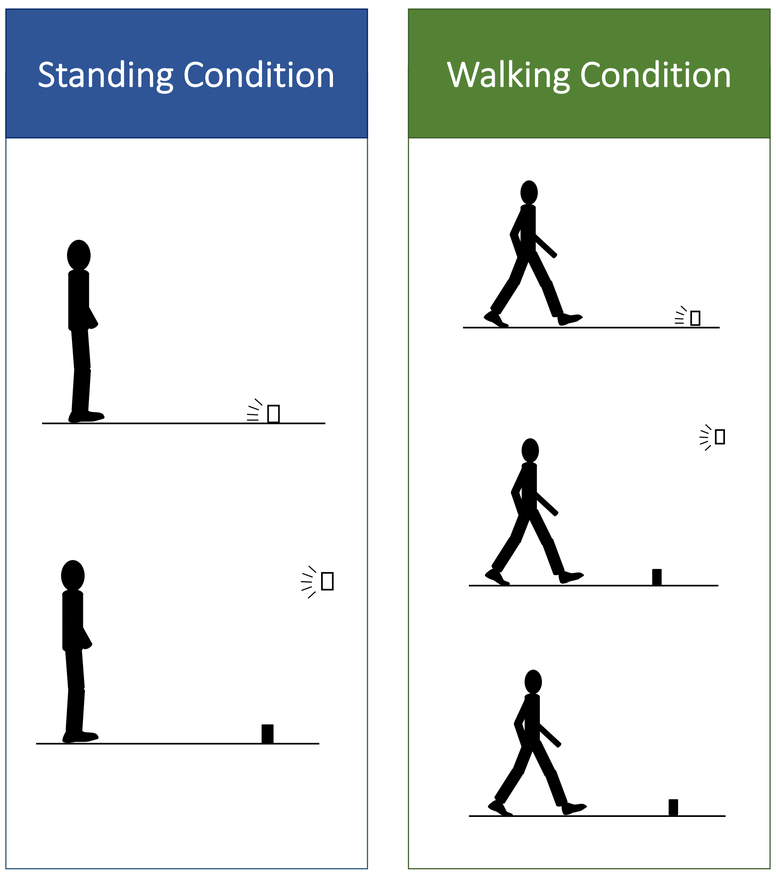

FIGURE 1. 17 young adults completed a simple RT task while standing or walking. The RT cue light was either on the obstacle or at eye level.

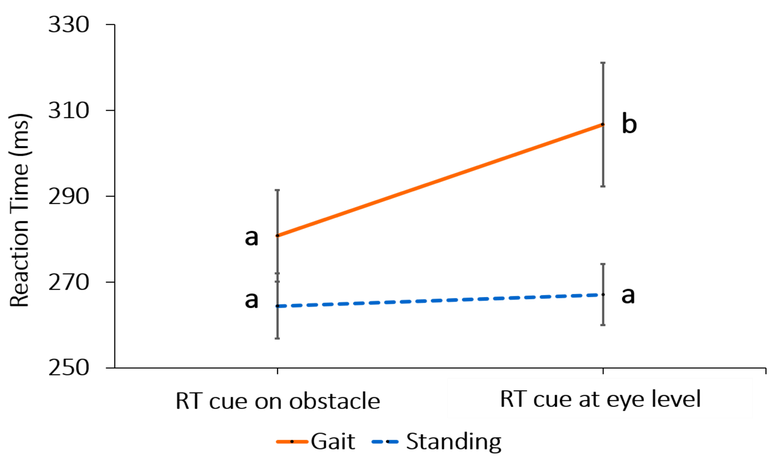

FIGURE 2. RT demonstrated an interaction of cue location by task (p=0.01). RT was the same during the standing task, and was longer when gaze was diverted away from the obstacle during walking. Different letters distinguish statistically significant differences.

RESULTS AND DISCUSSION

- The location of the RT task only affected the walking task (p=0.01), but not the standing task [Figure 2].
- RT variability was greater in walking task (p<0.001).
- When the gaze was diverted away from the obstacle, the trail foot placement was closer to the obstacle compared to the gaze diverted to the obstacle (p=0.002).
- Closer foot placement increases risk of tripping [3].

CONCLUSIONS

- Impaired performance in the gait task likely resulted from structural interference as the same perceptional mechanism, vision of the obstacle, was used for both the cognitive and gait task.
- In the standing task, vision of the obstacle was only relevant for the cognitive task, so no structural interference was evident.
- The role of vision is critical for young adults while obstacle crossing, and future studies should explore how diverted gaze affects older adults during adaptive gait.

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