Why the Driver is Never Sick: The Role of Control and Gender in V.I.M.S.  
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Background

Through research and innovation engineers have produced better vehicles, locators, and plans that suppress the motion characteristic that make people motion sick (though not intentionally). The vehicle is itself an engineering marvel with a body built to withstand the stress of the road and the air current around it. However, while the vehicle is designed to handle the stresses of the road, the human body often cannot. The lack of motion sickness in the vehicle is due to the design of the vehicle, not the body. In the case of the human body, the lack of motion sickness is due to the design of the body, not the vehicle.

Research Objectives

- The main objective of this study is to explore the relationship between the role of control and gender and the occurrence of motion sickness.
- We expect participants to exhibit greater head motion variability relative to the drivers’ motion (resulting from the participant’s inability to behave as they are supposed to) than the passive participants.

Methods

Participants

- 36 participants (3 males, 9 females) were run in same-gender pairs
- All participants had normal or corrected-to-normal vision and were in good health with no history of inner ear (vestibular) dysfunction or dizziness
- Participants were required to come for two consecutive sessions and were paid for their participation
- Participants were aware that there was a chance that they would become motion sick.

Materials

- Head Mounted Display: Two virtual reality glasses SVGA 3D AO-AD1317 (C) display systems, (CA) personal displays were used to present the virtual environment
- Headset: SanDisk computer gamepad was used to control movement within the VE

Motion Tracker: body movement was tracked using a magnetic tracking system (Flock of Birds, Ascension, Inc.) Four sensors were used (see Fig. 1). Motion was sampled at 60 Hz.

Stimulus

Driving Simulation: A commercial driving simulation (Need for Speed, EA Sports, Inc.) was used for the control trials. For the experimental trials, the same track was used for all conditions (the track was reversed for the second session).

See Figure 2 for screenshots of stimuli.

Data & Analyses:

- Motion data was collected in six axes of motion (AP, Lateral, Vertical, Roll, Pitch, & Yaw) for each participant
- We analyzed the SSQ to determine whether the simulation produces symptoms of sickness
- We analyzed the variability, velocity, and range of head motion in the AP and Lateral direction
- We conducted a 2 (Gender: Male, Female) x 2 (Role: Control, Passive) x 2 (Trial: 1st, 2nd) ANOVA

Analysis

- We analyzed the correlation between head motion of the driver and the passenger for the three experimental conditions.
- The correlation between the head motion of the driver and the passenger was stronger for the control condition than for the passive condition.

Discussion

- The results of this study suggest that the role of control and gender play a significant role in the occurrence of motion sickness.
- Men and women may have different perceptions of control and how it affects their experience of motion sickness.
- The results of this study may have implications for the design of future vehicles and the development of motion sickness prevention strategies.

References and Acknowledgments