A person wearing a VR headset is driving a car in a simulated environment. The background shows a street with buildings and a clear sky. The car's interior, including the steering wheel and dashboard, is visible in the foreground.

Vehicle Control and Driver Workload During Simulated Driving: Can Cue Substitution Compensate for Lower Simulator Feature Fidelity?

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July 23rd, 2021

Simulator Fidelity and Cue Substitution

Visual Cues: Wraparound screens and projectors



Motion Cues: Fixed-base

Visual Cues: Virtual Reality Headset



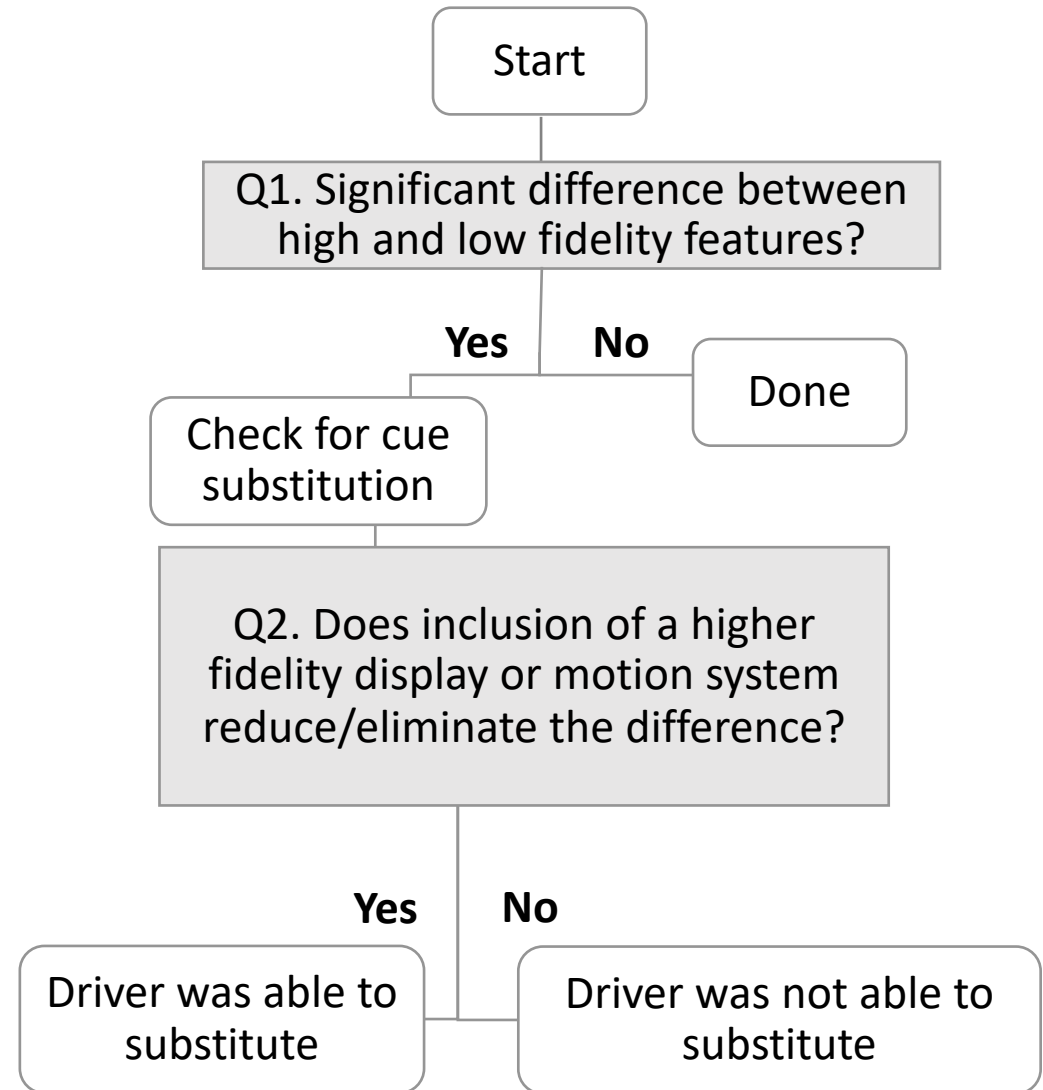
Motion Cues: 6-DoF Motion Platform



Apparatus and Analysis

Subsystem	Higher Fidelity Features	Lower Fidelity Features
Visual Display	Wraparound Screens + HD Projectors	Virtual Reality Headset
Vehicle Controls	Active force feedback wheel + pedals	Passive force feedback wheel + pedals
Motion Platform	Static/Fixed-base	6 DoF Dynamic

Measures: Lateral (SDLP) and longitudinal control (coefficient of variation)



Results and Conclusions

Q1. Significant difference within subsystem?

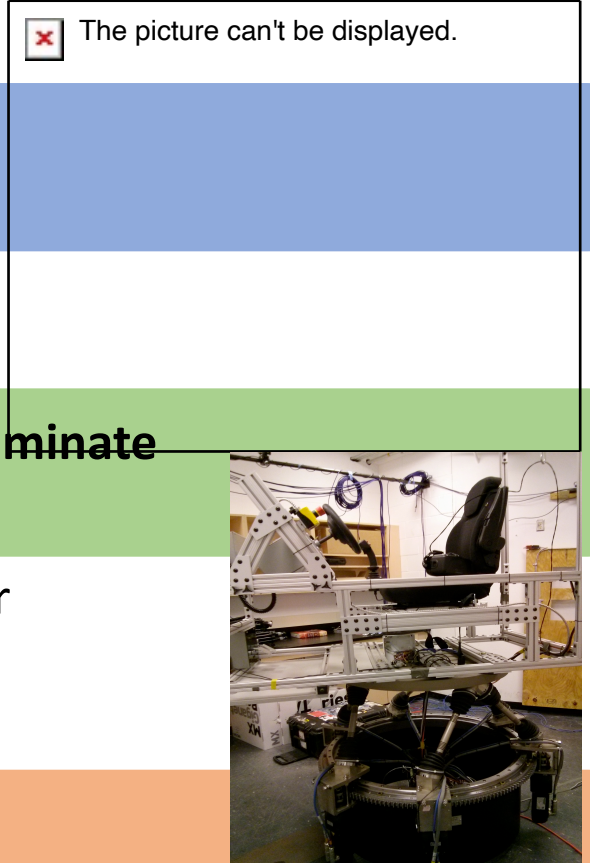
- Only between the higher and lower fidelity vehicle controls


Q2. Did the inclusion of a higher fidelity display or motion system reduce/eliminate the difference?

- Some evidence that cues from the motion platform could compensate for lower fidelity steering wheel and pedal feedback

Conclusions

- Provides a method to quantify cue substitution
- Can cue substitution compensate for lower simulator feature fidelity?



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