

# The Use of a Virtual Cane for Improving Standing Postural Stability

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## Research Question

- Does the Virtual Cane (VC) improve one's postural balance during standing on an unstable environment?

## Instrumentation

- A customized VC, see Fig. 1A. The cane provides distance information through hands so that users can adjust their posture to maintain balance. A graphic user interface was also developed to control VC settings wirelessly.
- A dual-axis robotic platform was used to simulate a compliant environment, see Fig. 1B.

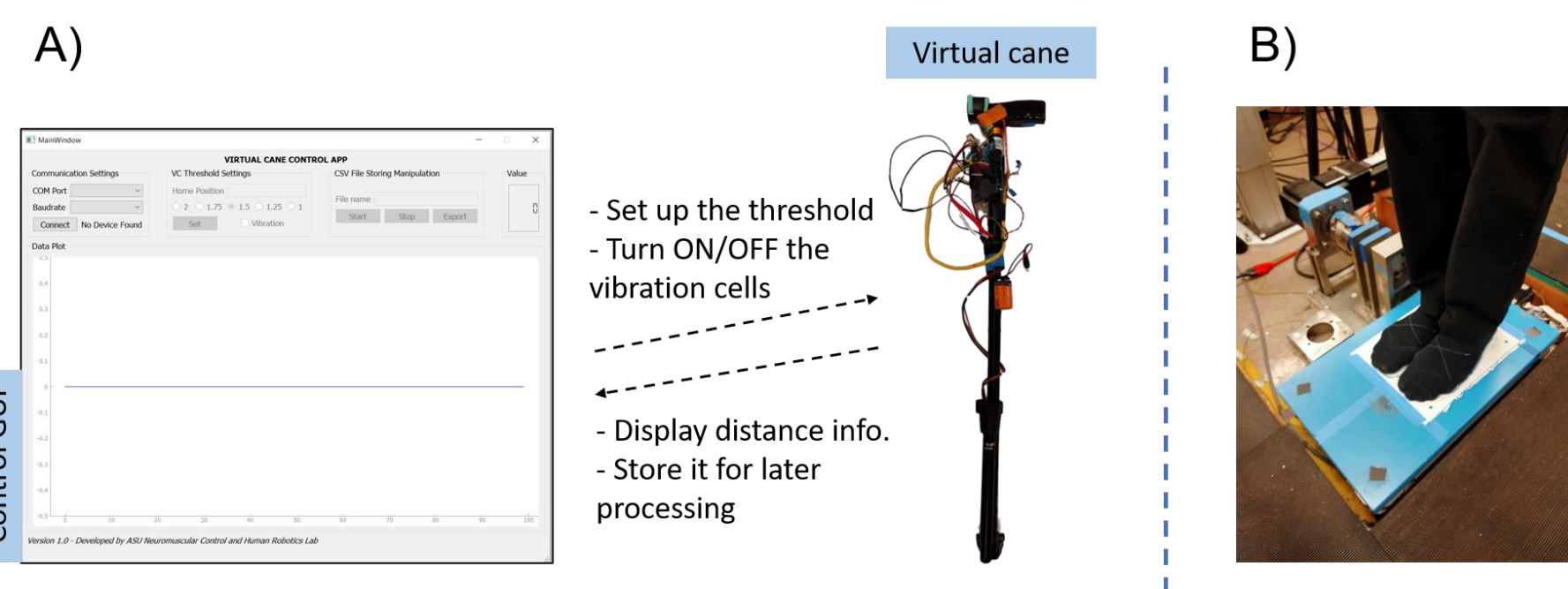
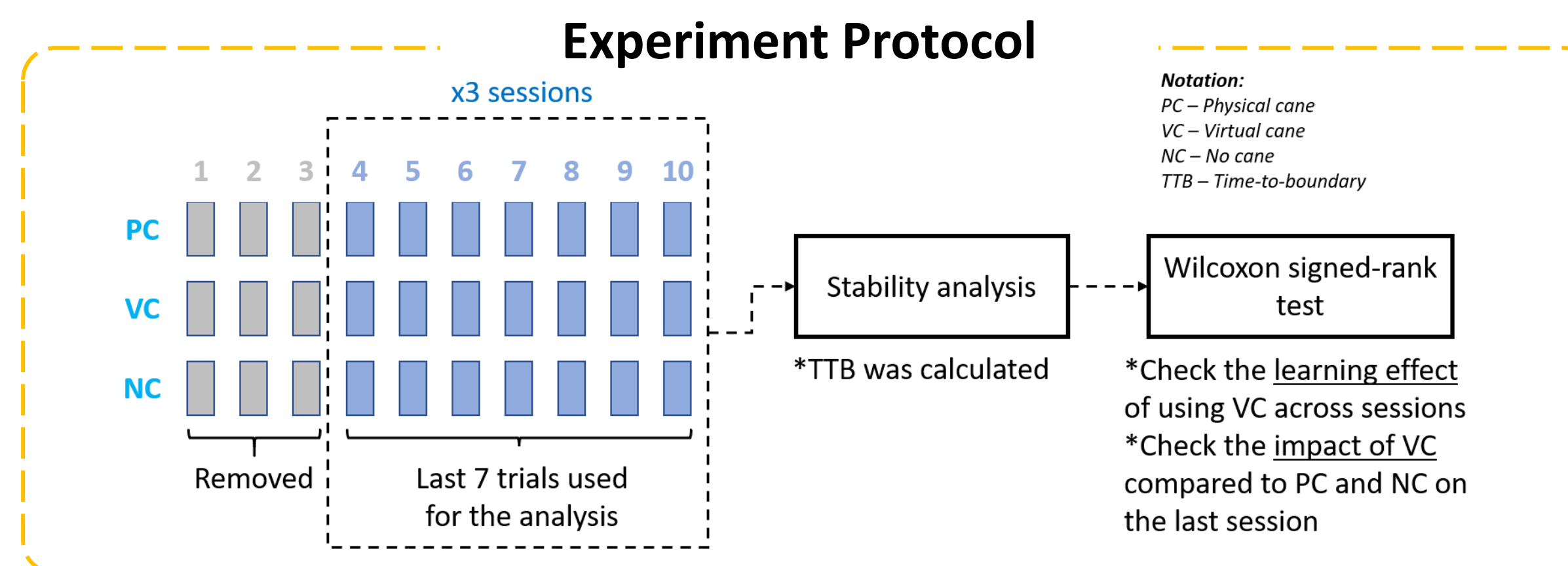


Fig. 1. A) Virtual Cane and its control GUI for experiment settings, and B) the dual-axis robotic platform to simulate a compliant environment

## Methodology

- Five healthy subjects participated in this study.



- A questionnaire was provided to each subject after each session to collect their ratings of VC benefit.

## Results

- VC significantly improved one's standing balance in the medio-lateral direction, see Fig. 2.

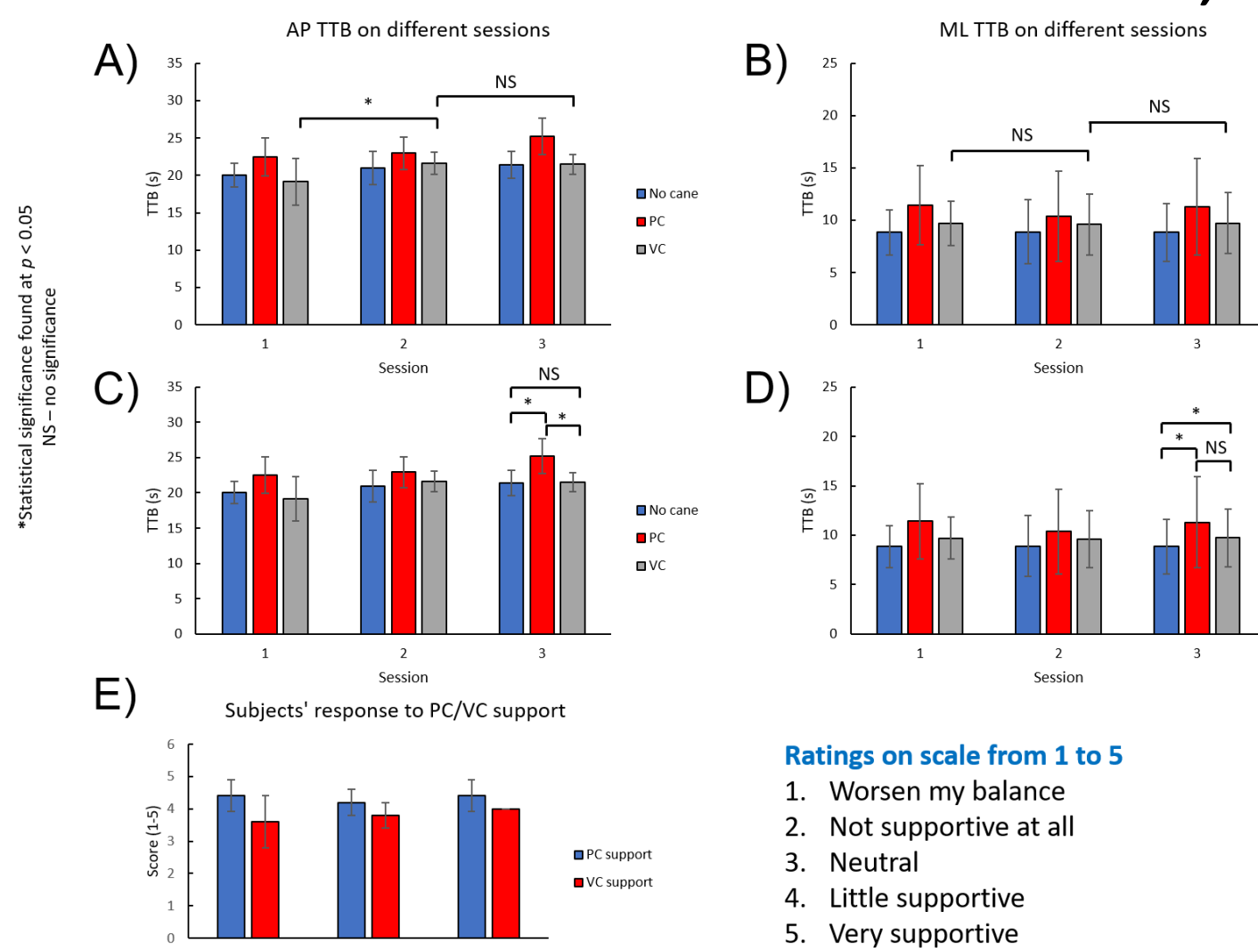


Fig. 2. A) and B) Learning effects of VC use on postural stability. C) and D) Comparison between VC, NC, and PC. E) Subjects' response on VC and PC benefits during standing balance across 3 sessions.

## Implication

- This study suggested that *the VC* can be used to improve one's postural balance under unstable environments.
- Results also revealed that subjects can effectively use the VC after *only two sessions* of the experiment.

## Future Work

- The VC size* should be reduced to be more applicable in daily use.
- Data from mobile devices can be used to improve the performance of the VC.

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