

# Vibrotactile stimulus detection during Fitts aiming: Implications for the use of biofeedback devices during skilled, manual tasks

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## Background

- Can we use a vibrotactile feedback device to reduce musculoskeletal injury risk in healthcare workers?
- Device should not interfere with manual tasks
- We used a dual-task paradigm to measure vibrotactile detection and motor performance to quantify possible interference

## Methods

30 participants (4 men, 25 women, 1 non-binary; mean age = 19.03 ± 1.30)

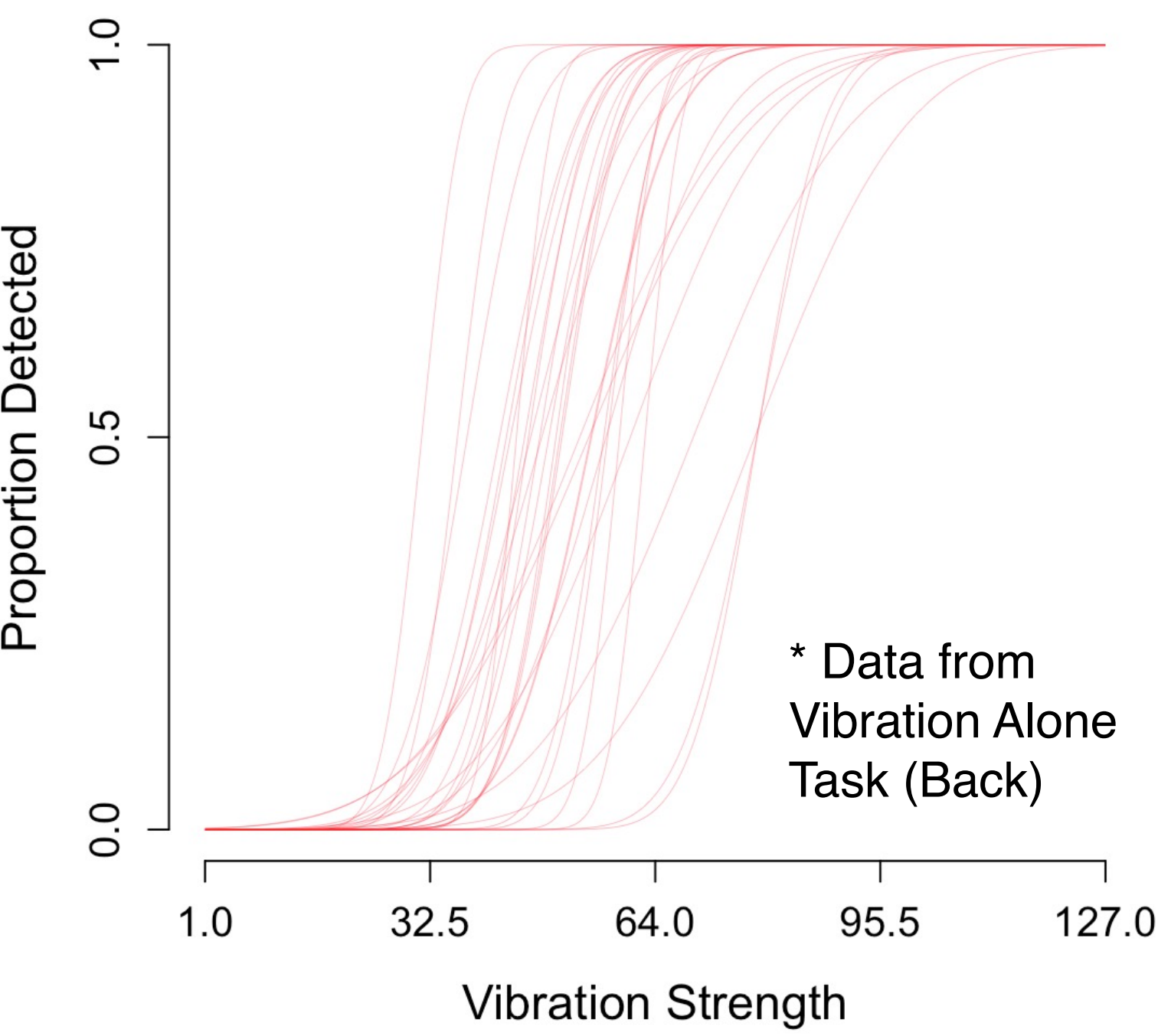
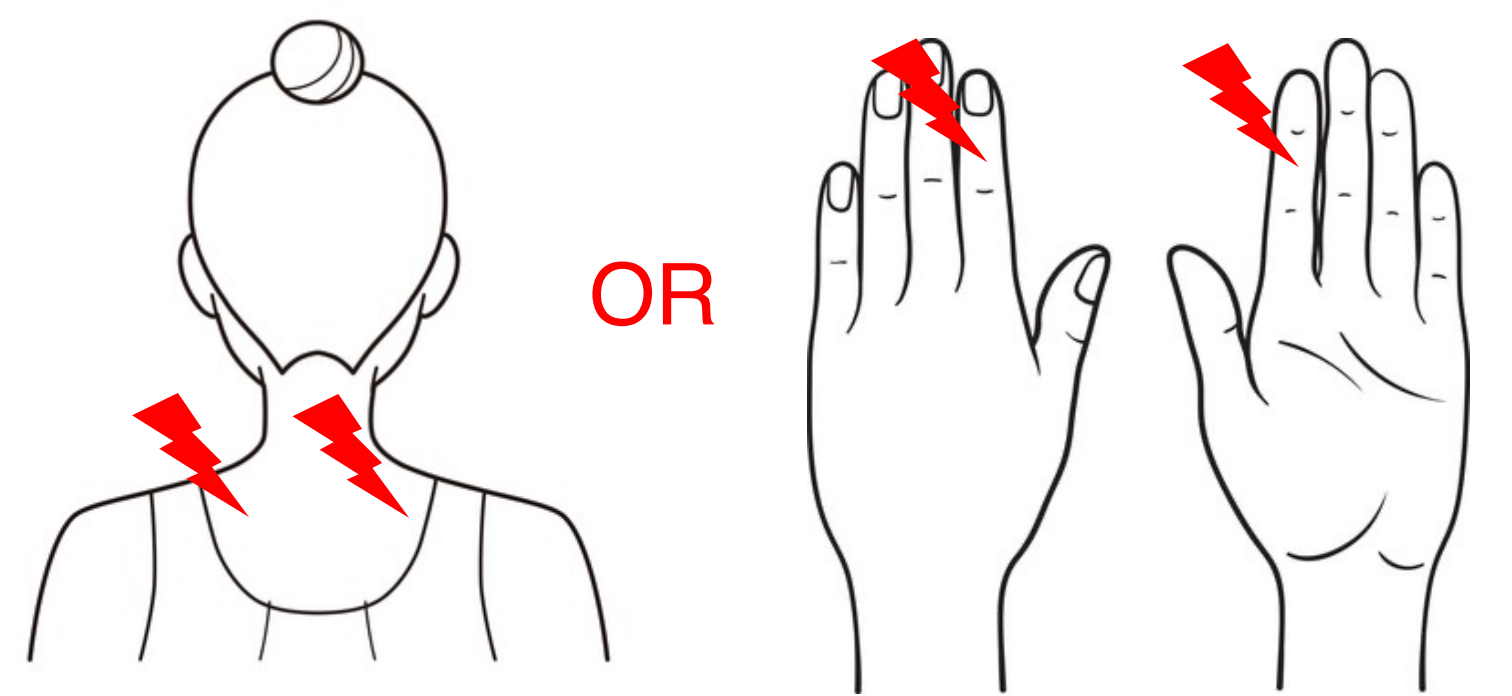
### Day 1 ----->

| Vibration Alone*<br>(until threshold) | Motor Alone<br>(256 trials) | Dual-Task*<br>(480 trials) | Motor Alone<br>(256 trials) |
|---------------------------------------|-----------------------------|----------------------------|-----------------------------|
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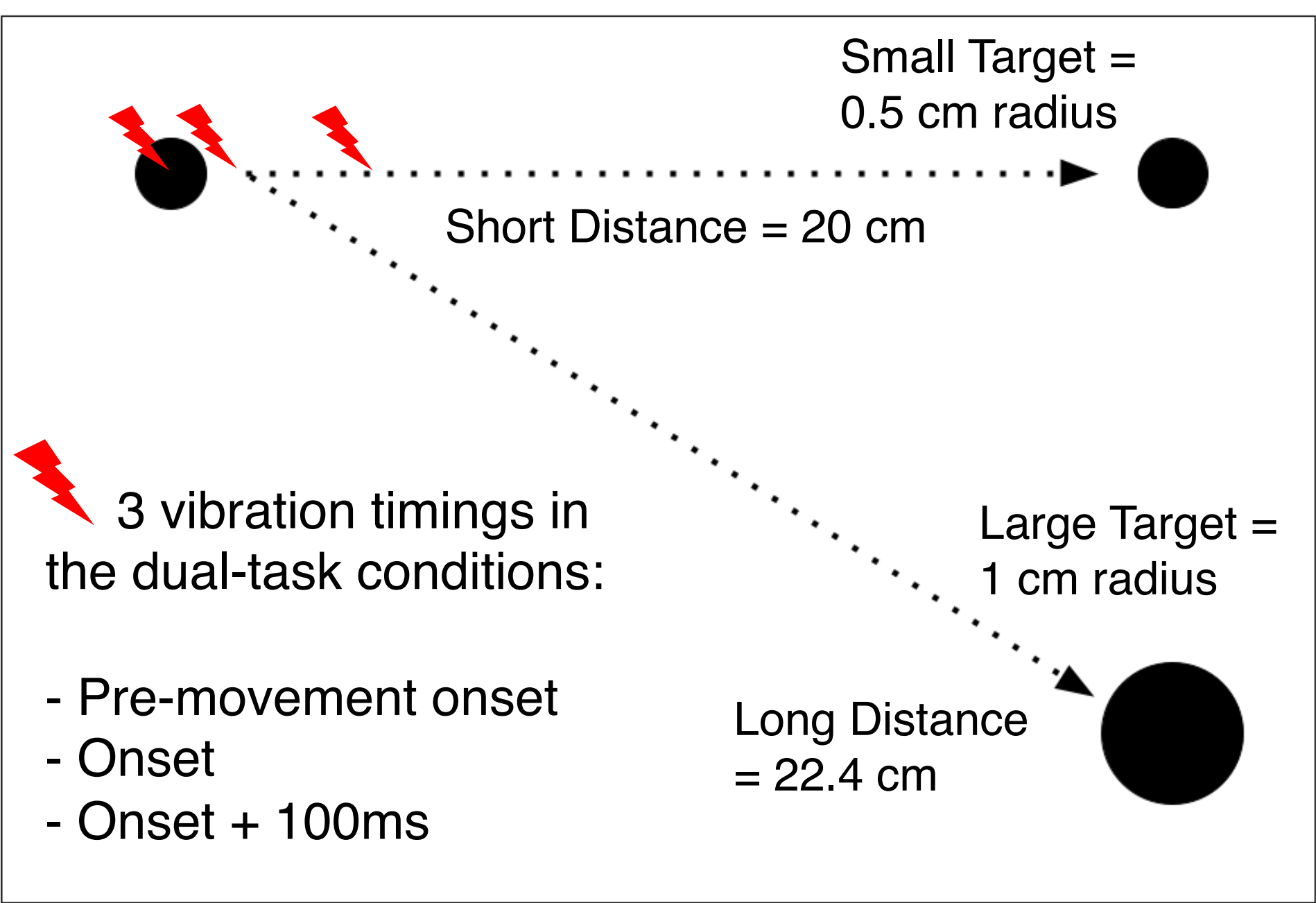
### Day 2 ----->

| Vibration Alone*<br>(until threshold) | Dual-Task*<br>(480 trials) | * Back and Hand were counterbalanced across days |
|---------------------------------------|----------------------------|--------------------------------------------------|
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### Vibrotactile Detection Task



### Motor Task



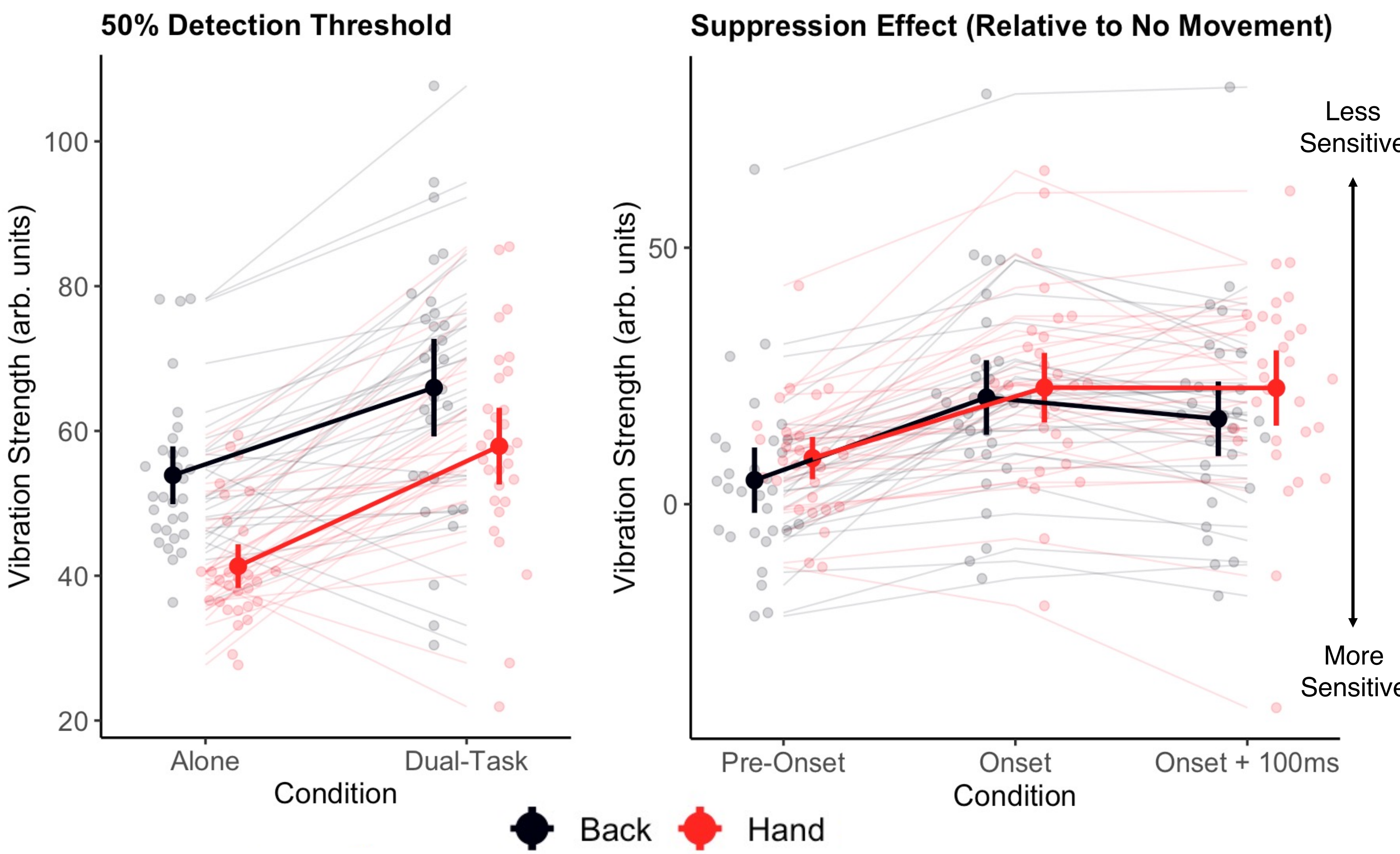
Motor Task was performed using a Wacom Intuos Pro tablet + stylus

Vibrotactile Detection Task was performed using a custom-built Arduino device

## Conclusion

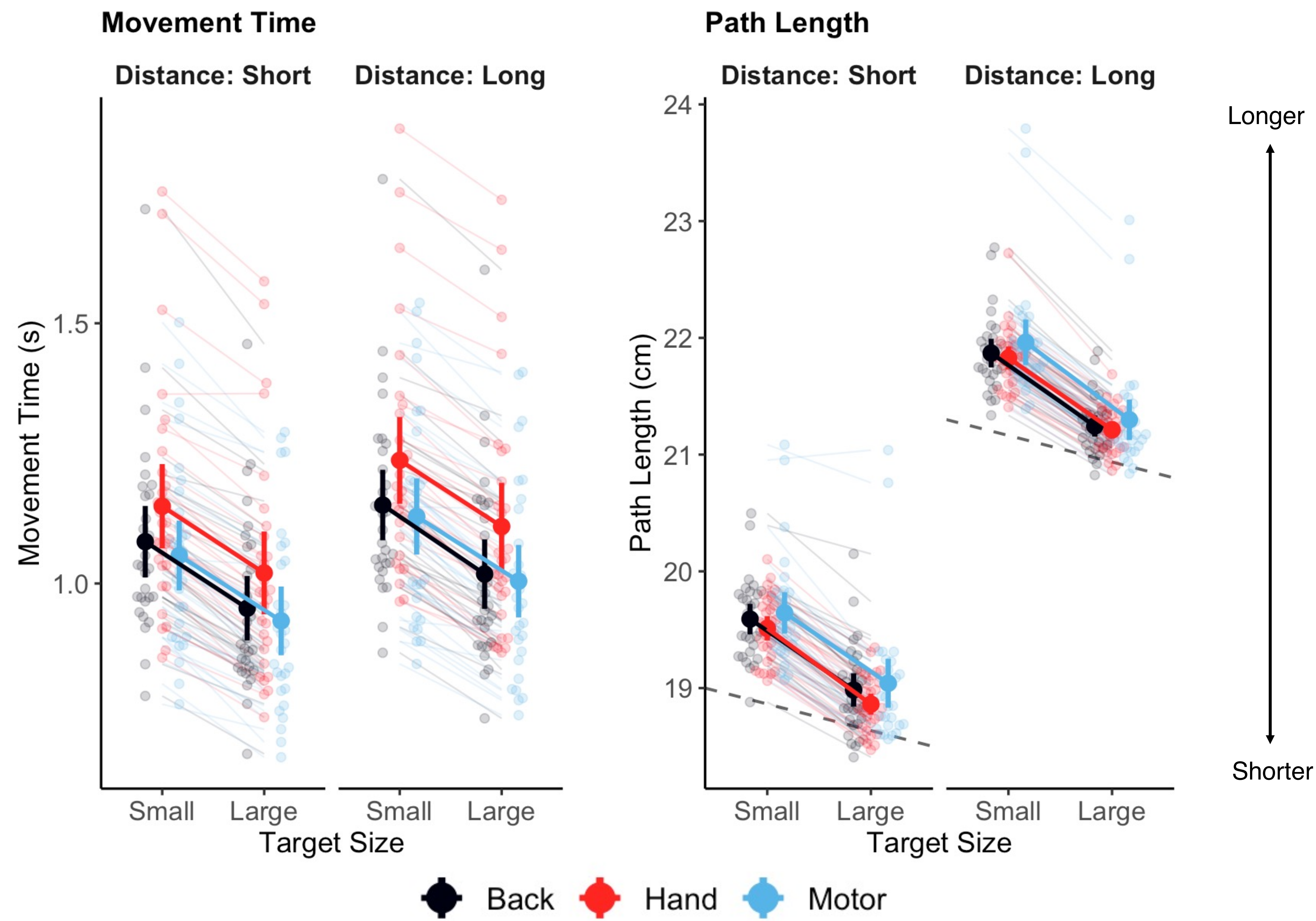
- Sensitivity to vibration is reduced *during* movement for both the back and hand, but only vibration on the hand affects motor performance
- Strong feedback delivered to the back should be readily detectable without impeding motor performance

## Vibrotactile Detection Task



Less sensitivity to vibrotactile stimulation on the back, and when the hand is in motion

## Motor Task



Movement Time is longer when the hand is stimulated, for small targets, and for long distances

Path Length is longer for small targets and long distances

