



Transcutaneous spinal direct current stimulation does not appear to improve simple reaction time

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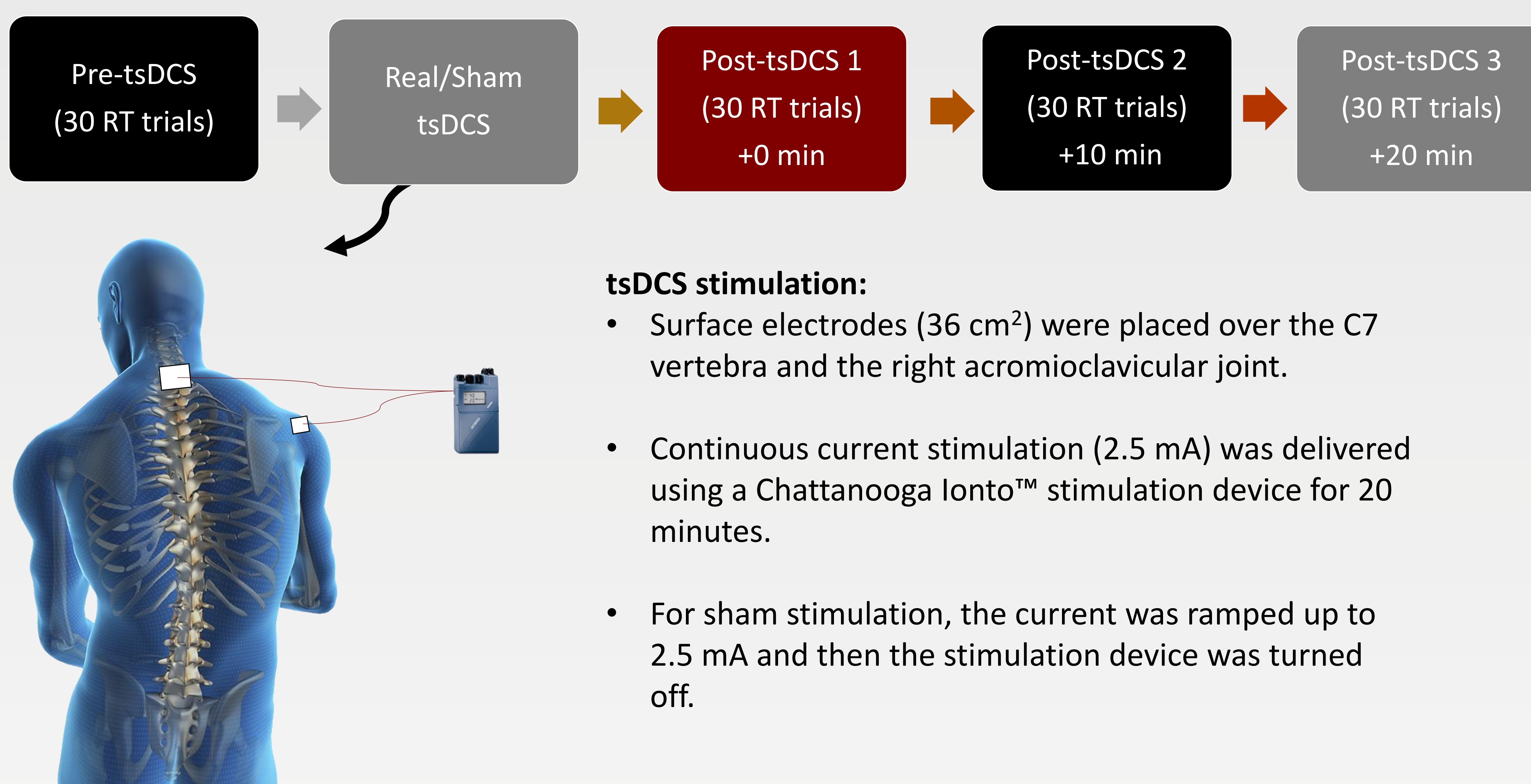
Background

- Transcranial direct current stimulation (tDCS) is a non-invasive, electrical stimulation technique that can be used to increase cortical excitability and improve functional capabilities¹.
- More recently, studies have shown that transcutaneous spinal direct current stimulation (tsDCS) can also increase excitability in the tissues of the peripheral nervous system for up to 2 hours².
- This study examined whether the increased excitability brought on by tsDCS can translate into functional changes in a simple reaction time (RT) task.
- It was hypothesized that tsDCS would improve RT for at least 20 minutes after the end of stimulation.

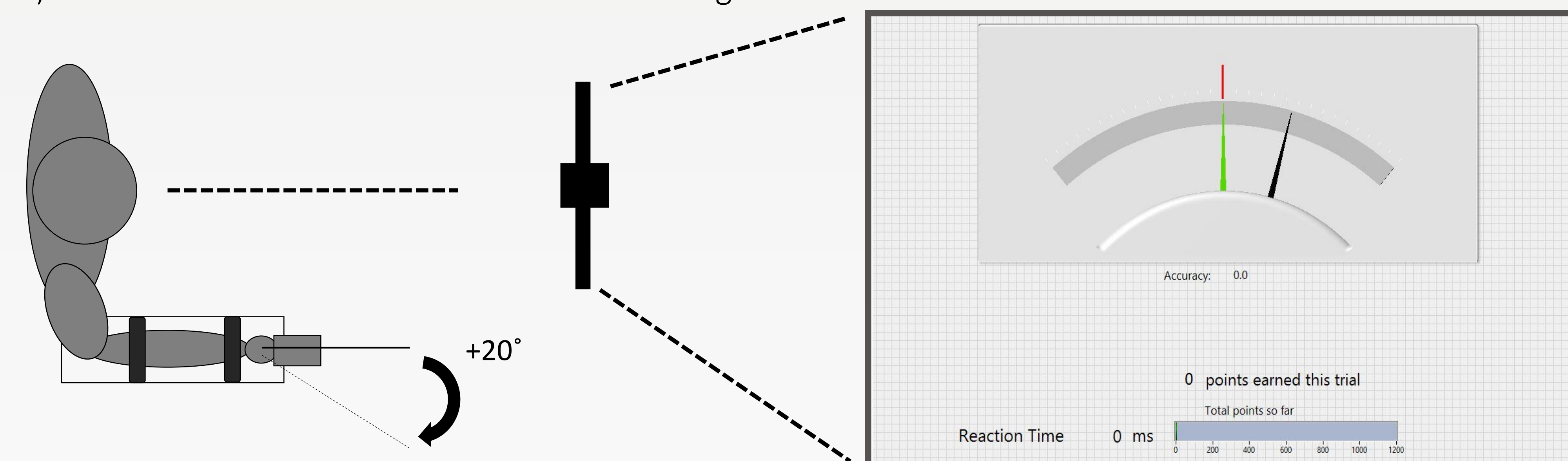
Question: Can increased spinal excitability induced by tsDCS improve simple RT?

Methods

1) Participants (n=6) were given real and sham tsDCS stimulation on two separate testing days with a minimum washout period of 48 hours:



2) Reaction time was measured for the following wrist extension task:



Electromyography (EMG) collected from:

- Right extensor carpi radialis longus (Agonist)
- Right flexor carpi radialis (Antagonist)

Visual display seen by participants:

- RT and movement accuracy feedback were provided following every trial.
- An auditory warning signal was provided followed by an auditory go-signal.

Results

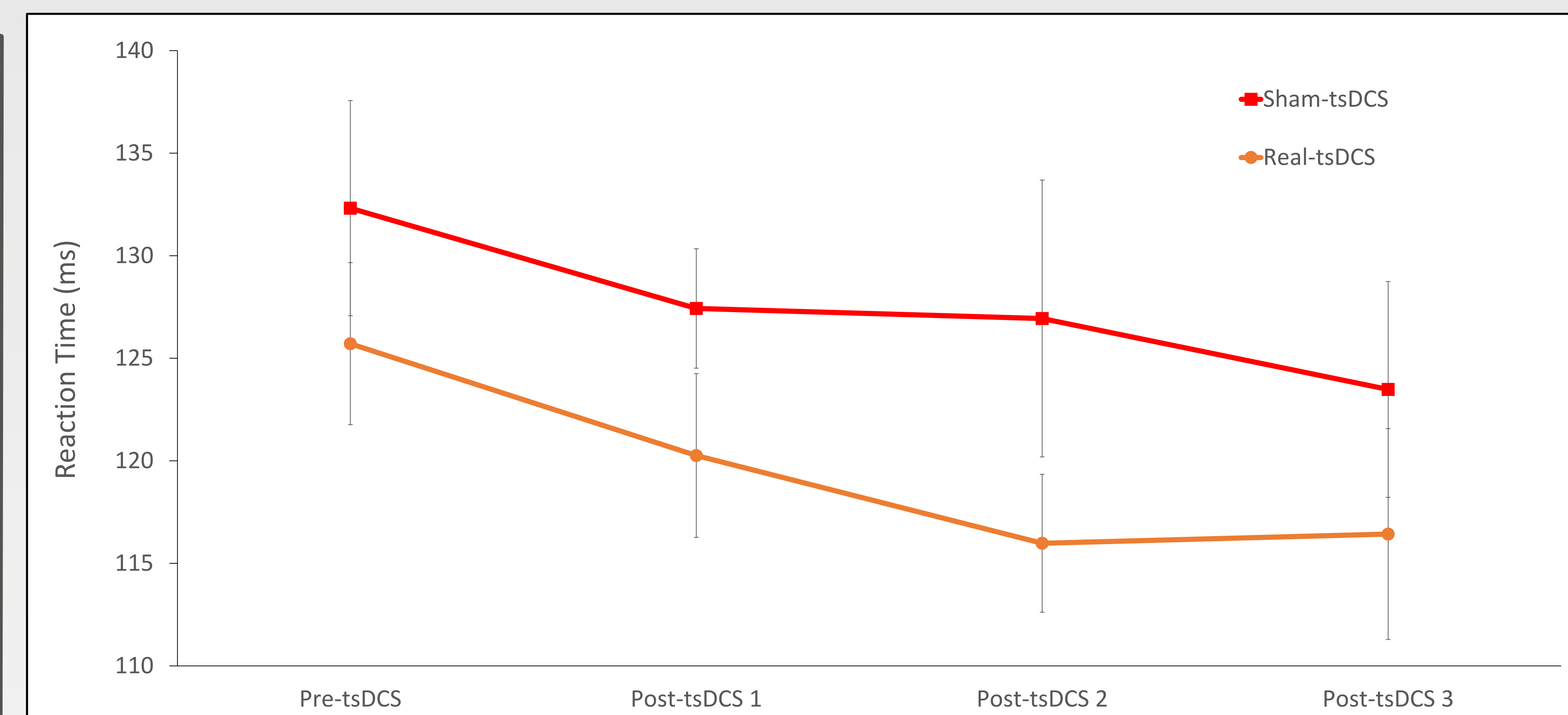


Figure 1. Mean (SE) premotor reaction time (RT) for **real** and **sham** tsDCS stimulation across experimental blocks. No significant differences ($p > .05$) were found between stimulation conditions or testing times.

- Results showed that tsDCS did not lead to measurable behavioural changes.
- Premotor RT appears to improve after stimulation; however, there were no significant differences ($p > .05$) between sham-tsDCS and real-tsDCS.

Discussion & Conclusion

- The current study suggests that increased spinal excitability brought on by tsDCS stimulation does not appear to cause any improvements in simple RT compared to sham stimulation.
- A previous study showed little effect of tsDCS on spinal excitability³. If spinal excitability is not increased, no improvements in RT would be anticipated.
- Alternatively, the results could be due to small sample size (n=6), or individual variability in response to tsDCS.