

Mouse motion measures improve SSRT in impulsivity assessment



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INTRODUCTION

ADHD and other disorders are characterized by impulsivity. It is studied through both questionnaires and performance-based tasks. However, these measures rarely correlate with each other (Toplak et al., 2013). **Why?**

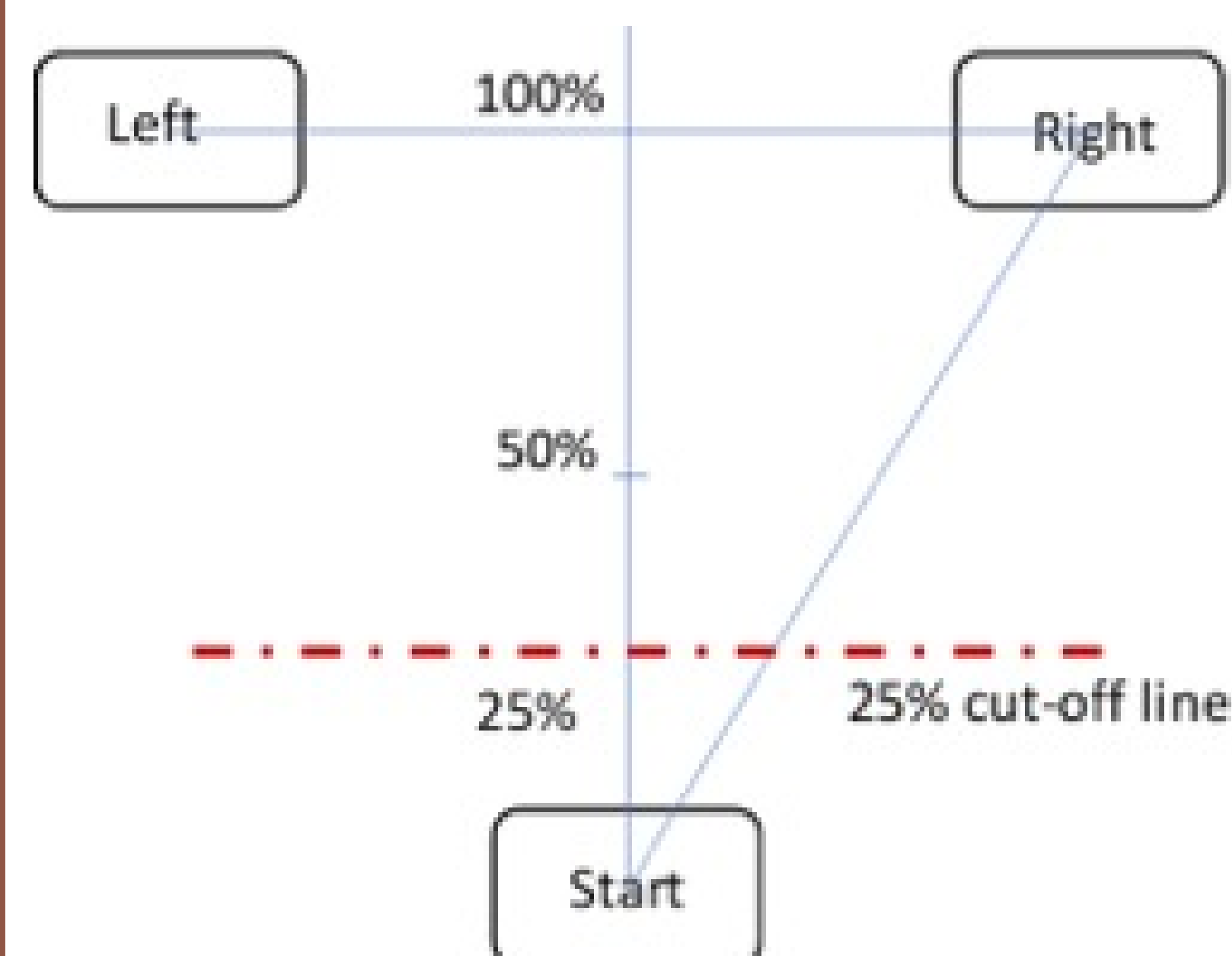
- Decision-making is dynamic (Stillman et al., 2017)
- Performance-based tasks rely only on accuracy and RT
- Motor-based measures are indicative of ADHD (Leontyev et al., 2018)

Research questions: Will augmenting traditional performance-based task with motor measure improve associations with questionnaire-based measures? Which parameters of the Stop-signal task affect these associations? How can the performance measures be utilized to predict questionnaire scores?

DESIGN

Design: Contrasting keypress and mouse movement conditions across different levels of response definition and stop-signal delay setting methods.

- Experiment 1: Preset stop-signal delays, response = clicking on the button
- Experiment 2: Staircase stop-signal delays, response = crossing 25% cut-off line
- Experiment 3: Staircase stop-signal delays, response = crossing 25 or 50% cut-off line



MATERIALS & METHODS

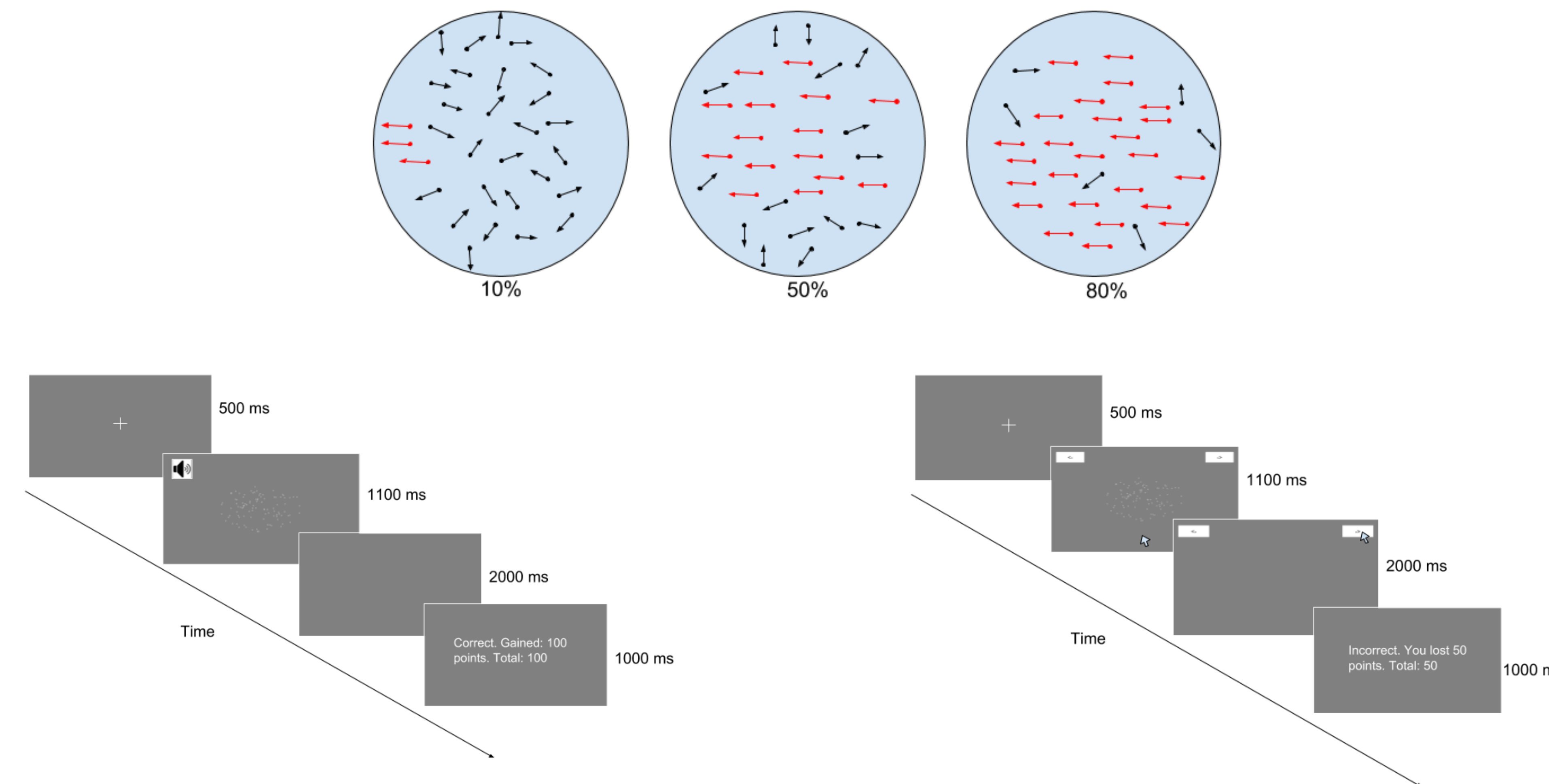


Figure 1: Keypress trial

Figure 2: Mouse movement trial

576 trials (432 "go"/144 "stop")

Independent variables:

- Mean RT, SD RT, Accuracy
- SSRT

Independent variables:

- Mean RT, SD RT, Accuracy, SSRT
- Total distance, acceleration, velocity
- Stopping distance

$$d_{stop} = d_{total} - d_{before\ stop-signal}$$

RESULTS

Spearman's correlation between predicted and test data from Ridge Regression

	Impulsivity/Emotional lability	DSM-IV: Hyperactive/ Impulsive	Inattention/Memory problems	DSM-IV: Inattentive
<i>Experiment 1</i>				
Keypress	0.23 (0.23)	0.13 (0.26)	0.25 (0.18)	0.3 (0.20)
Mouse motion	0.31 (0.26)	0.25 (0.32)	0.23 (0.35)	0.08 (0.36)
<i>Experiment 2</i>				
Keypress	0.34 (0.23)	0.24 (0.23)	0.07(0.26)	-0.12 (0.24)
Mouse motion	0.28 (0.24)	0.34 (0.23)	0.34 (0.24)	0.42 (0.18)
<i>Experiment 3</i>				
Keypress	0.19 (0.25)	0.15 (0.27)	0.12(0.26)	-0.02 (0.26)
Medium inhibition	0.15 (0.31)	0.19 (0.24)	0.30 (0.22)	0.35 (0.23)
Low inhibition	0.06(0.28)	0.3 (0.28)	0.05 (0.27)	-0.02 (0.27)

PARTICIPANTS

Experiment 1:

- Keypress: 56 (25 males and 31 females)
- Mouse motion: 35 (16 males and 19 females)

Experiment 2:

- Keypress: 50 (27 males and 23 females)
- Mouse motion: 50 (15 males and 35 females)

Experiment 3:

- Keypress: 50 (17 males and 33 females)
- Medium inhibition: 53 (17 males and 36 females)
- Low inhibition: 50 (10 males and 40 females)

CONCLUSION

- Stopping distance is a good analogue of SSRT for motor control.
- Mouse movement measures predict the scores on different ADHD subscales better than keypress measures
- The associations between performance measures and questionnaire scores are contingent on the definition of response

STOPPING DISTANCE

