The role of active touch: differential mechanism in blindness

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Introduction

Research focus on active touch lead to the conclusion that its advantage on the perception might depend on the experimental task [2]. In fact, passive and active touch are two different process, with some studies showing a suppression of afferent information to the somatosensory cortex during active touch. This is called *movement-related sensory gating* and could lead to a worst encoding [3]. Another open discussion refers to the possible enhanced tactile sensitivity in blind individuals, with some authors reporting better performance in this group compared to their sighted counterparts [4], while others found no differences between the groups [5], highlighting the important role of familiarity and experience in their performance [6].

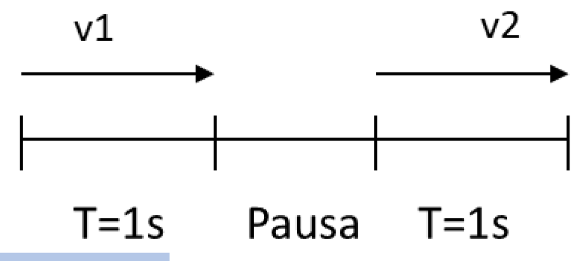
With this work, we wanted to shed some light into the role of active touch in sighted and blind individuals using dynamic stimuli discrimination.

Method

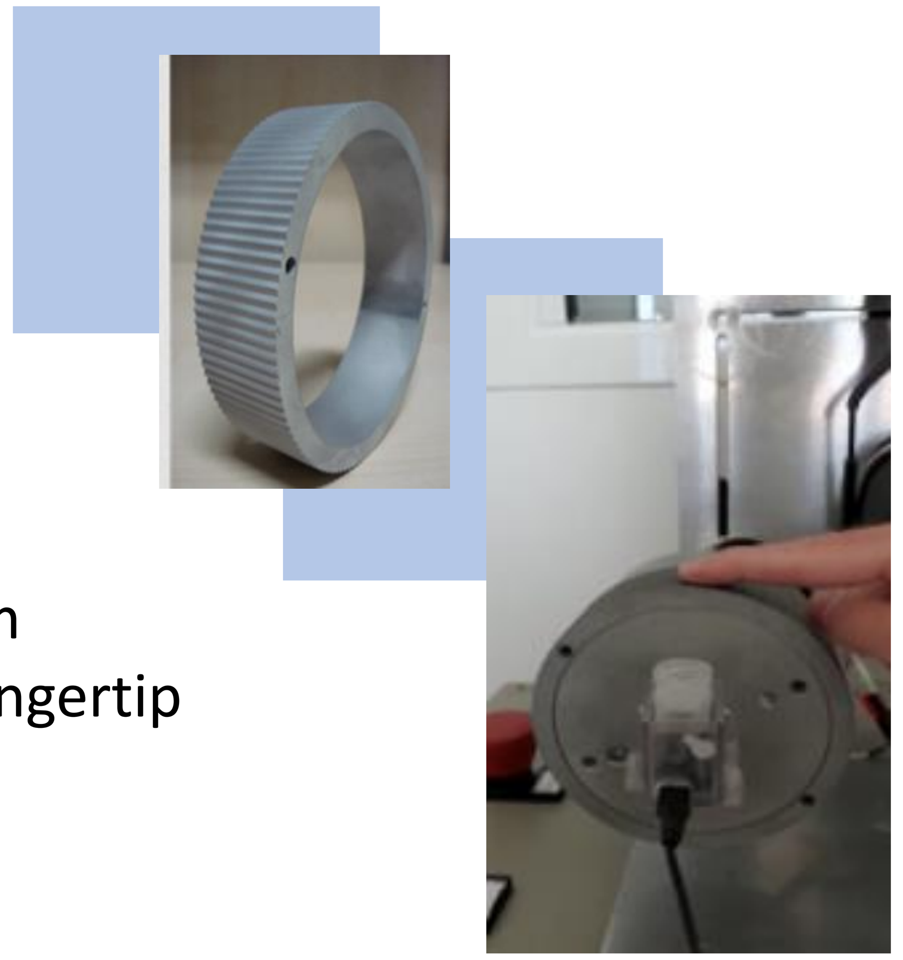
Participants:
- 18 sighted
- 18 blind

Task:
2AFC - The participant has to perceive a sequence of two movement with different speeds and to discriminate which was faster between the two.

Standard velocity:
3 cm/s
Comparison speed:
QUEST [6]

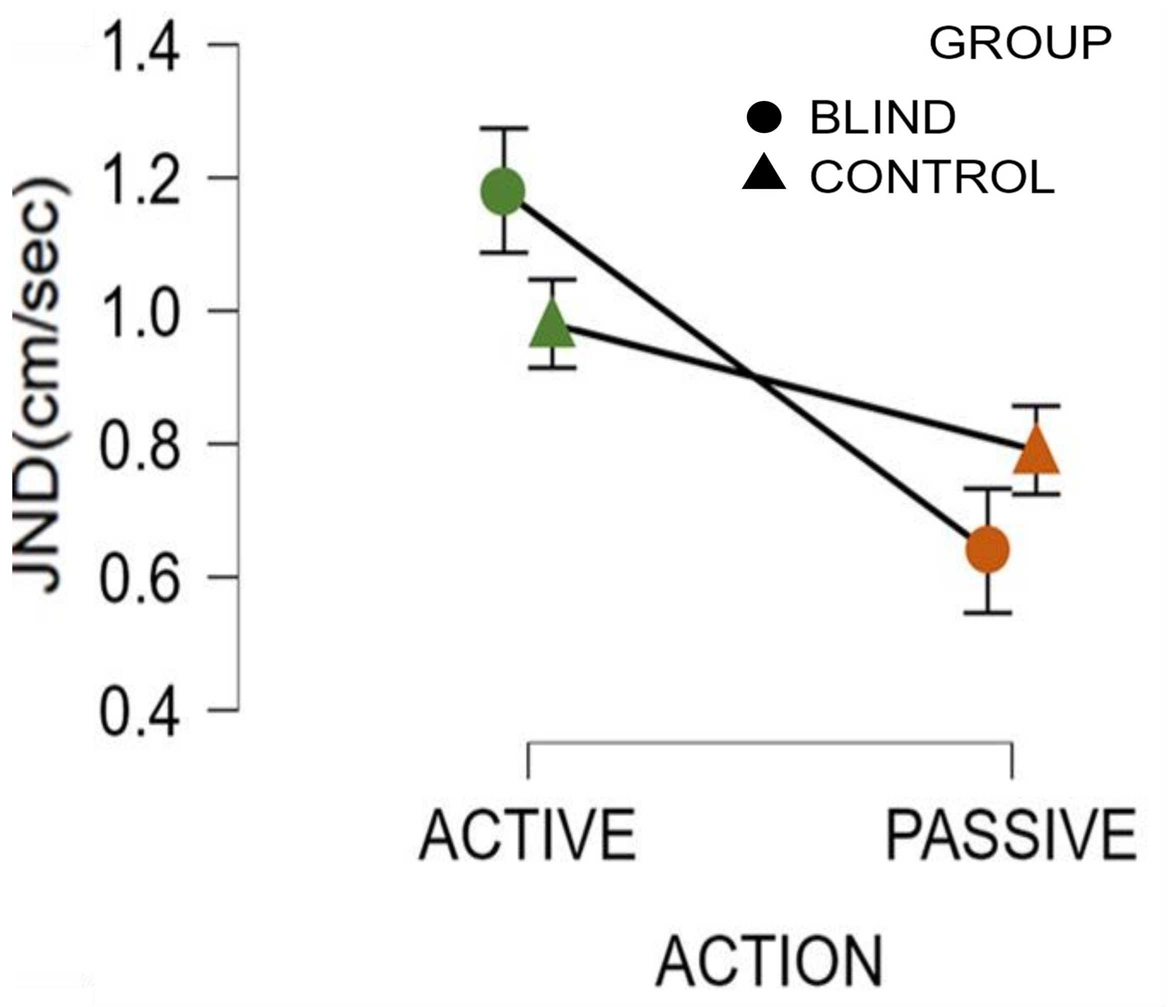


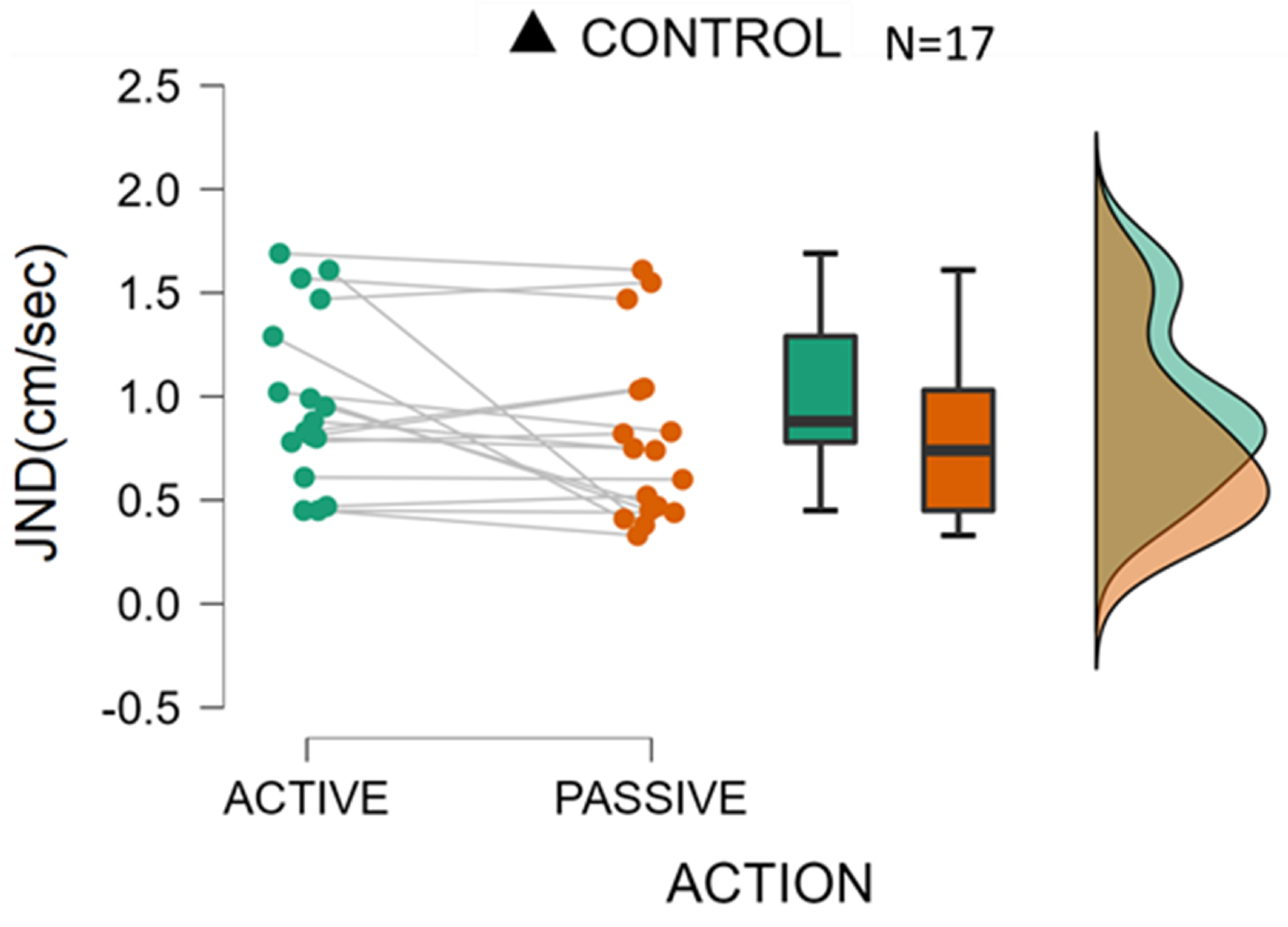
Conditions:
- Passive touch
- Active touch

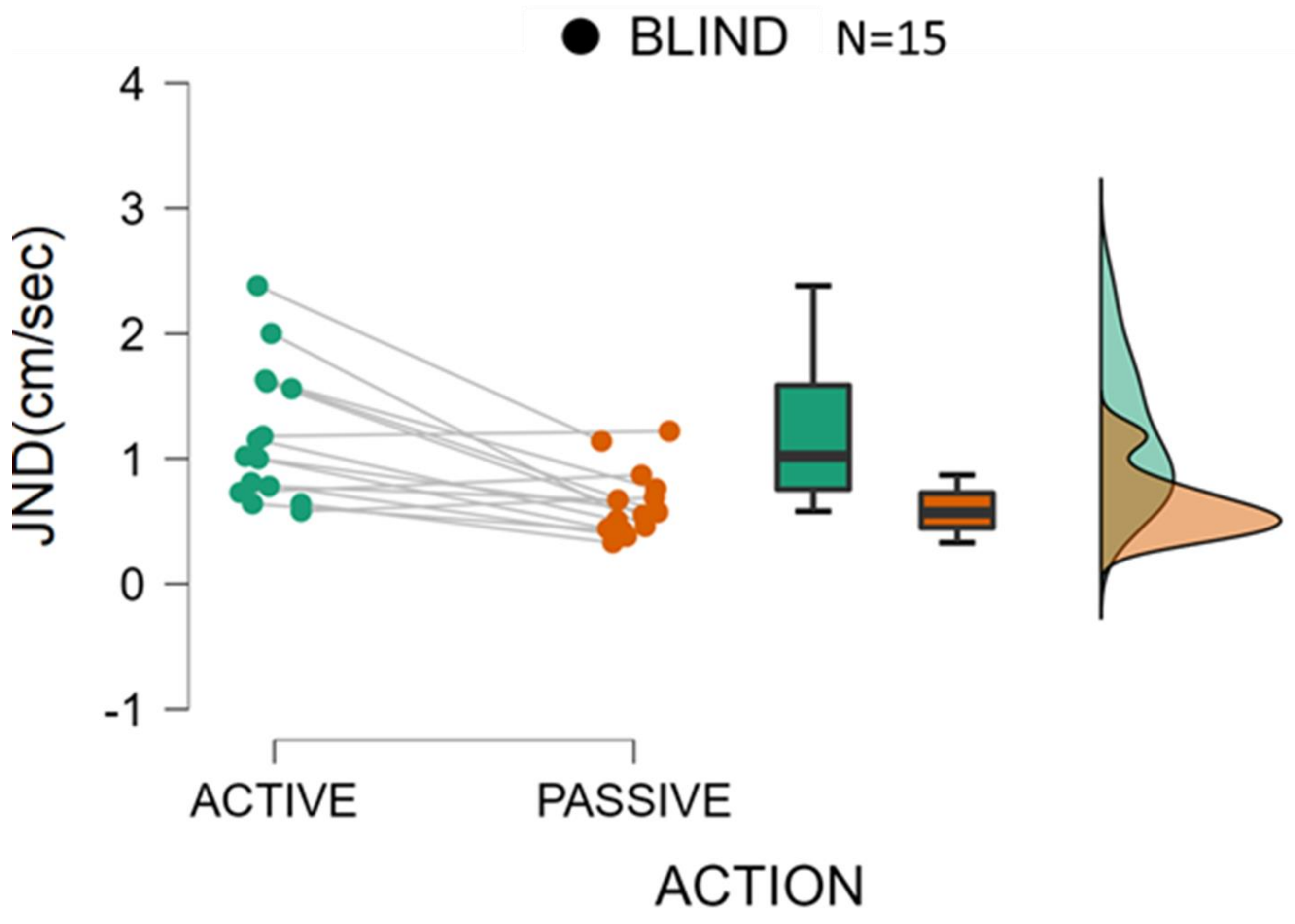


Stimulation:
-Tactile stimulus: 10 cycles/cm
-Tactile area of stimulation: fingertip of index

Results







Group*Action p=.035*
Post Hoc: significant differences between Blind-Active and Blind-Passive p<.001***

Conclusions

Sighted individuals:

No differences between the Active and Passive conditions

The similar performance might be caused by an enhanced transmition due to **central influences**, such as attention and motor set [1]. Also, as active touch involves **kinaesthesia** and **proprioception** combined with the **cutaneous perception** [7] the integration of this information might also contribute to maintain the thershold.

Blind individuals:

Significant worse performance in the active condition

Blind individuals might be **more sensitive to movement-related sensory gating.** This might be due to the **weakened proprioceptive spatial representations** [8] and their **difficulty to optimally integrate multisensory information** [9].

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