

The space between us: The effect of social context on the spatial boundaries of visuotactile interactions during the Somatic Signal Detection Task

L. Mirams¹, & E. Poliakoff²

¹Liverpool John Moores University, UK, ²The University of Manchester, UK

l.r.mirams@ljmu.ac.uk

Background & Aims

- During the Somatic Signal Detection task (SSDT¹), the presence of a light flash next to the body increases both correct and false reports of feeling a near threshold vibration.
- We previously found that lights occurring 1cm or 17.5cm (but not 40cm) from the body, lead to a more liberal response criterion during this task².
- Experiencing shared social touch has been found to expand the spatial boundary of over which a sound speeds responses to touch (an audiovisual interaction)³.
- Prior to the Coronavirus pandemic, we investigated whether the social context moderates the boundaries of visuotactile interactions in the same way.
- **The aim of Experiment 1 was to obtain a more detailed picture of the spatial boundaries of visuotactile interactions during the SSDT.**
- **The aim of Experiment 2 was to investigate how the social context (the presence of another person + shared touch) moderates these spatial boundaries.**

Methods

Experiment 1

- 32 females (M age = 23.69, SD = 7.71) completed a modified version of the SSDT.
- Participants were asked to detect a near threshold vibration at their fingertip, which occurred on 50% of trials, either alone, or with a simultaneous light flash, which could occur at one of 5 distances from the hand:

		Touch	No touch	TOTAL:
Light	1cm	15	15	30
	9cm	15	15	30
	17.5cm	15	15	30
	28cm	15	15	30
	40cm	15	15	30
No Light		75	75 (catch)	150
	TOTAL:			300

SSDT outcome variables:

Hit rates (HR; % correct reports of Touch),
False alarm rates (FA; % incorrect reports of Touch),
Sensitivity (d' ; HR-FA),
Response criterion (c ; HR+FA).

Experiment 2

- 40 females completed the modified SSDT whilst facing an unknown female confederate (Figure 1), before and after 3 minutes of *interpersonal multisensory stimulation* (IMS).
- During IMS, the participant received brush strokes to their cheek whilst viewing the confederate's cheek being stroked.
- Brush strokes were administered at a speed of 3cm/s to activate C-Tactile Afferents.
- For the experimental group (N = 20, M age = 21.60, SD = 3.75) the IMS was synchronous, for the control group (N = 20, M age = 20.70, SD = 2.32) it was asynchronous.

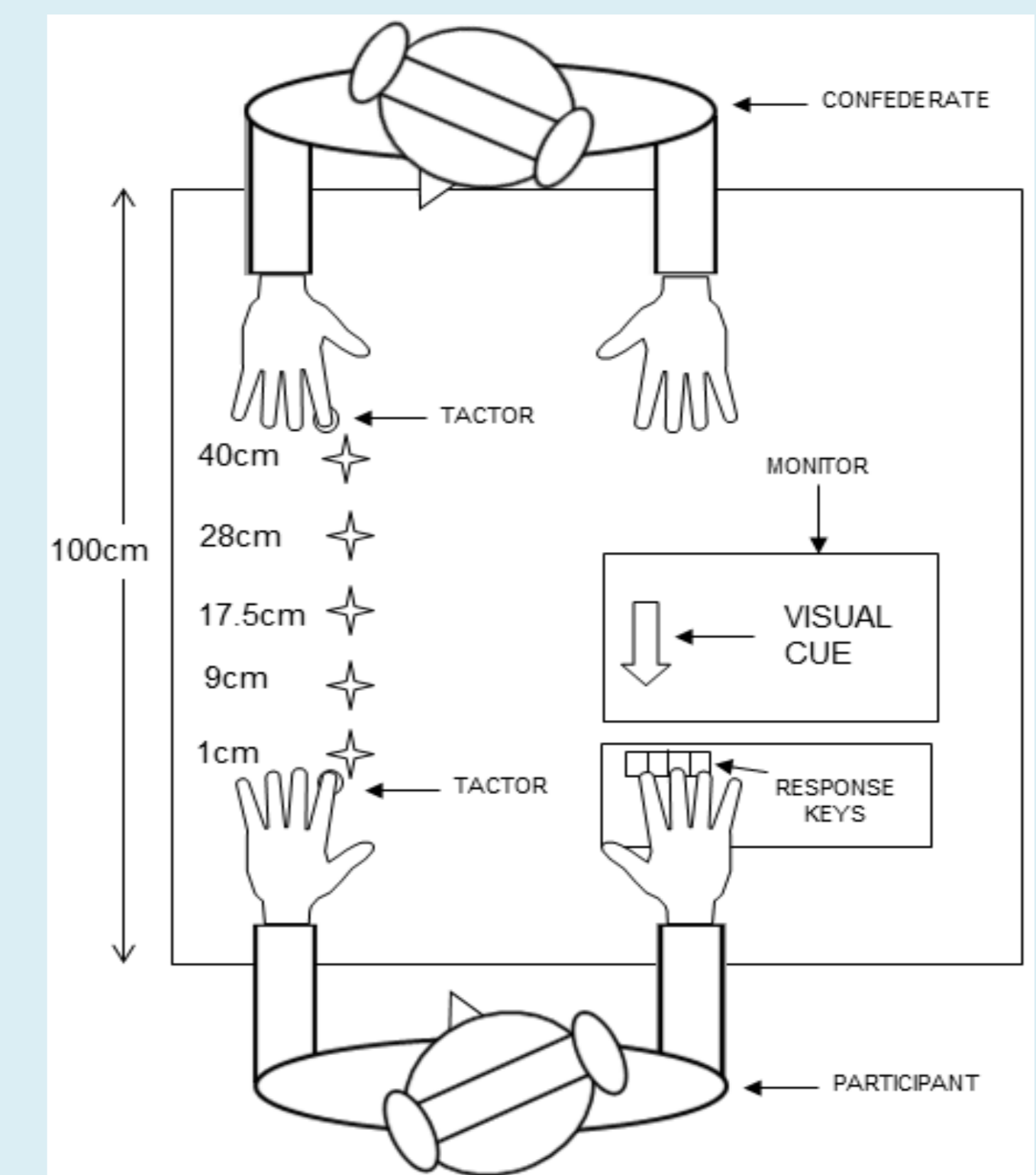


Figure 1. Experiment 2 set-up.

- After completing the SSDT for the second time, participants completed a 12 item questionnaire which asked about their experience of the IMS⁴

Experiment 1

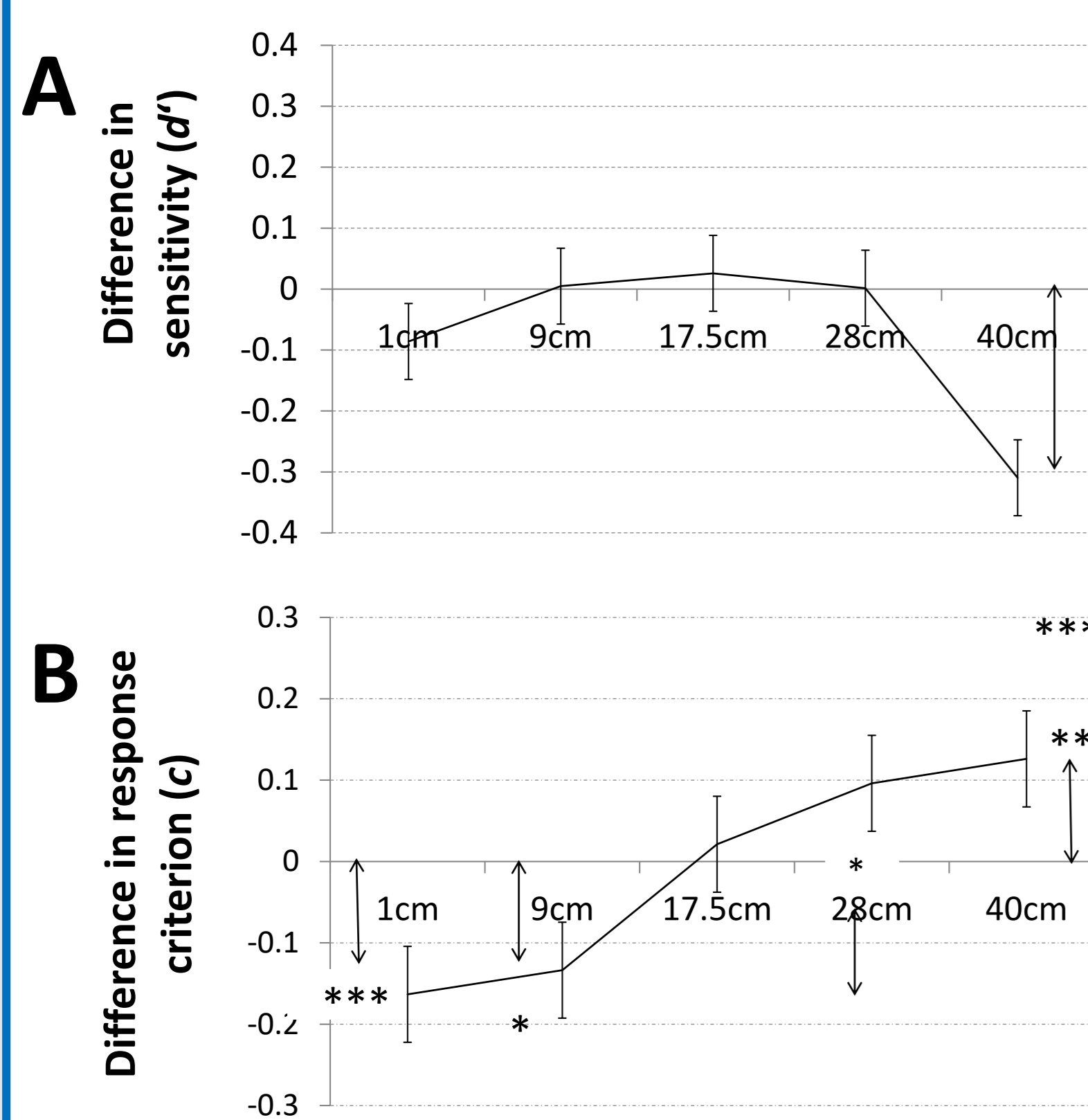


Figure 2. Mean difference in sensitivity (A) and response criterion (B) in light-no light trials at each distance. * $p < .05$, ** $p = .01$, *** $p < .001$.

Experiment 2

Results

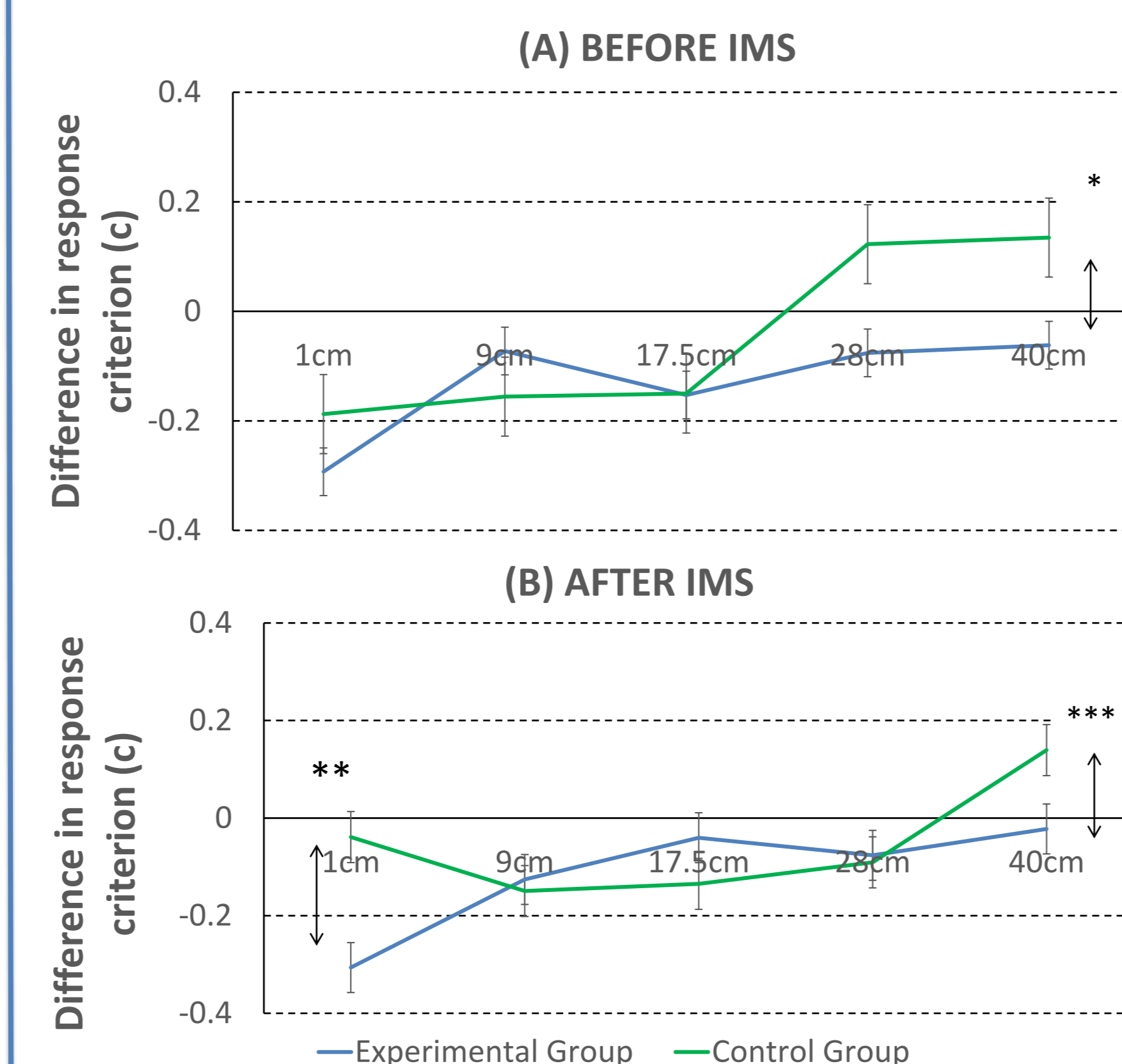


Figure 3. Mean difference in response criterion in light-no light trials at each distance in the control group (green) and the experimental group (blue) (A) before IMS, (B) after IMS * $p < .05$, ** $p = .02$, *** $p = .001$.

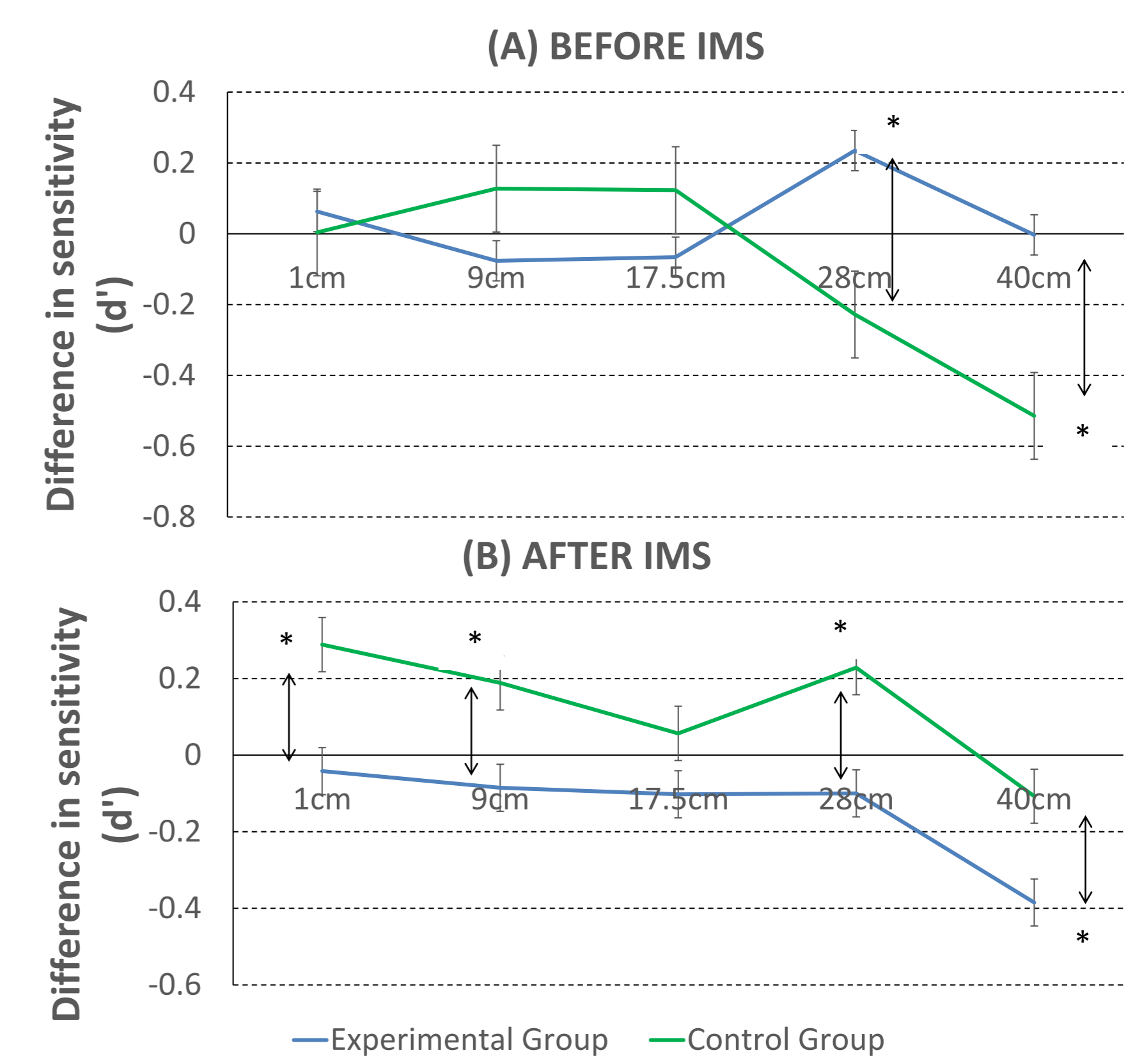


Figure 4. Mean difference in sensitivity in light-no light trials at each distance in the control group (green) and the experimental group (blue) (A) before IMS, (B) after IMS * $p < .05$.

Summary & Conclusions

Experiment 1: The light increased reports of feeling the touch (i.e., led to a lower, more liberal response criterion) at 1cm and 9cm from the hand. At 17.5cm, the light had no effect on touch reports. When the light occurred further away from the hand it reduced the tendency to report feeling touch (leading to a more stringent response criterion and reduced sensitivity).

Experiment 2: A similar pattern of results was found in the baseline condition in Experiment 2 for the control group, whereas the experimental group did not show a reduced tendency to report feeling the touch when the light occurred 28cm or 40cm from the hand at baseline.

- Synchronous IMS has been found to increase audiotactile interactions in the space close to the other person, perhaps due to feelings of ownership over the other's body³. Therefore, we expected that in Experiment 2 after synchronous IMS, the experimental group may show an increased effect of the light on touch reports at the larger hand-light distances.
- There was mixed support for this hypothesis. After synchronous IMS, the experimental group showed a *reduced* effect of the light on response criterion when it occurred 17.5cm from the hand, but an *increased* (detrimental) effect of the light on sensitivity when it occurred 40cm from the hand, due to increased light-induced false alarms in this condition.
- This suggests that the experiencing synchronous IMS does alter the boundaries of visuotactile interactions during the SSDT.

1. Lloyd, D. M., Mason, L., Brown, R. J., & Poliakoff, E. (2008). Development of a paradigm for measuring somatic disturbance in clinical populations with medically unexplained symptoms. *Journal of Psychosomatic Research*, 64(1), 21-24.

2. Mirams, L., Poliakoff, E., & Lloyd, D. M. (2017). Spatial limits of visuotactile interactions in the presence and absence of tactile stimulation. *Experimental Brain Research*, 1-10.

3. Maister, L., Cardini, F., Zamariola, G., Serino, A., & Tsakiris, M. (2015). Your place or mine: Shared sensory experiences elicit a remapping of peripersonal space. *Neuropsychologia*, 70, 455-461.