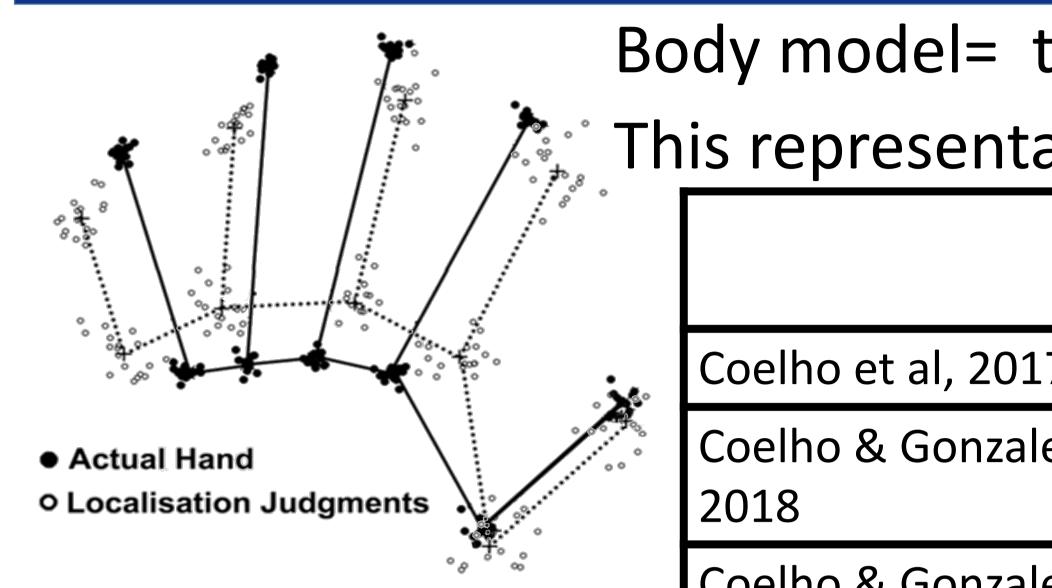




## How Action Modulates the Body Model Lara A. Coelho, Connor Way & Claudia L.R. Gonzalez The Brain in Action Lab, Department of Kinesiology, University of Lethbridge, Lethbridge, AB

### Background

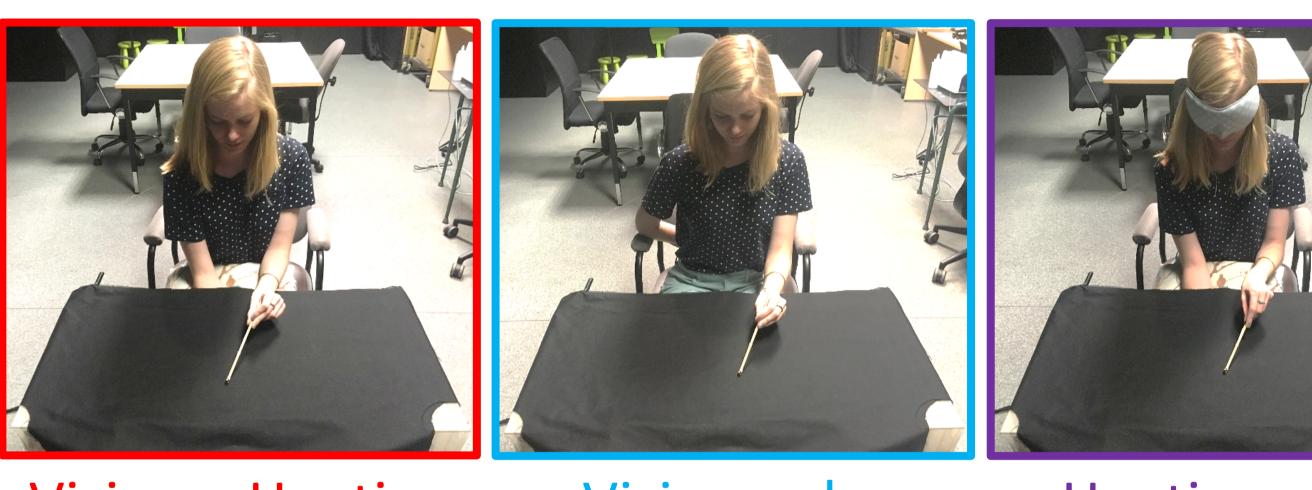


Longo & Haggard, 2010

Body model= the representation of the spatial content of the body.

	Hand width	Finger length
Coelho et al, 2017	13.4%	-17.1%
Coelho & Gonzalez, 2018	14.2%	-15.6%
Coelho & Gonzalez, 2019 (females only)	9.9%	-17.2%

### Does haptic feedback reduce body model distortions?



Vision + Haptics

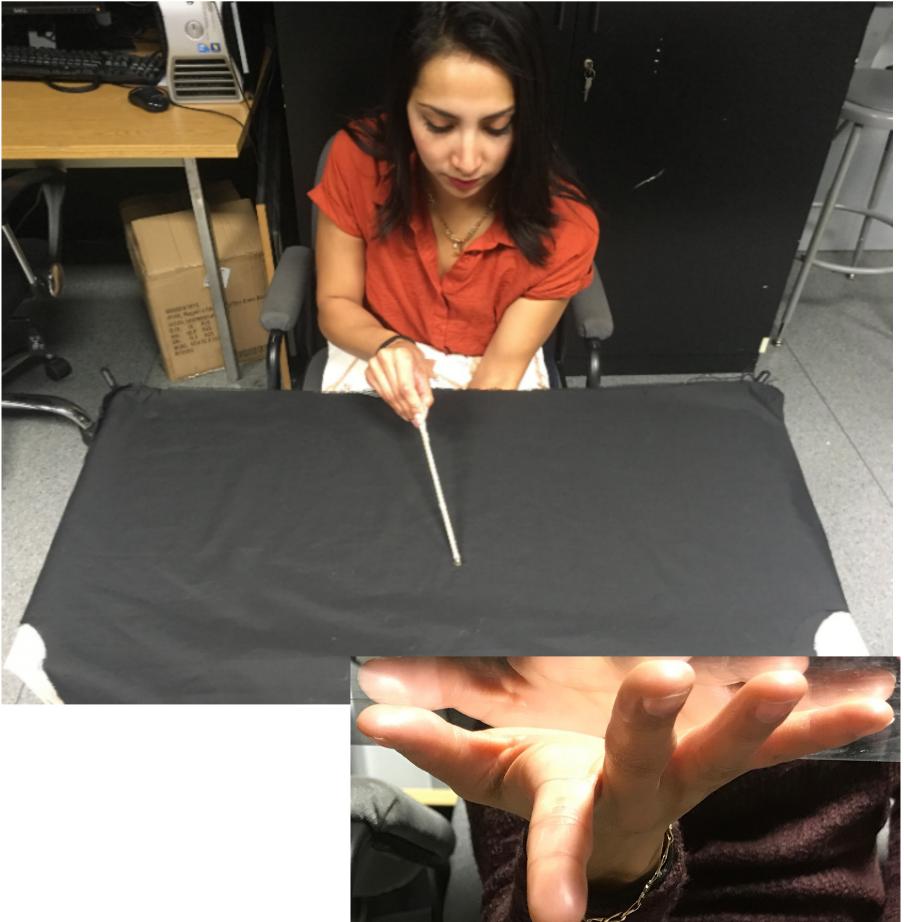
Vision only Coelho & Gonzalez, 2018

Haptics only

Research Question: Does the increased haptic feedback during movement modulate the body model (of the hand)?

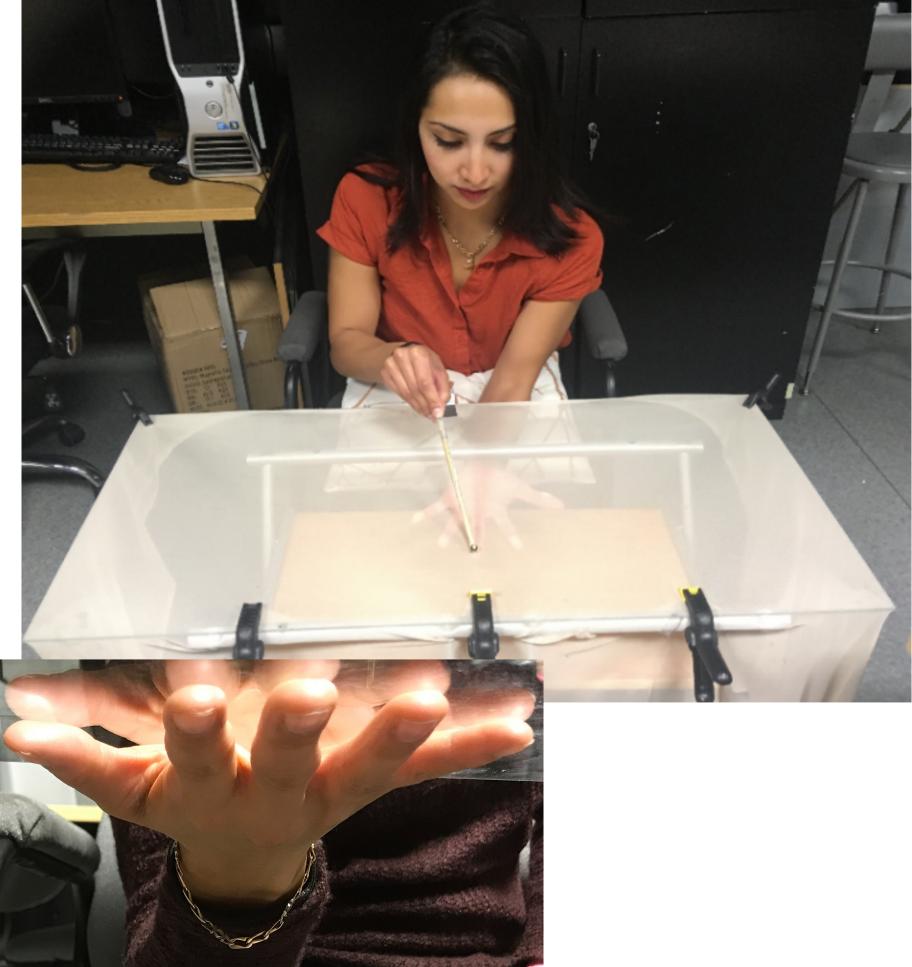
Hypothesis: If increased haptic feedback modulates the body model, then tapping at the time of estimation, should reduce body model distortions.

### Occluded hand condition



Before each estimation, the participant tapped their finger 5 times to the beat of a metronome set at 95 BPM.





This representation combines with afferent signals to guide position sense.

How can manual action be accurate if it relies on a distorted body model?



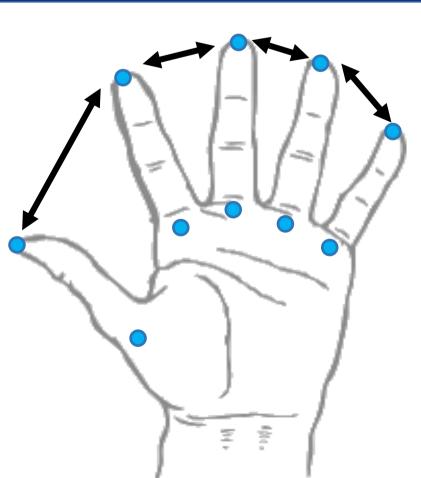
	Vision + Haptics		Vision only		Haptics only	
	LH	RH	LH	RH	LH	RH
land /idth	1	1	_	_	_	1
nger ength	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	_	_

Haptics only group = most accurate

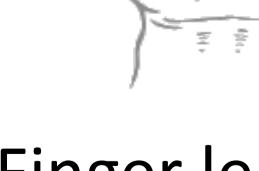
## Nethods



	Ν
Tapping group	33
Control group	32



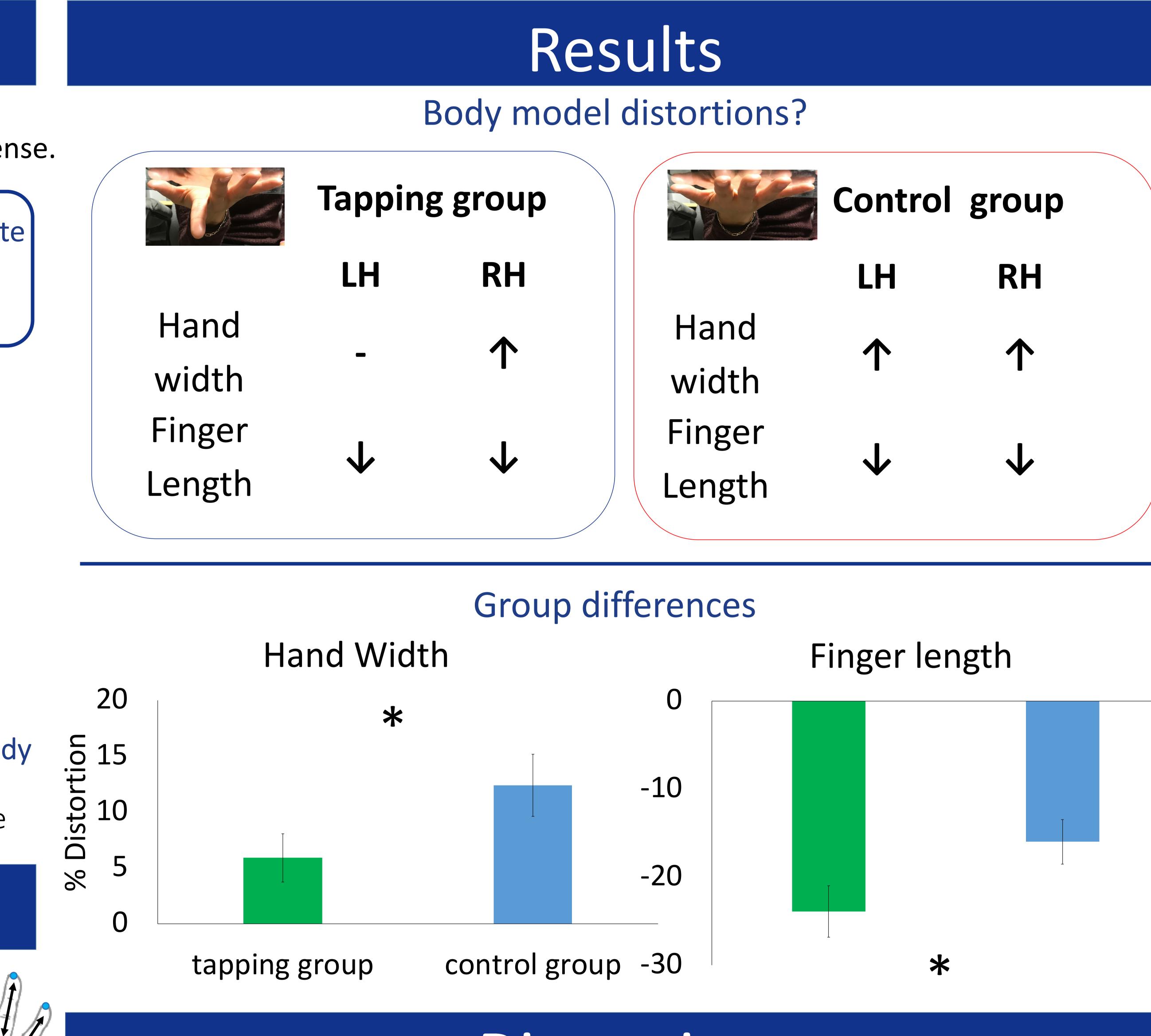
Hand width





Optotrak camera





# Discussion

Finger length



•Hypothesis = partially supported •Hand width was perceived more accurately, but finger length was more distorted. •IP joint hits the table and not the finger-tip. Does this lead to smaller estimates of finger length. •Separate body model for haptics? •How then do we perform accurate manual actions? Is it possible that the body model is exclusively part of the ventral visual stream? Coelho, L.A., & Gonzalez, C.L.R. (2018). The visual and haptic contributions to hand perception. Psychological Research, 82(5), 866-875

**IRED** marker

Coelho, L.A., & Gonzalez, C.L.R (2019). Chubby hands or little fingers: Sex differences in hand representation. Psychological research, 83(7), 1375-1382. Coelho, L.A., Zaninelli, G., & Gonzalez, C.L.R. (2017). A kinematic examination of hand perception. Psychological Research, 81(6), 1224-1231.

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<b>Control group</b>		
	LH	RH
Hand width	ſ	$\mathbf{\uparrow}$
Finger Length	ł	ł