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Investigating how humans perceive differences between drops of water

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Introduction We have receptors in our skin that allow us to sense and interact with liquids in our environment, *e.g.* to determine if it's raining or to adapt our grip force on a wet object so that it does not slip. As humans do not have hygroreceptors, wetness perception relies on the integration of tactile information conveyed by low-threshold mechanoreceptors and/or temperature information conveyed by thermoreceptors (Filingeri & Ackerley, 2017). We aimed to investigate how participants perceive drops of water at room temperature, by modulating the height and the mass of a drop and we hypothesized that participants would readily be able to quantify these differences.

Methods on the palm of the hand

Experiment 1

5 masses
(10, 20, 25, 40, 50mg)

12 drops of water per mass

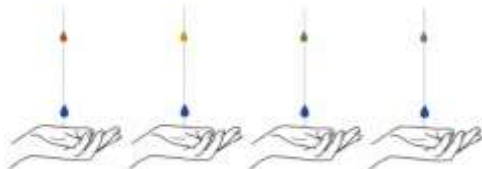
Experiment 2

4 heights
(6, 12, 18, 24cm)

12 drops of water per height

Participant had to rate on unbounded scale the intensity of the feeling

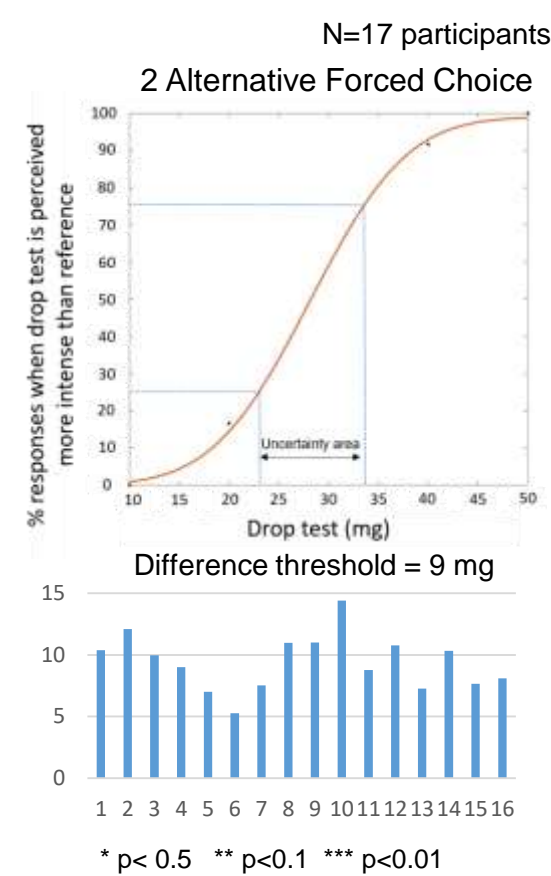
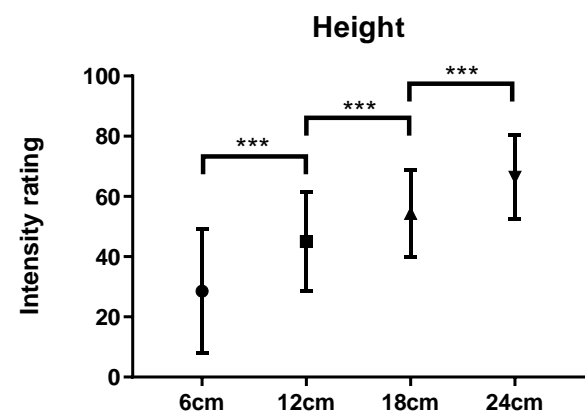
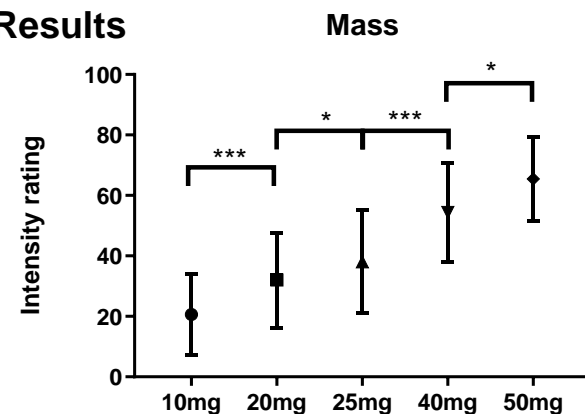
Experiment 3



1 reference mass vs. 4 test masses
(25mg) (10, 20, 40, 50mg)
12 drops of water for each pair, total 48 pairs

➔ 2-AFC: Which drop of water is more intense?

Results



Conclusion

- Participants needed a drop mass between 5-10 mg to perceive a difference.
- The minimum amount for perceiving a difference psychophysically is 9 mg.
- Drop intensity increased linearly with height.
- There exists very little in the literature concerning the perception of wetness and we show that humans are able to discriminate well between different intensities of sensation by changing the properties of small drops of water.
- Microneurography will be performed to explore responses of mechanoreceptors in humans to drops of water.

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