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Individual ability to discriminate between wetness and dryness during short contacts with a warm surface

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Introduction

The interaction between thermal and touch sensing seems to be largely acknowledged as the principal responsible of the perception of skin wetness [1]. However, it is still unclear which sensory input is essential or sufficient to generate this perception [2].

Methods

In this study, the role played by thermal afferents and thermal sensations in contributing to the perception of wetness was investigated when 4 different warm stimuli (+4 and +8°C above individual skin temperature) varying in terms of wetness level (using a dry or a wet fabric) were applied in a balanced order on the bare and dry upper and lower back of 8 participants (20.9 ± 1.6 years) resting in an environmental chamber (22°C; 50% relative humidity). Participants were informed only about the body region subjected to the stimulation. No information was provided on the type and magnitude of the stimulation, to limit any expectation effects. Skin temperature, skin conductance, thermal sensation and wetness perception were recorded before and after the application of each stimulus (10 s). Data were analysed using a repeated measures ANOVA and Friedman test.

Results and Discussion

The relative increase in skin temperature resulting from the application of the stimuli was found to be not significantly different ($p>0.05$) between upper (+0.96 ± 0.1°C) and lower back (+0.75 ± 0.1°C). Resting local skin temperature was always increased by the application of the stimuli. Warmer stimuli produced statistically significant greater ($p<0.05$) thermal sensations with no differences between warm-dry and warm wet. No statistically significant differences ($p>0.05$) were found between wetness perception scores resulting from the application of the different stimuli to both skin sites. The threshold we set (point “-2 slightly wet” of the wetness perception scale) to identify a clearly perceived wetness was never reached during none of the four stimulations, neither for the upper nor the lower back. Average variations in votes (post stimulation – resting wetness perception) were calculated for each stimulus and then compared. No statistically significant differences ($p>0.05$) were found between the average variations in votes resulting from each stimulus for both skin sites. Participants did not discriminate between warm-dry and warm-wet stimuli and no perception of wetness was reported at all during any of the experimental conditions.

Conclusions

These findings indicate that thermal sensations can significantly alter the perception of skin wetness and that the co-activity of other sensory modalities varies in importance according to multiple factors.

References

1. Bentley, I: **The synthetic experiment**. *Am. J. Psychol* 1900, 1:405–425.
2. Ackerley, R, Olsson, H, Wessberg, J, McGlone, F: **Wetness perception across body sites**. *Neurosci Lett* 2012, 52:73-77.