AN INVESTIGATION ON HUMANS' SENSITIVITY TO ENVIRONMENTAL TEMPERATURE

Laura Battistel[1,2], Massimiliano Zampini & Riccardo Parin[2]

Contact: laura.battistel@unitn.it

[1] Center for Mind/Brain Sciences (CIMeC), University of Trento, Italy
[2] terraXcube, Eurac Reserach, Viale Druso 1, 39100, Bolzano, Italy

BACKGROUND

→ Rich literature about local skin thermal sensitivity[1]

→ What is our **sensitivity** to **environmental temperature** (Exp 1)?

→ Evidence in favour of the Hue-Heat effect[2]

→ Can **visual stimuli alter thermal judgments** (Exp 2)?

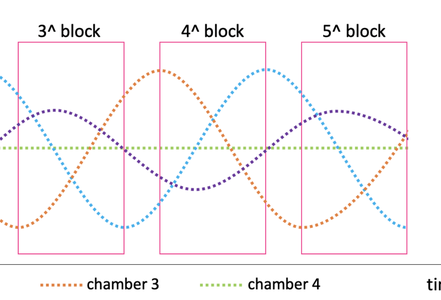
METHODS

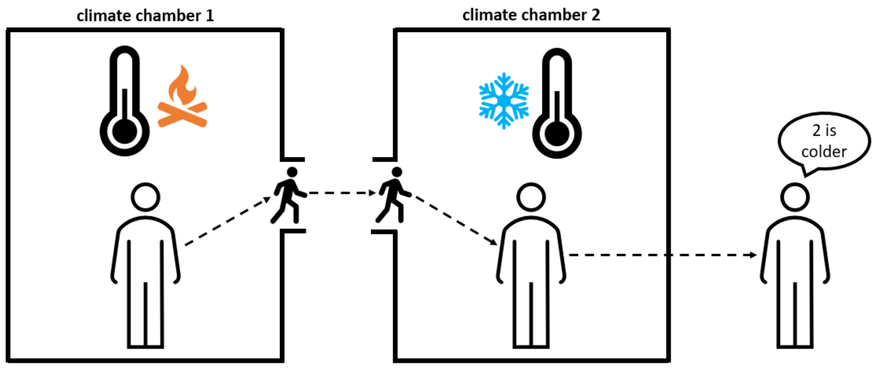
52 participants (26 each experiment)
50% females
18 – 65 years old 18.5 < BMI < 24.9

Same clothes:
long jeans
t-shirts

Questionnaires:
ETSRS + EQ +
BPQ + GPAQ

Facility:
4 climate chambers connected through an air-lock
Precise control of temperatures

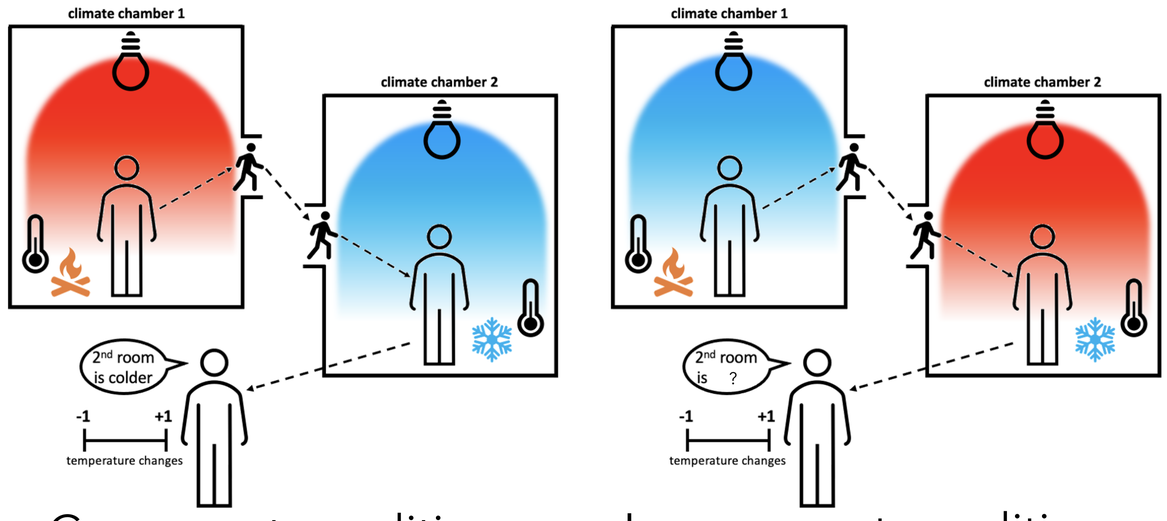




Exp 1: participants stay in one chamber for 5 seconds, then they move to the next one and say whether the second chamber is **warmer** / **colder** than the first one

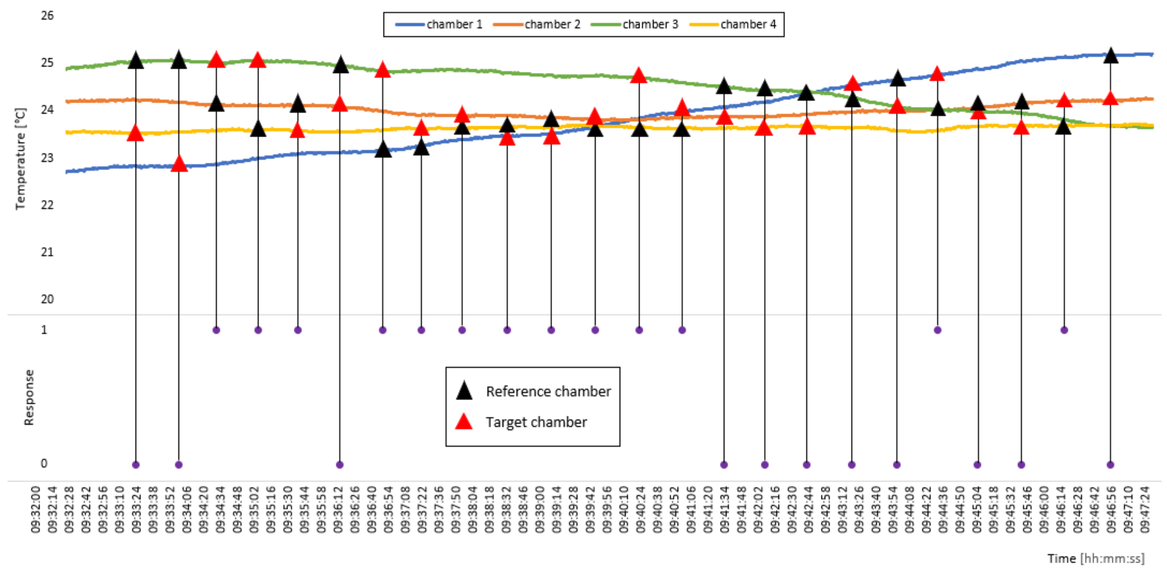
Procedure:
Temperature varies inside each block between 23°C and 25°C

Exp 2: same as Exp 1 except for different colours of the lights



Congruent condition Incongruent condition

ANALYSIS

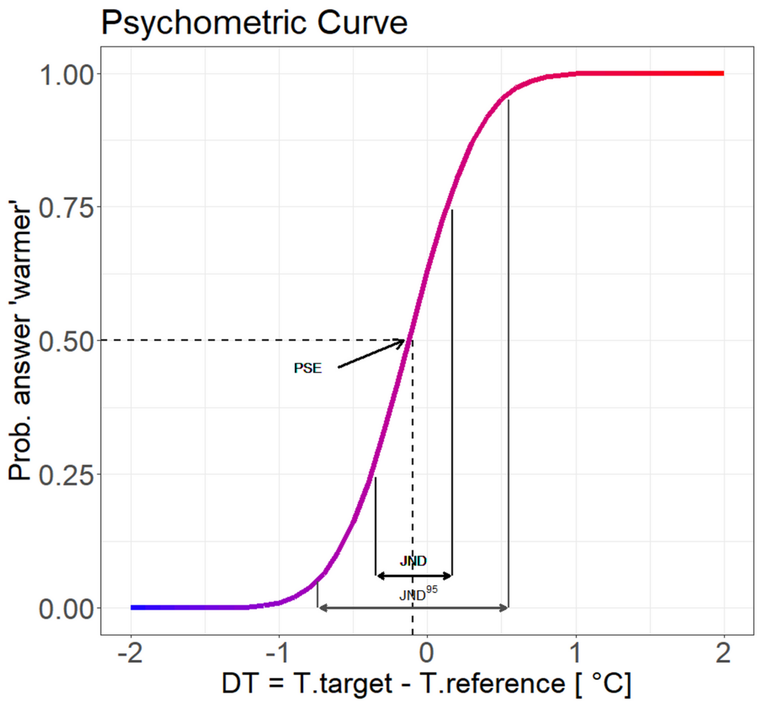


We calculated the ΔTs between the target chambers and reference ones and we associated their answers (1 = "warmer"; 0 = "colder")

We used GLMM for both experiments and calculated the PSE, JND, JND^{95} and CPLs

RESULTS

Experiment 1



Model:
R ~ DT + (DT | Participants)

Marginal R^2 = 0.68
Conditional R^2 = 0.72

DT: 2, 1, 0, -1, -2

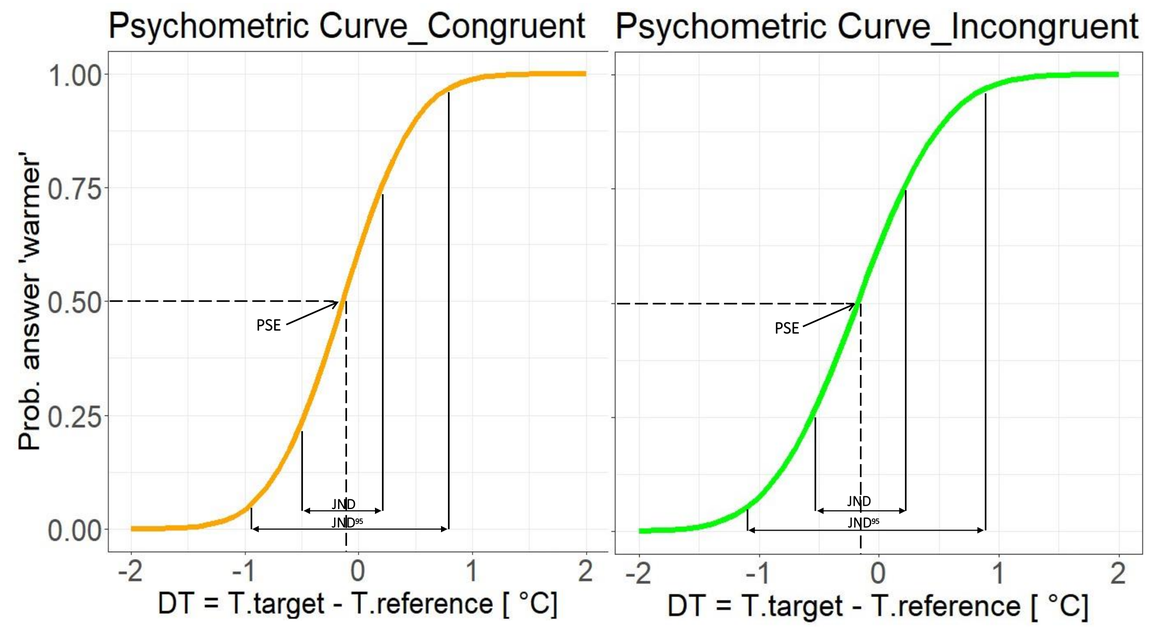
→ PSE = - 0.13 °C
→ JND = 0.38 °C
→ JND^{95} = 0.92 °C
→ CPL^{+} = 0.80 °C
→ CPL^{-} = - 0.91 °C

Experiment 2

Model: R ~ DT + Condition + (DT + Condition | Participants)

Marginal R^2 = 0.47 Conditional R^2 = 0.49

Significance of effect of condition = 0.52



→ PSE = - 0.14 °C
→ JND = 0.50 °C
→ JND^{95} = 1.21 °C

→ PSE = - 0.18 °C
→ JND = 0.57 °C
→ JND^{95} = 1.39 °C

REFERENCES:
[1] Filingeri (2016). Neurophysiology of Skin Thermal Sensations. *Comprehensive Physiology, 6*(3), 1429
[2] Mogensen, M. F., & English, H. B. (1926). The apparent warmth of colors. *The American Journal of Psychology*