

We are more sensitive to temperature than we thought, study reveals

January 11 2024



Andrea Eccher, terraXcube technician, in one of the climatic chambers in which the experiments on human perception take place. Credit: Eurac Research/Andrea De Giovanni

An experiment conducted by Laura Battistel involved the use of four

temperature-controlled climate chambers, ranging from 23 to 25 degrees Celsius. Twenty-six participants were involved: 13 men and 13 women. Volunteers had to compare pairs of chambers, moving from one chamber to another, and then say which was warmer and which was colder.

Each person made 120 comparisons between pairs of rooms, resulting in a total of 3120 comparisons. Data analysis revealed an average threshold for perception of temperature differences of 0.92 degrees Celsius. Moreover, all the participants showed very similar temperature sensitivity.

"This indicates that this may be an inherent characteristic of our species," Battistel says. "We are all endowed with a pronounced sensitivity to environmental temperature, although we are unaware of our cognition of it."

The idea of studying human sensory capabilities using the terraXcube was the brainchild of Massimiliano Zampini, a full professor at CIMEC, University of Trento. The goal of this research is to find out what we can perceive about the environment around us. Only in this way, can we deepen our knowledge of how the environment influences the way we think and act.

In this sense, the study fits into the line of research on "Grounded Cognition," the [scientific theory](#) according to which the cognition we have of our surroundings is inseparably linked to our sensory perception of the world itself. In other words, according to this theory, when we reflect, try to recall a lived experience, or approach our surroundings, our senses are activated, and they influence our thinking.

The results of the study have potential implications for the heating, ventilation, and air conditioning sectors in buildings.



The corridor connecting the four climate chambers of the Small Cube, one of the three environmental simulation areas that the terraXcube is divided into. Credit: Schirra/Giraldi

"From the perspective of energy sustainability, being able to determine a [temperature](#) range in which the individual maintains their state of comfort while reducing the building's energy load would benefit us and the planet," explains Riccardo Parin, supervisor of Battistel's work.

"In our study, however, we do not focus on participants' thermal comfort. In fact, we are currently more interested in finding out how our

perception changes at temperatures higher or lower than those generally considered comfortable. And this is what we will be investigating in future experiments," Parin concludes.

"Our infrastructure is made available for research in a wide variety of fields. From clothing to [emergency medicine](#) in the mountains, from the [automotive industry](#) to [climate change](#)," says Christian Steurer, director of terraXcube. "The idea of conducting research on the human psyche inside our climate chambers intrigued me right from the start. Now the project is starting to bear fruit. I am looking forward to the next developments."

The research is [published](#) in the journal *Scientific Reports*.

More information: Laura Battistel et al, An investigation on humans' sensitivity to environmental temperature, *Scientific Reports* (2023). [DOI: 10.1038/s41598-023-47880-5](#)

Provided by Eurac Research

Citation: We are more sensitive to temperature than we thought, study reveals (2024, January 11) retrieved 13 May 2024 from <https://medicalxpress.com/news/2024-01-sensitive-temperature-thought-reveals.html>

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