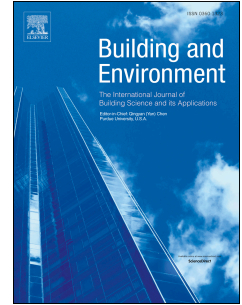


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Influence of short-term thermal experience on thermal comfort evaluations: A climate chamber experiment

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ABSTRACT

The purpose of this study is to explore how a short-term thermal experience influences thermal comfort evaluation. Thermal experience, which refers to the previous thermal environment, may result in the formation of some “memory” on humans. When people enter another environment where the temperature is different from the previous one, the previous experience may result in some different feelings and changes on the evaluations of thermal comfort, comparing with staying in a steady state condition. In this paper, we mainly focus on short-term thermal experience within the time scale of minutes to hours. Climate chamber experiments were conducted for analysis and discussion. The experiment we designed had three sets of conditions: 1) started and ended at an air temperature of 20°C, and experienced higher temperatures in between; 2) started and ended at an air temperature of 25°C, and experienced higher or lower temperatures in between, and 3) started and ended at an air temperature of 30°C, and experienced lower temperatures in between. The evaluations of thermal comfort of the subjects at different temperature conditions were recorded by questionnaires. We found that both comfort and discomfort resulted from the contrast between the current and previous conditions. Even though the initially poor thermal environment was improved a little bit, the evaluation of the thermal comfort would be improved a lot. Additionally, the decrease of thermal sensation caused by cold stimulation was more obvious than the increase due to hot stimulation. People’s the evaluations could be considered as a combination of both the past and the present feelings.

KEYWORDS

Thermal experience, chamber experiment, thermal sensation, step-changed temperature, adaptive thermal comfort

1. INTRODUCTION

Indoor thermal environmental quality contributes to the thermal comfort perception, well-being and performance of the occupant [1]. Human thermal comfort is defined as “that condition of mind which expresses satisfaction with the thermal environment” [2][3]. Thermal comfort conditions can be evaluated by using a lot of indices based on environmental variables such as air temperature, humidity, wind speed as well as behavioral ones such as clothing and activities [4]. What kind of indoor climate should be created and how to implement it are closely connected with human health and the building energy consumption. Accordingly, it is essential to examine our requirements for indoor space conditioning, and to judge if it is necessary to maintain what are now regarded as comfortable environments in some current standards.

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