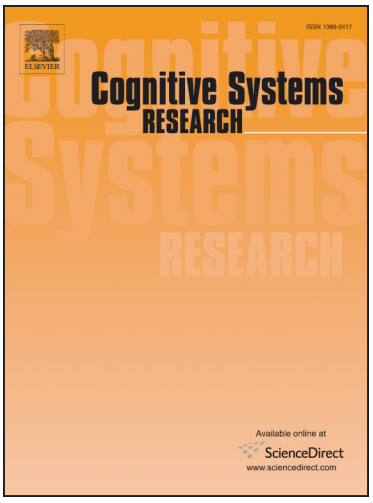

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Assessing Affective Experience of In-Situ Environmental Walk via Wearable Biosensors for Evidence-Based Design

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Abstract
In environmental psychology research, the most commonly used methods are phenomenological interviews and psychometric scales. Recently, with the development of wearable bio-sensing devices, a new approach based on bio-sensing data is becoming possible. In this study, we examined the feasibility of using wearable biosensors to document affective experience during in-situ walk. An eight-channelled Procomp multi-bio-sensing devices (EKG, EEG, skin conductance, temperature, facial EMG, respiration) were used, in addition with a GPS tracker, to measure the in situ physiological affective responses to environmental stimuli. This pilot experiment revealed consistent results between bio-sensing measures and two traditional methods, i.e. phenomenological interviews and psychological Likert scale rating, which indicated that mobile bio-sensing could be a promising method in measuring in-situ affective responses to environmental stimuli as well as diagnosing potential environmental stressor. This new bio-sensory method, as exemplified in this paper, could help identifying negative stressful stimuli and providing evidence-based diagnosis to support design strategies.

Keywords: Environmental Neuroscience; Affective Mapping; Environmental Experience.

1. Introduction

Human experience matters. Experience predicted and measured by environmental psychology is a key factor in design generation[1] and post-occupancy performance evaluation[2-4]. Additionally, recent research studies revealed that better scenic view correlated with lower sickness report spatially[5-10]. In other words, human experience matters not only because it is crucial for the practicality and comfort of urban design, but also because it is important for people's health.

Two methods are commonly used to document environmental experiences. One method is phenomenological interview[1,11-13], in which participants are asked to recall details of incidents as adequately as possible. Another method is psychometric scales, especially Likert scales, which are usually five- or seven- or nine- point scale with a neutral point in the middle [14-15]. However, traditional ways of recording and measuring in-situ human experience, such as phenomenological interview and psychometric scales, are demanding because the process of obtaining data is sometimes subjective and time-consuming.

With the development of the biosensor techniques, recording biological data by using wearable biosensory devices became possible. In the recent years, with the advancement of bio-sensing technique, growing studies are using bio-sensing data in combination with or as complimentary to psychometric data [16-17]. Psychological evidences indicate that affective responses can be well predicted using bio-sensing data[18-19], which seemed to be applicable in measuring in-situ environmental experience[20-23].

Therefore, in this experiment all above methods have been adopted. The experiment was specially designed to test the feasibility of biosensor method and to compare the three ways to build a design decision. The experiment was also designed to compare which of these three ways would be best to build a design decision supporting system in the long run.