Urban Attractors, Physical Proximity and States of Mind: Measuring Dynamic Experiences in Varying Typologies of the Built Environment

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ABSTRACT:

The presented research work attempts to offer new insights on the human responses to the public space through quantifying the impact of varying qualities of the built environment to the individual experience [1]. The objective is to afford architects and urban designers with novel metrics on spatial cognition and emotional states for supporting design intuition and better informing urban interventions [2]. The research methodology includes the measuring of the spatial experience and psychological transactions of test subjects while navigating and exploring the urban environment, leveraging the emerging technological opportunities of mobile wearable sensing tools. Two research experiments are discussed, exploring the relationship between (a) urban attractors and user attention in walking tasks, and (b) urban proxemics and psychological states through different modes of transportation.

The first study addresses the influence of specific elements in the urban environment on people's mental maps of a place, reinterpreting studies on city "imageability" [3,4]. Drawing correlations between visual perception and physical characteristics of the public space, this experiment employs the use of sensor data from a wearable eye-tracker to analyze human attention patterns while exploring the actual environment [5,6] – as opposed to more conventional studies of screen images in indoor settings [7]. By mapping the eye gaze of 15 test subjects as they walk along a familiar route in Cambridge, MA, this experiment correlates gaze duration/intensity and different qualities of the viewed elements (pavement, entrances, corners, etc.). The juxtaposition of the eye-tracking results with a post-walk map-drawing task also allows to make comparisons between the portion of existing information that is taken in through the eye and what is remembered or processed into memory.

The second experiment investigates the emotional impact of varying typologies of the public space while navigating the environment through four modes of transport: walking, cycling, driving, and riding the subway. This research draws on precursory Psychogeography studies [8] and recent investigations on mobile cognitive measurements [9,10], as well as on proxemics theories that sets a hierarchy of physical proximity – from the body space, through the personal and social space, to the public space [11]. In the study, a test subject followed a specific route in Boston travelling through three unique neighborhoods, each time using a different mode of transit. Proxemics was studied with a set of proximity sensors directed at the four corners, whereas a wearable EEG brain scanner allowed to track brain activity [12] throughout the experiment and against proximity. The analysis of the readings and spatial scenarios are reinterpreted for the creation of a taxonomy of urban compositions that juxtaposes the spatial condition, proximity, and state of mind of the 99 cases observed.

Future studies will expand this lexicon of experimented urban situations, inviting for a critical engagement with the neuroscience towards a deeper understanding of how the spatial morphology, the dynamic activities, and the subtle varying conditions of places affect people's perception and behavior in urban contexts. This framework might eventually foster enhanced design methods in which the human experience – and even emotions – are placed at the forefront of design decisions towards more engaging, pleasant, and responsive built environments.

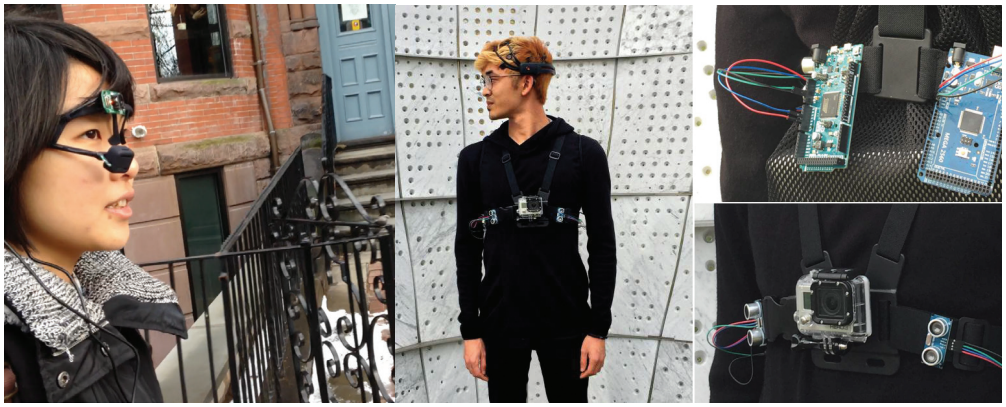

Fig. 1 Test subject wearing an eye tracker in the public space (left) and measurement of the test subject's emotional states and proxemics values through a mobile EEG scanner and proximity sensors (right).

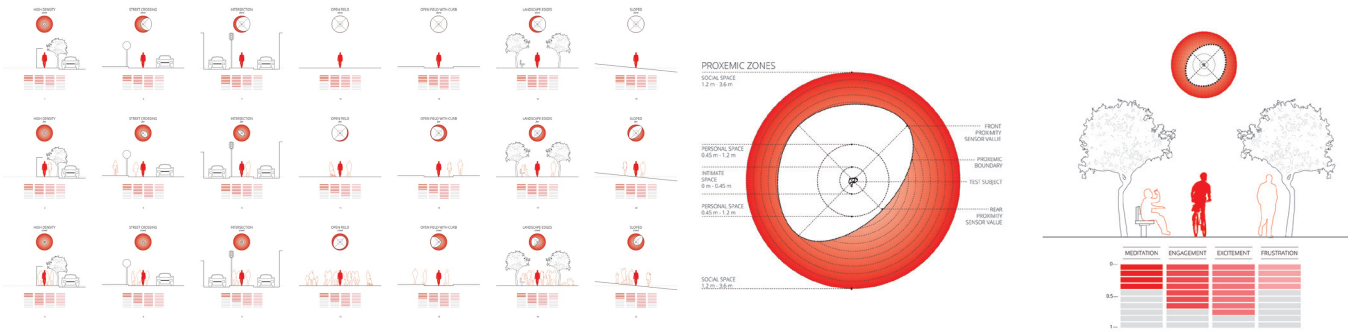

Fig. 2 Analysis and visualization of proximity data and EEG readings in relation to varying typologies of urban environments and modes of transport.

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