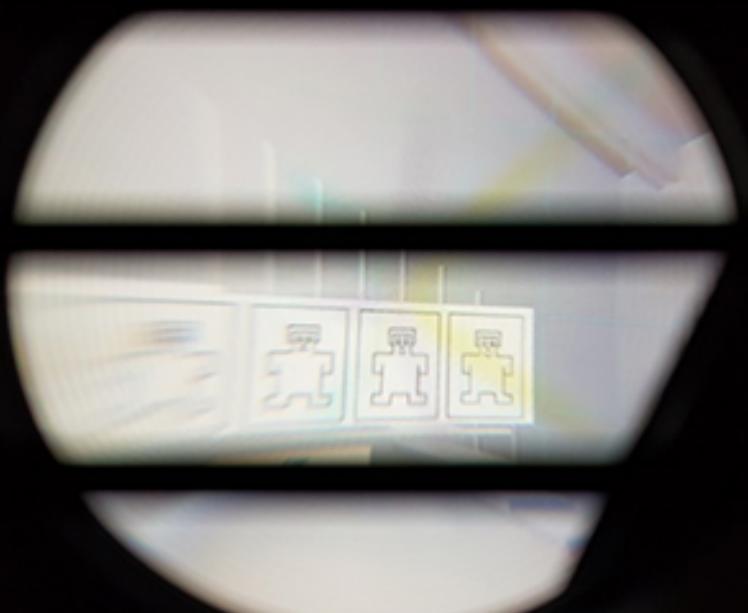


Residential Interior Form Analyses and Its Impact on Emotion and Brain Dynamics

Maryam Banaei*, Ph.D.

School of built environment, University of Technology Sydney, Sydney, Australia**

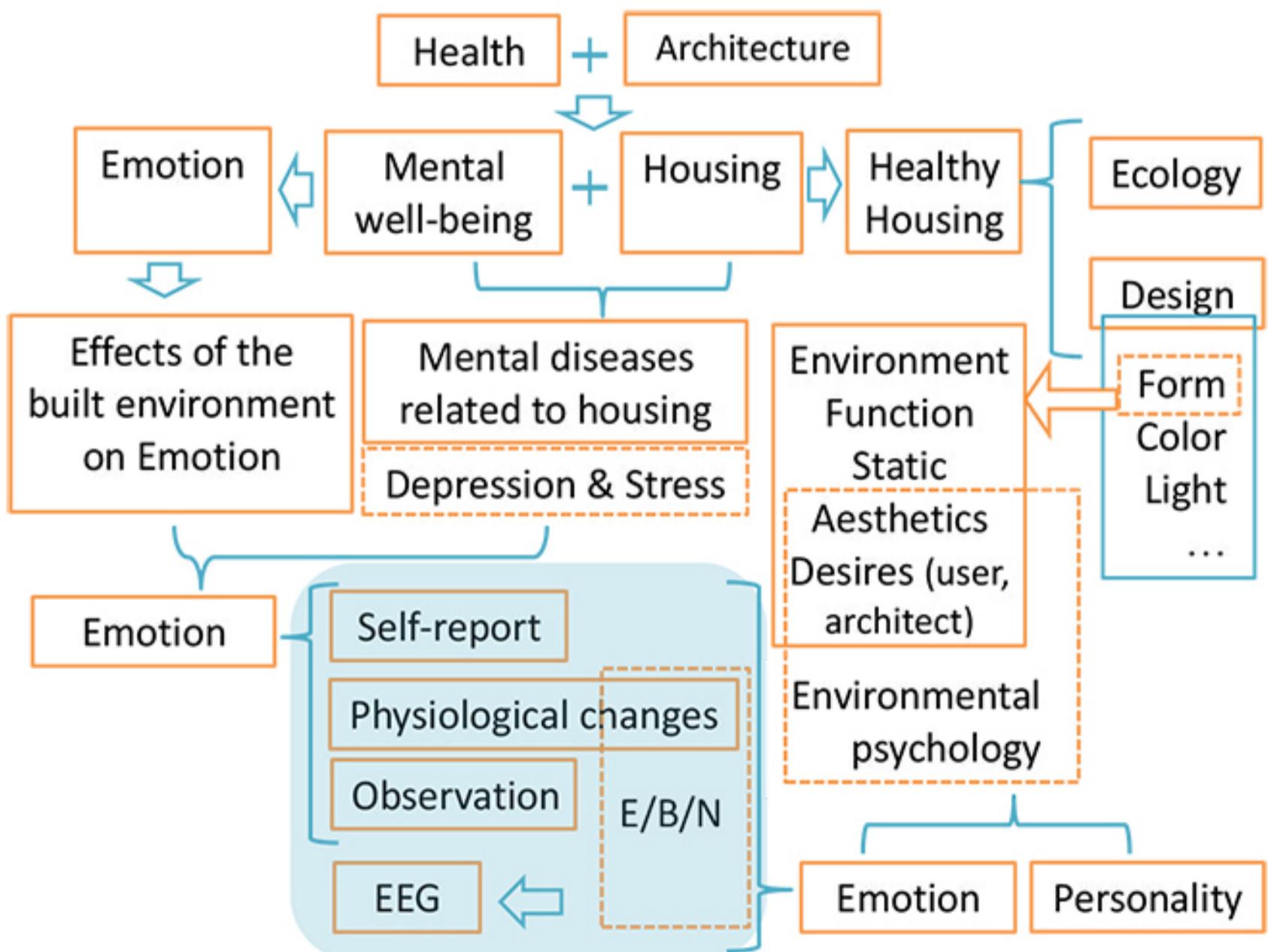


42

Introduction

Residential interior space can have significant impacts on the inhabitant's mental well-being [1-3]. In fact, the interior form is one of the interior design parameters that has rarely been studied from the mental well-being perspective. Emotion is one of the mental well-being factors [4, 5] that has effects on residential [6, 7] and the built environment illnesses [8-10]. Therefore, this study investigated res-

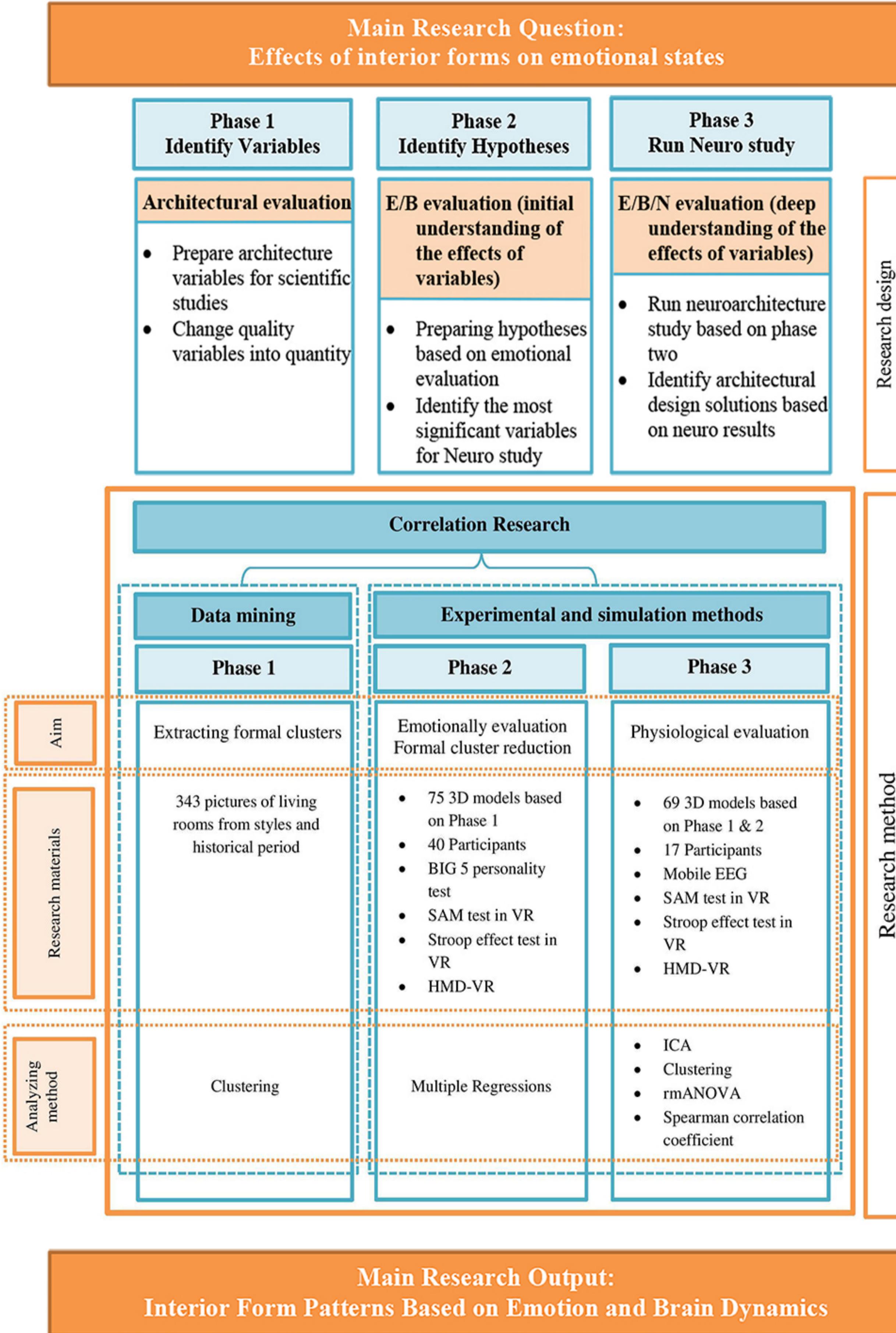
both environmental psychology and neuroarchitecture. Neuroscience recently has been advanced in the mobile brain and body imaging. This provides a great opportunity to evaluate architectural design factors quantitatively in real situations. These quantitative measures of physiological changes were used in this study to investigate the effects of interior forms on inhabitants.



Methodology

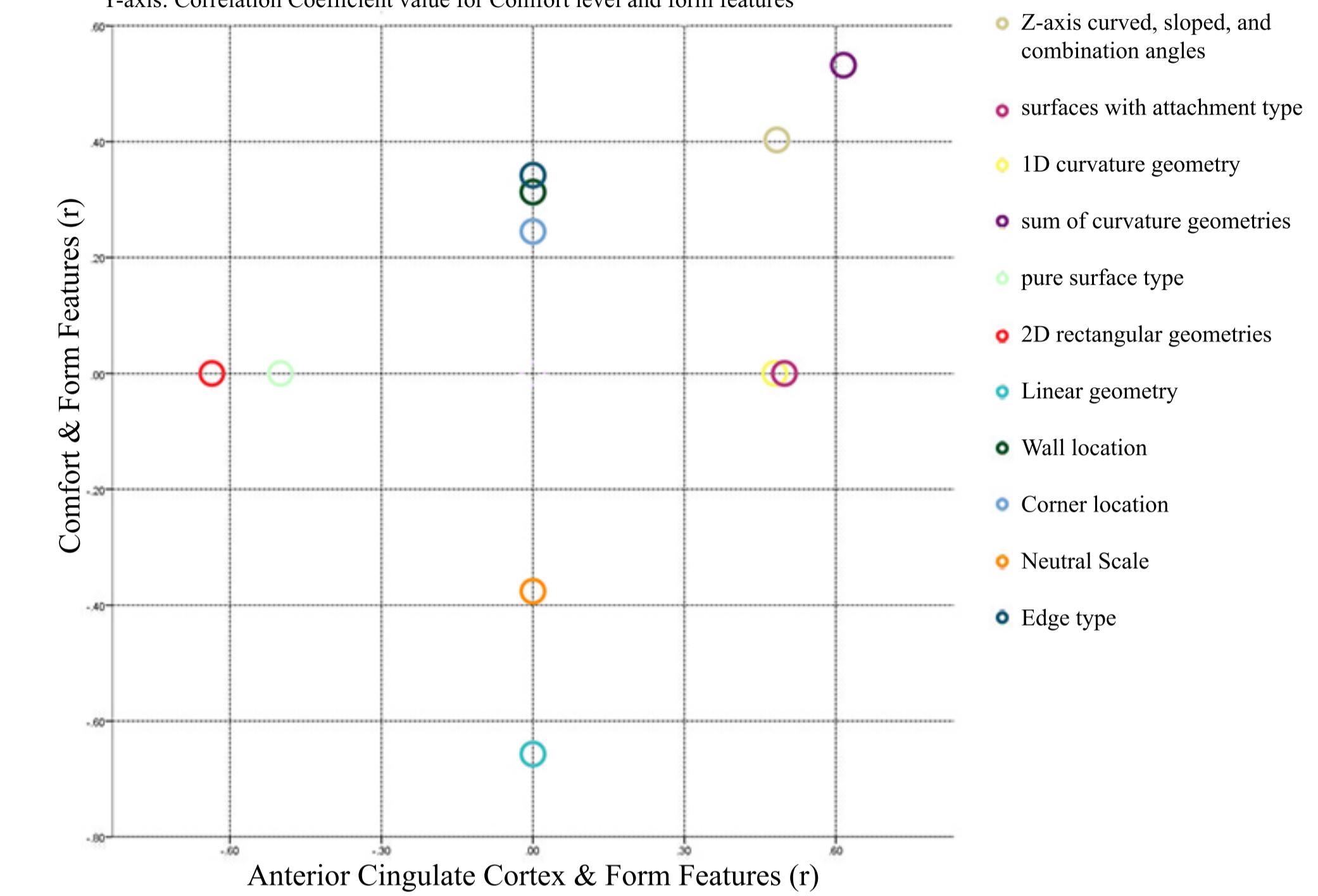
This neuroarchitecture study aims to clarify the effects of forms on emotion by considering brain dynamics. Indeed, this study was conducted in three phases to determine the emotional impact of the interior forms on users.

In this basic research, data was obtained from reference documents, photos, questionnaires (virtual images and verbal), and physiological data (mobile EEG). Through the use of the quantitative method, this study sought to determine the relationship between interior form, emotion, and brain dynamics. Data mining was used for the first phase, while experimental and simulation methods in VR were used for the second and third phases, respectively.



Interior form pattern chart (based on form features)

X-axis: Correlation Coefficient value for ACC activity and form features
Y-axis: Correlation Coefficient value for Comfort level and form features



Conclusions

25 formal clusters out of the interior forms indicated in phase 1 [11]. Then, the relationship between each formal cluster, emotion, and personality traits was evaluated in phase 2 [12]. The same method applied for descriptive features [12]. Finally, the last phase's results demonstrated significant differences between curvature and rectangular forms in the activity of the anterior cingulate cortex (ACC) region in the brain in theta frequency [13]. The results also highlighted the fact that brain areas such as ACC, precentral gyrus, posterior cingulate cortex, and occipital lobe changed significantly according to forms' perspectives [13]. As a conclusion, architectural interior form patterns were suggested based on their emotional effects.

*maryamsadat.banaeibrandabadi@uts.edu.au

**Former affiliation: School of Architecture and Environmental Design, Iran University of Science and Technology, Tehran, Iran. This study was supported by Cognitive Science and Technology Council (COGC), number 1586.

References

- Giuliani, M.V. and M. Scopelliti, Empirical research in environmental psychology: Past, present, and future. *Journal of Environmental Psychology*, 2009. 29(3): p. 375-386.
- Evans, G.W., The built environment and mental health. *J URBAN HEALTH*, 2003. 80(4): p. 536-555.
- Housing and health in Europe: the WHO LARES project. 2009, New York: Routledge.
- Zautra A.J., M.C. Davis, and B.W. Smith, Emotions, personality, and health: Introduction to the special issue. *Journal of personality*, 2004. 72(6): p. 1097-1104.
- Sternberg, E.M., The balance within: The science connecting health and emotions. 2001: Macmillan.
- Shiota, MN and JW Kalat, *Emotion*. 2012: Wadsworth.
- Folkman S. and J.T. Moskowitz, Positive affect and the other side of coping. *American psychologist*, 2000. 55(6): p. 647.
- Manzo, L.C., Beyond house and haven: Toward a revisioning of emotional relationships with places. *Journal of environmental psychology*, 2003. 23(1): p. 47-61.
- Seamon, D., Emotional experience of the environment. *American Behavioral Scientist*, 1984.
- Gifford, R., Environmental psychology matters. *Psychology*, 2014. 65(1): p. 541.
- Banaei, M., A. Ahmad, and A. Yazdanfar, Application of AI Methods in Clustering of Architecture Interior Forms. *Frontiers of Architectural Research*, 2017. 6(3): p. 360-373.
- Banaei, M., et al., Emotional evaluation of architectural interior forms based on personality differences using virtual reality. *Frontiers of Architectural Research*, 2020. 9: p. 138-147.
- Banaei, M., et al., Walking through Architectural Spaces: The Impact of Interior Forms on Human Brain Dynamics. *Frontiers in Human Neuroscience*, 2017. 11: p. 477.