

Available online at www.sciencedirect.com

Frontiers of Architectural Research

www.elsevier.com/locate/foarSOUTHEAST
UNIVERSITY

RESEARCH ARTICLE

Externally-induced meditative states: an exploratory fMRI study of architects' responses to contemplative architecture

Julio Bermudez^{a,*}, David Krizaj^b, David L. Lipschitz^c, Charles Elliott Bueler^d, Jadwiga Rogowska^d, Deborah Yurgelun-Todd^d, Yoshio Nakamura^c

^aSchool of Architecture and Planning, The Catholic University of America, 620 Michigan Ave. NE, Washington, DC 20064, USA

^bDepartment of Ophthalmology and Visual Sciences and Department of Neurobiology & Anatomy, School of Medicine, University of Utah, 65 Mario Capecchi Dr., Salt Lake City, UT 84132, USA

^cUtah Center for Exploring Mind-Body Interactions, Pain Research Center, Department of Anesthesiology, University of Utah, 615 Arapeen Drive, Suite 200, Salt Lake City, UT 84108, USA

^dCognitive Neuroimaging Laboratory, Department of Psychiatry, University of Utah, 383 Colorow Drive, Room 323, Salt Lake City, UT 84108, USA

Received 28 July 2016; received in revised form 8 February 2017; accepted 10 February 2017

KEYWORDS

Contemplation;
Meditation;
Architecture;
Embodiment;
Phenomenology;
Neuroscience

Abstract

Built environments can induce contemplative states, but direct evidence for their impact on the brain is lacking. This exploratory work investigated brain correlates of internal states elicited by architecture designed for contemplative experience. Functional MRI and self-reports of 12 architects were assessed to study their responses to photographs of ordinary and contemplative architectures. Images of contemplative buildings: (1) induced attentive, receptive, and absorbing experiences and diminished internal dialogue; (2) involved decreased engagement of prefrontal cortex; and (3) activated the occipital lobe, precentral gyrus, and inferior parietal lobule. They suggest that viewing buildings designed for contemplation may evoke experiential and brain signatures that consistently differ from those induced by buildings that serve everyday functions. The depth of such externally induced states was inversely correlated with the engagement of the Default Mode Network. Our study points toward a novel avenue for investigating how contemplation can be cultivated in the human brain/mind.

© 2017 The Authors. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

*Corresponding author.

E-mail address: bermudez@cua.edu (J. Bermudez).

Peer review under responsibility of Southeast University.

<http://dx.doi.org/10.1016/j.foar.2017.02.002>

2095-2635/© 2017 The Authors. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Please cite this article as: Bermudez, J., et al., Externally-induced meditative states: an exploratory fMRI study of architects' responses to contemplative architecture. *Frontiers of Architectural Research* (2017), <http://dx.doi.org/10.1016/j.foar.2017.02.002>

1. Introduction

While we daily interact with a large number of practical, aesthetic, and religious objects, the impact that architecture has over our lives is one of the most profound produced by human artifacts. We spend up to 90% of our time in buildings that may affect us greatly even when their influence is not consciously noticed (Altman, 1975; Evans and McCoy, 1998; Hillier and Hanson, 1984; Rapoport, 1990). Growing empirical evidence indicates that well-designed environments raise mindfulness, restore cognitive fatigue, improve well-being, maintain health and facilitate healing (Hiss, 1990; Kellert et al., 2008; Ouellette et al., 2005; Sternberg, 2009). It is therefore not surprising that, since prehistory, every society and culture entrusts certain (often sacred) buildings to initiate and maintain altered (contemplative) states (Barrie, 1996; Bergmann, 2012; Eliade, 1959; Hejduk and Williamson, 2011; Jones, 2000; Kieckhefer, 2004; Mann, 1993; Norberg-Schulz, 1974).

In the present context, contemplation/meditation is defined as an intentionally induced state of consciousness characterized by present-centeredness, focused and sustained attention, relaxation, and absence of judgment (Boccia et al., 2015; Bond et al., 2009; Cahn and Polich, 2006; Lutz et al., 2008; Nash and Newberg, 2013; Tang et al., 2015). Broadly stated, contemplative states may be attained through (1) Internally-Induced (IN-I) methods that depend on inner, psychological or subjective regulation and focus (e.g., counting breaths, mantras, open monitoring, koans); and/or (2) Externally-Induced (EX-I) conditions that draw and uphold attention towards their perceptual and objective elements (e.g., iconography, artifacts, natural or man-made environments, social situations) by placing the practitioner within a cultural-religious container that optimizes hierophantic experience. The two modes of eliciting contemplative states mirror these two directionalities of the human mind: toward stimulus-independent mental/intrapersonal events or stimulus-oriented perceptual/extrapersonal targets (Burgess et al., 2007; Corbetta and Shulman, 2002; Nobre et al., 2004); which are likely to reflect the activation of two global brain networks that process intrinsic (internally oriented, self-processing) and extrinsic (task-positive, external reality oriented) stimuli (Golland et al., 2007; Josipovic, 2013). Image/object visualization techniques of meditation utilize the same rationale behind EX-I contemplation, however, they are likely to fall under IN-I methods as they depend on the imagination and subjective effort to operate (King and Brownstone, 1999; Kozhevnikov et al., 2009; Lehmann et al., 2001).

Although contemplative states may be reached through IN-I or EX-I methods, the overwhelming majority of neuroscience and clinical studies have focused on meditation (or meditative training) as a self-regulated or inward-driven practice (Bishop et al., 2004; Cahn and Polich, 2006; Lutz et al., 2008; Nash and Newberg, 2013). These studies provided important information about the neural substrate that underlies contemplation and the many benefits it can confer upon its practitioners, including improvements in cognitive performance, affective regulation and immunological response; greater sense of wellbeing; reduction of anxiety, depression, and stress; increased motivation;

elevation of pain thresholds; and growth/proliferation of neurons, among others (Brefczynski-Lewis et al., 2007; Carlson et al., 2001; Davidson, 2004; Grant et al., 2011; Holzel et al., 2011; Jacobs et al., 2011; Lazar et al., 2005; Lutz et al., 2008; Moore and Malinowski, 2009; Slagter et al., 2007; Thompson et al., 2011; Williams et al., 2001; Zeidan et al., 2015).

However, these investigations tended to exclude arrays of experiences associated with the use of contemplation-inducing images, objects and environments. Neuroaesthetics and neurotheology, two recently developed neuroscience-based approaches also tend to side-step empirical investigations of EX-I contemplative states (Aaen-Stockdale, 2012; Di Dio and Vittorio, 2009; Kawabata and Zeki, 2004; Newberg and D'Aquili, 1998; Schjoedt, 2009). Even when architecture has been the center of neuroscientific investigation, research has been primarily limited to understanding neural substrates associated with wayfinding, the evaluative perception of beauty, or other non-contemplative responses (Eberhard, 2009a, 2009b; Mallgrave, 2010; Vartanian et al., 2015). Recent neuroscience efforts are beginning to consider the emotional and psychological impact of architecture (Fich et al., 2014; Ma et al., 2015; Robinson and Pallasmaa, 2015) whereas research in psychology documenting the restorative potential of contemplative environments is growing (Herzog et al., 2010; Ouellette et al., 2005) and phenomenological studies have pointed at an intriguing experiential link between buildings constructed to provoke experience and meditative states (Bermudez, 2009, 2011a, 2011b). These considerations prompted us to undertake an investigation of neural correlates of architecture-based contemplative experience.

The strategic goal of this first pilot study was to probe this new field of inquiry so as to develop the rationale and conceptual framework for further scientific investigations. Specifically, our exploratory study used two architectural conditions. The Control condition comprised slides of buildings that were not designed to induce meditative responses (e.g., office, housing, shopping mall) whereas the Experimental condition included slides of buildings designed to foster contemplation (e.g., temple, church, courtyard). The samples of the latter were chosen amongst the top 10 most cited buildings reported to provoke profound experiential responses in a recent survey on the topic (Bermudez, 2009; Friston et al., 1995). Professional architects (with no previous meditation training) participated in the study, which was conducted under IRB approval at the institution where the research took place. Subjects were placed into the fMRI scanner and instructed to allow themselves to experience the images as if they were present in the space shown in them. Buildings were depicted through a succession of photos simulating an actual walk from outside to inside. Three questionnaires (one after each block and an exit interview) were used to collect phenomenological data.

Here, we aim to document differences in brain-activated patterns and subjective states triggered by “contemplative” vs. “ordinary” buildings, not unlike the differences between meditative and regular mental states. Second, we hypothesized that architecture-induced contemplation might be differentially processed by brain regions that support our interactions with external reality (occipital, parietal,

Download English Version:

<https://daneshyari.com/en/article/6742485>

Download Persian Version:

<https://daneshyari.com/article/6742485>

[Daneshyari.com](https://daneshyari.com)