



Toward a theory of environmental satisfaction and human comfort: A process-oriented and contextually sensitive theoretical framework



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ABSTRACT

This article proposes a new theoretical framework of environmental satisfaction and human comfort, highlighting the role of human agency in the interaction between humans and environment and the context within which such interactions occur. The framework is constructed by building on Bronfenbrenner's bioecological model and logically connecting existing theories in the broader area of social sciences. The proposed framework conceptualizes satisfaction and comfort as an optimization process accomplished through one's active perception, interpretation, and modification of his/her socio-physical environment. This optimization process is viewed as ongoing and cyclical. Four modes of optimization are proposed: environmental modification, behavioral adaptation, normative adaptation, and withdrawal.

Three methodological implications are then discussed: using multiple sources of information to examine divergent worldviews amongst involved social groups; building case study profiles for each place type using the proposed theoretical framework; and employing multi-level, interdisciplinary approaches in both research and practices.

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1. Introduction

The quality of built environments and their relationships to human life have been a central focus of building evaluation studies in the environmental design research field, with user satisfaction and comfort as two of the most frequently studied indicators of successful building design. For example, many studies of residential environments utilized satisfaction as an outcome of housing quality and a predictor of important issues like justice and perceived safety (e.g., Austin, Furr, & Spine, 2002), child development and associated family issues (e.g., Schaefer-McDaniel, 2009), mental health (e.g., Wells & Harris, 2007), and place attachment (e.g., Evans, Kantrowitz, & Eshelman, 2002). Studies of the workplace also broadly utilized satisfaction and comfort as outcomes of workplace environmental qualities or causes of outcome behaviors such as worker morale and job satisfaction (e.g., Lee & Brand, 2005; Newsham et al., 2009), as well as self-rated productivity and performance (e.g., Leaman, Thomas, & Vandenberg, 2007). To objectively assess environmental quality, researchers have developed standardized environmental assessment tools for various building

types such as housing (e.g., Adair et al., 2014; Fänge & Iwarsson, 2003; U.S. Department of Housing and Urban Development & U.S. Department of Commerce, 2013) and workplaces and educational buildings (ASHRAE, USGBC, & CIBSE, 2010; Center for the Built Environment, 2008). However, how one assesses environmental quality has been far from complete and assessments of how it affects the environmental satisfaction and comfort have been even less well studied.

This article delves into this rather complex issue by theoretically exploring the relationship between environmental quality and satisfaction on the one hand and between environmental quality and comfort on the other. Building on the rich traditions of environmental psychology and particularly ecological worldviews (e.g., Wapner & Demick, 2000), and by combining existing literature on satisfaction and comfort in housing and building evaluation studies, the article proposes a new theoretical framework of satisfaction and comfort as place-based and process-oriented constructs where human agency plays a central role (Bronfenbrenner & Morris, 1998; Elder, Johnson, & Crosnoe, 2003).

The nature of this research can be described as logical argumentation, in which theories are built by connecting seemingly disparate group of factors, phenomena, or established premises into a coherent explanatory system (Groat & Wang, 2002, p. 301).

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The proposed framework is intended to guide and orient the investigation of socio-physical conditions and processes and further allow the linking of different cases and investigative concerns together in a logical fashion (Lichterman & Reed, 2015, p. 588). These functions conform to the role of theories in inductive inquiry but differ from that of theories in logico-deductive inquiry, where theory is viewed as an interlinked set of covering laws and proposed associations that can be falsified or verified (Lichterman & Reed, 2015, p. 588). Accordingly, the proposed framework puts more emphasis on preserving empirical nuances found in the process of human comfort and satisfaction over a concern for parsimony in order to increase contextual sensitivity and applicability in real world practices.

The ultimate goal of the article is to re-contextualize the concepts of satisfaction and comfort as two important theoretical constructs and further define them as more context-dependent human conditions. This is in contrast to a conventional understanding of person-environment relations where an isolated individual is passively impinged upon by external environmental stimuli (i.e., environmental/architectural determinism). Arguably, environmental determinism has provided the foundation for numerous building evaluation studies (de Dear, 2004). This proposed theoretical framework is intended to provide a means to understand how an individual, as a member of social groups, actively interacts with the complex system of his/her social and physical environment to achieve satisfaction and comfort. By embracing the role of human agency, researchers and practitioners in the field can orient their practices to empower the users and help them achieve dynamic conditions of satisfaction and comfort.

1.1. Literature review

1.1.1. Environmental satisfaction vs. human comfort

Environmental satisfaction in building studies involves the subjective appraisal of the objective qualities of a given environment, indicating how much the given environment meets the expectations and needs of the inhabitants (Ibem, Opoko, Adeboye, & Amole, 2013). Because the individual's expectations and needs are dependent upon his/her value system in relation to his/her life stages (Elder et al., 2003), as well as his/her goals and purposes for the given space (Canter, 1999, p. 202; Preiser & Vischer, 2005), the individual's satisfaction with the environment is not easy to de-contextualize and objectively assess (M. A. Humphreys, 2005). The objective condition of environment itself is also complex because it is an inherently socio-physical construct that operates at multiple levels (Amérigo & Aragonés, 1997; Manzo & Perkins, 2006).

In a slightly different vein, the word "comfort" refers to: (1) a state of physical and material well-being, with freedom from pain and trouble and the satisfaction of bodily needs; (2) relief or support from mental distress or affliction; (3) consolation, solace, soothing, the feeling of consolation or mental relief. In everyday life, the term connotes a physically and mentally relaxed state, free from constraint, pain, danger, stress, tension, or financial worry ("Oxford Dictionary of English," 2010). Unlike the concept of satisfaction, which involves higher level of cognitive activity—memory and judgment based on one's value system and purpose of spaces—the concept of human comfort has been used in the environmental design research field mostly to study physical/physiological sensation and perception of discrete environmental stimuli from one's immediate surroundings. The construct has been used to find the point where human physical/physiological body feels comfortable so that an individual can focus on a given task without being distracted by the measured stimuli (e.g., Paul &

Taylor, 2008; for a recent movement that challenges such tendency see sections 1.1.3. and 2.5).

The complexity of these two major constructs has surfaced in two ways. First, many studies of residential environments utilized the concept of satisfaction as a general indicator of overall housing success while other studies went further to study the concept as a predictor for many of the important issues of residential life such as child development and mental health (e.g., Schaefer-McDaniel, 2009). The concept of "comfort" has been much less discussed. On the other hand, studies of workplaces and commercial buildings employed the concept of satisfaction mainly to assess global outcomes of environmental factors such as job satisfaction or overall building satisfaction. The concept of comfort was employed to address physical/physiological comfort with discrete indoor environmental qualities such as lighting, acoustics, thermal comfort, and indoor air quality (e.g., Paul & Taylor, 2008). A considerable number of studies frequently used both concepts interchangeably (Frontczak et al., 2012; e.g., Newsham et al., 2009).¹ Due to this discrepancy in the two fields, research on residential environments is reviewed first where studies on environmental satisfaction are reviewed. Research on workplaces is reviewed in a later section, where the concept of comfort is also extensively discussed.

1.1.2. Environmental satisfaction

Residential satisfaction studies in the field of environmental design research show three major trends as they relate to the proposed theoretical framework; (1) a residential environment is composed of a spatial structure and social relations; (2) each of the spatial and social structures is a multi-layered and nested system; (3) such a double structure is assessed through subjective vs. objective appraisal, but measurement issues continue to exist. Each of these points is discussed in subsequent sections.

First, the housing literature clearly demonstrates the dual layer of a residential environment as being composed of physical and social dimensions. Many studies have simultaneously examined two distinctive dimensions to assess the quality of a housing environment (e.g., Amérigo & Aragonés, 1997; Austin et al., 2002). Even when researchers chose to work with physical dimensions only, they made explicit the limited study scope while acknowledging the dual structure (e.g., Christensen, Carp, Cranz, & Wiley, 1992; Evans et al., 2002; Spokane et al., 2007; Wells & Harris, 2007). While competing claims exist on which dimension has stronger influence on satisfaction (e.g., Handal, Barling, & Morrissy, 1981; Wright & Kloos, 2007), such mixed claims clearly demonstrate the importance of both social and physical factors on satisfaction.

Second, studies have demonstrated that the spatial structure of housing is an inherently multi-layered nested system. The multi-layered nested system refers to a set of physical places of graduated size, each fitting within the one immediately larger: housing, neighborhood and community, and larger ecology. Scholars have treated housing satisfaction as being connected to all layers of this nested system (e.g., Adriaanse, 2007; Austin et al., 2002; Bonaiuto, Bonnes, & Continisio, 2004; Galster & Hesser, 1981; Wright & Kloos, 2007). Generally less acknowledged in these studies is the fact that individuals exist within a nested social system of individuals,

¹ Such a discrepancy partly reflects the disciplinary backgrounds of the researchers engaged in housing studies versus those in workplaces. While scholars of housing studies largely come from various social sciences with interests in a broader spectrum of human life, a predominant number of scholars of workplace environments had their methodological roots in engineering and human physiology.

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