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RESEARCH ARTICLE

Sinan and Palladio: A comparative morphological analysis of two sacred precedents

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Abstract

An exploratory study on the design schemes underlying two architectural precedents is presented and discussed. The study compares the formalistic compositions of two prominent precedents on multiple levels. These levels include the morphological, semantic, and pragmatic layers. The morphological aspects of these layers are emphasized. The study aims to identify the commonalities and differences between two cases of classical sacred architecture in terms of their morphometric and morphosyntactic structures. These cases are represented by Palladio's *Il Redentore Church* and Sinan's *Süleymaniye Mosque* designs. The scope of the analysis focuses on the syntax and mathematics of the floor plans, and the facade and section of each case are referenced occasionally. Within this scope, the proportional system that regulates the compositions and eidonomy of the precedents are scrutinized. Findings resulting from the comparative analysis are reported and then discussed. The study shows that the two ostensibly different precedents share obscurely many commonalities, which are greater than what their initial appearances suggest.

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1. Introduction

Analyzing the designs of architectural precedents can be significantly informative for practitioners and educators in the field of systematic design processing. In principle, such analysis is similar to "Reverse Engineering," where products are dismantled to infer their methods of assembly. This

method can help designers externalize and reveal design principles and style derivation rules that are typically implicit. Although the recognition of precedent-based design (PBD) as an independent systematic design methodology is relatively new (Eilouti, 2009; Moraes Zarzar and Guney, 2008), the PBD foundation as an analysis of precedents is older (Clark and Pause, 1979, 1985). Furthermore, the roots of PBD can be even traced back to Vitruvius (1999) who documented the experiences of previous architects. Within the framework of PBD studies, the area of comparative analysis has strong potential to help in the design practice

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and academia. Comparative design studies are expected to contribute to the architectural design knowledge body, education, and practice. Comparative design studies can also help reveal, among others, the common design principles of buildings that belong to a given class even if they are developed in different geographic and temporal contexts.

In education, a comparative critical analysis of sets of buildings that share a typology or style represents an intellectual exercise for learners. The analysis may help in determining the rules of composition from visual or graphical representations. Examples of this are represented by precedent-based instruction (Akin, 2002) and example-based design processing (Sio and Kotovsky, 2015). In fact, the comparative visual analysis method has strong origins in art history instruction, which can be traced back to the early 20th century. An early example of this is represented by the scholarly writings of Wölfflin (1950). These writings explain how he applied this method through slide pairings of architecture and art image presentations.

In practice, an explicit system of composition may provide a clear point of departure for design conception and processing. In addition, structured comparative analysis may be used to organize and optimize case study analysis to provide analogical and metaphorical inspirations for design.

Despite its significance, the structured comparative analysis of the built form did not receive sufficient attention in recent architectural literature. Examples of related literature include a critical study of modern architecture (Frampton and Simone, 2015), a provocative reading of Palladio's plans (Eisenman and Roman, 2015), a collective procedural study of Palladio villa designs (Eilouti, 2008), and a comparative analysis of the design schemes of Palladio and Sinan buildings (Eilouti, 2012). Related studies in the area of PBD have also been conducted. An example is the study of Eilouti (2009) that focused on design approaches using knowledge recycling from precedent-based analysis and synthesis models. Although these few examples contribute to the architectural design literature, the area of scholarly comparative critical analysis of architectural designs is still under-researched.

This study is based on the premise that architectural compositions convey a formal language that has a structure similar to that of natural languages. As such, architectural composition has a set of vocabulary elements (with semantics and semiotics) and syntax grammars (e.g., Natapov et al., 2016). The analogy between visual and verbal languages is well established (e.g., Summerson, 1966). The generation of complex structures using a set of primitive elements and a precisely formulated set of grammar rules is based on Noam Chomsky's generative grammars (Chomsky, 1956, 1965; Gandelzonas, 1983). Influenced by Chomsky, Peter Eisenman designed a series of residential designs, which he called "cardboard architecture." In these designs, Eisenman embodied what he referred to as "deep structure," through which he attempted to explore the concept of "visual syntax." The complex nature of this approach stemmed from Eisenman's interest in language structure and semiotics, which he obtained through his study of Chomsky's works. In Eisenman's architecture, the design process is synchronized with the research process into formal structures and fractal geometric shapes (Eisenman, 1983; Gandelzonas, 1983).

Following the same language-based approach, Eisenman and Roman (2015) graphically analyzed 20 of Palladio's villas and illustrated the evolution of Palladio's villas from those that exhibit earlier classical symmetrical volumetric structures.

The present research focuses on the analysis of the morphology, geometry, and mathematics of some architectural designs of two influential architects that lived in nearly the same historical period (approximately 500 years ago) but in two different locations and representing two different cultures (that is, Western and Islamic cultures). The two prominent architects are Andrea Palladio who represents Western architecture and Sinān who represents Islamic architecture in the Renaissance period. Andrea Palladio is an Italian architect who lived from 1508 to 1580. He is widely considered one of the most influential architects in the history of Western architecture (Norwich, 1975). Sinān lived nearly in the same period (1489-1588). Similarly, he was considered as the chief Ottoman architect during his entire career and is universally classified as one of the most remarkable architects in the history of Islamic architecture. The study of key architectural precedents of the works of these two architects is expected to enhance the mapping and comparison of the design language structures and architectural composition principles of the two cultures during the same temporal framework.

A review on the literature backgrounds of the designs of Palladio and Sinan yields two observations. First, the architectural library is rich with research and publications on the works of Palladio and Sinan, each studied independently. Examples include the studies on Palladio's designs (Ackerman, 1967; Constant, 1993; Murray, 1971; Norwich, 1975) and the formal language of Palladio's palazzo façade language (Eilouti, 2008). Other examples include studies on Sinan's designs (e.g., Goodwin, 1993; Necipoglu, 2005; Özer, 1987; Rogers, 2006; Saoud, 2007).

The second observation is related to the suggestion of some architectural studies that indicated mutual influences between Islamic and Western architectures in the Renaissance period on the basis of the frequent exchange in trade and travel (Howard, 2000). For instance, a few comparisons between Sinan and several Italian Renaissance architects and artists, such as Michelangelo and Alberti, have been made (Vasari, 1963). Several examples of these comparisons proposed the mutual influence of design principles between Italian and Ottoman architectures during the Renaissance period (De Osa, 1982; Howard, 2003; Kostof, 1995). These instances proposed the existence of several similarities between Western and Islamic architectural precedents based on visual analyses.

Despite existing efforts, the area of structured comparative analysis that examines the commonalities and differences between Sinan's and Palladio's designs still needs exploration. This research is designed to contribute to knowledge in this particular area. This research addresses the comparative morphological study of a sample of the designs of the two architects. Notably, the main concern of this research is the visual study of the precedents rather than the cultural or social factors that may have affected their designs. The visual study focuses on the exploration of the commonalities and differences in the morphological and

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