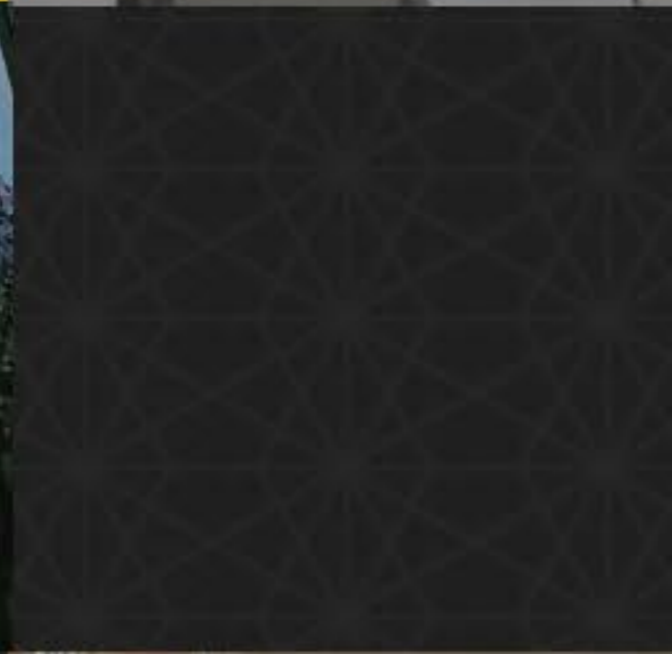


Coherence of Interior and Exterior Formal Qualities in Parametric Designed Buildings

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Introduction

- Pencils and tracing paper making the form-finding process very time-consuming.
- Precedents with complex curve forms cannot be found in previous decades as they are predominant only recently
- the most promising potential of this technology is the form-finding process, mainly focused on the formal aspects of the building
- The hypothesis of this paper is that the overuse of the parametric tools in façade design may lead to an incompatibility and incongruity between the formal aspects of the exterior form and the form and flow aspects of the interior.

Parametric Design

■ Architecture has found a new tool for conceptual design in digital media (Schnabel, 2007)

Scripting methods (Schumacher, 2009)

Possible to tackle the challenge of modifying models

These variable data not only are the input data but also include geometric information

Rule sets are the basic and major part of the parametric design which generate architectural and urban models (Abdelsalam, 2009)



Form Creating through Parametric Tools

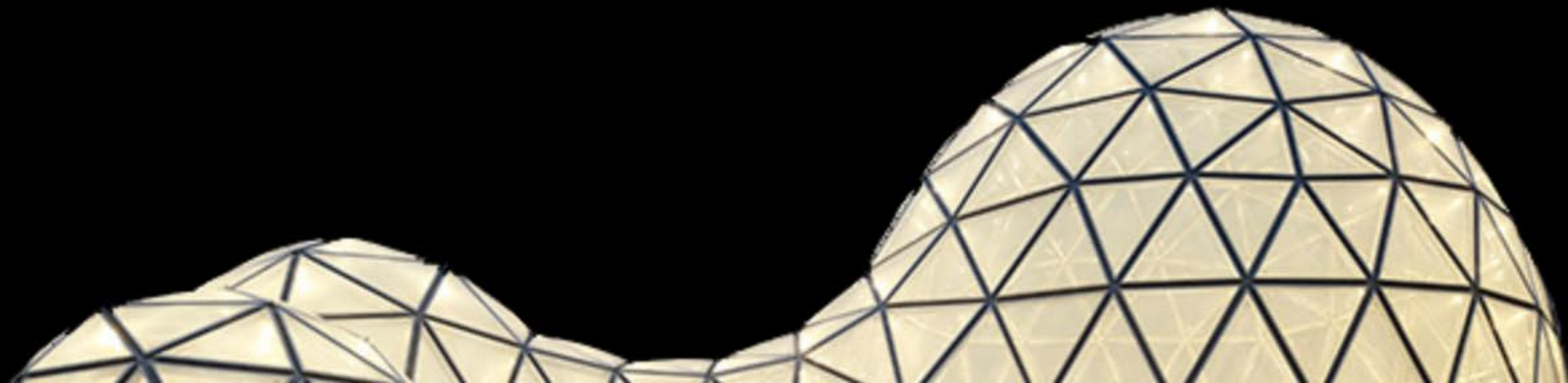
- An exploration process of associative relationships of geometric concepts.

Mathematical knowledge of architects and computer parametric tools lead to complex architectural forms.

Design computation has the claim to be able to help the designer take complex and complicated decisions with greater confidence compared to the conventional case

enthusiasm over the unconstrained experimentation on a fluid n-dimensional design space.

Computational tools are falsely characterized by this tendency, and are believed to only generate form that is sculptural at its best



Architectural Aesthetic

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Although some people may view aesthetic as qualitative and idiosyncratic, researchers have continued in their search for general principles.

Evaluative response has been found to consist of three components: pleasantness, excitement, and calmness.

Nasar (1989) classified aesthetics in two major parts:

1- formal aesthetics and its variables (variables can be easily measured because they have physical features)

2- symbolic aesthetic (interaction between its features and the individual's knowledge)

Formal and Symbolic Aesthetic

■ study of the structure: formal aesthetics
study of the human responses: symbolic aesthetics.

example: the symbolic meaning of the national stadium in Beijing – the bird nest.

Attributes of formal aesthetics include shape, proportion, rhythm, scale, complexity, color, illumination, shadowing, order, hierarchy, spatial relations, incongruity, ambiguity, surprise, and novelty

In relation to the environment, researchers have replaced the term complexity with diversity, or visual richness

In the context of this study, complexity refers to diversity and visual richness which most parametric designed forms comprise

“order” alludes to the logic relation between similar formal elements,



Different Approaches in Design Aesthetic

Four research approaches in design aesthetic literature:

- 1- Specific objective features of the built environment
- 2- The relation of more abstract variables such as cognitive constructs to building preference
- 3- The goodness of fit or prototypicality as a key to observer preference.
- 4- The mediating role of affect: how observers' affective responses to their architectural preferences are related to their preferences for different building facades

The first two mentioned approaches can be considered as the formal and tangible aesthetic.

The last two approaches are intangible and psychological related aesthetics based on observers' appraisals rather than the buildings' formal features.





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Methodology

The Selection of Case studies

- 1- Parametric Thinking (Gaudi's designs)
- 2- Architects today use computers as a machine to produce technical drawings.
- 3- Architects use parametric tools to create the whole form of the building through computerized design and with the least interference of architects' hands.
- 4- building design incorporates different parts, for instance structure, optimization, energy, mechanical design

Methodology

Because both parametric design researches and aesthetic assessment fields have a broad range of the different studies, it would be logical to narrow down the research area. Based on aforementioned information, Fig. 1. maps out in what domain this research is focused.

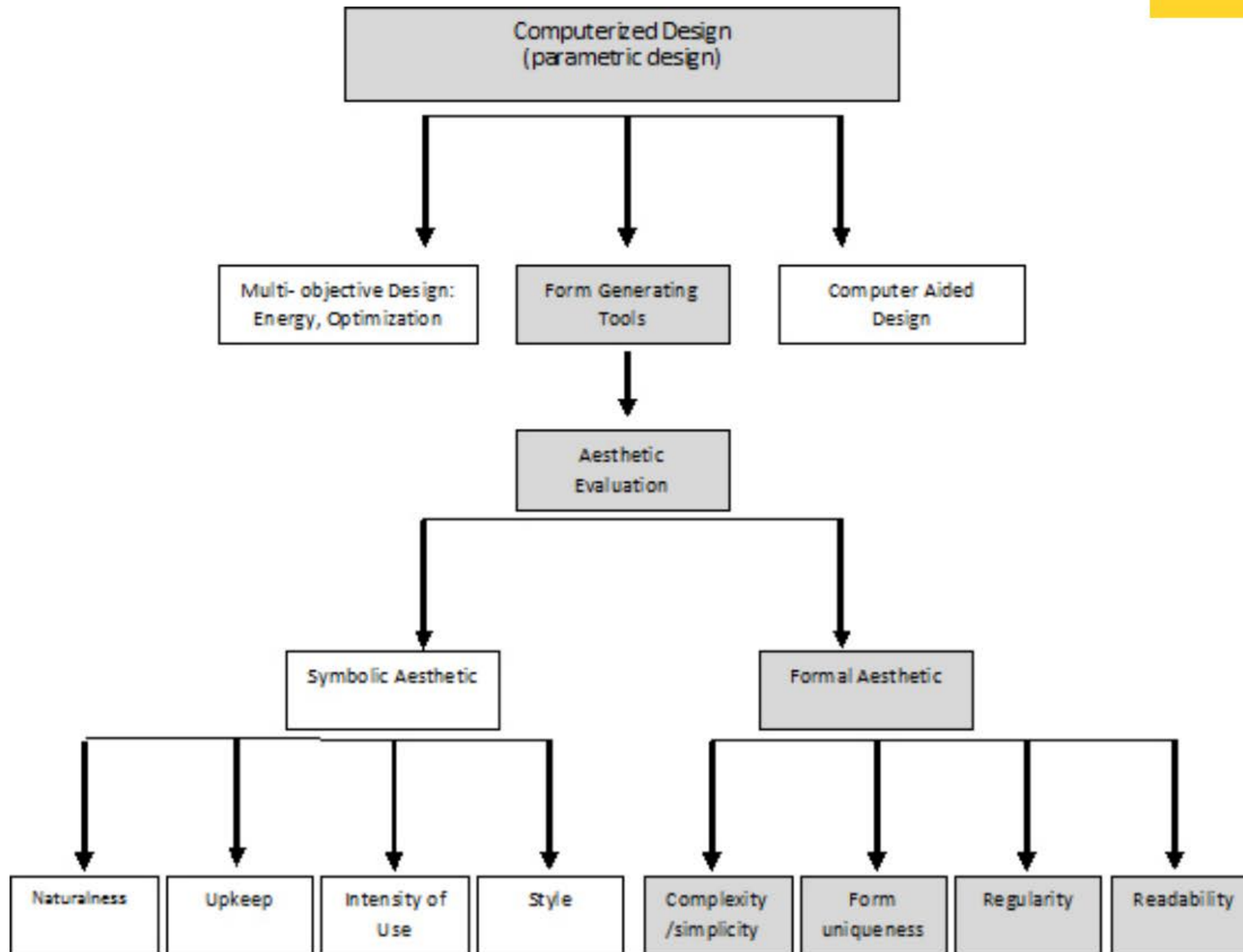


Figure 1 Model depicting the focus of this research. Source: Authors

Analysis of Cases



Factors

the aesthetic features of the building based on the theory of Nasar which are complexity, form, uniqueness, regularity, and readability



First Survey

we evaluate the initial and general spectators' perception of the set of buildings. To do this, we ask graduate design students to match interior views to exterior views.



Second Survey

a more precise map of their formal coherency, architecture students were asked to evaluate each building by formal criteria.

First Survey



■ All Correct Matches ■ ■ All Wrong Matches

Our first hypothesis states that the lack of formal coherency can be seen between interiors and exteriors of parametric designed buildings.

Our initial aim is to evaluate whether the design students could make a logical formal relation between interior and exterior views

Second Survey

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- we provided a survey to twenty-five architecture students.
- where they were asked to mark each view as complex or simple, typical or atypical, order or chaos, and mystery or clarity (Nasar (1994) theories)
- This collected data helped us compare all the interior and exterior views of twelve cases at the same time. Consequently, the results depict that exterior views have specific characteristics, which are significantly different from interior features.

Table 2. the results of the second survey. Source: Authors

		Complicity/ simplicity		Form uniqueness		Regularity		Readability	
		Complex form	Simple form	Typical	Atypical	Order	Chaos	myster y	clarity
Dance Palace	Interior	20	5	1	24	11	14	19	6
	Exterior	23	2	3	22	13	12	12	13
Broad Museum	Interior	18	7	2	23	14	11	19	6
	Exterior	19	6	1	24	7	18	21	4
CIB Architect	Interior	0	25	15	10	24	1	5	20
	Exterior	12	13	24	1	20	5	4	21
Zahner Factory	Interior	4	21	23	2	15	10	7	18
	Exterior	22	3	6	19	6	19	16	9
King Fahad Library	Interior	9	16	23	2	24	1	19	6
	Exterior	19	6	2	23	12	13	2	23
Dear Jingumae	Interior	14	9	12	13	17	8	15	10
	Exterior	25	0	3	22	7	18	20	5
Charles park	Interior	4	21	23	2	24	1	7	18
	Exterior	22	3	6	19	8	17	24	1
The Bad Café	Interior	1	24	25	0	25	0	11	14
	Exterior	24	1	4	21	6	19	21	4
Petersen Automotiv e Museum	Interior	1	24	23	2	25	0	11	14
	Exterior	22	3	5	20	3	22	19	6
Contempor ary Office Space	Interior	19	6	4	21	17	8	23	2
	Exterior	25	0	0	25	7	18	22	3
Faculty of Engineerin g Italy Pavilion 2015	Interior	15	10	16	9	18	7	20	5
	Exterior	22	3	8	17	8	17	18	7
	Interior	25	0	1	24	3	22	24	1
	Exterior	24	1	0	25	2	23	23	2

Exterior-Interior



Figure 1 the comparison between interior and exterior features. source: Authors



Although this transition from hand-drawing architecture to computerized architecture brings a lot of possibilities on the table that were never conceived before, it has some drawbacks which can be easily recognized in some contemporary buildings of the last decade or so.

In terms of formal features, incoherency can be considered an obvious predominant characteristic.

Due to the overuse of parametric tools on the façade of buildings in order to produce seductive and even spectacular forms, the inner space quality which is one of important goals of architectural design has at times been neglected.

This preliminary observation needs further investigation as this small sample size can only lead to new hypotheses.

limitation:

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Discussion and Conclusion



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