

## Space's Interiority by Probabilities Dicing

**Oday Qusay Abdulqader**

Ph.D student, Universiti Sains Malaysia - School of housing, building and planning- Malaysia  
Lecturer in Mosul university-Architectural Department-Iraq  
[odaychalabi@gmail.com](mailto:odaychalabi@gmail.com)

**Fuziah Ibrahim**

Prof. In the Universiti Sains Malaysia, School of housing, building and planning - Malaysia  
[fuziah@usm.my](mailto:fuziah@usm.my)

**Azizi Bahauddin**

Prof. In the Universiti Sains Malaysia, School of housing, building and planning - Malaysia  
[azizi@usm.my](mailto:azizi@usm.my)

### Abstract

The interior design process linked to mass and void term, Masses consist of the main elements of interior design, such as walls, ceilings, floors, levels. The interior design process is the confluence of the components of these elements to generate a coherent interactive interior design. The possibilities of using specific design elements in generating different interior spaces are a creative and tricky method. Interior design projects can be simulated as a possibility box for generating mass and formations shape inside. This study related to design retail space that offers small and medium area. Because of the requirements of the current technological era, simplicity is needed to design interior elements, and reflected multiple meanings and functions of the form. Achieving simplicity should consider interior design principles as the real generator interior space tools. Depending on the area, the area is modulated to find the value of the units and scale of space. Shape possibilities for each of the walls, ceilings and floors will be different as results, But identical in terms of primary forms constituents. Virtual design will be studied in this paper for 6m x 6m x 6m. The value of the module is 1 unit, the process of generating space possibilities to arrange the elements of space. As it is similar to the process of throwing the dice, depend on each space module in addition to the principle adoption of repetition and reflection in composition. This study is an analytical and applied study for generating possibilities of space that carry an aesthetic value and convenience for users. Academics will enter through the results models by virtual And record their assessments as a model questionnaire, which designed to adopt the aesthetic values associated with the formation of Shape grammar.

### 1. Introduction

The evolution of the technology of methods and design materials significantly affected the limitation of interior design. Interior design nowadays doesn't depend on the principles of interior design only, but it should use new and strange methods of design to create mass and space to connect with technological development. Retailers everywhere, with different types are designed by different designers with different purposes. Some of these designs attracted users by the aesthetic elements, which connected to the users' comfortability value with that design. Strange design leads to the same value of attraction and excitement. Interior design as box are a strange

method to design space and masses, actually is a dialectical relation. Who is created the interiority of interior design, space or mass. In this paper, both are used to generate interior design. Some researchers mentioned that the main elements of the interior design process are the structural element (walls, ceilings, and floors) [1][2]. Interior design should connect these elements as a one body to reflect the Affiliation to one place. The relationship among the design of structural elements follow same strategy process, and it could be different, but at least some matching should by using integrated design characteristics[3].

Simplicity and complexity are linked with each other and considered to be a measurement tool for aesthetic standards in interior design. The study adopted to deal with the main interior design principles in the generation of simple primary shape, these primary shapes can be assembled in a manner possibilities in one space. Simplicity doesn't mean poor shape and space without design or designers' purposes. Simplicity could lead to complex design and could affect the psychology and physiology users' needs. The most important value of the design should match these needs. This matching lead to achieve users' second skin, which designer have to reach it by playing on the strategy and methods of interior design role[4]. The study is an attempt to find a suitable method to use the principle of simplicity in the generation of an interior space, to be matched the second skin of the user by simulating the interior space as a cubic. To solve this problem, objective of this study was to find the suitable principles to create interior design by simple way to be aesthetic and exciting design. Reaching this goal will depend on two types of literatures.

## 2. Literature Review

The interior design process linked between the design strategy and shape expression. The literature review part have two types of studies, each type focuses on specific area. Some of Studies related to interior design principles and creating shape, another studies focuses on psychology and perception term.

### 2.1 studies related to generating shape:

Different studies discussed the principles of interior design and its affect on the perception and user behaviour. In this part, studies that related to simplicity strategy in creating shapes in interior design will be discussed. Qasim (2005) explained that the objectivity purposes can be reached by basic and simple design principles in order to achieve high quality of the interior design feelings[2]. These basic and simple design principles are:

- Rhythm.
- Balance.
- Proportional relationships.
- Dominion in space by:
  - Differentiation of one formal element.
  - Differentiation in colour or its tones.
  - Unification the perspective direction.
  - Oncoming or estrangement degree from the receiver[2].

Ching and Binggeli (2012) marked that interior designing process follow two main ways. First way, design as one part, every detail will follow the overall design and have a specific position and function in that design. Second way, interior design process could start from detail then links with the element of space to produce overall

interior design[1]. Abdulqader and others (2011) explained that any design can analyzes depending on three stages of group( detail, part, overall) (Figure 1)[5].

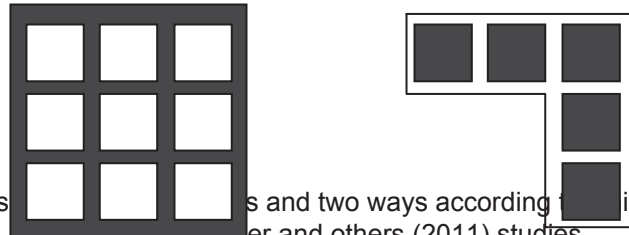


Figure 1. Creating spaces and two ways according to Binggeli (2012) and Abdulqader and others (2011) studies.

Caan (2011) and Feldman (2013) illustrated that interior space have two main groups of element, floor and ceiling as the first group, which may be design as one part or as negative and positive design (Figure 2). Walls and partitions as second group, which nowadays designed by one strategy to reflects that boundary of space and give unlimited area like using mirror in interior space (Figure 3)[3][6].

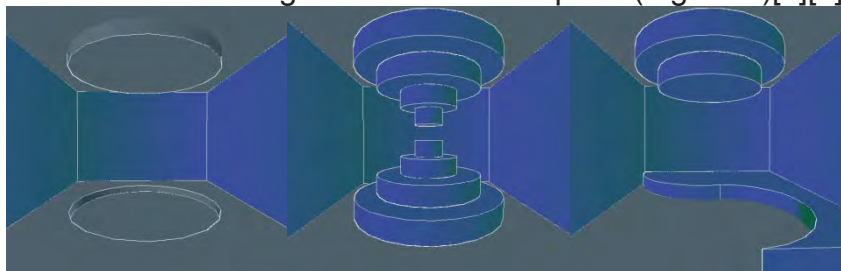


Figure 2. Relationship between element of group 1 (floor, ceiling) according to Caan (2011) and Feldman (2013) explanation. (Reference: researcher)

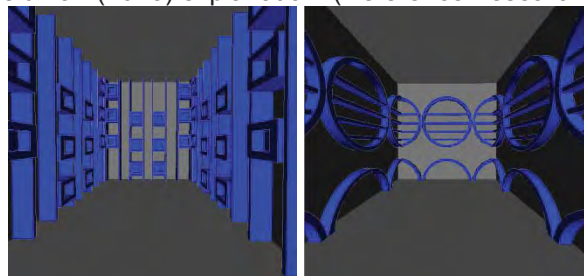


Figure.3 Walls designed as mirror in one group according to Caan (2011) and Feldman (2013) explanation. (Reference: researcher)

Some researchers mentioned that simplicity could be created by using scale and modular principles, to create a unity in design [7]. Designers can create their own scale and modular unit according to the area of design and functional needs. Modular could be used in different levels (area, volume) (figure 4) with different types (with transformation in scale, with transformation in proportion rate, with reflection transformation) [8].

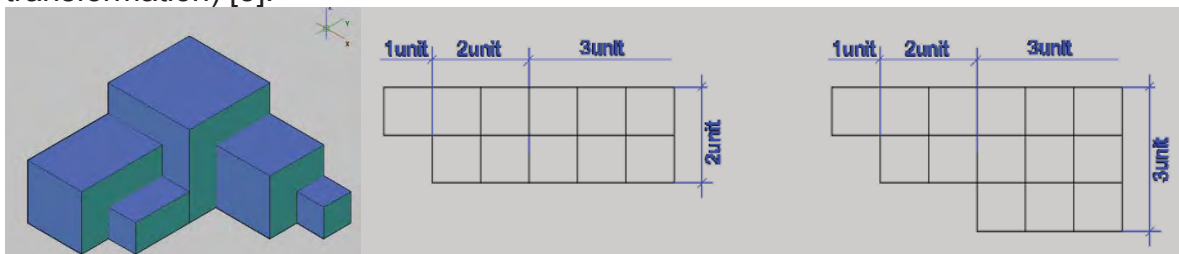


Figure 4. Levels of scale with modular, which can be used in dicing interior design. (Reference: researcher)

## 2.2 studies related to perception and psychological needs:

The studies in this part focusing on the design results and psychological effects on users' behaviour more than the actions. Realizing the creative design value depends on achieving second skin by achieving the physiological and psychological needs. Designers should be depended on the second skin elements in interior design processes, by playing on simplicity concept and its relationships with the user's perception. This strategy linked to generating shape processes which can address the users' minds by effecting on the mental image store [9]. The effective process of perception in interior space is one of designer responsibility, which depends on transferring what in the designer's mind to physical material and shapes. Physical output perceptible sensory by the user, then the perception process starts [10]. Jirjees (2008) explained that the concept of design is the main effective element in the users' perception. Each design or designer have special effects, exciting users in interior design is very important to evaluate the design by touch users' second skin [10]. Cann (2011) mentioned that users could be excited by attract them to evaluate the design, especially when design have the strange idea like using simplicity concept. One colour interior space, using mirrors, similarity between designed elements and negative with positive all these ways could attract users to interior space. Touching users' second skin doesn't mean just in positive feelings, but negative feelings are one of the attracting element [6]. Interior design of retail follows these attraction element for different purposes, it's not just for economical and marketing term, but in the famous cities, interior design have a high level of attracting to make these cities memorized by users in order to be as a measurement tool.

### 3. Interior Design as a Cube

From the previous studies, variables to design interior space as cube were found. In addition to identifying stages of design the interior space. Dicing interior design generating strategy is a metaphor strategy, which created vary of models for the same space. Playing on the design of structural element and making the interior space able to formation process to fix the suitable design for users. Users will be one of the effective elements in the design process, part of the process. The Interior space have six elements to design it as a cubic volume. As a results of the previous studies findings, simplicity strategy can be used to create interior design for retail space by modelling it with dicing space, which follows the following stages to produce different models for the same space and element of design:

#### 3.1 stage 1:

Selecting the area and volume that the designer wants to reflect his idea by using simplicity term. Actually, in this paper, six faces considered to apply the concept of dicing (4 walls, floor, and ceiling) (figure 5).



Figure 5. The basic element of space to start the dicing design.

#### 3.2 stage 2:

Finding the value of modular from existing or metaphor element, which designer wants to use it in the design, simply by divided the six faces and find the related units to prepare it to the next stage (figure 6)

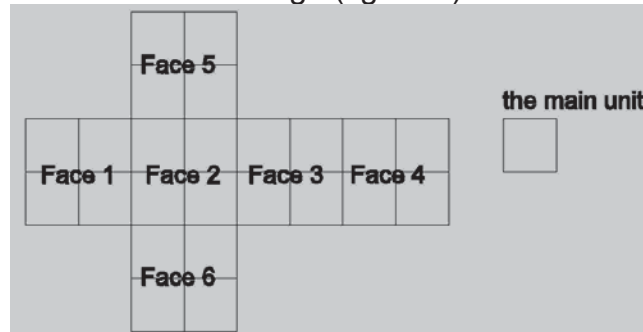


Figure 6. Finding the main unit.

### 3.2 stage 2:

In this stage designer can reflect his concept to formulate the main unit as a module for all design, this should follow the psychological and physiological needs for users to be acceptable for users' second skin. Designers could select design element to be in two groups (walls, floor with ceiling). There are many suitable designs for retail space to create creative and attraction interior space (figure 7).

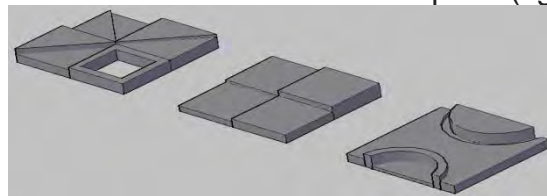


Figure 7. Designs for unit selected from existing retails.

### 3.3 stage 3:

This stage is to design the faces each one can be designed by same unit but with different principles of design that mentioned in the previous studies. As a result of this stage six faces designed depending on designers and users needs (figure 8).

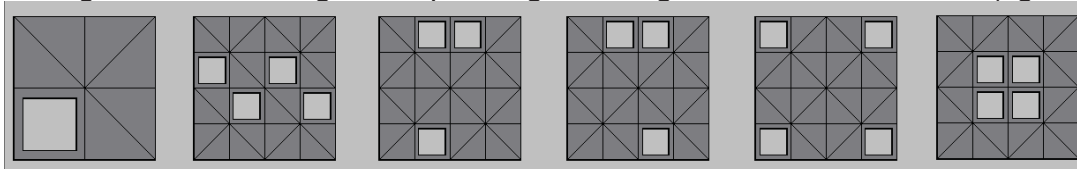


Figure 8. Six faces design depending on the main unit and generated by using reflection, scale, and repetition.

### 3.4 stage 4:

To reach the overall interior design, designer can select the faces for walls, floor, and ceiling according to the variable's value that mentioned in the literature review. As applied to this study four designs (figure 9) generated to test it by users virtually, to find which models touch users' second skin and attracted users to evaluate the design negatively or positively.

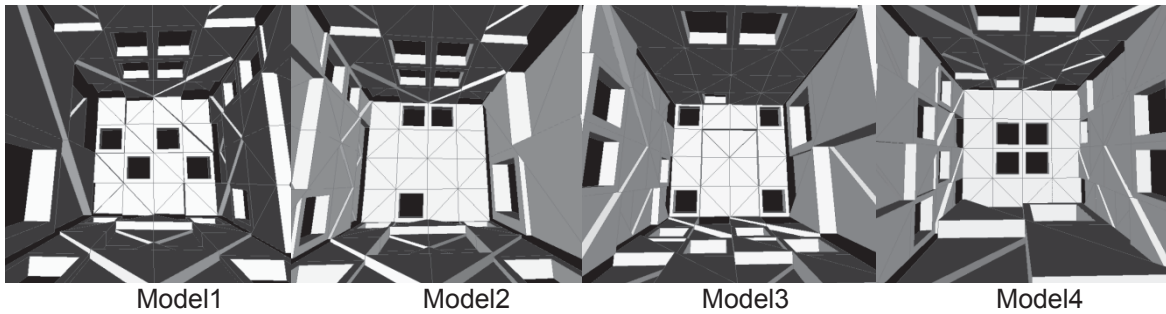


Figure 9. Four different models designed by the probability of dicing (Reference: researchers)

#### 4. Testing Designed Models

The results of design models for the same space with the same unit of design will be faced the real test by the recipients to evaluate the models according to perception and psychology variables, which were mentioned in the literature review part. The test is not to select the best design from the generated models, but to marking the suitable strategy that can be used to create interior design from simple stage. This test made depending on checklist of variable (Table 1) designed as a questioner with interview to evaluate the four models in virtual, after making tour inside the models. Recipient will feel the interiority of design from the first time, all image will be translated from real image to mental image, which is what recipient want to start the evaluation and find the value of aesthetic and exciting.

Table 1. Perception and psychological variables to test generated models.

No.	Give sequence for models					
Main variable	Exciting	Details				
		Overall				
	Scale	Normal				
		Huge				
		Tight				
	Strangeness	Adaptable				
		Strange				
		Unadaptabl				
	Spiritual	Anti				
		Friendly				
Function	Suitable					
	Efficient					

The population of study was from different nationality and different ages, it selected randomly from vary places from shopping centre and shopping street in Pulau Penang – Malaysia, which contained many famous malls, famous shopping centers, famous shopping streets.

## 5.Results and discussion

The results of this paper appeared in two levels, the first level is results from checklist and interview with recipient, which show that exciting variable was 45% for model4 and 20% model3, 15% for model2, and 20% for model1 and that matched with the sub-variable (exciting in details and overall). Normal Scale variable results show 37% for model 1 and 31% for model2, 12% for model 3, 21%for model4. Results for strangeness show 23% for model1, 26% model2, 24%model3, 27% model 4. The results for spiritual feelings were very near for all models, all were between friendly and anti-friendly. 87% from recipient mentioned that the design suitable for different function. The second level of results it related to matching the designed principles with checklist variables, which show that the matching value was 79% for all models. The users attracted to make this test to enter this virtual interior environment and give their opinion in negative or positive way, that mean the strategy of design were successful to exciting the tester to evaluate the interior space, because they feel like part of design process. Even there is some limitation of the study, but dicing design or interior design as cube is a simple design stage to get creative spaces.

## 6.Conclusion

Interior design as a cube is a theory for simple interior design, which can used to generate creative interior design by simple stages. Interior design in a complex process, which have many effects and factors that should treatment to create efficient space. As the results show, the simple way to achieve the second skin for users is by involving users in the design and used set of principles suitable for dicing interior design. As a checklist results, users gave high value to models that used modular in design by selecting or creating unit of module in addition to use the scale factor in the two directions. The results indicated the changing proportion is not efficient to use it in dicing design. The most important factor is reflection and its type, which have the gained affect on the dicing interior design process to generate interior space as a cube, by selecting which face to which design and finding the probability interior design form this process.

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