Original Article

Aesthetic design thinking model for urban environments: A survey based on a review of the literature

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Abstract The primary aim of this qualitative grounded theory study is to unpack a method to understand the construction of aesthetic meaning, addressing the context differentiation. It is hypothesised in this study that the process of aesthetic cognition and the indicators thereof have different meanings in different urban contexts. In this regard, by conducting a systematic review of 140 qualitative studies that have been published since 1970s (in the 1970s, there was a movement towards the study of the aesthetic quality of the urban environment), this study proposes an aesthetic design thinking model to elucidate how built and non-built environmental factors of urban spatial configuration affect human perception. Our study demonstrates that every aesthetic response to the environment is derived from a communication between contemplative feeling, sensual desire and an immediate state of involvement. The findings contribute useful evidence to enhance our knowledge regarding to the role of formal and symbolic meanings of space configurations on aesthetic cognition of the urban environment.
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Keywords: urban environment; configuration of elements; aesthetic properties; aesthetic cognition; aesthetic appreciation

Introduction

This article addresses the relationship between the elements of urban spatial configuration and human perception in contemporary urban spaces in order to understand how particular elements of urban spatial configuration affect people's taste. To answer the research question the authors focused on the process of the psychology of human perception (sensation, perception, conception) in order to gain some insight into how human beings perceive their environment and how the configuration between the elements of urban spatial configuration leads to aesthetic judgment.

There is no doubt that because of mass housing construction (Wassenberg, 2013, p. 288) following the Second World War (Wassenberg, 2013, p. 288), and the Modern Movement in Design (Trancik, 1986, p. 7), as well as the effects of globalisation, urban space organisation has undergone a radical transformation (Richardson and Bae, 2005). There are some scholars that support this claim. For example, Koolhaas (1978, p. 940) believes that the new urban form described as the 'generic city' leads to the conglomeration of objects that generally bear no relation to one another.

Tschumi (1996, pp. 23–24) also states that in the post-modern era urban spaces appear as places of spatial fragmentation in which the traditional methods of urban spatial configuration cannot be applied. Alexander *et al* (1980) described this problem as the cold landscape of the twentieth century, which is the result of the lack of a language for construction in configuration of urban spaces. Trancik (1986, p. 37) believes that in contemporary urban contexts buildings are treating as isolated objects. He believes that lost spaces occur as result of the lack of aesthetic quality of configuration in contemporary urban spaces.

On the basis of the above discussion, we can see that the adaptable language for the organisation of contemporary urban spaces has disappeared.

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Consequently, the practice of urbanism that has embraced fragmentation and a culture of difference, leads to many problems for its users such as imageability (Lynch, 1960), legibility, way-finding (Bentley *et al*, 1985, p. 42), psychological illness (Cupchik, 2002) and so on. There is, therefore, no doubt that urban spatial configuration has an effect on human taste. Therefore, there should be a framework for aesthetic design.

The following paragraph sheds some light on the discussions around urban spatial configuration and supports the preparation of a reliable context for study in an urban space organisation. Solá-Morales through reading of urban morphology and urban typology highlights the impact of infrastructures in the city. He believes that urbanisation, parcel subdivision and edification encompass the layers that allow a better understanding of the spatial logics of city structure (Solá-Morales, 2008). From an ecological point of view Forman (2008) evaluated patterns of urbanisation from the perspective of nature and people. He believes that land-use principles could be extracted from landscape ecology, transportation and hydrology. Busquets and Correa (2006) by focusing on the new conceptions of operative contextualism and new ways to organize infrastructure, attempts to provide legibility of contemporary urban interventions. Considering, all the problems of contemporary urban spatial configuration and the academic classification for the study of urban spaces, the core of this qualitative ground theory study is to understand how the taste of the user is affected by the configuration between the elements of urban spatial configuration.

In view of the fact that there was a movement in the 1970's to 'anaesthetize' contemporary urban spaces (Gibson, 1979), in order to be able to introduce a comprehensive model with which to assess the process of aesthetic perception, this study attempted to gather from related literature (since the 1970's) the principles of aesthetically suitable urban configuration. In this regard, methodologies for assessing urban configuration based on human taste such as landscape, the preference matrix by Kaplan *et al* (1989), the prospect-refuge theory by Appleton (1975), the natural environmental model by Carlson (1979), the engagement model by Berleant (2005), the arousal model by Carroll (1995), the mystery model by Godlovitch (2004) and the sceptical view by Budd (2002) are well-described. By focusing on the human cognition process in psychology (sensation, perception, conception) this study prepares a context for the study of the process of human aesthetic cognition in urban environment.

The hypothesis formulated in this study claims that the aesthetic appreciation of the environment based on the elements of urban spatial configuration has different components, meanings and characteristics in the differing contexts of a city. In this respect, it is clear that a strong relationship between the elements of urban spatial configuration and aesthetic appreciation in human cognition exists. The proposed model for assessing the aesthetic quality of urban configuration is applicable in the context by the questioner or in-depth interview by respecting to the indicators used in the proposed model. Therefore, by using this method, it will be possible to propose a framework – a visually aesthetic configuration – based on human taste, during the design process. An aesthetic survey also provides urban designers with an overview as to where the city requires reshaping. The findings contribute useful evidence to enhance our knowledge regarding the role of formal and symbolic meanings of space configurations on aesthetic cognition. Figure 1 illustrates the research process followed to design a proper method for analysing the effects of built and non-built environmental factors on the aesthetic cognition of the built environment.

Methods and Data

The methodology employed in this positivist approach involves a qualitative study performed by systematic literature review on the aesthetics of urban space configurations. The main aim of this research is to introduce a comprehensive model to assess the aesthetic effects of organisation between the elements of urban spatial configuration on human cognition. We will also seek to identify aesthetic properties of the built environment. Then we will extract indicators of aesthetic judgments and dynamics of aesthetic appreciation from the literature. To design a proper method, we also analyse different approaches of aesthetic design in urban environment (for example, Appleton, 1975, 1988; Orians, 1980; Balling and Falk, 1982; Kaplan and Kaplan, 1982a; Ulrich, 1983, 1986). Then, we will focus on the literature to find the principals of aesthetic design based on human taste. In this regard, both renewed and contemporary approaches to aesthetic design in the current urban milieu will be assessed to find their contribution regarding to increase aesthetic quality of

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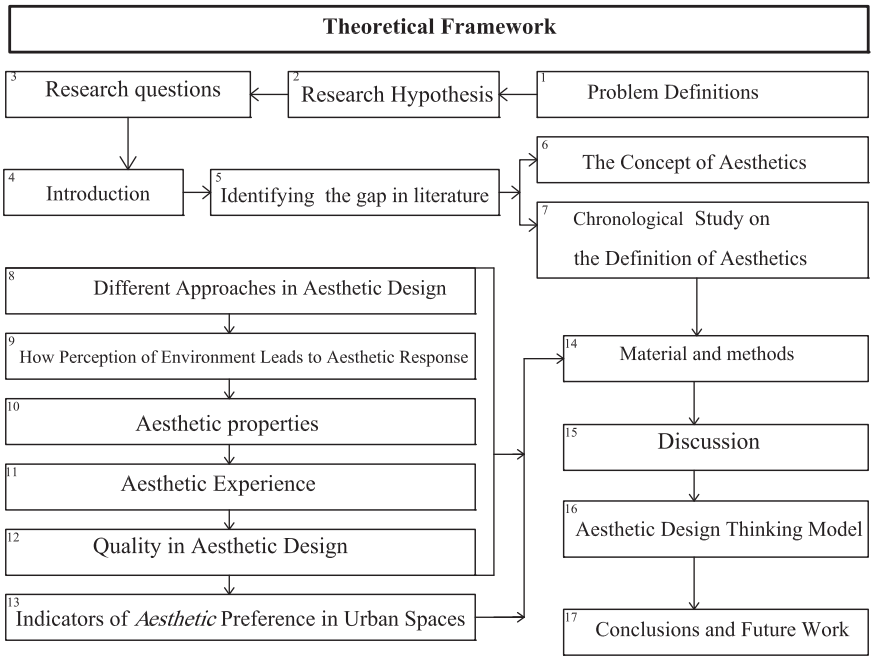

Figure 1: Framework of the research.

urban spaces. As the indicators of aesthetic appreciation vary from one context to another, the proposed model is designed in a way that renders it applicable in different contexts.

The concept of aesthetic

Aesthetics is a discipline that studies the beauty and attributes of an object and their perception through our taste. The idea was first mentioned by philosophers of art to explain the beauty of objects. More recently, aesthetics has become part of other disciplines, such as psychology (Berlyne, 1971, 1974; Funch, 1997), sociology (Bourdieu, 1984; Grunow, 1997), marketing (Brown and Patterson, 2000; Charters, 2006) and anthropology (Douglas, 1982). Porteous (1996) believes that the term *aesthetic* originates from the Greek word *Aisthanesthai*, which means 'to perceive'. The term aesthetic was introduced for the first time in the work of *Aesthetica* written by Baumgarten (1750), who is well-known as the father of modern aesthetics. In his definition, aesthetics is a science involving the senses and cognition. Later, *aesthetics* became a major topic in Western philosophy, providing a means for disputing the essence of art and appraising beauty (Dickie, 1997; Railton, 1998; Sibley, 2001). In this regard, Blackburn (1994) confesses that aesthetics is the study of human sensation, conceptions and judgments, which derives from our appreciation of the arts. At this point, it is necessary to clarify that there is a distinction between beauty and aesthetic; the term 'beauty' is the peculiar attribute of an object or place that offers an experience of pleasure, satisfaction and meaning, but the term 'aesthetics' refers to the philosophical study of beauty and its appreciation.

To propose a sustainable model for the analysis of the term 'aesthetics' in contemporary urban spaces, it is also necessary to examine how the definition of aesthetics has changed throughout history.

Chronological investigation on the philosophy of aesthetics

Recently discovered wall images from the Cave Age and ratios in Egyptian pyramid designs reveal that the term 'aesthetic' dates back many millennia. However, the term was first formulated as a philosophy in ancient Greece (Danaci, 2012). Plato (427–347 BC) was the first Western philosopher who considered the nature of art (Fenner, 2003). To Plato, aesthetic principles formed the fundamentals of aesthetic science. In a dialogue between Socrates and Diotima (Fenner, 2003), Plato tells us that 'the knowledge of beauty is a process that begins through the appreciation of objects in the

natural world'. Aristotle (384–322 B.C.) matured Plato's theory of imitation. According to Aristotle, beautiful objects had to possess certain dimensions. He also assumed that aesthetic appreciation is the interaction between balance, order and imitation. Today, we can see that the Greek schools of philosophy had a deep influence on Western philosophy during the Renaissance. The Renaissance used symmetry, proportion, restraint, regularity and balance as vital components of beauty (Lothian, 1999). The modern philosophy of aesthetics was established in the seventeenth century (Lothian, 1999). In the eighteenth century, there was a shift from general sense perception to a particular focus on the arts. This subjective view of the aesthetic experience is still prominent in modern aesthetics (Tatarkiewicz, 1980).

Figure 2 illustrates the definition of aesthetics from different disciplines such as art, architecture, landscape architecture, urban design. It also includes references to philosophers that have influenced architectural theories.

A critical and constructive analysis of Figure 2 reveals that the term 'aesthetics' has different meanings when discussed from within different philosophical points of view and it is appreciated based on a wide range of conceptual categories, such as form, expression, beauty, taste, feelings, symbolism and imagery. The analysis also indicates that the environment has a significant and varied effect within the different political, ecological, social and symbolic contexts.

Aesthetic design

The aesthetic design of urban spaces is a design based on human taste. Aesthetic design offers an opportunity to increase the hedonic values of the built environment. It applies to all design activity in that it offers an opportunity for communication between contemplative feeling, sensual desire and an immediate state of involvement. In respect of Figure 3, the aesthetic design deals with the collective variables of urban spatial configuration to increase arousal potential.

Different approaches in aesthetic design

On the basis of a comprehensive survey of the literature on aesthetics, it can be claimed that there might be different approaches to the aesthetic design of the environments. The expert approach, in contrast to perception-based approaches, subjective or objective approaches in design and rationalistic or romanticist approaches, are the most important methodologies highlighted in this research (see Table 1).

(A) The objective approach to aesthetic design is derived from physical elements and their configuration. Thus, the physical elements of urban space configurations are mainly considered in this approach. In the subjective approach to urban aesthetic design, the concepts of beauty may be essentially personal, idiosyncratic and determined by culture (Balling and Falk, 1982). It is also widely recognised that culture clearly exerts strong effects on the way humans perceive and respond to the environment (Radović, 2004). These cultural response norms are the result of complex interactions between objects and the minds of the beholders (Carlson, 1979; Kaplan, 1987). In this context, Daniel (2001) asserts that perception-based environmental assessment has always taken both objective and subjective viewpoints into consideration.

(B) The expert approach transforms the biophysical features of the environment into formal design parameters. This approach heavily favours the objective side of the philosophy of aesthetics. On the other hand, perception-based approaches treat the biophysical features of the environment as stimuli that arouse aesthetically applicable psychological responses through relatively distinct perceptual processes. In this context, scholars also acknowledge that perception-based evaluations of environmental aesthetics generally achieve high levels of reliability (Ribe, 1982; Gobster, 1983; Herzog, 1989; Hetherington, 1991).

(C) In the rationalistic view of aesthetics, sense paves the way to the science of beauty. According to this perspective, it is not enough to simply appreciate an artefact or environment; rather, it is mandatory to explain and evaluate the origins of this appreciation. In this view, scholars believe that laws cannot truly define aesthetics because certain perceptions cannot be explained by appealing to elementary impressions. Considering the romanticist view, Ruskin (1857) believes that a thing of beauty is a joy forever. This view suggests that rules cannot truly describe aesthetics, aesthetics also requires clarification by appealing to elementary impressions.

A critical analysis of the different approaches to aesthetic design reveals that all approaches have the same concern: *increasing the aesthetic quality of the environment*. Understanding how quality of the environment effects on aesthetic judgment will help to comprehend the process of human aesthetic cognition.

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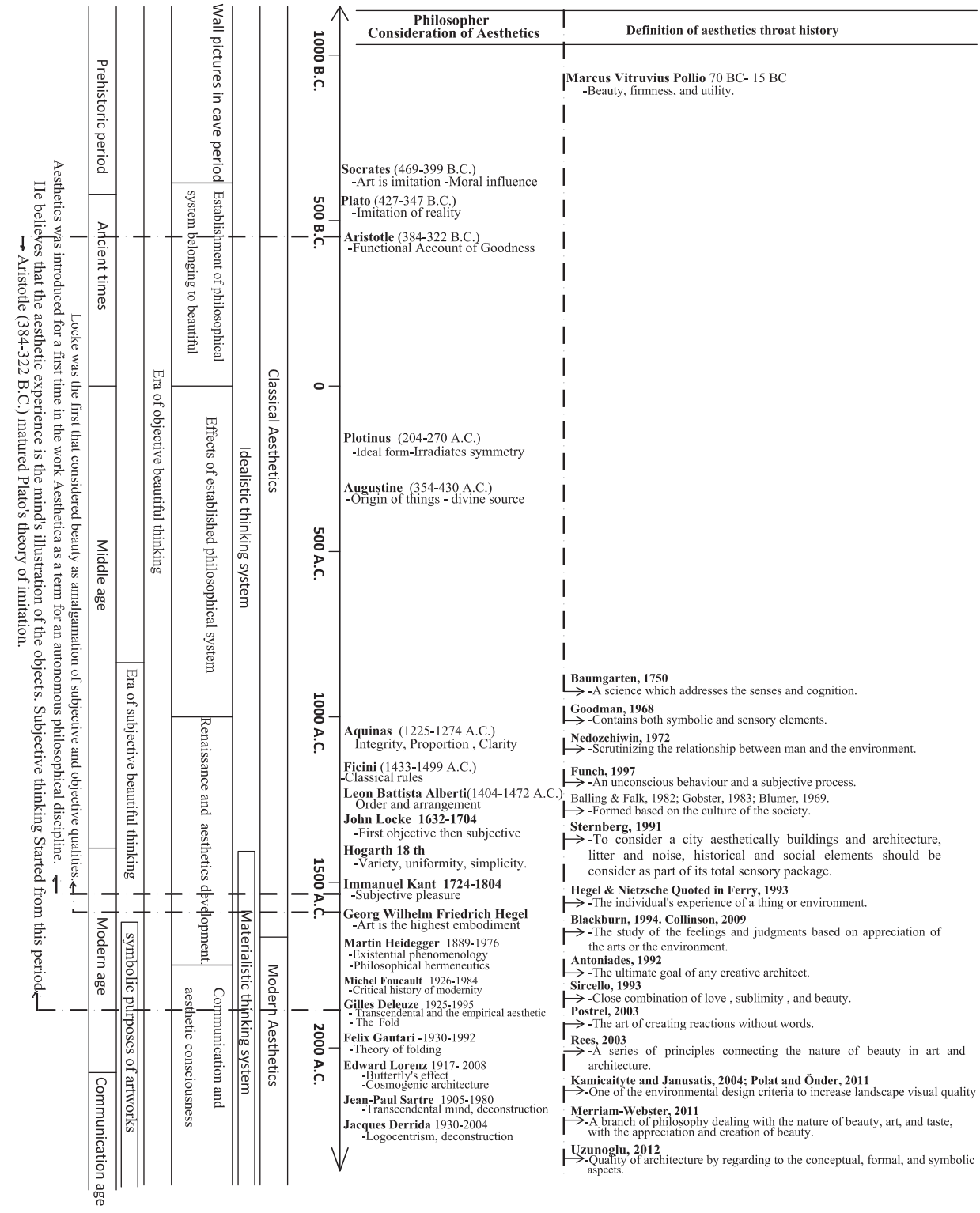

Figure 2: Chronological investigation on the definition and philosophy of aesthetics.

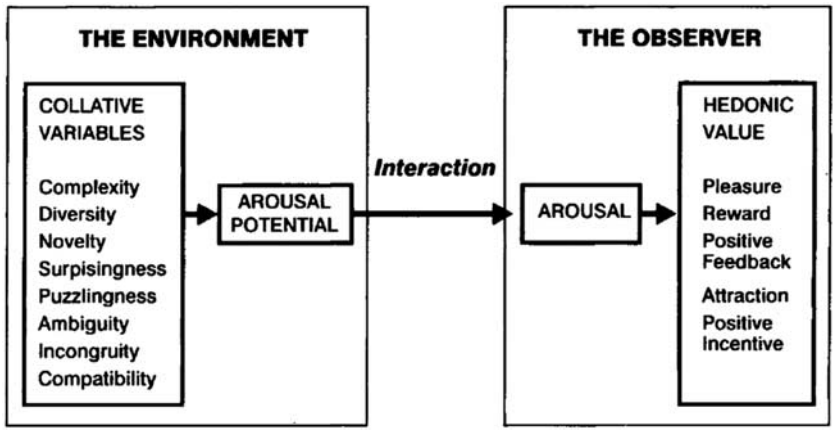

Figure 3: Aesthetic response to the environment (Porteous, 1996, p. 119).

Table 1: Different approaches in aesthetic design (Adopted from Ruskin, 1857; Balling and Falk, 1982; Ulrich, 1977; Nohl, 2001)

Different approaches in aesthetic design	
A Objective aesthetic (Physical aesthetic)	Subjective aesthetic (Psychological aesthetic)
B Expert aesthetic	Public preferences
C Rationalistic view	Romanticist view

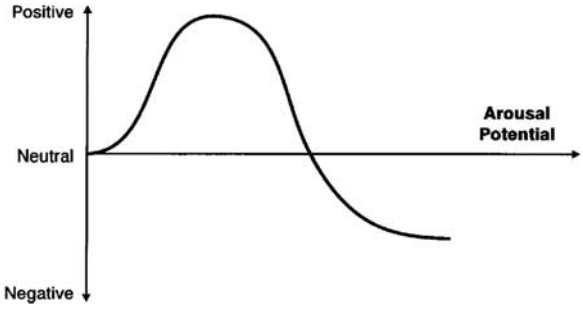

Figure 4: The Wundt-curve according to Berlyne and Wohlwill (Adopted from Porteous, 1996, p. 119).

How does perception of the environment lead to aesthetic judgment?

Aesthetic responses to the environment are derived from the cognition of aesthetic properties in urban configurations and are examined based on the different features of an environment, such as building style, colour, streetscape, house style, city image and urban environment (Nasar, 1994; Heft and Nasar, 2000; Olascoaga, 2003). The organisation between the futures of an environment such as complexity, diversity, novelty, surprising, puzzling ambiguity and compatibility among the elements of environmental configurations are called collective variables. Collective variables in the environment possess the potential for arousal. Tangible arousal in a person depends on how attentive that person is at the moment of observing the environment. Porteous (1996, p. 118) believes that tangible arousal may affect the attainment of hedonic value (aesthetic satisfaction). Hedonic value is the pleasure obtained from observing the environment or a work of art. In this respect, Figure 3 illustrates the interaction between an observer and the environment-created hedonic value. Hedonic values arise from perceiving or experiencing the collective variables of an environmental configuration that forms the basis of aesthetic judgment in the urban environment.

Figure 3 reveals that aesthetic preference appears to be monotonically related to environmental variables such as prototypicality and meaningfulness. Therefore, it is possible to assume that there is a relationship between the arousal potential of an environment and aesthetic appreciation. Arousal potential based on the amount of contradiction or complexity associated with the configuration of an environment may create a positive or negative aesthetic response. The reverse U-shaped correlation between complexity, preference and novelty are well introduced in Figure 4.

In this respect, we could argue that every aesthetic response to the environment is derived from communication between contemplative feelings, sensuous desire and an immediate state of involvement, and the interaction between them will lead to judging the environment. To understand the principals of interaction, it is necessary to search the literature to define the definitions of aesthetic properties and aesthetic experience.

Table 2: General views on the aesthetic properties

Aesthetic property			
Psychological properties	*Organisational properties*		*Meaningful properties*
The formal qualities of objects, such as size, colour and intensity (Hekkert *et al*, 2003)	Explain what we see and why we favour to see specific patterns over others (Ramachandran and Hirstein, 1999)		Subjective properties which we can perceive, including originality, familiarity, prototypicality and novelty (Hekkert and Leder, 2007)
	Unifying properties	Harmony, symmetry, order, balance or 'good' proportion.	
	Complexity and variety	Variety and complexity of patterns are offered for their ability to create arousal (Berlyne, 1971)	
	Unity in variety	If people are attracted to order and unity, they also seek complexity and variety	

Aesthetic properties Although the importance of aesthetic properties differs from one context to another (Kozak, 2003), such properties facilitate the ultimate image formation of an environment (Baloglu and McCleary, 1999). By considering judgment of beauty as a cognitive process (Kaplan, 1985), aesthetic properties will have their own influence on the creation of the mental perception of the final image (Echtner and Ritchie, 1991). Bentley *et al* (1985) also concluded that to have a high quality of aesthetic properties, the amalgamation of all human senses – vision, hearing, touch, taste, smell and emotions – is required in urban design. In this regard, the authors based on Montazeri's (2013) research classified indicators of aesthetic property into three categories: psychological, organisational and meaningful properties Table 2.

Aesthetic experience Aesthetic experience involves the interaction between the environment and the observer. Beardsley (1969, pp. 3–11) suggests that to obtain a unified and pleasurable experience, the designer should focus on form and aesthetic qualities. The specific qualities associated with the form of an object or environments are complexity, unity and intensity, which are linked to pleasure. Beardsley (1958) also demonstrated that the necessary ingredients for an aesthetic experience are (i) an object or group of objects, (ii) resulting sensation, (iii) complexity and (iv) unity. The strength of the sensation must also increase with the degree of complexity (Beardsley, 1958, p. 528). Against the background formed by the literature on environmental aesthetics, Gjerde (2010) revealed an analytical framework for environmental aesthetics (see Figure 5). His research shows that aesthetic experience varies with the intensity, unity and complexity of aesthetic elements and can be categorised into sensory perception, cognition and meaning. Aesthetic judgment is formed based on immediate sensory, cognitive appraisal of a human scene via experience and assessment of values and meanings. A critical analysis of his proposed model reveals that the model does not contain all indicators of aesthetic properties; for example, the observer's subjective cognition of the environment is not considered. We also use Gjerde's model to improve our understanding of the process of cognition (sensation, perception and conception) by categorising the aesthetic elements of urban space configurations and their interrelations.

What is the meaning of aesthetic quality in design?

Aesthetic qualities of design include both perceivable and intangible qualities that are derived from the relationships between design elements and special configurations. To explore the essence of aesthetic design, Lang (1988) divided aesthetic qualities into two groups: formal and symbolic. The study of form configuration is called *formal aesthetics*. The study of observers' reactions to the content environment or form is called *symbolic aesthetics*. In this regard, Nasar (1994) introduced rhythm, scale, complexity, colour, shape, proportion, shadowing, order, hierarchy, spatial relations, incongruity, ambiguity, surprise and novelty as indicators of formal aesthetics. Formal aesthetics concerns the determination of quantifiable characteristics via quantitative approaches. In their research, Bostanci and Ocakçi (2011) introduced harmony, diversity and clarity as indicators of formal aesthetic quality. In addition, the effects of

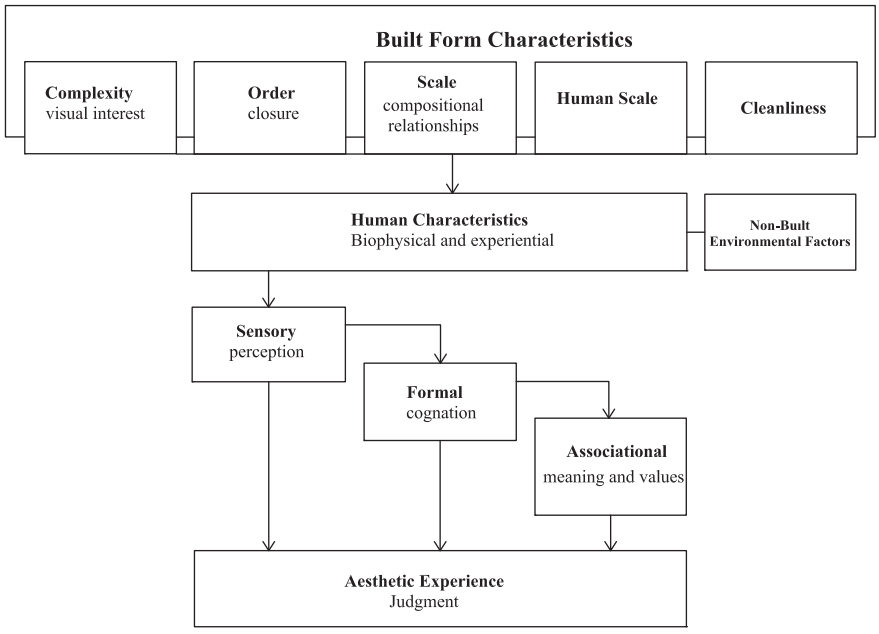

Figure 5: Framework for environmental aesthetics cognition (Adopted from: Gjerde, 2010).

symbolic qualities on the aesthetic quality of the environment can be determined by considering the meaning and function of the aesthetic properties of objects or the environment (Table 3).

By considering Kim's (2006) and Graves's (1941) studies on aesthetic design, their study identified seven principles that can be varied to enhance aesthetic quality: balance, emphasis, pattern, proportion, movement, harmony and variety. It is also possible to conclude that to increase the aesthetic quality of an urban environment, an amalgamation of all formal and symbolic properties in the configuration of the environment is required. The following paragraphs attempt to collect indicators of urban aesthetic preference from the literature.

Table 3: Indicators of aesthetic quality based on the entropy approach (Adopted from Bostanci and Ocakçi, 2011)

Aesthetic quality	
Formal	*Symbolic*
Diversity Harmony Clarity	Meaning Function
Measurable by qualitative methods	Measurable by quantitative methods

Indicators of urban aesthetic preference in the literature

According to the methodological approach of this research, in order to prepare an objective context for the study (to obtain general validity) and equal distance to each researcher the authors decided to bring together the indicators (which affect aesthetically suitable urban configurations) without having any critical standpoint. Asthe indicators of aesthetic appreciation in each context vary, the proposed model should encompass all indicators. In this context, Lynch (1960) introduced the term imageability. He suggests that the environment has the ability to take on an influential aesthetic quality. Consequently, he proposed nodes, paths, landmarks, districts and edges as essential elements of urban design. Reed (2011) revealed that in analysing the aesthetics of the urban environment, visual terms can be explained in the interpretation of spaces. These terms are form, line, colour and texture, which may constitute the main components of an environmental configuration. In this regard, Nasar (1998) also introduced five characteristics of liked environments, in contrast to disliked environments. The attributes can be deconstructed into a series of generalised preferences, namely naturalness, upkeep, openness and defined space, historical significance and order. The observer's perception of each attribute is important (Nasar, 1998, pp. 62–73). Gestalt psychology also improved upon the idea of space configuration by interpreting the relationships between shapes or spatial arrangements (see Arnheim, 1977). Later, the Gestalt school formulated laws to measure the goodness of configuration (principles of grouping

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and coherence), which pertained to similarity, closure, continuity, proximity, common ground and orientation (see Koffka, 1935; Boring, 1942). In this regard, Lynch (1981, pp. 105–108) introduced the characteristics of good city form, such as figure-background clarity, continuity, dominance, form simplicity, clarity of joint, motion awareness and time series. Later, Sitte (1889) introduced a picturesque approach to urban design. He derived a series of artistic principles that apply to public squares by incorporating the following principles: (i) The centre of public squares should be kept free of chaos to use monuments for visual concentration; (ii) irregularity is suitable in a configuration; (iii) public squares should be enclosed and (iv) when determining the shape and size of public squares, the configuration of urban squares should also be considered. Alexander *et al* (1980) indicated that whether an environment projects a positive or negative image depends on the density of the strong centre in the space and its defined boundary, and configuration. In fact, each building should be a good neighbour to existing ones. In this regard, Smith *et al* (1997) claimed that our innate capacity for aesthetic appreciation derives from a sense of pattern, appreciation of rhythm, sensitivity to harmonic interconnections and appreciation of balance.

The term 'responsive environment' was proposed by Bentley *et al* (1985) to increase the degree of choice with respect to permeability, robustness, richness, variety, legibility, visual appropriateness and personalisation. We also stressed the need for more democratic and enriching environments that maximise the degree of choice available to users. In this regard, Trancik (1986) described the evolution of modern spaces and analysed historic examples, leading to the three combined approaches to urban design theory: (i) place theory, (ii) linkage theory and (iii) figure-grounded theory. These theories differ significantly from each other, but Trancik noted that the amalgamation of these principles in urban design configuration will lead to a good and high quality in urban spatial configuration.

Jacobs and Appleyard (1987) suggested seven objectives that must be addressed to produce good urban configurations. They believe that a good urban space may create a liveable, identifiable and controllable space, and provide access to opportunities, imagination and joy (Jacobs and Appleyard, 1987, pp. 115–116). Kaplan *et al* (1989), through research on environmental behaviour, developed four complementary qualities that influence people's visual experience of landscapes: legibility, mystery, coherence and complexity. Rapoport (1990, p. 288) identified 36 characteristics of the successful urban environment, almost all of which are related to size and shape. He grouped the characteristics into six categories and believed that an aesthetically successful urban environment is likely to have high levels of enclosure and narrowness, complex profiles, highly articulated surfaces and enclosing elements. Moughtin (1992) devised elements of traditional design principles to define beautiful architecture in urban spaces. He concluded that symmetry, scale, proportion, order, unity, balance, rhythm, contrast and harmony are principles of aesthetic design in an urban environment. Accordingly, Gehl (1996, p. 135) noted that size, shape, connections, the disposition of elements within a space and the detailed design of these elements are important in determining the quality of a public space. On the basis of an extensive analysis of place-based physical visualisations, Smith *et al* (1997) developed a similar list of qualities that urban environments should fulfil: connection, mobility, liveability, character, personal freedom and diversity. Weber *et al* (2008) also proposed symmetry, homogeneity, scale and formal uniformity as principal predictors in the aesthetic appreciation of the built environment.

Consequently, Lawson (2001), by interpreting criteria of the spatial needs of human beings, concluded that to obtain well-configured spaces, we should consider sensation and perception, size and distance, scale and social order, foreground and background, verticality, symmetry, colour, meaning, context, comfort zone and the creation of a comfort zone in our aesthetic design of urban spaces. Thomas (2002, p. 56) noted that a visual characteristic that creates physical differences and generates an aesthetic response can be implemented by considering the shape of surroundings, their profile, colour, materials, texture, size, height and detail. Thomas believes that an aesthetic urban environment may possess regularity or irregularity, but the important aspect of an urban environment is the sense of visual repose provided to instil spatial character and integrity. Burton and Mitchell (2006) also developed a methodology for organising interpretable urban spaces; they proposed six key urban aesthetic configuration principles: familiarity, acceptability, legibility, distinctiveness, comfort and safety. The authors believe that implementing these qualities in the configuration of an urban environment greatly facilitates the development of viable urban spaces. Another group of scholars has also empirically evaluated aesthetic judgment in city settings with respect to

various principles, including novelty and typicality (Nasar, 1994; Hekkert *et al*, 2003), vegetation (Cackowski and Nasar, 2003; Kyttä *et al*, 2011), order (Nasar, 1998), the interplay between order and complexity (Kaplan, 1982b), maintenance, and upkeep (Nasar, 1994) and good configuration (Ferry, 1993, p. 24).

As, the collected indicators in the section'Indicators of urban aesthetic preference in the literature' are a little bit chaotic and need to be organised in a systematic way, the proposed model for the study on the aesthetics of urban spaces based on collected indicators is structured using the three steps of human cognition in psychology (sensation, perception and conception). The following paragraph will attempt to justify a model that could be applicable in different contexts.

Discussion

The lack of aesthetic quality in the configuration of urban spaces creates many problems for users, such as psychological illness and visual pollution, and poor legibility, imageability and way-finding in urban environments. In this regard, the main aim of this study was to introduce a model to analyse the relationship between environmental configuration and human perception to identify measurable criteria that indicate the interaction between urban spatial configuration and aesthetic quality. A chronological analysis of the philosophy of aesthetic thinking has also revealed that idealistic thinking has always been the main concern throughout history. Figure 2 shows that the classical principles of aesthetics have always focused on the objective part of aesthetic design (Lothian, 1999). In the eighteenth century, Kant was the first person to introduce the subjective aesthetic thinking philosophy by introducing the meaning of *taste*. A critical analysis of successful contemporary urban environments reveals that modern urban spaces, particularly, those constructed after the beginning of the communication age, use both subjective and objective indicators of design (Moughtin, 1992; Madanipour, 1996).

On the basis of the systematic review of literature, the researchers proposed a framework to understand how formal and symbolic elements of urban spatial configuration leads to aesthetic judgment.

Figure 6 illustrates that the formal and symbolic arousal potential of the built and non-built environmental attributes are the main indicators of aesthetic properties that leads to aesthetic judgment. Attributes of built environment or arousal potential could be assessed based on formal and symbolic elements of urban spatial configuration. Non-built environmental attributes could also be assessed by study on cultural experience, personality, intention, sociological and psychological factors and education.

Consequently, to propose a suitable methodology for testing the hypothesis formulated in this study, the researchers identified four main keywords that suggest the aesthetic cognition of an urban environment. The proposed keywords are organised based on human psychological cognition (sensation, perception and conception).

Sensation of objective urban elements

The first step in the cognition process is the sensation of objective elements in an urban space configuration. On the basis of the severity of the psychological effects on human psychological cognition, elements of urban spatial configuration can be classified into two types: micro-scale and macro-scale elements (Frey, 2003; Waterman and Wall, 2009).

Organisation factors leads to hedonic value (perception)

The second step in the cognition process is perception. In this stage the human mind tries to visualise the organisation between the elements by interpreting the relation between the elements of the urban spatial configuration.

Therefore, there should be a defined relationship between these elements. Scholars (for example, Koffka, 1935; Boring, 1942) have tried to find a rational relationship in the organisation of objective elements. In this regard, Lang (1988) classified these organisations into static and dynamic types. Both static and dynamic organisations between the elements of urban spatial configuration are called 'organisational properties', which leads to hedonic value. Static organisation between elements of urban spatial configuration could be assessed in organisational properties such as similarity (Koffka, 1935), density (Alexander *et al*, 1980), enclosure (Rapoport, 1990), symmetry (Moughtin, 1992), floor organisation (Arnheim, 1954), proportion (Zevi, 1974; Jacobsen and Hofel, 2002), order (Nasar, 1998), solids and voids (Lawson, 2001) and so on. Dynamic organisation between elements of urban spatial

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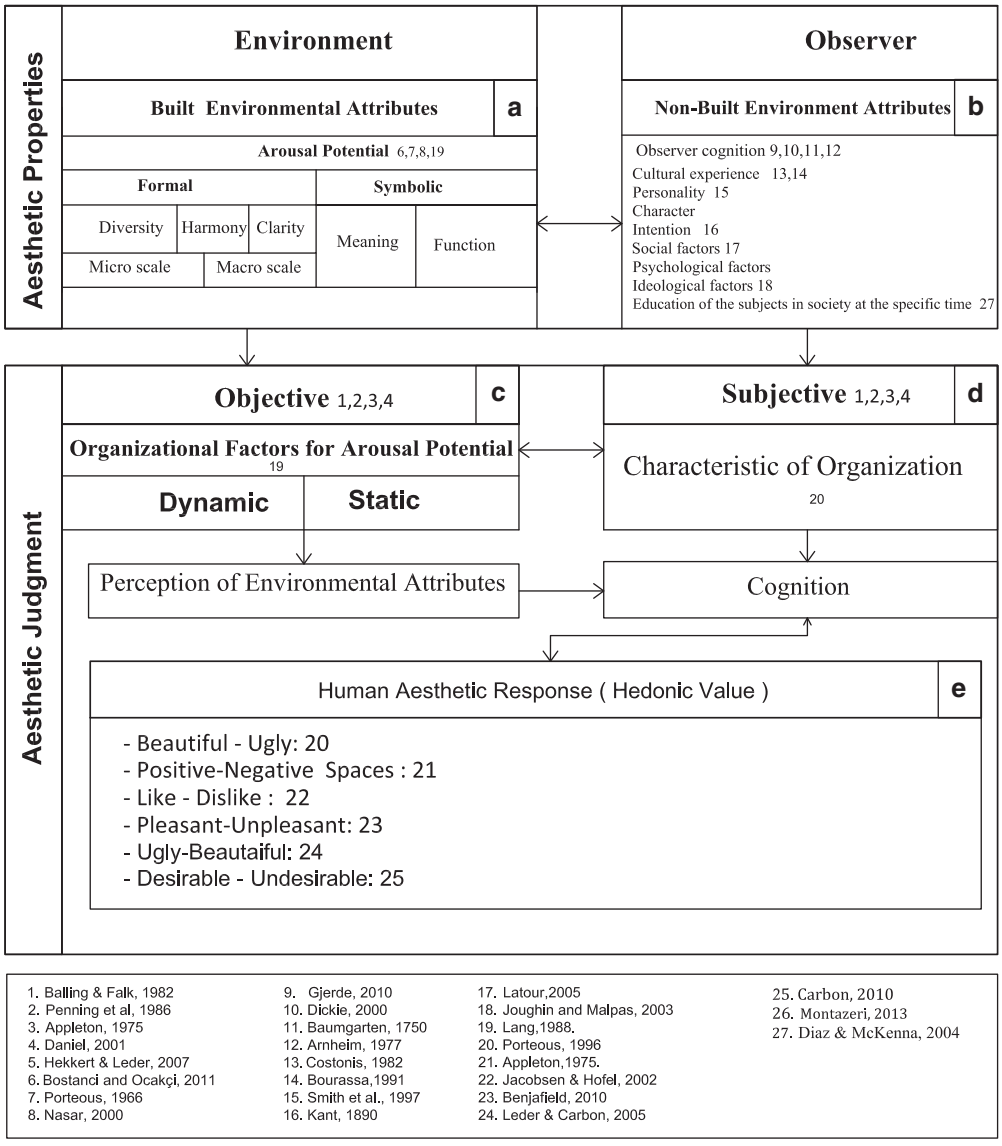

Figure 6: Effects of aesthetic properties on aesthetic judgment of the built environment.

configuration could also be assessed in organisational properties such as harmonious relationship (Graves, 1941; Weber *et al*, 2008), continuity (Koffka, 1935; Lynch, 1960; Cullen, 1961), diversity or variety (Arnheim, 1954), time series (Lynch, 1960), orientation(Koffka, 1935), robustness and permeability (McGlynn *et al*, 1985), proximity (Boring, 1942), complexity (Frewald, 1990) and so on.

Characteristics of configuration

The third step in cognition process is conception. In this stage, conception prepares an opportunity for observer to understand the meaning of configuration between the elements of urban spatial configuration. This stage is highly related to culture. Therefore, different people may have different aesthetic judgments and interpretation of symbols, depending on their cultural background. Our study revealed that the aesthetic characteristics of urban configurations could be classified into two main categories: formal conception and symbolic conception. Formal conception in urban spatial configurations could be assessed based on subjective indicators such as liveability (Smith *et al*, 1997), legibility (Kaplan *et al,* 1989; Ferry, 1993), comfort (Carr *et al*, 1993), coherence (Appleton, 1975), accessiblity (Trancik, 1986; Ferry, 1993, p. 24), tidiness (Nasar, 1983; Ferry, 1993), personalisation(Smith *et al*, 1997), vitality (Lynch,

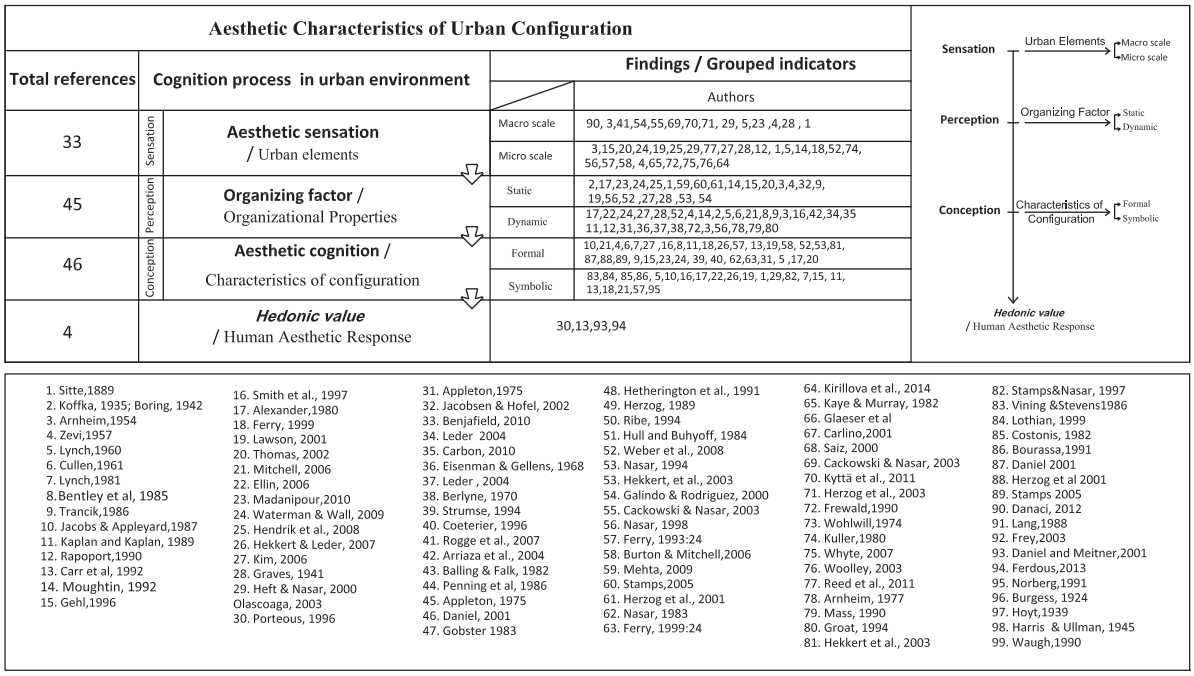

Figure 7: Mapping of the indicators on the aesthetics of urban environment.

1981; Kim, 2006), visual appropriateness (McGlynn *et al*, 1985). Symbolic conception in urban spatial configurations could be assessed based on subjective indicators such as Style (Stamps and Nasar, 1997), Identity and control (Lynch, 1981; Gehl, 1996), Safety (Ferry, 1993; Burton and Mitchell, 2006), Historical significance (Appleton, 1975), Novelty (Nasar, 1994; Weber *et al*, 2008), Symbolic values (Lothian, 1999), Authenticity and meaning (Lynch, 1960; Alexander *et al*, 1980; Ellin, 1996), Sense of belonging to the environment (Alexander *et al*, 1980), Meaning of place (Jacobs and Appleyard, 1987; Lawson, 2001), Mystery (Kaplan *et al*, 1989) and so on.

Hedonic value

The last stage of the cognition process involves the aesthetic reaction and judgment of the urban environment. The cognition of the urban environment based on characteristics of the urban configuration and non-built environmental factors (experience, personality, character, and sociological, psychological and ideological intentions) will lead to a response to the environment.

Figure 7 illustrates the relationship between the cognition process in psychology and our findings related to the urban environment. It prepares a framework to find the relation between human cognition processes (sensation, perception, conception) and collected indicators from systematic review of the literature.

In this regard, Figure 8 also clarifies the relationship between all indicators in urban space configurations based on the aesthetic cognition process. The perception of concrete-objective indicators of the urban configuration (Figure 8(a)) is the first step in the aesthetic cognition of the urban environment. This process is also referred as 'sensation' in psychology. Objective-abstract indicators of urban configuration (see Figure 8(b)) based on the physical attributes of place and human tastes will affect the observer's perception. We believe that these indicators help to organise and interpret sensory information. Consequently, the abstract-subjective indicator of urban space cognition (Figure 8(c)) evaluates the meaning of configurations of urban elements. In addition, these indicators allow for sensation of the environment and point to principles pertaining to the grouping of urban aesthetic elements. At this stage, the observer reacts and evaluate the quality and quantity of information already received from the environment. This reaction then gives rise to the observer's opinions about the environment, which are referred to as subjective-concrete (Figure 8(d)) indicators in urban aesthetic conception. In this phase, the aesthetic characteristics of the urban

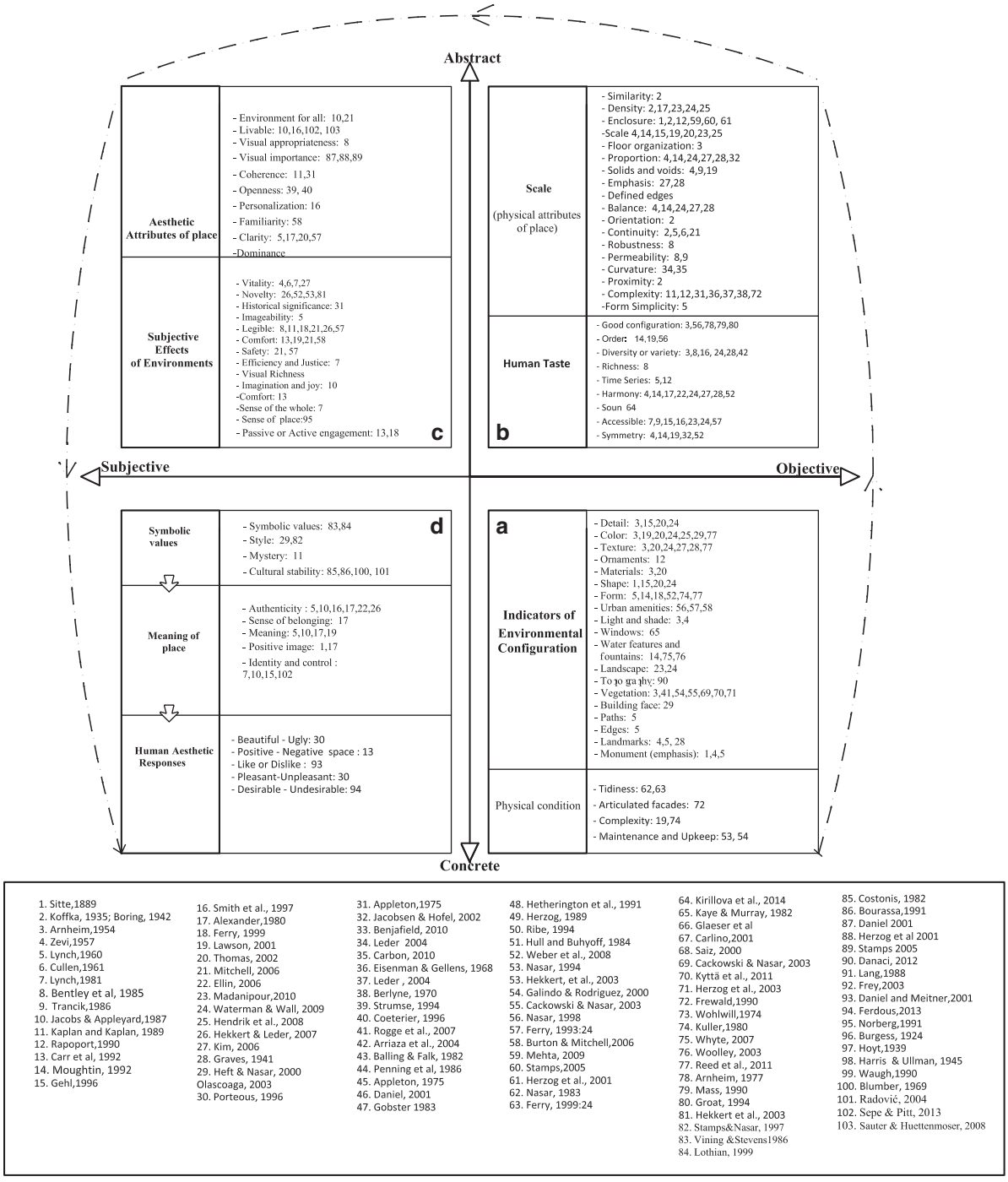

Figure 8: Framework for aesthetic cognition process in the urban environment – (a) Sensation: Aesthetic elements of urban space; (b) Perception: Organisation factors leads to arousal potential; (c) Conception: Urban configuration and values; (d) Hedonic values

configuration will lead to hedonic value, and based on this value the observer will be able to judge and respond to the environment.

This study provides a comprehensive methodology that considers environmental aesthetic indicators in the cognition process. Scholars such as Solà-Morales (2008), Forman (2008), Busquets and Correa (2006), strengthen the claim that: 'context' impacts on aesthetic appreciation. To be specific, we realise that the main reason why different aesthetic qualities are associated with the different contexts of a city is, in fact, related to the issue of spatial

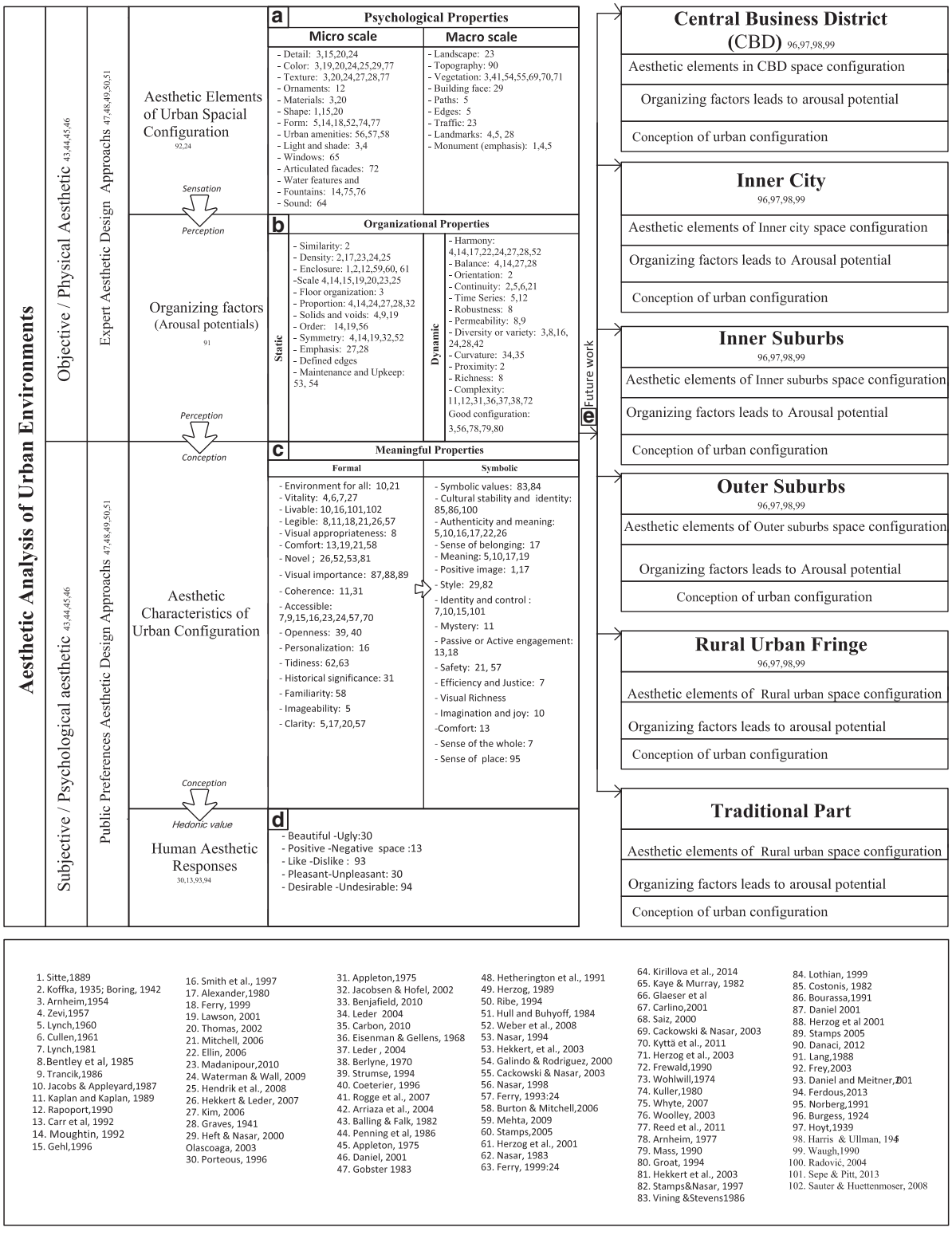

Figure 9: Model of aesthetic design thinking in the urban environment.

configuration, which can be discussed under the heading of morphology, such as land use. The six categories that the authors proposed in this research (see Figure 9e) prepare an opportunity to apply the proposed model in context. In view of the fact that the proposed model for assessing the aesthetic

quality of urban spatial configuration is based on the process of human perception, it will provide an opportunity to apply this model in each and every classification. But, to be able to apply the model in the other form of classification for urban morphology further study is required. Finally, to achieve the main aim of this study, the indicators of the aesthetic appreciation of the built environment (Figure 9) were identified by amalgamation of all discussions of this study.

Conclusions and Future Work

This study demonstrates that aesthetic design in urban configurations is an attempt to increase the quality of urban spaces. In this sense, the built and non-built environmental elements of urban spatial configuration (aesthetic properties) that directly affect on human arousal potential, collected by reviewing the related literature and classified based on the human cognition process in psychology. The results suggest that an aesthetic response to the environment is derived from the communication between contemplative feelings, sensual desire and an immediate state of involvement. It is also revealed that the organisational factors of a built environment are the main source of aesthetic judgment because of their arousal potential; based on the amount of contradiction or complexity in the configuration of an environment, a positive or negative aesthetic response is elicited. Therefore, it is possible to assume that there is a relationship between the arousal potential of an environment and aesthetic appreciation.

The study also determined that to increase the aesthetic quality of an urban environment, the amalgamation of all formal and symbolic meanings in the configuration of urban elements is required. The proposed model demonstrates that the study of the aesthetic cognition of urban space configurations involves four main stages: (i) a study of the objective elements of urban spaces, (ii) a study of the organisational factors of elements leading to arousal potential, (iii) a study of the subjective characteristics derived from the environmental configuration and (iv) a study of the human aesthetic response to the environment. On the basis of the indicators of each classification, the hypothesis of this study can be largely validated. Therefore, it can be concluded that aesthetic appreciation of the environment based on the elements of urban spatial configurations involves different components, meanings and characteristics in the different contexts of cities. As a future study various research problems can be defined by considering assessment of psychological effects of urban spatial configuration in regarding to the competing definition of the place. The applied methodology can also be elaborated by referring the different context of a city upon developed research question. The proposed model also can be applicable by using structured questioners and in-depth interview in regarding to various subject matter

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