ARTICLE

Feng shui: an alternative framework for complexity in design

Michael Y. Mak and S. Thomas Ng

Abstract
Building design is a very complex process that requires an integration of creativity, rationality and self-organization. Although there are numerous studies that examine how architects learn and apply their knowledge to design new buildings, the design process still cannot be explicitly defined. Because the way that architectural design knowledge is applied to building design cannot be formulated, the term ‘black box’ is used to represent an architect’s design mechanism that cannot be logically explained. Designers use intuition and individual past experiences to make heuristic decisions when tackling new situations in building design. These characteristics are similar to the Chinese philosophy of direct insight into the nature and principles and practice of feng shui as applied to building design. Feng shui is traditional Chinese wisdom aimed at creating harmony among the environment, buildings and people. The aims of this paper are to examine the potential of feng shui knowledge as an alternative approach to building design and to derive a conceptual framework based on the principles and practice of feng shui.

Keywords – Feng shui; building design; complexity in design

INTRODUCTION
The nature of design falls between science and art, and architectural design is a complex and intuitive process. Architects use knowledge from past experiences and from their own theories to create spaces with desired experiential qualities (Suckle, 1980). Jones (1970) recognized the complexity of the design process and suggested that a designer working on a problem is engaged simultaneously in three types of activity:

- Creativity: a designer is a ‘black box’ out of which comes a mysterious creative leap.
- Rationality: a designer is a ‘glass box’ inside which can be discerned a completely explicable rational process.
- Control over the design process: a designer is a self-organizing system capable of finding shortcuts across unknown territory.

This integrative design process is similar to the Chinese holistic view and the feng shui approach to the built environment.

Feng shui is a body of ancient Chinese wisdom in knowledge and experience relating to the built environment that has accumulated over more than 3000 years. There are two main schools of thought and practice in feng shui – the Compass School and the Form School. The Form School approach has been well recognized and widely accepted by feng shui researchers as comprising a scientific basis for the analysis of the built environment (He, 1990; Cheng and Kong, 1993). The principles and practices of feng shui are aimed at creating a harmonized built environment for people to live in, and it represents a traditional Chinese architectural theory for selecting favourable sites as well as a theory for designing cities and buildings (Lee, 1986).

Nowadays, as many researchers seek to establish a deeper understanding of the relationships between
the human and natural environments, architects begin to recognize feng shui as a broad ecologically and architecturally connected paradigm. Hwangbo (1999) believed that the practice of feng shui is an intuitive matter involving site selection and spatial organization, and it has strong parallels with the Western concept of geometry in architectural design.

The aims of this paper are to examine the potential of feng shui knowledge as an alternative approach to building design and to derive a conceptual framework based on the principles and practice of feng shui which comprises the following steps. First, the nature and complexity of design are explored, and similarities to Chinese philosophy and feng shui knowledge are explained. Second, the principles and practices of the Form School approach are introduced because it has been well recognized and widely accepted by feng shui researchers as comprising a scientific basis for the analysis of the built environment. Third, four fundamental concepts of the Form School approach are derived which provide a broad understanding of feng shui knowledge. Finally, a conceptual framework of feng shui for building design is constructed utilizing the concept hierarchy approach to establish a feng shui knowledge structure.

The findings of this paper contribute significantly to current practice of architectural design by providing an alternative framework for building design and creating a hierarchical structure of feng shui knowledge for building design. The purpose of this paper is not to give feng shui knowledge validity from a Western perspective of science and does not set out to challenge conventional theories of architectural design; rather, this feng shui design framework suggests the significance of an unconventional alternative system of analysis of building design.

**COMPLEXITIES IN DESIGN**

It is generally recognized that design falls somewhere between two extremes - science and art - and architectural design lies near the centre of this spectrum (Jung, 1996). Sargent (1994) studied the nature of design and suggested that there can be no unitary 'science of design'.

In the 1960s, design was interpreted in a similar way to the interpretation of science - the format of a scientific method was constructed in the form of analysis and synthesis. This approach originated in the notions of objectivity, rationality and universalism that are believed to constitute the scientific method - breaking the problem down to fragments and solving each of these separately before attempting some grand synthesis (Asimow, 1962; Jones, 1963; Archer, 1969).

However, more researchers (Gregory, 1966; Simon, 1969) began to recognize that design is not like science. This approach was largely based on the philosophy of science developed by Popper (1972) and Kuhn (1970). Popper (1972) suggested the concept of the 'conjecture-refutation' model of the scientific method instead of the logical process of induction whereby laws can be inferred from true facts. Kuhn (1970) proposed a 'paradigm' concept to explain the evolution of scientific knowledge, where scientific knowledge progresses through a 'paradigm shift'.

Jones (1970) admitted that it is impossible to ascertain the nature of design. He outlined three key points to attempt to describe the nature of design, which are summarized by Raftery (1991) as follows:

- There are very often long periods when the person who is about to make an original work seems to do nothing except take in information and labour fruitlessly at seemingly trivial aspects of a problem. This is known as 'incubation'.
- The solution to a particular problem or the occurrence of an original idea often happens when, at some particular point in time, everything seems to fall into place. This is known as the 'leap of insight' or 'change of set'. Basically the problem is perceived in a new light and very often an apparently complex problem turns into a very much simpler one.
- The main enemies of originality are mental rigidity and wishful thinking.

Incubation was a concept proposed by Poincare (1929) who interpreted the conditions for creativity as:

- A period of conscious work, data assembled, problem defined, etc. and some trials made at solutions.
The unconscious mind works at useful and fertile combinations during this time and useless areas are inhibited.

A hypothesis is derived which gives a fruitful direction. In Poincare’s own words as ‘a period of preliminary conscious work always precedes all fruitful unconscious work’.

Following the conclusions of Jones’ and Poincare’s work, design was described as a ‘problem-solving’ activity. However, the solution to the problem was perceived by individual designers and not measured objectively. The further implications of both Jones’ and Poincare’s work were that the solution is produced by an unconscious thought process. Humphreys (1976) recognized that this mystical approach is remarkably similar to the concept of ‘satori’ (the enlightenment in Zen Buddhist thought) in Chinese philosophy.

**FORM SCHOOL APPROACH**

Feng shui is a body of Chinese wisdom in knowledge and experience relating to the built environment that has accumulated over more than 3000 years. It has been developing throughout the existence of Chinese history and civilization, and has evolved from Chinese philosophy. It is founded on the earliest and greatest document of Chinese philosophy, *Yijing* (the Book of Changes) that originated around 800 BC. The primitive knowledge of feng shui was based on observations from three sources – astronomical phenomena, natural phenomena and human behaviour (Feuchtwang, 1974). The principles and practices of feng shui are aimed at creating a harmonized built environment. Feng shui represents a traditional Chinese architectural theory for selecting favourable sites as well as a theory for designing cities and buildings (Lee, 1986).

There are two main schools of thought and practice in feng shui – the Compass School and the Form School. The Compass School is based on metaphysical speculations of cosmology, in particular by analysing the directional aspects in terms of the relationships between the five elements, eight trigrams, heavenly stems, earthly branches and constellations. Practice in the Compass School uses primarily the Luopan (feng shui compass) and the composed elements of time in space (Skinner, 1982; Chiou and Krishnamurti, 1997). The Form School is primarily based on the verification of the physical configuration of mountains and watercourses surrounding sites and buildings. Its theory was built upon an understanding of the landscape – the profiles of the land, the sources of rivers and the terrain. The practice of the Form School first observes the land formation and terrain, and then determines the location and orientation of buildings.

The development of the Form School was widely accepted by the upper class of the ancient Chinese society and attracted scholars and intellectuals to join its practice. The principles of the Form School have been applied to design and construct castles, palaces and towns in China since ancient times (He and Luo, 1995). Lee (1986: 367) suggested that the principles and practices of the Form School approach represent ‘a compendium of Chinese architectural theory’.

Since the Ming Dynasty (1368–1644), these two schools of thought were not exclusively attached to their own methods for the practice of feng shui, but rather combined and integrated ideas from both (Lee, 1986). However, the Form School approach remained the primary consideration in feng shui practice (Xu, 1990; Too, 1996). Contemporarily, the Form School approach has been recognized as comprising a scientific basis for the analysis of the built environment (He, 1990; Wang, 1992; Cheng and Kong, 1993; Mak and Ng, 2005). For instance, research investigations carried out by Xu (1990) have compared the feng shui concepts using the Form School approach and the Hendler model, a well-known Western model of site analysis. The results indicated that feng shui is a more powerful tool in site analysis than the Hendler model.

According to Zang Shu (the Book of Burial), the first surviving important literature on Form School was written by Guo Pu (276–324). There are five main theories in terms of Form – Qi, Wind-water, Four Emblems, Form and Direction (He, 1990). The Form School approach considers mountain ridges, surrounding hills, watercourses, locations and orientations as the most important terrestrial and celestial elements for human dwellings because these elements represent both terrestrial and celestial Qi. These elements comprise the basic
terms of the Form School approach and are known as the ‘five feng shui geographical secrets’, i.e. dragon, sand, water, cave and direction (Lip, 1979):

- dragon – means the mountain ridges to be traced, and represents the topography
- sand – means the enfolding hills and soil condition, and represents the surrounding environment
- water – means the flow of water through or bypassing the site
- cave – or ‘feng shui spot’ means the niche position, and represents the best location
- direction – means the facing direction of the site and building, and represents the orientation.

RESEARCH METHODOLOGY
The development of a conceptual framework follows the procedure of the grounded theory approach. Glaser and Strauss (1967) described this approach as the discovery of theory from data, and emphasized its importance in providing researchers with predictive understanding, explanations, interpretations and applications. The procedures of developing the conceptual framework of feng shui knowledge are as follows:

- review and summarize relevant concepts from feng shui knowledge
- develop an appropriate framework for analysis
- review trends, patterns and issues in feng shui principles and theories
- reinterpret and develop knowledge hierarchy from the feng shui perspective in relation to building design
- integrate the conceptual framework development.

The fundamental concepts of the Form School approach are first derived from existing principles and practice. This process follows the procedure of grounded theory through the analysis of literature (Mak, 2004). Hence the hierarchies of feng shui concepts are identified and constructed in a form of hierarchical structure utilizing concept hierarchy approach. Concept hierarchy is used to organize factual domain knowledge and symbolic structural knowledge in the form of a generalization hierarchy. It is a common approach to utilize concept hierarchy for organizing structural knowledge and constructing the knowledge base because of its efficient mechanism to store and generalize a large body of interrelated concepts (Tam, 1993).

FOUR FUNDAMENTAL CONCEPTS OF THE FORM SCHOOL APPROACH
The five main theories of the Form School approach together with the five feng shui geographical secrets are developed into four fundamental concepts of the Form School approach to feng shui knowledge for building design:

- the concept of the feng shui model
- the concept of parallelism
- the concept of four design modules and
- the concept of feng shui design criteria.

CONCEPT OF THE FENG SHUI MODEL
The combination of these five feng shui geographical elements and the four emblems (green dragon, white tiger, black tortoise and red bird as the four cardinal directions) produce a classic feng shui model. This model has been interpreted in diagrams of spatial organization of auspicious mountains and watercourses in most of the ancient feng shui literature. Many feng shui researchers have summarized these diagrams into a simplified diagram of a feng shui model as shown in Figure 1 (Shang, 1992; Cheng and Kong, 1993; Han, 1995; Yi et al., 1996; He, 1998). This diagram illustrates the relationships between the key elements of the five feng shui geographical secrets being considered and how dragon vein, four emblems in sand, water feature, cave and bright court, and their directions were integrated into a feng shui model.

CONCEPT OF PARALLELISM
Most feng shui scholars (Skinner, 1982; Lee, 1986; Xu, 1990) recognized that the theories and practices of feng shui work in both macrocosm and microcosm. In terms of feng shui, a building is considered an architectural as well as a cosmic structure (Lee, 1986). Territory on earth is organizationally analogous with the four quadrants in the celestial sphere. These four quadrants are called azure dragon, red bird, white tiger and black tortoise, and are commonly known as the ‘four emblems’. Each of these heavenly
quadrants is identified with the regions of east, south, west and north, respectively. This relationship is recognized as the concept of parallelism in feng shui (Lee, 1986). The concept of a feng shui model not only applies to landscape and site selection, but can also be applied to the interior layout of buildings. Therefore, whether it is dealing with physical or topographical elements, or a housing structure or the proportional relationships of the interior of a house, the same principles and relationships of the feng shui model are still applied as shown in Figure 2.

**CONCEPT OF FOUR DESIGN MODULES**

When describing the site conditions and the design of dwellings, most of the feng shui texts, such as *Yang Zhai Shi Shu* (Ten Books on Dwellings of Living), categorized these aspects into outer form and inner form. According to Lee (1986), the outer form can be identified as the location of the site, conditions that surround the site, topographical conditions of the site and the shape of the site. The inner form can be identified as the layout of the building, elevations of the building, and elements of the building. Feng shui scholars Cheng and Kong (1993) explained the application of the Form School approach to the design of dwellings and proposed a further classification into four design modules – surrounding environment, external layout, internal layout and interior arrangement (see Figure 3).

- Surrounding environment. This aspect looks into the surrounding environment from a geographical point of view. This includes natural elements of topography, geographical features, mountains,
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**FIGURE 2** Correspondence of the four emblems in nature and architecture.
Source: adapted from Lee (1986)

**FIGURE 3** Four design modules.
Source: Mak (2004)

- External layout. The external layout deals with the external shape and exterior space of a building. This includes the shape of the site, geometry of the building, open space, entrances, driveways, landscaping and plants.

- Internal layout. The internal layout reflects the spatial management of a building. It considers the locations and functions of rooms, circulation patterns, and internal elements of structure, such as columns and beams, staircases, ceilings, doors and window openings (Rossbach, 1987).
**Table 1.24:** Key feng shui criteria for building design

<table>
<thead>
<tr>
<th>Surrounding Environment</th>
<th>External Layout</th>
<th>Internal Layout</th>
<th>Interior Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Topography</td>
<td>• Shape of site</td>
<td>• Layout</td>
<td>• Door openings</td>
</tr>
<tr>
<td>• Front of site</td>
<td>• Entrance</td>
<td>• Doors</td>
<td>• Bedroom</td>
</tr>
<tr>
<td>• Rear of site</td>
<td>• Shape of building</td>
<td>• Windows</td>
<td>• Kitchen</td>
</tr>
<tr>
<td>• Sides of site</td>
<td>• Orientation</td>
<td>• Shape of rooms</td>
<td>• Living room</td>
</tr>
<tr>
<td>• Street location</td>
<td>• Trees</td>
<td>• Staircase</td>
<td>• Bathroom</td>
</tr>
<tr>
<td>• Water view</td>
<td>• Pond</td>
<td>• Ceiling</td>
<td></td>
</tr>
</tbody>
</table>

Source: Mak (2004)

**Interior Arrangement:** The interior arrangement addresses the internal room arrangement and furniture placement. It considers the size and proportion of rooms and windows and doors. Furniture placement is a major part of interior arrangement. In practice, the bed in the bedroom, the stove in the kitchen, the desk in the office etc. have substantial effects on the use of a building (Rossbach, 1987).

**Concept of FENG SHUI Design Criteria**

Most contemporary feng shui scholars (Lip, 1979, 1986; Rossbach, 1984, 1987; Lee, 1986; Xu, 1990; Han, 1995; Choy, 1999) have set up their own criteria for feng shui design. For instance, Lee (1986) outlined three basic criteria for architectural design; Xu (1990) derived a four-step landscape model to deal with land formations; Han (1995) used 24 major criteria for selection of the best location; Lip (1979, 1986) listed a set of standard rules of thumb for assessment of architectural design; Choy (1999) suggested a 10-point design criteria checklist for property selection; and Rossbach (1984, 1987) provided a set of interior design diagrams for furniture placement. Although these criteria, derived from various contemporary feng shui scholars, were presented in different formats, they all follow the principles and practice of the Form School approach.

Based on these contemporary practices for feng shui design, 24 key criteria are identified (Table 1) and grouped according to the four design modules as shown in Figure 4.

**FENG SHUI DESIGN FRAMEWORK CONCEPT HIERARCHY APPROACH**

Based on the four fundamental concepts of the Form School approach, i.e. the concept of the feng shui model, the concept of parallelism, the hierarchy of four design modules, and criteria for feng shui design, an overall view of the Form School approach was provided. It is necessary to integrate these four fundamental concepts into a single diagrammatical organization of the Form School approach as shown in Figure 5. This diagram indicates that these four fundamental concepts are integrated and interrelated, and no single concept should be considered in isolation. For instance, the concept of the feng shui model integrated with the concept of parallelism is reflected in the hierarchy of the four design modules, and the criteria for feng shui design corresponding to the concepts of the feng shui model is applied to the hierarchy of the four design modules.

Based on the organization of the Form School approach, it is necessary to formulate a suitable process to integrate the four fundamental concepts of feng shui knowledge. It is recognized that a concept hierarchy approach provides a powerful way to represent structural knowledge (Tam, 1993). Using a concept hierarchy, the relationship between each piece of data can be expressed and presented with abstract terms (Lee et al, 1997).
A concept hierarchy takes the form of a generalization tree in which the most specific concepts (concept instances) form the leaves of the tree and the internal nodes represent intermediate concepts. Each intermediate concept is derived from generalizing concepts residing immediately at the next lower level. As a result, a path from the root to a leaf corresponds to a sequence of concepts, each obtained by adding more specific information to the previous one. Therefore, in a concept hierarchy, a concept needs only to store information specific to itself.

Construction of a concept hierarchy requires summarizing and generalizing a knowledge domain; however, it is still an unstructured process that involves a manual development of the hierarchy (Zupan et al., 1999). Concept hierarchies can be built explicitly by domain experts or knowledge engineers or extracted from a database using structural information and data distribution; these form the basic sources of the domain knowledge (Lee et al., 1998). Tam (1993) suggested that to construct a concept hierarchy from a set of concept instances, the order of the concept instances is the most important feature, especially when the number of concept instances is small. The concept hierarchy constructed from the first few concept instances will form the skeleton of the hierarchy that will be expanded by adding the remaining instances.
HIERARCHIES OF FOUR FUNDAMENTAL CONCEPTS

When constructing a concept hierarchy of the feng shui knowledge structure, the four fundamental concepts of the Form School approach are first translated into sets of concept instances represented in a format of hierarchy to indicate the characteristics and structure within each concept:

- hierarchy of the feng shui model (Figure 6)
- hierarchy of the feng shui model for exterior and interior (Figure 7)
- hierarchy of the four design modules (Figure 8) and
- hierarchy of the feng shui design criteria (Figure 9).

SKELETAL HIERARCHICAL STRUCTURE

A skeletal hierarchical structure is constructed to demonstrate the interrelationships between the four fundamental concepts of the Form School approach. These four fundamental concepts are first represented in a format of hierarchy and are then integrated to form a skeletal structure of the hierarchy of the feng shui knowledge (Figure 10). Primarily, the hierarchy of the four design modules (Figure 8) outlines the skeletal...
structure of the hierarchy. The hierarchy of feng shui knowledge is first classified into outer and inner forms, and then categorized into four design modules – the surrounding environment, the external layout, the internal layout and the interior arrangement. Each design module is connected to a feng shui model because the concept of parallelism implies that this feng shui model applies to the exterior as well as the interior (Figure 7). The concept of the feng shui model is incorporated with the hierarchy of feng shui design criteria which are grouped according to the four design modules (Figure 9).

After the skeletal hierarchical structure of the feng shui knowledge is created, the overall hierarchical structure of feng shui knowledge can be derived in detail to show further integration of the four fundamental concepts of the Form School approach (Mak, 2004; Mak et al, 2005). The overall hierarchy has more information and more elegant shape than that of the first hierarchy which only provides a skeletal hierarchy; the overall hierarchy tends to result in a more successful generalization process (Lee et al, 1998). For instance, in each design module, the hierarchy of the feng shui model can be organized in detail with the combination of the five geographical secrets and the four emblems theory as shown in Figure 6. The relationship between these attributes is then reviewed and connected to the relevant feng shui
A questionaire survey of architects in Sydney and Hong Kong was used to evaluate the four fundamental concepts of the Form School approach and the developed hierarchical structure of the conceptual framework. The results of the survey demonstrated that these fundamental concepts and the conceptual framework are accepted by architects (Mak, 2004). Overall, there was very strong correlation between the groups of architects in Sydney and Hong Kong notwithstanding the fact that they have very different cultural, educational and geographical backgrounds (Mak and Ng, 2005).
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**FIGURE 8** Hierarchy of the four design modules.
Source: Mak (2004)

**FIGURE 9** Hierarchy of the feng shui design criteria.
Source: Mak (2004)
CONCLUSIONS
Building design is recognized as a very complex and intuitive process. Architects use their knowledge accumulated from intuition and past experiences to make heuristic design decisions. These characteristics are similar to the Chinese philosophy of direct insight.
into the nature and principles and practices of feng shui as applied in ancient Chinese architecture. It is suggested that interpreting feng shui knowledge would enable the development of an alternative design framework from this Chinese architectural discipline. In particular, the Form School provides a holistic approach that allows integrated components and elements to be considered for the built environment. However, due to a lack of properly documented feng shui principles and guidelines, it is difficult for architects to apply the knowledge of feng shui in further enhancing their design. There is a need to establish a more structured code of practice for feng shui application before the theories can be widely spread and adopted.

Although the principles and practices of the Form School approach provide a broad understanding of feng shui knowledge, a systematic development of the four fundamental concepts and a hierarchical structure of feng shui knowledge have never been established. In this paper, the authors are using the knowledge elicitation and representation techniques to establish a more structured framework of feng shui, and the results may help to improve the awareness and usage of this ancient wisdom for building design.

AUTHOR CONTACT DETAILS
Michael Mak (corresponding author): School of Architecture and Built Environment, University of Newcastle, NSW 2308, Australia.
Tel: +612 4921 7450, fax: +612 4921 6913, e-mail: Michael.Mak@newcastle.edu.au
S. Thomas Ng: Department of Civil Engineering, University of Hong Kong, Pokfulam Road, Hong Kong.

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