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INTERPRETING CULTURAL ARTIFACTS

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ABSTRACT

Interpreting Cultural Artifacts explores qualitative methods and tools for analyzing traditional Chinese artifacts and the complex cultural background behind them. The goal is to develop structuralized and systematic methods for understanding traditional artifacts, which may become inspirations for contemporary product designs.

ICA, Interpreting Cultural Artifacts, interprets artifacts at three levels: surface level of evident features, immediate reasoning, and the deep cultural influential factors. SETIG (social, economic, technological, ideological and geographical) factors analyze the broader cultural contexts of cultural artifacts. Impact Analysis explores how different factors relate to each other, and affect the design and development of artifacts. Finally, Visual Language and Shape Grammar are existing methods borrowed for visual and formal language studies of artifacts.

Key Words: Cultural Artifacts, ICA: Interpreting Cultural Artifacts, SETIG Factors, Impact Analysis

1 INTRODUCTION

Recently, many Chinese and people outside of China have found a common interest of using Chinese traditions as inspiration for innovation. The goal is to develop products that are appropriate to Chinese consumers, or to attract foreigners with unique Chinese features. However, learning from the traditions has not been an easy task at all. There are no formal methods and tools for analyzing the complex Chinese traditions and convert those traditions to products today. Shown in Figure 1, a baseball hat with traditional closing button decoration and the Beijing railway station with an imperial style roof top are examples, in which traditions are treated with little thinking, and become added on features rather than integrated ideas.

Figure 1. Left: A baseball hat with traditional closing button decoration
Right: the Beijing railway station with an imperial style roof top built in 1990s

The great history of China is obviously a direct cause for the difficulties of understanding the traditions especially for product teams that usually have very tight schedules. For thousands of years, while the deep Confucius and Taoist philosophies are interpreted by generations of masters into customs and rituals of everyday life, the origins of the ideas remain a mystery to most people.

The complexity of the Chinese culture and the lack of methodologies prevent companies from investing in cultural research, which can result in endless exploration without any standards to evaluate the outcomes. Since most local companies are cost driven, they usually do not support research. On the other hand, the lack of cultural knowledge has prevented Western companies to support cultural research for their Chinese market, especially when they can still sustain their success in China with their consistent and superior product qualities.

The immature design education in China does not give enough support to cultural research either. Design in China is often treated as a discipline of form giving with limited research. Following the success of modern Western design, most Chinese design students are encouraged to learn from the "classic" Western designs rather than their great traditions.

The goal of this research is to develop methods and tools that can be used to interpret the complex meanings of cultural artifacts, artifacts that are unique to certain cultural background and can be used as inspirations for contemporary product designs.

2 INTERPRETING CULTURAL ARTIFACTS

Since Chinese artifacts usually embody layers of symbolic meanings (Fig. 2), the interpretation of cultural artifacts requires a holistic understanding of not only the evident features of them, but also the hidden cultural meanings that indicated by or influence the evident features.

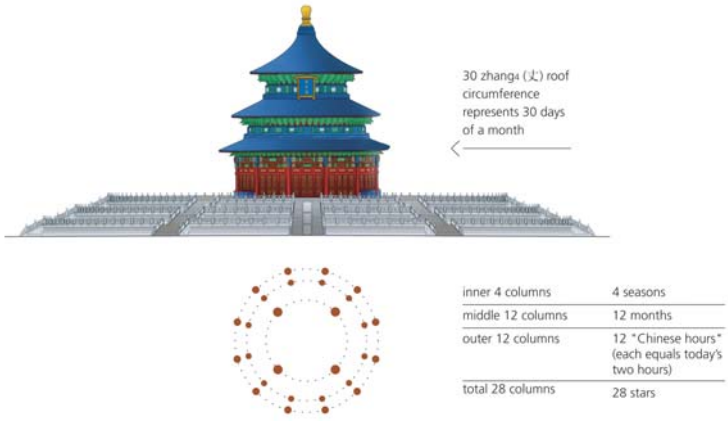

Figure 2. Selected symbolic meanings of the Temple of Heaven

Figure 3 proposes a basic theoretic model for interpreting cultural artifact. It interprets artifacts at three levels: surface level of evident features, deeper reasoning and influential factors. Evident attributes studies the easily identifiable features of design and usage. Deeper reasoning looks at different decision factors. They can be hierarchical rules that regulate the standards of artifacts based the status of the users, or symbolic meanings such as indication of good fortunes. They can also be aesthetic preferences, ergonomics and sometimes technological considerations. The influential factors may include SETIG (social, economic, technological, ideological, and geographical) factors of the historical period in which the artifact was developed, philosophical foundations that formulate the patterns of thinking and reasoning, and traditions of how people live and how things are used everyday.

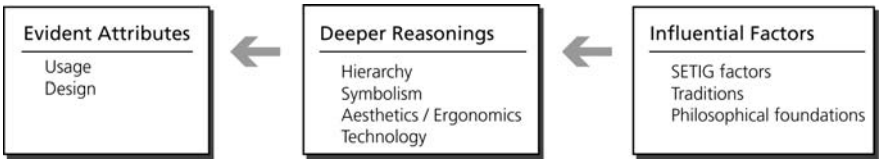

Figure 3. Basic theoretic model of ICA: Interpreting Cultural Artifact

2.1 SETIG Factors

SETIG Factors refer to the social, economic, technological, ideological and geographical conditions of a historical period. It can be used as a supporting tool to analyze the cultural contexts of cultural artifacts. The concept of SETIG Factors is an extension of the SET Factors that helps identify new product opportunities by analyzing the evolving social, economic and technological forces (Cagan &

Vogel, 2001). Adding ideological and geographical forces the SET Factors analysis leads to the understanding of the even broader cultural contexts.

As these factors constantly evolve and change, they lead to new forms of art and artifacts. For instance, the advancement of metallurgy technology had led to the development of iron tools in the Han dynasty. Also, in the Han dynasty the social stability, economic prosperity and the development of handicrafts industries had enabled the once fancy elite class bronze or copper ware (Fig. 4, left) to be used more often as articles for daily use with simpler and practical designs (Fig. 4, right).

Figure 4. Left: 人面纹方鼎 Square Bronze Ding with Mask Design, Shang period (1,700-1,100 BC) Right: 长信宫灯 copper lamp, Han Dynasty (206BC-220AD)

Since the development of artifacts is often influenced by the broader social, economic, technological, ideological and geographical factors, SETIG Factors can be used to analyze the historical conditions and cultural contexts of a given artifact. The following SETIG factors had formed the context of the copper lamp shown in Figure 4.

- Social: during the early Han dynasty, many prisoners of wars, bankrupt peasants, or criminals had become servants. With her knees down, holding the lamp, she is a clear illustration of the social hierarchy of the Han dynasty.
- Economical: the development of the Han economy and its handicrafts industry allowed bronze and copper to be used for everyday artifacts with simpler and more functional designs.
- Technological: the development of melting technology took the advantage of the shining and smooth quality of copper.
- Ideological: the earlier mythical, decorative and exaggerative aesthetics was replaced by a more realistic, simpler and functional aesthetics.
- Geographical: No evidence of direct geographical influence on its design.

2.2 ICA: Interpreting Cultural Artifacts

While SETIG Factors studies artifacts at a higher contextual level, "ICA: Interpreting Cultural Artifacts" looks at cultural artifacts at a much detailed level. It analyzes cultural artifacts at three levels: surface level of evident attributes, second level of deeper reasoning and the third level of influential factors. Figure 5 is a basic model of Interpreting Cultural Artifacts. Here, the design of an artifact is analyzed by its style/decoration, size/proportion, color, material/texture and technology. The usage includes its function (why), user (who), context of use (how). Background information may indicate when and where it was made by whom, where it was unearthed, etc.

Name of an Artifact

- background information

Image of the Artifact

		Evident Attributes - Usage - Design	Deeper Reasoning - Hierarchical Rules - Symbolic Meanings - Aesthetics / Ergonomics - Technology	Influential Factors - SETIG Factors - Philosophic Foundation - Traditions
Usage	function			
	user			
	context of use			
Design	style / decoration			
	shape / size			
	color			
	material / texture			
	technology			

Figure 5. ICA: Interpreting Cultural Artifacts

Once an artifact is chosen, the evident attributes of it can often be easily identified, measured or observed. However, the analysis of immediate reasoning and influential factors requires extensive research. Figure 6 and figure 8 show how ICA: Interpreting Cultural Artifacts is applied on different artifacts. Examples of contemporary products that share similar reasoning and influential factors are also shown to illustrate how the traditions are reflected through contemporary designs. Figure 6 is the interpretation of Qi_2-$Nian_2$-$Dian_4$, the Temple of Heaven, where the imperial sacrificial ceremony for good harvest is taken place annually. Figure 7 shows how the newly built Shanghai Science Museum incorporates similar Feng-Shui and Yin-Yang ideas that were used for the design of the Temple of Heaven. The roof is a representation of the universe with a rising sun (the top of a ball shape structure in the open area on the roof) and a crescent moon (the attached circle sits on the higher end of the roof). The public square in front of the museum is also influenced by the site planning of the Temple of Heaven, the Round Heaven and Square Earth.

Qi2-Nian2-Dian4 (祁年殿)

Temple of Heaven, Beijing

Built in 1420, Ming Dynasty, the same year when the Forbidden City was built.
Rebuilt in 1545 (Ming), 1890 (Qing).

		Evident Attributes	Deeper Reasoning	Influential Factors
Usage	function	Sacrificial alter to the god of Heaven	Pray for favorable weather, good harvest and social stability.	Part of the tradition of offering sacrifices to the gods of Heaven, Earth, Sun and Moon. It dates back as early as the Xia4 (夏) period (21-16 century BC).
	user	Emperor	Emperor is the son of the Heaven God. He is the only one who has the privilege to offer sacrifices to the God of Heaven.	*The Rite of Zhou* (周礼), the ritual system developed in Zhou1 (周) period to maintain the hierarchical social structure.
	context of use	Annually on the Winter Solstic day Located in the south of the old Beijing city	Correct timing is crucial to all ritual events. South represents Yang and the Heaven.	*The Rite of Zhou* (周礼): *Da4 Si1 Yue4* (大司乐); *The Law of Change* (易经); Feng-Shui ideas
Design	style / decoration	Imperial, symmetric, religious style	Sacrificial alter for imperial use only	*The Rite of Zhou* (周礼); *Feng-Shui ideas*
	size / Proportion	Diameter: 24.5 m,		
		Height (*the 3-layer-terrace not included*): 32 m, equal to traditional Chinese measurement 9 zhang4 (丈) 9 chi3 (尺)	9 zhang4 (丈) 9 chi3 (尺) Use the largest single digest Yang (odd) number, 9 to symbolize the greatest power of the emperor.	Yin-Yang theory and Feng-shui ideas *Zhou1-Yi4* (周易, The Law of Change and the interpretation of it) is the main philosophic foundation of the numerical symbolism.
		Lower lever roof circumference: 30 zhang4 (丈) or 97 m	30 zhang4 (丈) represents 30 days of a month.	
		height / diameter = 1.3 *roof circumference/diameter = 4.0*	The proportion is determined by the symbolic height and the lower lever roof circumference. It does not have significant meanings.	
	color	before 1751 blue top level roof	Blue heaven	Yin-Yang theory In the Yin-Yang theory colors often associate with directions and the essential materials (metal, wood, water, fire and earth) of the nature. There was also a hierarchical architecture color usage system in ancient China that is associated with the social hierarchy.
		yellow middle layer roof	Yellow earth	
		green lower leverl roof	Green crops and plants	
		After 1751 blue color for all levels	Unified blue roof and green Dou3-Gong3 (斗拱) structure beneath symbolize nature and live.	
		Red column and gloden decoration	Gold and red are imperial colors.	
	material / texture	wood structure, tile roof	The developed wooden structure techniques and architectural ritual system	Earth and wood had been primary building materials for thousands of years. It is also part of the idea of maintaining harmony between human activity and nature.
	technology / structure	 inner 4 columns	4 seasons	Yin-Yang theory and Feng-shui ideas *Zhou1-Yi4* (周易, The Law of Change and the interpretation of it)
		middle 12 columns	12 months	
		outer 12 columns	12 "Chinese hours" or directions	
		total 28 columns	28 stars	

Figure 6. Interpretation of Qi_2-$Nian_2$-$Dian_4$ (祁年殿), Temple of Heaven

Figure 7. Left: Shanghai Science Museum, Right: The Temple of Heaven

Herb medicine is an important part of traditional Chinese medical theory and practice. The herb pillow has been popular for its believed medicinal value that restores the internal balance between the physical body and the spiritual Qi (Fig. 8). Even though Chinese hospitals now primarily rely on Western medicine to cure diseases, herb medicines and traditional therapeutic devices such as jade pillow, message pens and magnetic cups are still favored by Chinese, who do not need any scientific proof of their medicinal functions (Fig. 9).

Medicinal Herb Pillow

Han Dynasty, Unearthed from Ma3-Wang2-Dui1 (马王堆) Han Tombs, Tomb Number 1
Hunan Museum, Chang2-Sha1, Hu-Nan2 Province

		Evident Attributes	Deeper Reasoning	Influential Factors
Usage	function	To relieve rheumatic headache during sleep	According to traditional Chinese medical theory orchid can be used to relieve rheumatic pain, to harmonize the Qi of human body, etc.	Han dynasty had established the foundation of traditional Chinese medical theories. People believed long term, natural and lifestyle treatment of many health problems.
	user	Xin-Zhui, Marquise of Dai4, (轪) Chang2-Sha1 (长沙) Kingdom, early Han dynasty.	Herb medicine was not a precious treatment, but an embroidery pillow with stuffed orchid was a luxury item.	
	contexts of use	Han style bedroom or living room environment, in which beds were often low.		People sat low. Bed and Ta4 (榻, smaller and narrower bed) were low, and to be used for sleeping, reading, eating, etc.
Design	style / decoration	Simple shape, colorful decoration	Matches the style of bedroom or living room furniture, which usually has simple but elegant shape.	
	size / Proportion	Length: 45 cm / 17.75 " Height: 12 cm / 4.75" Depth: 10.5 cm / 4.125"	The size is probably determined by the size of the bed or by the straw mat for the bed unearthed from the same tomb.	
	color	Vermilion, gloden, brown	Determined by the material chosen.	
	material / texture	Embroidery cover	Comfort	Han dynasty had developed very advanced silk and textile handicraft industry, and was know as the Silk Country.
		Orchid stuffing	Medicinal function and smell	Shen2-Nong2-Ben3-Cao3-Jing1 (神农本草经) edited in the Han dynasty is the first complete theory of Chinese herb medicine, and had documented over 360 herb medicines.
	technology	Orchid stuffing	Allow the medicinal function	Traditional herb medicine theories
		Chain stitches techniques of the embroidered pillow case Silk making and textile technology	Create surface textures and decorative patterns	Han had developed advanced techniques of silk making, dyeing, embroidery, and advanced weaving such as jacquard weave.

Figure 8. Interpretation of Medicinal Herb Pillow

Figure 9. Left: Jade pillow Right: massage pen with different heads

3 IMPACT ANALYSIS

While SETIG Factors analyses and ICA provide a holistic understanding of traditional artifacts, Impact Analysis examines how different factors, including the deeper reasoning and the influential factors relate to each other, and affect the designs of these artifacts.

3.1 Factors that Influence the Designs of Cultural Artifacts

By using the ICA, we can bring to the surface the hidden meanings and cultural backgrounds that influence the design of an artifact, and how it is used. Looking at the two examples of the ICA, we would notice that the design (style, size, color, material, and technology) of an artifact it is also affected by the usage of it (function, user, context of use) (Fig. 10). For example, to offer sacrifices to the god of heaven is the essential decision factor that guides the design of the Temple of Heaven from its macro level site planning to the structural details. For the purpose of relieving rheumatic headache during sleep, it led to the design of a medicinal herb pillow and the choices of herb medicine to be stuffed in it (Fig. 8).

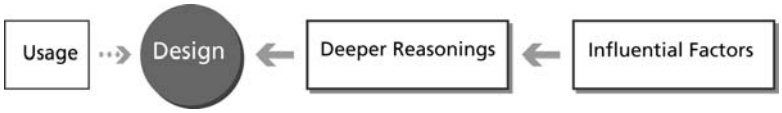

Figure 10. Different factors that have impact on the designs of an artifact

3.1.1 Usage

Function (for what purpose/why), context and time of use (how it is being used), and user (by whom) affect the design of an artifact at different levels (Fig. 11).

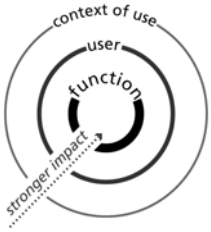

Figure 11. Impact of usage on designs of artifacts

The function of an artifact often defines what it is. The user is another decisive factor that differentiates an artifact from artifacts that perform similar functions. In the past, the social status of the residence directly influences the size and color of his house based on certain hierarchical rules.
Context of use often affect the style and other specific design details. To be placed in the central family room, it leads the design of the Yokeback armchair to a style that fits the family room environment. Being used for occasions such as formal family gatherings or meeting guests, it requires that both the style and placement of the chair speak for the social status of the master of the family.

3.1.2 Deeper Reasoning

Hierarchy, symbolism, ergonomic considerations, aesthetic preferences and technology influence the design of an artifact with different prioritized influential power (Fig. 12).

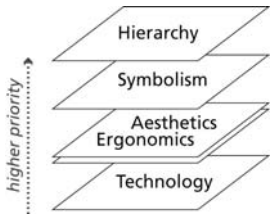

Figure 12. Impact of immediate reasoning on the designs of artifacts

Hierarchical social rules have influenced the designs of many traditional Chinese artifacts with unsurpassable power. They strictly regulate size, style, color, decoration, material choices of architecture, clothing, chair making, etc. Breaking the rules could put one in prison or even killed in the old times.

Symbolism is probably the most important characteristic of Chinese art and design that adds emotional, spiritual and contextual qualities to artifacts. Numbers, directions, materials, colors, shapes and auspicious patterns can all carry symbolic meanings with references to Yin-Yang and Feng-Shui ideas.

Aesthetics preferences and ergonomic considerations become primary design decision factors when hierarchical rules and symbolic meanings pose no restriction or limitations. It can often be noticed in the designs of Ming style furniture (Fig. 20).

The advancement of technologies is often an important driver of novel artifacts. As it reaches its maturity, it becomes less decisive. For instance, without the development of the gear drive mechanism, the water-powered waterwheel would not have been developed as a farming tool. However, the maturity of water power technology did not completely replace man or animal powered wheels. The choices were often made accordingly based on the context of use.

3.1.3 Influential Factors

Influential factors include SETIG factors of specific historical periods, traditions and philosophical foundations (Fig. 13).

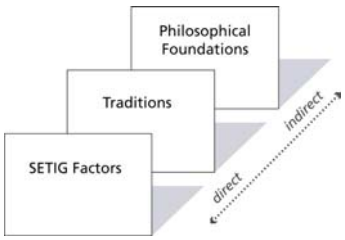

Figure 13. Impact of influential factors on the development of artifacts

SETIG factors of a particular historical period directly influence the development of artifacts. Usually, social conditions determine the appropriateness of an artifact and who the user will be; economic situations affect how quick an artifact spreads to what level of the society; new technologies make new artifacts possible; ideologies indicates deeper philosophic and cultural value an artifact; and geographical background gives an artifact regional characteristics.

Traditions are customs, practices and ideas developed over long periods of time. They heavily influence people's daily life. Holidays and special occasions such as wedding ceremonies have generated hundreds of artifacts for special usages. Sometimes traditional rules tell us what is or is not an appropriate gift for someone at certain occasions.

Taoism, Confucianism and Buddhism are widely known philosophical foundations of Chinese culture. Confucianism focuses on social ritual and human relationships, and emphasizes the social role of art and art appreciation. Taoism focuses on cosmos view and epistemology. Taoist aesthetics seeks harmonious relationship between human and nature. Buddhism strongly influences the daily life of Chinese people. However, it does not have very direct influence on Chinese art and design, except for providing religious subjects for the arts.

Traditional Chinese medical theory and aesthetics may also provide philosophical inspirations.

3.2 Impact Analysis of Cultural Artifacts

Understanding how different design decision factors affect the design of an artifact and how they relate to each other allows us to create an Impact Analysis of these factors (Fig. 14). It provides a structure of design decision factors with indications of relative degrees of priority.

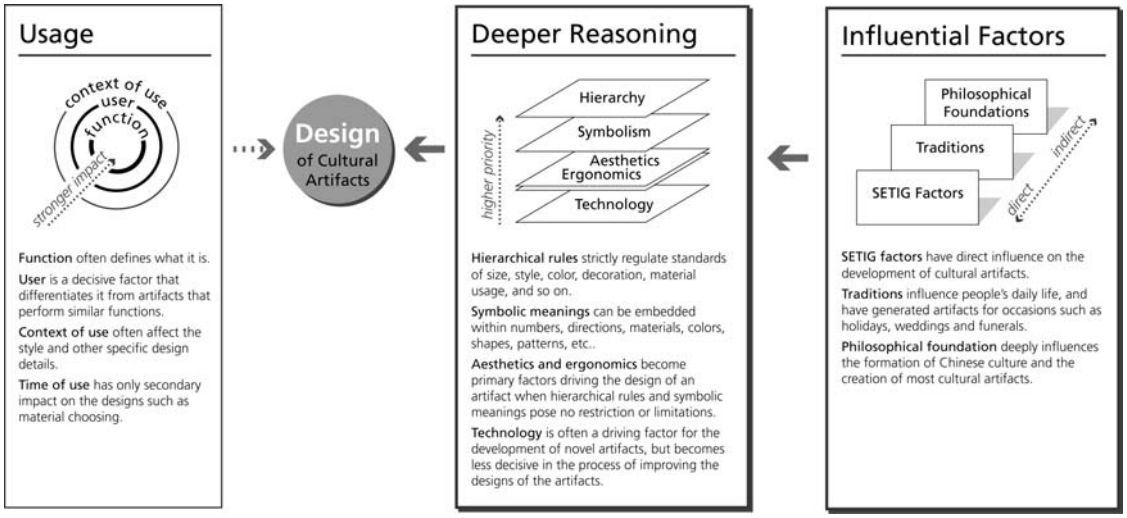

Figure 14. Different factors that have impact on the design of cultural artifacts

When this Impact Analysis is applied to specific artifacts, it can generate a general decision impact structure that serves as a procedural design guideline to check hierarchical rules, symbolic meanings, aesthetic preferences, and so on. Figure 15 is a study of Hui Style private houses. Here, we notice that the influential power of a decision factor may vary when it is applied on different aspects of the design. For instance, even though hierarchical rules generally have the strongest reasoning power, aesthetics might share the same level of influence when choosing the styles and materials of a private house.

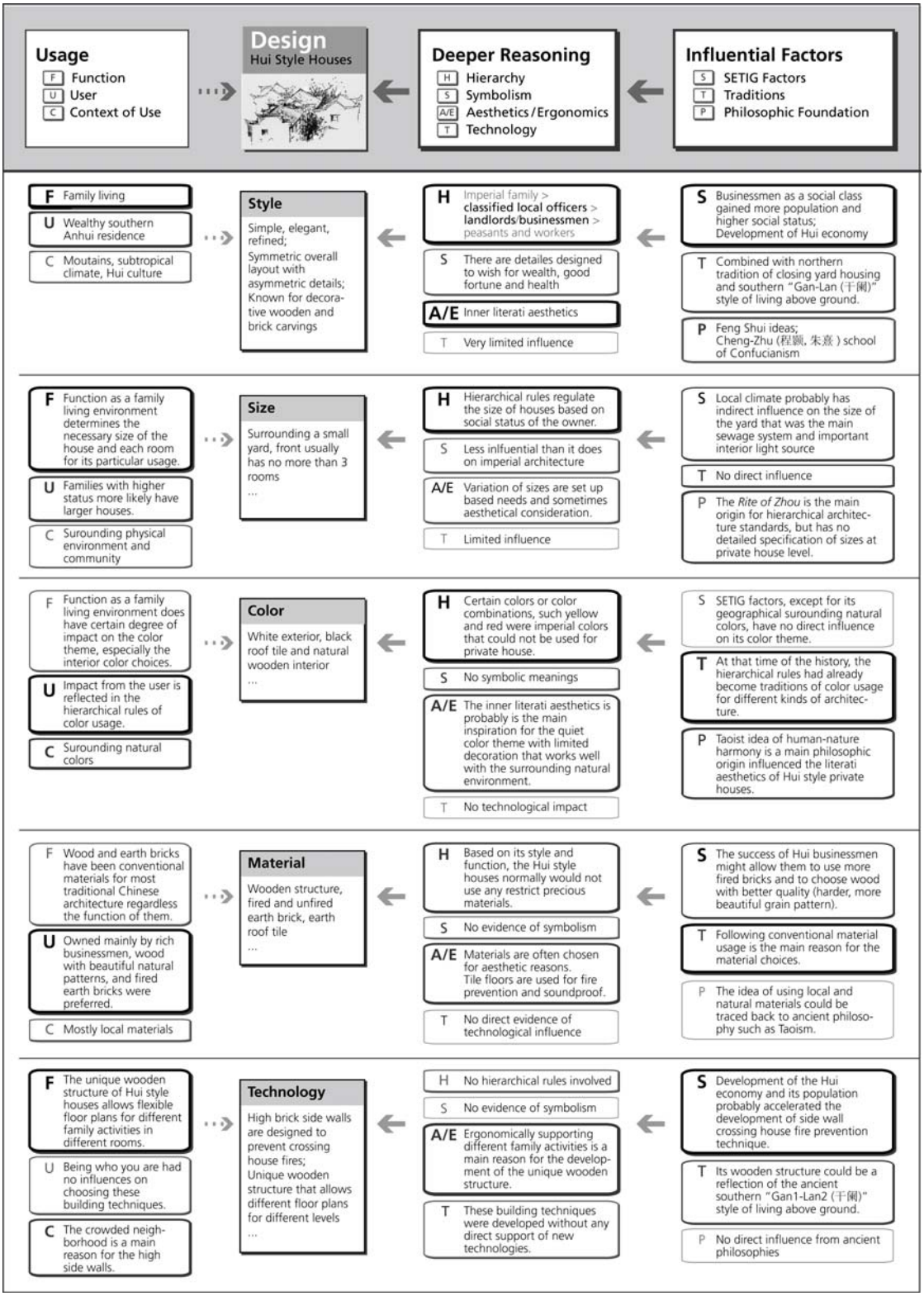

Figure 15. Impact Analysis of Hui Style private house design

Different decision structures may emerge based on the different types of artifacts studied or the classification of artifacts. Usually, when a general class of artifacts, such as traditional architecture is studied, it generates a general structure of decision factors with indications of relative influential power. When the Hui style private houses, it begins to generate a more specific guidelines of design with clearer indications of preferred and avoided design choices (Fig. 16). Clearer and more detailed grammatical rules emerge as the classification goes deeper.

	Classification of Artifacts	Examples
General Structure of decision Factors	A General Class of Artifacts	Traditional Architecture
	A more specific class of Artifacts	Traditional Houses
	A particular class of Artifacts	Hui Style Private Houses
	Specific Artifacts	Front Gate of Hui Style Houses
Sepcific Guidelines of Design	Details of Artifacts	Front gate decoration of Hui Style Houses

Figure 16. Different levels of Impact Analysis

4 SHAPE GRAMMAR OF CULTURAL ARTIFACTS

Primarily explored by architects and engineers, shape grammars are used for numerical form analysis and computational formal engineering design synthesis. Early studies include George Stiny's "Two exercises in formal composition" (1976), and "Introduction to shape and shape grammars" (1980). The ideas have been used to generate a variety of designs including Chinese lattice designs by Stiny published in 1977 and Frank Lloyd Wright's prairie houses by Koning and Eizenberg in 1981.

Although most Chinese artifacts contain complex and subtle cultural messages, shape grammars can be used to study the exterior formal languages of them. For instance, since the old social hierarchy no longer exists and the context of use has been changed, developing shape grammars for a Yokeback Armchair is possible when necessary. By studying the parts and their variations of a Ming style Yokeback Armchair (四出头官帽椅) (Fig. 17), we can start to build a preliminary compositional shape rule schemata of it (Fig. 18). Even though a complete shape grammar requires much more complex rule writing for the formation of each chair part, this exercise shows it can be done. Some culturally appropriate parts or structural options can be prioritized through rule writing. To choose a preferred design among many available options generalized by grammars, users' preferences, contexts of use and designers' aesthetic intuition may be relied on.

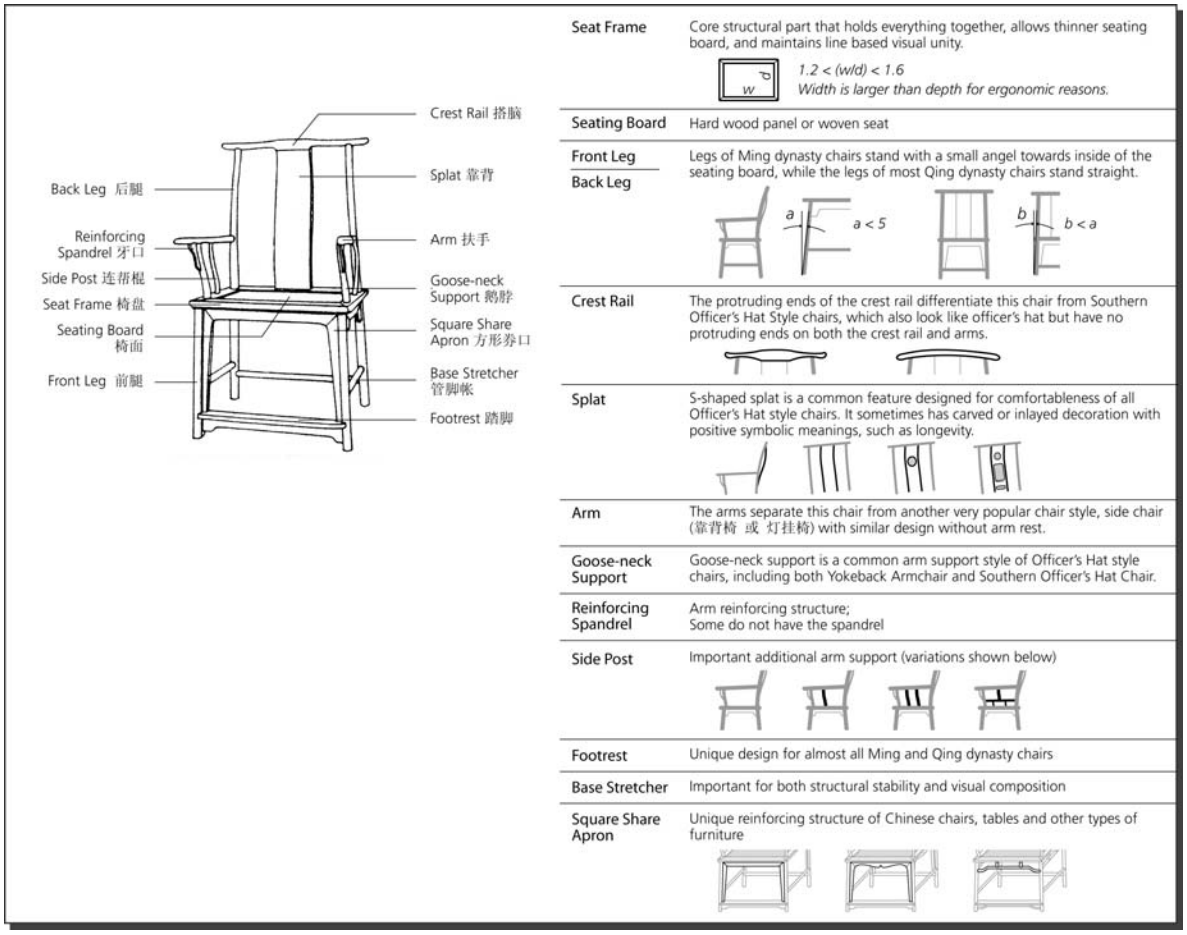

Figure 17. Ming dynasty Yokeback Armchair 四出头官帽椅

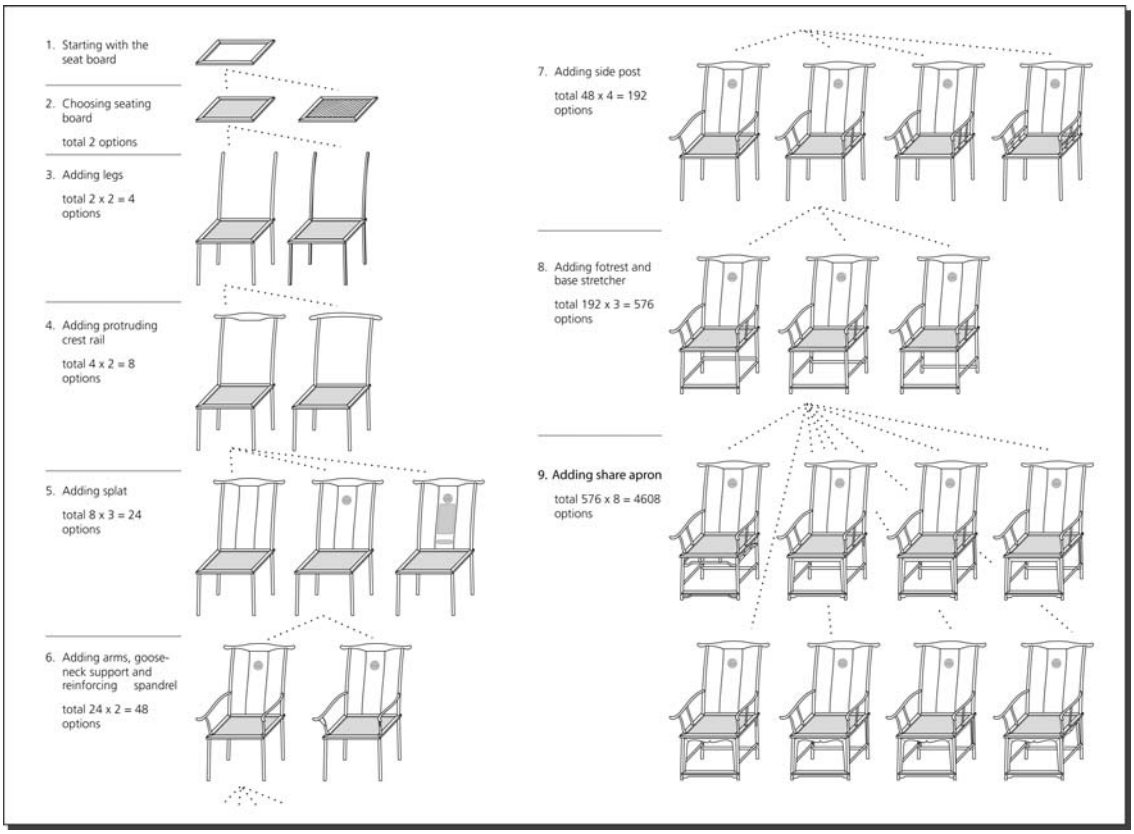

Figure 18. Basic composition shape rule schemata for Ming dynasty Yokeback Armchair

5 VISUAL LANGUAGE ANALYSIS

Visual language analysis, also known as product semantics, allows us to transform subtle visual appearance into new design concepts. It can be used to study the overall visual appearance of an artifact, and can be focused on size, proportion, color, decoration, visual pattern or texture. Figure 19 left is visual language studies of the Temple of Heaven roof line. The roof slope of Qi_2-$Nian_2$-$Dian_4$, which is determined by the roof height and its diameter (or depth), illustrates a subtle visual difference between architecture from different periods. Figure 18 right shows different artifacts share similar visual language. However, certain cultural knowledge is required to understand the different design factors behind the external visual appearances. For instance, while the roof line of Qi_2-$Nian_2$-$Dian_4$ is heavily affected by the symbolic meanings of its overall height and the lower level roof circumference, the roof line of a private garden pavilion is influenced more by aesthetic preferences and the preferred sunlight exposure time. A garbage bin in Beijing imitates the roof line of traditional architecture, and a tea cup simply shares the similar visual language.

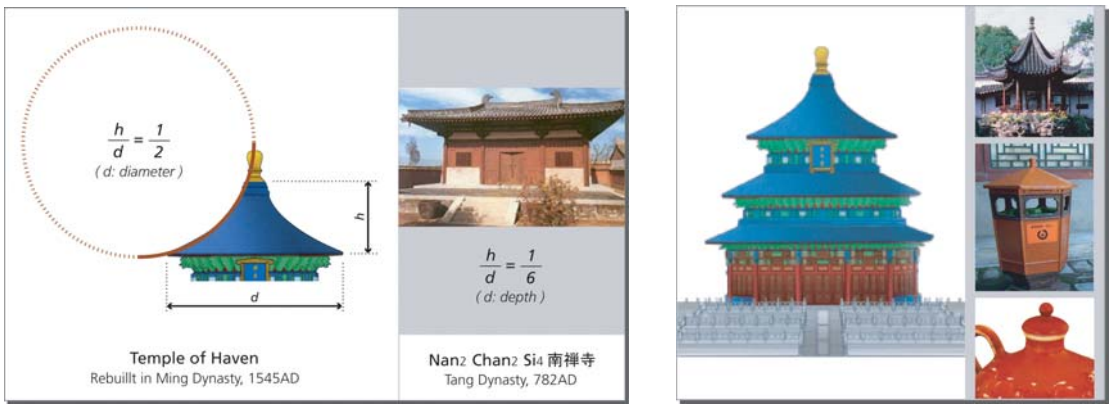

Figure 19. Visual language study of Qi_2-$Nian_2$-$Dian_4$ (祁年殿) roof line

Figure 20 is a visual language study of Beijing Opera masks. Here, the visual elements of opera masks are taken into parts, recomposed, and translated into Chinese style of athletic shoe designs.

Figure 20. Visual Language of Beijing Opera masks, Guangzhou Academy of Fine Arts

6 CONCLUDING REMARKS

ICA: Interpreting Cultural Artifact is a tool that structuralizes and communicates the complex cultural information of cultural artifacts. The combination of evident attributes, immediate reasoning and influential factors provides a structure to decode the embedded cultural messages from exterior appearances to the deeper cultural contexts. Impact Analysis provides a structure of decision factors that guide the design and development of cultural artifacts. SETIG Factors analyzes the overall cultural contexts of artifacts. Shape grammars and visual language analysis study the exterior visual and formal languages of artifacts.

Together, these tools provide a systematic method that guides designers to actively search for the deep cultural connections behind the exterior appearances of cultural artifacts. Insights generated by these tools can be used to develop contemporary products with reflection of traditions and appropriate connection to cultural values.

Being qualitative and non-discipline specific, these tools can be used and understood by people with different disciplinary and cultural backgrounds. They support communication and knowledge sharing among disciplines.

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