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Understanding Aesthetic Appreciation as an Aid to the Development of Sustainable Urban Environment

Centre for Resource Management and Efficiency
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ABSTRACT

Sustainable management of the existing built environment is becoming increasingly important in the construction industry. Consequently, more emphasis has emerged to consider issues of refurbishment and renovation. The aesthetic values of buildings are recognised as critical guiding attributes both in terms of the potential long-term aspects of sustainability and as basic reasoning for the continued maintenance and management of existing buildings. A process is required that will allow different aspects of a potential refurbishment project to be assessed objectively and weighted equally when deciding whether an existing building should be preserved, adapted or demolished.

The thesis attempts to provide a useful understanding in terms of the aesthetic appreciation when considering future sustainable management of the existing built environment. Two parallel research activities were initiated to examine important aspects of human aesthetic perception regarding buildings in the built environment. The first addressed the potentially universal and culturally derived aspects of human responses in perceiving the aesthetic qualities of houses from 3 counties through the agency of colour photographs. A three language semantic differential scale was developed to be linguistically equivalent so that an inter-cultural research tool could be derived to ascertain an understanding of people's aesthetic appreciation through the use of descriptive adjectives. The second activity was initiated to develop and test the concept of building endurance regarding the general public's aesthetic appreciation of existing buildings. A methodological framework was developed to facilitate investigation of changes of human aesthetic response related to changes in the built environment.

Cross-cultural variables and respondent's age parameter were found to be influential in conditioning people's aesthetic responses to photographs of houses and urban streetscapes. Few differences were observed between male and female aesthetic responses both in their descriptions of visual quality and their ideal house profile. A cross-cultural, universal profile of ideal house qualities was obtained by utilizing responses from the cross-language semantic differential scale. However differences in people's aesthetic preference selections were observed. Additionally, respondents' preference rankings demonstrated that the general public supports the desire of preserving the existing urban condition. Appropriate refurbishment strategies were suggested to guide decision making when assessing changes to be made to an existing building and its surrounding environment while at the same time maintaining people's aesthetic appreciation.

The research activities presented in this thesis provide a contribution to current knowledge of the general public's aesthetic appreciation of the existing buildings and built environments which may be used to aid future sustainable development of the built environment.

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GLOSSARY

Metabolist Movement

The general meaning of metabolism is the biological process by which life is maintained through the continuous cycle of producing and destroying protoplasm. “Metabolism” in terms of the architecturally based “metabolist movement” relied upon the notions of “Changeability and Flexibility. They were the key elements that the Melabolist Group seized upon and explored. To the Japanese architects who adopted the name, it meant creating a dynamic environment that could live and grow by discarding its outdated parts and regenerating newer, more viable elements”.

Mondernism

The general meaning of modernism refers to a movment in the arts or religion that break with traditional forms or ideas. “Modernism” in architecture addresses a new architectural style that emerged in many Western countries in the decade after World War I, from the early 20th century to the end of 1970s. It was based on the "rational" use of modern materials, the principles of functionalist planning, and the rejection of historical precedent and ornament.

Brutalism

Brutalism refers to a stark style of functionalist architecture that makes use of steel and concrete in massive blocks. It is a style which flourished from the 1950s to the mid 1970s, and arose from the modernism architectural movement.

Aesthetic Endurance

The ability of a building to be valued aesthetically and to be appreciated through time.

Aesthetics

A set of principles concerned with the nature and appreciation of beauty.

Perceptual Concept

Single concept used to describe a specific composition of perceived qualities, i.e. mystery, complexity or coherence, etc.

Aesthetic Response

Human reactions after the input of aesthetic information which could be expressed either verbally, in writing or in action.

Aesthetic Appreciation

Appreciation, in general terms, refers to the recognition of the value or significance of something. In this thesis, appreciation includes recognition of both the positive and negative quality of aesthetic value in the built environment.

Perception

The ability to see or become aware of something. Perception is the act or process of knowing. It involves a cognitive process as a way of regarding, understanding, or interpreting something. Although it is often done intuitively, the act of perceiving involves interpretation which conveys one's understanding of what is being perceived.

Observation

The act or instance of viewing or noting a fact or an occurrence. In this thesis, observation refers to the process of pure data input through the act seeing or regarding attentively. Such a process does not involve judgment, emotion or understanding.

Sensory Aesthetics

Sensory aesthetics is concerned with the pleasure of the sensations human receive from the environment. It involves the arousal of one's perceptual systems, it is multidimensional, and arises from the colours, orders, sounds, and textures existing within the environment.

Formal Aesthetics

Formal aesthetics in architecture is concerned primarily with the appreciation of the physical attributes in the visual world, such as the shapes, rhythms, complexities, and sequences of experiences of individual buildings and the combinations of buildings that form the built environment.

Symbolic Aesthetics

Symbolic aesthetics addresses the associational meanings that humans hold through their appreciation of the environment.

Human Comprehension

The action or capability of the human mind to perceive and understand objects.

Abstract Description

Abstract description addresses responses which are expressed using concepts such as complexity, characteristic, symmetry or balance. These types of descriptors were considered to represent only the objective aspect of an aesthetic response, not the subjective emotional descriptors, which addressed the physical attributes of objects.

Affective Response

Affective response is sometimes referred to as emotional response. Emotional or affective responses are the subjective aspect of human perception which defines human aesthetic experience or responses in terms of feelings.

Cognitive Associations

The mental action or process of acquiring knowledge through thought, experience and the senses. A process of information processing, development of concepts, perception, sensation, or intuition resulting from the acquisition of knowledge.

Non-cognitive Associations

Non-cognitive association refers to human response that express feeling and emotion.

Objective Quantification

The objective measurement of physical variables.

Normative Judgment

The use of judges' ratings to define standardized variables with a clear reference.

Phenomenological Description

The description of variables in phenomenological terms, i.e. in terms of human consciousness and experience.

Correspondence

Correspondence refers to the condition that two sets of data are identical or have a close similarity, i.e. they match or agree almost exactly.

Semantic Usage

Semantic usage refers to ways respondents use the words and intensity levels provided by the semantic differential scales to describe their aesthetic responses.

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1 Introduction

1.1 Background

An environment-oriented approach is being called for in every field today, with the enormous amount of energy consumed inherently in the construction of buildings, significant pressure for a shift of consciousness in the construction industry is evident. Consequently, a sudden increase in the topic of renovation has emerged in an attempt to facilitate the sustainable management of the existing built environment and to maximize the total usage of existing resource. Though conflicts between development and preservation or refurbishment continue to raise attention, the attitude towards renovation is changing. The impossibility of continually producing new architecture is recognized and the current social circumstances have emphasized the role of renovation as a means to revaluate existing building as valuable resources.

The notion of sustainability comprises several dimensions in a perspective of long-term responsibility. Building for long life means that at some time in the future decisions will need to be made as to whether the existing building should be maintained in its current form, refurbished with some modification or change of function, or demolished and the site redeveloped. Many factors will be involved in such decisions and may include consideration of economic, social and environmental issues, for example. In the context of managing the existing building fabric to achieve more sustainable development, the aesthetic value of building appearance is an important factor regarding the decision as whether the existing built environment should be preserved, readjusted or demolished. The long term solution requires a shift from utilitarian values to a view in which aesthetic and social values play a more prominent role.

Such recognition and shift of emphasis regarding renovation or refurbishment is equally evident throughout the world. However, the contexts, social organizations, economic pressures or even people's perceptions are often different cross-culturally. The aesthetic value of the existing built environment stands out to be a critical concept concerning both the long-term aspect of sustainability and the basic reasoning for the management of the existing buildings in the built environment. The thesis attempts to provide a useful understanding considering the issue of aesthetic appreciation regarding future sustainable management of the existing environment through research and observation made across different cultures.

1.2 Thesis Structure

This thesis presents the research in ten chapters. The research is initiated in four stages; initially the research is introduced through a concept development framework, then diverse topics of literature review, and a specification of the methodology presented regarding the

research area. Then the processes of two research activities are presented with data collection and analysis. The thesis concludes with a discussion of the research findings and the framing of their contribution in terms of future research. A brief outline of each chapter in the thesis is laid out sequentially with the flow chart diagram to explain the research process and thesis structure, shown in Figure 1.1 at the end of this chapter.

1.3 Chapter Contents

Chapter 1 provides an overview of the thesis and an understanding of its structure.

Chapter 2 to chapter 5 presents the diverse topics of the literature reviews regarding various key concepts involved in the thesis. Chapter 2 presents the development of research issues from general to specific which leads to the identification of the research problems and definitions of the investigation domain.

Chapter 3 considers the issue of long-term sustainability and refurbishment strategy with a visual life-cycle assessment model developed to address the impacts of changes throughout the various phases of a building's lifetime. A short discussion regarding the UK's listing policy in relationship to the desire of extending a building's lifetime has been included. The chapter then follows by introducing the concept of building endurance and the idea of maintaining a building's aesthetic appreciation through case studies observed in Taiwan.

Chapter 4 extends the notion of long-term sustainability by examining the notion that refurbishment of existing buildings is beneficial in sustaining the cultural structure and the diversity within a specific society. With the research location set in Japan, several refurbishment projects were reviewed and analyzed.

Chapter 5 addresses one of the key concerns of the recent preservation debates and refurbishment considerations of the existing urban built environment, namely its aesthetic value. Examples illustrating the aesthetic concerns regarding decision making as to whether an existing building should be demolished, remain intact or be refurbished were discussed. This has been followed by a wide-ranging literature review regarding aesthetics in theory and as a practical concept. With such understanding, research questions were developed to address people's aesthetic appreciation regarding changes made to the existing built environment.

Chapter 6 reviews research methodologies related to human perception and environmental aesthetics. Research techniques for ascertaining aesthetic perception and approaches used in measuring aesthetic responses were also discussed. The chapter concludes by indicating issues and variables (suggested from reviews) to be considered in future research regarding aesthetic appreciation of the built environment.

Chapter 7 reports the research activity initiated in addressing the contextual and universal issue of aesthetic perception. A semantic differential scale that was equivalent in three-languages was developed through the use of an open-ended questionnaire in the three cultural contexts of Japan, Taiwan and the UK. The SD scale was utilized to understand people's aesthetic appreciations in relation to various demographic factors, and difference/similarity in people's semantic understanding regarding the aesthetic quality of the built environment.

Chapter 8 focuses on investigating the concept of the endurance of a building's aesthetic appreciation through both changes to the building itself, either through refurbishment or maintenance, and changes in its surrounding context. This part of the research activity was undertaken in Japan only considering an existing historical building and its surrounding environment. Changes to the existing building and its surrounding environment were simulated to allow impacts on people's aesthetic appreciation to be observed and analyzed.

Chapter 9 discusses the findings obtained from chapters 7 and 8 with conclusions drawn in response to the proposed research questions.

Chapter 10 is a short discussion of the research outcomes, implications for future study, and contributions to the understanding of aesthetic appreciation throughout this research study. Finally, the thesis concludes with personal thoughts and insights on how the notion of aesthetic appreciation could be incorporated as an aid to the development and sustainable management of urban environment.

On the following page outline of the thesis structure is presented.

INTRODUCTION

Chapter 1: Introduction - Introduction, and thesis structure.

LITERATURE REVIEW

Chapter 2: Conceptual Framework - Identify research issues and define research domain.
Research Objective: To develop understanding of aesthetic appreciation as an aid to the development of sustainable urban environment.

Chapter 3: Long-term Sustainability and the Endurance of Building Appreciation

Chapter 4: Refurbishment Case-Studies

Chapter 5: Understanding Aesthetics

- **A.** Aesthetic perception is objective and universal. Aesthetic appreciation is based on the innate qualities of the form of appearances.
- **B.** Aesthetic perception varies as context/ place changes. Aesthetic judgement is based on cultural specifics and individual interpretations.

Research Questions:

1. Does aesthetic perception remain constant through both place and time?
2. What are the physical features of building appearances employed by general public in making aesthetic judgments of refurbishment?

METHODOLOGY REVIEW

Chapter 6: Research Methodologies

- **A.** Aesthetics in practical research terms. Measurable attributes in aesthetics.
- **B.** Aesthetics in theoretical terms. Non-measurable attributes in aesthetics.

RESEARCH ACTIVITY

Chapter 7: Research A - Addressing the contextual and universal issue of aesthetic perception.

Phase 1 of R.A
Development of 3-language semantic differential scale.
Phase 2 of R.A
Feasibility study of the developed 3-language SD scale.
Phase 3 of R.A
Utilizing the SD scale in understanding people's aesthetic appreciation. Examining the influence of various demographic factors and semantic usages regarding people's aesthetic perception and responses.

Chapter 8: Research B – Investigating the endurance of a building's aesthetic appreciation through changes made to the building itself and changes in its surrounding context.

Phase 1 of R.B
Identify significant building features and suggest potential refurbishment strategies on individual building façade to allow the aesthetic appreciation of the building to be maintained.
Phase 2 of R.B
Is it possible to manage changes in the built environment to allow building's aesthetic appreciation be maintained?

CONCLUSION

Chapter 9: Conclusion - Research outcomes and conclusion.

Chapter 10: Discussion – Discussion, contribution to knowledge and implications for future research.

Figure 1.1. Outline of the thesis structure.

2 Sustainable Management of the Existing Built Environment

2.1 Sustainability

Sustainability discourses and environmental problems have become a fundamental part of everyday life concerns as we enter the end of the first decade of twenty-first century. This decade has been dominated by several important environmental concerns, including the growing concern over energy supplies; the agreement among scientists that global warming is occurring; and the fast-growing economies throughout the world, especially in Asia, causing rapidly increasing demand for fossil fuels. Global warming and environmental changes have evolved into a major economic and political issues and the link between energy and economic growth, poverty alleviation, environment and climate impacts is becoming increasingly visible. The idea that we should live with a sustainable lifestyle has become central and requires daily environmental actions and attentions.

The concept of sustainable development gained momentum in the 1980s when scientific evidence about depletion of resources and degradation of the environment became obvious. The subject has since then became one of the key research and policy issues as we enter the twenty-first century. The interest in sustainable development can be said to develop from the pressures groups and particular interested parties associated with the green movement who saw the depletion of non-renewable resources after the oil crises of 1973 and 1979, the pollution of air and water, and the breakdown of social cohesion through globalisation causing profound impacts on the world's ecological systems and the wellbeing of human society.

Sustainability, in general terms, addresses the capacity to allow a certain process or state to continue or be maintained for a period of time. Some of the early themes debated around the discourse of sustainability can refer back to political economists working during the 1800s the period known as the Enlightenment. The concern about limits to growth in today's environmentalism would be familiar to Thomas Malthus in terms of his concerns about overpopulation [1]. The discussion about the dangers of technology and the limits to scientific certainty were expressed by Mary Shelley using the Frankenstein myth to express notions in opposition to the prevalent mechanistic approach to science and to the humanist separation of human beings from nature[2]. John Stuart Mill's hypothesized that the "stationary state" of an economy might be something that could be considered desirable and anticipated the Green agenda existing today concerning the destruction of nature in pursuit of economic growth [3]. The recognition, that environmental quality and the conservation of natural resources are of importance for the well-being of human society today and also for generations to come, was first discussed in the 1973 United Nations Conference on Human Environment in Stockholm. The concept of sustainability was first used by the World Council of Churches in 1974 [4], it was proposed by Western environmentalists in response to the poverty and deprivation of the

developing world. Since the mid of 1970s, debates concerning sustainable development have grown in intensity and have risen up the international agenda in recognizing and addressing this issue at a global level.

Sustainability and sustainable development came to full prominence in 1987 when the World Commission on Environment and Development published its report *Our Common Future* (also known as the *Brundtland Report*) [5]. It defined sustainable development as:

> *"the development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

Since that time this statement has served as a basic definition of sustainable development for debates and actions that arose from concerns regarding this global environmental issue. However, the Brundtland Report also goes on to say that:

> *"Sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs."*

This further statement above refers sustainable development as a process or as forms of progress instead of a fixed goal. It indicates the importance of continuous learning and adaptation with evolution as knowledge progresses. It addresses the development of multidisciplinary working environments where all participants are involved in the process to improve the present conditions in order to allow the future generation to have the opportunity of satisfying their needs. It acknowledges aspirations as well as needs and limitations in the pursuit of improvement across all societies. It is not about conserve at all costs neither does it seek reduction in economic growth, nor is it about relying on finding technical fixes. It is it is about recognizing that a change of approach is necessary. Sustainable development is about creating harmony and balance between conflicting values and ensuring consistency between human activities and the environment.

By the end of 1988 *Our Common Future* had received public support from many of the world's governments. The Earth Summit held in June 1992 in Rio de Janeiro, Brazil, by the United Nations Conference on Environment and Development (UNCED) was intended to follow up on key recommendations and strategies previously identified in the Brundtland Report. The Rio conference focused on targeting the inter-related links between the world's environmental problems and issues concerning economic conditions as well as the social equity across communities. The Summit reached a number of important conclusions with the development of the *Rio Declaration on Environment and Development* [6], which included 27 principles for achieving global sustainability. It suggested that social, environmental and economic needs must be met through harmony and that these themes should be balanced with each other for sustainable outcomes to be achieved in the long term. A major

achievement of the Rio conference was the adoption of Agenda 21 by the United Nations. Agenda 21 was a plan of action that aimed to pursue the principles of sustainability and to bring the required actions through into the twenty-first century. It proposed a “bottom-up” approach, which emphasized the participatory role of citizens, communities and non-government organizations. It suggested that development should be seen as built by people rather than from the top down through large state projects. It aimed to improve the social, economic and environmental quality for human settlements through integrated approaches to environment and development. A new Commission on Sustainable Development (CSD) under the aegis of the United Nations was also established to monitor the progress.

In December 1997 the UN Framework Convention on Climate Change was held to set targets for green house gas emission. The Kyoto Protocol that was finally agreed was an uneasy compromise. It committed the industrialized countries to an overall reduction of 5.2 per cent in their collective annual emissions of the main greenhouse gases in the commitment period of 2008-2012 compared with 1990 levels [7]. The protocol meant to put in place one single model of legally binding targets and timetables for all industrialized countries to reduce their emissions of greenhouse gases. However, depending on conditions, different industrialized countries had different targets which resulted in many negotiations occurring before the rules and regulations in Kyoto were agreed and ratified by all countries involved. The notion of sustainable development and the interdependence economic and social development and environmental protection was refined further in the Report of the World Summit on Sustainable Development promoted by the United Nations in 2002 [8]. It declared that there is a "*collective responsibility to promote and strengthen economic development, social development and environmental protection – interdependent pillars of sustainable development with synergy between one another – at local, national, regional and world levels.*" It was considered that attaining a balance between these three areas provided the reference point for any “sustainable” actions.

Before the 1987 Brundtland Report, it was difficult to identify any official social, economic or environmental policies that recognised sustainable development as a significant policy objective, whereas since the publication of Agenda 21 and the Kyoto agreement, it is difficult to identify government policy statements that do not address sustainable issues [9]. With all the endeavours and participations in setting up the policy framework, the next stage would be to understand what the policy addressed and how to translate the principles into practice.

The philosophy of sustainable development was thought to come in several major respect from the science of environmental economics which concerns the way economics and the environment interact. As expressed in the Brundtland Report, the economy is not separated from the environment and the notion of sustainability is recognised as the need to achieve a

compromise between the economy and the environment. A basic understanding of sustainable development refers to the ways in which humans manage the impacts of economic activities on the environment and how these affect environmental quality, which in turn impacts on the future performance of the economy. Consequently, the concept of sustainable development was established based on the three inter-related themes of economic growth, ecological balance and social progress.

It is evident that a single definition for sustainability does not exist nor can one successfully explain and encompass the meaning or boundary of sustainable development in one set of definitions. Nitin Desai makes an important point that the problem in agreeing on the meaning of sustainable development is not fundamentally about agreeing upon a precise definition, but about agreeing upon the values that would underlie any such definition [10]. Development in itself is a value word which embodies a set of desirable goals or objectives for what constitutes good for society. Based on the general notion of sustainable development as defined in "Our Common Future" [11], sustainable development implies continuous economic growth without degrading or depleting natural resources nor have serious impacts on the global environment that will be inherited by future generations. It encompassed not only growth but also general utility and the improvement of human wellbeing.

2.2 Sustainability in the Built Environment

The subject of sustainability has developed from concerns regarding environmental problems and natural resources. The early emphasis was centred on recognizing the need to maintain the quality of the natural environment and of sustaining the integrity of the biological system. The impacts that human activities and economic developments have on the natural system were realized and considered. However, 'the environment' consists of not only the spontaneously self-organized 'natural environment', but also the humanly constructed 'built environments'. Built environments are the day-to-day worlds in which humans live and where many human activities and actions occur. Humans survive in urban environments and increasingly live in modern societies, spending nearly all our time and doing most of our activities within human organized built environments. The structure and quality of our built environment is no doubt a significant determinant of our wellbeing. In consequence, how we build and perceive these environments and how we live in them should be a question of prime importance.

Approximately 40 percent of extracted resources are consumed within the building environments of the industrialised countries, together with 30 to 40 percent of generated energy. Current consumption rates of these resources will have a profound effect on the availability of natural resources for future generations. Built environments impose not only massive demands upon the planet but also generate massive amounts of waste. The actual

creation of the built environment has many negative impacts on the world's ecological systems, the rapid deterioration of resources and the wellbeing of human society. The construction, maintenance and operation of the built structures all have significant impacts on the environment, both locally and globally. Buildings at all stages of their lives, in the short or long term, contribute in many ways to the formation of the complex built environment. From construction to demolition or renovation or refurbishment, buildings and their multitude of components and systems all have different and serious impacts on the environment. These effects are not limited to the local areas or the building's immediate surroundings but include a wide range of regional and global effects. The construction industries would need to adjust their focus to include addressing sustainability issues, which may include reconsideration of the building design processes and construction procedures as well as the re-evaluation of the fundamental decision making processes.

Addressing sustainability in the built environment is a complex task which involves consideration of many interconnected issues including environmental degradation, building activities, maintaining cultural identity, enhancing social diversity, sustaining economic viability, creating community development and participations. Sustainability requires all sectors of human activity to reconsider their actions and it demands attention to both the environmental and social contexts of the built environment. Consequently, the subject of sustainability or sustainable development with regard to the built environment requires a wide-ranging exploration of diverse topics in order to thoroughly understand and practice this complex field of discourse.

2.3 The Roles of Culture and Cultural Diversity Within the Concept of Sustainability

The notion of sustainability encompassed by the Brundtland Report in 1987 recognised the need to achieve a compromised between the economy and the environment. For a period of time, the focus of sustainability had centred in maintaining the economic development while sustaining the natural environment for the future generations. As Vernon Ruttan remarked in the late 1980s and early 1990s cultural considerations have been cast into the underworld of the development thought and practice; he suggested that no development economist would agree to the proposition that cultural variables might be important in explaining political and economic development [12, 13].

However, a shift in emphasis has occurred that has refocused considerations of sustainability onto human beings as the centre of development concerns. This became evident when the United Nations Development Strategy for the 1990s adopted human development as its key focus, and the United Nations Development Program (UNDP) instituted its annual Human Development Report, the first of which appeared in 1991. The objective of human development was interpreted as being able to enhance the ability of people

to lead a long life and increase the capabilities of people to live as they desire [14]. A reorientation of development thinking along a people-centred strategy of human development has obvious cultural implications. People are both the objects and also the means of development, they exist together and interact in varieties of ways within the framework provided by their culture which is constructed based upon their shared beliefs, values, traditions which contextualise their daily lives.

In 1995, the United Nations World Commission on Culture and Development translated this notion into the field of culture and introduced the need additionally to re-conceptualising development in human terms to achieve a compromise between culture and development. The existence of close links between culture and sustainability has been considered from both an academic point of view and from the point of view of government policies for cultural development. The language and concepts of the Brundtland report were used to define the concept of cultural sustainability in terms of intergenerational equity but applied this notion to the management of cultural capital, which was defined as "*the culture which we have inherited from our ancestors and which will be passed on to coming generations*" [15]. The economist David Throsby considered that the "*concept of sustainable development as defined in ecological terms can be extended to apply to culture by recognising parallels between the concepts of natural and cultural capital*" [16], *in which ecosystem support the biosphere and the cultural infrastructure supports the social universe; both in turn provide essential sustenance for the economic life carried on in their respective domains* [17]. Culture provides a set of economic and social benefits and contributes to the improvement of environmental quality. Throsby also stated [18]: "*a single definition of cultural sustainability is not possible. However, we can get a better understanding of the meaning of this term by developing a set of principles making it possible to judge the sustainable management of cultural capital*". Utilizing the notion of sustainability as defined in the Brundtland Report, he identified six principles which define sustainability in its application to cultural capital as follows [17]:

- *"The creation and production of both material and non-material benefits, by the flow of cultural goods and services, for people as individuals and as members of society.*
- *Inter-generational equity, derived from the recognition of the interest of future generations in accessing the culture inherited from the past.*
- *Intra-generational equity concerning the rights of current generations to fair access to cultural resources and benefits flowing from cultural capital.*
- *The significance of cultural diversity in maintaining cultural systems, that is to say, diversity of ideas, beliefs, traditions and values.*
- *The principle of precaution states that the decisions which may lead to irreversible change should be approached with caution. It refers to the destruction of an irreplaceable item*

of cultural capital and addresses it to the risk of extinction of living species in the field of biodiversity.

- *The maintenance of cultural systems and the recognition of interdependence – a principle based on the idea that cultural capital makes a contribution to long-term sustainability where no part of any system exists independently of other parts."*

The importance of culture when considering economic and environmental development were beginning to be recognized in the international community as it addressed sustainable approaches to development policy. In April 1998, the Intergovernmental Conference on Cultural Policies for Development in Stockholm, the 150 governments represented agreed that the prime policy objective would be to make cultural policy one of the key components of development strategy [19]. It was proposed that governments should establish policies which recognise the importance of culture in development 'in such a way that cultural policies become one of the key components of endogenous and sustainable development' [19]. Since then, a gradual recognition of the importance of culture in relation to sustainability has occurred, as was shown at the conference organised jointly by the World Bank and UNESCO, entitled Culture in Sustainable Development [20]. Three aspects can be highlighted to show how culture is being considered in the international agenda of development thinking. First, is the concern of the effect that globalization may have on the local cultural diversity. Second, is a search for 'bottom-up' processes of strategy that emphasise cultural interactions within and between communities. Third, is the wish to promote cultural expression and awareness though programmes directed towards poverty. These considerations have started to have an influence on how organisations and agencies consider sustainability where culture was to be considered in a development context by all sectors. The dual values of economics and cultural were to be accounted in decision-making process for achieving both cultural sustainability and environmental sustainability.

In the field of cultural policy, the need to deal with culture and sustainability in an integrated manner has been recognised. A conference "City and Culture", held in Stockholm as European Capital of Culture in 1998, analysed the role of culture in the sustainability of cities [21]. In January 2000, the first international conference "Culture in Sustainability Cities" [22] was held in the Japanese city of Kanazawa, while in May 2004, the 4th Forum of Local Authorities for Social Inclusion, in Porto Alegre approved the cultural Agenda 21. This document demonstrated the commitment of participating cities and local governments to human rights, cultural diversity, sustainability, participative democracy and the generation of conditions for peace. The world organisation United Cities and Local Government (UCLG) adopted the cultural Agenda 21 as a reference document for its cultural programmes and took on the role of co-ordinating the process after it was approved.

The inclusion of culture has led to a broader approach to the concept of sustainability that

is based on the concept of human development in conjunction with the traditional idea of economic development that is limited to growth in production and productivity. Consequently, culture has become to be seen as the fourth theme of sustainability; together with the previously accepted themes or notions of economic growth, ecological balance and social progress. As stated by Hawkes [23], the advance towards a sustainable society occurs "*most effectively if cultural vitality is included as one of the basic requirements"*. The notion of culture as an important aspect of the concept of sustainability was well expressed in 1998 by James D. Wolfensohn during his term as president of the World Bank Group [24]: "*The issue of culture and development is not a subject that we regard as controversial. We start from the proposition that you cannot have development without a recognition of culture and of history. In a world that is becoming increasingly globalized, in a world where there are pressures for cultural homogeneity across all our countries, what is abundantly clear is that it is essential for us to nurture, to prize, to revere and to support the culture and the history of the countries in which we operate. Very simply, we do not believe that you can move forward unless you have recognition of the base and the past from which we have come.*"

Any attempts seek to define Culture finds itself referring back to Tylor's [25] original 1871 definition that *"(culture) is the complex whole which includes knowledge, belief, art, law, morals, customs, and any other capabilities and habits acquired by man as a member of society"*. It clearly defines culture as (almost) everything that characterizes humans, as Rapoport stated *"the possession of culture makes us all human and defines our species, yet it also divides us by languages, religion, food habits, rules, and many other specific aspects of culture to the extent that one can speck of 'pseudo-species"* [26]. Culture embodies the way humans live their lives; it is built on values that humans share and also where values differs; it is about the relation between the individual and society; it deals with all the matters that concern people and communities and all the diversity in between. Most important of all, culture expresses our visions of the future and what we want to pass on to future generations; as stated by Jon Hawkes in addressing cultural sustainability, *"our culture connects our present with our pasts and with the future we imagine. It is with culture that we make the connections, the networks of meanings and values, and of friendship and interest, that hold us together in time, in place and in society"* [27].

Culture is gradually being recognized as a distinct, separate and integral aspect in the discourse of sustainable development separate from the realm of social sustainability. In 1995, UNESCO defined the cultural dimension of community development as being *"the whole complex of distinctive spiritual, material, intellectual and emotional features that characterize a society or social group. It includes not only the arts and letters, but also modes of life, the fundamental rights of the human being, value systems, traditions and beliefs"* [28]. Cultural sustainability means that changes occur with respect to the existing cultural values and

considerations are made addressing the local context.

In summary, the cultural theme within the overall concept of sustainability requires cultural actions that encourage creativity, cultural diversity and the conservation and the dissemination of cultural heritage as an aspect of social development that acts at both the individual and collective levels. Cultural sustainability means that changes occur in ways that respects cultural values. Cultural heritage gives identity and meaning to people and places. In terms of sustainability, appreciating the process of placing value on cultural heritage and the opportunities that can arise from an understanding of this resource is essential. Communities are often passionate about heritage and the challenge is to capture and guide that commitment.

2.4 Sustainable Refurbishment of Cultural Heritage and the Built Environment

A key and easily identified aspect of cultural heritage is embodied in the buildings that exist within villages, towns and cities. Apart from the function of providing safe and comfortable spaces for human habitation, buildings act as symbols of a society's success. The accumulation over time of buildings within urban environments represents a chronology of the social, economic and cultural developments and progress of a society. Buildings in the built environment and their urban context constitute non-renewable resources to the society through their historic diversity, quality and continuity [29]. It has been recognised by the United Nation, 1996, that there is a need for promoting the role and importance of the built heritage, particularly in the light of the need for cultural identity and continuity in a rapidly changing world, since they represent an important element of stable and humane social life. As a cultural resource, the building fabric constitutes in itself a long lasting, continuously representative, physical and emotional memory.

Traditionally, the issue of the cultural value of buildings has been associated mainly with the conservation of individual monuments and historic urban fragment. Conservation policies of the built heritage have mainly concentrated on the preservation and renovation of listed monuments and individual historical buildings. In order to protect heritage buildings from inappropriate developments located within their close surroundings, conservation policies may extend beyond individual buildings to create a conservation protective zone. However, this process of transformation often leads to reduction of diversity and may limit the possibility of prolonging the usage lifetime of the existing buildings. Consideration of the urban settings and the surrounding built environment of cultural heritages must be taken into account in the process of conservation or refurbishment. The concept of integrated conservation of the built cultural heritage includes all rehabilitation and revitalisation measures designed to assure the durability of the built heritage; maintain it within the frame of an appropriate built/natural environment; and allocate and adapt it to the present needs of society [30]. One of the crucial

concepts in sustainable development is the ability of achieving long-term value where changes and effects have to be assured in the long term. The concept of refurbishment or revitalization can be seem as a more sustainable alternative and this has sometimes been referred to as 'active conservation' [31], where considerations focus the architectural heritage in itself, and develop strategies to foster and allow appropriate long-term development of the urban fabric.

In architecture refurbishment is considered to be the creation of a new function or a new configuration for an existing building. Coincidentally, the act of refurbishment may include integrating the ecological, economic, social and cultural aspects of the surrounding environment. It includes the challenges of responding to the historical architectural value of the existing building as well as integrating existing material elements and spaces to reflect contemporary needs and styles. The refurbishment process suggests a closed-loop life cycle for materials and buildings which encourage the building industry to approach design and building construction in ways that make reuse and recycling happen.

Figure 2.1. A closed-loop life cycle for materials and buildings.

Sustainability in relation to buildings is defined as a set of processes aimed at delivering efficient built assets in the long-term. It is about taking a strategic view of reducing the impact of human development on the environment. Sustainability in the context of buildings and the built environment is primarily concerned with matters such as designing buildings for long life and low maintenance, minimizing construction waste and pollution, saving energy, increasing the use of recycled and locally produced materials, and relying less on toxic chemicals. It is about incorporating the whole-life cycle perspective into the design of new buildings as well as in refurbishment schemes. Most buildings undergo a variety of cycles during their service life, where changes in the intensity or type of use will impact on how well a building performs. Through the process of refurbishment, the long-term utility of a building can be prolonged and the continuing use of the property can be ensured.

2.5 Managing the Existing Urban Fabric

Refurbishment has been recognized as a sustainable response in the treatment of existing building fabric. It is a strategy which not only helps to reduce the impact of urban development on the environment, but also encourages the sustaining of historical, cultural, social and aesthetic characteristics of the local built environment. According to the IEA report [32], urban areas in various countries are experiencing problems related to poor use of building and high flows of energy and materials through the existing building stock. Kohler's analysis of the evolution of the European building stocks indicates that the critical issue for sustainable development does not reside in the standards for new buildings. Instead it is in the management of existing buildings and refurbishment of the post-World War II buildings as well as the conservation of the complex qualities of historic towns [33]. In Japan, there is a huge amount of architectural stock, the total floor area of existing buildings amounts to about 8 billion square meter. The average annual amount of new construction is about 0.2 billion square meters, and this means that it would take at least forty years to rebuild all existing buildings [34]. In addition, the population projection (prepared by the Ministry of Health and Welfare of Japan) indicates that the population soon will begin to decline and there is going to be a far less demand for new building construction works in Japan [35]. All these suggest that the construction industry not only should reorient their focus towards a reconstruction industry, but also from the perspective of sustainable built environment, the discourse of sustainability should shift the emphasis to address the long term management of the existing building stocks in the built environment.

Managing the development of existing and future built environments requires action at different organisational levels, to include local and regional planners, construction companies, city councils, designers, architects and engineers, and the residents that occupy the urban environment. Often, difficult choices have to be made about whether or not a particular building should be demolished or refurbished. The final decisions regarding such choices depend upon many factors that range from economic value of a building to its value as a cultural artefact. A number of tools, such as life cycle costing, exist to assess the economic value of buildings. Similarly life cycle analysis can be utilised to examine the environmental impacts of different options, such as demolition or renewal/refurbishment. However, such tools do not currently exist for the assessment of the social or cultural value of buildings as cultural artefacts.

2.6 Sustainable Assessment Tool and Cultural Consideration

The abundant definitions of sustainability make the concept both confusing and abstract. Sustainability can be defined both qualitatively in words and quantitatively in numbers, reflecting on its nature as an overarching term covering both the soft and hard issues. Sustainability in the social and cultural context is often defined qualitatively in words as an

ethical proposition addressing issues such as local community, life-quality, historical heritage, local identity and wisdom and social structure, etc. Expressing sustainability in operational terms raises the need for measurement; in order to set sustainability goals and achieve them, designers and planners have to know whether their efforts have been successful or not. They have to know what parameters to measure and how to assess their significance.

Several existing and widely used environmental assessment tools were reviewed based on their feasibility of assessing the existing built environment. Existing quantitative assessment tools are applied conventionally in terms of system life expectancy and other economic and technically based environmental factors to provide indications or weightings that assess success in complying with guidelines or regulations. Building environmental impact, economic performance, building environmental loading and building service qualities could be assessed using existing environmental assessment tools, such as BREEAM, LEED, CASBEE and GBTool, (refer to Appendix 3). However these measures are not addressed to the cultural values and social diversity of the existing building fabric. Issues concerning cultural capital and qualities have been generally treated as qualitative concepts and consequently have always been considered difficult to research due to their perceived immeasurability.

The paradox of "*Think globally, act locally*" suggests that sustainable issues should be considered at various scales and levels within and across societies. Environmental problems and environmental impacts undoubtedly exist worldwide and so solutions and actions towards sustainability must be considered at a global level. However, the dangers inherent in today's movement towards globalization must be acknowledged by making reference to the context in which strategies for achieving sustainable development are devised and in which they operate.

As stressed by Guy and Farmer [36], *"the emblematic issue in terms of the sustainable development of the built environment is authenticity and the notion that truly sustainable buildings and efficient solutions need to relate more fully to the concept of locality and place."* Frampton suggested, '*sustaining any kind of authentic culture in the future will depend ultimately on our capacity to generate vital forms of regional culture*' [37]. Current technologically based sustainable approaches and design methodologies towards buildings makes no reference as to how users interact with the features and systems and also often fail to take into account the cultural values of a particular place or people. According to Ujam and Stevenson [38] this means, *'refuting the concern of certain 'green' architects with 'green' but culturally unsustainable technical fixes situated within existing building typologies… Without cultural awareness, any attempt to create a more sustainable environment is likely to falter as it encounters but fails to recognise very deeply structured personal responses to particular places that will tend to override shallow environmentalism'*. A building designed with excellent sustainable performance standards could easily fail due to the lack of consideration for the inhabitants' needs, expectations and behaviours. Roslin [39] argues that an

ecologically aware society '*… has as much, if not more, potential for the conservation of resources than 'technical innovation', and that this potential is 'culturally bound*''.

Among numbers of notable environmental assessment tools GBTool stands out as specially designed to permit customization in dealing with different regional contexts. SBTool 2007 is a software system derived from GBTool, that is designed to assess the environmental and sustainability performance of buildings.

SBTool is a generic framework, which provides a generic toolkit that allows local organizations to develop one or more rating system that suits the needs of particular regions. The method allows users to establish a scope for assessment, to derive a system that reflects the relative importance of performance issues in a particular region, and to utilize regionally relevant benchmarks. Regional authorities are provided with the means to ensure that the assessment system they develop will be relevant to their unique local conditions by replacing the generic benchmarks provided in the system with their own [40].

Since the Sustainable Building Conference 2000 and Green Building Conference 2000, SBTool has been adopted by some countries as a generic framework for establishing their own environmental assessment system which effectively takes into account their region-specific, social-specific and site-specific context factors. Based on Green Building Conference 2002's report, 16 countries anticipated submitting case-studies for utilizing the GBTool, and the results were presented in the SB05 conference 2005 in Tokyo [41]. Continued adaptations can also be found from the recent SB07 conference held in Seoul in June in 2007 [42]. In spite of its wide adoption and contextual specification procedures, difficulties have occurred in collecting and reporting actual performance results, or the causes of issues arising in both social aspects and other regional specific impacts. It is evident that although SB07 provides a highly flexible generic framework that allows the regional socio-cultural issues to be addressed, and contextually developed guidance addressing the causes, issues and methods of assessing the actual performance results, socio-cultural issues still require to be better understood and addressed.

2.7 Assessment Tool for Cultural Management of the Existing Built Environment

Although the abstract notions of sustainability, culture, environment and society are used almost universally, through language and context they refer to specific conditions and realities. The judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture [43]. Thus, it is not possible to base judgements of values and authenticity within fixed criteria. The respect due to all cultures requires that heritage properties must be considered and judged within the cultural contexts to which they belong [44]. In the process of achieving sustainable societies cross-cultural information exchange has to be carefully constructed and

must recognize and consider; context, regional identity, cultural similarities/differences and social diversity. This implies the need to create harmony between contextual/local solutions and universal/global structures.

Cultural resource in the built environment refers to the existing building fabric and comprises not only the individual (historical) buildings but also its direct urban environment as 'context' or as 'neighbourhood'. Both entities should be treated with equal respect and consideration to each other with different strategies to sustain sufficient urban density, complexity and quality within the urban environment while maintaining the historical character and local identity. The principal challenge is to develop indicators and methodologies for the long-term management of the building stocks that takes account of their cultural values given by the local society, their innate architectural qualities generated and acquired through time and their relation to surrounding space.

2.8 From Cultural Value to Aesthetic Value in the Existing Built Environment

Building heritage exists in society within the framework of the cultural context created by the local people and conditions. It acquires cultural significance and values with the passing of time and marks history for the society. However, the non-singular nature of the concept of cultural value means that any attempt to evaluate this intangible notion in terms of existing building fabric will have to begin from understanding the abstract notion of value in the context of culture discourse of the built environment.

The notion of value in a fundamental sense can be seen as the origin and motivation of all human behaviour. The approach taken by behavioural science in treating the question of value seems to lend itself to the study of value in buildings [45]. A widely used definition of this understanding of value, given by the anthropologist Kluckhohn, sees value as a '*conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable which influences the selection from available modes, means and ends of action*' [46]. Ideas of value permeate the notion of culture. Certain properties of cultural phenomena are expressed with specific qualifiers which have value, such as the value of a color in a painting, or can be used in general terms as an indication of the merit or worth of a work, an object, an experience or some other aspect of cultural experience [47]. Cultural values refer to human thoughts and actions; it concerns the beliefs and moral principles which provide the framework for human thinking and being. Steven Connor describes value in the cultural discourse as being 'inescapable', not just the idea of value itself but also the *"process of estimating, ascribing, modifying, affirming and even denying value, in short, the processes of evaluation… We are claimed always and everywhere by the necessity of value in this active, transactional sense"* [48]. The dimensions of cultural value and the methods that might be used in assessing it must be develop out of cultural discourse and place emphasis on the interaction of

humans with the environments they experience.

Generally, the true cultural value of an object, work of art or any public goods was seen to be as lying within the intrinsic qualities of aesthetic, artistic or broader cultural worth they possess. This view of cultural value emphasises the innate, universal, transcendental, objective and unconditional characteristics of the objects. This illustrates the notion that the inherent value of cultural objects is absolute, where although judgements may differ between individuals and the ground may shift over time, but the absolute cultural worth would always and eventually be evident. Yet, the cultural value of an object might instead be perceived and evaluated based on a viewer's perception, experience and cultural background. The question arises to whether the assessments of the cultural values of buildings in the built environment will differ when evaluated within a specific cultural context and fixed time frame or alternatively within a cross-cultural comparison or in the context of a long-term concern? Additionally, is a universal generic assessment method possible or are contextual and cross-cultural considerations required?

In a search for understanding the cultural value and strategies for operating and practicing this notion, Thorsby suggested four propositions to be undertaken before any progress is possible: (i) to accept a distinction between aesthetics and sociology within the notion of culture; (ii) to find consensual agreements in particular cases which are interesting in their own right, in another words the search for objective and pure reasoning behind the judgement; (iii) to understand that cultural value is a multiple and shifting notion which cannot be comprehended within a single domain; (iv) to accept that measurement may not be possible [49].

Cultural value is recognized as encompassing various variables which cannot be expressed within a single domain. It seems desirable to separate out the domain of aesthetics discourse from the broader social or cultural context in which judgement of cultural value is made. When compared to familiar quantitative or qualitative standards some of the notions within the meaning of cultural value may be impossible to measure, as Terry Smith suggests, cultural valuing tends against measurement, whether by reference to externally or internally generated scales, because it '*occurs as flows: its modes are generation, concentration, the emergence of channels, strings, sometimes chains of valuing*' [50].

Thorsby suggested a possible way forward in the attempt to dismantle the concept of cultural value by breaking it down into several important constituent elements. He used an artwork as example, which he considered may be described as providing a range of cultural value characteristics including: (a) aesthetic value; (b) spiritual value; (c) social value; (d) historical value; (e) symbolic value; and (f) authenticity value [51]. Such a range of criteria could be proposed as a generic framework for assessing the multi-facet cultural value, whether the issue is absolute or relative, fixed or movable, objective or subjective. This approach of

deconstructing/ dismantling the notion of cultural value into constituent elements as a means of articulating more clearly the multi-dimensional nature of the concept was also suggested by Rapoport to clarify excessively broad and abstract concepts such as 'culture' [52].

In the context of managing the existing building fabric to achieve a more sustainable development, the aesthetic value of building appearance is an important factor regarding the decision as whether the existing built environment should be preserved, readjusted or demolished. Thorsby suggested that "*the starting point for an identification of value within a broadly cultural context lies in the irreducible principle that value represents positive characteristics rather than negative,.. it can be aligned with the pleasure principle in guiding human choices"* [53]. The aesthetic value of the built environment may affect the immediate human perception and judgment of it. It may also influence the cognition and belief that humans developed towards the context of the surrounding environment and affect their behaviours and preferences and guide their decisions and choices. Nevertheless, in order to aid the decision making processes required in the task of managing the existing built environment, the problems involved in its evaluation remain important and require sufficient attention. Several assessment methods were suggested by Throsby drawing from valuation methods used in the social sciences and the humanities, however he concluded *"assessment is fallible not just because of the lack of measuring rods, but because of the non-singular nature of the phenomena themselves*. … *there may be a crisis in contemporary cultural value theory, but it should not dissuade us from seeking to articulate more clearly what cultural value is and how it is formed"* [54]. In the process of finding the appropriate method for assessing cultural value of the existing built environment, it became evident that a single method would not be possible to encompass the multi-dimensional notion of cultural value. Specific assessment tools targeting the individual attributes separately appeared to be appropriate and necessary.

2.9 Aesthetic Value in the Context of Sustainability

Designing and constructing or refurbishing buildings to ensure long lifetimes is proposed to achieve more nearly sustainable development of the urban environment. However, building for long life means that at some time in the future decisions will need to be made as to whether the existing building should be maintained in its current form, refurbished with some modification or change of function, or demolished and the site redeveloped. Many factors will be involved in such decisions and may include consideration of economic, social and environmental issues, for example. However, the notion of the aesthetic value in the cultural domain of a building or development is often a consideration when judgements of cultural worth are to be made in the process of managing the existing building fabric. The long term solution requires a shift from utilitarian values to a view in which aesthetic and society values

play a prominent role. As Scruton stated in his essay, "*aesthetic considerations should take precedence over all others. Aesthetic value is the long-term goal; nobody wishes to conserve a building if it does not look right*" [55]. The intention and decision to preserve or refurbish existing buildings generally is not based on aesthetics alone, but aesthetic arguments are frequently advanced as key motivations for preservation as well as the basis of the will to refurbish. According to John Passmore: *"a more sensuous society could never have endured the desolate towns, the dreary and dirty houses, the uniquely ugly chapels, the slag heaps, the filthy rivers, the junk yards which constitute the "scenery" of the post industrial west… Only if men can fist learn to look sensuously at the world will they learn to care for it"* [56].

The notion of sustainability comprises several dimensions in a perspective of long-term responsibility. Aesthetic impacts have been recognized as key elements of the notion of sustainability when applied to the sustainable development of the built environment. Guy and Farmer included aesthetics as one of the six competing design logics in achieving the appropriate form for green buildings [35], which emphasised the importance of the aesthetic impact of the built environment. In addition to Rene Dubos' maxim *"Think globally, act locally"*, he also stated that *"the worst thing we can do to our children is to convince them that ugliness is normal"*, which indirectly addresses the issue of aesthetic value in the field of sustainable development.

The aesthetic value of an existing building can refer to the properties of pleasing shape, harmony form and other aesthetic characteristics inherent in either the visual appearance or the physical dimension of one individual building or the street scene of building environment. The aesthetic quality of a building can be defined as an intrinsic architectural quality which contributes to a component of the building's cultural value acquired through the specific contextual condition. It can also be defined in terms of the viewer's aesthetic reading of the building influenced by that individual's perception, taste, understanding and judgement. Nevertheless, as a basis for the definition of cultural value it can be considered that the aesthetic value guides and affects the way people interact with the environment through visual perception, value judgement and decision making as well as to the physical behaviours and response actions.

Aesthetic value of the existing built environment stands out to be a critical concept concerning both the long-term aspect of sustainability and the basic reasoning for the management of the existing buildings in the built environment. Despite that, difficulties do exist regarding both the conceptualization and applicability of the notion and its measurement, which consequently push the issue of aesthetics into the subjective, less convincing and insufficient ground of argument. With such difficulties, the concept of aesthetic value must be examined and understand before any attempt is made to define or assess such a notion in the context of sustainable built environment.

Next chapter will consider the concept of long-term sustainability and refurbishment strategy to address impact of changes throughout phases of building lifetime particularly in the context of visual aesthetic quality. The notion of building endurance regarding the maintenances of a building's aesthetic appreciation is introduced through case studies.

2.10 Reference

1. Thomas Malthus (1798) *An Essay on the Principle of Population*, Oxford: Oxford University Press, 1993, p 11
2. Mary Shelley (1826) *The Last Man*, London: Hogarth, 1985
3. John Stuart Mill (1848) *Principles of Political Economy*, Harmandsworth: Penguin, 1985, pp 113-116
4. World Council of Churches (1974) *Report of Ecumenical Study Conference on Science and Technology for Human Development*, Geneva: World Council of Churches.
5. World Commission on Environment and Development (1987) *Our Common Future*, Oxford: Oxford University Press
6. United Nations Conference on Environment and Development (1992) '*The Rio Declaration on Environment and Development*', Rio de Janiero: UNCED Secretariat.
7. United Nations (1997) *The Kyoto Protocol to the United Nations Framework Convention on Climate Change*, Online. Available HTTP: <http://www.unfccc.int/resource/docs/onvkp/kpeng.pdf> (May 2002).
8. United Nations (2002) *World Summit on Sustainable Development*, Johannesburg, United Nations.
9. Talbot, R., & Magnoli, G. C. (2000). Social Inclusion and the Sustainable City. In W. Fox (Ed.), *Ethics and the Built Environment* (pp. 91-101). London: Routledge.
10. Dresner, S. (2002). *The principles of sustainability*. Sterling, USA: Earthscan Publications Ltd.
11. Ibid. 5.
12. Ruttan, Vernon, 1988. Cultural endowments and economic development: what can we learn from anthropology?, Economic Development and Cultural Change 36 (Supplement): S247-S271.
13. Ruttan, Vernon, 1991. 'What happened to political development?', Economic Development and Cultural Change 39: 294-305.
14. United Nation Development Program (1991) *Human Development Report*, Oxford: Oxford University Press
15. Our creative diversity: report of the World Commission on Culture and Development, 2nd rev. ed. Paris: UNESCO, 1996. 309p.
16. Throsby, D. (2005). On the sustainability of cultural capital. *Macquarie Research Papers*, 10.
17. Throsby, D. (2001). *Economics and Culture*. Cambridge, Cambridge University Press.
18. Throsby, D. (1995). Culture, Economics, and Sustainability, *The Journal of Cultural Economics*, 19, 199-206.
19. UNESCO, 1998. *Final Report of Intergovernmental Conference on Cultural Policies for*

Development: The Power of Culture, Stockholm, 30 March-2 April, Paris: UNESCO

20. World Bank/UNESCO. 1998. *Culture in Sustainable Development: Investing in Cultural and Natural Endowments*. Proceedings of the Conference sponsored by the World Bank and UNESCO, Washington, DC, September 28 and 29, 1998. Washington, DC: World Bank.
21. International Conference: *City and Culture: Urban Sustainability and Cultural Processes*. Stockholm, May 1998
22. International Conference: *Culture in Sustainability of Cities.* Ishikawa International Cooperation Research Centre, Kanazawa, Japan, 18-19 January, 2000
23. Hawkes J. 2001, *The Fourth Pillar of Sustainability: Culture's essential role in public planning*, Common Ground Publishing in association with the Cultural Development Network Victoria.
24. Wolfensohn, James D. 1998. *Culture in Sustainable Development: Investing in Cultural and Natural Endowments.* Remarks for the Conference sponsored by the World Bank and UNESCO, Washington, DC, September 28 and 29, 1998. Washington, DC: World Bank.
25. Tylor, E. B. (1871). Primitive culture: researches into the development of mythology, philosophy, religion, language, art and custom. London: J. Murray.
26. Rapoport, A. 2005. *Culture, Architecture and Design*. Chicago, Locke Science Publishing Company, Inc., p.37.
27. Hawkes J. 2003, 'Understanding Culture', *Just and Vibrant Communities Conference*.
28. World Commission on Culture and Development (WCCD), 1995. *Our Creative Diversity*, Paris: UNESCO
29. Johansson, B.O. (1996) The cultural environment as a resource in a sustainable urban culture. In: *Urban development in an Eco-cycle Adapted Industrial Society*. Swedish Building Research Council, Report 96:2, Stockholm.
30. Council of Europe (1975) Council of Europe Resolution (76)/28. Council of Europe, Strasbourg.
31. Dupagne, A. (2002) The urban renaissance through preservation of historic centres and integration of new buildings and urban aspects: the EU-SUIT project. In: International Symposium: *Restoration Principles for a new Europe*. Conference at Ghent University, Department of Architecture and Town Planning, Ghent 2002.
32. Core Reports: Life Cycle Assessment Method for Buildings. (2004). *Annex 31 Energy-Related Environmental Impact of Buildings*, Canada Mortgage and Housing Corporation.
33. Kohler, N. (2003) Cultural issues for a sustainable built environment. In R. J. Cole, & R. Lorch (Eds.), *Buildings, Culture & Environment* (pp. 83-108). Oxford: Blackwell

Publishing Ltd.

34. Construction Research Institute, 1954-1998. *Annual report of architectural statistics*, supervised by Construction Economy Bureau, Ministry of Construction: 1954-1998. Construction Research Institute.
35. National Institute of Population and Social Security Research, 1997. *Population Prospect of Japan*: Jan. 1997, Health and Welfare Statistics Association.
36. Guy, S. and Farmer, G. (2000) Contested constructions: The competing logics of green buildings and ethics. In W. Fox (Ed.), *Ethics and the Built Environment* (pp. 73-87). London: Routledge, p. 80.
37. Frampton, K. (1985) *Modern Architecture: A Critical History*, London: Thames and Hudson, p. 314.
38. Ujam, F. & Stevenson, F. (1996) Structuring Sustainability, *Alt'ing*, March: 45-9.
39. Roslin, M. (1996) Making connections, *Proceedings of Evolving Environmental Ideals*. 14th Conference of the International Association for People-Environment Studies, Stockholm.
40. Larsson, N. (2007) *An Overview of SBTool July 2007 Release*. iiSBE (The International Initiative for a Sustainable Built Environment).
41. Larsson, N. (2002) *Review of GB-Tool and Analysis of GBC 2002 Case-Study Projects*. iiSBE (The International Initiative for a Sustainable Built Environment).
42. KGBC (Korean Green Building Council) and ERC (Sustainable Building Research Center funded by MOST/KOSEF). 2007, June 27-29. "Proceedings of the International Conference on Sustainable Building Asia SB07 SEOUL", Seoul, Jeong Publishing.
43. ICOMOS (1994) The Nara Document on Authenticity, www.international.icomos.org/naradoc_eng.htm, 5.9.2000.
44. Ibid.
45. Pultar, M. (2000) The conceptual basis of building ethics. In W. Fox (Ed.), *Ethics and the Built Environment* (pp. 155-169). London: Routledge, p. 159.
46. Kluckhohn, C. (1951) Values and value-orientations in the theory of action: An exploration in definition and classification. In T. Parsons and E. A. Shils (Eds.), *Toward a General Theory of Action*, Cambridge, MA: Harvard University Press.
47. Ibid.
48. Connor, S. (1992) *Theory and Cultural Value*, Oxford: Blackwell, p.8.
49. Ibid. 17., p.28.
50. Ibid. 17., p.28.
51. Ibid. 17., p.29.
52. Ibid. 26., p.93.
53. Ibid. 17., p.27.

54. Ibid. 17.
55. Scruton, R. (1999) Most architecture should be modest: On architecture and aesthetic judgment. In W. S. Saunders (Ed.), *Judging Architectural Value*, Minneapolis: University of Minnesota Press, pp. 124-128.
56. Passmore, J. (1974) *Man's Responsibility for Nature*, New York: Scribner's, p.189.

2.11 Bibliography

1. UNCED – United Nations Conference on Environment and Development (1992a) *Earth Summit 92 (Agenda 21)*. Regency Press, London.
2. United Nations (1992b) United Nations Framework Convention on Climate Change, Online. Available HTTP: http://www.unfccc.de/ (March 2002).
3. World Bank, 1999. Culture and Sustainable Development: A Framework for Action, Washington, DC: World Bank.
4. United Nations Development Program (UNDP). 1994. Human Development Report 1994. Oxford University Press.
5. CECC, Centre of Expertise on Culture and Communities, 2007. *Culture as a Key Dimension of Sustainability: Exploring Concepts, Themes, and Models*, Creative City Network of Canada.

3 Building Endurance

In this chapter, concepts developed in the previous chapter from sustainability in the built environment to management of the existing urban fabric and to the emphasis on aesthetic value in the context of sustainable application will be further discuss and develop in the context of long-term sustainability, refurbishment strategy and the notion of building endurance addressing humans aesthetic appreciation.

3.1 Long-term Sustainability

Designing, constructing and utilizing buildings to ensure long lifetimes is proposed to be a strategy to achieve more sustainable development in the urban environment. *"The architect's work is intended to live on into the distant future. He sets the stage for a long, slow moving performance which must be adaptable enough to accommodate unforeseen improvisations"* [1]. In 1972, seven years before the first major world oil crisis, Alex Gordon, the former RIBA president, initiated the long-life, loose-fit, low-energy movement. It was an approach promoted for building design to accommodate the needs of the future. The term 'sustainability' was not commonly used at that time, as it was before the publication of the Brundtland Report, and long-life was the term used to deliver such a concept together with the terms also current of flexibility and energy efficiency. The philosophical basis of Gordon's 3Ls principle was that [2] *"it would be ecologically beneficial to erect buildings which last, which are designed in a way to remain adaptable for changed uses and which use little energy in their operation."* A flow chart for long-term sustainability concepts to be discussed in this chapter is shown in Figure 3.1.

Whether in the context of new or existing buildings, it is important to recognize that achieving sustainability is about continuous improvement that deals with a variety of construction processes and different aspects of lifecycles for delivering more sustainable buildings. It accounts for environmental, social and economic considerations for every stage of building development from the decision to build, the finding of a site, the gathering of material and resources, the specification, design, construction, operation, occupancy, refurbish/re-use and demolition.

Non-renewable resources are finite and new buildings consume both renewable and non-renewable resources, which consequently causes excessive environmental impacts. The sustainability of buildings can be better maximised when re-use and refurbishment are considered as part of the required and repeated cycle throughout a building's service lifetime. As discussed in the previous chapter, the existing building stock represents the largest financial, physical and cultural asset in the built environment. The aim is to maximise the efficient use of existing buildings through maintenance or refurbishment to enhance their

performances, their abilities to adapt to changes and so to extend their total life endurances.

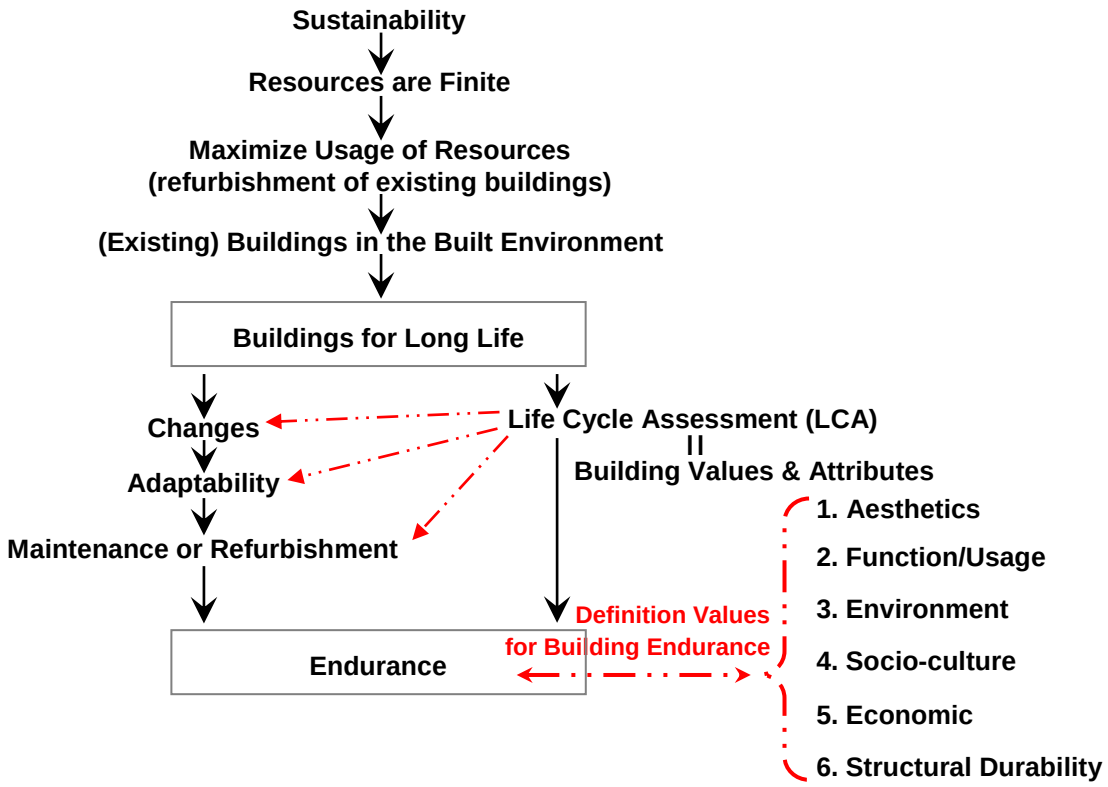


Figure 3.1. Long-term sustainability flow chart.

3.2 Building Endurance

To consider designing a building for long life means to maximise the lifespan of not only the physical elements of the building itself, but also the non-physical attributes acquired by a building throughout the course of its lifetime. It is commonly said that the built environment reflects the current condition of a society, but it must also reflect a society's future which requires buildings to be designed or refurbished to adapt; to change and evolve over time. Buildings and their associated features exist within a number of different "environments", including natural, and social and cultural, and consequently have significant impacts within various building assessment categories. The impacts that arise from a building also depend on the surrounding site and its contextual conditions, in terms of climate, natural environment, history, society, community and individual users. *"If a building doesn't support change and reuse, you have only an illusion of sustainability. You may have excellent building orientation and other energy-saving systems, but the building must also be able to be flexible to meet a change in curriculum"* [3].

Building endurance was proposed as the central theme in addressing this long-life concept for enhancing the sustainability of the built environment. Endurance is *"the state or fact of preserving"*; it is also *"the act, quality or power of withstanding hardship or stress and continuing existence"* [4]. According to the *Concise Oxford English Dictionary* [5], "endure"

means to *remain in existence*; thus, *endurance* is defined in this study to be the ability or strength to continue or last as applied to individual buildings and the built environments in which they exist. If a building is designed with long life as a key consideration then it is more likely to endure. However, the concept of building for long life is not necessarily limited to the longevity of the physical components that make up the building. It is obvious that in order for a building to endure that first it must be capable of surviving physically, i.e. its structure and systems must be resistant to the various agents that cause deterioration of its structural integrity, material strength and the quality of its appearance. However, the longevity of the building may also be at risk from other, non-physical agents such as the expiration of its aesthetic appreciation by the public, or its failure to satisfy current needs functionally, structurally or even economically. All these agents may lead the building to require necessary maintenance, redistribution of internal structures and spaces or demolition and replacement. As discussed in previous chapters, users' perceptions and aesthetic appreciation of a building have an important role in the process of achieving a successful building. As Japanese architect Shigeru Ban suggests, *"permanence is not a matter of the materials you use, permanence is whether people love your building"* [6]. This concept is especially important when dealing with refurbishment projects of existing buildings, if a building is not loved by the general public the effort of saving the building would not be much appreciated. This hypothesis is to be expressed further through the refurbishment case studies in the following chapter.

Various issues and factors can contribute to the determination of a building's performance and its capability to endure for a long service life. They are all related and could together be a motivation or opportunity for considering the attributes of buildings over longer time periods and to foster continuous improvement of new and existing buildings.

3.3 Building Changes

Although it was said that [7] *"one of the most ancient commonplaces of architecture is that buildings persist in time"*, in reality, no building stands forever, eventually they all fall down or are demolished under different circumstances. Most buildings undergo a variety of changes and/or cycles during their service lifetimes; for example due to natural causes, the effects of weathering or the decay of materials; artificial man-made adjustments to adapt it to changed uses and other necessary replacement and refurbishment works. Buildings, or works of architecture, need to be allowed to develop over time, to mature, grow and evolve to acquire the qualities and values derived from age, patina, accidents of history and other effects of time.

Those changes that happen to a building throughout the different phases of its lifetime may modify and reshape the condition of the building. Buildings gain meaning and value through use and their existence within a society, they behave in different ways in response to

the passage of time. Dutch architect, Herman Hertzberger, argues that *"the point is to arrive at an architecture that, when users decide to put it to different uses than the one originally envisaged by the architect, does not get upset and consequently loose its identity"* [8]. The ability of a building to endure through the test of time and continue to remain in existence and function depends on how well the building responds or adapts to those changes and whether such changes/interventions enhance or decrease the overall value or appreciation of the building. As stated in the IEA report [9] concerning buildings designed for adaptability, *"unless a building is capable of responding to changing circumstances, it is vulnerable to becoming poorly utilized, prematurely obsolete and unable to accommodate new, more efficient technologies ".*

3.4 Adaptability, Maintenance, or Refurbishment for Building Endurance

There are many terms used to describe the improvement works or interventions acting upon a building to adjust, reuse or upgrade its existing conditions for satisfying new requirements or changes of use. Douglas [10] explained the primary differences between adaptation and maintenance as in Table 3.1.

Table 3.1. Primary differences between adaptation and maintenance [12].

Intervention	Nature	Purpose
Adaptation	**Medium** to large-scale work (e.g. change of use) to part or the whole of a building, done intermittently, over long periods. **Involves** substantive adjustments and alterations	To improve or modify a building's performance. To satisfy changing user or legal requirements. To change a building's use. To enhance a building's value. To enhance a building's image.
Maintenance	**Small**-scale work to a building (e.g. cleaning out roof gutters or repainting external woodwork), done regularly or almost continuously, over both short and long periods. **May** involve some beneficial improvements.	To preserve the physical condition of the building. To sustain the value of the building. To provide a satisfactory internal environment. To comply with statutory requirements. To retain a building's image.

The word "adapt" means to *make suitable for a new use or purpose, or become adjusted to new condition* [11]. An adaptable building has the ability to allow future changes to be made easily and with minimum expense to meet the evolving needs of its occupants and society. In the context of this research, adaptability refers to the capacity of a building to accommodate various changes over the course of its lifetime. Changes are inevitable and multi-dimensional; a building that is more adaptable to changes over time could be more efficiently utilized and is more likely to endure with a longer service lifetime. Buildings are not static in terms of either their uses or their conditions, and so adaptability is also about

responding to and implementing changes in both the physical and the non-physical attributes of an existing building.

To “maintain” means *to cause or to enable a condition to continue*, often it means to *keep in good condition by checking or repairing it regularly* [13]. Maintenance used in this research refers to any upgrading interventions made to an existing building through human creations to both the physical and non-physical attributes of a building. It means to keep the building in a repaired condition, including both the functional and visual aspects, so that it may continue to serve the needs of the owner and occupants for a longer lifetime. As addressed in Douglas’ table, *“maintenance may involve some beneficial improvements”*. For instance, the maintenance or upgrading of a building in response to required changes for improving the building performance to allow continued usage could provide positive socio-cultural added value to the building through a change of function that addresses community needs. However, this maintenance work may also have a negative impact concerning the building’s financial value in making profit or sufficient income. Consequently, maintenance work must take into account the building’s capacity to adapt and respond to the changes made through the upgrading process to ensure an overall positive and well-balanced improvement to include its physical, environmental and economic performances, as well as the added values that may ensue to building aspects such as the community’s perceptions of its socio-cultural and aesthetic values.

To “refurbish” is defined [14] as meaning to *renovate and redecorate*. At a basic level, to refurbish something is to give it a facelift or a refit to enhance its appearance. In the context of a building, refurbishment primarily involves extensive maintenance and repairs as well as some improvements to bring it up to a modern standard. In this research, refurbishment is used as an overarching term to include any types of intervention not only the physical works done on the building but also the non-physical adjustments made for the building to adapt to various aspect of changes. When referring to the existing buildings in the built environment, refurbishment addresses the continuous utilization of any existing structure with necessary maintenance works to improve its physical conditions and any adaptive adjustments for the building to continue endure for future service.

3.5 Building Value and its Context

The built environment must be able to adapt to the contexts within which it exists, whether it be on the level of interaction with human society or the natural environment. In English Heritage’s Conservation Principles [15], the contribution made by setting and context was set out as one of the eight processes for assessing the heritage significance of a place. According to the guidance [16], ‘context’ “*embraces any relationship between a place and other places. It can be, for example, cultural, intellectual, spatial or functional, so any one place can have a*

multi-layered context. The range of contextual relationships of a place will normally emerge from an understanding of its origins and evolution. Understanding context is particularly relevant to assessing whether a place has greater value for being part of a larger entity, or sharing characteristics with other places." A building or piece of architecture constantly is affected and informed by its relationships with the urban context within which it exists. For example it will have a strong visual relationship to its surrounding environment and generally will be seen and evaluated as a part of the complete visual panorama.

Culture, history, social conditions and aesthetic appreciation are all essential components of change that occur through time. It is through the creation, construction and use of buildings that such components change and are expressed, not as museum pieces. The British architect, Cedric Price stated: "*value cannot be stored and contained in a particular place as building, cage or museum, because values change and therefore their environment should transform itself as well*". In the speech given by Simon Thurley, chief executive of English Heritage (EH), EH's conservation philosophy was codified into a set of principles which were based on a basic premise that places/buildings should be managed to sustain significance and that understanding the values of places/buildings is vital. It states that [17] *"to understand the significance of any place, whether it is a building, an archaeological landscape, or an urban conservation area, it is necessary to establish its value to society. The value comprises both the relative value of its individual components and the value of the whole in relation to other places"*.

Time and change have to be included when considering the issue of building endurance and aesthetic appreciation surviving into the future. This goes beyond the notion of adaptability as creating flexibility of use to include the possible rearrangement and adaptation of an individual building to its surrounding environments. It has to be considered that change may be a significant part of the process of preservation. A building must be able to relate to different facets or conditions within its surroundings whether they be natural or built environments.

3.5.1 Changes over a building's lifetime

Identifying and accounting for so many potential changes and agents which may or may not affect a building's performance presents a complex challenge when assessing the potential for an existing building to endure. The development of a tool or decision aid is required to help facilitate the evaluation and decision making processes. The intention of such a tool should be to provide a platform for allowing various issues and changes to be compared easily and considered simultaneously when changes or interventions are to be made to different aspects of a building.

Such an evaluation tool should consider the potential economic, cultural, historical, social and aesthetic values incorporated within the building after each phase of changes or interventions made throughout the building's lifetime. Figure 3.2, was derived by the author to

illustrate the possible phases of changes or interventions that could occur to a building during its periods of occupancy. A performance evaluation stage was also included as this most likely would be required after changes or interventions occur and decisions need to be made as to whether its future endurance is appropriate based on the building's current condition. The closed-loop cycle suggests that more than one phase of change or intervention could occur together with necessary performance evaluation processes to not only sufficiently re-utilize the existing building but also to ascertain the long-term performance of a building's condition after each phase of change or intervention.

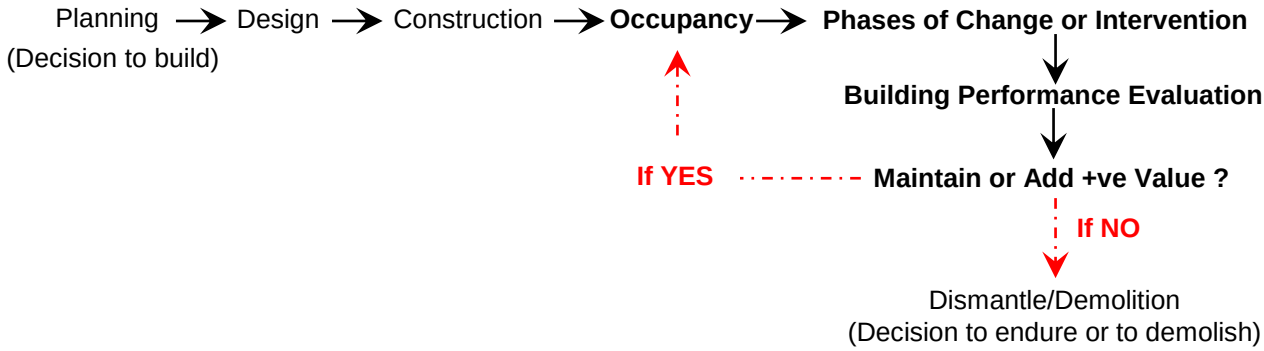


Figure 3.2. Closed-loop building cycle including potential phases of change or intervention with stage of performance evaluation.

Figure 3.3, derived by the author, is a phase module diagram that attempts to illustrate visually the various changes (arrows on each value axis) that may occur to a building through different phases of its lifetime with the resulting effects being positioned in either a positive or negative value zone. A series of phase module diagrams occurring on a horizontal timeline axis would provide an easily assimilated understanding of the effects of historical changes and the potential future effects of changes or intervention currently being considered. The notion of the phase module diagram has been developed through literature reviews, examination of current available sustainable assessment tools. It has been refined through observations of existing and in progress refurbishment projects, which are to be further discussed in more detail in the next following case studies chapter. Six aspects of building performance were identified as (i) structure; (ii) function; (iii) economic; (ix) environment; (x) socio-cultural and (xi) aesthetics.

Changes in a building occur through a variety of influences which can be categorised in many different ways; for example, in terms of either external or internal factors, physical and non-physical components, or the tangible and intangible values applied to the building. Changes acting on the building in each of the six value aspects are illustrated using either red or the blue arrows placed on top of the relative value aspect axes, where the red arrows indicate that negative value is added to this specific building value from changes made to the

building in this phase of the building's lifetime, and the blue arrows represent the positive added value. When several value aspects (indicated by black X sign on each axis) fall into the negative value zone (red), or pass through the dismantle surface to the black zone, a decision to demolish the building may be suggested as a more efficient solution for managing this particular existing building. However and in contrast to the previous assessment, the scenario illustrated in Figure 3.3, shows that the aesthetic qualities of this existing building's appearance are assessed to be at the maximal value boundary, because the building is highly appreciated by the local community aesthetically, say. Under such circumstances the owners/users of the building may be willing to change its usages and to adapt and renew the existing building condition to prevent the demolition of the structure.

One phase module for illustrating changes and interventions act on a building over phases of its complete lifetime.

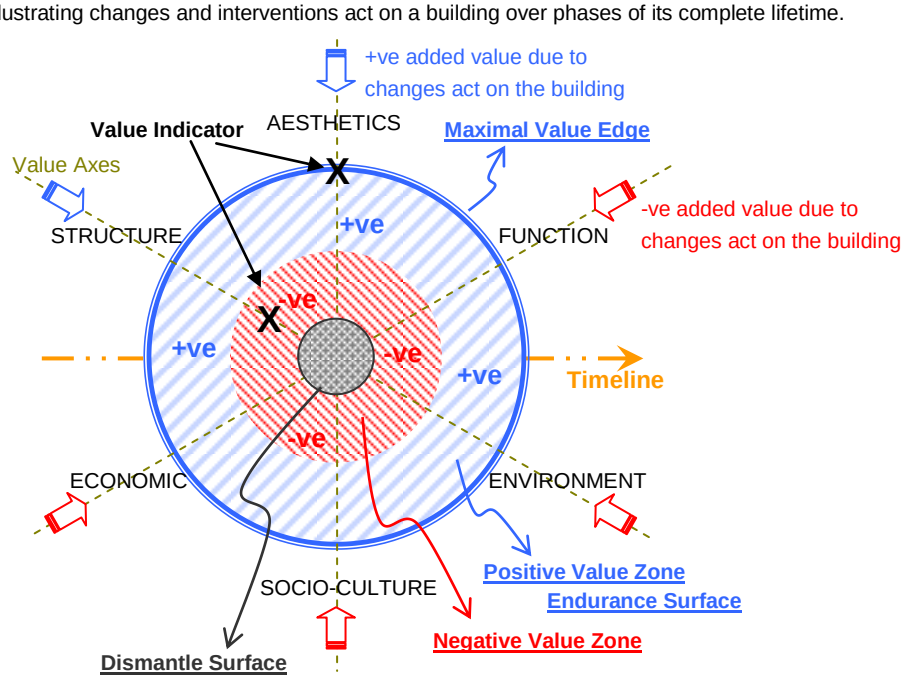


Figure 3.3. Phase module diagram for assessing the endurance ability of an existing building.

The phase module diagram was developed in an attempt to suggest a visual tool that could be utilized in the decision making process for refurbishment projects concerning whether an existing building should be refurbished or demolished. The various building aspect values and attributes involved in a decision making process that assesses the feasibility of refurbishment could be evaluated and compared utilizing different module diagrams to illustrate different phase conditions throughout a building's lifetime. This suggests that a tool, which allows simultaneously the comparison and consideration of various changes and their resulting impacts on all aspects of the building, is necessary in order to provide a more holistic response to providing solutions for the purpose of extending the usage and lifetime of an existing building.

3.5.2 Building lifespan and rate of change

The service lifespan between each phase of the changes or interventions that may occur in a building depends on the type of building. Generally, the level and the required frequency of the changes or upgrades occurring to a building, either externally or internally, cannot be accurately foreseen or assured.

The function of the building, the durability of the structure and materials, the frequency of the usage, the period of maintenance and repair, the building's appreciation level from the local community, etc., can require different rates of changes. Figure 3.4 lists the typical life-spans and rates of change for the major building components and usage aspects based on two sets of references for office buildings [18] and houses [19]. The typical rates of change occurring are compared for the same building components and functions for the two different building types.

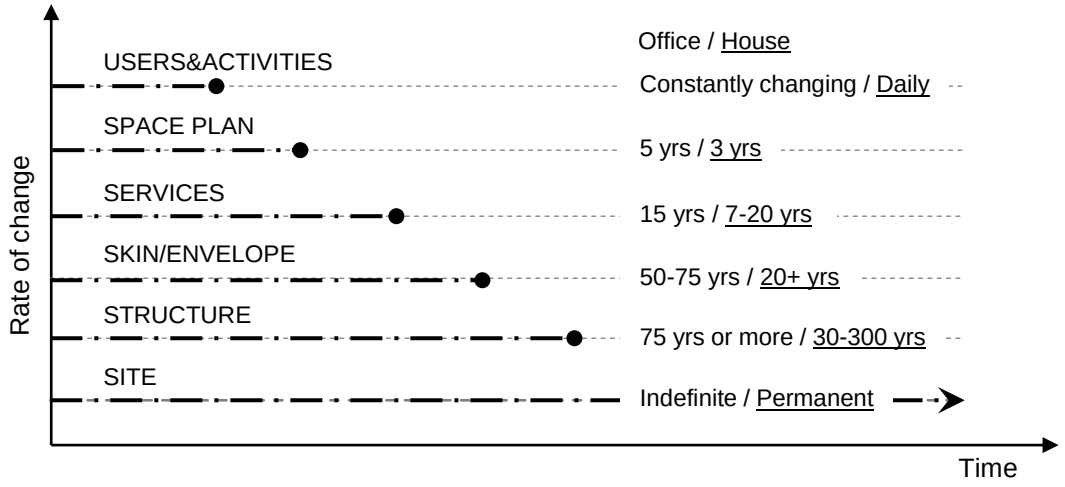


Figure 3.4. Typical lifespan and rate of change of the major building components for building with office and housing function [x, y].

3.5.3 Life Cycle Concept

According to the IEA core report on "Life Cycle Assessment Methods for Buildings" [20], *LCA* is *a technique for assessing the environmental aspects and potential impacts throughout a product's life, from raw material acquisition through production, use and disposal*. The LCA tool is applied to buildings to determine first the environmental profiles of building materials and so leading to an assessment of the environmental impact of the building itself. The technique involves compiling an inventory of relevant inputs and outputs for a clearly defined system, and then evaluating the potential environmental impacts associated with those inputs and outputs. Although primarily developed to address the environmental aspects of a building, the concept of life cycle assessment was adopted in this research to evaluate changes in all six aspects of a building's performance including the environmental attributes over the course of its service lifetime.

When assessing each change or intervention phase throughout a building's lifetime, both the actual inputs (changes that act on the building), and the resulting outputs (the impact that each change has on other aspects of the building), as well as their relative cause-and-effect relations may be considered simultaneously. It is always possible that some changes or interventions purposely made to improve certain aspects of a building's performance may unintentionally cause negative impact to other value aspects of the building. For instance, in considering the natural changes that may occur to a building through different phases of its lifetime, the decaying of a building's internal structure due to climate changes or natural disasters could decrease the building's structural integrity which then leads to failure of it's structural endurance and as a consequence the use of the building is abandoned causing the necessity for demolition. However, the weathering effect that natural environments have on a building's external appearance may aesthetically added positive value to the building and consequently lead the decision maker to adjust the structural problem to allow the building's potential endurance and continued usage due to people's high appreciation of the aesthetically weathered façade. As addressed in the report of "Assessing Buildings for Adaptability" [21]: *Aesthetically pleasing, long-lasting buildings can be so enjoyable that people will adapt their needs to the existing form of the building, rather*

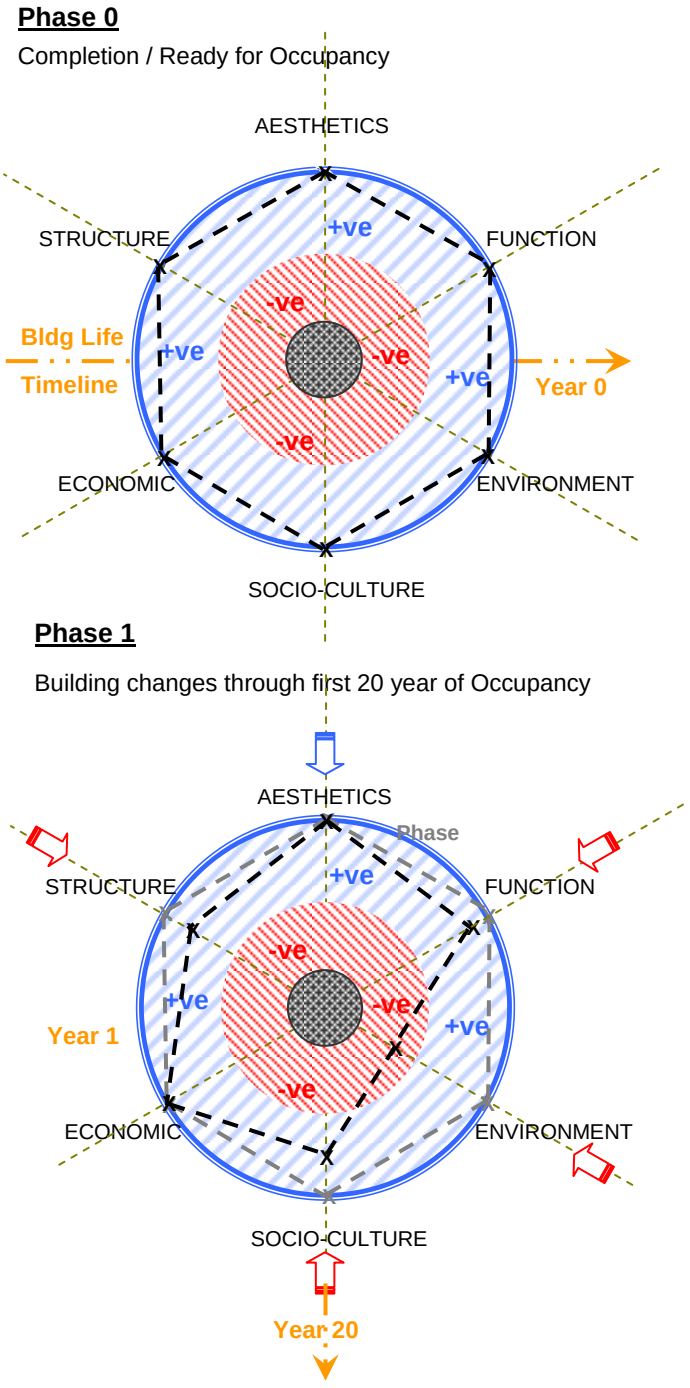


Figure 3.5. Simulation of building lifetime phase modules.

than renovate or demolish the structure. This extends building life and improves the use of space in a similar manner to adaptable designs (as make changes to the building). It is important to recognize the cause-and-effect relations, both positive and negative, between changes and interventions done to the different value aspects to ensure the overall building value and performance quality throughout each phase of changes.

3.5.4 Simulation of changes or interventions throughout phases of a building's lifetime

Utilizing the phase module diagram developed in figure 3.3, four sequential phase modules were put together in figure 3.5 to simulate a complete building lifetime scenario. Phase 0 represents the ready for occupancy stage after the completion of building construction. When the building is first completed, all six values are assumed to fall closed to the optimal value edge.

The phase 1 module was derived to simulate a building condition after 20 years of occupancy where changes occurred to the building either naturally through the effects of weathering which increased the aesthetic quality of the building façade, physically due to the wear of the internal building components resulting in the decreased value of building

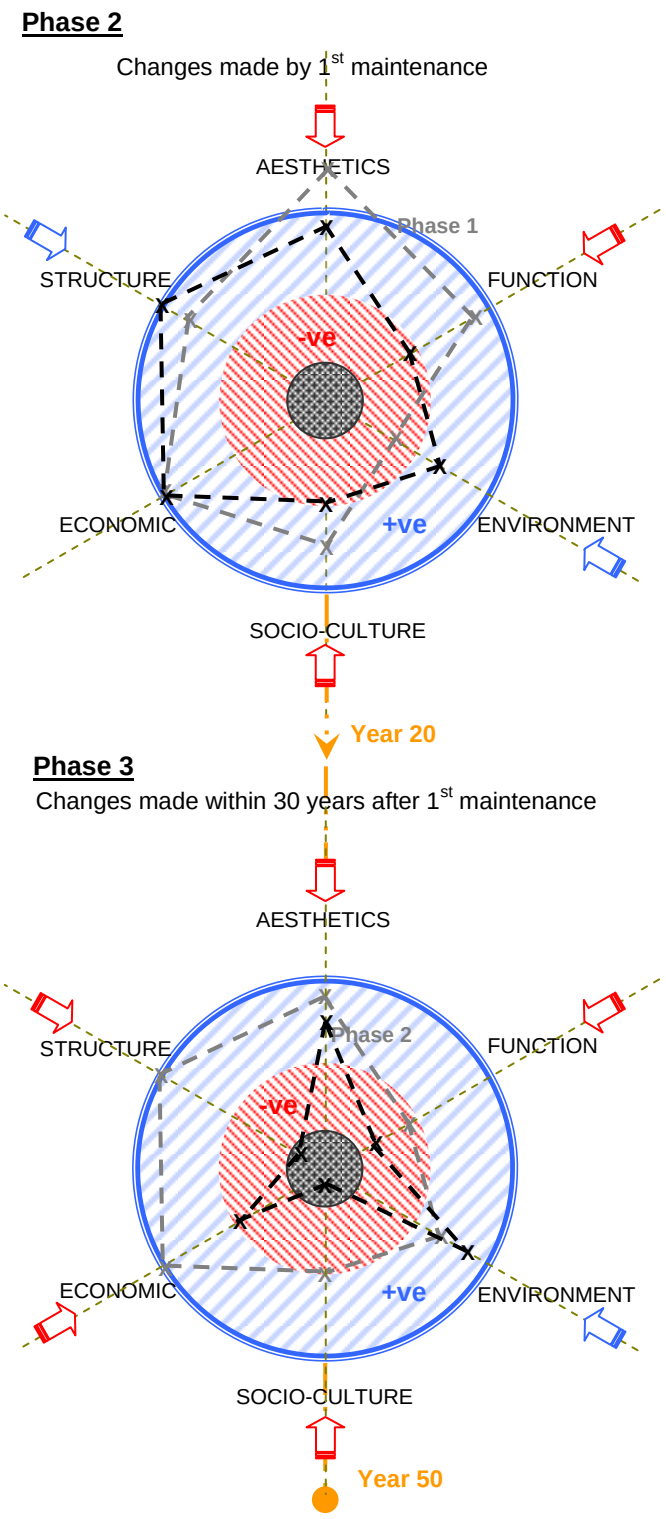


Figure 3.5. Simulation of building lifetime phase modules.

structure, or introduced changes in building services that generated negative impact on the functional value. It is possible that during these 20 years of occupancy, the building dramatically degraded the surrounding environment because of the lack of environmental impact consideration at the planning stage of the building design. A slight decrease in the socio-culture value could have arisen from the shortage of public space for the local community.

After these 20 years of occupancy with various positive and negative changes made to the building, the first cycle of maintenance was carried out in response to those changes and in an attempt to improve the current building condition and quality to allow the building to continue to serve and endure effectively into the next phase of its lifetime. Changes made to the building through maintenance works could sometimes added positive value to one aspect but caused negative changes to another aspect, for instance, efforts made to strengthen the building structure may cause a decrease of the efficiency in building function due to the extra space required for the structural purpose, as shown in phase 2. Similarly, in order to adapt to the changing of climate and to take into account of the different environments a building may experience through its lifetime, the building must be repaired or refurbished to ensure that it is able to withstand those changes. In attempts to decrease the negative impact the building has on the environment, solar shadings could be added to the exterior envelop of the building to reduce the unnecessary heat gains inside the building. Although this justification could bring positive added value to the building concerning its environmental performance, the visual changes made to the building façade may not be appreciated by the user and so decrease the aesthetic value and appreciation of the building.

Phase 3 illustrates changes that may have occurred to the building during another 30 years of occupancy after the first maintenance work in year 20th (phase 2). By this time, the building has reached its 50th year of service lifetime, a major deterioration has happened to the building structure due to some natural or man-made disaster occurring at the site. For example, the construction of a high-rise apartment complex in the nearby neighbourhood has cause a deterioration of the soil stability on the building site which has caused various cracks on the internal concrete structure of the building. Several parts of the building structure could no longer conform to the current structural building regulations. Considering the socio-cultural performance of the building, 50 years after its first completion, due to the change of local community and society structure, the building could no longer sustain current user and community requirements which caused its socio-cultural value to fall through the dismantle surface. After these 50 years of occupancy, the building is in the condition where various aspects have reached the dismantle or negative value zone, refurbishment works to bring the building completely up to current standards would require a significant amount of replacement works and budget. Although several other aspects of the building still demonstrate its ability to

endure, decision makers may decide to dismantle the building based on the weak structural value and substantial refurbishment costs.

The phase module diagram has been shown to have a useful function in illustrating and comparing the effects of changes occurring in key aspects of the assessment of the value perception of a building and how investing in further changes might affect the future value perception. The effects of time and of potential decisions to introduce change can be viewed holistically in one diagram.

The principal challenge is to develop indicators and methodologies for the long-term management of the building stocks that takes account of their cultural values as perceived by the local society, their innate architectural qualities generated and acquired through time and their relation to surrounding environment.

3.6 UK Process for Listing Buildings

In the UK a mechanism exists for a building to be listed to indicate its special architectural and historic interest, and to ensure that some thought will be given to its future during the planning process. The listing of buildings is intended to help society acknowledge, understand and celebrate its shared history. Statistics from English Heritage (EH website) state that in England 2.5% of all listed buildings are listed as Grade I and are considered to be of exceptional interest, sometimes of international importance. Grade II* buildings make up 5.5% of all listed buildings and are defined as particularly important buildings of more than special interest. Finally, 92% of all listed buildings are designated Grade II buildings and are considered nationally important and of special interest. Grade II is the most likely grade of listing for a home owner.

The statistics from the English Heritage website state that the likelihood of a building being listed depends mostly on its age, with older buildings being more likely to be listed. All buildings built before 1700 which survive in anything like their original condition are listed, as are most of those built between 1700 and 1840. The criteria for listing become more stringent as their age decreases, so that post-1945 buildings have to be exceptionally important to be listed. A building has normally to be over 30 years old to be eligible for listing. Of the total number of listed buildings in the UK, 38% are domestic dwellings; 15% date from before 1600, nearly 20% date from the 17th century, 31% from the 18th century, 32% from the 19th century, 3% from 1900-1944 and 0.2% from 1945 or later. This focus on older buildings would seem to act to the detriment of examples of more modern architecture. Consequently, the question often arises as to how old a building should be to have historical, cultural or social value.

3.6.1 How old does a building have to be to be eligible for listing?

A recent one day conference entitled “Mending Modernism”, sponsored by English Heritage, considered this issue. During the one-day conference “Mending Modernism” [22]

Simon Thurley, Chief Executive of English Heritage, asserted that the conservation of post war buildings (post 1945) was currently the most controversial and difficult area in English conservation practice. The problems related to this issue caused English Heritage to re-examine and translate its conservation philosophy into a set of understandable principles based "*on a basic premise that places should be managed to sustain significance and that understanding the heritage values of places is vital*" [23].

Thurley [24] considered that to understand the significance of any heritage asset, it first was necessary to establish its value to society. It was asserted that the value should comprise both the relative value of a building asset's individual components and the value of the entire asset in relation to other places. However, Thurley considered that in order to overcome the "*individualistic, stylistic and dogmatic attitudes that tend to dominate and confuse arguments about conservation*", it was necessary to measure the significance of a heritage asset against a set of values that generally are held valid by society.

English heritage have proposed and adopted four "values" as the basis for evaluating the historic significance of a potential heritage asset:

Evidential value;	e.g., the physical record of innovative construction and materials in buildings
Historical value;	e.g., being the first of its kind, or that it is illustrative of a pivotal point in history, or a building that is associated with particular events
Aesthetic value;	e.g., places with rigorous design values, and
Communal value;	e.g., places such as the post-1945 town centre layouts that promoted the social value of pedestrian shopping areas and integrated parking; or experiments in social housing.

Thurley conceded that these were not the only the values that could be used to assess the significance of heritage assets, but he proposed that they were the ones that encapsulated heritage value and that they could be applied to judge the significance of any development, from any period, presumably including examples of modern buildings. However, he suggested also that "*Other values such as utility, economy and environmental sustainability sometimes may also be employed and may at some stage in the planning process have to be weighed against heritage value*."

It was Thurley's view [25] that the listing criteria for Modernist buildings were much tougher than say for any building built before 1800, for example. Buildings constructed before 1800 that are close to their original states and of average quality generally will qualify for listing. However modernist buildings, and by logical assumption any building constructed post-1945, have to demonstrate that their significance is unusually high. He asserted that the

consequence of this was that listed buildings from this period generally were the exceptional only and not just the ordinary products of their age.

During his presentation [26], Thurley considered the case study of an application for consent for the demolition and redevelopment of the grade II listed Southside Hall of Residence built for Imperial College by Richard Sheppard, Robson and Partners between 1960 and 1968. This development had been listed because of the manner in which the architects had fused the principles of Le Corbusier to the principles of the "Oxbridge staircase" to develop a new style of university architecture. However, Imperial College argued that from the start the student accommodation had demonstrated serious design, technical and functional flaws and that to retain them in their present form, or after considerable remodelling, could be questioned, in terms both of functionality and economics.

Although the halls of residence were considered to provide an example of an exceptional building with high significance, high evidential and historical value its demolition was agreed. Thurley justified this decision on the basis that ultimately the planning system embodies more than heritage significance and other factors are involved in decision making. The UK government's planning guidance PPG15 [27] requires the application of two tests against which a proposal to demolish must be assessed. They are:

(i). consideration of the condition of the building and the cost of repairing and maintaining it in relation to its importance and the value derived from its continual use; and

(ii). the adequacy of efforts made to retain the building in use;

If these two conditions suggest that the feasibility of conservation is low in terms of economics or a future useful function for the building, the merits of alternative proposals for the site have to be considered.

Thurley concluded that [28] "*Modernist buildings do present special problems to conservationists*". However, he considered that if building conservation is to be a credible and constructive part of society that a conservation philosophy is required that embraces all building types and periods of construction.

At the same conference Elain Harwood, Senior Architectural Investigator for English Heritage, made a presentation entitled "Looking at Listing Criteria, Weighing up Value" [29]. In the presentation she stated that "*For a post-war building to be listed, it has to articulate its brief not only with elegance but carry its principles all the way through*". She noted that at the time of her presentation that in terms of post war buildings the lists included buildings of importance to the nation "*for the interest of their architectural design, decoration and craftsmanship*". The existing listed modern buildings were deemed to have been drawn from all styles of recent architecture, giving credit to those buildings that displayed imagination and ambition. Additionally, Harwood asserted that the intelligent treatment of functional

requirement was given special consideration, as was the dramatic treatment of space that could occur in modern buildings because of new materials and engineering techniques. Buildings that demonstrate technological innovation, as well as those associated with a significant historic 'first' were considered eligible for listing. In some cases buildings are listed where they contribute to an important architectural or historic group. It was stressed that the integrity of a building as a total design was a key consideration. Finally, a building with listed quality should possess a consistent idea that runs through its various components - its structure, plan, architectural form, materials, and services.

The presentations of Thurley and Hurley introduced important issues for consideration in terms of the listing of modern buildings but these also exposed some issues that relate to the decision making process in general. The "four values" adopted by English Heritage to assess the historical significance of existing buildings included the historical, aesthetic and communal values. However, it has to be questioned as to whether processes exist that allow these assessments to be made objectively. For example, whose aesthetic judgement and whose notion of communal value are to be used for such assessments.

3.6.2 Linking Heritage to the notions of regeneration and economic development

In the forward to the UK Government "Heritage Protection for the 21st Century" White Paper [30] the Rt. Hon. Tessa Jowell, MP, Secretary of State for Culture, Media and Sport and Alun Pugh, AM, Minister for Culture, Welsh Language and Sport write that "*The historic environment matters to all of us. It tells us about who we are and where we have come from. It gives identity to our villages, towns and cities. It has shaped the distinctive character of our countryside……..People want a heritage protection system that is simple to understand and to use. They want a more open system that enables individuals and communities to make their voice heard. And they want a clearer role for the heritage in wider policy – they want to see the historic environment at the heart of planning, of regeneration, of environmental stewardship, and of building sustainable communities.*"

The proposals in the White paper were based on three core principles [31]:

- Developing a unified approach to the historic environment;
- Maximising opportunities for the inclusion and involvement of the local community; and
- Supporting sustainable communities by putting the historic environment at the heart of an effective planning system.

Additionally, it was suggested that although a key strength of the historic environment was its "*depth and diversity*", this diversity had led to unhelpful distinctions and divisions; for example between buildings and archaeological remains, or between heritage in the urban and rural environments. The current procedures for designating buildings for listing were stated as

being perceived as complicated, difficult to understand and bureaucratic. A lack of integration of heritage issues into planning procedures may mean that they fail to be considered sufficiently in wider development debates.

It was suggested that the heritage protection system was seen as something designed to meet the needs of professionals rather than users. Consequently, it was proposed that a heritage protection system should encourage the involvement of the public in decisions on protection by being accessible and easily understood. The white paper suggested that the following should occur for this to be achieved:

- The designation system should allow more consultation and scrutiny and should promote debate on what should be protected in future.
- The public should be better informed as to why things are protected and about how to use the system to provide that protection.
- Local authorities and local communities should be encouraged to identify and protect their local heritage.
- Easy public access to information about the historic environment that surrounds them should be ensured.

A key aspect of the White Paper [32] was the belief that that heritage protection could enhance the achievement of sustainable communities by providing a focus for regeneration and economic development by ensuring the sustainable use of resources.

It would appear that much thought and consideration has occurred in the UK regarding the re-use and conservation of existing buildings. How this process is used in the context of the building listing when disputes occur between different parties, e.g. the architectural professions and local authorities has been brought into focus by the Building Design Campaign for the listing of the Robin Hood Gardens apartments in the London Borough of Tower Hamlets and the decision making process undertaken by English Heritage. This will be considered in more detail in the case studies in Chapter 5.

3.7 Aesthetic Changes Made Through Time & the Appreciation of the Decay

It has been proposed, that the effects of changes made to a building either deliberately or by nature through time should be considered when assessing human aesthetic appreciation of the environment. It is reasonable to expect that this appreciation is not fixed and does not stay constant. Human responses endure, reshape, verify and develop based on what they perceive an object to represent and in response to a moment of time. The potential changes that can occur through time may not only alter a building's appearance but may also have an impact on human response to it. As stated by Leatherbarrow and Mostafavi [33], *"weathering is a process that can productively modify a building over time"*, a building's decay, visual marks

from environmental wear and tear, maintenance done by the occupants could all potentially change its visual aesthetic quality and cause a different appreciation from a perceiver.

Refurbishment or regeneration of a building or a part of the built environment may not be limited to the act of cleaning up the façade or dismantling parts and replacing them with a brand new façade or structure. Refurbishing a building or conserving a part of an existing building, for example the building's envelop, means making use of the existing and taking into account the different phases of a building's lifetime which could coexist to represent the process of transformation through time. As Kevin Lynch [34] stated in his discussion about time and conservation, *"I propose to enlarge the choices among ways of structuring time. Different people would like to feel time passing at different rates; some want to live in the future, some in the past; they prefer to package their days in different ways"*. These layers of building appearances related to phases of passing time are thought to be desired in creating diversity within the built environment. The notion and importance of aesthetic value related to changes induced by the "passing of time" is illustrated by two case studies from Taiwan that demonstrate an extension of the view of the aesthetic qualities of buildings into the phases of decay.

3.8 The Extension of Aesthetic Appreciation through Time and Decay

In Chinese legend, an animal exists that is called "the four unlike" with the head of a deer, back of a camel, tail of a donkey and legs of a cow. The Haian road in Tainan city, south of Taiwan, is considered by local inhabitants to resemble spatially such an animal and has been regarded as an urban "hybrid creature". This lack of ordered structure and mixture of different conditions, history, and physical phases of various buildings and infrastructures has given Haian road a distinct flavour and inspired several interesting projects concerning the aesthetic quality and appreciation of the built environment.

Haian Road has always been a critical urban space throughout the history of Tainan. In 1991, the Tainan city government commenced a construction project based on this 40 metre wide road with a proposed scheme for an underground shopping street and car parking in an attempt to utilise Haian street as a driving force to transform this old urban district within Tainan city. When the project was first proposed, the city government ignored both the criticism voiced by academics and concerns from the local citizen groups and insisted on proceeding with the project. Four years after its initiation and until the year 2002, the project suffered a series of engineering errors, building collapses, financial crises and a corruption scandal and finally failure. Consequently, this newly completed two-storey deep and 800-metre long underground space was sealed off, with only the street level being left (or nearly abandoned) and used for traffic access only. In order to allow this extensive construction of over 816 metres of underground passages, many traditional share-wall houses

were demolished, carelessly destroyed to provide the necessary space and land area for the road expansion, as shown in figure 5. This inconsiderate and many would say unlawful behaviour by the city planners resulted in citizen's property rights being undermined, broken building facades and fragmented land lots, which in turn caused the street development to be delayed and eventually deserted. This chaotic situation aroused many citizens to make complaints. As a consequence, the bureau of city development of the Tainan municipal government launched the project, "Demonstration Project for the Beautification of Haian Road", encouraging local artists and academics to aesthetically refurbish and revitalise this broken urban landscape and social network.

Figure 3.6. The before, in progress and after photo of Haian road's expansion construction.

Ironically, this failure and physical fragmentation created a peculiar challenge and opportunity for the artists, designers, landscapers and architects who were involved in attempts to revitalize the residents' visual encounters with these derelict walls and their street experiences. One particularly interesting example was the approach to refurbishment carried out by artist/architect, Liu Kuo-Chang who re-presented the ruins and the past history of the street both visually and aesthetically, figure 3.7.

"The Memory of the Wall" by Kuo-Chang Liu and his Open Studio, utilized the concept of one point perspective and coloured the ruined walls with blue paint and white line drawings of interior settings, as they might have been before the demolition, to resemble a "blueprint" technical drawing. The resemblance of the "blueprint" drawing, traditionally used in engineering and construction, was taken as a metaphor to convey the concept that the work of refurbishment is "still in progress" and will continually proceed with changes made through time. As can be seen in figure 3.7, three pieces of half cut wooden beams remain within a destroyed share-wall house and were incorporated with furniture fragments collected from the demolish site, such as half the remains of a chair, a clock stopped at 7:26pm, a suitcase half opened and burned.

Figure 3.7. "Memory of the Wall" by Kuo-Chang Liu and Open Studio.

This display attempts to freeze the experience that an observer may have encountered with the wall in the time before the demolition and transfers them into the past. The metaphor of the blueprint with the use of the white lines and fragments was used to depict that which originally existed visually on the site. The changes made through time of both the tangible and intangible elements of the physical environment were transformed and expressed architecturally and artistically to the public view. This public art response to the devastated urban landscape achieved much public aesthetic appreciation, positive feedback and also strove to achieve public enthusiasm to participate in the following phases of public art-making elsewhere in the same location [35]. "The Memory of the Wall" has become both a local and tourist "sightseeing attraction".

Another thought provoking example of Liu's concept of appreciating the beauty of decay was demonstrated in his Tree House project in the Anping harbour area of Tainan. This old house had been a storage place for various merchants and companies next to what had once been a local port area. It had fallen into disuse and ruin and had become overwhelmed by a Banyan tree growing through it from the centre of the house. The Banyan tree was very strong and grew through cracks within the building structure which overtook and is still overtaking the house, see figure 3.8.

The building and it surrounding land were sold to the local city government, which held a design competition to invite refurbishment solutions for this historical structure. Most of the proposals suggested the removal of the Banyan tree and to preserve and refurbished the building structure with only intangible traces of the tree, such as through story telling or decoration. Liu approached the challenge from a very different perspective, where he acknowledged and respected the strength of the Banyan tree; he saw the tree not as a

“problem” but as an “opportunity” as the heart of this refurbishment project. In his concept, the strength of the Banyan tree was emphasized and framed by all the ruins and cracks that had occurred through time. The marks of decay, the changes made to the physical structure, the beauty of this aging process were the focus of his refurbishment solution.

This appreciation of the existing and the continuous changing state of the building stood out as the most convincing and desirable solution. Liu’s concept won the approval of both the public and city government to become the winning proposal. Subsequently, the house was refurbished by strengthening the roof structures in order to support the weight of the Banyan tree. A sky over-path was constructed through the building structure so that visitors could view the coexistence of the tree and the physical structure of the building as well as for observing the process of decay and the changes made to the structure through time.

Figure 3.8. “Tree House Project” by Kuo-Chang Liu and Open Studio.

The author found this different and perhaps extreme approach to the refurbishment of an existing structure through the appreciation of the decay and the realization the changes manifested through time extremely fascinating and exciting. The Tree House currently attracts thousands of tourists annually and throughout all four seasons. The structure never stops changing with the passing of time and its aesthetic qualities are believed to endure. The ultimate purpose of the refurbishment was to revitalize the existing, to continue the usage of a structure, and to provide new opportunity and new spirit for the structure. Liu’s approach has not only provided the building with a new function, it has also ascertained the structure’s ability

to continue its existence into the future and endure through changes that occur through time.

The aesthetic value of buildings stands out to be a critical guiding attribute concerning both the potential long-term aspect of sustainability and as a basic reasoning for the maintenance and management of existing buildings in the built environment. Scruton [36] in his discussion concerning objectivity in aesthetic judgment, highlighted the importance of the long-term aesthetic value and quality of a building considering that it may outlast the fickleness of fashion and the ravages of time. In the context of long building life the notion of aesthetic endurance becomes a key issues of the discussion. If a building is to continue to be used and last into the future with potential changes of its function or surrounding context, can its aesthetic value endure and continually be appreciated by different generations with different social expectations? Building for long life means that at some time in the future changes and modifications may occur. How much change can occur while still allowing the building to maintain its aesthetic value and for the architecture to continue to receive aesthetic appreciation from future generations?

However, the notion of aesthetic endurance and the need to assess the significance of the historical, aesthetic and communal values of existing buildings implies that an objective, transparent and socially inclusive assessment process is required for decisions about whether and how it might be refurbished. An important issue for consideration would be as to whose aesthetic judgement and whose notion of communal value should be used for such assessments. Subsequently, how can such aesthetic judgment be clearly understand and applied in attempt to assess those values regarding existing built environment?

The notion of long-term sustainability and building endurance developed in this chapter will be further discussed and investigated in the following chapter with refurbishment cases reviewed in Japan.

3.9 Reference

1. Rasmussen, S. E. (1959). *Experiencing Architecture.* MIT Press Cambridge, Mass.
2. Szokolay, S. V., & Brisbin, C. (2004). *Introduction to architectural science*. Oxford: M. A., Architectural Press.
3. Croxton, R. (2003). *Architectural Record*, August 2003, pg 147.
4. The American Heritage Dictionary of the English Language (4th ed.). (2006). Houghton Mifflin Company.
5. Concise Oxford English Dictionary on CD-ROM Version 1.0 (10th ed.). (2000). Oxford.: Oxford University Press.
6. McQuaid, M. (2003). *Shigeru Ban*. Phaidon, London, UK.
7. Leatherbarrow, D., & Mostafavi, M. (1993). *On Weathering: the life of buildings in time*, Cambridge, Mass.: MIT Press.
8. Hertzberger, H. (2005). Herman Hertzberger Lessons for students of architecture. 010 Publishers. Rotterdam.
9. Background Reports: Assessing Buildings for Adaptability. (2004). *Annex 31 Energy-Related Environmental Impact of Buildings*, Canada Mortgage and Housing Corporation.
10. Dogulas, James. (2002). *Building Adaptation*. Oxford: M.A., Reed Educational and Professional Publishing Ltd.
11. Ibid. 5.
12. Ibid. 9.
13. Ibid. 5.
14. Ibid.
15. *Conservation Principles, Policies and Guidance for the sustainable management of the historic environment*. (2008). English Heritage.
16. Ibid.
17. Thurley, Simon. (2006). The Constructive Approach to Conserving Modernist Buildings. *Mending Modernism*, An English Heritage One-day Conference, Royal College of Physicians Building, Regent's Park, 14th December 2006.
18. *BCO Guide*. (2000.) Battle, T., & Battle, R (eds.). The British Council for Offices.
19. Ibid. 10.
20. Core Reports: Life Cycle Assessment Method for Buildings. (2004). *Annex 31 Energy-Related Environmental Impact of Buildings*, Canada Mortgage and Housing Corporation.
21. Ibid. 9.
22. Ibid. 17.
23. Ibid.

24. Ibid.
25. Ibid.
26. Ibid.
27. *Planning Policy Guidance 15: Planning and the Historic Environment*. (September 1994). Department of the Environment, Department of National Heritage.
28. Ibid. 17.
29. Harwood, Elain. (2006). Looking at Listing Criteria, Weighing up Value. *Mending Modernism*, An English Heritage One-day Conference, Royal College of Physicians Building, Regent's Park, 14th December 2006.
30. *Heritage Protection for the 21st Century*. (March 2007). Department for Culture, Media and Sport. Welsh Assembly Government.
31. Ibid.
32. Ibid.
33. Leatherbarrow, David., & Mostafavi, Mohsen. (1993). *On Weathering: the life of buildings in time*, Cambridge, Mass.: MIT Press.
34. Lynch, Kevin. (1972). *What time is this place*, Cambridge, Mass.: MIT Press.
35. Tu, Jamei. (2008, May). Reinventing a Street by Arts. *Dialogue*, 124, Taipei, Taiwan.: Meei Jaw Publishing Co., Ltd., pp. 101-104.
36. Scruton, Roger. (2007). In search of the aesthetic. *British Journal of Aesthetics*, Vol.47, No.3, pp. 233-250.

3.10 Bibliography

1. *Regeneration and the Historic Environment*. (January 2005). English Heritage.

Draft Heritage Protection Bill. (April 2008). Secretary of State for Culture, Media and Sport.

4 Case Study

4.1 Refurbishment Case Studies

The notion of refurbishment in the existing built environment is continuously growing in Asia as a response to the loss of local identity and wisdom due to the rapid demolition of existing infrastructure, rapidly expanding populations demanding new buildings (Japan and Taiwan excepted), and the progression to uniformity caused by globalization and architectural imperialism. With the research location set in Japan, several refurbishment projects within Japan have been reviewed and investigated in order to gain a background understanding of the various issues and aspects involved in managing current existing built environments to promote building endurance and to ensure long-life usage of available resources.

4.2 Research Methodology

Refurbishment of existing buildings was suggested, in chapter 2, to be beneficial in sustaining the cultural structure and the diversity within a specific society. Contextual issues and backgrounds of an existing building are often the crucial factors in deciding whether or not that building is to be refurbished and how it could be refurbished. Hence, the initial research objective was to examine several refurbishment projects in designated locations to ascertain how various factors, either contextual or non-contextual, contributed in shaping individual case-study projects.

4.3. Qualitative Research

> *"Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them. Qualitative research involves the studied use and collection of a variety of empirical materials."*

Norman Denzin and Yvonne Lincoln [1], authors of a comprehensive three-volume handbook on qualitative research, offered the above definition. Within this definition four key components of qualitative research could be identified: (a) the natural settings represent the context that is being studied, (b) the understanding of how the respondents make sense of their own circumstances, (c) a focus on interpretation and meaning of the collected data, and (d) the use of multiple tactics .

Research regarding people and society often tries to understand the relationship between attitudes, opinions and the actual behaviours that people display. Qualitative research, is different from quantitative research in that it involves developing an in-depth understanding of human behaviour and the reasons behind such behaviour. Hence, qualitative research

methodologies were applied in this study to investigate the reasons and motivation behind the various aspects of each refurbishment case and to understand the actions, decisions and behaviours that arose as a consequence. Table 4.1 derived by the author illustrates some basic differences between qualitative and quantitative research methods.

Table 4.1. Difference between qualitative and quantitative research methods.

Qualitative	**Quantitative**
How & Why	What & When & Where
Focused & Small	Random & Large
Categorize data into patterns	Data is measurable and may be put into graphs or tables
Exploratory	Conclusive
Inductive process used to formulate a theory	Deductive process used to test a pre-specified hypotheses to derive a theory
Subjective	Objective
Text-based	Number-based
Unstructured or semi-structured response options	Fixed response options
More time spent during the analysis phase	More time spent on the planning phase

4.3.1 Induction strategy

Qualitative research often involves induction processes that are used to formulate a hypothesis related to specific subject matter. Induction is defined as the process of reasoning in which conclusions do not follow necessarily from the premises or evidence presented, even though the conclusions may support the premise. The process involves estimating the validity of observations of part of a group of facts as evidence for a proposition about the whole issue. Induction is the process of deriving general principles from particular facts or instances, generalisation. It is a process of theory building, developing generalisations from evidence.

For inductive reasoning, behaviours are observed and the consequent data is recorded without any preconceptions as to their relative importance. The investigative strategy involves four major procedures: (i) setting up a programme of investigation that is open-ended and attempts to collect data without preconceived notions; (ii) the analysis, comparison and classification of the obtained data without reference to a hypothesis or theory; and (iii) the derivation of patterns and generalisations of behaviour from the data providing a means to analyse relationship between attributes or aspects of behaviours; and last, (iv) the testing of the generalizations and patterns that have been derived through subsequent investigations to formulate theory of a specific subject matter.

Since the study was particularly interested in issues concerning refurbishment projects

and contextual information specific to the motivations leading to the choice of the refurbishment option, case studies of existing projects were examined using a number of qualitative research strategies and multiple sources data collection techniques. Collecting and assessing data related to social behaviours is difficult especially when comparisons are to be made across different case studies. A clearly stated and comprehensible definition of the overall research objective and methods for organizing the collection of data that are efficient and effective are required. The purpose of the data gathering activity, the type of data required and the most appropriate methods for data collection must be specified. A research progress chart, shown in Table 4.2, was developed to facilitate the investigation of selected refurbishment case study.

Initially, in the exploratory phase, it is useful to ask a series of questions to obtain a general understanding of the refurbishment subject and related to each individual case study. Questions regarding what is happening in this field of activity; the general themes, perspectives, patterns, and participants; the relationships and links between different variables could provide a general view for the research and identify or discover salient or important issues to help in generating hypotheses for the next research phase. Observation and multiple source data collection techniques with sufficient recording devices are also useful in this phase of research to help identify issues and variable of concern and to allow an understanding of what data should be collected.

Table 4.2. Research progress chart.

Induction procedures	(i) programme set up	(ii) analyse obtained data	(iii) derive patterns	(iv) test obtained patterns to formulate theory
	Explore ⟶	**Explain** ⟶	**Describe** ⟶	**Predict**
Study purpose	Investigate little understood phenomena Identify or discover important issues Generate hypotheses for further research	Investigate the causes of observed phenomena Identify plausible causal networks related to observed phenomena	Document phenomena of interest	Forecast events or behaviours Predict and assess outcomes of actions
Data collection techniques	Observation Interview Questionnaire Multi-source data collection	Observation Interview Questionnaire Document analysis General survey	Observation Interview Questionnaire Document analysis General survey	Large scale survey

Interviewing individuals from experts to laypersons is another effective research approach for exploring a yet, little understood subject. Interviewing has the advantage of being relatively quick to organise and carry out. It is flexible in terms of the location for the investigation and allows good control of the sample characteristics in terms of accessing a cross-section of the

public. The interview questions can be structured or unstructured, or a combination of both, to allow the free flow of information and provide the potential for obtaining unexpected useful data. Additionally, it provides the opportunity to clarify ambiguous or conflicting information. In the exploratory phase, an unstructured interview was proposed to allow open discussion with respondents concerning the subject of refurbishment and in terms of each selected case study.

For each of the selected refurbishment case studies, multiple sources of data were collected and the semi-structured interview technique was used as the major strategy for obtaining information concerning a specific project. An outline of major questions was set out and distributed to relevant interviewees before the actual interview. Where possible, the structured questions were posed to different groups of participants, e.g. local government officials, the current building user/owners, local residents and others. Additional open-ended discussion often followed after the structured questions were answered where the content was varied and based on the interests of the different groups of interviewees. Notes and tape recorders were utilized to aid the interview data collection process and the gathering of both structured and unstructured information. All the data were recorded initially in their native language and were later translated into English during the analysis stage.

4.3.2 Content analysis

Content analysis, according to Neuendorf [2] may be briefly defined as "*the systematic, objective, quantitative analysis of message characteristics*". It is thought to be the best approach for testing relationships within a basic communication model. Berelson [3] proposed five purposes for content analysis: *(a) to describe substance characteristics of message content, (b) to describe form characteristics of message content, (c) to make inferences to producers of content, (d) to make inferences to audiences of content, and (e) to determine the effects of content on the audience*. As indicated by Neuendorf [4], content analysis itself can "*only describe message characteristics or identify relationships among message characteristics, its methods are integral to a full understanding of human behaviour and hence essential to social and behavioural science*".

According to Weber [5], a central idea in content analysis is that the many words of the text may be classified into much fewer content categories. Each category may consist one, several, or many words. Words, phrases or other units of text classified in the same category are presumed to have similar meanings. During the case studies, specific investigation concerns were outlined for each project such as causes, key issues, motivations behind the decision to refurbish, and the participants and activities that comprised the projects. The objectives of the investigation were to ascertain relationships between each of the various aspects involved and to derive patterns for each refurbishment case study, so as to understand the contextual influences, particularly regarding obstacles to the development of

each of the projects.

After the initial exploration and data collection phase, document analysis procedures were used to compare and classify the data obtained in an attempt to derive patterns and generalisations from the behaviours recorded. Consequently, content analysis was devised in this research as a systematic procedure to examine the content of recorded information, and was used to extract comparable information and potential patterns across different refurbishment cases and across various contextual issues and social backgrounds.

Voice recordings together with photographs and multi-source documentations were found to be useful strategies when conducting cross-cultural research utilising data collection processes occurring in different languages. Voice recording and visual data collections became essential as information that needed to be translated before analysis and comparisons could be made.

Direct referencing or quoting are not made in relation to the interview aspects of the research. However, the sources of documentary data are addressed in the reference section at the end of this chapter. The information and data collected from meetings, interviews and various sources of documentation are analyzed and reported in paragraph and bullet point format throughout the following sections.

4.4. Case Study Setting

4.4.1. Japan - The general situation current in Japan

According to IEA the report [6], demolition rates are increasing throughout much of the developed world, and due to the artificially low costs of landfill disposal and incineration, much of the sold waste arising from these demolitions is not being recycled. The average age of a buildings in Tokyo is now 17 years, while in Germany, of the 60% of buildings that survived World War II, only 15% remain standing today.

The actual service life of buildings in Japan, according to Ikaga et al. [7], ranges from 30 to 40 years for most of the building construction types apart from 50 years for reinforced-concrete structured apartment buildings. As discussed in Chapter 2, a huge amount of architectural stock exists in Japan, which it is estimated would take at least forty years for society to replace with new buildings. Figures 4.1 demonstrates that with a consideration of increasing the durability of existing buildings through renovation work, there could be a total reduction of new construction works of gross floor area 20 million m^2 by the end of year 2050. According to this source [8] a consequent increase in the need to renovate and refurbish existing buildings would ensue.

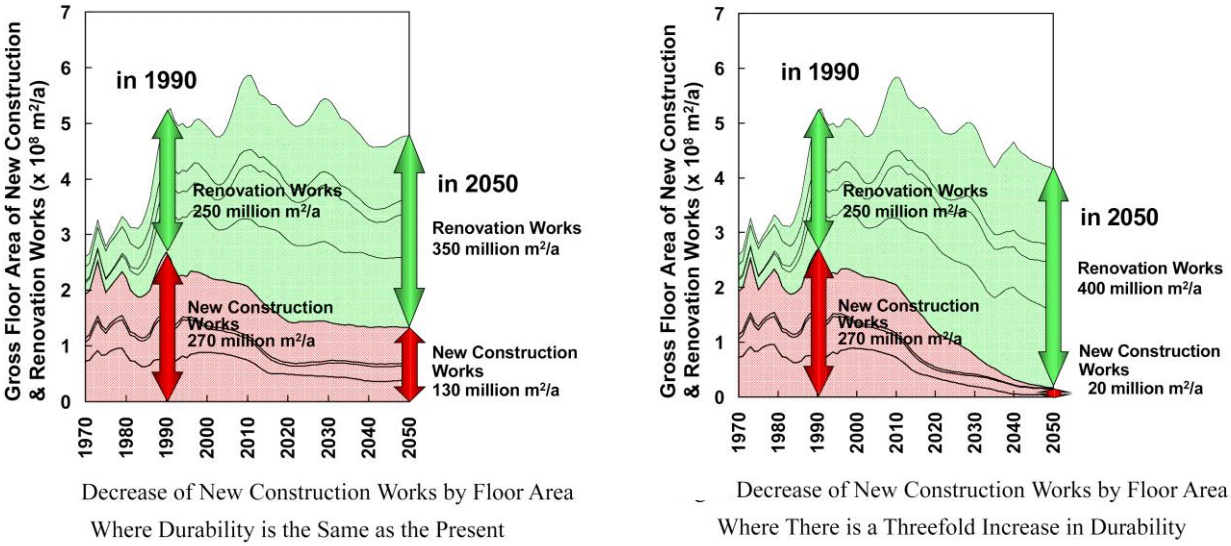


Figure 4.1. Japan's new construction context regarding building durability.

Within Japan the city of Kitakyushu is pre-eminent regarding its desire and policies to minimize its environmental impact and to develop sustainable solutions for its future development. Initially, the city's efforts were focused on reducing the polluting impacts of its major steel production and chemicals manufacturing industries. However, the city as a whole, including the government, community and residents, more recently have put a special emphasis on the activities of refurbishing and preserving the historical built environment. However, the rapid economic development of Japan since World War II and an accompanying development of a habit of demolishing buildings after an average lifetime of 30 years has already caused the stock of old buildings to be diminished considerably.

Since the research work of this study was situated in Kitakyushu city, Japan, several major refurbishment projects were introduced to the author with help from the local government officers. Several refurbishment projects occurring at various scales and differing community backgrounds were indicated as significant examples within the city of Kitakyushu and accordingly three were chosen as case study examples. For contrast a private ownership building in the city of Kumamoto saved from demolition was also chosen for investigation.

4.4.1.1 Context of Kitakyushu, Japan

Kitakyushu, Figure 4.2, is the northernmost city on the Japanese island of Kyushu and has a population of just over 1 million people, of which about 10,000 are non-Japanese (~8000 from south and north Korea). The city of Kitakyushu was formed in 1963 through the amalgamation on an equal-basis of five adjacent wards, namely Moji, Kokura, Tobata, Wakamatsu, and Yahata. The city administration is located in Kokura, while the former city areas remain as administrative units known as wards.

From the late1960s and throughout the 1970s and to the present, the city has made

considerable efforts to reduce the environmental impacts of its steel manufacturing and chemical engineering industries. As a consequence it has become pre-eminent in Japan in terms of its environmental policies and actions. It is Kitakyushu city's intention to become the world capital for sustainable development. The 'Kitakyushu Initiative for a Clean Environment' was adopted at that 4th Ministerial Conference on Environment and Development of the United Nations Economic and Social Commission (MCED) in September 2000, and in 2001 the Kitakyushu Initiative Network was founded. By January 2006, 61 cities from 18 countries in Asia and the Pacific Region had joined the network and are exchanging information and carrying out pilot projects.

Figure 4.2. Geographical location of Kitakyushu city, Japan.

4.4.1.2 Meeting with Kitakyushu City officials

In order to understand how refurbishment was viewed in Kitakyushu City and considering Japan's policy structure and political system, an initial meeting was arranged with officials at Kitakyushu City Hall representing the "Buildings and City Planning" and "Construction" and "Environment" bureaus and the "Technology Management Supervision Office", in order to better understand the most appropriate approach to carry out the investigation within the city. The discussion was based on the questions shown in Table 2, which were distributed to the city bureaus and offices before the meeting.

Table 4.3. Meeting questions with Kitakyushu city officials.

Qs	**Kitakyushu City Hall**
1	What strategies and/or polices exist regarding the refurbishment or re-use of existing buildings in Kitakyushu city?
2	What are the motivations for refurbishing old buildings in the city?
3	What are City's views on refurbishment projects and old buildings?
4	To what categories of ownership do these policies apply, e.g. owned by city, central government, private individuals or companies?
5	Do any national organisations exist to purchase and maintain buildings of historical interest in Japan? How would the city interact with such an organisation?
6	Do these policies apply across the entire city or are they applied only in special areas, e.g. the Mojiko retro area?
7	What criteria are used to assess whether or not an individual building will be refurbished or re-used?
8	What implementation procedures are followed in carrying out the refurbishment projects?
9	What city agencies are involved in the decision making process regarding the refurbishment and re-use of a building?
10	Does a city list exist for the number of buildings in Kitakyushu City that could be refurbished?
11	Do any examples exist where these policies have been applied?
12	What support does Kitakyushu city provide for refurbishment projects, e.g. financial, expertise, organizational, etc?

The meeting ascertained the following key points:

1. The Kitakyushu City is keen on promoting environmental efficiency by utilizing the existing(public) buildings as well providing a means for continuing and enhancing the local history and identity.
2. Several policy documents existed providing a basic agenda to facilitate refurbishment projects on valued historical or existing buildings, but these did not directly address the refurbishment issue.
3. The "Urban Landscape Development Districts" agenda was set in 1984 and was intended for (i) the preservation and continuation of the aesthetic and historical quality of the urban nature landscape within Kitakyushu City, (ii) the creation of city environments to foster cultural identity and character, and (iii) the attraction of town-making activities to promote social cohesion.
4. In addition to this urban landscape orientated agenda, the City had recently discussed and set a policy regarding the refurbishment of existing building stock. However as stated at the time of the interview that this policy had not yet been translated into procedures or processes.
5. From Kitakyushu city's perspective the concept of efficient utilization of existing property was developed from the pursuit of cost reduction. In the City's "Kitakyushu Management

Reform (June, 2006) Agenda", it included the sub-concept for the "reduction of maintenance and management cost", which aimed to reduce the running cost of public infrastructure by promoting maintenance plans for roads, buildings, services and landscape plants. Concerning the maintenance plan for buildings, inspection was deemed to be required to ascertain the adequacy of the maintenance plan contents and the relative administrative expense.

6. The notion of structural longevity with its potential to allow long building lifetimes was also considered in the agenda as an important issue to reduce total building cost. During the discussion it was stated that currently the projected building lifetime in Japan is set to be approximately 30 years. However, it was recognized and addressed in the agenda that a building, especially in the case of reinforced concrete (RC) structures, has the durability of 60 years or more. The view was expressed that either by recycling building materials and its components or through refurbishment according to the existing building structure's ageing condition, seismic adequacy and usage purpose or frequency, the longer the building is used, the greater the reduction in its total cost.

At the time of the interview (October, 2007), this policy was stated to be still at the discussion and development stage. The translation of the policy into actual procedures was stated to be an ongoing process that would rely on the experience of past refurbishment projects in the city. Past and current public projects occurring in the city were discussed and as a consequence, three refurbishment projects in the city were selected as case studies for the research: the Koyanose historical area in Yahatanishi ward, the old ward office in Tobata district and the old Furukawa mining office in the Wakamatsu district. The three projects were chosen because they provided a range of similarities and differences regarding their refurbishment processes, operating structures, ownership, and resident involvement.

4.4.2. Case Study 1 - Wakamatsu Ward

Wakamatsu Ward, Figure 4.3, is one of the five wards amalgamated to create the City of Kitakyushu. Occupying nearly 70 square kilometre of land area at the North-West corner of the City, Wakamatsu Ward has its south point facing the seashore of Dokai bay, central area containing old historical street landscape. It is also the base for the more recent Eco-town recycling industry development, new container port

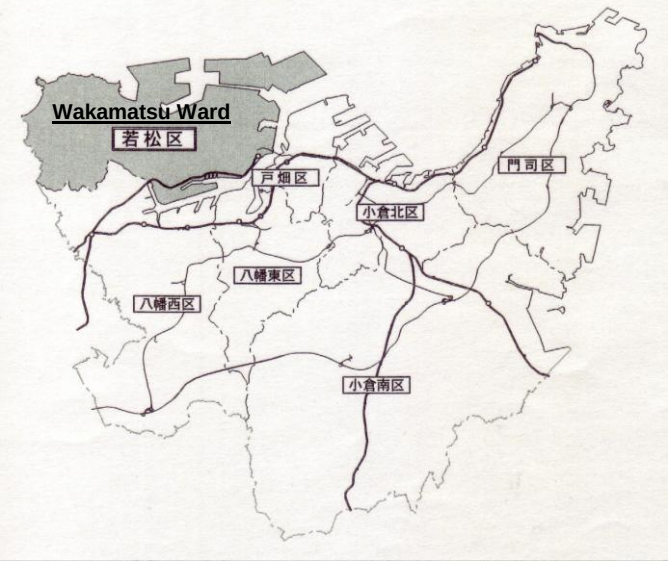


Figure 4.3. City of Kitakyushu with its five adjacent wards.

facilities built on reclaimed land on the north shore and the continuing science and research park development situated at the north western area. It has been at the heart of Kitakyushu's freight port and industrial development for over 100 years. At the turn of the 19th to 20th century it became a major port for the export of coal and was served by both railway and shipping. The town of Wakamatsu prospered from having the port served as the storage area for the coal shipping service that in the past supported the Japanese energy industry as well as the local steel industry. Due to the lack of train service in early period of Meiji (1868-1912) / Taisho (1912-1926) and Showa (1926-1989) era, shipping played an active part as the means of transportation.

Yahata ironworks was established in 1901 by Nippon Steel, which was able to introduce water and electricity services, much earlier than any other cities in Japan, to the areas adjacent to the steel production facilities, including the Wakamatsu area. In 1920, a flush lavatory was made possible in the "Tochigi Building" in the Wakamatsu south-shore area, which gives evidence of the prosperity of Wakamatsu's industry and the surrounding city area. As a consequence of this development, many business firms such as the Ueno marine transportation building for coal shipping, the Furukawa mining building, Aso mining building and the Coal hall were built on the Wakamatsu south-shore creating a distinct building landscape for the port area. The buildings related to these activities, including the railway station gave the city's old waterfront a special character.

4.2.2.1 The old Furukawa Mining Company Building

The old Furukawa Mining building, Figure 4.4, was constructed in 1919 with the establishment of the Furukawa mining company. Through many phases of changing ownership and building functions the building continued to serve and adjust to different usage requirements until its final user moved out during the year 1996. The building then remained unoccupied and abandoned. When the last owner of the building decided to demolish the building, the Wakamatsu residents began an activity to save the "former Furukawa Mining Wakamatsu Building" by forming a non-profit organisation (NPO) and participating in fund raising activities to save the building for the community. In response to the citizens' wish to keep this building and the enthusiasm shown by local residents, the Wakamatsu Ward office through representation to Kitakyushu city assisted the local community based NPO to purchase the building from the last owner. The building is now owned by the local community NPO group that was specifically established for that purchase and afterwards for managing the building, which now serves as a citizen's gallery and community space.

Figure 4.4. The old Furukawa Mining Company Building after refurbishment.

Several meetings were arranged with officials at Wakamatsu Ward Office representing the "Town Planning" section. The discussion at the initial meeting was based on the questions shown in Table 4.4, which were distributed to the relevant Ward officers before the meeting. The questions were constructed to ascertain the Ward's general motivations and perspectives on refurbishment projects as well as to further understand the refurbishment process and the specific aspects related to this project.

Table 4.4. Meeting questions with Wakamatsu ward officials regarding the old Furukawa building.

Qs	**Wakamatsu Ward (Old Furukawa Mining Company)**
1	What is the Ward's view on the refurbishment of old/existing buildings?
2	What strategies and/or policies were used regarding the refurbishment or re-use of the old mining building?
3	What were and are the motivations for refurbishing old buildings?
4	Does the Ward actively promote the preservation/refurbishment of existing buildings?
5	What role has and does the public play in preserving/refurbishing existing buildings?
6	How does the ward office respond to a public wish to preserve/refurbish an existing building?
7	What criteria are used to assess whether or not an individual building will be refurbished or re-used?
8	What implementation procedures are followed in carrying out the refurbishment projects?
9	What city agencies and public organizations are involved in the decision making process regarding the refurbishment and re-use of buildings?
10	What support does Kitakyushu city provide for refurbishment projects, e.g. financial, expertise, organizational, etc?
11	How successful does the ward office consider that the old mining company building refurbishment project has been?
12	Does the ward office remain involved with the old mining company building since the completion of the refurbishment? (e.g. who owns the building? What kind of activity happens in the building? Who is responsible for the maintenance?)
13	How many more refurbishment projects have been considered or completed since the

	old mining building project? How would the experience gained in this project affect future decision making and strategies for building refurbishment projects?

During the first of the meetings, the Ward's officials invited the leader of the local NPO group, "Wakamatsu South Coast Historical and Environmental Landscape Consideration Committee", who was in charged of the community activities for this specific refurbishment project, to participate in the meeting and to explain the refurbishment procedure of the building. His views are summarized as following:

1. Previous to the establishment of the preservation movement, the original Wakamatsu Station situated at the edge of the south-foreshore was suddenly demolished. The station was equipped with a double track system from its original construction in 1891. However, after the privatization of the Japanese National Railways in 1983, the station became part of the privatised JR (Japan Railway) company and was demolished within the two year following this event. The demolition notification and subsequent demolition event was completed before any public consultation could occur. This sudden demolition caused disappointment and anger of the local citizens who considered that the history and culture of Wakamatsu had been razed without public consultation. However, this event contributed to their awareness of and desire to keep other significant buildings in the area.
2. The "Wakamatsu Old Furukawa Industrial Building" is well known as the building situated on the south-foreshore seafront. The building adopted the building law from the Taisho era and was constructed in year 1919 with the European building methods current at that time. Inevitably, the building has aged after generations of utilization and its structure integrity has decreased which eventually led the building into dangerous condition for continue usage. It was proposed by the owners that functionally the building would not be able to sustain further occupation because with its condition it would be difficult to maintain the building in its existing state for any type of future usages. It was also stated that it would cost more to refurbish the building than to demolish it. Consequently, the decision was made by the owner to demolish the building. However, when the demolition decision was announced, especially after the painful lost of the Wakamatsu station, the local citizens protested for the building to be refurbished for the purpose of preserving the history and culture of Wakamatsu.
3. Subsequently, in response to the demolition of the station and the proposed demolition of the Furukawa building, a symposium was held in 1995 in a search for solutions and future treatment for buildings from the coal production and exporting period. Eleven local cultural organization groups such as the general residents' association and the Women's Society of Wakamatsu, together with the chairperson

from the local shopping district acting as chairman and with some administrative guidance from others, gathered to freely discuss whether buildings from the coal exporting period should be demolished or whether they should be kept for the children of the next generation.

4. As a consequence of the enthusiasm of the participants and the considerable supports shown towards preserving and continuing the history of Wakamatsu, a second symposium was held that culminated in a request by the NPO leaders to the Board of Education in the City government to investigate and assess the value of the "Wakamatsu Old Furukawa industrial building". The investigation was carried out in 1997 and it concluded that this specific building did hold significant historical and cultural value for Wakamatsu area. The local citizens were then informed about this assessment via a symposium and were consulted about their wish to preserve the building. With local citizens' support, a decision was made to preserve the building. Various procedures, negotiations and techniques were required for decisions to be made on preserving a building, however, the NOP has the view that local citizen's opinion should be considered together with the local citizen organizations and association to attain a common aspiration regarding whether a specific building should be preserved or not. As a result, the local citizen organization named "Wakamatsu South Coast Historical and Environmental Landscape Consideration Committee" was established to support and fight for preservation activities.
5. With the decision made to preserve the "Wakamatsu Old Furukawa Industry Building", preservation activities were initiated by conducting a campaign to collect signatures from supporters for the refurbishment/ preservation petition. The collection of signatures was used as a way to demonstrate the local residents' appreciation of and their desire to keep the building to the City government. Following the petition, a donation activity was organized by the residents in the ward to persuade the City government to buy of the building with funds raised from the donation activity. From the local organization groups, 90% of the people participated in the 100 yen (about 0.68 GBP) per person donation and 2,800,000 yen (about 19,062 GBP) was collected. In total, 74,000,000 yen (about 503,796 GBP) was raised from the donation activity covering the entire Wakamatsu local business sectors, shops in the shopping arcade, women's associations and the general public in the ward. The amount of money raised was both surprising and encouraging.
6. It was considered fortunate that the whole preservation event unfolded in such a short time. The initial signature collection activity drew everyone's enthusiasm which paved the way for the successful donation activity. With the signatures representing local residents' wishes and the surprising amount of funding collected, the mayor of

the City was convinced to support the preservation of the building. Eventually the City funded 390,000,000 yen expenses to preserve and repair the building for the benefit of the residents in the whole City of Kitakyushu.

7. The appreciation and desire of the Wakamatsu ward residents led to the preservation of the building that was used then as a community centre for the Wakamatsu ward. New buildings may be interesting and attractive for a period of time, but historical buildings convey the fondness and memory of people and act as reference points of their lives and sources of interest for conversations. It is important to preserve and restore historical buildings. However, preservation interest groups and their participants may be active and fight hard for buildings for only a period of time. Concern arises that historical buildings and their preservation are only appreciated by the older generation and special interest group. Education plays an important role in conveying the importance of existing history and culture. Enthusiasm and understanding of the preservation of historical buildings must be introduce and inherited by children to prolong the building life and allow the history and the culture to endure into the next generation.

The whole refurbishment process was very successful, smooth and straightforward due to private ownership of the building and the strong enthusiasm and activeness of the local residents. However, at the time of the refurbishment petition, the City government stated clearly that this project was a special case to receive such financial support from the City. Despite the success of the “Wakamatsu Old Furukawa industrial building”, the model of its refurbishment procedure has not been implemented or considered for other buildings within the Wakamatsu Ward or Kitakyushu City.

4.4.3 Case Study 2 - Koyanose Historical Inn Town Area

Koyanose area is a specially designated area of historical interest within Kitakyushu city which has been promoted through the city’s “building histories town making” programme. The project takes advantage of several streets adjacent to the river Onga that comprise existing historical buildings together with a high density of historical assets in the surrounding environment. The Koyanose area was an important point on the Nagasaki-Kaido way, which was an old road and trade route across Kyushu. The route joined the north Kyushu city of Kokura to Nagasaki, which was one of the few Japanese ports open to foreign trade. It was used by the Dutch traders at Nagasaki for visiting the commander of the local army garrisons based in Kokura at that time. Additionally, during most of the Edo period of Japanese history, the route was used by the local lord to travel between these two important trade centres. Due to its historical significance, the area was specially designated for historical preservation. The city planning bureau developed a set of guidelines and a subsidy system which financially supported the construction of new buildings and the maintenance and refurbishment of

existing building to encourage citizens to maintain the harmony of the building characteristics with the immediate historical landscape, architectural styles and quality existing in the area. Criteria were set out for receiving this financial support, which required building and landowners to conform to particular architectural forms and requirements on the building façade within a designated area. These rules were relaxed by stages in adjacent zones that were given different status as shown in Figure 4.5.

Figure 4.5. Koyanose historical inn town area, with designate historical preservation districts.

Two refurbishment guidelines were set out and illustrated through both diagrams and descriptions in booklets that were distributed free for the general public including the local residents. Restoration works are required to be carried out according to the categories of the building's physical architectural elements, such as roof shape, façade colour, exterior appearance, openings, stories, etc. Depending on the scale of the restoration, up to 1/2 of the total renovation cost could be subsidized both with reconstructions done to restore or preserve the appearance of an historical building (up to 6 million yen) and improvements done to harmonize the appearance of historical landscape (up to 3 million yen).

Questions concerning the various refurbishment procedures and the development of the renovation guidelines were sent to the "Buildings and City Planning" bureau as they have kept responsibility for this project. Several key points were summarized by the author based on the responses received.

1. Local citizen's participation and the general public's cooperation were recognized by the City government as the most important factor behind the success of the Koyanose historical district project.
2. The two renovation guidelines were formulated through public consultation and their wish

to preserve Koyanose district's history, distinct architectural features, traditional building techniques and neighbourhood characteristics.

3. The subsidy system was introduced to the public through the use of these two guidelines which were supported actively by the local residents. Koyanose's refurbishment guidance was considered to be a very useful method for preserving and sustaining the area's aesthetic and historical qualities.

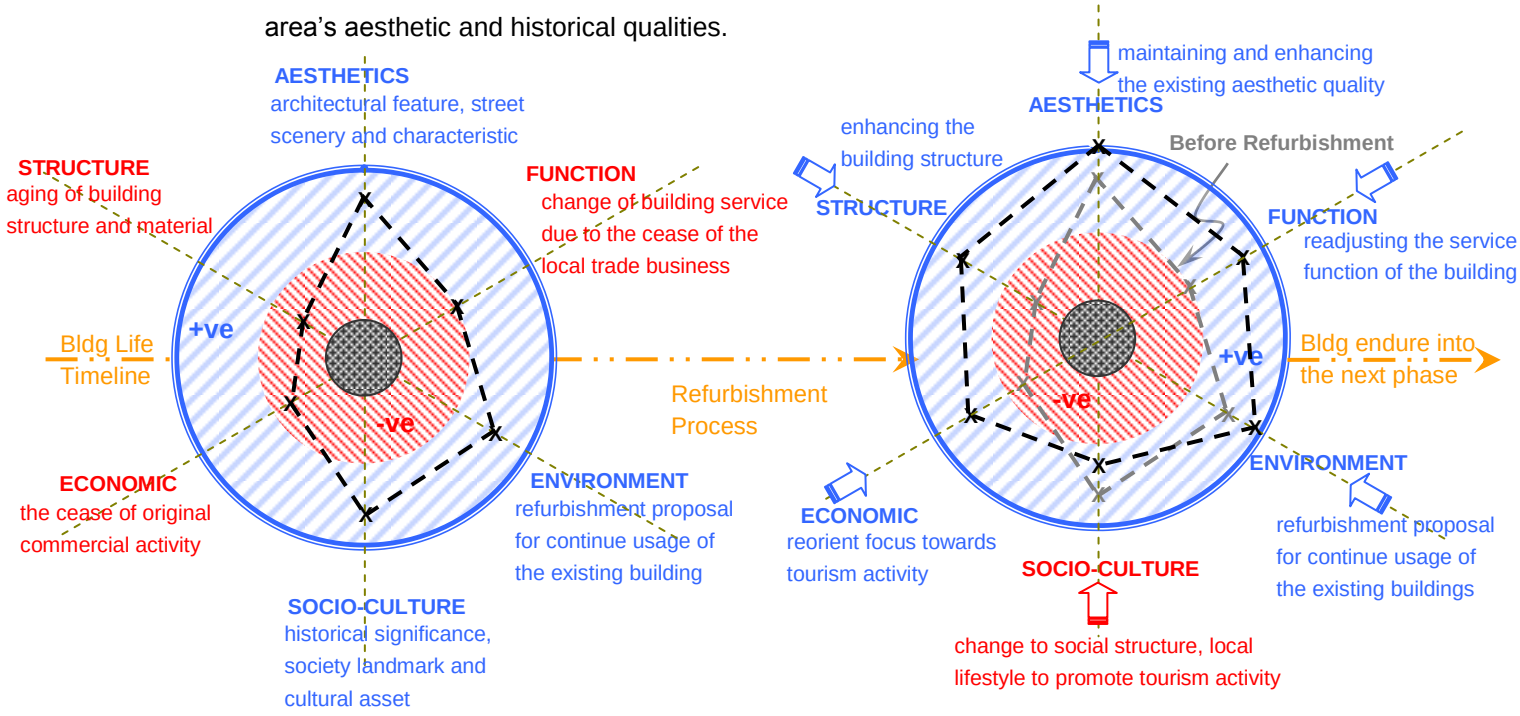


Figure 4.6. Building lifetime phase modules illustrating the Koyanose case study.

The Koyanose project demonstrated the potential for successfully achieving public cooperation and provided an example model. However, nearly 7 years after the project's completion, the methods developed and experiences gained have not been considered or used as a basis for guidelines and procedures for other refurbishment projects in the city.

The phase module diagram developed previously in chapter 3 in attempt to illustrate various changes (may)occurred to a building through different phases of its lifetime was used here to visually explain the Koyanose project, shown in Figure 4.6. Both the before and after refurbishment building performance were indicated on the module diagram regarding six relevant building aspects. The module diagram allows comparison and consideration to be initiated visually and simultaneously regarding changes made to the building and their resulting impacts. Such diagram could facilitate future decision making process to suggest appropriate changes for the building to allow continue usage and extension of the its lifetime.

4.4.4 Case Study 3 - Old Tobata Ward Office

The old Tobata Ward Office building was constructed in 1933 and had served as a local governmental office since then. At the end of year 2006, in order to accommodate the

increased required office space, the building function of Tobata ward office was moved to a newly constructed office/apartment complex across the street. The old Tobata ward office building was then closed for a series of examinations and inspections to ensure its capacity of endurance for the process of refurbishment and any proposed future usage, figure?.

Standing as one of the few remaining historical buildings in Tobata ward and the only building representing the architectural style of the early 20th century period in Japan, the old Tobata ward office building was considered to be an important historical, cultural and architectural asset both by the city government and the local residents. The building is situated on one corner of the triangle park in the centre of the Tobata ward where many of the cultural events of the ward occur. For example the annual Tobata lantern festival is held there and so the building has become a local landmark both aesthetically and as a symbol of the community.

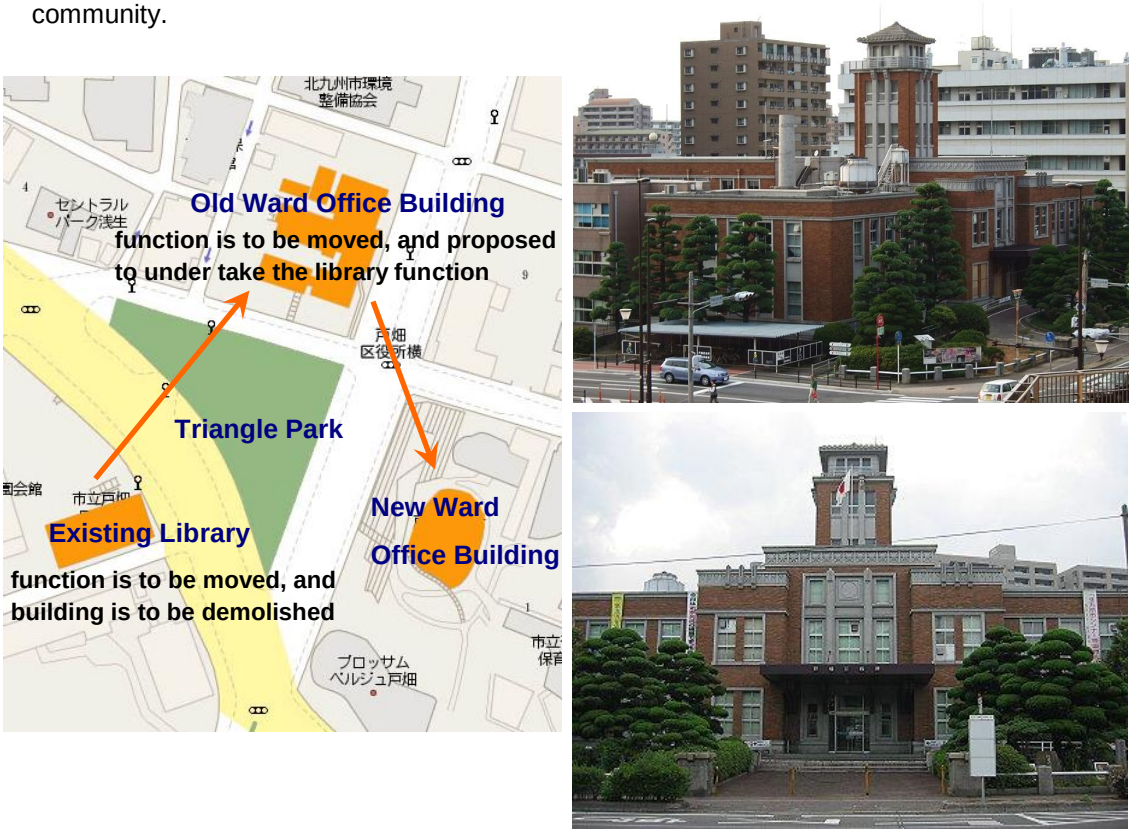


Figure 4.7. Photographs of the existing(old) Tobata Ward Office with the development plan of its surrounding area.

The need to have a distinct building of sufficient capacity to host the local library function was clear and definite for the Tobata community. The existing library building that was situated close by, see Figure 4.7, was a poor quality building from the 1960s and had become too small to fulfil the current library needs. Consequently, the decision had already been made that this building should be demolished and replaced. It was proposed that the old Tobata ward office could become the new library. However, the preliminary inspection of the old Tobata ward

office building indicated the aging of some of the building materials due to moisture problems and the inadequacy of some parts of the structure in terms of current earthquake resistance requirements. Additionally, it was considered that the old ward office internal space arrangements of the building could not successfully accommodate a modern library function. However, the local government officials of Tobata ward understood the importance of the building to the local population. Consequently, investigations were continued to ascertain what sort of function the building might have in the future before implementing refurbishment works. Therefore, the building was temporarily closed to await decisions to be made concerning its future usage. A meeting was arranged with officials at Tobata Ward Office representing the "Town Planning" section. The discussion was based on the questions shown in Table 4.5, which were distributed to the Ward before the meeting. The questions were constructed to ascertain the ward's general motivations and perspectives on refurbishment projects in the context of achieving a more sustainable society. Questions 1-10 were the same for interviews carried out with the Wakamatsu Ward's official concerning the Old Furukawa Mining Company, two extra questions were added to address specific issues here concerning the Old Tobata Ward Office.

Table 4.5. Meeting questions with Tobata ward officials.

Qs	**Tobata Ward (Old Tobata Ward Office)**
Refer to Table 2 (questions used for the Old Furukawa Mining Company) for question 1-10 which were the same for both interviews.	
11	As at this moment, the decision has been made to convert the old Ward Office building into a library, how does this effect the decision making process? Would decisions be made differently if the indented future function of the building was to be different?
12	What key issues will be considered in finalizing the strategies for this building?

The meeting ascertained several prominent issues concerning the Ward's general views on maintaining local historical buildings into the future.

1. Since the library function was clearly defined to be the future usage for the old Tobata Ward office building after refurbishment, the project was subsequently assigned to the Educational Bureau in the City.
2. Although the social and cultural issues were based local to Tobata, the Tobata Ward office has no direct responsibilities concerning decision making for the building or funds to implement that decision. The Ward mainly functions as an administrative facilitator between the local residents and the central city government.
3. However, concerning the local historical buildings, the Tobata Ward does have its own interests and considerations at the ward level as refurbishment criteria: (i) how deeply and enthusiastically do the local residents feel about the specific building; (ii) does the building exhibit any local historical value; (iii) how can the building be used in the future for the benefit of the local community; and (iv) how much will it cost to refurbish the

building and other financial issues, such as where are the funds coming from.

Concerning the first point, as previously discussed, the central Kitakyushu city government was in the process of formulating policies concerning very general concepts regarding the management of the existing buildings within the city. However, no procedures had been formulated or implemented yet in relation to those policies. Until the time of the interview, all the refurbishment projects within the City were implemented on a case-by-case basis with different processes and procedures. The major reasons for this indefinite approach were stated as being due to the lack of a specific city policy regarding refurbishment issues and the fundamental policy structure system in Japanese society, where the responsible governmental bureau for an existing building is decided based on the building's function.

At the time of the interview (November, 2007), the Ward office was holding frequent meetings and discussions with the local residents and non-profit organisation (NPO) groups to examine the current needs of the local society and to consider proposals regarding a new function for the building. Although the future usage for the old Tobata Ward office building is still uncertain due to the building's structural inadequacy, the wish to refurbish the building and to continue to have the opportunity to aesthetically and historically appreciate the building was strongly and definitely expressed by the local residents. The Ward itself also recognized the importance of not only allowing the building structurally to endure into the future, but also to maintain the building's architectural quality and historical significance. Whatever the future building function and internal structure, refurbishment work has been determined for the building and its aesthetic appearance is to be maintained so that it may be continuously appreciated by the local residents while serving as a symbol of Tobata.

The case of the Tobata Ward Office building demonstrated that very frequently various issues and aspects are involved in the decision making process as to whether a building should be refurbished or not and as to how should it be refurbish. Nonetheless, when a building clearly exhibits substantial value in one specific aspect, e.g. the aesthetics of its appearance, this value could become the dominant factor driving the decision towards the choice of refurbishment. For the building, there are obvious difficulties concerning the durability of the building's structure and internal materials regarding current regulation for earthquake standards. Based on the Ward's estimations, strengthening the structure and maintaining the exterior shell would cost one-and-a-half to twice the amount of demolition and rebuilding. While recognizing the importance of the aesthetic quality and cultural significance of the building, the refurbishment decisions needed to be made with well-balanced consideration concerning all the issues involved. Utilizing the phase module developed previously in chapter 3, the old Tobata ward office case was mapped out in Figure 4.8 to allow visual illustration of the various issues involved in this refurbishment project as an attempt to facilitate discussion between different participants and to aid the decision making process.

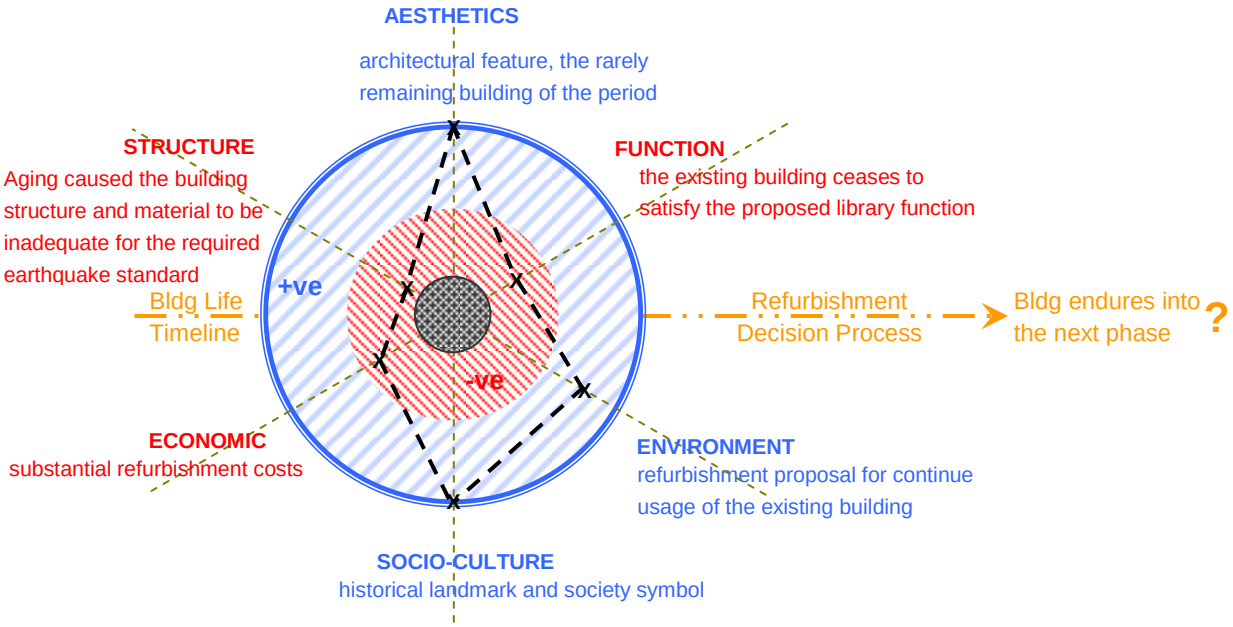


Figure 4.8. Building lifetime phase module illustrating the current situation of the old Tobata Ward Office.

4.4.5 Case Study 4 - Orangeri PS Company, Kumamoto

The Orangeri building, situated in Kumamoto city southwest from Kitakyushu city on the island of Kyushu, Japan, was constructed in 1919 (the same year as the Furukawa Mining Co. Building) by a famous foreign-trained local architect. The building has the historical significance of being the first reinforced concrete building in the city at the time when it was first constructed. The building was constructed to function as a bank building and hence it was designed with highly durable internal and external structures which consequently allowed the building to continuously endure with a long lifetime. However, by year 1996, the bank branch service was terminated, and at the same time Japan was facing the collapse from the previous economic bubble which inevitably resulted in the usage of the building to be abandoned. The building (including the land in the case of Japan) was then opened for potential buyers by a real estate company starting year 1997.

During the World War II, Kumamoto City suffered from several floods which caused severe damage and losses to many historical buildings. According to a local newspaper article (1974), “The living house”, a total of 59 buildings from both the Meiji period (1868-1912) and the Taisho period (1912-1926) stood in the City with 27 of them within the city centre. However, by the year of 1998, there were only 11 buildings remaining. In response to these losses, concern and anger developed among the local citizens, local academics and organization leaders. Subsequently, the “Kumamoto Town Making Trust” was established with core members from the local old town research committee to first gather views and opinions from the prefecture citizens to understand their opinions regarding this loss of historical buildings,

and second to call for citizens' participation and support for preservation activity related to the remaining historical buildings. Afterwards, an open symposium named "The Missing Kumamoto building Photo Exhibition" was held under the topic of "Revitalisation of Kumamoto Town". A preservation petition collected on the street was conducted with over 15,500 citizens' signatures. As in Wakamatsu ward in Kitakyushu the local community were concerned with the danger of losing important local historical and cultural landmarks.

Figure 4.9. Photographs of the Orangeri building after refurbishment.

Unlike the old Furukawa Mining building at Wakamatsu ward where donation activity was held, in the case of Kumamoto, the old bank building was needed a new buyer who would appreciate the building's aesthetic and historical quality. Meanwhile, the real estate company was eager to demolish the building and replace it with new apartment building for profit. Consequently, members of the "Kumamoto Town Making Trust" urgently visited the local business sectors in search of potential buyers, and also consulted local academics for refurbishment strategies to maintain the building's aesthetic and historical qualities while allowing a potential new building function. Fortunately, by the end of year 1997, the president of PS Company announced his wish to acquire the building with a plan for refurbishment.

Unstructured questions and answers occurred between the author and the president of PS Company during a visit to the building. No recording was made of the discussion, however several paper documents and articles were given to the author by the PS president explaining about the company, the building's history, the preservation petition and the refurbishment process.

PS Company develops wet heating and cooling systems based on radiators to develop technologies and sustainable solutions for building usages in response to local environmental conditions. Understanding that preservation work alone would not provide the building with a promising or secure future, the president of PS Company purchased the building to be

refurbished to serve as a product and technical show room with office space. PS Company was well acquainted with buildings and building services technology and worked to provide sustainable solutions to the design of building services systems. The company president saw this building as an opportunity to apply those principles in refurbishing the existing building with view to giving it positive added value. For instance, the building structure required an extra internal steel structural system to comply with current earthquake related regulations. The new structure not only left undisturbed the original concrete structure but also amplified the aesthetic quality of the interior space (see Figure 4.9).

Sustainable building features such as natural ventilation and photovoltaic solar panels were introduced to use natural resources more effectively and so decrease the building's environmental impact. Additionally, the building used water to water heat pumps which utilised ground water from a 50m deep borehole. Initially it was proposed that the original window frames for the building would be replaced with double-glazed wooden framed windows of a similar style. However, this proved to be too expensive due to the high cost of bespoke windows and the fact that double-glazed systems were very rare in Japan at the time of the refurbishment. Consequently, modern styled single piece glass windows were used as replacements. However, in the view of many visitors to the building, this change to the building façade was deemed to have improved its aesthetic appearance and provided positive added value for its aesthetic appreciation (see Figure 4.9). Constant community activities, academic symposiums, private business consultations are held using the building space which has received several awards and appreciation with its technical innovation, sustainable achievement, local history preservation and community development since its completion.

The president of PS company appreciated the building's historical importance and architectural quality and so the building was refurbished with consideration of the local community, history and cultural identity. More importantly, the building was purchased and refurbished with a clear future function and sustainable management planning as a consequence of the company president's forward vision. Figure 4.10 was derived by the president of PS company as the management core of the building, it clearly expressed that the building was refurbished under the intention to serve the local citizens as well as to promote research activity on architectural design, energy and sustainability.

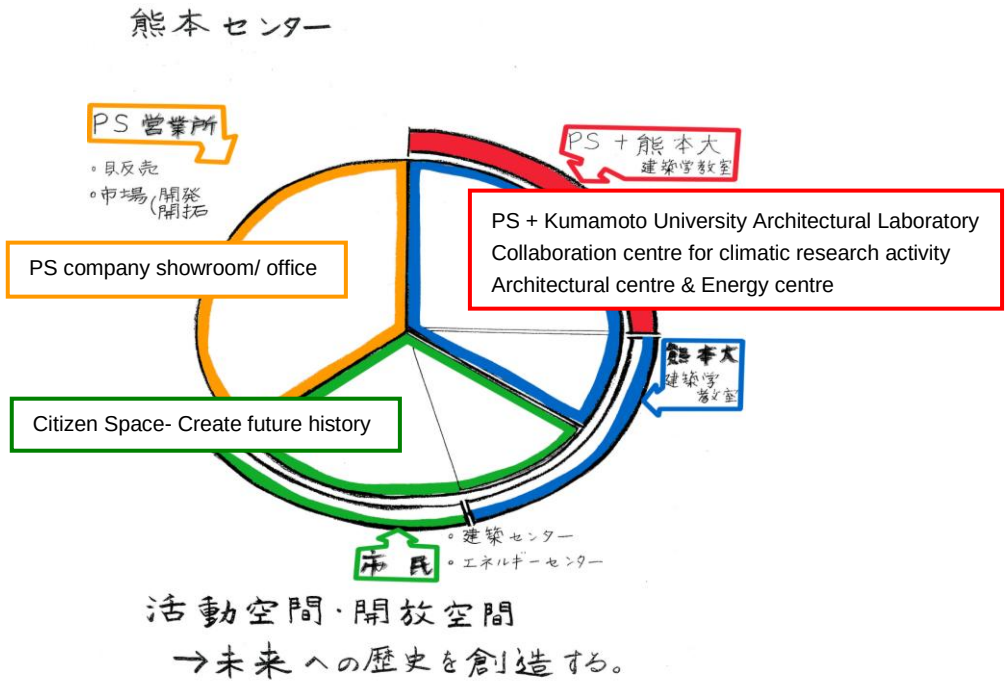


Figure 4.10. Management core for the Orangeri building derived by the PS company president.

Figure 4.11 was derived by the author, utilizing the building phase module developed previously, to visually illustrate the interaction of various concerning issues during the refurbishment process. Various issues concerning the existing building must be assessed and taken into account when planning or designing solutions for refurbishment. The building phase module developed by the author attempts to facilitate this process to achieve a well-balanced and well-considered refurbishment project.

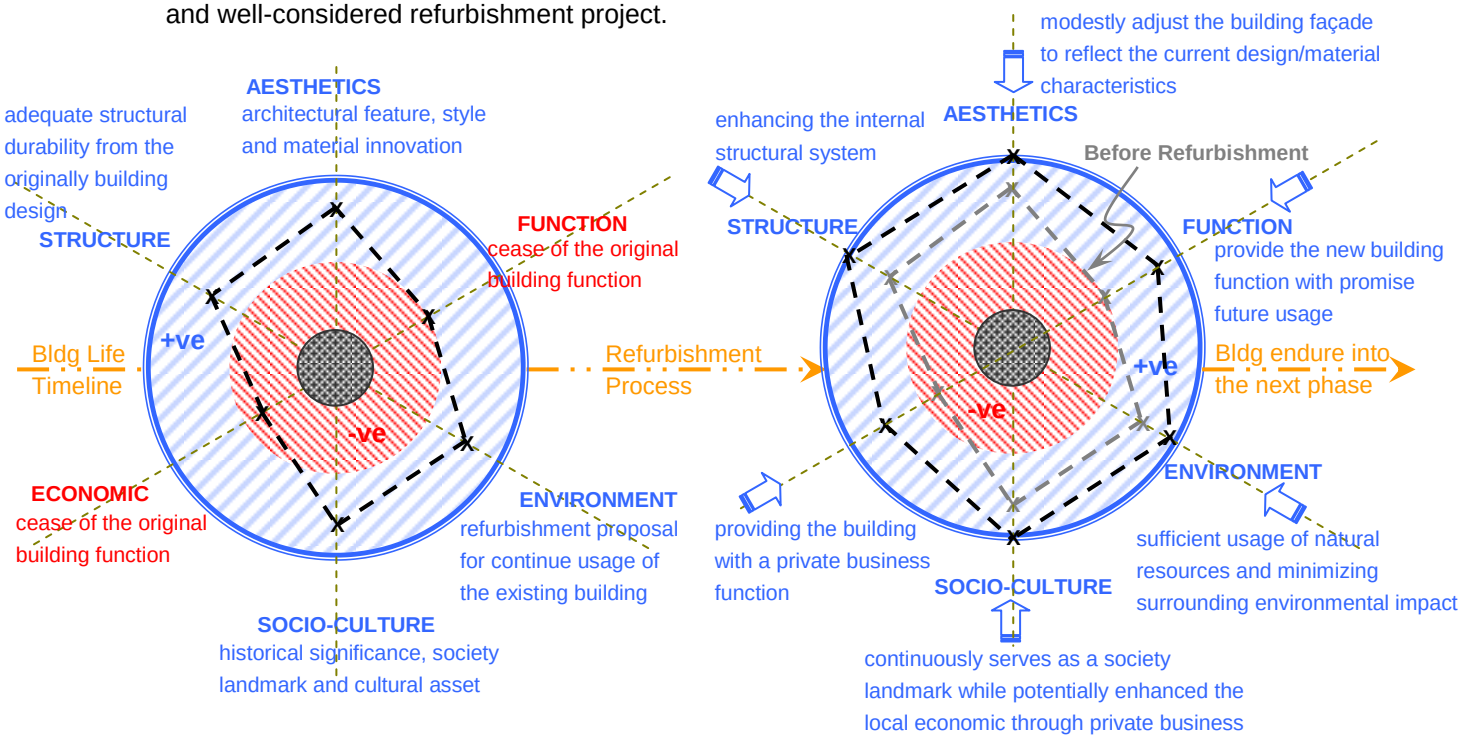


Figure 4.11. Building lifetime phase module illustrating the Orangeri case study.

4.5 Conclusion

Regarding style or aesthetic appearance of buildings, Japan is well-known for its innovative and adventurous incorporation of materials and construction methods in creating architectures which often lead the contemporary and international trend but which often demolished within 30 years of construction. In recent years there's been a surge of interest in the topic of renovation which in retrospect, has always been a traditional approach innate to the Japanese culture, for instance the periodic rebuilding of Japanese temple every 20 years. In response to the economic crisis, calls for environment-oriented approach in every field, transition to a low-carbon economy, and since inherently an enormous amount of energy is consumed in the construction of buildings, a significant pressure for a shift of consciousness in the construction industry is evident. The attitude towards renovation is changing, the impossibility of continually producing new architecture is recognized and the current social circumstances have emphasized the role of renovation as a means to revaluate existing building as valuable resources. Such recognition and shift of emphasis regarding renovation or refurbishment is equally evident throughout the world. However, the contexts, social organizations, economic pressures or even people's perceptions are often different across cultures. The thesis will attempt to provide a useful understanding regarding future sustainable management of the existing environment through research and observation made across different cultures.

In this chapter, the notion of long-term sustainability was extended through several refurbishment case studies in the context of Japan. Refurbishment of existing buildings was concluded to be beneficial in sustaining the cultural structure and aesthetic diversity of a society. Aesthetic quality of the existing built environment was demonstrated to play an equally important role as other economic, environmental, structural, socio-cultural and functional factors regarding the sustainable management of the existing urban fabric. The notion of aesthetics and the concept of human aesthetic appreciation will be discussed and developed through reviews of current preservation debates and aesthetic literatures.

4.6 Reference

1. Denzin, Norman., & Lincoln, Yvonna. (1998). *Strategies for Qualitative Inquir*y. Thousand Oask, Calif.: Sage Publications.
2. Neuendorf, Kimberly. A. (2002). *The Content Analysis Guidebook*. London: Sage Publications, p.1.
3. Berelson, Bernard. (1952). *Content analysis in communication research*. New York: Free Press.
4. Ibid, 1., p.53.
5. Weber, Robert. P. (1990). *Basic Content Analysis* (2nd Ed.). London: Sage Publications, p.12.
6. Core Reports: Life Cycle Assessment Method for Buildings. (2004). *Annex 31 Energy-Related Environmental Impact of Buildings*, Canada Mortgage and Housing Corporation.
7. Ikaga, Toshiharu., Murakami, Shuzo, Kato Shinsuke, & Shiraishi, Yasuyuki. (2002). Forecast of CO2 Emissions from Construction and Operation of Building in Japan Up to 2050. *Journal of Asian Architecture and Building Engineering*, vol.1, no.2, 149-156.
8. Institute of Construction Prices Investigation, 1995. *1990 In-put-output table for construction sector analysis*, supervised by Construction Economy Bureau, Ministry of Construction, Jan. 1995, Institute of Construction Price Investigation. Japan.

4.7 Bibliography

1. Groat, Linda., & Wang, David. (2002). Architectural research methods. New York: John Wiley & Sons, Inc.
2. 石井清喜：旧第一銀行熊本支店を保存、新建築５７、１９９８年５月号、株式会社新建築社。
3. Renovation: Beyond Metabolism. *The Japan Architect* 73, 2009 Spring, 株式会社新建築社。

5 Aesthetics

In previous chapters, aesthetic value of the existing built environment stands out to be a critical concept concerning both the long-term aspect of sustainability and the basic reasoning for the management of the existing buildings in the built environment. In this chapter, current debates regarding preservation projects and historic environments will be reviewed initially to further emphasis the concern of humans aesthetic appreciation of the existing urban fabric. The concept of aesthetics and aesthetic perception will then be discussed through literature reviews to better understand how such notion could be assess and apply to facilitate future sustainable development of the built environment.

5.1 Aesthetics in the Built Environment

The intention to convert or refurbish the existing urban fabric generally is not based on aesthetics alone, however, the notion of the aesthetic value of a building or the urban built environment frequently advanced as one of the key consideration for preservation debates as well as the basis will to refurbish. In the midst of sustainable development and a worldwide economic crisis, discussions centring around the question of "whether to refurbish or demolish an existing building" have occurred steadily and increasingly throughout different countries and professional fields. Part of this concern has developed as a response to the high consumption of energy in the building construction and the enormous amount of existing building assets; however, the controversies that arise frequently in relation to modern styled buildings have been evident as another primary drive for these debates. Writing in the March issue of Grand Designs Magazine, British culture Minister Margaret Hodge [1] expressed her opinion that *"modern buildings shouldn't be judged by the same criteria as historical structures when awarding listed status. We should be able to consider matters other than the architectural or historical value in deciding whether to list."*

In June 2007, the BBC News Magazine website considered this issue by examining five of Britain's controversial buildings, as shown in Figure 5.1, with the question: *Eyesore or Gem*?, and stating that "*the maxim of beauty being in the eye of the beholder is no more true than in people's estimations of modern buildings*" [2-6]. All four buildings, other than the St Pancras, were open to be voted on by the general public as to whether they should remain intact or be demolished. The four buildings are all post-war constructions designed with Brutalist style and raw concrete material. From comments and discussions on the BBC News webpage, those who wish to demolish these buildings based their opposition on the building's brutal, aesthetically displeasing appearance and its dilapidated state which constantly impose an gloomy atmosphere and image to the surrounding environment. The lack of constant maintenance resulted in the building's steady deterioration and the inappropriateness of the building's original design attitude and intention for today's society are also reasons behind the

demolition wish. Contrarily, the supporters based their petition on these buildings' architectural, historical or iconic importance without concerning the aesthetic condition of their building appearance. They believed that with amount of time people's perspective on modernism, brutalism and raw concert might change and the public would eventually fall in love and appreciate these outstanding designed architectures. However, it is important to note that most of the comments based its supports under the condition that the building must go through a phase of refurbishment, either with or without contemporary design, to bring the building up-to-date functionally and aesthetically. Although the voting results are only indicative and may not reflect the public opinion, they all tended to concentrate on the demolition side of the argument (percentage results could be view from web addresses provided in reference 2-6).

Figure 5.1. Four buildings (Milton Court, Gateshead Car Park, Brunel Roundabout, Greyfriars Bus Station) to be voted in BBC's Architecture Week on the topic Eyesore or Gem.

In July 2005, the Los Angeles Superior Court judge gave the Los Angles Unified School District the go-ahead to demolish most of the famous Ambassador Hotel [7]. The hotel designed in 1921 by Myron Hunt was a Hollywood icon as well as the location for some significant historical events, the assassination of Robert F. Kennedy in 1968 and several Oscar award ceremonies as well as a movie set for many famous films. Additionally, architect Paul Rudolph's Riverview High School in Florida was announced to be demolished and replaced with a parking lot in February 2006 [8]. All these buildings were designed by famous architects and were well known by the local population, and internally among the architectural profession. The increasing pace with which these design icons are being proposed for demolition has perturbed the architectural profession, as expressed in various Building Design articles. They provide examples and a general understanding of the context and background behind the refurbishment, demolish or preservation debates.

During the year 2008, widely based discussions took place regarding the future of the Robin Hood Gardens housing estate in Poplar, East London, Figure 5.2 [9-13]. The preferred option of the building's owner, Tower Hamlets Council, was to demolish the building. However, many in the architectural profession considered the building, the construction of which was completed in 1972, as an iconic example of "modernist" design and the culmination of the design experience of the architects Alison and Peter Smithson. In view of its perceived importance as an example of the modernist aesthetic by some famous names in the architectural field, a campaign was implemented for the building to be listed [14-18]. The debate surrounding the Robin Hood Gardens housing estate highlighted the importance of the notion that for a building to attain long life its aesthetic value must endure through time and be appreciated by a wider audience than the architectural profession. It is proposed by the author that this ability for a building to be valued through time should be called its aesthetic endurance. Increasingly, aesthetic endurance becomes an important issue both from the point of view of the design of the original building as well as choices for urban development and planning of new development in the context of existing building stock. Debates such as those that arose regarding the Robin Hood Gardens estate raise the question as to whose notion of aesthetic value will or should be included in these judgments. Also, are the notions of aesthetic consistent with the same actors or do they change through time, life stage and experience? In addition, does the awarded listed status change the way people use the building and the aesthetic appeal and importance of its image?

Figure 5.2. Robin Hood Gardens, East London housing complex designed by Alison and Peter

Smithson in the 1960s and built in the early '70s.

Similarly, in Japan, architect Kisho Kurokawa's Nakagin Capsule Tower was threatened with demolition in April 2007, [19-20] when the building's management association approved plans for it to be replaced with a new 14-story tower building. The Nakagin Capsule Tower is probably Kurokawa's best-known building and is appreciated by many architects as a pure expression of the Metabolist movement, popular in the 1960s and 1970s. This architectural movement was based on the notion of buildings formed from modular components and Kurokawa's Nakagin tower was the first design where a module or capsule as a room was inserted into a mega-structure that was built for actual use. Many, particularly in the architectural field, consider still that the Capsule Tower through the notion of "Metabolism" realised the ideals of, exchangeability and recyclability and was a prototype of sustainable architecture.

The tower was located in the Ginza area of Tokyo, and was originally designed as a "Capsule Hotel" to provide economical housing for businessmen working late at night during the week in central Tokyo. Its construction was completed in 1972. The building was composed of two towers, respectively 11 and 13 stories high, and constructed from 140 capsules (see Figure 5.3) that were assembled onto concrete cores using 4 high-tension bolts. The one-person-room capsules were modified shipping containers (4 x 2.5 meter), with a built-in bedroom with TV, radio and alarm clock and a bathroom unit. The capsule and its interior furnishings were pre-assembled in a factory then lifted by crane and fastened to the concrete core shaft. The tower has long been appreciated by architects as a pure expression of the Metabolism movement both in its design and functional innovation, as well as its aesthetic appeal as an architectural icon.

Figure 5.3. Basic capsule and photos as in the Kurokawa capsule tower.

Kurokawa's design theory was based on the ability to make the capsules detachable and to replace them when needed. However, the building was not maintained during its lifetime,

which allowed damage to water pipes, causing drainage problems, and in the later years of its existence residents expressed growing concern over the presence of asbestos. Kurokawa suggested that the original design theory should be respected and that each of the capsules should be removed and replaced with an updated unit, utilising the existing and original concrete cores. This notion gained the tacit support Japan's four major architectural organisations, including the Japan Institute of Architects. However, and ironically in view of the original design theory, the building's management association wished to demolish the building and replaced it with a new 14-story tower, citing concerns regarding the towers' ability to withstand earthquakes and its inefficient use of valuable land in a prime Tokyo location. The proposed new 14-storey building would increase the available floor area by 60 percent.

To date, (March 2009), Kurokawa's tower, Figure 5.4, has not been demolished after a long international campaign by Kurokawa himself and others in the architectural profession that has attempted to demonstrate the building's iconic status. In a survey by London-based World Architecture News [21], over 10,000 architects in 100 countries were polled on their thoughts on supporting Kurokawa's solution for the tower as replacing the capsules. The results [22-23] were as follows: 75% for replacing the capsules, 20% for leaving it as is, and 5% for demolition. Even if the tower is demolished, international interest remains high in recycling each individual capsules. The future of the tower is uncertain, but the building and the ideas behind it have represented unique and appreciated contributions to architecture. Kurokawa died early in the year 2008 and it is likely that without his leadership the campaign to prevent the demolition of this building will also expire.

Figure 5.4.Kurokawa's capsule tower.

The Robin Hood Gardens development and the Kurokawa Capsule Tower were both constructed in 1972 and considered to be iconic at that time and to many people remain so now. Many in the architectural profession (as referenced in previous paragraphs) consider that these buildings are important examples of the particular stylistic developments of the 1960s and 70s and that their demolition should be resisted so that they may be appreciated by future generations. However, neither of these two buildings has shown much support from the public in general or from the organisations responsible for the management of the buildings. The reasons for this lack of support are probably complex and relate as much to making more "efficient" use of scarce and valuable land in a city context as well as the difficulties in maintaining the original buildings. However, such motivations and reasons for the demolition of existing buildings have been overcome where there has been an overwhelming public support for the building to remain. One key question regarding both these examples is, given that the architectural profession consider them iconic buildings in terms of architectural theory and aesthetic style, why are the general public at best lukewarm about supporting the buildings' preservation? Could it be that the managers of the buildings and the public at large do not apply the same notion of aesthetic value to these buildings as the architectural profession? Are modern architectural styles less valued aesthetically because they are still considered to be unusual and the public at large have neither the language nor the experience to value them or is something more fundamental at work?

These examples demonstrate that it is important to discuss and understand current views as to the meaning of aesthetic value and to consider the notion of aesthetic endurance in terms of developing methods through which such notions might be understood, tested and/or assessed. However, before developing the notion of aesthetic endurance further the concept of aesthetics itself must be examined.

5.2. Aesthetics in Theory

Aesthetics is the branch of philosophy that is concerned with the nature of art and the criteria of artistic judgment, or more generally as defined in the *Concise Oxford English Dictionary* [24] as "a set of principles concerned with the nature and appreciation of beauty, especially in art". It is also defined as "the branch of philosophy which deals with questions of beauty and artistic taste". Aesthetics is broader in scope than the philosophy of art, which comprises one of its branches. In practice, aesthetics refers to the sensory contemplation or appreciation of an object, while the philosophy of art refers to the appreciation or criticism of an artwork.

Generally, the aesthetic value of an object or work of art is considered to be concerned with the innate properties that characterise it together with a viewer's perception and judgement of where the object lies within the spectrum from beauty to ugliness. The concept

of aesthetics is concerned with the question of whether the qualities that give rise to an aesthetic perception of an object are intrinsically present within the object that they appear to qualify, or whether they exist only in the mind of the individual who perceives them. The question arises as to whether objects are understood through a particular mode of perception, the "aesthetic mode", or whether the objects have in themselves special qualities "aesthetic qualities" that are interpreted by the person who experiences them, i.e. the perceiver? Additionally, are these qualities universal and are they understood and appreciated universally?

5.2.1 The concept of beauty

Prior to the mid-eighteenth century, aesthetic inquiry was quite different from what it is today since there was no substantial concept of art as detached from trades or civic function. Works of art were commissioned by patrons and the buying and selling of existing artworks was limited.

The idea that the constant essence of beauty might consist of proportions of dimensions is attributed to Pythagoras (580-500 BC) who is said to be have discovered the fact that certain arithmetical proportions in musical instruments produce harmonic tones. On the basis of these musical harmonies the Greek tried to explain also the beauty in the proportions of the human body, of architecture and other objects. In Plato's time (428-348 BC), questions concerned with the perception of beauty placed value on attributes that promoted proper ethics and practically improved the perceiver's (human's) way of life. Plato considered the meanings accumulated in the words of conventional language, where he noted the Greek word for "beautiful", *kalos* also means "good" and "proper". He felt that beautiful objects incorporated proportion, harmony, and unity among their parts. Beauty was considered to be a permanent property that belongs to objects and which remains the same irrespective of whether a perceiver admires the object or not. Aristotle (384-322 BC), a student of Plato, clarified the concept of beauty through the enumeration of components of the objects such as order, repetition of measures and exactness. In the Middle Ages, the research of beauty was classified as opinions based on a variety of notions from theology; the argument was that beauty is an attribute of God. A notable researcher was Augustine of Hippo (354-430 AD), who stated that beauty consists of unity and order (rhythm, symmetry or simple proportions) which emerge from complexity [25]. After the revival of such inquiries into the nature of beauty during the Renaissance, the majority of the research adopted the view that sensing beauty in an object is not a result only of the properties of the object, but that it depends also, and perhaps to a greater extent, on the circumstances existing during the study of the object. Epicurus, (342-270 BC) contrary to other Greek philosophers, presented a totally different theory, stating that when one senses beauty, a feeling of pleasure is involved. The notions of Epicurus set the origins of the hedonistic theory. Beauty was not regarded as a property of

objects, but rather as a sensation related to perception. Both the theories of Plato and those of Epicurus were considered by Vitruvius in his own theory of the concept of beauty in architecture, which will be discussed later in this chapter.

5.2.2 The concept of aesthetics

The term aesthetics is derived from the ancient Greek *aesthesis*, meaning sensation or perception, in contrast to intellectual concepts or rational knowledge. In 1735, a German philosopher, Alexander Baumgarten, was the first to use the word "aesthetics" through his study of the relationship between poetry and philosophy [26]. He considered the philosophical prerequisites for perceiving works of art in order to ascertain the reasons behind man's experiences of beauty and appreciations of it. Baumgarten considered that the perception of aesthetics was gathered through the experiences of the human senses and that beauty is the most perfect kind of knowledge that sensory experience can have.

The meaning of the notion of aesthetics was further developed by Immanuel Kant who considered that Baumgarten's aesthetics could never contain objective rules, laws or principles of natural or artistic beauty. For Kant the aesthetic experience of beauty was a judgment of a subjective but universal truth. In his terms, "aesthetics" described the pleasurable aspect of the appreciation of beauty; an aesthetic judgment was subjective and related to the internal feeling or sense of pleasure or displeasure and not to any qualities in an external object. Kant's theory of pure beauty comprised four aspects: its freedom from concept (end or purpose), its objectivity and universality, the disinterest of the spectator (without involving self-interest) and its obligatory nature (being selfless). Pure beauty was considered to hold the human mind's attention with no further concern than contemplating the object itself. An object was perceived purely in terms of viewing without any further purpose than to enjoy it for its own attributes alone. In Kant's view, beautiful objects had no specific purpose and judgments of beauty were universal and not expressions of personal preference. In the *Critique of Aesthetic Judgment* [27], Kant tried to capture what was distinctive about judgments of beauty by describing them under four attributes; *(i) judgments of beauty are based on feeling; (ii) judgments of beauty have, or make a claim to, "universality" or "universal validity"; (iii) Unlike judgment of the good, judgments of the beautiful do not presuppose an end or purpose which the object is taken to satisfy; and (iv) Judgments of beauty involve reference to the idea of necessity, in the sense that one's judgment itself serves as an example of how everyone ought to judge.* The second attribute concerning universality was expanded according to Ginsborg Hannah's [28] writing on *Kant's Aesthetics and Teleology*: "*that is, in making a judgment of beauty about an object, one takes it that everyone else who perceives the object ought also to judge it to be beautiful, and, relatedly, to share one's pleasure in it. But the universality is not "based on concepts." The fact that judgments of beauty are universally valid constitutes a further feature (in addition to the disinterestedness of the pleasure on which*

they are based) distinguishing them from judgments of agreeable. For in claiming simply that one likes something, one does not claim that everyone else ought to like it too. But the fact that their universal validity is not based on concepts distinguishes judgments of beauty from non-evaluative cognitive judgments and judgments of the good, both of which make a claim to universal validity that is based on concepts." It means that the basis for a perceiver's response to beauty was considered to exist in the structure of their mind. If the perception of other individuals regarding a particular object differed, the original perceiver still could express the opinion that other individuals ought to be satisfied but not necessarily in agreement with the original perceiver's judgement. In terms of this model of aesthetic perceptions, the hypothesis proposed implies that some underlying unity to aesthetic judgment exists that allows the expression of aesthetic appreciation to occur and be understood across cultures, social classifications and through time.

5.2.3 Other views in aesthetics

The notion of (western) aesthetics went through a period of slow revolution from the late 17th to the early 20th century. Beauty or aesthetic quality was emphasised as the key component of art and of the aesthetic experience by both German and British thinkers. During this time, new thinking about art and aesthetics arose partly due to the increased interest in sensory knowledge in philosophical discourse. There was a new trend in cultural criticism that involved a wider scope of art, where different types of arts were compared to one another, and arguments arose as whether or not one should compare them and whether such comparisons should be conducted with single or differing sets of rules. According to Scruton and Munro's writing [29], it was not until the end of the 17th century that the distinctive concerns of modern aesthetics were established, where taste, imagination, natural beauty, and imitation came to be recognised as the central topics in aesthetics.

In Britain the principal influences were the 3rd Earl of Shaftesbury and his disciples Francis Hutcheson and Joseph Addison. Shaftesbury believed that the fundamental principles of morals and taste could be establish through a consideration of human nature *"as human sentiments being so ordered that certain things naturally please us and are naturally conducive to our good"* [30]. For Addison [31], *"imaginative association is the fundamental component in our experience of art, architecture and nature, and is the true explanation of their value to us"*. For Francis Hutcheson [32], aesthetic judgments are perceptual and take authority from a sense that is common to all who make them. In this perspective, the notion of aesthetics and the aesthetic experience was believed to be disclosed by humans' inner mental sense, which in other words, a subjective fact determined and varied by different perceivers.

The eighteenth-century was a time when the general public was given greater access to works of art, where arts no longer belonged so exclusively to particular privileged groups within a society and were open to a wider range of spectators and judgements. Apart from

Baumgarten and Kant, several other thinkers expressed their interest in understanding aesthetics. Schiller, was inspired by Kant's theory that aesthetic experience was free from concepts and was disinterested. He developed further the theory of the disinterested character of aesthetics. In response to the French Revolution, Schiller [33]asserted in his work, that *"it is possible to elevate the moral character of a people, by first touching their souls with beauty"*. For Schiller, aesthetic appreciation of beauty was the most perfect reconciliation of the sensual and rational parts of human nature.

5.2.4 Chinese aesthetics

Chinese aesthetics is influenced strongly by Daoism, Confucianism and Buddhism which manifests a distinctive and complex view of nature. The basic assumption is that the world of phenomena manifests the *Dao*, the Way of nature. It shows a distinctive practical-emotional spirit and a tendency to harmoniously unite human beings with nature, and believes that beauty is, first and foremost, a free state or way (*Dao*) of human life; the most important thing for human beings is how to make their own lives and existence beautiful.

Confucianism formed the foundation of Chinese social values, which admire loyalty, filial piety, obedience, fidelity, politeness, hard working, modesty and dedication. It was also influential with the Chinese arts in that it provided Chinese traditional aesthetics with a strong utilitarian trend. "Arts convey morals" is the principle of Confucian aesthetics, which pursues the unity of beauty and good as well as the unity of aesthetics and social function.

Lao-tzu, the legendary founder of Daoism, in his *Tao Te King* considered that the concept of beauty is the birth of ugliness and the emergence of moral guidance gives rise to the immorality. Instead of having absolute value independently, beauty and ugly relies on each other's existence in the human world. Lao-tzu believes that the inherent quality of aesthetics is eternal and unbreakable and such quality is independent and in all respect, exclusively existed. In Lao-tzu's theory, form is predominated in aesthetics and beauty can exist outside of human sense. However, Lao-tzu has never attempt to clearly define beauty or aesthetics (note that in Chinese only one word exists in describing either beauty or aesthetic quality). In his concept, despite the actual existence of beauty, such quality is neither absolute nor constant and it is subject to change according to time, location and individual. In Lao-tzu's word, he descript aesthetics as "form with no shape, image with no object and the so called abstraction". Therefore, beauty is a form could not be named and concurrently both endure and vary. Consequently, any attempt to define such a quality could only result in vain.

5.2.5 Japanese aesthetics

Japanese aesthetics addresses to a set of ancient ideals that include wabi (subdued, austere beauty), sabi (rustic patina), mono no aware (the pathos of things), yugen (mysterious profundity), and kire (cutting). These ideals underpin much of Japanese cultural and

aesthetic norms on what is considered beautiful or tasteful. A focus on nature, a recognition of the transience of all things of beauty, and the ideal of tranquility formed the basis of many Japanese aesthetic ideals.

Japanese literary aesthetics are rooted in both Shinto and Buddhism. In Shinto, nature is characterized by places of spiritual power, mystery, and beauty. Buddhism offered a view of nature that emphasized impermanence and interrelationship. All things are transient and unstable, and they are radically interdependent.

5.3 Aesthetic Concerns

According to Martin's discussion [34] based on the *Grove Dictionary of Art*, there are four major subjects that are continually addressed by aesthetics. Often thought to be the central is the question of what is art, how can it be defined? The border between art and non-art has always been a difficult one to draw considering the wide variety of uses for the term "art", and also the context dependency of its meanings as given by the perceivers. Definitions of art could depend on the effect it has on its audience, its place in society, how it was created, or the kind of information, emotion or impression it exhibits. Discussion exits as to whether such strict classifications or definitions are really necessary for inquiries concerning the question "what is art?"

Another much debated area of discourse concerns whether aesthetic discourses can be thought of as objective or subjective. Additionally, concerns exist as to whether a work of art is "good" or "bad", which examples are better or worse than others, and whether or not it is possible to make such judgment. Finally, issues arise regarding the importance of the creation of the works of art, the extent to which attributes that are not directly perceptible have relevance regarding the manner in which it is experienced.

Concerning the debate of whether aesthetic judgments can be thought of as objective or subjective, one side of the argument views aesthetic judgments as a matter of personal taste, determined by each individual's ideas or feelings. Taste was seen either as a sense (by Hutcheson), or as a peculiar kind of emotionally inspired discrimination (by Hume). Hutcheson's [35] explained that *"the origin of our perceptions of beauty and harmony is justly called a 'sense' because it involves no intellectual element, no reflection on principles and causes"*.

David Hume's view on art and aesthetic judgment is intimately connected to his moral philosophy and theories of human thought and emotion. When writing about Hume's philosophy, Gracyk [36] interprets this as *"feeling, not thought, informs us that an object is beautiful or ugly, or that an action exhibits virtue or vice."* In Hume's own words *"the very feeling constitutes our praise or admiration"* [37]. Gracyk continues by stating "*The feeling or sentiment is itself an aesthetic or moral discrimination. It is prior to, and the basis of, any*

subsequent expression of praise or admiration. The sentiment is the beauty of the object and it is the virtue of desirable human action. Sentiment is the sole source of values governing human activity. Taste is a "productive faculty, and gilding or staining all natural objects with the colours, borrowed from internal sentiment, raises, in a manner, a new creation." Value judgments were considered to be expressions of taste and emotional sensing judgment rather than reasoned analysis, and the recognition of aesthetic and moral beauty was considered to be a manifestation of taste and sense.

On the other side of the argument, aesthetic discourse was thought of as being objective and that the subjective model of aesthetic judgment was thought to described only the viewer's response, not the artwork or the object itself, and the facts about a work of art lay in the objective attributes inherent within the physical structures and dimensional relationships of the work. In contrast to Kant's view that beauty cannot be reduced to any more basic set of features, the British analytic theorists, William Hogarth [38], in his book *The Analysis of Beauty*, implements six principles which independently affect the notion of beauty: (i) "*Fitness of the parts … is first to be considered, as it is of the greatest consequence to the beauty of the whole."* Hogarth's fitness does not necessarily imply purpose, it emphasises more on the visual aesthetic fitness of the forms as the source of beauty, as he stated *"forms of great elegance could result in disgust when improperly applied".* (ii) *Variety* as a source of beauty in contrast to the notion of "sameness". As he stated: *"the shapes and colours of plants, flowers, leaves, the paintings in butterflies wings, shells, seem of little other intended use, than that of entertaining the eye with the pleasure of variety."* Yet, he also addressed the need of having a certain amount of "sameness" within a varied experience; as *"when the eye is glutted with a succession of variety, it finds relief in a certain degree of sameness; and even plain space becomes agreeable, and properly introduced, and contrasted with variety, adds to it more variety."* (iii) Uniformity, regularity or symmetry which is understood as a form of "composed variety" which only pleases when it is suggestive to fitness. (iv) *Simplicity* or distinctness, which enhances the pleasure of variety. (v) *Intricacy* refers to the pursuit of discovering the beauty of an object and arises from the joys of this pursuit by the active mind. Every difficulty in understanding or grasping the object enhances the pleasure of overcoming it, in order to continue the pursuit. Intricacy in form as Hogarth defined *"to be that peculiarity in the lines, which compose it, that leads the eye a wanton kind of chase, and from the pleasure that gives the mind, intitles it to the name of beautiful."* (vi) *Quantity*, i.e. forms of magnitude that are associated with the notion of greatness or the sublime. *"Forms of magnitude, although ill-shaped, will however, on account of their vastness, draw our attention and raise our admiration."* Hogarth presented an attempt to systematise and theorise work of arts through the innate physical attributes or visual aesthetic dimensions of the objects. Further discussion concerning the objective argument of the aesthetic attributes inherent within the

physical objects is addressed below when considering the object of aesthetic experience.

The discipline of aesthetics in its modern form has come to be primarily concerned with issues surrounding the creation, interpretation, and the appreciation of works of art. It involves how the experience of aesthetic attributes of the objects is mediated and perceived through the individual sensitivity and cognition of the perceiver, and the way that the experience of it is shaped and conditioned through its context, social circumstances and the previous experiences and knowledge of the perceiver. Aesthetics deals not only with the nature and value of the arts but also with those responses to any objects that provide the basis for the expression in language of the beautiful and the ugly. Figure 5.5 was derived by the author from the literature reviews on the theory of aesthetics in attempt to provide a visual reference to aid the discussion of different aspects surround the notion of aesthetics. The diagram illustrated a simplified categorization of subjective versus objective attributes when defining aesthetic expression. First, an art object is perceived and understood through the senses; then responses are generated through the processes of description, evaluation, interpretation and judgment. However, the circumstances, contextual issues, societal settings and cultural structures can condition these responses. It is possible that an underlying unity motivates human aesthetic judgments and that a universal aesthetic framework exists inherently within objects that allows the expression of aesthetic appreciation to occur. However, it equally is possible that the term aesthetic or beautiful has no sense except as the expression of an attitude, which is attached by different people to different states of conditions.

In Scruton and Munro's writing on *Aesthetics* [39], they proposed three broad approaches to understanding ideas such as beauty and taste. *First, is the study of the aesthetic concepts, or the analysis of the "language of criticism," in which particular judgments are singled out and their logic and justification displayed. Second, is a philosophical study of certain states of mind – responses, attitudes, emotions – that are held to be involved in aesthetic experience. The final approach is the philosophical study of the aesthetic object, that the existence of such objects constitutes the prime phenomenon; aesthetic experience should thus be described according to them and the meaning of aesthetic concepts be determined by them*. These three approaches show parallel concerns, as expressed in Figure 5.5, by focusing on three major elements that centre around the perceiver and the perceived object, i.e. a piece of art work or a building, and the response of the aesthetic experience. The premise was proposed that underlying all of these aesthetic phenomenons similar principles are operative and similar interests are engaged which allow the expression of aesthetic appreciation to occur. The research sought to clarify the nature of aesthetics appreciation as applied to the built environment and to delineate its underlying principles and concerns. The model shown in diagram one was utilised to understand the concept of aesthetics in assessing aesthetic

quality in the existing built environment.

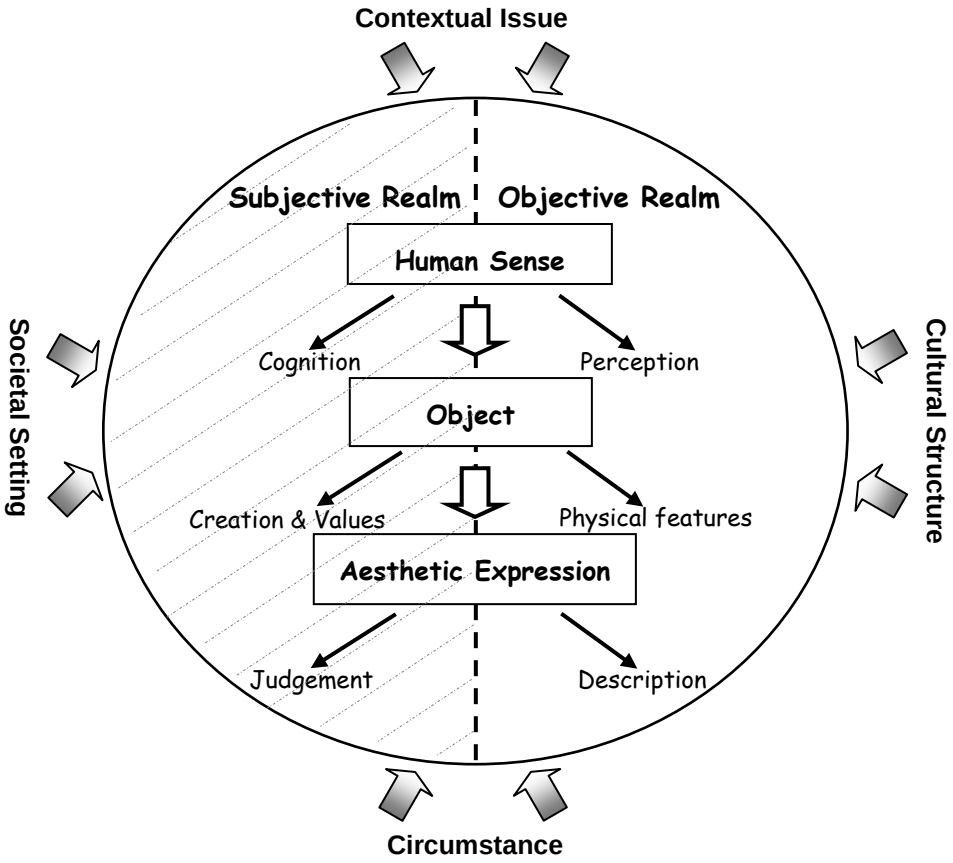


Figure 5.5. Visual diagram illustrating issues surround the notion of Aesthetics.

5.4 Aesthetic Object

Scruton and Munro [40] suggested that "*the first concern of aesthetics is to study the objects of aesthetic experience and description and to find in them the true distinguishing features of the aesthetic realm."* It expressed the notion that the aesthetic phenomenon exist primarily as a consequence of the properties within objects in which human react and respond to and describe in aesthetic terms. Under this premise, aesthetic perception and experience are described and expressed in terms of the physical qualities and features of the objects under human perception.

The German philosopher, Hegel [41] stated *"the idea of the beautiful as the absolute idea contains a totality of distinct elements, or of essential moments, which as such, must manifest themselves outwardly and become realised. Thus are produced in what we may call, in general, the Special Forms of Art, the appropriate and adequate form."* For Hegel, art was an objective conveys beauty. The development of this idea of beauty "*is not accomplished by virtue of an external activity, but by the specific force inherent in the idea itself so that the Idea, which develops itself in a totality of particular forms, is what the world of art presents us."* In this aspect, form expresses the idea of beauty, form is essential in allowing such quality to be

sensed by the perceiver. In another words, the aesthetic qualities or attributes are to be found in the perceived forms of any beauty objects.

In Scruton and Thomas's [42] discussion around the relationship between form and content, they mentioned that: Hegel [43] also argued that *"our sensuous appreciation of art concentrates upon the given "appearance" – the "form." It is this (the form) that holds our attention and that gives to the work of art its peculiar individuality. In losing its individuality, the content loses its aesthetic reality. Because it addresses itself to human sensory appreciation, the work of art is essentially concrete, to be understood by an act of perception rather than by a process of discursive thought"* [44]. The essentiality of form in relation to its content is addressed here, without the form there is no reason for attending to the work of art of any objects, no aesthetic perception could be constructed or justified by mere reference to objects' content or meanings.

Plato's writings on beauty were based on his theory of "Forms". One of the forms is "beauty", or the permanent property which belongs to all beautiful objects. Plato's *Forms* may be referred to as the different physical properties of an object, such as beautiful, tall or small. Plato placed the form of beauty at the top of a hierarchy of forms where beautiful surpasses all other *Forms*. Plato mentioned no other *Form* in the *Symposium*; where *"beauty is the Form enough"*. For Plato, *"Beauty alone is both a Form and a sensory experience (Phaedrus 250d)."*

In Plato's *Timaeus* [45], he stated: *"That which is apprehended by intelligence and reason is always in the same state; but that which is conceived by opinion with the help of sensation and without reason is always in a process of becoming and perishing and never really is."* This property of beauty remains the same irrespective of whether somebody admires the object or not. Alberti [46] also stated *"that beauty is some inherent property, to be found suffused all through the body of that which may be called beautiful."* Considering this line of thinking, beauty is an inherent property of any aesthetic object and a constant essence of beauty could be said to consist of a unity of dimensions that generates aesthetic expressions across various responses, cultures, social circumstance or though time.

5.5. Aesthetics in Architecture

The *Concise Oxford English Dictionary* [47] defines architecture as *"the art or practice of designing and constructing buildings"*. Architecture has been a form of art and buildings have tended to be included in the class of aesthetic objects as they can be seen as objects that express art qualities. For centuries, buildings existed within villages, towns and cities and served the function of providing safe and comfortable spaces for human habitation. Architectures act as distinctive symbols of societies to which they belong and act as cultural languages. They evolve and change with the community to which they bear and reflect

contemporary thoughts. Throughout history building has played a crucial role in helping to define human society's relationship with its larger surroundings. It has not merely been a means for providing shelter, but also has operated as a medium that embraces the progression and understanding of the world we live in. These forms and structures exist within a context, a local condition and a specific social structure. A building's architectural qualities provide forms that are, and become, cultural assets which gain in value and identity through their existence and express cultural characteristics and features through their usage within and throughout different time frames and contexts. Evidently, the subject of aesthetics has always been a major consideration in the field of architecture and building design. As expressed by Scruton's writing on Alberti, *"Alberti, in his repeated emphasis on what is appropriate, fitting, ordered and proportionable, is placing aesthetic considerations at the heart of the builder's activity."*

Vitruvius claimed in his *The Ten Books on Architecture* that architecture must comprise triple essence: *utilitas*, *firmitas* and *venustas* which Wotton was to translate as 'commodity, firmness and delight' [48]. To avoid misunderstanding, these three qualities are better described as functionality, strength and aesthetic effect. These qualities demonstrate that a general distinction can be made between the practical use attributes and aesthetic attributes of architecture. Aesthetic attributes in buildings are often expressed within other sub-concepts of architectural qualities, which Vitruvius expanded into six separate categories: *ordinatio* (ordering), *disposition* (design), *eurythmia* (shapeliness), *symmetria* (symmetry), *décor* (correctness), and *distributio* (allocation) [49]. Following Vitruvius's concepts, a building is beautiful when the appearance of the structure is pleasing and in good taste. Vitruvius believed that the proportions displayed by the human body could be used as a model of natural proportional perfection. He considered that if a building is to create a sense of aesthetics, it is essential that all its components are in due proportion according to correct principles of symmetry.

Leon Battista Alberti introduced the idea that architecture is mediated by the laws of nature. In his *On the Art of Buildings* [50], he defined beauty as *"that reasoned harmony of all the parts within a body, so that nothing may be added, taken away, or altered, but for the worse."* Beauty was for Alberti *"the harmony of all parts in relation to one another,"* and subsequently *"this concord is realized in a particular number, proportion, and arrangement demanded by harmony".* He referred to many aesthetic aspects addressed by Vitruvius proposed the use of mathematical terms such as number, proportion and distribution as a basis for aesthetic reasoning in architecture.

Scruton [51] reviews and critiques certain influential doctrines - functionalism, spatial experience, historical meaning and the essence concept of proportion - concerning the way of understanding aesthetic values and describing architectural experience in terms of

architecture forms. For Scruton, the aesthetics of architecture is the aesthetics of everyday life, he concluded that *"aesthetic understanding is inseparable from a sense of detail and style, from which the appropriate, the expressive, the beautiful, and the proportionate take their meaning."*

5.5.1 Architectural aesthetics in space and time

Architecture is used most prominently to deliver a message, meaning or image to its viewer through the agency of a building's appearance. A building conveys tradition and culture, it portrays the way in which a society lived at a certain time. Sigfried Giedion [52] believed that architecture serves as an index to a period. *"Everything in it, from its fondness for certain shapes to the approaches to specific building problems reflects the conditions of the age from which it springs. It is the product of all sorts of factors – social, economic, scientific, technical, ethnological."* He explains that the character of the age and the people can be interpreted and conveyed through a structure in a way that allows future generations to recognise a building and associate it with a period of the past. As in his words [53], *"… architecture is indispensable when we are seeking to evaluate that period"*. A society senses changes to perceptions of community and the relationships existing between individuals' as they evolve with time. The manner through which these sensibilities to social relationships evolve will be reflected in architectural responses that will also change with time. However, it might be reasonable to ask that if architecture is the result of so many particular conditions that exist at the moment of a building's creation and its period of existence, is it proper or possible to examine it outside of its original context? Giedion discussed this issue in terms of the value of architecture as an independent organism. He believed that once a building appears it constitutes an organism in itself with its own character, which can reach out beyond the period of its birth, the social class that commissioned it, and beyond the stylistic convention to which it belongs. Walter Benjamin also discussed how the nature of the aesthetic sense of perception changes according to social circumstance [54]. It would seem that a dual view exists as to how we perceive architecture, whether we understand it and value it as an independent organism with a set of physical properties of aesthetic value; or we judge it based on its attached sociological conditions and contextual issues.

Recently, current notions of aesthetics have been tested by Scruton [55], who questioned whether the "subject of aesthetics" actually exists. He suggested that aesthetics could be considered "*an invented category, which identifies no stable or universal feature of the human condition"*. He makes this proposal partly because of the ideological nature of the underlying concepts that define the subject of aesthetics. In support of this view he suggested that "*the term 'aesthetics' is itself a philosophical coinage"* and that it was derived from the original Greek word "aesthesis" which can be interpreted as sensation, perception or feeling. The appreciation of objects exists as a form of sensuous knowledge rather than intellectual or

conceptual knowledge. For example, when considering poetry, the content is at some level a perceptual content and is not expressed through concepts alone.

Scruton pointed out that according to post-modernized Marxists [56,57], aesthetics should not be considered to be a part of philosophy but rather as an ideology. The development of the modern usage of the notion of aesthetics could be considered to have arisen from the development of art as a commercial enterprise linked to the rise of a nouveau riche class across 17th and 18th century Europe. The purchasing of art, to some extent as an investment, inevitably lead to the question as to what constituted good art and how such a judgement could be made. Baumgarten developed the notion of aesthetics to mean the study of good and bad taste, ostensibly linking this to good or bad art and consequently good taste with beauty. Marxist philosophers have used the notion that aesthetics as a philosophical conception was associated with the rise of the nouveau riche. They asserted that it was adopted because of its value in promoting the economical and political interests of a given social class. Consequently, the ideas and theories relating to aesthetics were and are adopted because they serve and amplify the interests and social power of those that promote them. In these terms the notion aesthetic value is seen to be part of the development of bourgeois culture and the modern capitalist society. Marxist theory considers ideology as a power-seeking mode of human thinking through which ideas and theories are adopted because they serve the interests of a given class that in turn will use them to increase it social power. Thus, Kant's notion of the aesthetic judgement as being free from concepts, stated as a "disinterested interest", was not describing a human universal but rather the presentation of bourgeois ideology.

Scruton [58], seems to place importance on the Marxist view of aesthetics to develop an understanding of the nature and meaning of the notion of disinterested interest. He states that "*this 'disinterested' perception of nature, of objects of human beings and the relations between them, confers on them a trans-historical character. It renders them permanent, ineluctable, part of the eternal order of things. Bourgeois social relations are thereby inscribed into nature and placed beyond the reach of social change."* He implies from this that the notion of aesthetics, as derived by Kant, can be used to isolate objects from their use or function or as objects with economic value and so to perceive them in some purified manner in terms of their true meaning. In further developing the discussion Scruton considers that aesthetic judgement of artefact is related to states of mind and the flow of human history and so aesthetic interests "*are all laden with the culture and historical circumstances of those who experience them".*

It is not unreasonable to draw from Scruton's discussion that an alternative model of aesthetic judgments exists, which considers that judgments of "taste" may differ between cultures and that they may change over periods of time. Consequently, judgments of the

aesthetic value of an object not only involve aspects of its innate or manufactured qualities but additionally to issues that relate to social conditioning. Although aesthetic judgments might be considered to be based primarily on the physical senses, other human responses may also be involved such as emotion, intellectual opinion, desire, culturally and socially conditioned preferences and values, education, training, instinct, or a complex combination of all of these. Thus, within a given cultural group, or a social subset within that group, it is possible that a collective perception of beauty exists that could be interpreted as being a conditioned response arising from the established and traditional customs of that culture or social context. The discussion returns back to the paradox as to whether an objective aesthetic judgement towards buildings in the built environment exists which could allow a universal assessment measure to be developed and utilised for comparing architectural values across different cultures, contexts and time? Can a universal understanding of aesthetic quality towards buildings be identified– a definition of aesthetics that can be applied to the responses of all people at all times? Alternatively, do human perceptions of aesthetic quality of the built environment shift and transform themselves in different times and spaces or contexts?

Considering the notion of aesthetic value from an ethical perspective, Nigel Taylor [59] examined the question of whether any ethical grounds for praising or criticising the aesthetic content of buildings exists. His concerns were derived from his observation that many people have had the experience of wanting to register what they feel as an essentially moral objection against the form of a building only to find that their objection has been interpreted as an aesthetic objection that carries no moral weight. In his discussion he proposed that morally based criticism of a building or its aesthetic value can only be made if a clear distinction is necessarily drawn between the people – who make the judgment, and the object – the building or the inanimate objects. He states *" in cases where we feel justified in morally criticising a building, we need to distinguish criticism of the building because of its use, from criticism because of its aesthetic content or form."*

In search for "objectivity" in aesthetic judgment, Scruton [60] considered the question: *"What in particular could we mean by objective "standards" in building and design?"* In his view, judgments can be objective if they are led by the nature of human rationality to agree upon certain evaluations. He considered that the core principles of moral judgment were objective and based this assertion on the observation that rational beings consult only the facts and set aside everything that might compromise their impartiality when they come to agreement. He applied this in addressing aesthetic judgment that *"about basic matters rational beings have a spontaneous tendency to agree, provided that they attend not to their special and distinguishing interest but to the common concern of everyone."* Using an example in asking ordinary people how their town should be designed, he illustrated four principles that he considered to justify the spontaneous patterns of agreement. The first

principle was that, *"buildings should outlast the purpose for which they are constructed and also be able to adapt with the change of purpose."* He stated, "*in architecture function should follow form"* in adapting to temporary human purposes. The second principle is that *"aesthetic considerations should take precedence over all others. Aesthetic value is the long-term goal; utility, the short-term. After all, nobody wishes to conserve a building if it des not look right."* The third principle addressed the fact that architecture is a public art, which should be designed and constructed with consideration of the general public, the passers-by, the residents and the neighbours. The last principle stated that architecture is a vernacular art which addresses the different understanding of aesthetics between architects and the general public. Scruton stated further that, *"for most people, the aesthetic is important not because they have something special or entrancing to communicate, but merely because, being decent and alert to their neighbours, they want to do what is right."* In conclusion, objective judgment of a building's aesthetic value is possible if distinctions are made between its physical form and the respondent: if aesthetic judgments are obtained from the general public which are defined based on their definition of beauty or good taste.

5.6 Aesthetic Perception

Previously, discussions have considered objects in terms of their aesthetic values and their physical features in generating aesthetic experience and allowing such experience to be described in aesthetic terms by the recipient. No matter the types of object say a piece of art work or a building, the contextual circumstances, the approach adopted during their creation or the sequence of events that they may experience, the key concern in understanding the course of aesthetic expression depends on the study of the responses of perceivers to those objects. According to Scruton and Munro [61] the study of the aesthetic concepts or the analysis of the language of criticism has a dual purpose: *(i) to show how (if at all) aesthetic descriptions might be justified, and (ii) to show what is distinctive in the human experiences that are expressed in them."*

Also, in Rapoport's [62] work on environment behaviour studies, nine mechanisms linking people and environments were identified as *Physiology, Anatomy, Perception, Cognition, Meaning, Affect, Evaluation, Action and Behaviour, Supportiveness*, refer to Table 5.1. Special emphasis was addressed towards the *Perception* mechanism in which Rapoport first defines *perception* as *"the sensory reception of information from the environment."* He then argues that *"this is essential; without initially perceiving the external (and even internal!) environment, nothing else can happen."* Additionally, Alberti [63] proposed in his *Ten Books on Architecture* that, *"when you make judgments on beauty, you do not follow mere fancy, but workings of a reasoning faculty that is inborn in the mind."*

Table 5.1. Description of Rapoport's nine mechanisms linking people and environments.

Physiology – adaptation, comfort with regard to temperature, humidity, light levels, glare, noise, etc.
Anatomy – sizes and heights of elements.
Perception – the sensory reception of information from the environment.
Cognition – this concerns the mental processes that intervene between perception (acquisition of information) and knowledge about the environment.
Meaning – this is related to the anthropological aspects of cognition, includes latent aspect.
Affect – the emotions, feelings, moods, etc.
Evaluation – this leads to preferences and choices based more on wants than on needs.
Action and Behavior – the response to cognition, meaning, affect, and evaluation.
Supportiveness – this can be physiological, anatomical, psychological, social, cultural, affective, regarding choice, activity systems, behavior, and so on.

Consequently, it is proposed that a study of the responses and aesthetic perceptions of humans to "designed" objects should be undertaken; the descriptions given in aesthetic expression, the language used to express judgment and the reasoning behind such evaluation, would provide an understanding of the aesthetic qualities defined and used by the viewers and the pattern of reasoning used in making "aesthetic" judgment.

Aesthetic perceptions are generally concerned with human responses to qualitative elements of objects such as colour, sound, line, form, and words and with the way in which they are combined, say in response to a natural landscape or a consciously created work of art. The emotions of the perceiver are considered to be conditioned by their responses to the combinations of these qualitative elements. The expression of aesthetic perception generally is considered to occur through the stating of an opinion or "criticism". The structures and meanings of an object are analysed and evaluated by comparing it with other similar objects. The expression of aesthetic judgement may be considered to be the semantic interpretation or description of the observer's perception.

The word perception refers to what a person is able to perceive through the use of their bodily senses to process data about the environment or an object. According to the *Oxford English Dictionary*, perception is *"the ability to see, hear, or become aware of something through the senses; the state of being or process of becoming aware of something in such a way; a way of regarding, understanding, or interpreting something."* Perception could be divided into three phases: sensing, cognitive interpretation and evaluation which are different aspects of one single event occurring either in a linear process or perhaps more commonly through feedback in a back and forth looping action. Perception is what allows humans to understand the world through the experience of the senses and the collection of information, it relates back to its original Latin meaning as *"the action of taking possession, apprehension with the mind or senses."* Regarding the aesthetic quality of the built environment, the question remains as to how people perceive the buildings in the environment and what

language they utilise in expressing their aesthetic appreciation. Furthermore, what makes an object or, in this case, a building aesthetically pleasing in a first impression, but also in the long-term? What are the bases of this appreciation and evaluation?

To perceive something is not to understand something, but rather to believe that the perception represents the reality or a truth. Aristotle [64] stated that *"there are two distinctive peculiarities by reference to that which we characterize the soul – 1. local movement and 2. thinking, understanding and perceiving."* He grouped understanding and perception together under the common assumptions of his predecessors who, *"all look upon thinking as a bodily process like perceiving, and hold that like is understood as well as perceived by like… They cannot escape the dilemma: either whatever seems is true or error is contact with the unlike: for that is the opposite of knowing of like by like… That perceiving and understanding are not identical is therefore obvious; for the former is universal in the animal world, the latter is found in only a small division of it."* Aristotle's view of perception refers to the most immediate response humans create using their senses; perception itself is uninterrupted, it represents the raw data that enters our mind in order to be processed through thought and action.

Thomas Reid [65] explored these theories of immediacy and their relation to perception. He states *"If, therefore, we attend to that act of our mind which we call the perception of an external object of sense, we shall find it in these three things: First, Some conception or notion of the object perceived; secondly, A strong and irresistible conviction and belief of its present existence; and, thirdly, that this conviction and belief are immediate, and not the effect of reasoning."* This action of perceiving an object through sensing and recognizing its existence in its immediate form, and creating an immediate experience towards the object, according to Reid [66], *"it is not by train of reasoning and argumentation that we come to be convinced of the existence of what we perceive; we ask no argument for the existence of the object, but that we perceive it; perception commands our belief upon its own authority, and disdains to rest its authority upon any reasoning whatsoever."* Seeing is, in many ways, believing according to Reid's concept. In order to believe or understand something, one must be able to perceive the existence of such an object, and such perception that occurs is indeed immediate. These notions lead to the view that although all perception is not always objective or unmediated, the most immediate perceiving action is at least universal, and it indicates some concept or notion about the objects we perceived without the employment of reasoning.

James J. Gibson [67] developed the information-based perception theory where he explored the connection of the senses with sensation and perception. He writes, *"there are two different meanings to the verb to sense, first, to detect something, and second, to have a sensation."* Gibson [68] does not believe that the senses are the key to perception; he states *"the theory of information pickup requires a perceptual system, not senses."* This approach focused on the discovery of how humans process phenomenal information and the

relationships that come to exist within this process. The existence of sensory experience is not denied, but Gibson relies on the cognitive to accept information from our surrounding as the basis of visual perception.

John Dewey [69] explores the role of perception in *Art as Experience*. For Dewey, aesthetic evaluations come after the initial phase *"as production must absorb into itself qualities of the product as perceived and be regulated by them, so, on the other side, seeing hearing, tasting, become aesthetic when relation to a distinct manner of activity qualifies what is perceived."* The perception of any medium or object requires the use of perception as the intermediary, which in itself is immediate, but connects with understanding. Perception becomes aesthetic judgement when perceived quality is identified as having aesthetic value by the perceiver during the act of perceiving. Perception is not only what we see, nor is it what we understand about what we see, but it is the balance of seeing and understanding simultaneously. Kant [70] also demonstrated that it is not enough to just experience, but rather there must be a set of underlying truths that enable our experience. *"The doing or making is artistic when the perceived result is of such a nature that its qualities as perceived have controlled the question of production. The act of producing that is directed by intent to produce something that is enjoyed in the immediate experience of perceiving has qualities that a spontaneous or uncontrolled activity does not have."* In this perspective, aesthetic perception is generated when the perceived object is made deliberately with aesthetic qualities and is created through the intention of producing an object that is aesthetically pleasing. When our senses interpret something, there is an understanding between the viewer and their relation to the perceived object. Perception does not represent something that is fixed or constant, but rather has elements that are fixed in a system of changing elements. Reality has a set of standards that form our perception, as a priori truths addressed by Kant that space and time are fixed systems which create boundaries that allow the phenomenon to be possible.

It seems that two main views exist regarding the meaning of perception and its relationship with aesthetic judgement. The classical view expressed by Aristotle is that perception refers to the most immediate response humans create using their senses; perception itself is uninterrupted, it represents the raw data that enters our mind in order to be processed through thought and action. This view is shared by both Reid and Dewey. However, Gibson seems to reason that what these writers view as perception is just sensory data input and that this input has to be acted upon by a perceptual system to create perception. However, agreement appears to exist that the act of perceiving involves an immediate process of sensory information reception, that may or may not be termed perception, and that judgements of this information lead to aesthetic appreciation that may be conditioned by the perceiver's experience or the existing contextual conditions applying to the object.

5.7 Conclusion

As stated by Kevin Lynch [71], *"Aesthetics is often considered a kind of froth, difficult to analyse, easy to blow away."* Despite a seeming multiplicity of aesthetic aims, and despite centuries of architectural practices under given principles of design related to physical attributes of building, i.e. form and function, aesthetics still exists as a vague notion which remains open to debate and opinions. Negative attitudes exist towards the notion of aesthetics, even when it is agreed that such a notion is necessary in the creation of art works. Some do not acknowledge that it extends beyond the sphere of philosophical discourse. Some only have a vague notion of what it is, based on the common use of "aesthetic" to mean "pleasing" or "beautiful", and some carry a strong subjective expression of what they believe it is. The idea that there may be certain universal truths about the notion of aesthetics, which imply some fixed characteristics are not always understood or appreciated. However, based on the discussion in this chapter, it is reasonable to assume that the ability to perceive aesthetic qualities in an object is believed to be universal in all human beings; and aesthetic perception is to be generated when humans encounter objects constructed with aesthetic qualities or which have been created based on the aesthetic intention. Therefore, the search of an underlying unity to aesthetic responses should be possible through the investigation of the language used by recipients when describing their appreciation of objects.

The endurance of a building's aesthetic value through time was also discussed and considered to be desirable in response to the long-term goal of sustainability. Consequently, the aim of the study is to develop a methodological framework to understand human aesthetic perceptions of buildings in the built environment, and to investigate the viability of a universal tool that attempts to assess this aesthetic quality across the cultural context, and also to develop the notion of aesthetic endurance further through the exploration of a research methodology to address such a concept. Additionally, in response to the subjective and objective debate of aesthetic judgment, the study will attempt to examine the question: does aesthetic perception remain constant through both time and place? If yes, a set of universal and permanent aesthetic attributes could be identified. If the answer is no, then how can we ensure the long lasting aesthetic quality of the existing built environment? Building for long life means that at some time in the future changes and modifications may occur. How much change can occur while still allowing the building to maintain its' aesthetic value and for the architecture to continue to receive aesthetic appreciation from future generations?

Next chapter will review existing research methodologies related to human perception and environmental aesthetics to facilitate development of research activities and techniques to address humans aesthetic appreciation of the built environment.

5.8 Reference

1. Hodge, Margaret. (2008, February 26). Modern buildings must prove their worth, says Hodge. *Building Design*. Retrieved May 5th, 2008, from http://www.bdonline.co.uk/story.asp?sectioncode=427&storycode=3107228&c=1
2. Eyesore or gem: Gateshead car park. (2007, June 18). *BBC Online News*. Retrieved June 18, 2007, from http://newsvote.bbc.co.uk/2/hi/uk_news/magazine/6763067.stm?dynamic_vote=ON#vote_6748859
3. Eyesore or gem: Brunel Roundabout. (2007, June 19). *BBC Online News*. Retrieved June 19, 2007, from http://newsvote.bbc.co.uk/2/hi/uk_news/magazine/6766823.stm?dynamic_vote=ON#vote_6766823
4. Eyesore or gem: Greyfriars bus station. (2007, June 20). *BBC Online News*. Retrieved June 20, 2007, from http://newsvote.bbc.co.uk/2/hi/uk_news/magazine/6221200.stm?dynamic_vote=ON#vote_6221200
5. Eyesore or gem: Milton Court. (2007, June 21). *BBC Online News*. Retrieved June 21, 2007, from http://newsvote.bbc.co.uk/2/hi/uk_news/magazine/6222792.stm?dynamic_vote=ON#vote_6222792
6. Eyesore or gem: St Pancras. (2007, June 24). *BBC Online News*. Retrieved June 24, 2007, from http://news.bbc.co.uk/2/hi/uk_news/magazine/6230106.stm
7. Long, J.T. (2005, August 3). L.A.'s Ambassador Hotel to be demolished, Replaced by School. *Architectural Record*. Retrieved December 2, 2008, from http://archrecord.construction.com/news/daily/archives/050803la.asp
8. Sokol, David. (2006, February 28). Rudolph's Riverview High School threatened with demolition. *Architectural Record*. Retrieved December 2, 2008, from http://archrecord.construction.com/news/daily/archives/060228riverview.asp
9. Alter, Lloyd. (2008, March 4). Concrete can be beautiful. *Treehugger*. Retrieved May 15, 2008, from http://www.treehugger.com/files/2008/03/concrete-can-be-beautiful.php
10. Dyckhoff, Tom. (2008, April 5). Robin Hood Gardens or the US Embassy, which buildings should be saved?. *Times Online*. Retrieved April 10, 2008, from http://www.treehugger.com/files/2008/03/concrete-can-be-beautiful.php
11. Milliss, Ian. (2008, March 5). Don't be brutal to Robin Hood Gardens. *Adaptivereuse.net*. Retrieved May 20, 2008, from http://adaptivereuse.net/2008/03/05/dont-be-brutal-to-robin-hood-gardens/
12. Baillieu, Amanda. (2008, February 21). To the rescue of Robin Hood. *Building Design*.

Retrieved May 9, 2008, from http://www.bdonline.co.uk/story.asp?sectioncode=426&storycode=3106996&featurecode=12173&c=1

13. Jenkins, Simon. (2008, June 20). This icon of 60s New Brutalism has its champions. So let them restore it. *The Guardian*. Retrieved April 15, 2009, from http://www.guardian.co.uk/commentisfree/2008/jun/20/architecture
14. Hurst, Will. & Olcayto, Rory. (2008, February 29). Profession rallies to save threatened housing estate. *Building Design*. Retrieved March 9, 2008, from http://www.bdonline.co.uk/story.asp?sectioncode=426&storycode=3107659&channel=426&c=2
15. Hurst, Will. (2008, March 12). EH delays Robin Hood Gardens decision following BD campaign. *Building Design*. Retrieved April 14, 2008, from http://www.bdonline.co.uk/story.asp?sectioncode=426&storycode=3108645&channel=426&c=2
16. Shariatmadari, David. (2008, March 4). Prizewinners throw their weight behind Robin Hood Gardens campaign. *Building Design*. Retrieved March 9, 2008, from http://www.bdonline.co.uk/story.asp?sectioncode=426&storycode=3107912&channel=426&c=2
17. Ouroussoff, Nicolai. (2009, March 18). Rethinking postwar design in London. *The New York Times*. Retrieved April 10, 2009, from http://www.nytimes.com/2009/03/19/arts/design/19robi.html?_r=1&ref=designs
18. Rogers, Richard. & Power, Anne. (2008, June 20). Estate of the art. *The Guardian*. Retrieved April 15, 2009, from http://www.guardian.co.uk/artanddesign/2008/jun/20/architecture.housing
19. Solomon, Yuki. (2007, April 30). Kurokawa's Capsule Tower to be razed. *Architectural Record*. Retrieved April 20, 2008, from http://archrecord.construction.com/news/daily/archives/070430kurokawa.asp
20. McBride, Blair. (2008, December 22). Nakagin Capsule Tower: Architecture of the Future. *PingMag*. Retrieved April 15, 2009, from http://pingmag.jp/2008/12/22/nakagin/
21. Nakagin Tower dilemma. (2005, September 23). *World Architecture News.com*. Retrieved April 15, 2009, from http://www.worldarchitecturenews.com/index.php?fuseaction=wanappln.projectview&upload_id=126
22. Nagakin tower WAN poll result. (2005, September 23). *World Architecture News.com*. Retrieved April 15, 2009, from http://www.worldarchitecturenews.com/index.php?fuseaction=wanpoll.showwanpollresults
23. Nagakin Tower wins reprieve. (2006, January 19). *World Architecture News.com*.

Retrieved Aprile 15, 2009, from http://www.worldarchitecturenews.com/index.php?fuseaction=wanappln.projectview&upload_id=222

24. Concise Oxford English Dictionary on CD-ROM Version 1.0 (10th ed.). (2000). Oxford.: Oxford University Press.
25. Carol Harrison. (1992). *Beauty and Revelation in the Thought of Saint Augustine*, Oxford University Press.
26. Baumgarten, Alexander. (1735). *Reflections on Poetry*.
27. Kant, Immanuel. (1790). *The Critique of Judgment*. (translated by, James Creed Meredith). Retrieved December 22, 2008, from The University of Adelaide Library: http://ebooks.adelaide.edu.au/k/kant/immanuel/k16j/
28. Ginsborg, Hannah. (2008). Kant's Aesthetics and Teleology, *The Stanford Encyclopedia of Philosophy* (Edward N. Zalta ed.), from http://plato.stanford.edu/archives/fall2008/entries/kant-aesthetics/
29. Scruton, R., & Thomas Munron, T. (2003). *Aesthetics*, Encyclopaedia Britannica, CD-Rom Ultimate Reference Suite.
30. Shaftesbury, Lord. (2000). *Characteristics of Men, Manners, Opinions, Times*. Edited by Lawrence E. Klein. Cambridge University Press.
31. Addison, Joseph. (1712). The Pleasures of the Imagination. In *The Spectator*. Retrieved December 22, 2008, from http://www.mnstate.edu/gracyk/courses/web%20publishing/addisoncontents.htm
32. Hutcheson, Francis. (2008). *Inquiry into the Original of Our Ideas of Beauty and Virtue* (Revised edition). Liberty Fund Inc.
33. Schiller, Friedrich. (1910). Letters Upon The Aesthetic Education of Man. In *Literary and philosophical essays: French, German and Italian. With introductions and notes*. New York, Collier Series: The Harvard classics, 32.
34. Martin, Lesley. (2003). Aesthetics. *Constructing media theory*. University of Chicago. Retrieved December 21, 2008, from http://csmt.uchicago.edu/glossary2004/aesthetics.htm
35. Ibid. 32.
36. Gracyk, Ted. (2008). Hume's Aesthetics. *The Stanford Encyclopedia of Philosophy*. Edward N. Zalta (ed.). Retrieved December 23, 2008, from http://plato.stanford.edu/archives/win2008/entries/hume-aesthetics/
37. David Hume, (1975). *A Treatise of Human Nature* (L. A. Selby-Bigge, 2nd ed.). Edited by revised by P.H. Nidditch, Oxford: Clarendon Press.
38. Hogarth, William. (1753). *The Analysis of Beauty*. IULM University. Retrieved December 27, 2008, from

http://www.tristramshandyweb.it/sezioni/e-text/hogarth/analysis_html/title-page.htm

39. Ibid. 29.
40. Ibid. 29.
41. Bosanquet, Bernard., & Bryant, W.M. (1886). Selections from Hegel's Lectures on Aesthetics, *The Journal of Speculative Philosophy*. Retrieved December 22, 2008, from http://www.marxists.org/reference/archive/hegel/works/ae/index.htm
42. Ibid. 29.
43. Hegel, G.W.F. (1973). *Aesthetics: Lectures on Fine Art* (Vol. 1). Translated by T. M. Knox. Retrieved December 19, 2008, from http://www.marxists.org/reference/archive/hegel/works/ae/contents.htm
44. Ibid. 36.
45. Plato. (1997). *Plato's Timaeus*. Translated by Benjamin Jowett. Retrieved December 22, 2008, from The University of Adelaide Library: http://ebooks.adelaide.edu.au/p/plato/p71ti/index.html
46. Alberti, Leon Battista. (1988). *De re aedificatoria. On the art of building in ten books*. Translated by Joseph Rykwert, Neil Leach, and Robert Tavernor. Cambridge, Mass.: MIT Press.
47. Ibid. 24.
48. Wotton, Sir Henry. (1624). *Elements of Architecture*, London.
49. Vitruvius. (1999). *Ten Books on Architecture*. Translation by Ingrid D. Rowland. United States of America, Cambridge University Press.
50. Ibid. 36.
51. Scruton, R. (1979). *The Aesthetics of Architecture*. Princeton University Press.
52. Giedion, S. (2003). *Space, Time & Architecture: the growth of a new tradition* (5th ed.). Harvard University Press.
53. Ibid.
54. Benjamin, Walter. (1997). The Work of Art in the Age of Mechanical Reproduction. In Hannah Arendt (Ed.), *Illuminations*. . New York: Schocken Books., pp. 217-247.
55. Scruton, R. (2007). In search of the aesthetic. *British Journal of Aesthetics*, Vol.47, No.3, pp. 233-250.
56. Bourdieu, Pierre. (1984). *Distinction: A Social Critique of the Judgment of Taste*. Translation by Richard Nice. London.
57. Eagleton, Terry. (1990). *The Ideology of the Aesthetic*. Oxford: Oxford U.P.
58. Ibid. 54.
59. Taylor, Nigel. (2000). Ethical arguments about the aesthetics of architecture. In W. Fox (Ed.), *Ethics and the Built Environment*. London: Routledge, pp. 193-206.

60. Scruton, Roger. (1999). Most architecture should be modest: On architecture and aesthetic judgment. In W. S. Saunders (Ed.), *Judging Architectural Value*, Minneapolis: University of Minnesota Press, pp. 124-128.
61. Ibid. 29.
62. Rapoport, A. (2005). Culture, Architecture and Design. Chicago, Locke Science Publishing Company, Inc., pp. 12-13.
63. Ibid. 45.
64. Aristotle. (2004). On the Soul. In Robert Schwartz (Ed.), *Perception*, Malden, MA: Blackwell, pp. 12-17.
65. Reid, Thomas. (2004). Essays on the Intellectual Powers of Man. In Robert Schwartz (Ed.), *Perceptio*n, Malden, MA: Blackwell, pp. 24-29.
66. Ibid.
67. Gibson, James J. (2004). The Senses Considered as Perceptual Systems. In Robert Schwartz (Ed.), *Perception*, Malden, MA: Blackwell, pp. 71-76.
68. Gibson, James J. (2004). The Ecological Approach to Visual Perception. In Robert Schwartz (Ed.), *Perception*, Malden, MA: Blackwell, pp. 77-79.
69. Dewey, John. (2005). Having an Experience. *Art as Experience*, New York: Perigree, pp. 36-59.
70. Kant, Immanuel. Paralogisms. In *Critique of Pure Reason*. p. 358. Retrieved December 24, 2008, from http://www.hkbu.edu.hk/~ppp/cpr/paral.html
71. Lynch, Kevin. (1976). *Managing the Sense of a Region*. Cambridge, Mass.: MIT Press.

5.9 Bibliography

1. Pappas, Nickolas. (2008). Plato's Aesthetics", *The Stanford Encyclopedia of Philosophy*. Edward N. Zalta (ed.). Retrieved December 23, 2008, from http://plato.stanford.edu/archives/fall2008/entries/plato-aesthetics/
2. Aque, Chris. (2007). Perception. *Constructing media theory*. University of Chicago. Retrieved December 21, 2008, from http://csmt.uchicago.edu/glossary2004/perceptionperceivability.htm
3. Dwyer, Patricia. Perception/ perceptual realism. *Constructing media theory*. University of Chicago. Retrieved December 21, 2008, from http://csmt.uchicago.edu/glossary2004/perception(2).htm
4. Parkes, Graham. (2008). Japanese Aesthetics, *The Stanford Encyclopedia of Philosophy.* Edward N. Zalta (ed.). Retrieved April 12, 2009, from http://plato.stanford.edu/archives/win2008/entries/japanese-aesthetics/
5. <社會人與自然人之爭：孔子與老子藝術觀之比較>，劉司量撰/《中國人的價值觀》，沈清松編，桂冠圖書出版，一九九四再版一刷。

6. 阮慶岳著，《弱建築，從道德經看台灣當代建築》，田園城市出版社，台北，二〇〇六。
7. 老子，道德經，商務印書館 (香港)，二〇〇三年三刷版。

6 Methodology Review

In this chapter, the general public's aesthetic appreciation of the built environment will be further discussed and developed in the context of various research methodologies and techniques to aid the development of research activities in response to the thesis concerns.

6.1. Aesthetic Perception in the Built Environment

In the pursuit of sustainability the focus mostly has been on developing technical solutions that will reshape the built environment and consequently resolve environmental problems. An acknowledgement of the impacts that humans exert on the environment and responsibility for many environmental problems is necessary in order to refocus the emphasis in developing solutions to achieve sustainable development [1]. A better understanding of how humans perceive and interact with the built environment will be required.

Many environmental behaviour studies (EBS) have been undertaken to better understand the underlying factors that influence people's attitudes and concerns about the environment and environmental issues. For example, how do humans interact with environments when addressing environmental problems. Variables such as experiences, personality, beliefs about control, efficacy, and responsibility have all received considerable research attention [2, 3]. These researches have been based on traditional attitude theory, in which attitudes about environmental issues are measured on cognitive, affective, and behavioural dimensions. Other researchers have examined the underlying systems and factors that influence human responses towards the physical built environment. Visual qualities of the built environment, human perception and evaluation of the urban setting, aesthetic preference and personal dimensions for natural landscape, aesthetic impacts and planning controls have all received considerable research attention [4-8]. Most of these researches have focused on landscape and the natural environment, in which human preferences, experiences, perceptual concepts (e.g., mystery, complexity and coherence, etc.), and meaning dimensions are analyzed in relationship to an individual's aesthetic response. Schultz [9] argued that this approach to the study of environmental attitudes lacked a clear theoretical foundation for why a person develops particular types of attitudes. In order to ascertain the reasons behind human attitudes, a methodology that allows an understanding of human perceptions and the relative aesthetic responses towards the environment will be necessary.

6.1.1 The field of environmental aesthetics

Aesthetics as discussed in Chapter 3 is the field of philosophy that studies the way in which humans experience the world through their senses. The notion of aesthetics is especially concerned with the appreciation of particular objects that affect the human senses in a pleasing manner. Aesthetic appreciation is not limited to enjoyment of artworks only, it is

directed towards any object in the world and the everyday environment that surrounds day-to-day human existence and activity. Human aesthetic experience of the world is a concern of the field of environmental aesthetics, studies done in this field attempt to understand the aesthetic appreciation of humans as well as the human-influenced, human-constructed environments and the natural environments. Scientific methodologies are utilised to explain the relationship between human response and physical surroundings.

6.1.2 The scope of environmental aesthetics

The field of environmental aesthetics focuses on perceiving and recognizing the meaning of human interactions with the environment. It has developed in part because of the general public's concerns for the aesthetic conditions of everyday environments. Extending from the philosophical definition of aesthetics, it includes various environmental influences on the whole range of factors and issues that affect humans. It is also concerned about how such understanding could be utilised in the development of environmental design and solutions to provide favourable and enjoyable environments for the public.

Much of the work on environmental aesthetics grew out of attempts to analyse aesthetic experience in terms of the design features recognised and valued by the environmental design and planning disciplines when assessing natural and rural scenes or landscape architecture. Other empirical studies focused on measuring aesthetic preferences of different individuals for different environments. There were also attempts to provide a psychological basis for the appreciation of environments as well as attempts to apply aesthetic experience models to analyse such appreciation.

6.2. Research Methodologies of Aesthetic Response to the Environment

Researchers and designers involved with environmental aesthetics seek to find the universal principles that explain similarities and differences in human responses that give rise to aesthetic appreciation. According to Nasar [10], environmental influences on aesthetic evaluation have two components, the formal and the symbolic or associational. Formal analysis of aesthetics focuses on the attributes of the object and how they contribute to aesthetic response. Such an analysis may consider physical properties of objects such as size, shape, colour, complexity and balance. Symbolic analysis of aesthetics focuses on factors that allow humans to imply meanings, judgments or thoughts through experience or interaction with the perceived object and its attributes such as style or context.

Jon Lang [11] suggested that in attempting to understand the nature of the aesthetic experience, it is useful, according to Santayana [12], to distinguish between sensory, formal, and symbolic interaction between people and their built environment. *Sensory aesthetics* is concerned with the pleasure of the sensations human receive from the environment. It involves the arousal of one's perceptual systems, it is multidimensional, and arises from the colours,

orders, sounds, and textures existing within the environment. *Formal aesthetics* in architecture is concerned primarily with the appreciation of the physical attributes in the visual world, such as the shapes, rhythms, complexities, and sequences of experiences of individual buildings and the combinations of buildings that form the built environment. According to Lang [13], Fechner [14] pioneered work addressing formal aesthetics, which focused mainly on the formal issues of pattern perception, sequential experiencing of vistas, definition of complexity and simplicity and form empathy. Similarly, part of Berlyne's [15] approach to experimental aesthetics was defined in objective terms of physical attributes such as the number and lengths of lines, dots, and angles within visual patterns. *Symbolic aesthetics* addresses the associational meanings that humans hold through their appreciation of the environment.

6.2.1 Formal aesthetics and symbolic/sensory aesthetics

As discussed previously, human behaviours are influenced by the environment. The environment is multidimensional and constitutes both physical components, such as buildings with their attributes, and social components, such as human responses to the surrounding environment. Human perception of the physical environment can be defined either in terms of objective attributes independent of the perceiving individuals, or in subjective terms as a product of human comprehension of the environment. The first approach can be referred to as the formal analysis of aesthetics, which uses objective and quantitative techniques to identify the physical properties of an object, such as size, shape or complexity to the assessment of aesthetic quality of environments. Talbot [16] considered size and its meaning both aesthetically and functionally in the physical environment. Objective features such as buildings, pavements, fences, houses and enclosures were perceived as making places look smaller; while trees, trails, pathways and spaces were perceived as making places look bigger. Stamps [17] examined several physical determinants of visual impacts and aesthetic preferences for buildings in the environment, such as skylines [18]; residential façades [19]; variations in building silhouettes arising from the numbers of turns, lengths of segment, angles, and symmetry [20]; architectural details [21]; architectural mass [22]; scale and character [23]; and others [24]. Salingaros [25, 26] used mathematics and architectural patterns to examine twentieth century architectural attitudes towards human's visual experience of the built environment.

The symbolic and sensory approaches focused on defining the environment through human perception and cognition systems. Boulding [27] introduced the concept of "image" which was related to an individual's subjective knowledge of the world, and his or her sense of being located in space and time, and in a web of human relations and emotions. He proposed that *"a person's behaviour depends on their image of the world and this image not only makes society, society continually remakes the image which is the key for humans to understand the dynamic of society."* Stea's [28] study of cognitive maps, i.e. mental descriptions of the

environment, and environmental perception was concerned with *"how stabilized, fully formed impressions come to be, how mapping takes place in the brain, and the form and content of the maps as represented in human graphic or verbal descriptions."* Burnette [29] considered the nature and function of the mental image which people hold of architecture and their environments. He concluded that mental image has three important roles: *"as an abstract framework for organizing behaviour; as functional patterns in the mediation of thought; and as the symbolic basis of language and communication."* Hershberger [30-32] discussed the possibility of predicting human comprehension of (or meanings derived from) architectural environments. Various types of meaning were indicated and explained based on a perceiver's educational and geographical backgrounds. According to Nohl [33], symbolic meaning *"results from three levels of human response: perceptive cognition (which involves recognition, appraisal, and knowledge of a place), symptomatic cognition (in which objects disclose process behind them), and symbolic cognition (in which objects become symbols for something else)."* Berlyne [34] discussed perceptual concepts of human responses: novelty, complexity, and interestingness in relation to perception as well as his main idea on arousal and aesthetics [35-37]. Research on human emotional responses, such as feelings, towards the environment was reviewed by Stamps [38] to suggest that *"there should be three basic components to feelings: a component of pleasure, a component of arousal, and a component of dominance."* These studies all attempted to identify the underlying dimensions through which individuals perceive and interpret the environment and the relationship of these dimensions to aesthetic responses.

Figure 6.1 was derived by the author from various methodology reviews and analyses aim to underpin various aspects and attributes contributing to human aesthetic perception in the built environment. Nasar's [39] *Environmental Aesthetics, Theory, Research, & Applications*, Stamps' [40] *Psychology and the Aesthetics of the Built Environment*, and over twenty journal articles related to environmental aesthetics by Stamps and others (refer to bibliography) were reviewed as major references in developing this analytical diagram. Figure 6.1 attempts to illustrate what it is that humans perceive when interacting with buildings and the physical built environment, and how they respond and describe their perception and aesthetic appreciation.

This has been expressed in terms of a triangular relationship linking "perceiver", "building & physical environment", and "response". The specific appearance of a building, or any object in the physical environment can be perceived and defined through a set of physical features with objective measures. This process can be referred to as the formal analysis of aesthetic responses discussed in the previous paragraph. The perceived information is then synthesized by the perceiver through human observations and thoughts including cognitive or non-cognitive associations to generate responses or descriptions of such perceptual terms of the symbolic or sensory analysis of aesthetic appreciation. The perceiver's response could be

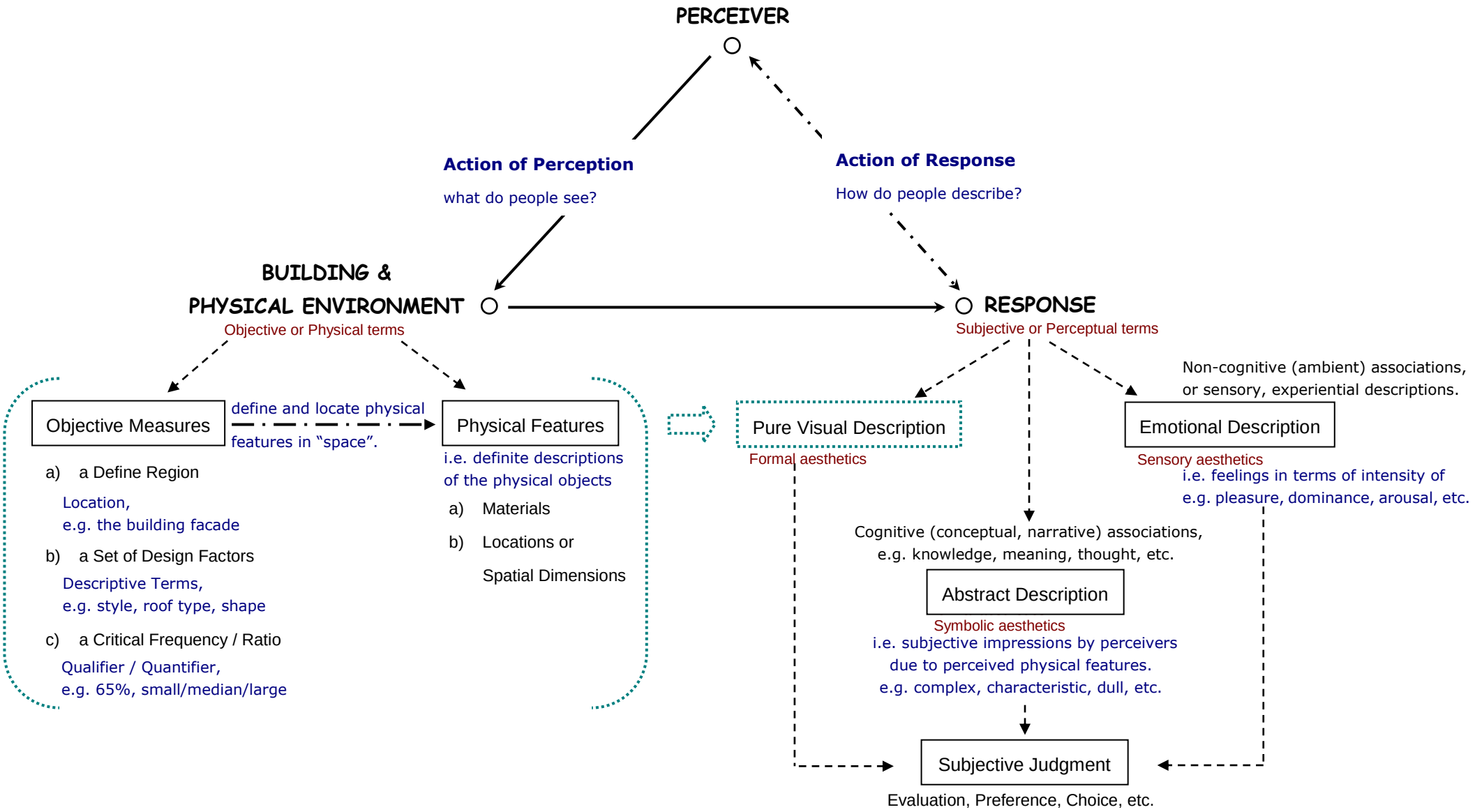


Figure 6.1. Analytical diagram illustrating determinants and components from human perception to aesthetic response.

based on a purely visual description formulated on the physical features of the perceived environment. Alternatively, it could be independent from the objective properties and be developed based on descriptions arising from perceptual translations of sensory or emotional experiences, or other knowledge based conceptual associations as abstract descriptions. These physical and/or perceptual responses become the basic reasoning behind an individual's subjective judgments or evaluations towards the built environment which eventually influences and directs human behaviour and action.

6.3. Approaches to the Definition of Aesthetic Perception

As illustrated in figure 1, aesthetic response can be defined in either objective physical features or subjective perceptual terms. Objective in this context refers to the quantification of environmental variables through a defining measure that is other than the perceptual process. The objective approach has been referred to by Willard [41] as an *"instrumentalist view and asserts that nature's objects and events have inherent aesthetic value as causes of the aesthetic experiences of people."* The subjective perceptual approach, on the contrary, according to Fenton and Reser [42] asserts that *"although there exists an objective external environment, aesthetic value is indeed determined by an individual's perception and construct of the environment."* In discussing approaches to research in environmental perception, Wapner, Cohen, and Kaplan [43] emphasized a dichotomy in the definition and perception of environment between two groups of researches: some researchers *"conceive of the environment in terms of independent or quasi-independent physical features – objective properties of phenomena*", while other researches assume *"that environment could not be characterized independent of either human perception or human action."* Russell and Ward [44] have also noted in a review of environmental psychology the *"continuing debate between environmental psychologists taking a cognitive approach and those emphasizing the study of the objective physical environment."* In searching for the most appropriate approach to define aesthetic appreciation related to the environment, Carlson [45] noted that, *"there is no theoretical conflict between these two approaches in the search for an understanding of human aesthetic perception, as each proposes necessary conditions for aesthetic appreciation of everyday environments."* He also [46] emphasized that aesthetic appreciation of the environment *"is a function of various non-formal qualities in addition to formal qualities."* Clearly, it is equally important to identify the underlying dimensions or objective determinants in making an aesthetic response, as well as to consider such judgment as dependent on human cognitive associations and individual's constructs of the environment.

This concern to identify the notion of aesthetics in terms of either objective attributes or subjective human responses was also discussed in chapter 3, where debates centred on whether aesthetic judgment can be thought of as objective or subjective. As stated by Carlson [47], *"there is perhaps some practical tension between the two kinds of approaches, owing to*

the appreciative difficulty of being totally engaged with objects of appreciation and yet at the same time taking into account knowledge relevant to their appreciation." Fenton [48] has also stated that *"the dichotomy between objective and perceptual or cognitive definitions of environmental variables or structural and content determinants of preference has a historical parallel in much of the research in experimental aesthetics."* There have always been simultaneous developments of methodologies or approaches to defining aesthetic response either through the objective properties of environmental stimuli or through aesthetic judgments devised from the perceived environment by an individual. Consequently, existing research suggested that parallel research is required in order to comprehend the link between human aesthetic perception of the physical built environment and the perspectives of objective (formal) and subjective methodologies.

6.3.1 The integrative approach between subjective and objective methodologies

Although these parallel streams of research have developed through the application of considerable reasoning and logic, it has been argued that it is important to consider how these parallel approaches can be reconciled and integrated to provide a more holistic understanding of human aesthetic appreciation towards the physical built environment. The perception of environmental aesthetic quality should be treated as an interactive phenomenon that is simultaneously dependent on both objectively definable variables and an individual's cognitive or non-cognitive representation of the environment. As Willard [49] stated: *"beauty emerges as a result of the interaction between a human experiencer (or even a nonhuman one) and the natural objects and events experienced, but that beauty is not located only in, or attributable solely to, either the former or the latter."* An adequate understanding of human response to the physical environment will ultimately require that perceiver and the perceived are given equal and concurrent consideration where an integrative approach is considered to address both sides of the argument.

Carlson [50] stated that *"this kind of bringing together and balancing of feeling and knowing is at the heart of any experience and is, moreover, that which is expected in the serious, appropriate aesthetic appreciation of works of art."* Fenton and Reser [51] discussed this interactional perspective by stating *"the issue, very briefly and in general, is how to reasonably assess the relative contribution of perceiver and perceived in determining a complex behavioural product, such as a percept, a judgment, or an environmental preference."*

6.4 Research Techniques for Aesthetic Perception

Developing design methodologies and solutions that include considerations of human values and behaviours are much more complex than developing technical solutions. Humans derive value not just from their physical surroundings and material satisfaction but also from the intellectual and emotional perceptions with which they interact with both the natural surroundings and the diversity in the built environment. Environments, and changes to them

affect the manner in which people behave; how people see and interpret their surroundings mediates environmental effects. These effects are tempered by experiences people have had in their past and their intentions for engaging with future surroundings. In any attempt to understand human responses toward visual attributes of buildings and the built environment, it is important to be able to understand the basis for individual and collective thoughts and perceptions regarding these structures and how these are translated into individual and societal responses and judgments.

6.5. Approaches in Measuring Aesthetic Responses

When attempting to measure or quantify aesthetic responses to the physical environment researchers and investigators have employed a variety of methods. Visual attributes in the physical setting are often utilised as the principle determinants of responses, where variables are defined through the use of objective measures or subjective descriptions with judgments. Figure 2 was derived by the author to illustrate the different approaches and relationships between various methods. It adopts the basic triangular links derived in figure 1, and illustrates the physical perceived environment as separate from the perceiver's responses. The diagram aims to provide a framework to aid researches in developing a methodology to assess the general public's aesthetic perceptions and also to examine and further develop the notion of building endurance concerning the aesthetic appreciation of the physical built environment.

Fenton and Reser [52] suggested that three principle approaches have been used to define physical landscape variables in influencing the perception of landscape quality: (i) the objective measurement of physical-setting variables (objective quantification); (ii) the use of judges' ratings to define standardised landscape variables with a clear environmental reference (i.e. normative judgment); (iii) the description of landscape variables in phenomenological terms, i.e. in terms of human consciousness and experience (phenomenological descriptions). Although focusing on landscape-preference literature review, these three main approaches were reviewed and illustrated in diagram figure 2 to suggest an efficient research approach for addressing aesthetic appreciation of the physical built environment.

According to Zeisel [53], people respond to environments in five different ways: (i) What they *see in* environments - perception and meaning; (ii) what they *feel about* environments - opinion and value; (iii) what they *do in* environments - place, path and relation; (iv) what they *do to* environments - adaptations, displays and messages; and (v) what they *know about* environments - knowledge and data. In considering human perception of environments, Zeisel explained, people make sense of their surrounding by observing them with all their senses and then organizing, interpreting, and giving meaning to what they observe. What people perceive and use in the interpretation in turn has consequences for what people do in an environment and how they respond to it. The better the process of what people perceive of their

surroundings and how they translate it into action is understood, the better the assessment that can be made in addressing people's needs and preference. Making sense of the environment is a process of perception, the way people select and organise what they are aware of in a situation through all their sense [54, 55]. Peoples' interpretations of what they perceive formulate the meanings or descriptions they assign to attributes or objects they perceived and which often are used as the basis when responding to environments.

6.5.1 Semantic differential scale with preference evaluation tool

According to Osgood et al. [56], Sapir and Whorf stated *"how we perceive, how we think, and even how we formulate philosophies depend upon the structure of the language we speak."* As illustrated in Figure 6.2, human descriptions of what they perceive in the physical environment can be separated into three categories: (i) visual description, (ii) abstract description and (iii) emotional description. The semantic differential, a general measuring technique developed by Osgood et al. [57] to measure connotative meaning has been used widely by researchers to obtain judgments of meaning or responses of perception from various respondent groups on various environmental qualities. In Osgood's [58] semantic differential task a subject judges a series of concepts (objects, e.g., flower) against a series of bipolar seven-step scales defined by verbal opposites (e.g., beautiful-ugly). Stamps [59] also discussed the example of using semantic differential scales for measuring feelings. Hershberger [60] investigated the meaning people attached to perceived architectural materials (such as the forms, colors, spaces, and other qualities of architecture), and the requirement to create physical environments that can be satisfactorily perceived, felt, and used by the respondents. Hershberger and Cass [61], reviewed a number of research projects that had employed semantic scales, and by selecting lead scales for the factors that had appeared in previous research, identified a group of twenty semantic differential scales to develop an approach that architects could use to predict user responses to the buildings they design [however, many of projects that Hershberger and Cass reviewed were unpublished dissertations or papers]. Sanoff [62] also utilised the semantic differential scale method to develop a model that was to be used by designers to describe desirable attributes. In Kasmar's [63] development of a usable lexicon of environmental descriptors, sixty-six descriptive adjective pairs were identified as a descriptive scale which can be used by people for the description of the physical environment.

The method of semantic differential scale not only can serve as a scaling tool in measuring the intensity level of feelings, meanings or descriptions of human responses; it can also serve as a descriptive tool where the focus is emphasised on selecting appropriate adjectives to form the bipolar terms serving as the two ends of the scale.Humans often express their response in combination with certain types of evaluations or judgments. Aesthetic judgment was briefly discussed in chapter three concerning theoretical debates and philosophical discourses. To analyse aesthetic appreciation, the qualities of various physical

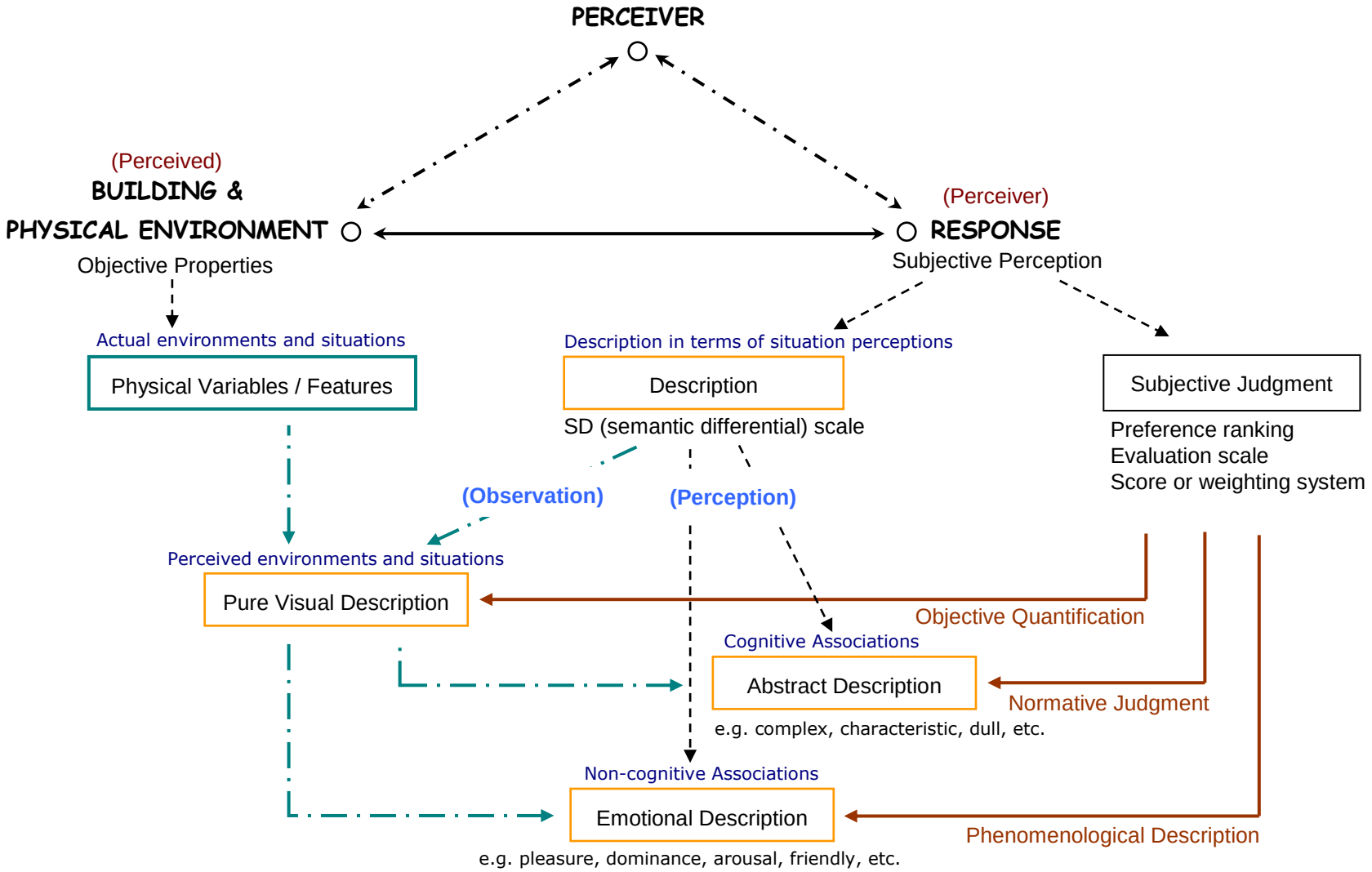


Figure 6.2. Approaches and tools aim to measure or quantify human aesthetic responses.

variables or the intensities of pleasures experienced, judgments and responses were often arranged in a rank order representing different degrees of magnitudes. Preference ranking or preference indication is often employed by researchers to obtain respondent's aesthetic judgment.

6.5.2 Visual description with objective quantification approach

In *visual description*, perceivers describe the physical variables or features of what they perceived in the environment. The process can be defined as quasi-objective description which prescribes the objective properties perceived by a human observer without involving any subjective judgment (i.e. pure data input). However, it could be argued also that in order to know what is perceived and to be able to describe the properties observed, cognitive associations such as knowledge or experience must be employed, which temper the visual description causing it to be subjectively dependent on the individual perceiver. The perceiver observes the environments with subjective or emotional associations which become his or her perception of the environments.

A selection of physical variables in the environment was first identified in the *objective quantification approach*, defined by Fenton and Reser [64], where respondents were asked to provide their aesthetic responses using preference reactions to visual material containing a variation of the selected variables. In the process of identifying specific physical features, researchers often assume a direct relationship between the objective properties of the actual environment and the observed (in contrast to perceived) aesthetic quality of the environment. However, distinction should be made between that which exist in the environment and that which is perceived by the observer. Research should focus on the features that are actually perceived by the respondents as providing true reasoning behind human behaviours and judgments. In Fenton and Reser's [65] critique on the objective quantification approach it was stated, *"studies that attempt to relate perceived aesthetic quality to objective characteristics of the environment generally suffer from both the manner in which the physical variables are selected and the nature of the criteria used in selection."* They contended that in this type of approach variables are often selected by the investigator based on their assumptions of what are the most common attributes of the environment on which people make judgments. As discussed previously, the physical variables in the environment may not reflect respondents' actual perceived quality in making aesthetic judgments. Consequently, variables assumed and defined by the investigators may not sufficiently represent what is important for perceivers in making an aesthetic response toward the physical environment. As commented by Sanoff [66] regarding his own study in developing a model of descriptors to measure attributes in the visual environment: *"In order to identify attributes for study, an ad hoc list was drawn from the terms most frequently used by designers in their judgments and descriptions of the environment, it undoubtedly reflects a professional bias."* This potential for differences to exist in environmental responses between the professionals and the general public will be

discussed further in later paragraph of this chapter.

The objective quantification approach also presented several other interpretive difficulties, where research has tended to examine the elements of stimuli as they related to aesthetic response, rather than emphasis on the content or relationship between different properties. For example, it is not clear why specific physical features should be associated with positive aesthetic response, or conversely negative response. The use of objectively quantifiable attributes only in the assessment of environmental preference has also led to a narrow consideration that only those aspects of the environment representing "formal" properties of the perceived situation were thought to have an influence on human aesthetic appreciation.

6.5.3 Abstract description with normative judgments approach

In moving towards a more subjective definition of human aesthetic perception, *abstract description* has been considered and refers to responses involving human cognitive associations such as knowledge, belief, thoughts or past experience in expressing such a descriptor. Abstract description addresses responses which are expressed using concepts such as complexity, characteristic, symmetry or balance. Although these types of descriptors were seen to address a more subjective aspect of human response when compared to pure visual description, it was still considered to represent only the objective aspect of an aesthetic judgment as those descriptors still addressed the physical attributes of objects in comparison to emotional descriptions where feelings were described. A useful method for distinguishing between the subjective and objective aspects of an aesthetic judgment or response were suggested by Stamps [67] as *"try to insert the descriptor into the following format: "I feel ____ in this environment.". If the sentence makes sense, the descriptor then belongs to a feeling; otherwise it belongs to the object."* This category of abstract descriptors or concepts were referred to as "vague ideas" by Stamps [68] in his critique of vague phrases and polices used in contemporary design review. He suggested that *"vague instruction ("fit the building into its context") tell that person very little about what he or she must do to comply".* He proposed that such abstract concepts should be more clearly defined in terms of materials and spatial locations (a defined region, a set of design factors and a critical frequency).

Figure 6.3. Figure derived from Stamps' [70] research on defining block character.

For example, in the research concerning the idea of visual character, shown in Figure 6.3, Stamps [169] proposed that *"the impression of character depends on the frequency of design features, if all houses are two stories or all are three stories, the character is clearly two or*

three stories (a, d). If only some of the houses have some features, the impression of character is not clear (b, c)". In this example, the block face represents the defined region; the set of design factors were the roof shape, house size and façade color; the frequency was referred to different ratio combinations of the set of design features in generating various stimuli. The critical frequency (the ratio which defined the abstract descriptor – visual characteristic) was then obtained from statistical analysis of respondents' response using preference selections. Taking this approach, the abstract descriptor – visual characteristic- can then be defined using objective descriptions of physical attributes with mathematical measures.

Stamps [71] also investigated the question of how well vague notions of complexity can be predicated from objective geometrical properties of architectural shapes. The impression of complexity has been an important but abstract concept in aesthetic theory. Several early studies were done by Berlyne [72, 73]. By focusing on shape complexity with building silhouettes, shown in Figure 6.4, Stamps' results suggested that: *"for architectural forms, the impression of complexity can be predicted quite well from the number of turns in the form's outline. The impression of complexity can be reduced about 25% if the form is symmetric. Variations in line lengths or angles did not affect the impression of complexity for this sample of forms (building silhouette)."* Figure 6.4 illustrates the process in developing visual stimulus to be evaluated by respondents in a paired-comparison experiment on the criterion of perceived complexity. Nine 2-dimensional building shape silhouettes were created that varied in four geometric factors: number of vertices, symmetry, variation of lengths of line segments and variation of angles. Stamps' investigations suggested potential research methodologies in relating abstract subjective descriptions with objective physical properties.

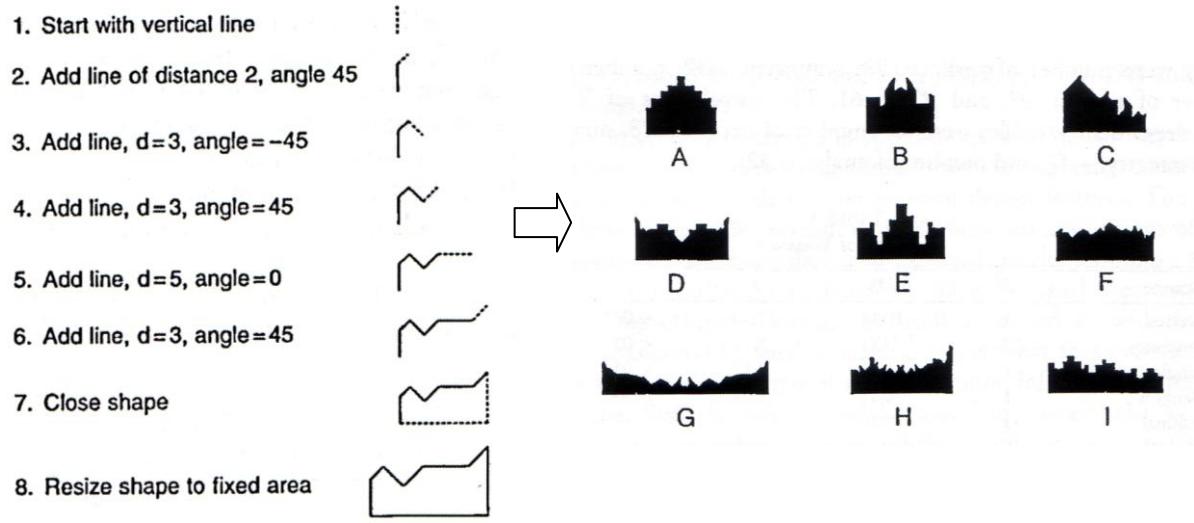


Figure 6.4. Figure derived from Stamps' [74] investigation of architectural silhouettes in relation to complexity.

This type of approach was referred to as making *"normative judgments"* in Fenton and Reser's analysis. The approach was demonstrated in Wohlwill's [75] research, which again

was concerned with the abstract concept of complexity, where the relationship between preference and complexity in scenes of the urban and natural environments was investigated. Wohlwill defined complexity, as a characteristic of the objective environment, and it was quantified by summing judges' ratings of *"color, shape, direction of dominant lines, texture, and natural versus artificial"* [76], which referred to *"actual attributes of the environment, rather than purely subjective experience"* [77]. All of these researches employed the normative judgments approach aimed at being able to quantify various abstract concepts with physical attributes to obtain objective measure of the environment that could then be used to predict preference or aesthetic appreciation.

6.5.4 Emotional description with phenomenological descriptions approach

The last type of description is concerned with human emotional responses in the expression of aesthetic perception towards the physical environment. This *emotional description* of a perceiver's responses to the aesthetic quality of the environment is sometimes referred to in terms of an "affective response". Emotional or affective responses are the subjective aspect of human perception which defines human aesthetic experience or responses in terms of feelings. According to Stamps' [78] review, there should be three basic components to feelings: a component of pleasure, a component of arousal, and a component of dominance; and feelings should be able to be described in terms of intensities of these three components. This approach of defining physical features based on an emotional description obtained from the perceiver is particularly important for researchers when identifying objective variables which may have a "psychological impact" [79] on the individual's perception of aesthetic quality.

Physical attributes of the environment also can be considered in phenomenological terms and may be investigated through structured-interview techniques, open-ended questions, verbal associations, and visual image responses [80, 81] where individuals elicit responses from either the cognitive or non-cognitive domains. Fenton and Reser [82] referred to this type of approach to the expression of aesthetic perception as *phenomenological descriptions*. Although Fenton and Reser didn't directly link this approach with emotional response, through examples provided in their writing, the author has suggested such linkage as illustrated in Figure 6.2. Honikman's [83] work was referred to by Fenton and Reser in applying this technique to describe the way in which living rooms are phenomenologically perceived and construed as similar and different. The electing of super-ordinate and subordinate constructs is described by Honikman [84] as follows:

> *"If a trio of interiors resulted in the informant identifying a "friendly-hostile" construct and the living room being studied was identified as being "friendly," he was asked, "What evidence do you have for saying it is 'friendly'?" He would then give another construct, for example, "cosy"; then he would be asked, "what evidence do you have for calling this room 'cosy'?" He would then give another construct such as "It has a low*

ceiling." Eventually a series of three or four constructs would emerge, usually relating an abstract construct such as "friendly" to a series of "physical" or "tangible" constructs such as the "relationship between the two chairs," "the warm colors" or "the rough texture of the bricks."

Consequently, descriptions such as "friendly", "hostile" or "cosy" were categorized by the author as the emotional descriptors which described feelings a perceiver obtained from perceiving physical properties of objects in the environment.

A major criticism indicated by Fenton and Reser towards this type of approach is that feelings do not describe what is being judged and nothing meaningful could be said of the relationship between the objective and the perceived attributes of the environment [85]. This was also addressed by Stamps [86], however, as illustrated in Figure 6.2 derived by the author, whether the obtained aesthetic responses contain abstract or emotional descriptions, researchers should always be able to define such responses with the perceived physical variables or descriptions as all three types of descriptors are formulated based on the observed physical properties of the environment. As demonstrated in the example given by Honikman above, an abstract or emotional construct such as "friendly", after a process of questioning to ascertain meaning based on reasons for preference, could emerge as a series of physical attributes.

In order to understand how people perceive the aesthetic qualities of the built environment, what kind of criteria they use and what are the potential influential factors in making aesthetic judgement, it is important and necessary to begin with researches that focuses on the examination of how people describe what they perceive in the environment and how aesthetic perceptions are expressed through the use of their languages. Initially in terms of the contextual background of the research (i.e., the location, the socio-cultural background, the language used for the investigation, and etc.), and the demographic factors of the respondent groups. Consequently, research techniques are required that can be applied to the collection of relevant data to provide an understanding of the basis for these perceptions through the manner in which they are expressed.

6.6. Research Context

6.6.1 Cross-culture / cross-context

The paradox of "Think globally, act locally" suggests that sustainability issues should be considered at various scales and levels within and across societies. It is difficult to assess how individuals or society in general understand and perceive aspects of human activity. In trying to examine how people or society respond to urban environments and the buildings within them it is important to be able to understand the basis for individual and collective opinions and judgments of these structures and how these are culturally conditioned and translated into individual and societal perceptions of them.

Comparisons across cultures are particularly difficult when non-material attributes such as peoples' feelings, perceptions and judgements are involved as such values cannot be easily measured. The discussion concerning aesthetic responses as the product of individual cognitive associations was discussed both in chapter 5, when addressing the subjective aspect of aesthetic judgment, as well as in early paragraphs of the current chapter in finding appropriate research methodologies to address this context of individual person dependent aesthetic response. As mentioned in the previous paragraph, according to Stamps' analysis on environmental aesthetic literatures, there were more studies focused within single cultures (64%) than across cultures. The limited attempts to address the influence that cultural context may have on human aesthetic appreciation are clearly demonstrated by table 3, which illustrated that cross-cultural studies so far have only focused on natural environment but not buildings or different style of architectures. Stamp concluded in his analysis that *"claims on cross-culture is solidly established and this topic is unlikely to reward future research. … The consensus between experts and non-experts was just the same as between other demographic groups."* He also stated that *"a plausible reason for this discrepancy is sampling bias"*, which is illustrated clearly in Table 6.1. It is the view of the author that the results of Stamps review, shown in Table 6.1, indicate a need for research to examine peoples' aesthetic responses towards buildings across different styles of architecture in the built environment and across different cultural contexts.

Table 6.1. Comparisons of participants in aesthetic appreciation studies to include students or non-students and whether participants were derived from one country or more than one country, and whether the scenes observed were of the natural environment, ordinary architecture, or avant-garde architecture. Derived from Stamps [109].

Stimuli	Students		No Students	
	Single-culture	Cross-cultural	Single-cultural	Cross-cultural
Natural environment	38	114	166	40
Ordinary Architecture	7	2	37	0
Avant-garde Architecture	9	0	19	0

Berlyne [110] investigated human verbal responses to visual patterns cross-culturally. Recognizing that human norms differ widely from culture to culture and exercise powerful influence over the taste of individuals, they proposed to understand how far cross-cultural findings reveal universal characteristics and how far they reveal peculiarities of human responses from participants with particular social backgrounds and/or cultural influences. They concluded *"there clearly are differences among individuals and among ethnic groups, but there are also impressive similarities in the ways in which people with markedly different cultural backgrounds respond to the same visual material."* In the process of understanding the general public's aesthetic perception towards the built environment, cross-cultural research

could generate useful empirical information concerning human perceptions and relative influence factors. Consequently, it is proposed that part of the research in this study is to focus on attempting to understand the human universals and differences of aesthetic responses as they apply to appreciations of buildings in the environment related to the cultural influences existing in three separate locations in Japan, Taiwan, and the UK. This part of the research will attempt to respond to the question of whether the perception of aesthetic quality remains constant cross-culturally, or whether it does vary and change based on different individuals with various contexts and cultural backgrounds?

6.6.2 Demographic Factors of the Respondent

In trying to examine how people and/or society respond to urban environments and the buildings within them, it is important to identify the various demographic factors which may affect people's aesthetic appreciation. In 1999, Arthur Stamps [87] published a literature review of one hundred and seven empirical items of literature that had been published on demographic effects in environmental aesthetics. This information was analyzed using statistical correlation in an attempt to provide planners with a better understanding of how well the preferences of different demographic groups agree. Over 12 demographic factors were examined as shown in Table 6.2, where the overall correlation of preference between different demographic groups was very high (r = 0.82). However, several potential weakness and future implications were identified by Stamps [88].

Stamps' work together with other reviewed literatures, are discussed and utilised in this study to consider which demographic factors are critical in the research of environmental aesthetics. Results from Stamp's analysis suggested that (i) studies of natural environments dominate (83%) over studies of built environments, (ii) about 40% of studies used students as respondents, (iii) there were more studies within single cultures (64%) than across cultures.

Table 6.2 illustrates the findings from Stamps' literature reviews [89] concerning the correlations of the environmental aesthetic preference between different demographic groups. Several conclusions were drawn by Stamps where low correlation was found for three demographic groups: when children of age 12 or less were compared with adults (F9-finding 9: r=0.61), when members of special interests were compared with other people (F11: r=0.56), and for avant-garde architecture when designers' tastes were compared with non-designers' tastes (F12: r=-0.46).

Table 6.2. Findings from Stamps' literature analysis by distinct demographic groups in environmental preferences. Number of stimuli samples used by researchers, reviewed by Stamps, to examine correlation among various demographic groups - after Stamps.

Comparison findings between different demographic groups	Nstim (number of stimuli)	r (correlation)
F1) All demographic groups	1221	0.82

F2) Designers/others: nature & ordinary architecture	141	0.89
F3) Ethnic affiliation	20	0.87
F4) Political affiliation	35	0.86
F5) Students as representatives	56	0.86
F6) Cross cultural	430	0.85
F7) Gender	63	0.84
F8) Students vs. other respondents	150	0.83
F9) Age <=12 vs. age > 12	24	0.61
F10) Real experts (designers) vs. others	221	0.60
F11) Special interest groups vs. others	42	0.56
F12) Designers/others for avant-garde architecture	80	-0.46

6.6.3 Demographic groups

In Stamps' literature analysis [90], thirteen demographic groups were used to categorized respondents included in all the previous researches he reviewed, as illustrated in Table 6.3. With reference to Table 6.2, the highlighted demographic factors will be considered in this study and are to be individually discussed in the following paragraphs.

Table 6.3. Demographic categories used by Stamps in his literature analysis.

Respondent Groups used in literature analysis – Definition provided by Stamps
1. Real Public –respondents sampled using survey protocols or from civic groups without vested interests in development issues.
2. Real Designers –actual architects, landscape architects, and planners.
3. Real Decision-makers –predominantly resource managers.
4, 5, and 6. Students –with architecture or landscape architecture majors, students with social science or other non-design majors, and students with managerial majors.
7. Students (others) –students with un-indicated majors.
8. Special Interest Groups – both for and against growth, included range interests, conservation interests, and neighbourhood activists.
9. Children whose ages were less than 13 years.
10. Males and Females.
11. People with liberal or conservative political affiliation.
12. Ethnic Membership – Hispanic, Black, Asian.
13. Cross-cultural variable.

6.6.4 The professionals versus the general public

Nasar [91] reviewed a variety of studies examining subjective response to environments and indicated the importance of the aesthetic evaluation dimension in response to the environment. It is evident from his work that the aesthetic quality of the environment is

important to the public. Citizens will fight to protect an aesthetic resource or protest to remove an eyesore; homeowners may become concerned with what they perceive as a neighbour's aesthetic intrusion; cities try to control the visual quality of their streetscapes, buildings and environments; national policies attempt to preserve local aesthetic characteristics and reduce possible visual degradation.

Evidence collected by Nasar [92] suggests that the general public value the visual qualities of their everyday environments. Building facilities, infrastructures and other day-to-day environmental settings are all experienced on a regular basis by large numbers of people, the general public, who have a substantial influence on the evaluative image of a city. However, despite this legitimate and extensive public interest, decisions about the visual quality of the environment often are made by design professionals or government agencies without consulting the general public. In Nasar's review, several researches [93-95] also indicated that *"professionals differ from the public in their environment preferences and, furthermore, such differences are not trivial and they can result in widespread effects."*

A number of researchers have investigated and compared results obtained from the professionals/experts and the general public/layperson concerning aspects, thoughts and preferences of the environment. Differences were observed in the responses and potential professional bias were indicated. Apart from Stamps' finding from literature reviews shown in Table 6.2 that correlation was low between real experts (designers) and others, Gifford et al. [96] reviewed over 15 articles which compared the aesthetic preferences of architects and laypersons. They found that *"architects and non-architects differ in their assessments of buildings or the way they conceptualize buildings"* and concluded from their investigations on the aesthetic differences that *"both groups strongly based their global assessments on elicited pleasure, but the two groups based their emotional assessment on almost entirely different sets of objective building features, which may help to explain why the aesthetic evaluations of architects and laypersons are virtually unrelated."*

All these studies and literature reviews suggest that differences exist between members of the design professions and laypeople's perceptions towards buildings, and results could be biased if the measuring tool has not been developed objectively based on the general public's understanding by considering the selection of descriptors to be used in measuring attributes in the environment.

6.6.5 Student as respondent

Previous studies to environmental aesthetic perception with a focus on buildings in the built environment mainly used students as respondents or compared results between design, non-design students with practicing design professionals. Stamps [97] states that *"students are used, of course, because they are so very convenient and inexpensive."* Although various studies have intended to address this issue of difference they have used pre-architects, architectural students or non-architectural university students to represent the non-architects

or layperson. In Hershberger's [98] study of meaning and architecture, he stated *"it was decided that the most straightforward and effective way to approach this problem was to conduct and experiment in which architects and laymen would be directly compared in their attribution of meaning to buildings"*, however *"the experiment utilized three groups of twenty-six students as respondents, graduating thesis students in architecture, group of pre-architects, and a random sample of non-architects versus a group of architecture students"*. It is clear that pre-architects or architecture students could not sufficiently represent the views and knowledge of non-architects or layperson concerning building evaluation. As demonstrated by Whitfield and Wiltshire's [99] study that *"evaluative differences both within and between groups comprising design trained and maths trained subjects. These differences, and particularly the patterns of association obtained, implicate training as a factor underlying the acquisition of aesthetic values – at least for the design trained "*. Although the aim of Kasmar's [100] study was to develop *"a lexicon of architectural descriptors that are relevant and meaningful and that can be used by non-architects to describe psychical environments"*. Categories used in describing architectural space were suggested by architects and designers and descriptors were listed by architectural students. This substantial use of students as respondents tends to provide a very limited understanding of the real public's aesthetic perception. Berlyne [101] referred to Frances' experiments which illustrated how *"even an extension to non-student sections of western society can cast doubt on the generality of findings"*.

Thus, the general public with a wide age span is identified in this research as the appropriate respondent group in an attempt to understand the general aesthetic appreciation of the public across different societies to develop assessment tools addressing the visual quality of the built environment.

6.6.6 Special interest group

When defining the special interest groups as shown in Table 6.3, Stamps included a rang of interest groups including both for and against growth, conservation interests, and neighbourhood activists. Referring back to Stamps' (F11 in Table 6.2), a relatively low correlation (r=0.56) was found for the special interest groups and other respondents. It is also apparent that among the 1221 studies he reviewed only 24 considered this demographic effect. It would seem, that further inquiries addressing this particular factor and comparison would be beneficial especially when considerations are made concerning the management of the existing built environment; a point supported by Stamps.

Buildings acquire a major part of their value and significance from local context including the local residents, community, direct or indirect users. Apart from the members of special interest groups (for example, historical preservation group), every individual, depending on their level of knowledge about the building, could all potentially posses a special interest towards a particular building.

6.6.7 Age groups including children (age from 9-11)

According to Table 6.2, there were only 24 out of 1221 stimuli samples that considered the comparison between the age of respondents above and under 12 years old. It would seem that future emphasis should be given to this issue, particularly when the consensus between children and adults was indicated to be low. It was also evident that substantial numbers of studies used students as respondents which presented a limited span of age considerations and life experience, and possibly social background, and so results derived from such populations could not convincingly be considered to represent the real population. Consequently, it is suggested that it would be worthwhile to investigate whether differences exist for responses between different age groups' to the built environment and the buildings within them and that children under age 12 should be included. Several studies [102-108] concerning environmental perceptions also indicated age as a critical influencing factor and a weak negative correlation with age was often demonstrated. Although focussing on landscape assessment, Zube and Pitt's [109] findings demonstrate that young children do rate the environment differently from adults and the ratings of the older adults differ slightly from those of young and middle-aged adults. In their study, respondents were broken down into six age groups (6-8, 9-11, 12-18, 19-35, 36-65 and 65+). It was found that the two youngest groups agreed on scenic value ratings, but deviated considerably from the remaining four age groups. Within the remaining age groups, very high correlations existed between the perceptions of the three groups from age 12 to 65-year-olds while a lower correlation existed between the ratings of the these three age groups and those subjects over 65-year-olds. Utilizing this reference and various demographic research questionnaires and reviews, together with considerations made about human lifestyles, the age groups of respondents for this study will be broken down into six age groups as: (i) 9 to 11-year-olds, (ii) 12 to 18-year-olds, (iii) 19 to 29-year olds, (iv) 30 to 49-year-olds, (v) 50 to 64-year-olds, and (vi) over 65-years-old.

6.6.8 Types of environmental stimulus

Apart from the above mentioned demographic factors, Stamps also addressed the need to investigate demographic differences within restricted ranges of environments. Findings F2, F10 and F12 shown in Table 6.2 addressed the issue of how well designers' evaluations agree with the evaluations of other groups concerning different types of environmental stimulus. A summary finding on this issue as stated by Stamps is the F10 result shown in Table 6.2, which compared designers' preferences against the preferences of other people with a low correlation of r=0.60. However, when the data were divided according to the type of stimulus, different results were obtained. He stated *"the key distinction was whether the stimuli were or were not high style, avant-garde architecture. If it were, then the agreement between designers and other people fell to r=-.46 (F12), but if the stimuli were of nature or of ordinary architecture, then the agreement between designers and other people was very high (r=0.82). what seemed to matter was not the demographic factor, but rather the stimulus factor."* Table

6.4 further illustrates this point while also indicating that more than half of the reviewed literatures were done on investigated the natural environment.

The issues highlighted above, both related to demographic factors of the respondents and types of environmental stimulus, will be addressed and taken into account when developing the study to investigate the general public's aesthetic perceptions towards existing buildings in the built environment.

Table 6.4. Findings from Stamps' literature analysis by type of stimulus in environmental preferences, findings following results shown in Table 6.1. - after Stamps.

Stimulus Types	Nstim (number of stimuli)	r (correlation)
F13) All	826	0.73
F14) Nature	530	0.80
F15) Built	296	0.54
F16) Ordinary architecture	179	0.80
F17) Avant-garde architecture	117	-0.09

6.7 Conclusion

The aim of this chapter was to review various methodologies employed by previous research in attempts to assess the aesthetic appreciation of the environment. Various difficulties encountered in understanding human perceptions were discussed. Several issues to be considered in future research were suggested such as; the need to focus on buildings and different styles of architecture and to address the real public as respondents, particularly children under 12-years-old. The need for an emphasis on cross-cultural study was suggested as providing potential for generating useful findings across a wider range of human aesthetic response, as well as contributing towards aim of sustainable development as it applies at local level. Comparisons between, and analysis of, aesthetic responses and judgments should not be based only on the physical features perceived; it should also consider human emotional and cognitive descriptions to recognise the relationship between what humans perceive and how those humans respond or feel. Consequently, the study will attempt to address the issues above while recognising the need to develop a methodological framework to examine the concept of building endurance especially related to aesthetic endurance.

Additionally, the universal and culturally derived aspects of human responses in perceiving the aesthetic qualities of buildings in the built environment should be examined. Ultimately the results of such investigations will respond to the emerging issues in the field of building assessment methods to provide guidance and design decision aids addressing issues of aesthetic appreciation in sustainable development.

Next chapter reports the research activity developed and initiated in addressing the universal and cultural issues of aesthetic response across three countries in the UK, Japan and Taiwan.

6.8 Reference

1. Maloney, M. P., & Ward, M. P. (1973). Ecology: Let's hear it from the people – An objective scale for measurement of ecological attitudes and knowledge. *American Psychologist*, 28, 583-586.
2. Schultz, P. W., Oskamp, S., & Mainieri, T. (1995). Who recycles and when: A review of personal and situational factors. *Journal of Environmental Psychology*, 15, 105-121.
3. Kals, E., & Maes, J. (2002). Sustainable development and emotions. In P. Schmuchk, & P. W. Schultz (Eds.), *Psychology and sustainability* (pp. 97-122). New York: Kluwer.
4. Kaplan, R. (1985). The analysis of perception via preference: a strategy for studying how the environment is experienced. *Landscape Planning*, 12, 161-167.
5. Kaplan, R., & Herbert, E. H. (1987). Cultural and sub-cultural comparisons in preference for natural settings. *Landscape and Urban Planning* 14.
6. Berleant, A. (1988). Aesthetic perception in environmental design. In J. L. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 84-97). New York: Cambridge University Press.
7. Nasar, J. L. (1984). Visual preferences in urban street scenes – A cross-cultural comparison between Japan and the United States. *Environment and Behavior*, 15, 79-93.
8. Purcell, T. (1992). Abstract and specific physical attributes and the experience of landscape. *Journal of Environmental Management*, 34, 159-177.
9. Schultz, P. W., Shriver, C., Tabanico, J. J., & Khazian, A. M. (2004). Implicit connections with nature. *Journal or Environmental Psychology*, 24, 31-42.
10. Nasar, J. L. (1988). Editor's introduction. In J. L. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 3-5). New York: Cambridge University Press.
11. Lang, J. (1988). Symbolic aesthetics in architecture: toward a research agenda. In J. L. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 11-26). New York: Cambridge University Press.
12. Santayana, G. (1896). *The sense of beauty*. Reprint, New York: Dover.
13. Ibid. 11.
14. Fechner, B. (1876). *Vorschule der Aesthetik*. Leipzig: Breitkopf und Hartel.
15. Berlyne, D. E. (1974). Verbal and exploratory responses to visual patterns varying in uncertainty and redundancy. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics* (pp. 121-158). Washington, D. C.: Hemisphere.
16. Talbot, J. F. (1988). Planning concerns relating to urban nature settings: the role of size and other physical features. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 290-299). New York: Cambridge University Press.
17. Stamps, A. E. (2000). *Psychology and the aesthetics of the built environment*. Massachusetts: Kluwer Academic Publishers.
18. Stamps, A. E. (2006). Visual impacts of skylines: effects of overall shape, turns in roofline,

and variance in building dimensions on ratings of pleasure and interest. http://home.att.net/~ieq/ 3 October 2006

19. Stamps, A. E. (1999). Physical determinants of preferences for residential facades. *Environment and Behavior*, 31(6), 725-753.
20. Stamps, A. E. (1998). Complexity of architectural silhouettes: from vague impressions to definite design features. *Perceptual and Motor Skills*, 87, 1407-1417.
21. Stamps, A. E. (1999). Architectural detail, van der Laan Septaves, and pixel counts. *Design Studies*, 20, 83-97.
22. Stamps, A. E. (1998). Architectural mass: from vague impressions to definite design features. *Environment and Planning B: Planning and Design*, 25, 825-836.
23. Stamps, A. E. (1994). A study in scale and character: contextual effects on environmental preferences. *Journal of Environmental Management*, 42, 223-245.
24. Ibid. 17.
25. Salingaros, N. A. (1999). Architecture, patterns, and mathematics. *Nexus Network Journal*, 1, 75-85.
26. Salingaros, N. A. (2000). Hierarchical cooperation in architecture, and the mathematical necessity for ornament. *Journal of Architectural and Planning Research*, 17, 221-235.
27. Boulding, K. (1956). *The Image: Knowledge in Life and Society*. Ann Arbor, MI: University of Michigan Press.
28. Stea, D. (1974). Architecture in the head: cognitive mapping. In J. Lang (Ed.), *Designing for Human Behavior: Architecture and the Behavioral Sciences* (pp. 157-168). Stroudsburg, Pennsylvania: Dowden, Hutchinson& Ross, Inc.
29. Burnette, C. (1974). The mental image and design. In J. Lang (Ed.), *Designing for Human Behavior: Architecture and the Behavioral Sciences* (pp. 169-182). Stroudsburg, Pennsylvania: Dowden, Hutchinson& Ross, Inc.
30. Hershberger, R. G. (1988). A study of meaning and architecture. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 175-194). New York: Cambridge University Press.
31. Hershberger, R. G. & Cass, R. C. (1988). Predicting user response to buildings. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 195-211). New York: Cambridge University Press.
32. Hershberger, R. G. (1974). Predicting the meaning of architecture. In J. Lang (Ed.), *Designing for Human Behavior: Architecture and the Behavioral Sciences* (pp. 147-156). Stroudsburg, Pennsylvania: Dowden, Hutchinson& Ross, Inc.
33. Nohl, W. (1988). Open space in cities: in search of a new aesthetic. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 74-83). New York: Cambridge University Press.
34. Berlyne, D. E. (1974). Novelty, complexity, and interestingness. In D. E. Berlyne (Ed.),

Studies in the new experimental aesthetics (pp. 175-180). Washington, D. C.: Hemisphere.

35. Berlyne, D. E. (1974). *Studies in the new experimental aesthetics*. Washington, D. C.: Hemisphere.
36. Berlyne, D. E. (1960). *Conflict, Arousal and Curiosity*. New York: McGraw-Hill.
37. Ibid. 15.
38. Ibid. 17., p.79.
39. Nasar, J. L. (1988). *Environmental Aesthetics: Theory, Research, and Application*. New York: Cambridge University Press.
40. Ibid. 17.
41. Willard, L. D. (1980). On preserving nature's aesthetic features. *Environmental Ethics* 2, 293-310.
42. Fenton, D. M. & Reser, J. P. (1988). The assessment of landscape quality: an integrative approach. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 108-119). New York: Cambridge University Press.
43. Wapner, S., Cohen, S. E., & Kaplan, B. (1976). *Experiencing the Environment*. New York: Plenum Press.
44. Russell, J. A., & Ward, L. M. (1982). Environmental psychology. *Annual Review of Psychology* 33, 651-688.
45. Carlson, A. A. (1977). On the possibility of quantifying scenic beauty. *Landscape Planning* 4, 131-172.
46. CARLSON, ALLEN (2002). Environmental aesthetics. In E. Craig (Ed.), *Routledge Encyclopedia of Philosophy*. London: Routledge. Retrieved January 15, 2009, from http://www.rep.routledge.com/article/M047SECT7
47. Ibid., at Conclusion page.
48. Fenton, D. M. (1988). Dimensions of meaning in the perception of natural settings and their relationship to aesthetic response. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 327-342). New York: Cambridge University Press.
49. Ibid. 41., p.297.
50. Ibid. 46., Conclusion page.
51. Ibid. 42., p.109.
52. Ibid. 42.
53. Zeisel, J. (2006). *Inquiry by Design*. New York: W. W. Norton & Company.
54. Goodey, B. (1971). *Perception of the Environment. Birmingham*, England: Centre for Urban and Regional Studies, University of Birmingham, pp. 2-3.
55. Theodorson, G., & A. Theodorson. A. (1970). *A Modern Dictionary of Sociology*. London: Methuen, p. 295.
56. Osgood, C. E., May, W. H., & Miron, M. S. (1975). *Cross-cultural Universals of Affective*

Meaning. University of Illinois Press.

57. Osgood, C. E., Suci, G.. J. and Tannenbaum, P. H. (1957). *The Measurement of Meaning*. University of Illinois Press.
58. Ibid. 56.
59. Ibid. 17.
60. Ibid. 30.
61. Ibid. 31.
62. Sanoff, H. (1974). Measuring attributes of the visual environment. In J. Lang (Ed.), *Designing for Human Behavior: Architecture and the Behavioral Sciences* (pp. 244-260). Stroudsburg, Pennsylvania: Dowden, Hutchinson& Ross, Inc.
63. Kasmar, J. V. (1970). The development of a usable lexicon of environmental descriptors. *Environment and Behavior*, 153-169.
64. Ibid. 42., p.111.
65. Ibid. 42., p.112.
66. Ibid. 62., p.247.
67. Ibid. 17., p.35.
68. Ibid. 17., p.26.
69. Ibid. 17., p.59.
70. Ibid.
71. Ibid. 20.
72. Ibid. 34.
73. Ibid. 36.
74. Ibid. 20.
75. Wohlwill, J. F. (1968). Amount of stimulus exploration and preference as differential function of stimulus complexity. *Perception and Psychophysics,* 4, 307-312.
76. Ibid., p.308.
77. Ibid. 76., p.63.
78. Ibid. 17., p.79.
79. Kaplan, R. (1975). Some methods and strategies in the prediction of preference. In E. H. Zube, R. O. Brush, & G. G. Fabos (Eds.), *Landscape assessment: Values, perceptions and resources* (pp.118-129). Stroudsburg, Pa.: Dowden, Hutchinson and Ross.
80. Lynch, K. *The Image of the City*. Cambridge, MA: M.I.T. Press, 1960.
81. Downs, R. M., & D. Stea (Eds.). *Image and Environment: Cognitive Mapping and Spatial Behavior*. Chicago: Aldine, 1973.
82. Ibid. 42., p.114.
83. Honikman, B. (1972). An investigation of the relationship between construing the environment and its physical form. In W. J. Mitchell (Ed.), *Environmental design: Research and practice. Proceedings of the Third Environmental Design Research Association*

Conference (Vol. 1, pp. 6-5-1—6-5-11). Los Angeles: UCLA.

84. Ibid., p.6-5-5.
85. Ibid. 42., p.115.
86. Ibid. 17., p.35.
87. Stamps, A. E. (1999). Demographic effects in environmental aesthetics: a meta-analysis. *Journal of Planning Literature*, 14(2), 155-175.
88. Ibid.
89. Ibid.
90. Ibid.
91. Nasar, J. L. (1988). Editor's Preface. In J. L. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. xxi-xxvii). New York: Cambridge University Press.
92. Ibid.
93. Canter, D. (1969). An intergroup comparison of connotative dimensions in architecture. *Environment and Behavior*, 37-48.
94. Groat, L (1982). Meaning in Post-Modern architecture. An examination using the multiple sorting task. *Journal of Environmental Psychology*, 2, 3-22.
95. Ibid. 31.
96. Gifford, R., Hine, D. W., Reynolds, D. J, & Shaw, K.T. (2000). Decoding modern architecture: a lens model approach for understanding the aesthetic differences of architects and laypersons. *Environment and Behavior*, 32(2), 163-187.
97. Ibid. 87.
98. Ibid. 30.
99. Whitfield, A., & Wiltshire, J., (1982). Design training and aesthetic evaluation: an intergroup comparison. *Journal of Environmental Psychology*, 2, 109-117.
100. Ibid. 63.
101. Berlyne, D. E. (1974). A cross-cultural study of exploratory and verbal responses to visual patterns varying in complexity. In D. E. Berlyne (Ed.), *Studies in the new experimental aesthetics* (pp. 259-278). Washington, D. C.: Hemisphere.
102. Ibid. 30.
103. Ibid. 99.
104. Ibid. 62.
105. Shen, J., & Saijo, T. (2008). Reexamining the relations between socio-demographic characteristics and individual environmental concern: Evidence from Shanghai data. *Journal of Environmental Psychology*, 28, 42-50.
106. Van Liere, K. D., & Dunlap, R. E. (1980). The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence. *The Public Opinion Quarterly*, 44, 181-197.
107. Fransson, N., & Garling, T. (1999). Environmental concern: conceptual definitions,

measurement methods, and research findings. *Journal of Environmental Psychology*, 19, 369-382.

108. Carp, F. M., & Carp, A. (1982). Perceived environmental quality of neighborhoods: development of assessment scales and their relation to age and gender. *Journal of Environmental Psychology*, 2, 295-312.

109. Zube, E. H., Pitt, D. G., & Evans, G. W. (1983). A lifespan development study of landscape assessment. *Journal of Environmental Psychology*, 3, 115-128.

7 The Contextual and Universal Aspects of Aesthetic Appreciation

7.1 Aesthetic Response in different cultural contexts

Based on the discussion on aesthetic philosophy previously in chapter 5, it was concluded that the ability to perceive aesthetic qualities in an object should be universal in all human beings; and that aesthetic perception is generated when humans encounter objects constructed with aesthetic qualities or which have been created based on the aesthetic intention. Therefore, the search of an underlying unity to aesthetic responses should be possible through the investigation of the language used by recipients when describing their appreciation toward physical objects. It was also discussed in the methodology review chapter that in order to understand how people perceive the aesthetic qualities of the built environment, it is important and necessary to begin with research that focuses on an examination of how "ordinary" people describe and express their aesthetic perception through the use of the language they speak.

The initial, and a major aspect of this part of study has been to investigate people's aesthetic perception through the collection of the language they used to describe the qualities of buildings in the built environment. As discussed previously in chapter 6, in order to attempt to gain an understanding of the general public's aesthetic responses, cross-cultural research could generate useful empirical information concerning patterns of human perception, judgments and other relative influence factors. Consequently, equivalent research was proposed and instigated in three separate locations in Japan, Taiwan and the UK in search for potential universal similarities or differences of human's aesthetic appreciation.

The aim of this part of research activity was to develop a methodological framework to understand human aesthetic perceptions of buildings in the built environment, and to investigate the viability of a universal tool that attempts to assess this aesthetic quality across different cultural contexts. Additionally, in response to the subjective and objective debate of aesthetic judgment, the study will attempt to examine the question: does aesthetic perception remain constant through change of context and place? If yes, a set of universal and permanent aesthetic attributes could be identified. If the answer is no, then how can we ensure the long lasting aesthetic quality of the existing built environment through refurbishment while take into account the difference in aesthetic appreciation between different cultures?

7.2 Data Collection Strategy

Strategies for data collection and information assessment may follow either or both deductive and inductive reasoning. In deductive reasoning a hypothesis is proposed and data is collected to attempt to verify the validity of that hypothesis so that it can be accepted as a theory that describes the behaviours observed. For inductive reasoning, behaviours are

observed and the consequent data recorded without any preconceptions as to their relative importance or the patterns of behaviours that occur.

In terms of research related to human perceptions and responses it is proposed that neither a purely deductive or inductive approach is appropriate. In general, the specific issues related to the research problem cannot be defined with certainty. Additionally, it is difficult to know at the outset how the various issues will be interpreted by the interest/social groups involved in the investigation, or even which groups will be involved. Consequently, it would be premature to adopt a "theoretical" position on how the issues should be investigated. However, it is equally certain that collecting data without a clear focus or objectives can be time consuming and possibly totally unproductive.

Collecting and assessing data related to social behaviours requires that careful strategies must be devised to achieve success. The purpose of the data gathering activity, the type of data required and the most appropriate methods for data collection must be specified. A research agenda is set out in Figure 7.1 to ensure that the data collected is relevant to the research objective, and judgments regarding the collection of data are made in reference to its intended use in terms of the research objective.

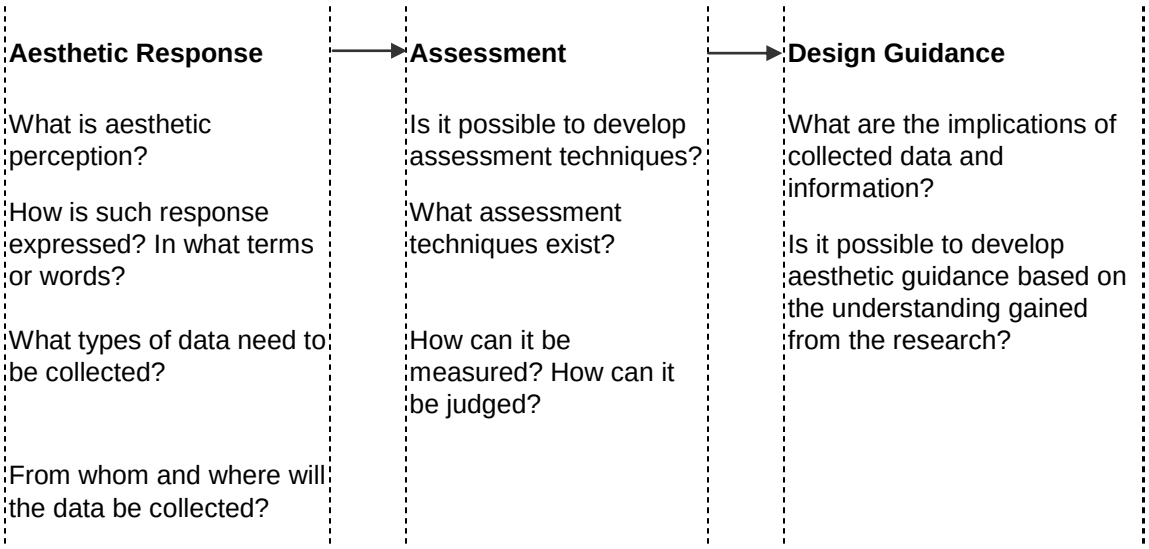


Figure 7.1. Research agenda for understanding aesthetic response.

7.3. Phase 1 of Research Activity A - Development of 3-lanaguage semantic differential scale

7.3.1 Cross-linguistic descriptor collection

The semantic differential scale developed by Osgood et al. was discussed previously in chapter 6 as an effective tool in deriving and understanding human descriptions of what they perceived or judged in the environment. Subsequently, the SD scale was selected by this study to obtain patterns of responses from the various respondent groups on the aesthetic

qualities of buildings. Several studies in the field of environmental aesthetics [1-5] have utilized the semantic differential technique with lists of adjective pairs developed during the research to specifically address the study purpose. More recent studies utilizing the semantic differential technique were also reviewed [6-11], though not directly addressing aspects of the built environment, these researches demonstrated the feasibility of the technique up-to-date in assessing people's behaviour regarding different issues. However, there is a tendency that researches incorporated SD scales were mostly developed in one single culture/language and applied on respondents with single or cross-cultural backgrounds.

Nasar's cross-cultural comparison of visual preferences in urban street scenes between Japan and the United States which employed 7-point bipolar rating scales with pairs of opposite adjectives which were developed in English and then translated into Japanese. The process of translation took a two-hour discussion with two Japanese translators to arrive at the best Japanese translation for 2 pairs of scales, however, the results of the study did demonstrate the feasibility of the method. In conducting cross-cultural research where the communities involved speak different languages, the act of translation becomes a critical issue in the research process. Osgood [12] reviewed Kumata's [13] work and stated: *despite the care with which these translations were made, the fact that translation served as the vehicle for demonstrating cross-linguistic and cross-cultural similarities in factor structure seemed to be the most likely source of bias. It could well be that we were literally forcing people in other cultures, speaking different languages, to operate within a semantic framework determined by the other language/culture speakers*. Osgood suggested that to avoid the potential bias of translation, and the resultant ethnocentric bias, the procedures for selecting qualifiers that would eventually serve as the dimensions of judgment in SD tasks has to be entirely intercultural; each language/culture group must determine its own descriptive scales. Since, the purpose of this study was to develop a universal tool which attempts to facilitate aesthetic evaluation in addressing the global issue of sustainability, the study attempted to conduct equivalent research procedures both cross-culturally in three separate contexts and cross-lingual with three native languages independently. The use of languages observed in the three separate locations during the investigation were used to develop a universal comparable but language independent semantic differential scale to provide a tool that attempts to assess the aesthetic quality of the built environment.

7.3.2. Method – Identify languages used in aesthetic response

Equivalent procedures in research are necessary and important in order to render data from diverse samples comparable. In within-culture and one language research this usually means identical instructions and procedures; however when researches are undertaken and are to be compared across diverse linguistic and cultural communities, different or more flexible instructions and procedures may be required. One way of dealing with this problem

was suggested by Lambert and Klineberg [14] where questions deliberately were made open-ended and replies were based upon the categorization of the responses for comparability. The methodological problem faced in this type of cross-culture/language study was essentially that of devising some means to get an overall picture of the human understanding that allows individuals to express ideas in their own terms while still allowing meaningful comparisons between different individuals, groups of individuals, and societies [15]. Such research should be carried out objectively but without sacrificing authenticity or prescribing any boundaries or fixed categories. Accordingly, for this study 'open-ended' questionnaires were chosen rather than providing a specific word checklist. The decision was made based on the purpose of the study to elicit ideas, descriptions, concepts, feelings and expressions that people use in describing buildings and their aesthetic perceptions of them.

7.3.2.1 Stimulus Materials and Questionnaire Questions

Three 'open-ended' questions were asked about coloured photographs of buildings in order to collect examples of the words, sentences or paragraphs people use when describing their aesthetic perceptions. The questions and instructions were carefully translated locally by native speakers into the three languages of the separate locations, ensuring that they had equivalent meanings and aiming at equivalent purpose. Photographs of four different building function categories, i.e. house, office, monumental and others, were carefully selected from the three locations; Japan, Taiwan and UK (see Figure 7.2).

Figure 7.2. Twelve photographs used in the first phase of questionnaire.

7.3.3 Questionnaire Procedure

Respondents were asked to answer the following three questions for each of the total of twelve photographs. The first question aimed to collect the emotive words people use in describing feelings or impressions they gain from looking at buildings: *How do you feel about this building? What are your impressions about this building?* The second question focused on the descriptive words by asking: *How would you describe this building?* The third question asked, *What features of this building do you like/dislike and why?* and was developed to understand what aesthetic features of building appearance people use when making aesthetic judgements and perceptions. At the end of the questionnaire, respondents were asked a final question related to all of the twelve shown photographs: *From all the photographs shown choose the building that you like the best and the one you like the least and explain why you like or dislike them.* The last question was asked to allow respondents the opportunity to provide additional examples of descriptive and emotive language.

7.3.4. Analysis

7.3.4.1 Elicitation of the descriptors

In response 80 questionnaires were completed and collected with fairly equal numbers of responses from each of the three locations. A diverse sample of 50 to 60 descriptive and emotive words were obtained from each of the twelve photographs shown in each of the three languages, Japanese, Mandarin Chinese and English. All of the collected responses were processed using content analysis independently in their separate language by native speakers from each of the locations to ensure the quality and consistency of the extracted descriptors. Words and vocabulary used by the respondents to describe their aesthetic perceptions about each building's appearance and to express their emotional feelings towards each individual building were extracted. Both descriptive and emotive adjectives were elicited to generate a set of descriptors for each linguistic community, ordered according to three criteria – overall frequency of usage, diversity of usage across the 12 photographs, and independence of usage across the photographs in order to obtain opposite responses and to avoid redundant concepts. The elicitation process generated approximately 120 descriptors in each of the three languages.

7.3.4.2 Categorization of descriptors

The aim of this part of research was to develop a comparable descriptive scale in three separate languages to facilitate assessment of the aesthetic quality of the built environment. The 120 descriptors obtained were first grouped into 20 categories of meanings, i.e. words that expressed similar domains of semantic concept were grouped together. Additionally, words lacking agreed-upon equivalency across three languages were eliminated. Instead of merely translating descriptors obtained from one language into the others, the process of grouping the

descriptors first into categories of meanings independently in three native languages helped to ascertain that the 'sense' of the words and the meaning of the descriptors in the original language were taken into consideration.

7.3.5. Results

7.3.5.1 Conceptual comparison pair of words

Among the obtained descriptors within the 20 categories of meaning, words that generated opposite concepts among each of the categories were identified based on their contrasting expressions and meanings derived from their use in the questionnaire responses to form pairs of conceptual comparison descriptors. An attempt was made to avoid using the direct opposite words in forming these pairs as often they were value-laden; for example, in the case of appealing verses unappealing where appealing has a positive and unappealing a negative connotation. By avoiding the direct opposite terms, the development of the measuring tool could have the potential to cover a wider range of concepts which people used in their responses when describing building appearance. A multi-national team was formed by native speakers from the three countries with fluent English/mother-tongue bilinguals. A total of 63 conceptual comparison pairs of descriptors were compiled from selecting at least one of the most representative words from each the 20 categories based on their equivalency across three languages and applicability in describing the general public's aesthetic perception of the buildings in the built environment.

7.3.5.2 Verification process

An additional verification process was undertaken to check the reliability and the validity of the 63 selected pairs of words. This process was carried out by native speakers who were not involved in developing the original word pairs from the three countries. The 63 pairs of descriptors were verified using three criteria based on the context of describing building appearance: (i) the appropriateness of this pair of descriptors in describing building's appearance in the built environment, (ii), (iii) the suitability of the pair of descriptors as conceptual contrasting pairs of words, both in meaning and usage. The individuals used for this reliability and validity checking process were selected from each country as; one language teacher to justify the pairs of words using their native language knowledge; one teacher or student from the design field to respond to the word pairs based on their design experience, and last were three other respondents from each of the countries with a high level of education but without a specific expertise in language or buildings. Pairs of words that were found to be highly building function/type dependent and lacking agreed-upon suitable opposites and equivalency across three languages were eliminated. Eventually, a set of 40 pairs of words was obtained in each of the 3 languages.

A total of 15 word pairs were selected out of the 40 developed pairs of words regarding

the most suitable adjectives for describing houses, listed in Table 7.1. The 3-lanauge semantic differential scale is assembled using the selected pairs of words with 7 points scale which is to be used in the following cross-cultural questionnaire study for the UK, Japan and Taiwan researches illustrated later in the chapter.

Table 7.1. Three-language semantic differential scale used in the housing questionnaire study in three separate countries, the UK, Japan and Taiwan.

WPs	English	Japanese	Mandarin	English	Japanese	Mandarin
1.	Subtle	地味な	樸素的	Showy	派手な	炫燿的
2.	Complex	複雑な	複雜的	Simple	シンプルな	簡單的
3.	Interesting	おもしろい	有趣的	Boring	つまらない	乏味單調的
4.	Cheerful	楽しい	愉快的	Gloomy	悲しい	沮喪的
5.	Intimidating	圧迫感のある	令人生畏的	Friendly	親近感のある	友善的
6.	Attractive	魅力的な	有吸引力的	Unappealing	魅力のない	不引人注意的
7.	Unimaginative	想像力がない	無創意的	Intriguing	好奇心が持てる	令人好奇的
8.	Beautiful	美しい	美觀的	Ugly	醜い	醜陋的
9.	Confined	閉鎖的な	侷限的	Open	開放的な	開放的
10.	Characterless	特徴がない	沒特色的	Unique	ユニークな	獨特的
11.	Balanced	バランスがよい	和諧的	Irregular	不規則な	不規則的
12.	Contrast	コントラストがある	有對比的	Uniformity	一様な	一致的
13.	Delicate	繊細な	精美的	Robust	たくましい	粗曠的
14.	Dull	退屈な	遲鈍呆板的	Dynamic	活動的な	活潑的
15.	Unsettling	落ち着きのない	感到不安的	Calming	落ち着いた	平靜的

7.3.6 Discussion

Osgood stated: *"although languages do display superficial uniqueness in phonology, grammar, and semantics which render them mutually unintelligible, at a deeper level they display certain universals which render them mutually translatable"* [16]. The methodological framework developed in this phase of the study, shown in Table 7.2, suggests the elicitation procedures to be undertaken in processing intercultural and inter-linguistic samples, for constructing semantically comparable instruments for measuring aesthetic aspects of the built environment. The final 15 pairs of conceptual comparison descriptors were incorporated with a seven steps scale to form the SD measuring scale which was used to assess people's aesthetic perception towards different buildings in the built environment.

Table 7.2. Framework for the elicitation processes of descriptors.

APPROACH cross-language comparison or single-language analysis	**PROCEDURE** Words selection procedures to be used in the development of 3 language SD scale	**RESULTS** Results obtained from questionnaires and analysis procedures
Procedures are taken independently in 3 separate languages.	**1. Open-ended questionnaire** - to collect words and descriptors.	Total of 90 questionnaires were distributed in 3 countries with 3 native languages. 80 questionnaires in total were collected.
	2. Content Analysis - to elicit adjectives from the sentence and paragraphs obtained from respondent.	50-60 words/descriptors per each photograph were obtained.
	3. Distribution of Usages - to select words to be used in developing the SD scale with criteria: (i) frequency of usage, (ii) diversity across the photo samples, (iii) independency of usage across photographs.	120 words and descriptors were elicited in total.
	4. Categorization of Descriptors - to avoid redundant dimension of words.	20 categories containing the 120 descriptors in each of the 3 languages.
Translation involved in selecting common descriptors cross 3 languages.	**5. Conceptual Comparison Pair of Words -** to select descriptors to be use in developing the bipolar adjective pairs.	63 conceptual comparison pairs of descriptors were compiled.
Procedures are taken independently in 3 separate languages.	**6. Verification of Selected Pair of Words -** to justified pairs of descriptors obtained from above procedures to then be used in developing the SD scale.	40 equivalent cross-language conceptual comparison pairs of descriptors were obtained.
	7. The Universal Comparable Semantic Differential Scale in three Language	15 equivalent cross-language word-pairs were used to assemble the semantic differential scale for housing questionnaire.

7.4. Phase 2 of Research Activity A – Feasibility study of the developed 3-language SD scale

7.4.1 Pilot study utilising the developed 3-language SD scale in the Japanese context.

The purpose of this phase of the research was to examine the feasibility of utilising the developed SD scale derived from phase 1. The questionnaires were conducted in Japan only utilizing the SD scale descriptors developed in the Japanese context. Since the SD scales in each of the 3 languages were developed in parallel and care was taken to make them linguistically equivalent and the research team was based in Japan, it was considered that for the purposes of the pilot study the Japanese SD scale would be used with Japanese respondents.

7.4.2. Method

7.4.2.1 Stimulus material and questionnaire question

Colour photographs of 5 houses built during the last ten years in Japan were shown with an SD scale containing 21 pairs of words deemed most suitable for describing houses (Figure 7.3). These words were selected from the verified list of 40 word pairs.

A key aspect of the pilot study was to consider how the responses to the questionnaires could be used to provide an understanding of the general public's aesthetic responses to the built environment.

(Subtle)地味な	□ □ □ □ □ □ □	派手な/豪華な(Showy)
(Simple)シンプルな	□ □ □ □ □ □ □	複雑な(Complex)
(Interesting)おもしろい	□ □ □ □ □ □ □	つまらない(Boring)
(Temporary)簡易的な	□ □ □ □ □ □ □	長持ちする(Durable)
(Bright)明るい	□ □ □ □ □ □ □	暗い(Gloomy)
(Unappealing)魅力のない	□ □ □ □ □ □ □	魅力的な(Attractive)
(Confined)閉鎖的な	□ □ □ □ □ □ □	開放的な(Open)
(Intriguing)興味のわく	□ □ □ □ □ □ □	独創性がない(Unimaginative)
(Ugly)醜い・不格好	□ □ □ □ □ □ □	美しい(Beautiful)
(Innovative)斬新な	□ □ □ □ □ □ □	ありふれた(Conservative)
(Impractical)実用的でない	□ □ □ □ □ □ □	機能的な(Functional)
(Fashionable)流行の	□ □ □ □ □ □ □	伝統的な(Traditional)
(Full of Character)特徴的な	□ □ □ □ □ □ □	特徴のない(Characterless)
(Disorganized)乱れた	□ □ □ □ □ □ □	整然とした(Ordered)
(Balanced)バランスのとれた	□ □ □ □ □ □ □	アンバランスな(Unbalanced)
(Angular)ゴツゴツした	□ □ □ □ □ □ □	なだらかな(Curved)
(Artificial) 人工的な	□ □ □ □ □ □ □	自然な(Natural)
(Distinct)目立つ	□ □ □ □ □ □ □	平凡な(Inconspicuous)
(Unsettling) 落ち着かない	□ □ □ □ □ □ □	落ち着いた(Calming)
(Impressive) 印象的な	□ □ □ □ □ □ □	普通の(Ordinary)
(Coherent) 調和のとれた	□ □ □ □ □ □ □	不適切な(Out of Context)

Figure 7.3. Sample page of the questionnaire used in Phase 2 showing "Building 1" with 21 pairs of bipolar adjectives selected from the final 40 pairs of conceptual descriptors (English words are shown for the purpose of the thesis only).

7.4.2.2 Respondent and Questionnaire Procedure

Forty Japanese citizens (21 males and 19 females), ranging in age from 20-50 took part in the pilot study. A total of 20 students in the age group of 20-30 were asked to participate in this

phase of research, together with 10 general citizens from each of the age groups of 30-40 and 40-50.

Table 7.3. Word pairs used for the ideal house response.

Word pair No.	**Word pairs**		**Word pair No.**	**Word pairs**	
1	Subtle	Showy	**5**	Innovative	Conservative
2	Interesting	Boring	**6**	Fashionable	Traditional
3	Bright	Gloomy	**7**	Confined	Open
4	Unappealing	Attractive	**8**	Artificial	Natural

Participants were asked to utilize the SD scale to describe their response to the building illustrated in each of the color photographs. Additionally, respondents were asked to mark out the characteristics of their "ideal" house using a reduced SD scale of 8 word pairs without a photograph being shown (Table 7.3).

Table 7.4. Example results derived from the questionnaires.

Word pair number	**Score**				
	Respondent identifier				
	M1	**M2**	**M3**	**M4**	**M5**
1	2	4	4	2	2
2	2	1	1	2	1
3	6	7	1	6	3
4	5	1	6	2	4
5	5	2	2	3	3
6	3	2	7	3	3
7	2	1	6	3	6
8	3	4	1	5	5
9	4	5	6	4	5
10	4	7	1	5	2
11	2	1	7	3	1
12	4	1	3	3	4
13	6	7	1	5	2
14	6	7	6	6	7
15	3	1	2	5	4
16	3	4	7	4	3
17	2	1	3	3	1
18	5	7	4	5	1
19	4	7	7	2	7
20	4	7	1	6	2

In order to facilitate analysis of the results the horizontal line of boxes of the questionnaires were numbered 1 to 7 from left to right, while the word pairs were numbered from 1 to 20 from top to bottom. This allowed a spreadsheet table, such as the example shown in table 1, to be derived from the full set of responses. In the example of Table.7.4. respondent M1 responded in the box 2nd from the left for the word pair "subtle – showy" and the 6th from the left for the word pair "interesting – boring" for the picture that he was viewing. The complete

spreadsheet contained 4200 data points.

7.4.3 Analysis

The results from questionnaires utilising semantic differential scales are often shown graphically as in Fig.7.4. The graph suggests that the results of the male and female groups were very similar. Additionally, the comparison of the data shown in Figure 7.5 suggests a reasonable degree of similarity between the male and female responses. The slope of the trend line would have a value of 1.0 if a perfect correlation existed between the male and female response. In this case the slope has a value of 0.78.

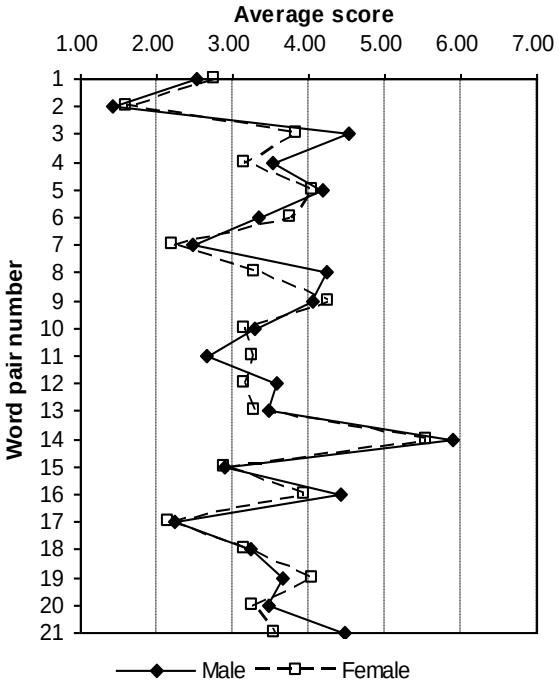


Figure 7.4. Averaged male and female responses to "Building 1".

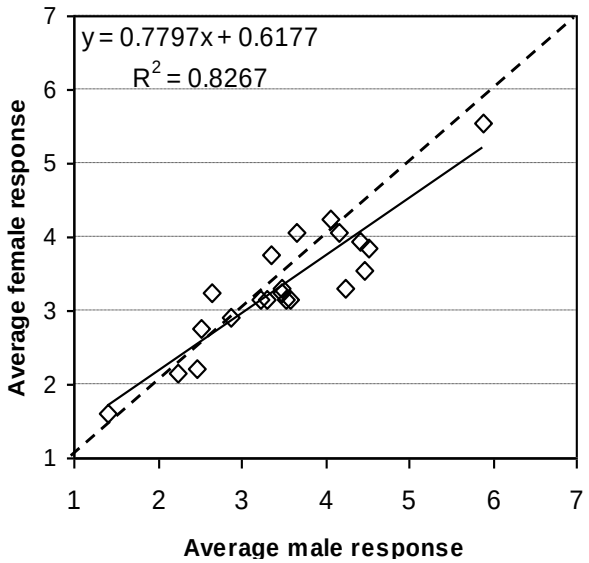


Figure 7.5. Comparison of the male and female responses to the photograph of "Building 1" with the unbroken line showing the trend line for the data.

The average value and the standard deviation for each word pair, for each picture and for male and female respondents separately were calculated from the spread sheets. It was noted that generally the standard deviations were higher for the male respondents.

Table 7.5. Comparison of the variation of responses for the male and female respondents.

Building number	Male		Female	
	Average of standard deviations	Standard deviation of the standard deviations	Average of standard deviations	Standard deviation of the standard deviations
1	1.70	0.45	1.40	0.34
2	1.67	0.33	1.20	0.19
3	1.54	0.51	1.15	0.22
4	1.55	0.47	1.31	0.29
5	1.67	0.30	1.34	0.21

Table 7.5 above shows how the average of the standard deviations varied for males and females. Additionally, the standard deviations of all the standard deviations for the male and female groups for each picture are shown. These data indicate further that there was less variation between the responses of the females when compared with the males.

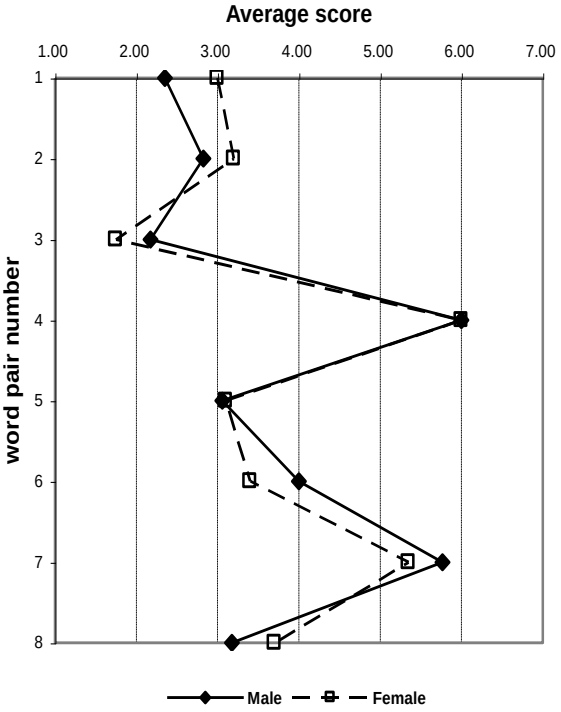


Figure 7.6. Comparison of male and female response to the attributes of an ideal house.

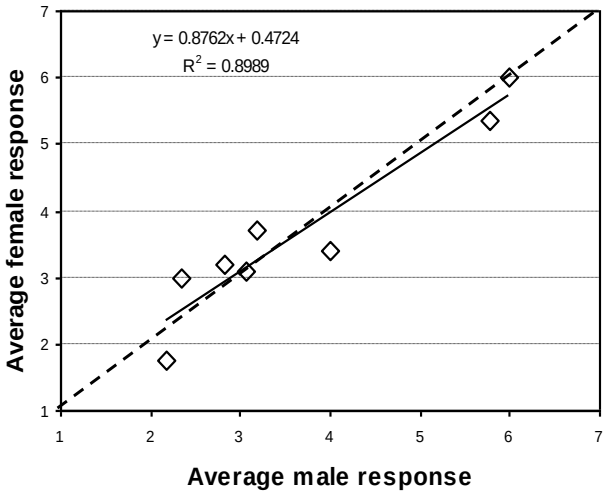


Figure 7.7. Comparison of male and female average scores to the attributes of an ideal house.

The SD scale questions regarding the attributes of an ideal house elicited almost identical responses from the male and female groups, as indicated in figs 7.6 and 7.7. Consequently, when comparing the notion of the ideal house against the score given for the photographs of actual houses the combined responses of the male and female respondents were used. These results are shown in Fig 7.8 and suggest that buildings 2 and 3 most related to the respondents opinions regarding the attributes of an ideal house. However, buildings 2 and 3 were very different in style, which suggests that the general

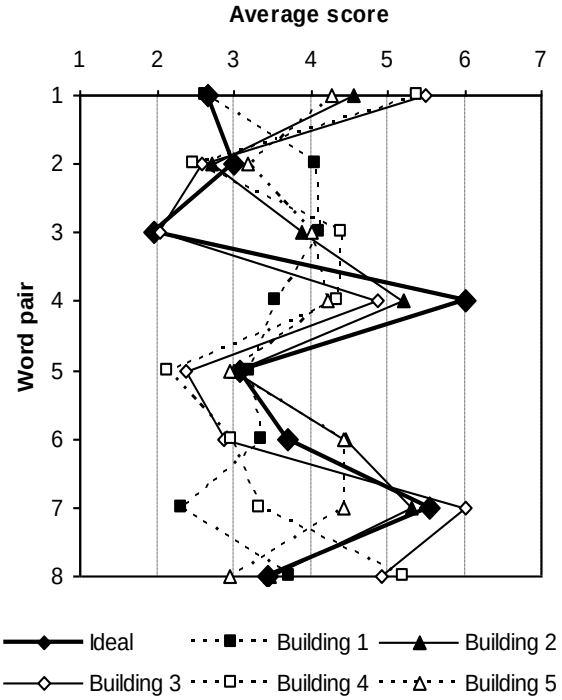


Figure 7.8. Comparisons of scores for 8 selected word pairs for the 5 building photographs and an ideal house.

public interpret the notion of an ideal building over a wide range of style.

7.4.4 Results

This phase of research indicates that utilising a semantic difference scale can provide quantitative information regarding the general public's response to buildings. In this particular study the results suggested that the responses of the male respondents were more variable than those of the females. Comparing the responses to the photographs of the buildings against responses to the same word pairs when applied to the notion of an ideal house did provide a useful tool to ascertain how closely the response to a particular building compared to the ideal. The results suggested that the general public's notion of an ideal house embraces a wide stylistic range, see Figure 7.9.

Building 2. Building 3.

Figure 7.9. Photographs showing building 2 and building 3 as used in the questionnaire.

7.4.5 Discussion

This phase of research demonstrated a methodological framework for developing a universal but language independent SD scale to be used in assessing the aesthetic perception of the built environment cross-culturally. Utilizing equivalent data processing procedures independently in 3 separate languages minimized the potential problems of having translation bias in the results obtained. However, translation procedures are inevitably necessary in carrying out cross-cultural research to render data comparable. Therefore, it was crucial to involve translation procedures at the most suitable stage to obtain the most objective and independently comparable data cross-culturally and cross-linguistically. This process required a great deal of care was very demanding and took considerable time. The results obtained from this pilot study in phase 2 have demonstrated the feasibility of using and the potential for the generation of research results arising from the developed SD scale. Comparisons could be obtained from people's responses using the developed SD scales that provided an aid to understanding their aesthetic perceptions towards the buildings in the built environment.

" Aesthetic value derives from the ways in which people draw sensory and intellectual stimulation from a place. Aesthetic values can be the result of the conscious design of a place, including artistic endeavour. Equally, they can be the seemingly fortuitous outcome of the way in which a place has evolved and been used over time. Aesthetic values tend to be specific to a time and cultural context, but appreciation of them is not culturally exclusive. "

Conservation Principles-policies and guidance for the sustainable management of the historic environment, English Heritage

7.5. Phase 3 of Research Activity A – Cross-cultural study on people's aesthetic response utilizing the developed 3-lanauge SD scale

7.5.1 Cross-cultural study on people's aesthetic responses in the UK, Japan, and Taiwan

It has been concluded that the ability to perceive aesthetic qualities in an object is universal in all human beings as discussed previously in chapter 5, and aesthetic perception is generated when humans encounter objects constructed with aesthetic qualities. Supposing aesthetic values are the result of conscious design with aesthetic intention, the search of an underlying unity to aesthetic appreciations should be possible through the investigation of the language used by recipients when describing their perception toward physical objects. This could then provide an understanding of how aesthetic appreciation of the urban environment could be enhanced through considerations and attentions to the design features and appearance components of physical objects.

Equally, aesthetic value could be the outcome of an object's existence over a period of time and within a special context which has been conditioned the perceiver's response socially, culturally and/or intellectually. For instance, within a given cultural group, or a social subset within that group, it is possible that a collective perception of beauty exists that could be interpreted as being a conditioned response arising from the established and traditions and customs of that culture or social context.

Consequently, aesthetic judgments of an object not only involve aspects of its innate or manufactured qualities but additionally to issues that relate to social conditioning. It is not unreasonable then to conclude that aesthetic appreciation may differ between the cultural background of the perceiver as well as the cultural context of the perceived object.

The discussion returns back to the paradox as to whether an objective aesthetic appreciation towards buildings in the built environment exists which could allow a universal assessment measure to be developed and utilised for comparing aesthetic values across different cultures and locations? Do people generally appreciate buildings from their own culture due to familiarity, acknowledgment or social custom? In contrast, would one prefer

buildings from outside of local context based on the reason of intrigue, interest or simply being different? Can a universal understanding of aesthetic quality towards buildings be identified through aesthetic response?

7.5.2. Method

7.5.2.1 Stimulus materials

A process flow-chart was prepared for the development and selection of the stimulus materials, as shown in Figure 7.10. This framework facilitates both the building samples collection and analysis process for the sample selection. Equivalent methods and procedures could be ensured when assembling stimulus samples obtained from each of the three countries on which the research is based by following the stages provided in the flow-chart.

(1)Collection of the house photograph samples.

A multiple method approach was used in this process as the sampling methodology for the collection of house samples. Architectural journal and magazine research, internet website review, actual on-site photograph surveys and interview with local architects were initiated in an attempt to compile a sufficient population of housing samples for each of the specific style categories, traditional, ordinary, innovative, and the research contexts.

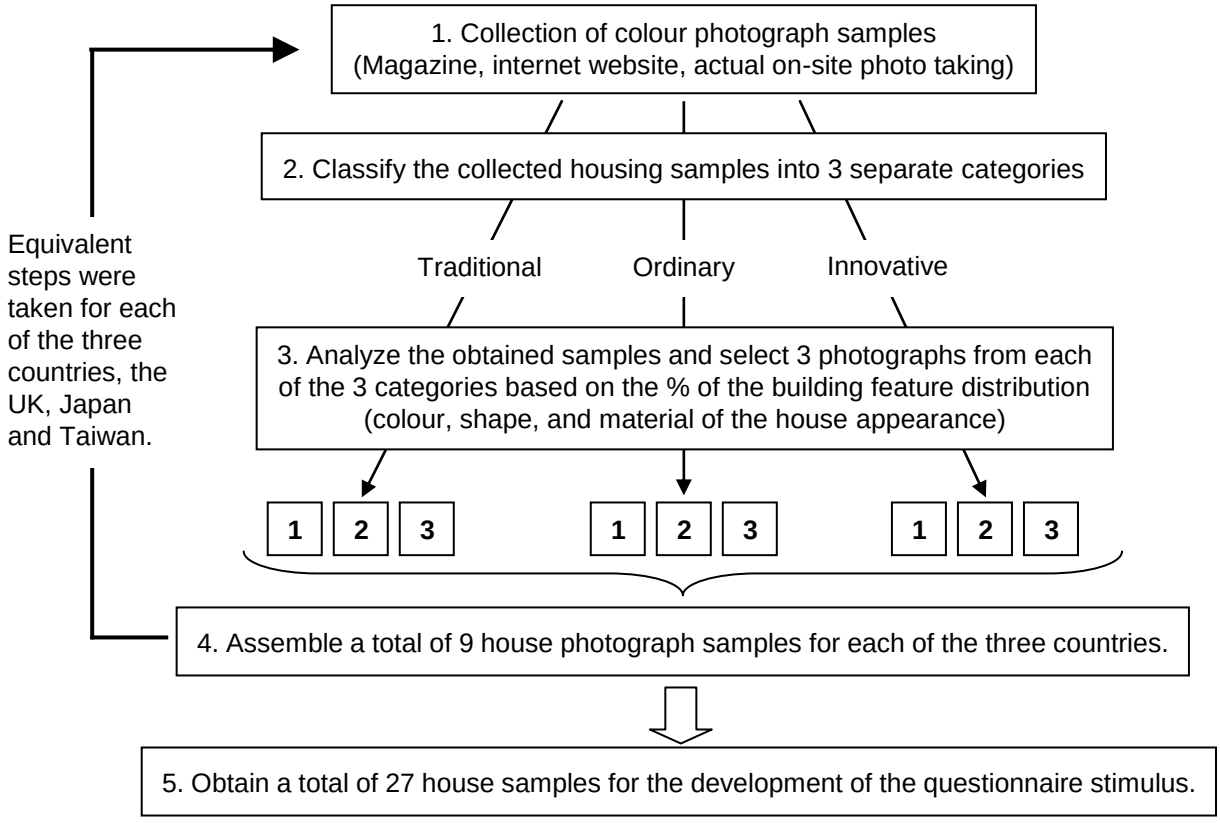


Figure 7.10. Process flow-chart for the development of the stimulus materials.

(2)Classify the collected housing samples into 3 categories.

A diverse sample of housing photographs were obtained from each of the three countries. The obtained samples were then classified into traditional, ordinary and innovative category separately based on their façade features and characteristics. The final number of samples obtained for each of the categories and from each of the three investigated countries are illustrated in Table 7.6.

Table 7.6. Numbers of sample house photographs assembled for each country.

Research Location	**UK**	**Japan**	**Taiwan**
Building Category	**Number of Sample**		
Traditional	78	84	38
Ordinary	38	98	33
Innovative	41	123	5
Total	**157**	**305**	**76**

(3) Analysis of the obtained samples and selection of 3 prominent samples for each category.

All of the obtained house samples were then analysed using building façade components, such as colour, shape and material separately in their category and obtained location as illustrated in Table 7.7. Three housing samples were then selected for each category and each country based on the frequency of such façade components in the total population of housing samples obtained.

(4) Assembly of a total sample of 9 house photographs for each of the three countries.

Nine colour photograph house samples for each of the three countries were assembled utilising the selection procedure outlined previously. Attention was taken to ensure all the building samples had equivalent building size proportions, adequate brightness and contrast, that potential visual obstacles in the photographs were removed, and that the images presented a consistent sky and background and passageway adjacent to each building.

(5) Obtaining a total of 27 house samples for the development of the questionnaire stimulus.

A total of 27 house samples were obtained subsequently as shown in Figures 7.11, 7.12 and 7.13. All the 27 photographs with given photograph numbers were incorporated with the semantic differential scale developed previously to assemble the questionnaire to address the contextual, cross-cultural and universal concerns of aesthetic appreciation in the development of sustainable urban environment.

Table 7.7. Characteristics exhibited by houses in UK, Japan and Taiwan.

UK				
Traditional	Colour	Exterior wall	Yellow	77%
	Shape	Window	Divided	52%
			Lintel	73%
			Sill	96%
			White frame	84%
		Door	Six panels	25%
			Road side	96%
		2 storey		87%
		Chimney		91%
	Material	Roof	Slate tile	56%
		Exterior wall	Straw	15%
			Brick	59%
			Rubble	19%
Ordinary	Colour	Exterior wall	Multiple	36%
			Reddish brown	21%
			Brown	15%
	Shape	Roof	Pitched	92%
		Window	Lintel	39%
			Sill	89%
			Bay	26%
			White frame	55%
			Pediment	23%
		Door	Double	13%
			Pediment	13%
			Road side	94%
		2 storey		94%
		Garage		57%
		Chimney		50%
Innovative	Colour	Exterior wall	Brown	23%
			White	20%
			Multiple	16%
			Black	13%
	Shape	Overall	Rectangle	39%
	Material	Exterior wall	Wood	19%
			Painted	17%
			Wood & Brick	14%
			Brick	12%
Japan				
Traditional	Colour	Roof	Grey	90%
		Exterior wall	White & Brown	66%
			Beige	14%
			White	10%
	Shape	Roof	Gabled & Hipped	51%
			Gabled	33%
		Window	Consecutive sliding	39%
			Latticed	26%
			Double sliding	91%
		Storey	2	61%
			Single	37%
		Bare beam and pillar		63%
		Pillar fixed on the stone		62%
	Material	Roof	Glazed tile	86%
		Exterior wall	Painted	83%
			Wood	56%
Ordinary	Colour	Overall	Beige	30%
			White	25%
	Shape	Roof	Hipped	48%
			Gabled	29%
		Window	Screen	94%
			Sliding	90%
			Latticed	54%
			Bay	29%
		Door	Single	83%
		2 storey		93%
		Terrace		81%
	Material	Roof	Slate tile	54%
			Glazed tile	33%
		Exterior wall	Painted	51%
			Painted & Tile	10%
Innovative	Colour	Overall	White	26%
			Grey	20%
			Black	10%
	Shape	Overall	Rectangular Composition	30%
			Rectangular	22%
		Window	Few	25%
			Distinct shape	13%
		Door	Single	78%
		2 storey		56%
	Material	Exterior wall	Painted	16%
			Galvalume sheet steel	15%
			Concrete	13%
			Glass	27%
Taiwan				
Traditional	Colour	Overall	Brown	23%
	Shape	Roof	Triangle	26%
		Window	Latticed	44%
		Storey	Single	42%
			2	52%
		Arch		26%
	Material	Exterior wall	Tile	26%
			Painted	26%
Ordinary	Colour	Overall	Multiple	66%
	Shape	Overall	Rectangle	78%
		Window	Consecutive Triple	57%
		Storey	2	18%
			3	60%
			4	15%
		Terrace		72%
		Shutter		51%
	Material	Exterior wall	Tile	69%

The limitations the obtained photograph samples in that they may not represent each country's overall building population is recognised. For example, the selected building samples could be biased due to regional differences that might exist within one single country. However, in terms of the research objective of developing a methodology it is considered that the sampling strategy is adequate.

Figure 7.11. The 9 photograph samples assembled for the UK.

Figure 7.12. The 9 photograph samples assembled for Japan.

Figure 7.13. The 9 photograph samples assembled for Taiwan.

7.5.2.2 Questionnaire assembly and procedure

The semantic differential scale developed previously with 40 pairs of conceptual comparison pairs of descriptors was reviewed to obtain a total of 15 pairs of descriptors emphasizing the appearance qualities of residential housing. Utilising the semantic differential scales, respondents were asked to judge the 27 colour house photographs against the seven-step scales of the selected 15 pairs of conceptual comparison pairs of building descriptors, as shown in the sample questionnaire illustrated in Figure 7.14. Each house photograph was placed at the top of a page and viewed successively again the series of the 15 word-pair scales.

The questionnaire included three separated sections that aimed to collect respondents' aesthetic responses addressing different concerns; (i) visual description, (ii) subjective description and judgement and (iii) preference so that the response made within these modes could be compared during the data analysis process. The cover page was provided with a short section inquiring demographic details from each respondent; gender, age, travel experience, job field and education. It also includes a color photograph and description

example explaining the method of responding the questionnaire. Due to the wide range of age groups and cross-language considerations in this study, careful attention was taken devising the simulated questionnaire example instructions so as to ensure a clear understanding regarding how the questions in the questionnaire should be answered.

The first section of the questionnaire, as shown in Figure 7.14 (part 1), focused on collecting responses from the respondents when buildings with various visual physical features are perceived. Respondents were asked to respond each of the displayed photographs using the provided 15 word-pair semantic differential scales. This procedure was then repeated 27 times for each of the photographs. In order to avoid potential error and bias due to the length of the questionnaire, a random selection of the photograph sequence was carried out for each questionnaire. This was to ensure that each of the 27 photographs could all received an equal amount of attention and to avoid respondents paying more attention to a questionnaire section that contained buildings from their country when responding to the entire questionnaire.

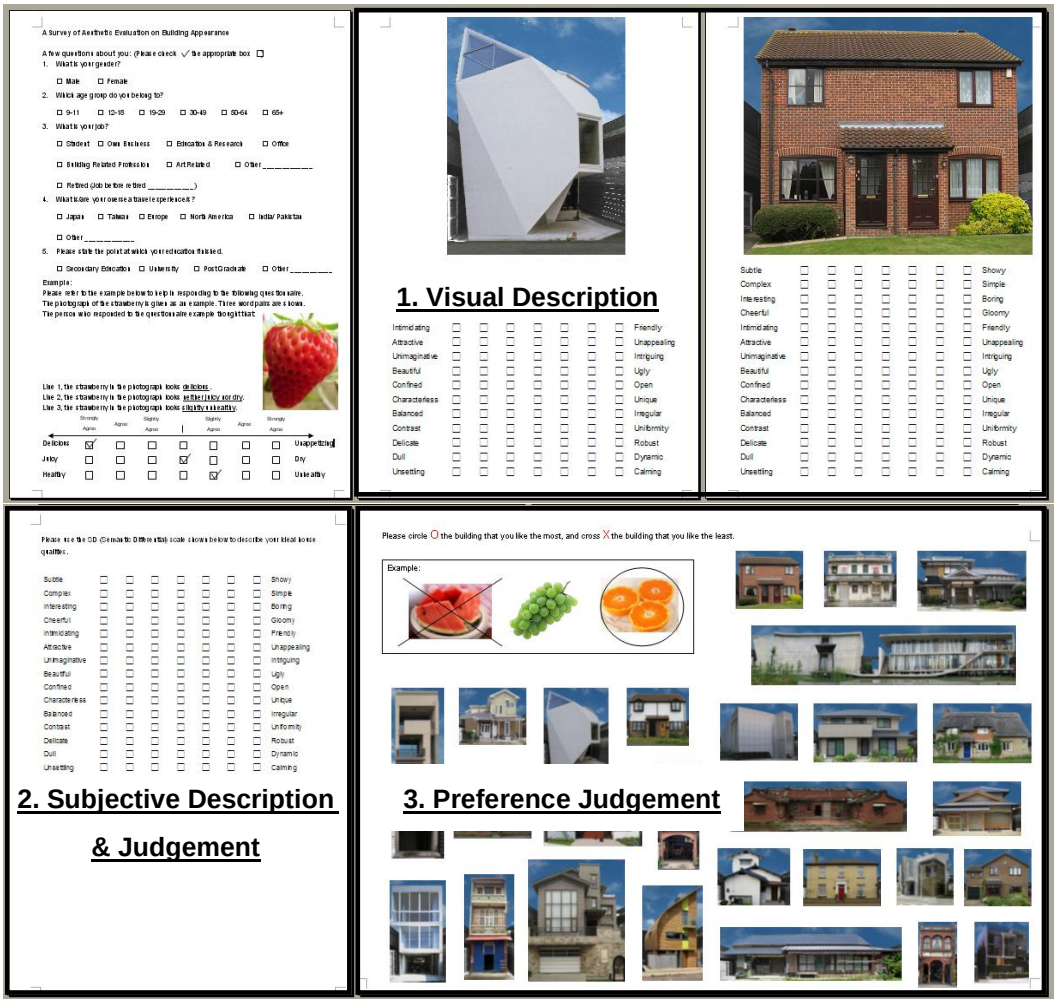


Figure 7.14. The structure of the housing questionnaire.

The second part of the questionnaire asked respondents to utilize the identical 15

semantic differential scale, without a photographic sample being shown, to describe what there responses would be regarding his or her “ideal” house. This part of questionnaire was devised to collect respondents’ subjective description and personal judgment concerning an ideal house, refer to Figure 7.14 (part 2). The second part of the questionnaire was developed in attempt to allow data comparisons between respondents’ stated ideal and the house that they identified as their most preferred from section 3 of the questionnaire.

The last part of the questionnaire is assembled on one A3 page contained an index of all the 27 shown photographs. Respondents were asked to circle the photograph sample that they like the best and to cross out the one they like the least. Data obtained from this part of questionnaire illustrates respondents’ preference selection amount all the house samples across categories and countries, shown in Figure 7.14.

The completed questionnaire was assembled with a total of 30 colour photograph pages in each of the three native languages separately for the three research countries, i.e. the UK, Japan and Taiwan. The three separate-language semantic differential scales developed previously in phase 1 were incorporated separately, in English, Japanese and Chinese Mandarin, with equivalent questionnaire format and photograph samples.

7.5.2.3 Respondents

The aim of the research was to distribute 30 sets of questionnaire for each of the six age groups of respondents as discussed in chapter six to include both the children and adults. Table 7.8 illustrates the numbers of questionnaires collected from each of the research countries from each of the six age groups.

Table 7.8. Number of questionnaire collected from each of the three research countries.

Number of questionnaire collected		**Six Age Groups with identifier A-F**						
Nationality & Gender		**A. 9-11**	**B. 12-18**	**C. 19-29**	**D. 30-49**	**E. 50-64**	**F. 65+**	**Total**
UK	**Male**	16	7	9	14	6	12	64
	Female	14	14	10	13	7	12	70
	Total (134)	**30**	**21**	**19**	**27**	**13**	**24**	**134**
JP	**Male**	16	13	16	14	15	17	91
	Female	14	17	14	16	15	13	89
	Total (180)	**30**	**30**	**30**	**30**	**30**	**30**	**180**
TW	**Male**	14	16	21	18	17	16	102
	Female	16	25	22	15	13	14	105
	Total (207)	**30**	**41**	**43**	**33**	**30**	**30**	**207**

7.5.2.4 Responses

As explained in phase 2 the pilot study of the research activity, in order to facilitate analysis of the results the horizontal line of boxes between each word of the word-pairs in the questionnaire were numbered 1 to 7 from left to right, having 4 as the neutral response. As illustrated in Table 7.9, the word pairs were numbered from WP1 to WP15 from top to bottom

and applied to each of the 27 photo samples from P1 to P27 for each set of responses from a respondent. This allowed a spreadsheet table, such as the example shown in Table 7.8, to be derived from responses obtained for one photograph sample.

Table 7.9. Example results derived from the questionnaire.

Word pair number	**Intensity score**		
	Respondent identifier		
	UBM1 (UK, Age 12-18, Male)		
P1WP1	Subtle	4	Showy
P1WP2	Complex	2	Simple
P1WP3	Interesting	2	Boring
P1WP4	Cheerful	5	Gloomy
P1WP5	Intimidating	3	Friendly
P1WP6	Attractive	5	Unappealing
P1WP7	Unimaginative	3	Intriguing
P1WP8	Beautiful	5	Ugly
P1WP9	Confined	1	Open
P1WP10	Characterless	3	Unique
P1WP11	Balanced	1	Irregular
P1WP12	Contrast	2	Uniformity
P1WP13	Delicate	4	Robust
P1WP14	Dull	3	Dynamic
P1WP15	Unsettling	3	Calming

In the example of Table 7.8 respondent UBM1 responded in the box 4 for the word pair WP1, “subtle – showy”, representing a “Neutral” response for this pair of words in response to the perceived house sample photograph 1. Subsequently, he described the perceived house photograph number 1 to be “Slightly Gloomy” for word pair 4 (WP4 box 5), and “Very Balanced” for word pair 11 (WP11 box 1). Each spreadsheet contained 405 data points arising from the responses for one individual respondent. The completed spreadsheet would contain up to 72,900 data points of responses from each of the three countries when the total number of 30 respondents for each of the 6 age groups were collected.

When a group of respondents judge a set of photographs against a set of adjectival word-pair of a semantic differential scale, a cube of data is generated. Such a cube is illustrated in Figure 7.15.

The rows of this cube are defined by the response scales for each of the 15 word pairs, the columns by the 27 photographs being described, and the semantic slices from front to back by the respondents giving the responses. Each cell cube represents a single value that describes how a particular respondent rates a particular photograph sample against a particular word-pair scale.

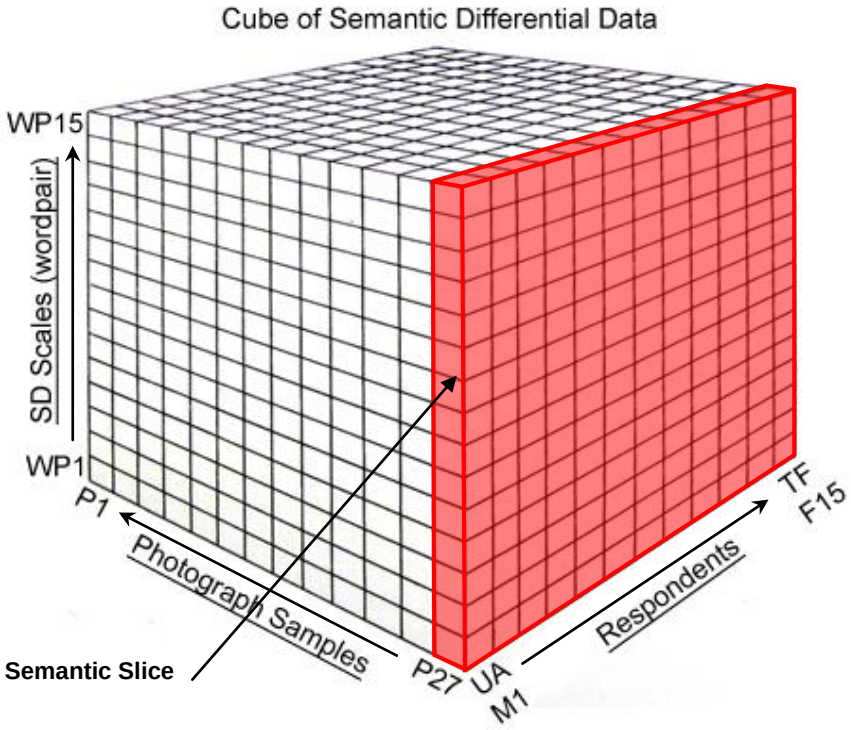


Figure 7.15. Semantic differential data cube (after Osgood [17]).

As suggested by Osgood [18], in analyzing such data, usually – but not necessarily – interests are emphasized in the correlations among response scales. Comparison analysis may correlate the responses to word-pair scales across respondents or across photographs or both; the respondent dimension could be broken down when interests are focused in cultural or demographic sub-variables. The tree-chart developed by the author, illustrated in Figure 7.16, regarding UK respondents only, allows the relationships between all the variables to be observed and visualized which facilitates the data analysis process. Analysis could be initiated for single respondents, single photograph samples, single word-pair scale, or groups of either, correlating across different photographic samples to obtain respondent's semantic response and across responses to obtain the photographical semantic response. In another words, there are many ways to understand this cube of semantic differential data and each comparison across or within different variables/sub-variables is appropriate for answering a different kind of hypothesis or concerns.

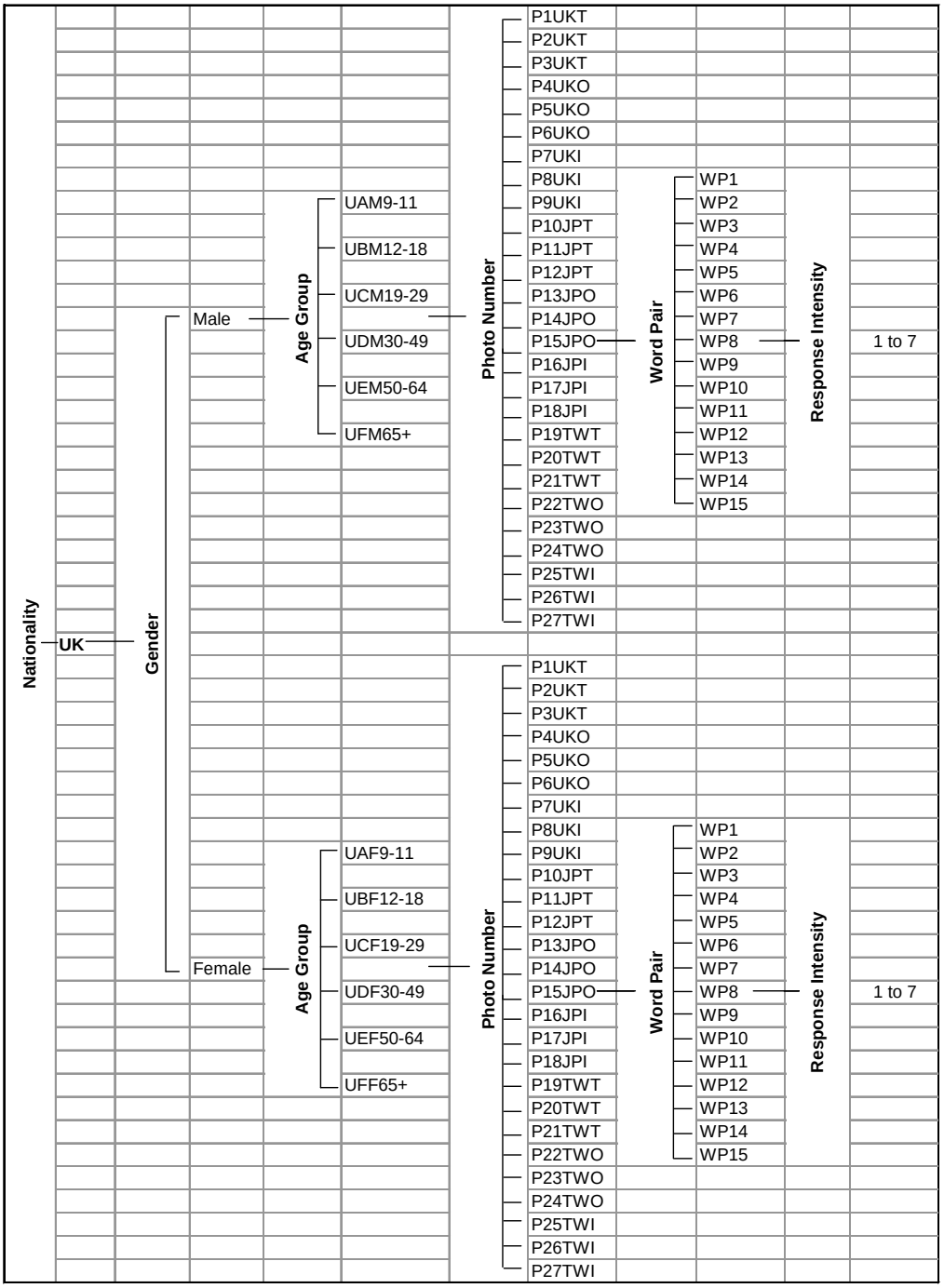


Figure 7.16. Variable tree-chart regarding UK dataset only.

Osgood considered that a seven-step scale would provide a good degree of discrimination for rapid yet reliable judgment tool for respondents during semantic differential measuring [19]. It was considered that respondents initially perform a very quick succession of two types of decision regarding; (i) Is the house shown in the photograph perceived as being characterised by the properties of one as opposed to the other of the adjective pair or not characterized distinctively by either of them; e.g., does the house in the photograph display the characteristics *subtle* or *showy*?; and (ii) if the response not neutral, to what degree is it

characterized by the properties of the adjective in question; e.g., is the house shown in the photograph *slightly subtle*, *subtle* or *very subtle*? These particular quantifiers were used to generate equal increments in intensity, as shown in Table 7.10.

Two word-pair adjectives will be similar in visual meaning to the extent that they display the same patterns of intensity across the set of house samples; two photographs will be similar in visual characteristics to the extent that the responses they engender with respect to word-pairs and quantifiers are the same; and two respondents or even groups of respondents as having similar semantic visual understanding to the extent that their patterns of responses in respect to word-pair, house sample and response intensity are the same.

Table 7.10. Example of the 7 increments in intensity for each word-pair semantic scale.

Subtle	Very Subtle	Subtle	Slightly Subtle	Neither Subtle nor Showy	Slightly Showy	Showy	Very Showy	**Showy**
	☐	☐	☐	☐	☐	☐	☐	
	1	**2**	**3**	**4**	**5**	**6**	**7**	

As explained previously, each respondent would effectively generate a total of 405 responses using each of the 15 word-pairs when responding to each of the 27 shown house photographs. Each response as checked on the seven-points scale is, in effect, an independent description of the specific house sample utilizing the particular pair of words. Table. 7.11 illustrates all the independent variables included in the questionnaire that will be considered and analyzed in relation to each other later in the chapter.

Table 7.11. Independent variables/sub-variables included in the questionnaire dataset.

Variable Categories	**1. Nationality**	**2. Gender**	**3. Age**	**4. Photo Samples**	**5. Word-pair**	**6. R. Intensity**
Sub-variable	UK/ JP/ TW	Male/ Female	9-11/ 12-18/ 19-29/ 30-49/ 50-64/ 65+	UK: 1～9 JP:10～18 TW:19～27	WP1～WP15	Between 1 to 7
No. of variables	3	2	6	27	15	1

The purpose of this research activity was to ascertain whether differences or similarities exist between gender, age groups, nationalities or respondents' cultural background regarding aesthetic perception and responses when house samples from different countries are perceived and judged. Do responses vary when the viewed house samples were from one's own culture and society rather than another, for example? How do responses differ when different house samples are observed?

7.6. Analysis of the complete collected questionnaire dataset

As suggested by Osgood [20], correlations across variables among response intensity is often chosen as the main analysing method in obtaining results from the semantic data, for example if the responses of males and females are to be compared. Three types of analytic methods were used to examine the collected questionnaire data. First, the direct comparison of two parameters, such as data from male and female responses, can be used to assess to what extent their responses correspond. This comparison can be achieved by plotting the male results directly against the female results to generate a graph such as that shown in Figure 7.17(a). This shows the slope of the line as being very close a value of 1.

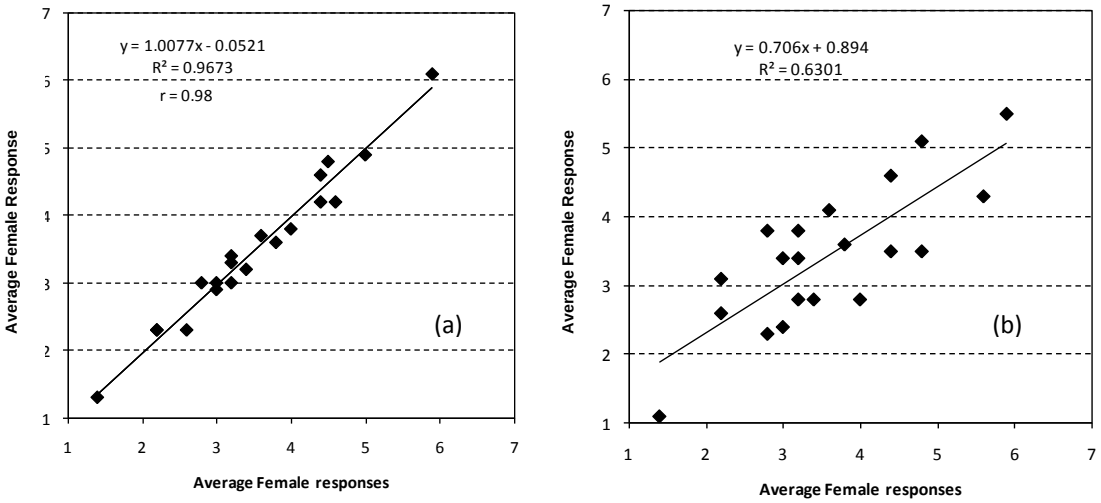


Figure 7.17. Comparison of Male and female responses (demonstration example).

This suggests that there is an exact correspondence between the female and the male responses. The R^2 and r-values for these data is also high which shows that there is little scatter in the data and the proposition of a linear correspondence between the female and male responses is valid. However, in Figure 7.17(b) the slope is 0.7 which suggests that an exact correspondence does not exist between the female and male responses and the R^2 value indicates that much scatter exists in the data and so the result may be unreliable. This useful technique will be used to compare sets of data.

Before carrying out the actual analysis procedure, a significant test for the correlation coefficient was first laid out. The formula for the calculation are:

A sample correlation coefficient is significant:

at the 5% level if its size (+ or −) exceeds $2 \times 1/\sqrt{}$sample-size

at the 1% level if its size (+ or −) exceeds $2^1/_2 \times 1/\sqrt{}$sample-size

Thus, in a sample of 49 pairs of responses, to be significant at the 5% level, the coefficient would have to be greater than $\pm 2/\sqrt{49} = 2/7 = 0.29$ (+ or −); to be significant at the 1% level, the coefficient would have to be exceed $\pm 2.5/\sqrt{49} = 2.5/7 = 0.36$ (+ or −).

Due to the complex nature of the questionnaire data obtained in this research, the number of different variables and the size of the total possible result comparisons are considerable. Principal component analysis and hierarchical cluster analysis were also used to generate alternative graphical results from the obtained responses in an attempt to both provide a better understanding of the data relationships, and to possibly validate findings obtained using other analytic methods.

As suggested by Osgood, *"data cubes produced by the SD technique contain a great deal of information. Factor analysis is a statistical technique for discovering the dimensional structure of a content domain for which the structure is unknown on a priori grounds. From the patterns of the inter-correlations among a finite but large number of characteristics of the domain of interest, we infer the existence of a basic set of dimensions whose combinations could give rise to all of the observed variations"* [21]. The main applications of factor analytic techniques are to reduce the number of variables and to detect structure in the relationship between variables, i.e. to classify variables.

Principal component analysis (PCA) is closely related to factor analysis; it is one of the two approaches to factor analysis apart from the common factor analysis. The purpose of PCA is to derive a small number of linear combinations (principal components) from a set of variables that retain as much of the information in the original variables as possible. It is mostly used as a tool in exploratory data analysis and for developing predictive models. Principal components are linear combinations of variables that retain a maximal amount of information about the variables. The term "maximal amount of information" here means the best least-square fit, or, in other words, maximal ability to explain variance of the original data. These describe the data without any essential information being lost, since the majority of the variables are typically correlated or redundant. For example, if house sample 1 always received responses to be *Subtle* in word-pair 1 and *Boring* in word-pair 3. Redundant variables are those responses which are either neutral or play little part in the distribution of the data. The relationships between variables using PCA are generalized and thus visualised by producing a scatter plot of the first two PCs in terms of component scores and loadings [22].

Hierarchical cluster analysis (HCA) is complementary to PCA and is employed when PCA score plots are deemed to be confusing or complex, for example if there are a very large number of samples, or if the data cannot be displayed or understood clearly in three or fewer dimensions. In this case, the data is visualized in the form of dendrograms (tree-structures) as illustrated in Figure 7.20. In this way, HCA permits larger and more complex datasets to be viewed in an intuitive and graphical way. HCA is a form of clustering analysis which assigns sets of observations into subsets (called clusters) so that observations in the same cluster are similar in some dimensions. A dendrogram is draw by calculating how similar the samples are to one another. This similarity is defined as the distance between two samples in the

N-dimensional space spanned by the N-measured variables. The shorter the distance between two samples, the more similar these samples are considered to be. Two steps are involved in generating a dendrogram: (i) calculation of the distance between samples via distance algorithms – Euclidean distance method; and (ii) grouping of the samples or cluster of samples via linkage algorithms – Ward linkage method. Consequently, both PCA and HCA were performed with the obtained questionnaire dataset. Results attained from the analysis are to be discussed subsequently in this chapter.

7.6.1. Gender Comparison Analysis

The collected questionnaire data from the first part of the questionnaire were first input into the spreadsheet separated by the variable categories illustrated in Table 7.11. Responses from each respondent in respect to each word-pair, for each house sample were grouped separately according to nationality, age group and gender. The average response intensities were first calculated from the spreadsheet for all the male and female responses separately within each age group, for each word-pair and for each house sample.

The first hypothesis, made from observation of the input data by the author, is that there exists no difference between male and female's average aesthetic responses in describing perceived house samples.

7.6.1.1 Visual Description Data for 27 house samples with 15 word-pairs

Initially, the average of the total number of responses obtained for both males and females using the 1-7 intensity scale for each age group was calculated separately from the spreadsheet. Each of the calculated averages, e.g. average male age group 9-11, contains 405 (15x27) points of intensity scores between 1-7 which are assembled by a total 15 word-pairs per each photographic sample and 27 house samples all together. A critical aspect regarding analyzing responses obtained from semantic differential scales is the appropriateness of using average to represent a group of data. For instance, although identical 15 pairs of semantic words were used for each of the 27 photographs, average responses for all 27 photographs in terms of the 15 word-pairs can not be calculated since each single photograph contains different characters, styles and cultural backgrounds. Each of the response in respect to one word-pair and one photograph is precisely independent from each other expressing a specific quality of the single viewed photograph using the particular word-pair. Consequently, each set of the 405 data scores need to be compared or analyzed independently.

(a) correspondence (slope) + regression coefficient (r-value)

The slopes and the scatter level (r-value) of the trend lines between male and female responses for each of the six age groups in each country were calculated using an Excel spreadsheet and are illustrated in Table 7.12. Such correlation coefficients were each

calculated from a sample of 405 pairs of average intensity responses obtained from the total number of collected male and female respondents for each of the 15 word-pairs and each of the 27 house photographs.

With almost all the correlation coefficients larger than +0.70 and from a sample of 405 pairs of responses, it is confident that there is strong relationship between male and female responses for all the age groups but group 12-18. However, in order to state the certainty for the observed relationship, a significance test for the obtained sample correlation coefficient could be applied using the formulas provided previously.

In a sample of 405 pairs of responses, to be significant at the 5% level, the coefficient would have to be greater than: ± 2/$\sqrt{}$405 = 2/20.13 = 0.10 (+/−); and to be significant at the 1% level, the coefficient would have to be exceed: ± 2.5/$\sqrt{}$405 = 2.5/20.13 = 0.12 (+/−). All of the correlation coefficient were significant not only at 5% but also at 1% level. Thus, a significant relationship between male and female's response could be concluded despite the different ages and cultural contexts.

Table 7.12. The value of the slope and the regression coefficient of the correspondence between avg. male and avg. female responses.

Correspondence (slope) and the regression coefficient (r-value) between avg. male and avg. female responses		**Age Groups**						**Avg. response of all age groups**
		A. 9-11	**B. 12-18**	**C. 19-29**	**D. 30-49**	**E. 50-64**	**F. 65+**	
UK	**slope**	**0.77**	**0.54**	**0.89**	**1.03**	**0.90**	**0.88**	**1.06**
	r	0.71	0.64	0.72	0.86	0.79	0.78	0.93
Japan	**slope**	**0.66**	**0.66**	**0.88**	**0.92**	**0.69**	**0.91**	**0.98**
	r	0.74	0.65	0.86	0.83	0.83	0.79	0.95
Taiwan	**slope**	**0.74**	**0.80**	**1.03**	**0.85**	**0.93**	**0.80**	**0.99**
	r	0.72	0.85	0.89	0.84	0.84	0.88	0.97

According to Table 7.12, the slope and regression coefficients of the trend lines were calculated using average male and female responses discarding the age parameter for each of the three countries. Slope very close to 1.00 were obtained with high values of the regression coefficient (*r*).

As described earlier the slope of the trend line would have a value of 1.0 if a perfect correspondence existed between the male and female response. Illustrated in Figure 7.18, each of the three individual countries all has the slope of a high value ranging from 0.98 to 1.06 when average response was used in calculation. These results suggest that a high degree of correspondence exist between male and female responses regarding all the 27 shown house samples with the 15 word-pairs semantic differential scales.

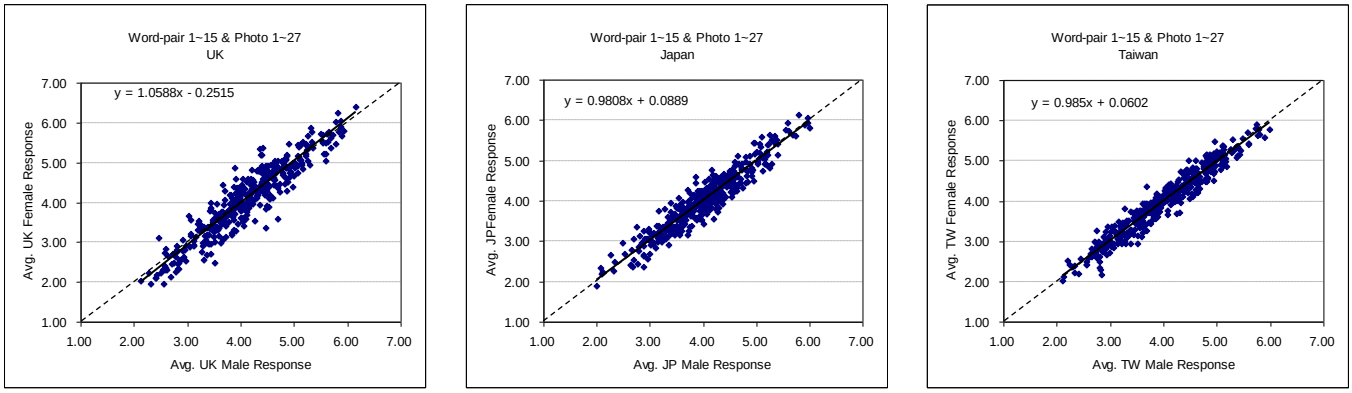


Figure 7.18. Correspondence analysis for male and female responses for three nationalities.

However, when the age parameter is considered differences between male and female responses were observed in several comparisons between different age groups, refer back to Table 7.12. Trend lines with slopes below 0.70 were particularly evident in the younger age groups such as the 12-18 for the UK responses, 9-11 and 12-18 for the Japanese responses. These results suggest that differences exist between responses collected from male and female respondents.

(b) Principal Component Analysis (PCA) + Hierarchical Cluster Analysis (HCA)

The average responses representing males and females separately for each age group and each nationality were used to perform both the principal component analysis and the hierarchical cluster analysis. The respondent dataset was coded separately with age, gender and nationality respectively, as illustrated in Table 7.13.

Table 7.13. Code for respondent regarding age, gender and nationality.

Age Group		**9-11**		**12-18**		**19-29**		**30-49**		**50-64**		**65+**	
Gender		**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Nationality	**UK**	UAM	UAF	UBM	UBF	UCM	UCF	UDM	UDF	UEM	UEF	UFM	UFF
	Japan	JAM	JAF	JBM	JBF	JCM	JCF	JDM	JDF	JEM	JEF	JFM	JFF
	Taiwan	TAM	TAF	TBM	TBF	TCM	TCF	TDM	TDF	TEM	TEF	TFM	TFF

As explained previously, principal component analysis was used here as the second analytical method to examine hypothesis proposed in each variable comparisons. Initially, a three-dimensional PCA score plot was generated, Figure 7.19, for the complete dataset including responses from all the respondents categorized into demographic groups as listed in Table 7.13.

To facilitate easy visual comparison between gender, the female respondent groups are coloured in red with male groups in black. In Figure 7.20, it can be seen that there is no definite separation of male and female responses into distinct clusters. This finding suggests that

gender difference does not cause a significant effect on aesthetic responses. Figure 7.20 also suggests that respondents from Taiwan form a separate cluster from those from Japan and the UK.

Although it is possible to ascertain groupings using the three-dimensional PCA score plot, it is difficult to clearly visualize the relationship between different data points, for example the distance between different responses, the exact overlapping between two or more than two different data points. Small clusters between several female groups can be observed in Figure 7.19 yet it is quite difficult to identify or assign an overall cluster separation between male and female responses.

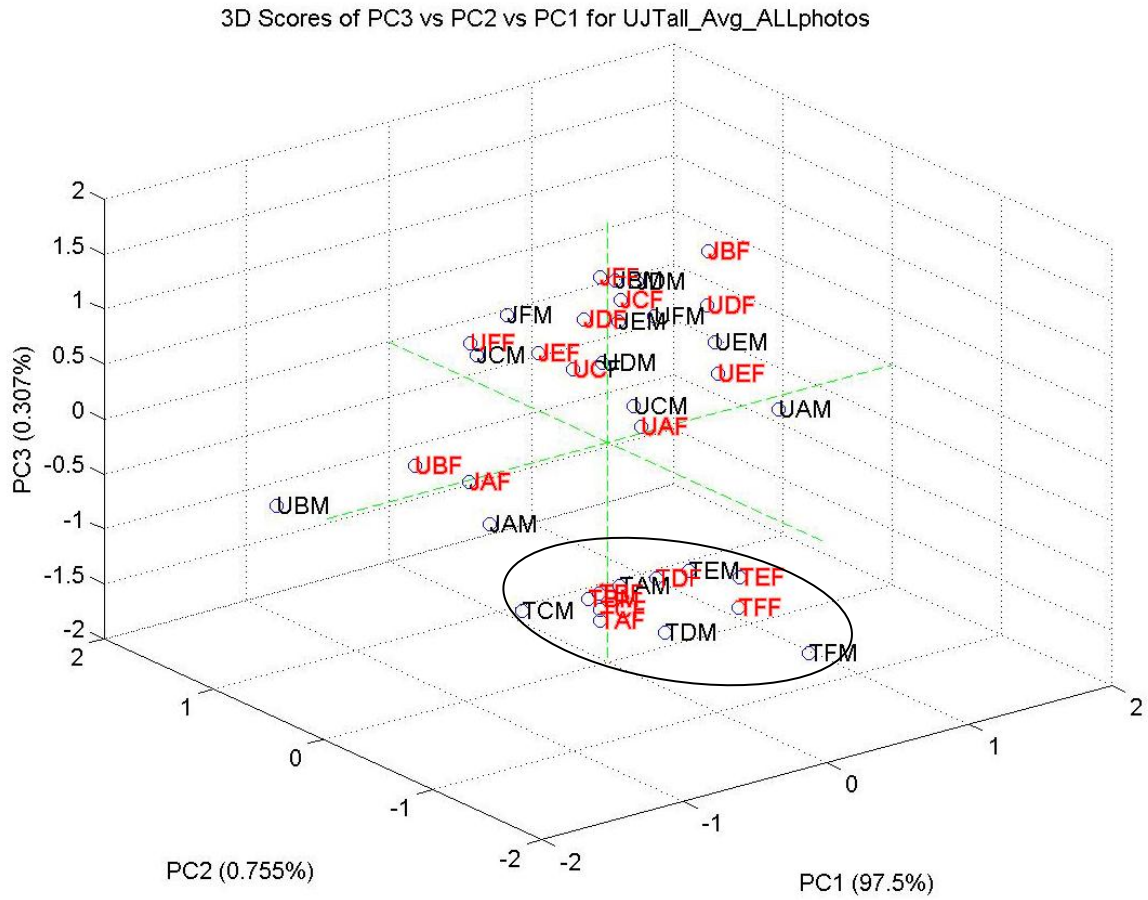


Figure 7.19. 3D PCA score plot for all three countries' responses across six age groups coloured separately with gender difference.

This is where hierarchical cluster analysis (HCA) assists where linkage and distance between data points are clearly illustrated using dendrograms on a two-dimensional plan, see Figure 7.20. Using the PCA plot results, as illustrated in Figure 7.20, an HCA plot can be produced as in Figure 7.21 which includes the data PC1 to PC3. Results observed in the HCA plot of Figure 7.21, illustrate that clusters could be found between male and female respondents from the same (Cluster 3: JAM and JAF) or different (Cluster 2: TCM, TDF and

TEM) age groups within a single nationality. In Cluster 1 a tight cluster between TAM (Taiwan_9-11_Male) and TBM (Taiwan_12-18_Male) was formed with TBF (Taiwan_12-18_Female). These random cluster patterns exist within and across different age groups suggested the reason behind the inconsistent correspondences found previously when high correspondence is obtained between the average response of male and female and yet lower correspondence is sometimes observed when the age parameter is taken into consideration.

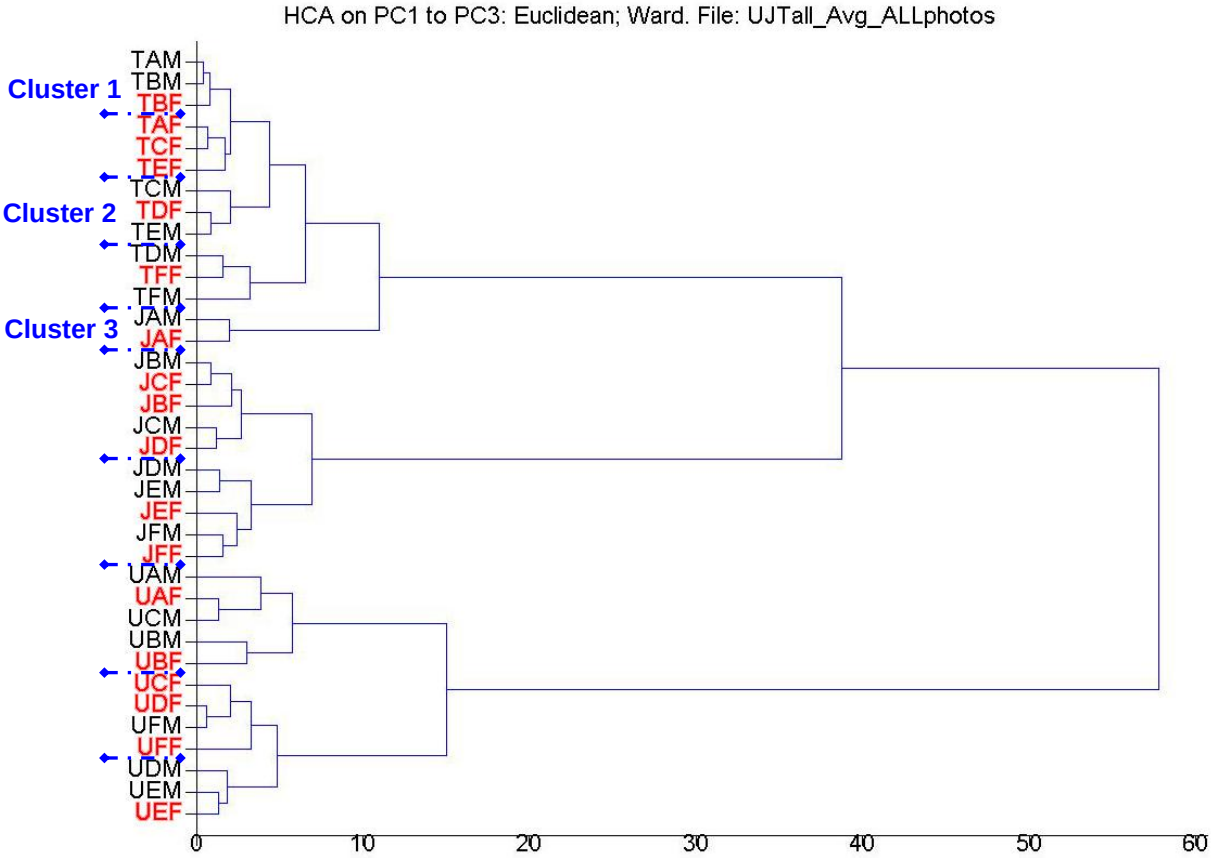


Figure 7.20. HCA dendrogram of the PCA scores shown in figure 7.21 regarding responses from all three countries including age and gender parameters.

Both PCA and HCA analysis demonstrate that no clear separation exists between male and female responses and suggested a considerable degree of similarity for the responses of both genders. These findings are consistent with results obtained using linear correlation analysis for direct comparisons, yet the HCA plot has been demonstrated as being particularly efficient in visualizing relationships between different data points and patterns in the overall observation.

(c) semantic response diagram

Questionnaires utilizing semantic differential scales are often shown graphically to allow visual comparisons between different respondents. Differences in responses, either in terms of

intensity, or side of the semantic word-pair scale could be easily visualized and compared by overlapping the different response diagrams. Due to the amount of data points in each single set of response (15 word-pairs X 27 house samples = 405 data points), any visual diagram in attempt to illustrate 405 data points would not be visually efficient. Hence, the strategy of utilizing the value of the absolute difference between two set of responses instead of the actual response intensity was considered. The use of the absolute difference between two different response allows averages value to be calculated when processing the data since the value represents the amount of difference in response independent to the specific photographic sample. Initially, the absolute differences between average responses obtained from male and female were calculated for each age group, each house sample and each word-pair. Since the values used for the comparison here were the absolute differences between response intensity. It was considered appropriate to generate one set of average absolute difference for each of the 15 word-pairs across the total 27 house photographs for each of the six age groups, as illustrated in Table 7.14.

Table 7.14. average absolute difference for each of the 15 word-pairs across 27 house photographs.

Age 9-11		Photo #																											
M vs F		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Ave
Word-Pair #	1	0.8	0.1	0.9	0.2	0.6	0.1	0.0	0.6	1.5	0.3	0.5	0.6	0.2	0.2	0.3	0.3	0.3	0.2	0.5	0.4	0.7	1.0	0.1	0.8	0.3	0.5	0.1	0.45
	2	0.4	0.1	0.1	0.0	0.2	0.0	0.1	0.3	1.1	0.4	0.5	0.2	0.1	0.7	0.5	0.8	0.4	1.7	0.7	0.6	0.5	0.5	0.1	0.6	1.1	0.5	0.2	0.46
	3	1.3	0.4	0.1	1.0	0.6	0.9	0.6	0.8	0.3	0.5	0.0	0.8	0.6	0.5	0.3	0.4	0.4	2.0	0.2	0.9	1.7	0.0	0.6	1.1	0.4	0.6	0.7	0.66
	4	0.9	0.1	0.2	0.2	0.6	1.4	0.5	1.3	0.6	0.2	0.7	0.9	0.2	0.3	0.2	0.4	1.8	1.2	0.5	0.3	0.2	0.3	0.8	0.4	0.1	1.0	0.1	0.56
	5	0.0	0.4	0.8	0.3	0.3	0.4	0.9	0.3	0.9	0.1	0.5	0.6	0.1	0.3	0.3	0.8	0.9	0.3	0.3	0.8	0.2	1.0	0.9	0.5	1.1	0.1	0.5	0.50
	6	0.9	0.6	0.1	0.6	0.6	0.6	0.3	0.1	0.3	0.2	0.0	0.6	0.4	0.2	0.5	0.3	0.0	0.6	0.7	0.6	1.9	0.1	0.2	1.3	0.4	0.1	1.3	0.50
	7	1.1	0.5	0.3	0.9	0.5	0.2	0.1	0.6	0.2	0.4	0.7	1.0	0.8	0.9	0.4	0.4	0.8	0.7	1.4	0.5	0.1	0.1	1.4	1.2	0.0	1.2	1.0	0.64
	8	1.5	0.5	0.4	0.7	1.4	0.1	0.7	0.1	0.4	0.9	0.2	0.7	0.3	0.8	0.5	0.9	0.2	0.7	0.0	0.3	0.6	0.2	0.2	0.3	0.2	0.8	0.4	0.52
	9	0.1	0.2	0.2	0.2	0.2	0.3	0.9	1.7	0.8	0.2	0.9	0.4	0.4	0.9	1.0	1.9	2.4	1.6	0.2	0.9	0.6	1.0	0.1	0.3	0.5	0.2	0.1	0.67
	10	0.7	0.5	0.1	0.4	0.5	0.3	0.8	1.2	0.3	0.1	0.4	1.4	0.1	1.0	1.4	1.3	0.9	0.3	0.3	0.4	0.5	0.6	0.1	0.3	0.7	0.7	0.6	0.59
	11	0.1	0.6	0.4	0.3	0.5	0.1	0.7	0.0	0.0	0.1	0.1	1.1	0.2	0.1	0.9	0.3	0.7	0.1	0.4	0.4	0.0	0.4	0.2	0.4	0.1	0.2	0.1	0.32
	12	0.1	0.2	0.0	0.1	1.4	0.9	1.4	0.4	0.2	0.6	0.4	0.8	1.0	0.4	0.7	0.9	0.3	0.7	0.3	0.9	0.4	0.3	0.6	0.1	0.7	0.2	0.1	0.51
	13	0.2	0.7	0.0	1.0	0.1	0.3	0.3	0.3	0.3	0.0	0.9	0.5	0.4	0.6	0.2	0.8	0.8	0.1	0.8	0.1	0.1	0.3	0.3	0.6	0.2	0.2	0.2	0.39
	14	1.1	0.5	0.0	0.1	0.1	0.1	0.2	0.2	0.8	0.2	0.0	0.4	1.0	1.0	1.4	1.7	1.2	0.5	0.5	1.2	0.2	0.9	0.5	0.2	0.6	0.2	0.2	0.55
	15	0.1	0.3	0.5	0.1	0.0	0.3	0.3	0.3	0.1	0.2	1.0	0.7	0.9	0.6	1.0	1.1	0.2	0.1	0.8	0.7	0.2	0.9	0.6	0.1	0.8	0.1	0.1	0.44

Figure 7.21 illustrates the average absolute differences between male and female responses for each of the 3 countries. The total range of response differences is from 0 to 6, with 0 signifying no difference between responses from male and female respondents and 6 being the greatest possible differences between responses, i.e. the difference between 1 and 7. The absolute differences calculated and shown in Figure 7.21 demonstrate that less than one incremental intensity difference exists between the male and female responses for all the six age groups, all the fifteen word-pairs and all of the three nationalities. Accordingly, the results suggest that in general, responses obtained from the male respondents are consistent with responses given by the female groups when questions are asked concerning their visual description of different house samples.

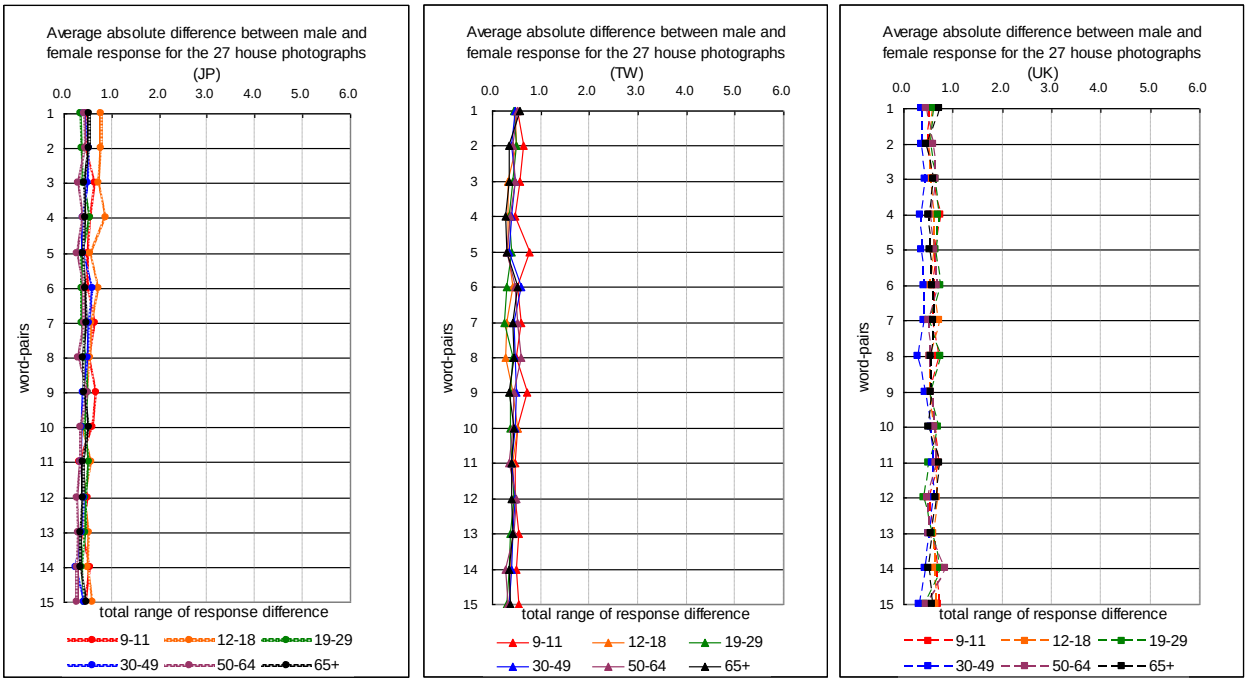


Figure 7.21. Average absolute differences between male and female responses for each nationality in semantic response diagram.

7.6.1.2 Subjective Description and Judgment – Ideal house response

During the second part of the questionnaire respondents were asked to use the semantic differential scale to indicate the qualities of their ideal house without a photograph being shown. Because of logistical difficulties, the ideal house response questionnaire was conducted by respondents from age 12 and above in the Japan and the UK contexts only.

(a) Correspondence + regression coefficient + significance test

The correspondences across gender for definitions of the characteristics of the notion of the ideal house were calculated from the responses for each of the six age groups in each country and are illustrated in Table. 7.15. The sample size used to calculate the correlation coefficients here was 15 as this was the number of word-pairs provided for the respondents to describe their ideal house qualities. High correlation coefficients (r-values of 0.78 to 0.99) were obtained for all the comparisons between males and females for each of the 5 age groups. Similarly, the obtained slopes of the lines were all relatively close to unity (1.00) apart from the UK 12-18 age group which had an exceptional low slope of 0.45, and the Japan 65+ age group with a slope of 1.31, but where the remaining 8 age groups (including UK and Japan) had 0.77 to 1.16 slopes with r-values of 0.88 to 0.99.

Table 7.15. Correspondence and r-value for average male and female ideal responses.

correspondence between avg. male and avg. female ideal responses		**Age Groups**					**Avg. of all age groups**
		B. 12-18	C. 19-29	D. 30-49	E. 50-64	F. 65+	
UK	**slope**	**0.45**	**1.04**	**1.05**	**1.03**	**1.07**	**0.95**
	r	0.78	0.93	0.99	0.92	0.89	0.98
Japan	**slope**	**0.84**	**1.00**	**1.16**	**0.77**	**1.31**	**1.06**
	r	0.88	0.96	0.97	0.97	0.97	0.99

These findings suggest that in general, especially when average response is used in the calculation, females and males responded similarly using the 15 word-pair and 7 intensity semantic differential scale regarding the qualities required of an ideal house. However, the age variable appeared to be an influential factor especially for the younger and older respondents.

In order to understand the significance of these results in terms of the correspondence value a significant test was calculated using 15 average responses obtain for each respondent age group (15 response data points from the 15 word-pairs). In a sample of 15 pairs of female versus male responses, to be significant at the 5% level, the correlation coefficient would have to be greater than $\pm 2/\sqrt{15} = 2/3.87 = \pm 0.52$; to be significant at the 1% level, the correlation coefficient would have to be exceed $\pm 2.5/\sqrt{15} = 2.5/3.87 = \pm 0.65$. All the correlation coefficients showed the relationships between the male and female responses to be significant not only at the 5% level, but also at the 1% level.

(b) semantic response diagram

Semantic response diagrams were also generated to illustrate comparisons between male and female ideal responses. In Figure 7.22, responses obtained using the 7-scaled, 15 word-pairs semantic differential scales from the UK respondents were coloured in blue with responses coloured in red for the Japanese respondents. For both nationalities, high similarities in responses were observed between male and female respondents for each of the 15 word-pairs. Some differences could be identified between the UK and Japan responses and such cross-cultural differences will be discussed further later in the chapter.

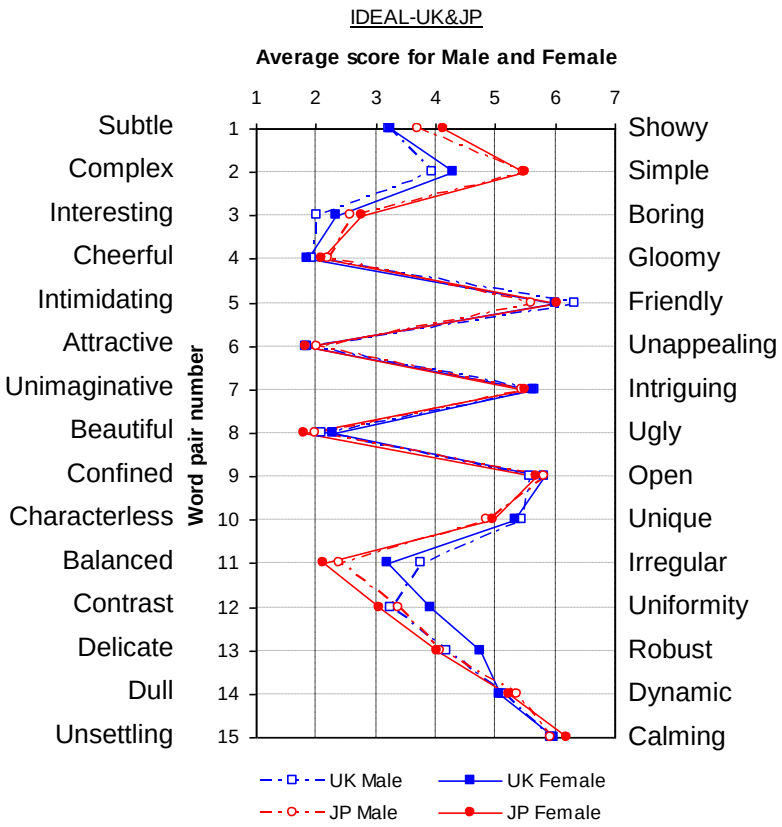


Figure 7.22. Semantic response diagram illustrating average ideal house response for both UK and Japan, male and female respondents.

7.6.1.3 Preference Judgment – the best and the least preferred house samples

In the last part of the questionnaire, each respondent was asked to select one house sample that they liked the best and one that they liked the least from the full collection of 27 photographs. A frequency table was drawn, Table 7.16, to estimate the proportions of the most preferred and the least preferred house sample in the total population.

Apart from Taiwan responses, where male and female respondents consistently agreed, both the UK and Japan male respondents selected different most liked and least liked house samples from the female respondents.

Table 7.16. Frequency of best liked and least liked votes for the full collection of 27 house photographs.

Photo No. and location		Best liked (O)						Least liked (X)					
		UK		Japan		Taiwan		UK		Japan		Taiwan	
		M	F	M	F	M	F	M	F	M	F	M	F
UK	1	15%	14%	4%	7%	6%	3%			5%	1%	6%	2%
	2	2%	6%					2%					1%
	3	13%	26%	2%	16%	5%	15%	2%	2%	1%			
	4						1%	2%	3%				
	5		2%		2%		1%	2%		1%			
	6			5%	2%	1%	1%		2%				
	7	15%	8%	5%	6%	3%	3%	2%	2%	1%	1%	3%	
	8	2%	2%	4%	1%		1%		2%	4%	5%	3%	
	9	8%	8%	18%	12%	3%	3%		2%	1%			
JP	10	6%	3%	13%	12%	2%	4%	2%	2%				
	11	2%	3%	10%	5%	11%	3%						
	12	2%		6%	2%	3%	2%			6%	3%		1%
	13	4%	3%	7%	11%	13%	6%		2%				
	14				5%	8%	4%	4%	6%				
	15						1%	2%		11%	12%	1%	2%
	16	2%	3%	2%	2%	3%	1%	15%	20%	11%	9%	7%	16%
	17			1%	1%		1%	8%	12%	7%	5%	5%	5%
	18				2%			2%			1%	2%	2%
TW	19	2%	2%					6%	2%	6%	5%	6%	7%
	20		2%			6%	2%	8%	8%	12%	16%	5%	7%
	21		2%	1%				15%	15%	11%	16%	9%	16%
	22							12%	9%	7%	7%	15%	13%
	23	8%	9%	13%	11%	17%	28%						
	24		3%					4%		14%	6%	29%	20%
	25	10%	2%	7%	2%	5%	10%	6%	8%	1%	9%	6%	4%
	26	2%	3%			10%	5%	4%	2%		1%		1%
	27	8%	3%			2%	2%	4%	5%	1%	2%	1%	1%

7.6.1.4 Summary of gender comparison analysis

The results suggest that there is strong correspondence between male and female responses when number of house photographic samples were viewed and judged utilizing semantic differential scales. Similarly, high correspondence between male and female responses was obtained when respondents were asked to indicate their “ideal” house qualities on the 15 identical semantic word-pairs without a house photograph being shown. The consistency of strong correspondences between gender were evident in all the responses from each of the three countries, the UK, Japan and Taiwan, as well as all the six age groups. However, when respondents were asked to indicate their preference selection among the 27 presented house samples, agreement between genders was only evident from the Taiwan responses.

These findings suggest that male and female responses were highly correlated when semantic differential scales were used to describe or judge the aesthetic qualities of a perceived house sample, or an imaginative ideal house. Nonetheless, such consistency across all three countries was not observed regarding preference judgment when respondents

were asked to select their most liked and least liked house samples. Conclusions generated from this part of questionnaire data could further suggest that common principle exists regarding male and female's aesthetic interpretation or description, but their preferences of aesthetic objects are not generally consistent.

7.6.2 Cross-cultural comparison analysis

Considering the consistently high correspondence between the responses of male and female respondents obtained previously for the male and female respondents utilizing the 15 word-paired semantic differential scales and 27 house samples, an average score that included both the male and female responses was calculated and used for the following analyses and comparisons. A new variable table, Table 7.17, was generated to include the cross-cultural variable of the questionnaire with a single average score including both male and female responses from each country.

Table 7.17. Full list of variables included in the questionnaire analysis with single average response value across genders.

Nationality	Age Group	Photo Number	Word Pair	Response Intensity
UK (Ave. Male&Female)	9-11	1UKT 2UKT 3UKT	1-Subtle/Showy	
		4UKO 5UKO 6UKO	2-Complex/Simple	
	12-18	7UKI 8UKI 9UKI	3-Interesting/Boring	
			4-Cheerful/Gloomy	
	19-29	10JPT 11JPT 12JPT	5-Intimidating/Friendly	
		13JP 14JPO 15JPO	6-Attractive/Unappealing	
	30-49	16JPI 17JPI 18JPI	7-Unimaginative/Intriguing	1----7
			8-Beautiful/Ugly	
	50-64	19TW 20TWT 21TWT	9-Confined/Open	
		22TW 23TWO 24TW	10-Characterless/Unique	
	65+	25TWI 26TWI 27TWI	11-Balanced/Irregular	
			12-Contrast/Uniformity	
			13-Delicate/Robust	
			14-Dull/Dynamic	
			15-Unsettling/Calming	
JP (Ave. Male&Female)	9-11	1UKT 2UKT 3UKT	1-Subtle/Showy	
		4UKO 5UKO 6UKO	2-Complex/Simple	
	12-18	7UKI 8UKI 9UKI	3-Interesting/Boring	
			4-Cheerful/Gloomy	
	19-29	10JPT 11JPT 12JPT	5-Intimidating/Friendly	
		13JP 14JPO 15JPO	6-Attractive/Unappealing	
	30-49	16JPI 17JPI 18JPI	7-Unimaginative/Intriguing	1----7
			8-Beautiful/Ugly	
	50-64	19TW 20TWT 21TWT	9-Confined/Open	
		22TW 23TWO 24TW	10-Characterless/Unique	
	65+	25TWI 26TWI 27TWI	11-Balanced/Irregular	
			12-Contrast/Uniformity	
			13-Delicate/Robust	
			14-Dull/Dynamic	
			15-Unsettling/Calming	
TW (Ave. Male&Female)	9-11	1UKT 2UKT 3UKT	1-Subtle/Showy	
		4UKO 5UKO 6UKO	2-Complex/Simple	
	12-18	7UKI 8UKI 9UKI	3-Interesting/Boring	
			4-Cheerful/Gloomy	
	19-29	10JPT 11JPT 12JPT	5-Intimidating/Friendly	
		13JP 14JPO 15JPO	6-Attractive/Unappealing	
	30-49	16JPI 17JPI 18JPI	7-Unimaginative/Intriguing	1----7
			8-Beautiful/Ugly	
	50-64	19TW 20TWT 21TWT	9-Confined/Open	
		22TW 23TWO 24TW	10-Characterless/Unique	
	65+	25TWI 26TWI 27TWI	11-Balanced/Irregular	
			12-Contrast/Uniformity	
			13-Delicate/Robust	
			14-Dull/Dynamic	
			15-Unsettling/Calming	

7.6.2.1 Visual Description Data for 27 house samples with 15 word-pairs

(a) Correspondence + regression coefficient

The regression coefficient and the slope of the trend line (showing correspondence) for each individual age group between the three nationalities were calculated from the results spreadsheet and are illustrated in Table 7.18. In general, a low regression coefficient and a value of slope (correspondence) that was considerably less than unity were observed for all the age groups between each of the three nationality comparisons. These results suggest that respondents with different national backgrounds responded differently when identical sets of house samples were provided and responses were required utilizing equivalent semantic differential scales. Comparisons between any two nationalities, shown in Table 7.18 indicate that in general respondents from Japan corresponded more closely with respondents from Taiwan than for the UK for all the age groups including the average response for all age groups. Additionally, in all three sets of cross-cultural comparisons, the 65+ age group constantly had slopes with values furthest from unity and the lowest regression coefficients when compared to the other age groups. This suggests that in comparison the older generation has the greatest difference in their aesthetic response cross-culturally.

Table 7.18. Slopes and r-values between respondents cross-culturally and across six age groups.

Slope (correspondence) and regression coefficient , r, cross-culturally		**Age Groups**						**Avg. response of all age groups**
		A. 9-11	B. 12-18	C. 19-29	D. 30-49	E. 50-64	F. 65+	
UK vs. JP	**slope**	**0.45**	**0.43**	**0.55**	**0.50**	**0.41**	**0.38**	**0.52**
	r	*0.48*	*0.40*	*0.53*	*0.52*	*0.58*	*0.48*	*0.59*
UK vs. TW	**slope**	**0.47**	**0.48**	**0.56**	**0.43**	**0.45**	**0.30**	**0.51**
	r	*0.49*	*0.43*	*0.55*	*0.44*	*0.52*	*0.30*	*0.50*
JP vs. TW	**slope**	**0.68**	**0.66**	**0.69**	**0.70**	**0.85**	**0.57**	**0.86**
	r	*0.66*	*0.63*	*0.71*	*0.68*	*0.70*	*0.46*	*0.75*

The results demonstrate that cultural and age differences are significant variables in people's aesthetic responses. Overall, Japan and Taiwan have the best correspondence in all the age groups while the UK respondents appear to be the group that responded most differently from Japan (in age group A, B and C) or from Taiwan(in age group D, E, F and the average responses).

(b) Principal Component Analysis (PCA) + Hierarchical Cluster Analysis (HCA)

Principal component analysis and hierarchical cluster analysis were also applied to facilitate the cross-cultural comparison for the extensive questionnaire data set. PCA was

proposed to be useful in examining the cross-cultural factor of this study since more than two independent variables can be compared from the set of data that has been constructed to contain underlying variables such as; 6 age groups, 15 word-pairs, 3 house sample style categories and 3 cultural context locations for each of the total 27 house samples.

As discussed previously, although it is possible to visualize relationships between different data points using the three-dimensional PCA score plot, it is difficult to accurately classify and compare the observed clusters and the inter-correlations between data points. Accordingly, the dendrogram generated from the hierarchical cluster analysis (HCA) was utilized in illustrating results obtained from the cross-cultural data comparisons.

First observation of the HCA diagram of Figure 7.234 indicates three definite clusters defined by respondents' nationalities. Cluster 2 contains all respondents from Taiwan (coloured orange) and the younger age group 9-11 respondents from Japan (coloured green). Cluster 2 includes all respondents from Japan (coloured green) but the 9-11 age group. Cluster 3 is compiled with responses obtained from all the UK respondents (coloured blue). Apart from the inconsistency of the youngest respondent group from Japan, which clustered with respondents from Taiwan, the finding suggests that strong cultural differences based on nationality exist between respondents' aesthetic perceptions and visual descriptions of identical housing samples.

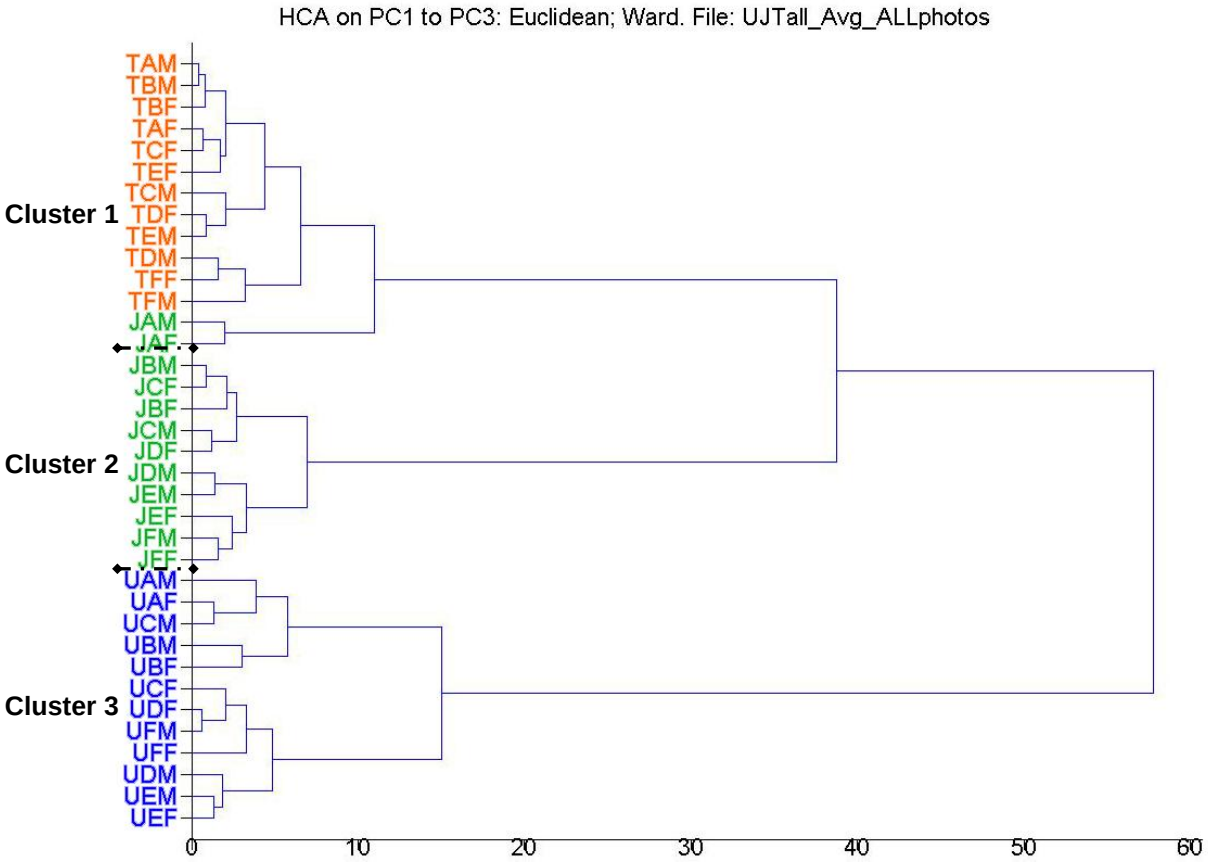


Figure 7.23. HCA plot addressing datasets including UK, Japan and Taiwan responses.

Figure 7.23 also demonstrates that the largest clusters with the greatest dissimilar elements occurred between the cluster containing all of the UK responses (cluster 3) with the cluster comprising all of the Taiwan and Japan responses (clusters 1+ 2). This observation demonstrates a distinct separation regarding aesthetic descriptions provided by the UK respondents and the Japan and Taiwan respondents and suggests that greater dissimilarities in aesthetic response are to be expected when respondents have greater differences in their cultural backgrounds. Figure 7.23 suggests that a respondent from Northern Europe would be likely to respond very differently from the East Asian when compared to the difference in response made by respondents from different countries within the East Asian region. However, such regional and sub-regional differences and similarities require further investigation in a wider geographical scale.

(c) semantic response diagram

Similarly, the semantic response diagram drawn to illustrate the average absolute difference between any two of the three nationalities in their responses on the 7-point and 15 word-paired semantic differential scale was shown in Figure 7.24. The figure indicates that the absolute difference between the UK and Taiwan average responses is highest for most of the 15 word-pairs, as shown by the red line. Conversely the differences in the responses obtained from Japan and Taiwan shown by the green line are the lowest. Both the HCA and the semantic response diagram support the results obtained from previous regression and PCA analyses in that they display that the Japanese and Taiwanese respondents have the greatest similarities in their aesthetic responses which are very different from the UK respondents.

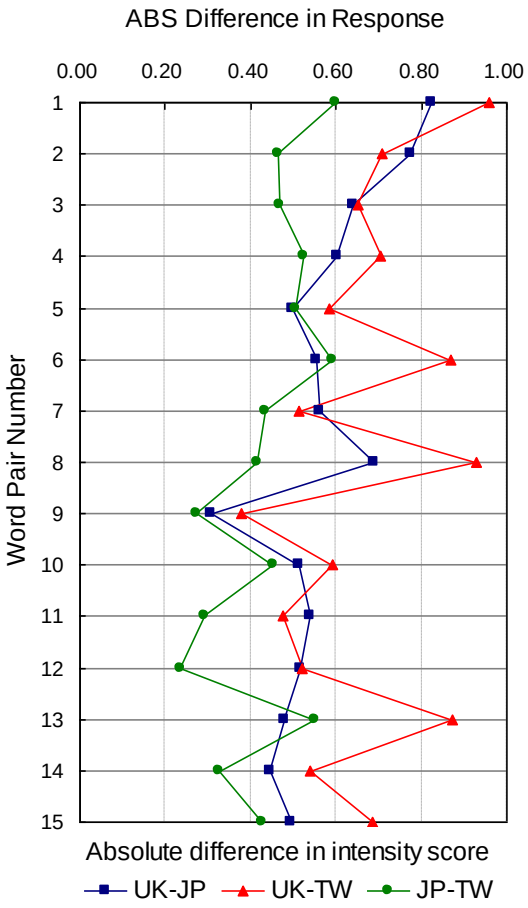


Figure 7.24. Semantic response diagram for the absolute difference scores in response intensity across three nationalities.

7.6.2.2 Subjective Description and Judgment – Ideal house response

(a) Correspondence (slope) + regression coefficient

The correspondence between the average responses obtained from the UK respondent and the average Japanese responses for the required qualities of an ideal house, as defined

by the 15 word pairs, for each of the five tested age groups were calculated and listed in Table 7.19. The sample size used to calculate the correspondences was 15 as this was the number of word-pairs provided for the respondents to use to describe the relative importance of the visual aesthetic qualities of an ideal house. According to Table 7.19, high correspondences were obtained between each of the five age group compared which indicates the overall high similarity between the UK and Japan ideal responses. The closeness of the slopes of the trend line to unity and the value of the regression coefficients are particularly high and consistent for respondents in age groups 19-29, 30-49, 50-64 and the average of all age groups. These results suggests that the cross-cultural variable has little effect on respondents' notion of the required qualities of an ideal house. With different cultural backgrounds and ages, respondents appear to have similar aesthetic profile for the qualities of an ideal house.

Table 7.19. Correspondence and regression coefficient between average UK and Japan ideal house response.

Correspondence (slope) and regression coefficient, r, between avg. UK and avg. JP ideal house responses	**Age Groups**					
	B. 12-18	C. 19-29	D. 30-49	E. 50-64	F. 65+	**Avg. of all age groups**
slope	**0.90**	**1.01**	**0.96**	**0.96**	**0.69**	**0.94**
r	0.75	0.95	0.92	0.94	0.91	0.93

(b) semantic response diagram

As no significant difference between male and female responses was found from previous analysis, the average responses for UK and Japan were used in this cross-cultural comparison in generating the semantic response diagram, Figure 7.25. Utilizing the semantic response diagram, differences in the actual response (the selected adjective from the word-pair and the intensity related to the particular word regarding to the perceived sample) can be clearly visualized and compared.

According to Figure 7.25, the selection of individual words in all the 15 word-pairs are mostly identical although several differences with intensity greater or equal to 1.00 in response were observed, for example in word-pair 1 (subtle/showy), 2 (complex/simple) and 11 (balanced/irregular).

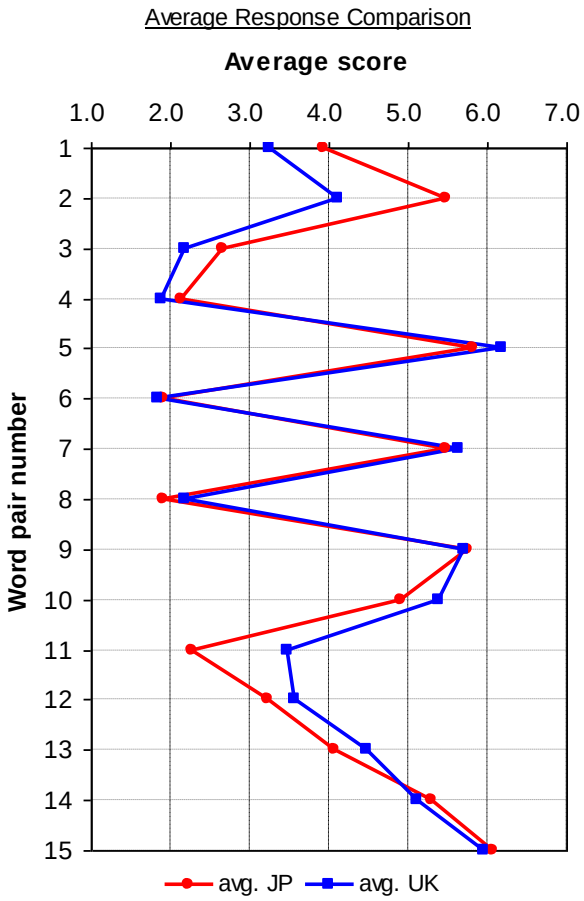


Figure 7.25. The semantic response diagram of the average ideal response from the UK and Japan.

The maximum possible difference in intensity between two responses is 6.00 (response difference between 1.00 and 7.00 in intensity) but the largest differences that occurred in Figure 7.21 were approximately 1.00 for only 3 out of the total of 15 word-pairs. Consequently, it could be concluded that the differences between the UK and Japanese responses were insignificant in terms of the cross-cultural comparison for the ideal house response. Yet, these observed differences in responding word-pairs will be further discussed in the word-pair comparisons section later in the chapter. Accordingly, it seems reasonable to state that this finding obtained from the semantic response diagram supports the previously result from the correspondence analysis that respondents from Japan and the UK have similar aesthetic profiles for the qualities of an ideal house.

7.6.2.3 Preference Judgment – the best and the least preferred house samples

A simplified frequency table was re-assembled using Table 7.16 where the house photographs which, amount all 27 samples, received no high voting in either the most liked or the least liked choice from all respondents were not listed here in Table 7.20. Since previous finding suggested that there is a gender differences when votes were given to a most like and

a least like house sample, the gender parameter is included in making comparisons between the 3 different nationalities.

Table 7.20. Frequency table illustrating respondents' best liked and least liked house photograph.

House sample No. and source location		Best liked (O)						Least liked (X)					
		UK		Japan		Taiwan		UK		Japan		Taiwan	
		M	F	M	F	M	F	M	F	M	F	M	F
UK	1. Traditional	15%	14%	4%	7%	6%	3%			5%	1%	6%	2%
	3. Traditional	13%	26%	2%	16%	5%	15%	2%	2%	1%			
	7. Innovative	15%	8%	5%	6%	3%	3%	2%	2%	1%	1%	3%	
	9. Innovative	8%	8%	18%	12%	3%	3%		2%	1%			
JP	16. Innovative	2%	3%	2%	2%	3%	1%	15%	20%	11%	9%	7%	16%
TW	20. Traditional		2%			6%	2%	8%	8%	12%	16%	5%	7%
	21. Traditional		2%	1%				15%	15%	11%	16%	9%	16%
	23. Ordinary	8%	9%	13%	11%	17%	28%						
	24. Ordinary		3%					4%		14%	6%	29%	20%

*Refer to figure 7.13 for colour photographs of the numbered house samples.

Inconsistency in the preference selections across the three cultures is observed in both the most liked and the least liked choices of house samples in Table 7.20. Cross-cultural differences exist in respondents' selections; for both the UK and Japanese respondents different house samples collected from the UK are preferred while respondents from Taiwan have chosen an ordinary house sample collected from Taiwan as their most liked selection. None of the UK collected house samples was selected as the least liked example from any of the three cultural respondent groups. Both the Japan and Taiwan respondents have chosen house samples collected from Taiwan as their least liked selection. The UK respondents are mostly consistent in selecting an innovative house sample collected from Japan as their least preferred example.

These findings indicate that cultural differences exist when respondents were asked to make their most liked and least liked selections from 27 house samples. Further reading of Table 7.20 suggests that respondents from Taiwan centered their selections on house samples from their own country both for the most liked or the least liked choice. This result could indicate that Taiwan respondents are more comfortable in making judgments on sample of buildings that they are familiar with. In contrast, respondents from Japan centered their selections on house samples collected outside of their own country. This is an interesting observation from the results, however further investigations are required in developing a hypothesis regarding preference selection in terms of cultural familiarity or other cross-cultural variables.

7.6.2.4 Summary for cross-cultural comparison analysis

Results obtained from the cross-cultural comparisons suggest that cultural differences exist among peoples' aesthetic perceptions. Low correspondence and regression coefficients were evident when comparisons were made between the visual descriptions obtained from the UK respondents to either the Taiwanese or Japanese respondents. A high degree of correspondence, however, was observed between Taiwanese and Japanese responses. The UK responses tended to cluster independently apart from the other two nationalities.

When preference judgments were requested, respondents from all three nationalities selected different house samples as their most like and least like choice among the total 27 shown photographs. No similarity in selections across cultures or genders were evident which suggests that cultural background and gender may be significant influential factors regarding people's aesthetic preference selections.

Despite the strong dissimilarity demonstrated in respondent's visual description and preference selection, consistent agreement on respondent's ideal house qualities were obtained. This results suggest that although preferences differ they are all interpretations of a universal ideal house quality profile which implies that a universal assessment tool to define the qualities of an ideal house could be developed utilizing a semantic differential scale.

Apart from the dissimilarities and similarities observed in this part of the comparison between responses collected from respondents with different cultural backgrounds, the age parameter also appeared to be a significant variable in conditioning respondent's aesthetic response with the greatest differences being displayed between the youngest and oldest age groups.

7.6.3 Age group comparison analysis

In the previous comparisons related to gender and culture, the age parameter was observed to be a significant influential variable in affecting respondent's aesthetic responses particularly between the youngest (9-11 and 12-18) and oldest (65+) age groups. As discussed in the methodology review in chapter 6, environmental perception studies suggested that age was a critical influencing factor influencing responses. It was suggested that research considered respondents between ages from under 12 to above 65 years old are required in order to assess whether differences exist regarding to their aesthetic responses of the built environment.

7.6.3.1 Visual Description Data for 27 house samples with 15 word-pairs

(a) Correspondence (slope) + regression coefficient (r)

A correspondence (slope) and regression coefficient matrix, Table 7.21, was computed using a spreadsheet for each country separately regarding comparisons for all of the six age groups used in the study. With six independent age groups, each matrix contains 15 sets of

comparisons between any two age groups. The traditional diagonal line of the correlation matrix which always consists of value 1.00 was omitted since those are the correspondences between each variable and itself (and a variable is always perfectly correlated with itself with a perfect 1.0 slope). This resulted in a 5x5 square matrix with age groups 1-5 from left to right in respect to age groups 2-6 from top to bottom.

Table 7.21. Correspondence (slope) and regression coefficient (r) matrix for the UK, Japan and Taiwan dataset regarding age comparisons.

The Correspondence & Regression Coefficient Matrices

UK	G1	G2	G3	G4	G5
G2	G1/G2				
slope	**0.70**				
r	*0.79*				
G3	G1/G3	G2/G3			
slope	**0.74**	**0.88**			
r	*0.73*	*0.77*			
G4	G1/G4	G2/G4	G3/G4		
slope	**0.70**	**0.84**	**0.94**		
r	*0.67*	*0.70*	*0.90*		
G5	G1/G5	G2/G5	G3/G5	G4/G5	
slope	**0.74**	**0.88**	**0.95**	**0.97**	
r	*0.64*	*0.66*	*0.82*	*0.88*	
G6	G1/G6	G2/G6	G3/G6	G4/G6	G5/G6
slope	**0.67**	**0.80**	**0.84**	**0.87**	**0.79**
r	*0.61*	*0.63*	*0.77*	*0.83*	*0.83*

Japan	G1	G2	G3	G4	G5
G2	G1/G2				
slope	**0.60**				
r	*0.61*				
G3	G1/G3	G2/G3			
slope	**0.71**	**0.88**			
r	*0.63*	*0.78*			
G4	G1/G4	G2/G4	G3/G4		
slope	**0.68**	**0.86**	**0.84**		
r	*0.64*	*0.79*	*0.88*		
G5	G1/G5	G2/G5	G3/G5	G4/G5	
slope	**0.57**	**0.66**	**0.61**	**0.73**	
r	*0.65*	*0.74*	*0.78*	*0.88*	
G6	G1/G6	G2/G6	G3/G6	G4/G6	G5/G6
slope	**0.41**	**0.59**	**0.53**	**0.65**	**0.86**
r	*0.44*	*0.62*	*0.63*	*0.74*	*0.81*

Taiwan	G1	G2	G3	G4	G5
G2	G1/G2				
slope	**0.83**				
r	*0.83*				
G3	G1/G3	G2/G3			
slope	**0.71**	**0.92**			
r	*0.67*	*0.87*			
G4	G1/G4	G2/G4	G3/G4		
slope	**0.72**	**0.90**	**0.93**		
r	*0.68*	*0.85*	*0.93*		
G5	G1/G5	G2/G5	G3/G5	G4/G5	
slope	**0.69**	**0.86**	**0.88**	**0.90**	
r	*0.67*	*0.83*	*0.90*	*0.92*	
G6	G1/G6	G2/G6	G3/G6	G4/G6	G5/G6
slope	**0.72**	**0.87**	**0.89**	**0.91**	**0.97**
r	*0.64*	*0.76*	*0.83*	*0.85*	*0.89*

G1= age 9-11
G2= age 12-18
G3= age 19-29
G4= age 30-49
G5= age 50-64
G6= age 65+
r = correlation coefficient
slope= correspondence

First of all, within each country's correspondence and regression coefficient matrix, the set of comparison with the lowest *r* value and slope is coloured in red. A coherent pattern is observed from all three matrices that the lowest pair values were found with comparisons made between age groups 1 and 6 (G1/G6). This finding suggests that greatest differences exist between responses given by the 9-11-year-old respondents and the over 65-year-old respondents in all three countries. The sets of age comparisons with the best *r* values and slopes within each country's 15 sets of age comparison are coloured in blue text. Similarly, a consistent pattern emerges that comparison between age group 3 and 4 (G3/G4) is constantly best correlated with slopes, correspondences, closest to 1.00. This suggests that respondents from age 19-29 and 30-49 corresponded highly in their aesthetic responses regarding the housing samples provided.

Additionally, when observations are made to examine each horizontal row in Table 7.21, another cross-culturally consistent pattern is evident that the closer the compared groups are in age, closer the slope is too unity, signifying a high degree of correspondence, and the higher the correlation coefficient of the trend line. Within each country's matrix, the diagonal line, comprising the closest age groups, mostly consists of the slopes closest to unity and the highest sets of correlation coefficients for the horizontal set of comparisons, the G5/G6 comparison for the UK respondents being the exception (Here all the best pairs of slopes and coefficients are highlighted in yellow for each horizontal rows).

These findings suggest that when comparisons are made between respondents from adjacent age groups, high similarities in responses are evident. However, when a wider age spectrum is considered, or comparisons made between respondents with greater differences in ages, then differences in responses are exhibited. This result suggests the hypothesis that gradual changes occur in peoples' aesthetic responses with increase of age. This interesting set of results and consequent hypothesis require further and fuller investigation.

(b) Principal Component Analysis (PCA) + Hierarchical Cluster Analysis (HCA)

Principal component analysis and hierarchical cluster analysis were both performed on each country's dataset separately to analyze differences or similarities in responses between different age groups of respondents regarding all the 27 house samples. Three PCA score plots were generated to illustrate results for the UK, Japan and Taiwan with the analysis indicating score loadings for males and females from each of the six age groups. Each age group data point was circled out as an individual set in the plot with red representing the younger age groups (9-11 and 12-18), blue as the eldest respondent groups (65+) and black as the three remaining middle age groups (19-29, 30-49 and 50-64).

Observations from Figure 7.26 indicate that the two younger age groups (9-11 and 12-18) constantly form separate clusters from the other age groups across all the cultures. In particular, the youngest age groups (9-11) in all the countries formed distinct clusters highly

separated from the other age group clusters. Additionally, distinctly separated clusters could be observed for the eldest age group in both the Japan and Taiwan plots, while it is partially clustered with the middle age groups in the UK result. In the Japan plot, the clusters for age 12-18 group are very close to the three middle age groups leading to the inference that they are similar in their aesthetic response. Definite and distinct age group clusters can be observed in the Taiwan dataset. It suggests that there is a greater independence between the responses obtained from different age groups in Taiwan.

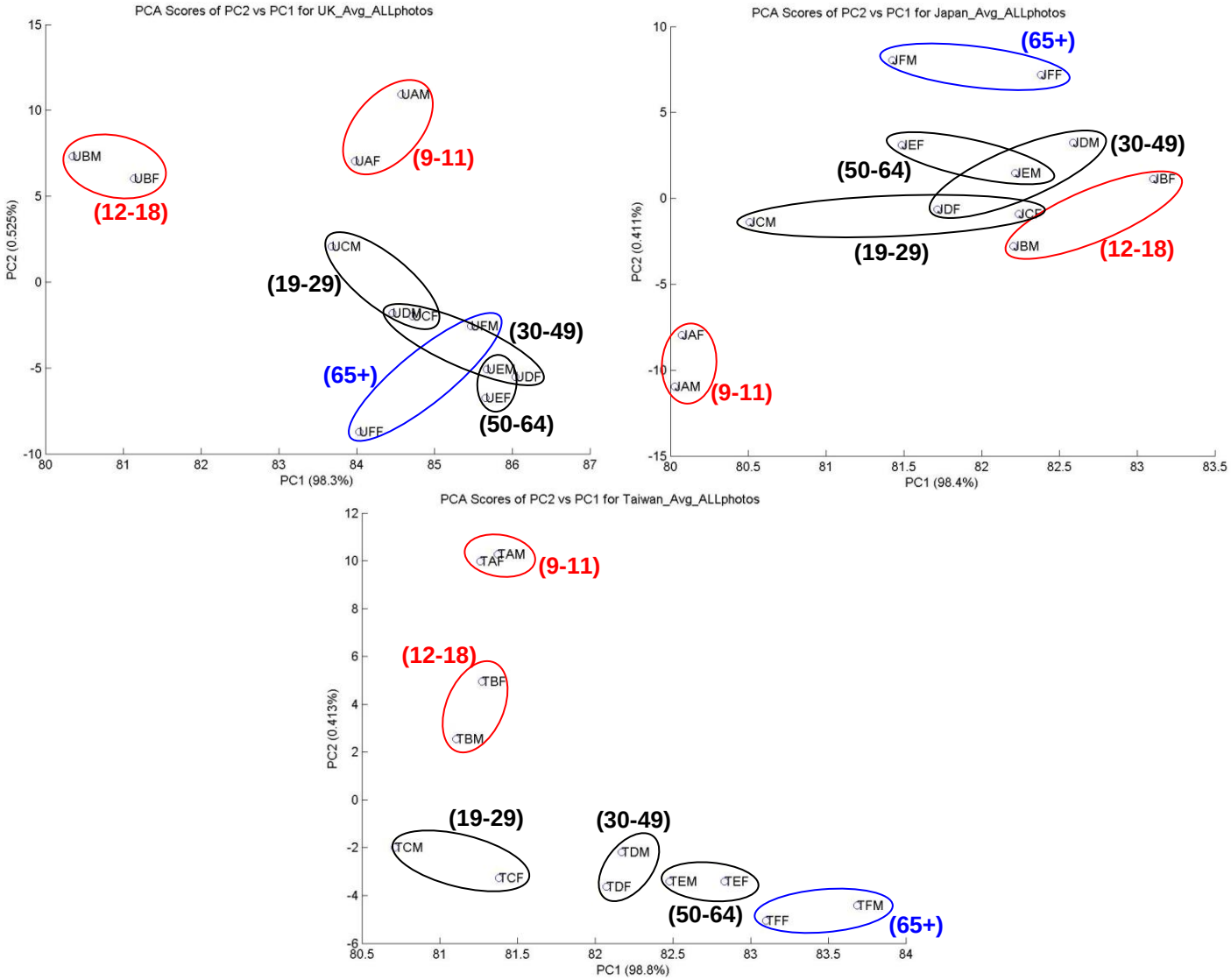
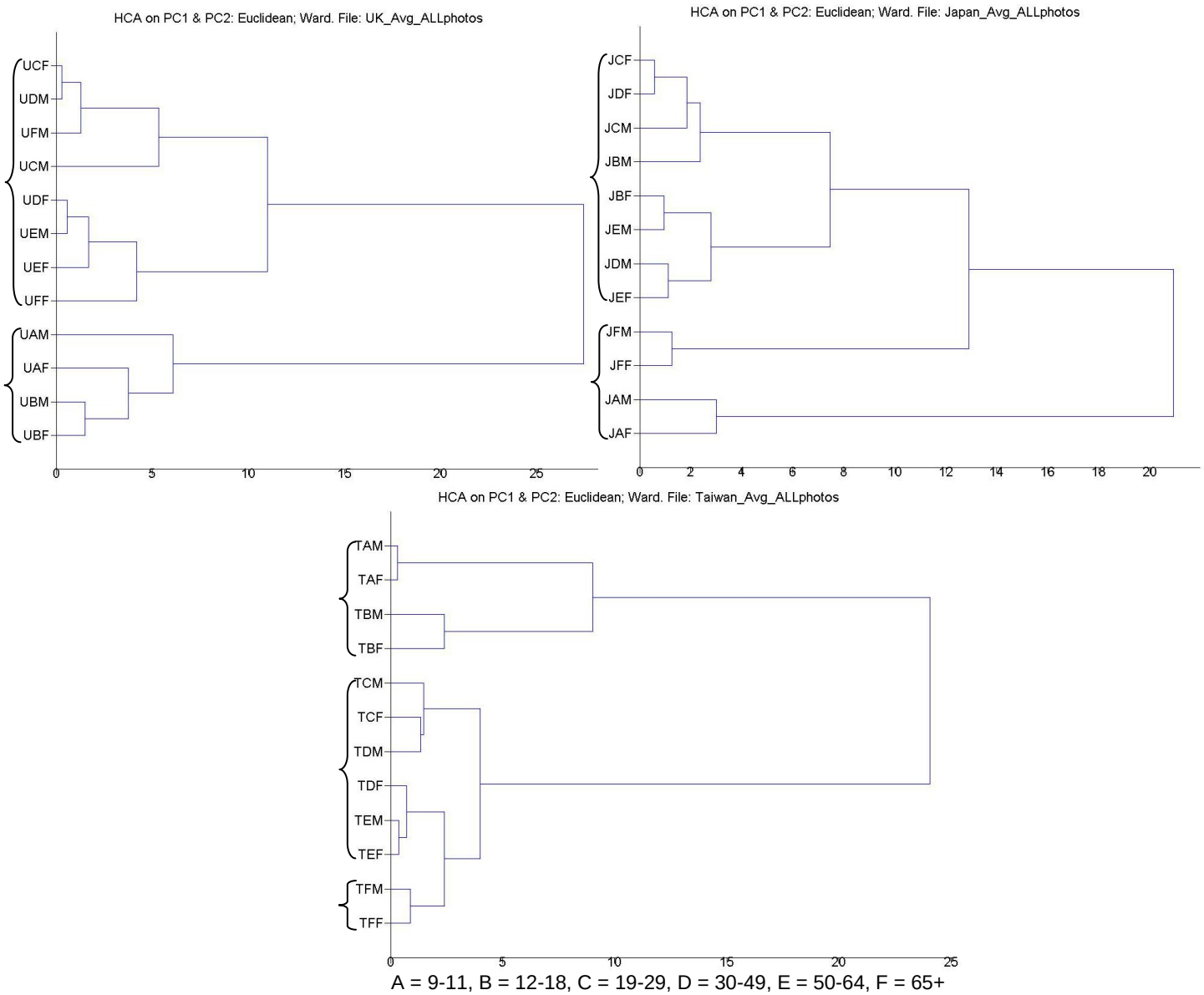


Figure 7.26. Two-dimensional PCA score plot for the UK (left), Japan (right) and Taiwan (bottom) dataset regarding age comparison.

HCA plots were also generated in Figure 7.27 for comparison with the findings obtained from PCA analysis. In the UK dendrogram, two distinct clusters with long branch-lengths were evident, which combine the two younger age groups (9-11 and 12-18) and separate them with respect to the rest of the remaining age groups (19-29, 30-49, 50-64, 65+). In the Japan result,

age groups 9-11 and 65+ are the outlier respondents with its own separate cluster apart from the other age groups. It is interesting to note that in Japan, respondents from age group 12-18 clustered very well with the other middle age groups which is not seen in either the UK or the Taiwan results. In Taiwan, similarly to the UK, the two younger age groups clustered separately on their own with the eldest age group clustered partially with the rest of the respondents.



A = 9-11, B = 12-18, C = 19-29, D = 30-49, E = 50-64, F = 65+

Figure 7.27. HCA dendrograms of the PCA scores matrix pertaining to the UK (left), Japan (right) and Taiwan (bottom) dataset regarding age comparison analysis.

In general, these observations support the findings obtained previously utilizing the linear regression comparisons to provide an indication of the correspondence between the responses of different age groups from the value of the slope of the line and a regression

coefficient. All the analysis techniques suggest that cross-culturally peoples aesthetic responses differed with respect to the age variable. The younger respondents, from 9 to 18-years-old (9 to 11-years old for the Japanese context), exhibit very different aesthetic responses to the middle age respondents from 19 to 64-years-old (12 to 64-years-old for Japan), and similarly 65+ respondents across all three countries.

(c) semantic response diagram

Utilizing the age comparison structure developed in Table 7.21, a total of 15 sets of comparisons of the absolute differences (ABS) between the responses given for each word pair between any two age groups were generated. However, due to the visual complexity of the semantic response diagram with 15 lines showing each set of comparisons, the full comparison figure has been separated into 4 sub-figures representing groups of comparisons with the same distance of age differences. For example, the sub-figure (1) in Figure 7.28 illustrates the comparisons between age group with one distance of age group difference, i.e. age group 9-11 versus 12-18; 12-18 versus 19-29; 19-29 versus 30-49; 30-49 versus 50-64; and 50-64 versus 65+. Similarly, sub-figure (2) in the same figure illustrates the comparisons between age group with two distance of age group difference from one another, i.e. age group 9-11 compared with 19-29; 12-18 versus 30-49; 19-29 with 50-64; and 30-49 compared with 65+.

The average score for each set of age difference comparisons is indicated in each sub-figure with the red line. The average score for the absolute difference in response between one age gap differences, shown in Figure 7.28(1), ranges from 0.36 to 0.52 for the 15 word-pairs. For the response with two age gaps difference, the average absolute difference ranges from 0.44 to 0.60 (Figure 7.28(2)); and 0.48 to 0.70 (Figure 7.28(3)) for the three age gaps; and 0.53 to 0.84 (Figure 7.28(4)) for the four and five age gaps. A constant increase in the magnitude of the absolute difference with the increase number of age gaps is observed. These finding suggests that respondents belonging to close age groups have greater similarity in their aesthetic responses than respondents from age groups further away from each other. Such constant differences also suggest that people's aesthetic response changes with increase of age. This notion requires further and more long-term investigation.

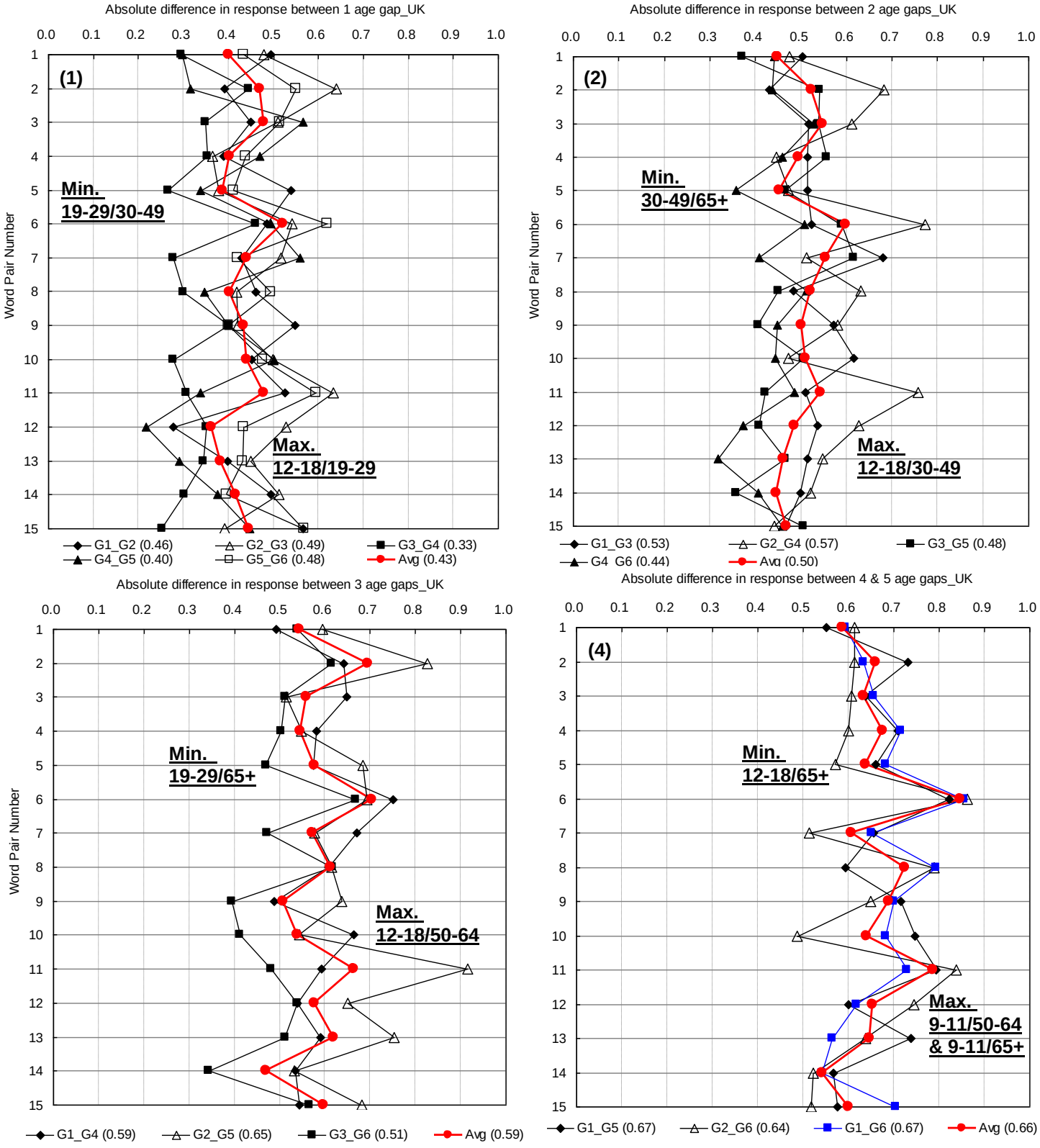


Figure 7.28. Absolute difference in response between respondents with different distance in age difference for the UK context.

The average ABS difference for each comparison was calculated across 15 word-pairs,

value shown in bracket on figure to the right of diagram label, to derive the group of responses with the maximum and the minimum ABS difference. In Figure 7.28, the set of age comparison both with the greatest ABS difference and the lowest ABS difference between responses were indicated for each of the four sub-figures. Overall age group 2, 12 to 18 year old, stands out to be the age group having the maximum difference when ABS difference is compared with other age groups e.g.; age group19-29 for 1 age group gap in Figure 7.28(1), age group 30-49 for the 2 age group gaps in Figure 7.28(2), and age group 50-64 for 3 age group gaps in Figure 7.28(3). However, with 4 and 5 age group gaps between responses, the youngest age group 9-11 appears to differ the most when compared with age group 50-64. In general, the conclusion can be made that the responses of the younger age groups differ the most from other age groups particularly the 12-18 age group for the UK dataset.

Similar observations were made to ascertain the age groups which generated the least ABS difference between responses. Age group 65+ appears to have the minimum ABS difference when comparisons were made with age group 30-49 in Figure 7.28(2) for the 2 age groups gap; age group 19-29 in Figure 7.28(3) for 3 the age group gap, and age group 12-18 in Figure 7.28(4) for 4 and 5 age gap. These observations suggest that respondents with age 65+ have the set of responses most closely related to the other three age groups; 12-18, 19-29, and 30-49.

These findings suggest that for the UK set of response a general trend exists that an increase in response differences occurs as age increases form 9 to 64 years old, whereas respondents with age 65+ have similarity in response with middle age group respondents (age 12 to 49 years old). However, such an assumption requires further investigation to support the finding that human aesthetic response changes with increase in ages.

Similar analysis and figures were generated for both the Japan and Taiwan set of responses in Figure 7.29 and 7.30. An increase in the average ABS difference of response is observed in the Japanese context with 0.32 to 0.52 for 1 age group gap in Figure 7.29(1), 0.38 to 0.68 for 2 age group gap in Figure 7.29(2), 0.37 to 0.70 for the 3 age group gap in Figure 7.29(3), and 0.36 to 0.79 for 4 and 5 age group gaps in figure 7.29(4). This observation again suggests an increase in response difference between age groups as the age group gap increased, which supported the finding found previously in the UK context.

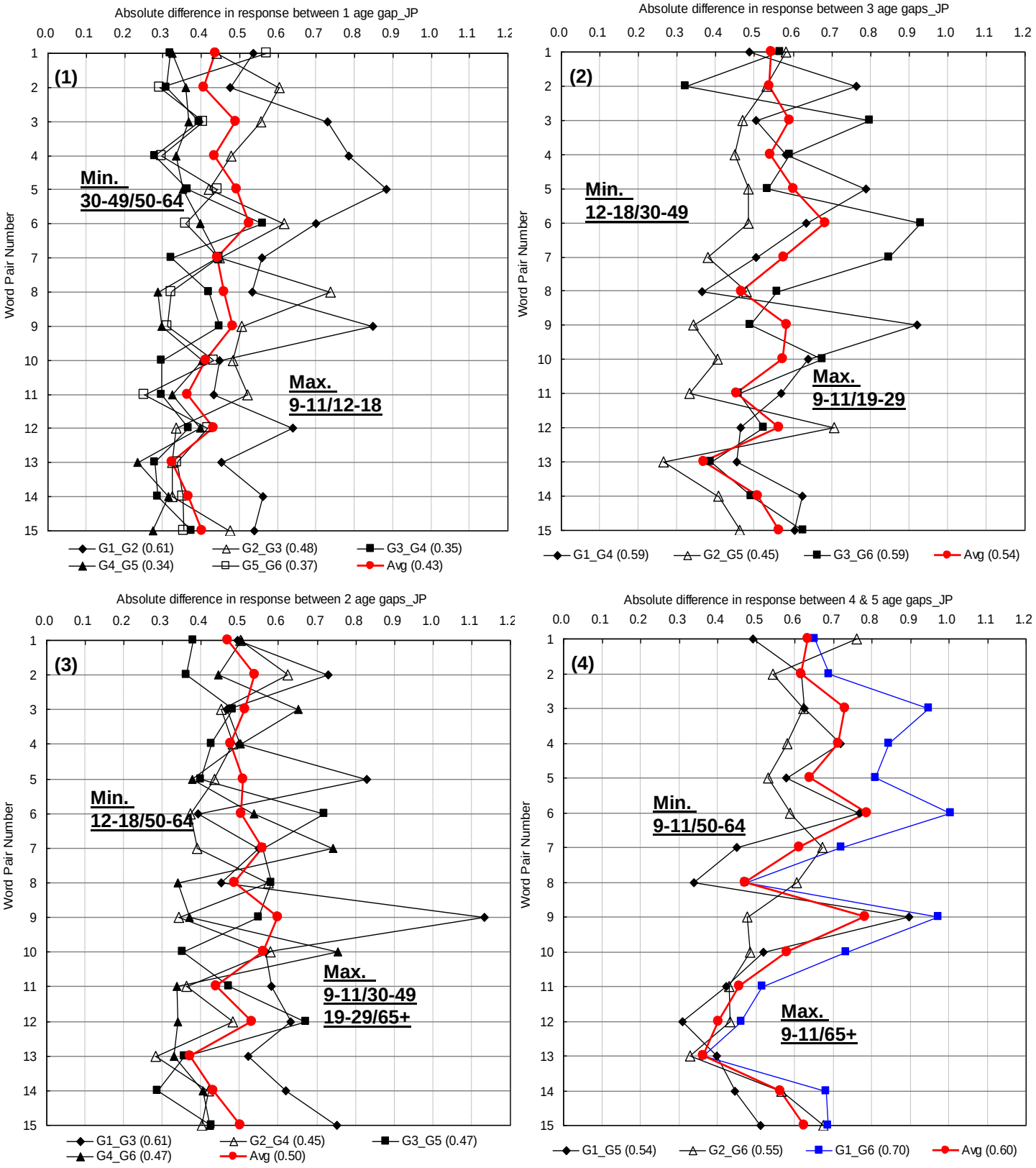


Figure 7.29. Absolute difference in response between respondents with different distance in age difference for the Japan context.

In Figure 7.29, for all of the four sub-figures displayed, the greatest ABS difference in

response occurred with comparisons made between the youngest age group 9-11 and the others. It suggests that when differences in responses between age groups were compared that the greatest differences of aesthetic responses always occurred between the 9-11 respondents when compared with differences between other age groups. Regarding the age group with the minimum amount of difference, respondents in age 50 to 64 has the least difference with age group 30-49 for the 1 age group gap, age group 12-18 in 3 age group gap and the 9-11 age group in the 4 age group gap. These findings suggest that in Japanese context, the youngest respondents (9-11) possess the greatest difference in aesthetic responses when compared with response differences between the other age groups. Respondents ranging from 50 to 64 years old had the smallest difference in response when compared with three other age groups 9-11, 12-18, and 30-49.

Similarly in Figure 7.30 showing the Taiwan context, the average ABS difference in response shows an increase in differences with the increase in age group distance between respondents. The ABS difference values range from 0.26 to 0.41 for the 1 age group gap difference comparisons, 0.33 to 0.55 for 2 age group gap differences, 0.39 to 0.70 for 3 age group gap differences and 0.42 to 0.84 for 4 to 5 age gap differences. Again, an increase in response difference is observed with an increase in age group gap difference between respondents.

Similar to findings found in the Japanese context previously, the 9-11 age group displayed the maximum ABS difference in responses for all four age group gap comparisons. The greatest differences were displayed between respondents from the 9 to 11 age group and the 12-18 in the one age group gap comparison, with age group 19-29 in the two age group gap comparison, with age group 30-49 in the three age group gap comparison and from age group 50-64 in the four age gap comparison. These again suggest that the youngest respondents' aesthetic responses differ the most from any of the other age groups. No clear suggestion could be made considering the minimum ABS difference in responses due to the inconsistency of the observed patterns.

In summary, a consistent increase in the absolute semantic response differences is observed with increase in age group gap difference of the respondents across all 3 cultures. The younger age groups, 9-11 in Japan and Taiwan and 12-18 in the UK, appeared to have the greatest differences in responses when compare to the other age groups. The difference in response between the youngest age group, 9-11, and the eldest age group, 65+, is the greatest among all the comparison. This finding is suggested in all three figures, Figure 7.29 and Figure 7.30, cross-culturally in sub-figure (4) and coloured blue.

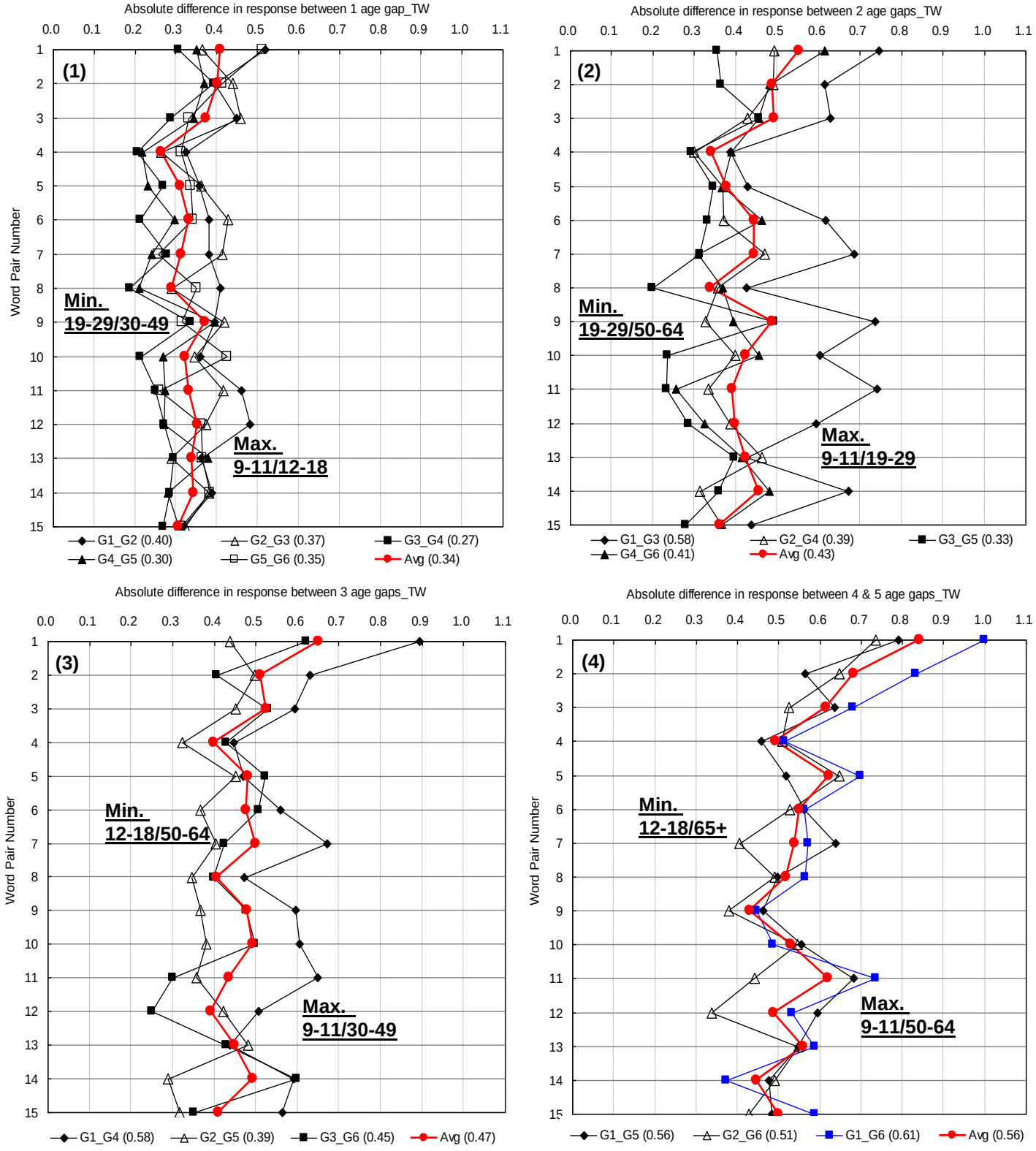


Figure 7.30. Absolute difference in response between respondents with different distance in age difference for the Taiwan context.

Such analysis and comparisons utilizing the semantic response diagrams allows visual comparisons to be made between different set of responses. Incorporating the concept of the

absolute difference in responses between age groups allowed an average value of the differences between the responses for each word pair for each age group to be calculated independently from the 27 house samples. This facilitated the analyses and comparisons of the aesthetic response difference across six age groups to in respect to the 15 word-pairs.

7.6.3.2 Subjective Description and Judgment – Ideal house response

(a) correspondence + level of scatter (r-value)

A correspondence (slope) and regression coefficient (r) table was compiled illustrating comparisons between the semantic responses to the notion of an ideal home across the five age groups separately in Japan and UK, as shown in Table 7.22. Sets of age comparison with correspondences, i.e. with slopes close to 1.0 have been highlighted. In general, most of the comparison sets for the UK context appear to have slopes that are not very close to 1.00, with correlations (r values) that are high, apart from comparisons made between age group 12-18 with age group 50-64, and between age group 30-49 with age group 50-64. Good correlations (r values) but slopes not close to 1.0 suggests low scatter in the responses and high certainty in the way two set of data match each other. This suggests that in general respondents from the UK have different ideal house semantic profiles across different age groups.

Table 7.22. Correspondence and regression coefficient matrix for UK and Japan ideal house response dataset regarding age comparison analysis.

UK	G2	G3	G4	G5	**JP**	G2	G3	G4	G5
G3	G2/G3				G3	G2/G3			
slope	**0.87**				**slope**	***0.84***			
r	*0.87*				*r*	0.95			
G4	G2/G4	G3/G4			G4	G2/G4	G3/G4		
slope	**1.11**	**1.19**			**slope**	***1.00***	***1.14***		
r	*0.91*	*0.98*			*r*	0.96	0.97		
G5	G2/G5	G3/G5	G4/G5		G5	G2/G5	G3/G5	G4/G5	
slope	**1.06**	**1.22**	**1.00**		**slope**	***0.97***	***1.14***	***1.00***	
r	*0.85*	*0.98*	*0.98*		*r*	0.92	0.96	0.99	
G6	G2/G6	G3/G6	G4/G6	G5/G6	G6	G2/G6	G3/G6	G4/G6	G5/G6
slope	**1.19**	**1.41**	**1.16**	**1.15**	**slope**	**0.86**	**1.00**	**0.87**	**0.87**
r	*0.81*	*0.96*	*0.96*	*0.98*	*r*	*0.93*	*0.96*	*0.99*	*0.99*

(b) semantic response diagram

Figure 7.31 illustrates the average ideal response for each of the five tested age groups for Japan and the UK respondents. The semantic response diagram allows effective visual comparison between the different sets of responses. Within both the UK and Japan contexts, levels of similarities and differences are observed with inconsistencies occurring across different word-pairs. Cross-culturally both sub-figures demonstrate differences in responses

across different age groups for word-pairs 1 to 4, and 10 to 15 with similarities in response showing on word-pair 5 to 9. Comparisons between word-pairs will be further discussed in the next section of the chapter.

Regarding comparisons of responses between different age groups, both sub-figures demonstrate similarity in response between age groups 30-49(green) and 50-64(blue). Again, difference in response was found between the younger (12-18 in red and 19-29 in orange) and the eldest(65+ in purple) respondent groups in both the UK and Japan contexts. Such finding supports the observation made using correspondence and correlation coefficients previously, see Table 7.22.

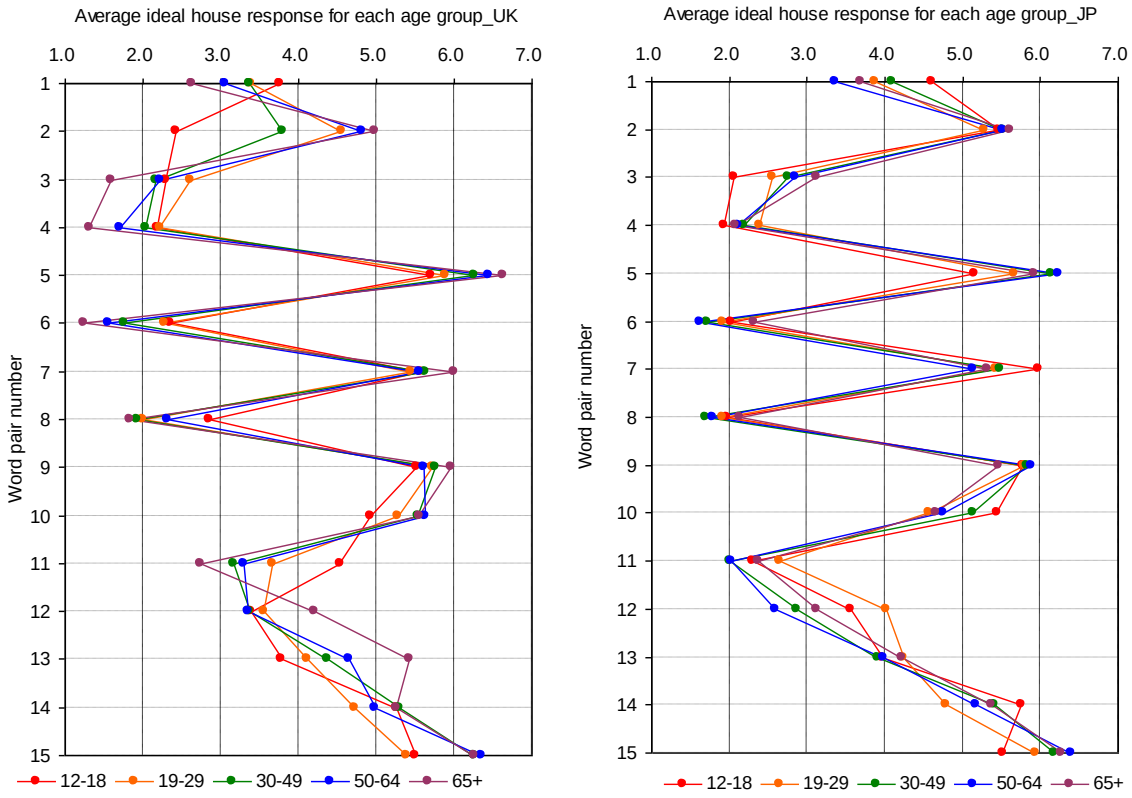


Figure 7.31. Average ideal house response for UK and Japan dataset regarding different age groups.

7.6.3.3 Preference Judgment – the best and the least preferred house samples

Table 7.23 was generated based on the frequency of votes obtained from respondents regarding their best and least preferred house sample selection. For comparison purpose, the table illustrates the item number of the house sample which has the highest proportion of votes with respect to the total of 27 photographic samples. The table is structured to facilitate easy visual comparison across the selections of all six age groups separately in male and female groups. Cross-culture and gender parameters are considered since previously comparison demonstrated that differences do exist in respondent's preference selection in relation to

respondent's cultural and gender background. Difficulty arose in stating one or two single house sample as the predominant selection due to the insufficient number of respondents for several age groups particularly in the UK set of data. This issue is recognized due to the limitation of the research and would be further considered in the future research to strengthen the observation results.

Female respondents tend to show better agreement regarding their selection of house sample than male respondents cross-culturally. In general scattered selections were observed across different age groups apart from male's least liked choice in Taiwan, female's best like choice in the UK, and female's best like and least like choice in Taiwan. Comparison between selections made by respondents in age group 9-11 and 65+, showed that different sample selections were made by these groups. By colouring traditional house samples in blue and innovative house sample in red, comparisons between age groups can be discerned with respect to styles of the house samples. An interesting pattern was found that younger respondents tended to prefer innovative house samples and dislike the traditional style which was directly opposite to the selection given by the older respondents. This finding suggests that age might be a crucial parameter that influences respondents' preference selection regarding different housing styles, such as traditional and innovative.

Identical table, Table 7.23, will be discussed further regarding house photograph comparisons later in the chapter.

Table 7.23. Frequency votes regarding respondent's best and least preferred house sample.

House Photograph No.			**Age Group**					
Respondents			**9-11**	**12-18**	**19-29**	**30-49**	**50-64**	**65+**
Male	○	UK	25	7	23	7		3
		JP	23 / 25	9	9	6	9 / 11	11
		TW	16 / 23	23		26	13	11
	X	UK	21	17		16	22	16
		JP	21	21	24	20	15 / 24	8 / 9
		TW	20	24	24	24	24	22 / 24
Female	○	UK		3 / 9	3	3	3	3
		JP	13	9 / 23	21	3	3 / 10	10
		TW	23	23	23	23	3	23
	X	UK	21	21		16	16 / 25	16
		JP	21	21	15	15	25	
		TW	21	20 / 24	22	24	24	24
Red = Traditional, Black = Ordinary, Blue = Innovative								

7.6.3.4 Summary for age group comparison analysis

Results obtained from the age group comparison analysis suggest that there are differences in people's aesthetic responses in relationship to their age. In general, the younger respondents responded very differently from the older age group when they are asked to

respond to house samples using the given 15 word-pair semantic differential scale. The younger respondents also show a difference in response regarding both their preference selection of house samples and ideal semantic responses when compared with the older respondents.

Despite the difficulties in deriving definite patterns and conclusions from the age comparison analysis, a consistent increase in response differences in respect to respondent's age differences was observed. This finding suggests that people's aesthetic responses or perceptions change in relationship to their age. Further investigation would be interesting to examine how such change in response varies in respect to the increase in one's age and the potential variables that condition such differences in response.

7.6.4 House Photograph Comparison Analysis

A total number of 27 house photographs were collected for the questionnaire assembly. Two parameters were considered during the sample collection process as house style category and the source location of the photographic samples. Three style categories were assigned to the samples as traditional, ordinary and innovative. Three photographs were collected for each individual style category from each of the three study countries, the UK, Japan and Taiwan. A matrix, Table 7.24, illustrates the two parameters with reference to the sample numbers used in the questionnaire.

Table 7.24. House photograph parameters; style category and source location with reference to the sample number used in the questionnaire.

House Photograph No.	**Style Category**		
Source Location	**Traditional**	**Ordinary**	**Innovative**
UK	1, 2, 3	4, 5, 6	7, 8, 9
Japan	10, 11, 12	13, 14, 15	16, 17, 18
Taiwan	19, 20, 21	22, 23, 24	25, 26, 27

Accordingly, the house photographic comparisons would be analyzed on the basis of the sample style and its source location in relation to respondent's cultural background and age group. How do respondents within the various groups respond when house samples with different styles and from different locations are perceived? Due to the similar cultural contexts assigned to both the respondent groups and the source location of the house samples, the notion of familiarity could be explored to ascertain whether or not that respondents have different aesthetic responses regarding house samples from their own local cultural contexts?

The observation made previously in the age comparison analysis regarding the best like and least like sample selections suggested that the younger respondents preferred samples from the innovative category where as the older respondents preferred the traditional house samples. This finding could be further tested in this section to ascertain whether the younger respondents do respond differently from the older respondents in aesthetic terms in supporting

their preference towards the innovative samples; and similarly with the older respondents and the traditional style.

7.6.4.1 Visual Description Data for 27 house samples with 15 word-pairs

(a) correspondence (slope) + level of scatter (r-value)

Comparisons made regarding all the 27 house samples would include both the age group and the cultural background of the respondents. Unlike previous comparisons made on respondents' demographic factors where correlation coefficient (r-value) and the slope were calculated using 405 data points (15 word-pair X 27 samples), in this section, each comparison contains only 15 data points in relation to each word-pair for one single house sample. A matrix was drawn in Table 7.25 to illustrate the variables and sub-variables to be included in the analysis.

The correspondence and the level of scatter between each comparison set for responses made by any two nationalities within one age group regarding each of the 27 photographs was calculated and listed in three tables, Tables 7.26 to 7.28, accordingly to the source location of the photographic samples.

Table 7.25. Variables and sub-variables included in the house photographic comparison.

Demographic Factor		**Sample No.**			
Comparison Set	**Age Group**	**Location**	**TR**	**OR**	**INNO**
UK/JP	9-11	UK	1	4	7
UK/TW	12-18		2	5	8
JP/TW	19-29		3	6	9
	30-49	JP	10	13	16
	50-64		11	14	17
	65+		12	15	18
		TW	19	22	25
			20	23	26
			21	24	27

With six age groups and responses from three nationalities, a total of 18 comparisons were calculated for each individual house photograph. Within one age group, the set of comparisons between two nationalities with the highest correspondence and regression coefficient was highlighted yellow. In the case when either of the two values is lower than 0.50, the set of comparisons is omitted although it might still represent the highest set among the three comparison. Any value below 0.50, either in terms of the slope or the r-value, indicates a poor correspondence and high scatter, which suggest no relationship exists between the sets of responses.

Observations made from Table 7.26 indicate that in general when responses between countries are compared that responses from Taiwanese and Japanese respondents corresponded better than those made with the UK responses. As photographs included in

Table 7.26 were all collected from the UK, this finding suggests that the UK respondents have a different set of aesthetic perceptions towards houses from their own culture when compared to responses made by Taiwanese and Japanese respondents regarding houses from the UK.

Table 7.26. The correspondence and regression coefficient for the UK house photographs; sample number 1 to 9.

	Age Group		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW
Photo No. 1 (UK, Traditional)	A	Slope	0.62	0.02	0.49	Photo No. 2 (UK, Traditional)	0.15	0.28	0.70	Photo No. 3 (UK, Traditional)	0.01	-0.05	0.93
	9-11	r	0.57	0.01	0.03		0.08	0.26	0.54		0.00	0.00	0.86
	B	Slope	0.16	0.62	0.29		0.70	0.76	0.77		0.22	1.02	0.37
	12-18	r	0.15	0.67	0.27		0.64	0.60	0.73		0.04	0.28	0.34
	C	Slope	0.45	0.62	0.73		0.78	0.87	0.76		0.71	0.67	0.88
	19-29	r	0.67	0.80	0.83		0.56	0.60	0.68		0.49	0.50	0.68
	D	Slope	0.42	0.58	0.72		0.22	0.32	0.73		0.59	0.60	0.83
	30-49	r	0.59	0.81	0.72		0.07	0.09	0.82		0.54	0.48	0.80
	E	Slope	0.42	0.65	0.59		0.34	0.32	0.53		0.53	0.61	0.74
	50-64	r	0.65	0.77	0.71		0.47	0.16	0.70		0.54	0.46	0.82
	F	Slope	0.18	0.61	0.32		0.35	0.57	0.42		0.67	0.81	0.66
	65+	r	0.19	0.78	0.30		0.25	0.30	0.39		0.61	0.46	0.86
Photo No. 4 (UK, Ordinary)	A	Slope	-0.07	-0.05	0.89	Photo No. 5 (UK, Ordinary)	-0.15	-0.28	1.00	Photo No. 6 (UK, Ordinary)	0.28	0.08	0.72
	9-11	r	0.01	0.01	0.82		0.03	0.15	0.80		0.07	0.01	0.52
	B	Slope	-0.13	-0.01	0.46		0.16	-0.21	0.04		0.02	0.05	0.38
	12-18	r	0.03	0.00	0.27		0.10	0.04	0.01		0.00	0.00	0.45
	C	Slope	0.10	0.19	0.85		-0.04	0.16	0.76		0.19	0.40	0.59
	19-29	r	0.03	0.14	0.54		0.01	0.07	0.55		0.10	0.29	0.53
	D	Slope	-0.08	0.23	0.45		-0.22	0.01	0.73		-0.12	0.04	0.82
	30-49	r	0.03	0.16	0.29		0.15	0.00	0.65		0.03	0.00	0.71
	E	Slope	0.14	0.23	0.38		0.07	-0.02	0.58		0.27	0.52	0.41
	50-64	r	0.22	0.14	0.59		0.02	0.00	0.68		0.23	0.23	0.64
	F	Slope	0.41	0.04	0.02		0.01	-0.25	0.33		0.06	-0.08	0.49
	65+	r	0.72	0.00	0.00		0.00	0.07	0.64		0.01	0.01	0.64
Photo No. 7 (UK, Innovative)	A	Slope	0.89	0.68	1.32	Photo No. 8 (UK, Innovative)	0.64	0.80	0.75	Photo No. 9 (UK, Innovative)	0.76	0.59	1.22
	9-11	r	0.70	0.88	0.82		0.74	0.82	0.79		0.60	0.77	0.71
	B	Slope	1.09	1.07	0.95		0.60	0.76	0.62		1.20	0.56	1.69
	12-18	r	0.84	0.83	0.89		0.84	0.66	0.80		0.54	0.44	0.76
	C	Slope	0.74	0.87	0.82		0.59	0.75	0.88		1.74	0.72	1.46
	19-29	r	0.84	0.89	0.87		0.39	0.60	0.80		0.67	0.33	0.73
	D	Slope	0.93	0.83	1.02		0.77	0.63	0.80		1.47	0.58	1.51
	30-49	r	0.85	0.83	0.84		0.68	0.48	0.60		0.57	0.26	0.75
	E	Slope	0.81	0.93	0.78		0.61	0.67	0.73		0.97	0.69	0.83
	50-64	r	0.77	0.89	0.69		0.72	0.68	0.69		0.50	0.22	0.78
	F	Slope	0.52	0.88	0.47		0.43	0.36	-0.23		0.90	0.47	1.13
	65+	r	0.60	0.56	0.65		0.16	0.15	0.04		0.44	0.28	0.55

This contextual difference in responses regarding the source location of the house photographs was especially evident with the ordinary style houses where the majority of the best correspondences occurred with comparisons made between Taiwanese and Japanese responses illustrating a difference to the UK responses. The overall slopes and r-values

appeared to have the highest magnitude with innovative house photographs (no. 7-8) and the least correspondence and highest level of scatter with ordinary style houses (no. 4-6). Slopes and r-values below 0.50 occur frequently within ordinary photographs number 4, 5 and 6 across comparisons made among all six age groups. For instance, not a single set of comparison for both age group 12-18 and 65+ have the value greater than 0.50. These findings conclude that ordinary style houses are more contextual in their aesthetic appearance in comparison to traditional and innovative styles. The results also suggest that in particular there was very little correspondence between the Japanese and UK or Taiwanese and UK respondents.

An interesting pattern can be observed with response highlighted in red from Table 7.26, that within the UK house photographs, sample number 2 has good correspondences in responses from all three nationality comparisons across age 12-18 and 19-29, and number 7 has good correspondence between responses across age group 12-18, 19-29, 30-49 and 50-64. These findings indicate that all the respondents from three different countries in the age group 12-18 and 19-29 responded similarly regarding traditional house photograph number 2; and respondents from age 12 to 64 have similar aesthetic response regarding innovative house photograph number 7 cross-culturally.

Regarding house photographs collected from Japan, responses illustrated in Table 7.27, the majority of the best correspondences for each age group per photograph were found with comparisons made between Taiwanese and Japanese responses. Since similar observation were made previously with house photographs collected from the UK, this suggests that source location of the photograph does not affect the correspondence relationship found between responses obtained from Taiwan and Japan. This could further imply that familiarity has no influence on people's aesthetic responses regarding house photographs collected within or outside of one's own cultural context.

Photograph number 10 with traditional house style received good correspondences in responses obtained from age 50-64 respondents from all three nationalities, highlighted in red. Similarly with innovative house photograph number 16 where good correspondences were found in responses from age group 19-29 and 30-49 for all three nationalities. Although no consistency could be concluded regarding respondent's age group, similarity in response across three nationalities for a particular house photograph was found only in traditional and innovative house style including both house samples from UK and Japan.

Table 7.27. The correspondence and regression coefficient for the Japan house photographs; sample number 10 to 18.

	Age Group		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW
Photo No. 10 (JP, Traditional)	A	Slope	0.73	0.85	1.04	Photo No. 11 (JP, Traditional)	0.38	0.48	0.86	Photo No. 12 (JP, Traditional)	-0.19	-0.61	-0.05
	9-11	r	0.24	0.59	0.59		0.21	0.49	0.51		0.01	0.16	0.00
	B	Slope	0.03	0.13	1.05		-0.36	0.38	0.30		0.28	-0.70	0.49
	12-18	r	0.00	0.02	0.82		0.21	0.23	0.09		0.01	0.30	0.07
	C	Slope	1.70	1.61	0.91		0.08	0.51	0.73		1.34	0.85	0.92
	19-29	r	0.23	0.24	0.70		0.01	0.33	0.37		0.34	0.20	0.57
	D	Slope	1.10	1.14	0.92		-0.23	0.45	0.27		1.70	0.98	0.80
	30-49	r	0.28	0.37	0.70		0.11	0.32	0.09		0.54	0.22	0.52
	E	Slope	0.82	0.75	1.02		0.09	0.48	0.51		1.16	0.69	0.66
	50-64	r	0.60	0.68	0.76		0.03	0.58	0.37		0.64	0.28	0.35
	F	Slope	1.01	0.98	0.79		0.22	0.97	0.25		0.67	0.07	0.46
	65+	r	0.40	0.33	0.72		0.11	0.53	0.26		0.22	0.00	0.25
Photo No. 13 (JP, Ordinary)	A	Slope	0.80	1.79	0.45	Photo No. 14 (JP, Ordinary)	-0.06	-1.47	0.13	Photo No. 15 (JP, Ordinary)	0.41	0.15	1.09
	9-11	r	0.36	0.69	0.54		0.00	0.44	0.10		0.28	0.08	0.57
	B	Slope	-0.46	-0.33	0.57		0.57	0.43	0.93		1.01	0.11	2.31
	12-18	r	0.04	0.01	0.46		0.07	0.06	0.59		0.09	0.01	0.71
	C	Slope	1.23	0.41	0.68		0.11	0.26	0.61		1.38	0.90	1.84
	19-29	r	0.42	0.05	0.47		0.00	0.02	0.35		0.19	0.35	0.79
	D	Slope	0.67	-0.66	0.45		0.28	-0.12	0.20		1.33	0.54	1.81
	30-49	r	0.20	0.12	0.32		0.16	0.02	0.05		0.48	0.32	0.80
	E	Slope	0.69	0.61	0.48		-0.04	0.18	-0.06		1.01	0.62	2.02
	50-64	r	0.29	0.08	0.66		0.01	0.05	0.01		0.16	0.33	0.76
	F	Slope	1.01	1.43	0.38		-0.18	0.36	-0.40		0.47	0.33	2.13
	65+	r	0.37	0.17	0.63		0.11	0.12	0.66		0.05	0.16	0.70
Photo No. 16 (JP, Innovative)	A	Slope	0.55	0.61	0.85	Photo No. 17 (JP, Innovative)	-0.17	0.22	0.10	Photo No. 18 (JP, Innovative)	-0.71	-0.46	0.59
	9-11	r	0.42	0.64	0.58		0.13	0.24	0.01		0.37	0.14	0.37
	B	Slope	0.65	0.66	0.89		0.33	0.37	0.70		0.15	0.01	0.81
	12-18	r	0.56	0.67	0.69		0.22	0.26	0.53		0.01	0.00	0.57
	C	Slope	0.78	0.71	0.97		0.29	0.35	1.04		0.31	0.11	1.41
	19-29	r	0.63	0.60	0.83		0.09	0.24	0.60		0.03	0.01	0.81
	D	Slope	0.85	0.71	0.96		0.62	0.47	1.02		0.32	0.13	1.24
	30-49	r	0.71	0.62	0.74		0.36	0.33	0.65		0.08	0.03	0.61
	E	Slope	0.61	0.71	0.68		0.39	0.23	0.78		0.81	0.38	1.16
	50-64	r	0.79	0.68	0.72		0.42	0.21	0.47		0.36	0.19	0.56
	F	Slope	0.66	0.65	0.46		0.45	0.13	0.43		0.69	0.09	0.39
	65+	r	0.65	0.48	0.28		0.43	0.04	0.15		0.30	0.01	0.07

Table 7.28 listed the correspondences and the levels of scatter for house photographs collected from Taiwan. The majority of the good correspondences were found between responses given by Taiwanese and Japanese respondents. The least number of good correspondences were observed in the ordinary house photographs. Regarding similarity in response across all three nationalities, highlighted in red, only one set of comparison was found with respondent in age group 19-29 regarding innovative house photograph number 26. All these findings tend to agree with observations made previously with house photographs collected from UK and Japan, that similarity in response across all three cultural groups was

mostly evident with innovative houses and that least number of good correspondences was found with ordinary style houses.

Table 7.28. The correspondence and regression coefficient for the Japan house photographs; sample number 19 to 27.

	Age Group		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW
Photo No. 19 (TW, Traditional)	A	Slope	0.18	1.13	0.11	Photo No. 20 (TW, Traditional)	0.78	-0.84	0.13	Photo No. 21 (TW, Traditional)	0.50	0.93	0.42
	9-11	r	0.05	0.51	0.05		0.14	0.09	0.03		0.44	0.67	0.41
	B	Slope	0.23	0.07	0.62		1.22	-0.43	-0.14		1.39	1.57	0.65
	12-18	r	0.03	0.00	0.52		0.33	0.06	0.01		0.73	0.71	0.55
	C	Slope	0.19	0.68	0.03		0.98	-0.06	0.07		0.69	0.77	0.49
	19-29	r	0.04	0.33	0.00		0.55	0.00	0.01		0.62	0.34	0.52
	D	Slope	0.14	0.48	0.29		0.70	-0.15	-0.04		0.43	0.39	0.25
	30-49	r	0.23	0.61	0.37		0.56	0.01	0.01		0.39	0.08	0.27
	E	Slope	0.06	0.47	0.10		0.34	-0.17	-0.02		0.37	0.47	0.50
	50-64	r	0.09	0.81	0.06		0.45	0.02	0.00		0.38	0.30	0.51
	F	Slope	0.09	0.55	0.35		0.49	-0.84	-0.20		0.48	0.15	0.22
	65+	r	0.03	0.24	0.64		0.33	0.26	0.14		0.22	0.04	0.03
Photo No. 22 (TW, Ordinary)	A	Slope	0.12	0.53	0.16	Photo No. 23 (TW, Ordinary)	0.76	0.93	0.67	Photo No. 24 (TW, Ordinary)	0.36	-0.95	-0.05
	9-11	r	0.08	0.39	0.10		0.48	0.42	0.77		0.23	0.24	0.02
	B	Slope	0.51	-0.16	0.41		0.44	0.56	0.31		0.25	-0.59	0.13
	12-18	r	0.17	0.01	0.37		0.55	0.16	0.55		0.06	0.17	0.03
	C	Slope	0.31	1.02	0.11		0.79	0.73	0.62		0.64	-0.89	-0.35
	19-29	r	0.35	0.41	0.11		0.48	0.26	0.60		0.31	0.43	0.18
	D	Slope	0.76	0.96	0.47		0.92	0.39	0.58		0.49	-0.98	-0.16
	30-49	r	0.71	0.38	0.66		0.83	0.14	0.36		0.20	0.36	0.06
	E	Slope	0.47	0.70	0.37		0.38	0.57	0.42		0.05	-0.49	0.17
	50-64	r	0.67	0.61	0.34		0.64	0.35	0.75		0.01	0.36	0.04
	F	Slope	0.73	0.17	0.63		0.04	0.02	0.46		0.41	0.04	0.75
	65+	r	0.80	0.11	0.16		0.00	0.00	0.80		0.29	0.02	0.10
Photo No. 25 (TW, Innovative)	A	Slope	1.39	1.10	1.21	Photo No. 26 (TW, Innovative)	0.63	0.70	0.81	Photo No. 27 (TW, Innovative)	-0.34	-0.04	0.07
	9-11	r	0.59	0.70	0.76		0.72	0.67	0.88		0.17	0.00	0.01
	B	Slope	0.48	0.28	1.01		0.47	0.88	0.50		0.31	0.27	0.45
	12-18	r	0.09	0.04	0.85		0.65	0.75	0.75		0.14	0.04	0.49
	C	Slope	0.79	0.68	0.98		0.86	0.85	0.85		-0.04	-0.25	0.48
	19-29	r	0.52	0.46	0.81		0.84	0.73	0.82		0.00	0.03	0.24
	D	Slope	0.55	0.43	0.61		0.89	0.66	0.79		0.22	0.12	0.78
	30-49	r	0.51	0.21	0.57		0.82	0.40	0.71		0.04	0.02	0.30
	E	Slope	0.33	0.13	0.75		0.40	0.43	0.69		0.54	0.42	0.61
	50-64	r	0.18	0.03	0.52		0.53	0.35	0.84		0.42	0.24	0.41
	F	Slope	0.37	-0.16	-0.02		0.25	0.27	0.52		0.14	0.10	0.37
	65+	r	0.46	0.16	0.00		0.12	0.05	0.79		0.05	0.01	0.34

Ordinary houses from all three countries created the most differentiation between responses from all three cultures. This is less obvious with the UK ordinary house where some correspondence occurred between the responses of the Japanese and Taiwanese respondents. Innovative or traditional style houses seem to be understood more universally.

The type of house style does appear to condition respondent's aesthetic response.

Cross-culturally, ordinary style houses received more scatter and difference in responses obtained across all three nationalities. In addition, when similarities were found across all three cultures, they were found in house photographs with either traditional or innovative styles but not ordinary. This suggest that ordinary houses are more contextual and potentially express more local elements in their aesthetic appearance which resulted in different responses from respondents with different cultural backgrounds.

The results from Table 7.26 to 7.28 show a marked difference in the responses displayed for the ordinary house category. Generally, there is a low correspondence for all the comparison made. It might be expected that respondents from a given country are more familiar with their own ordinary style house as these are very commonly experienced. Consequently for the UK context, it would be expected that low correspondence occur between the UK/JP and UK/TW comparisons. This is in fact the case found in Table 7.26. The same pattern is displayed for the Japanese and Taiwanese ordinary style houses. For the Japanese and Taiwanese ordinary houses, most of the correspondence values are low. The exception is for the UK ordinary houses where high correspondences occur for the JP/TW comparisons. These findings across the responses for the ordinary style houses for all three countries suggest that the notion of familiarity is a valid parameter when considering ordinary style houses in respondents' aesthetic responses. Additionally, there is a suggestion that Japanese and Taiwanese respondents react similarly when viewing UK ordinary houses.

(b) Hierarchical Cluster Analysis (HCA)

As explained previously, HCA plots have been used to assist in clarifying confusing observation arising from PCA plot. The dendrogram, HCA, plot more efficiently illustrates linkages and distances between sets of data point on a 2 dimensional plan. Three dendrograms were generated from the hierarchical cluster analyses, following the principal component analysis, to illustrate relationships and similarities in responses between different sets of respondents regarding different house photographs. The total of 27 house photographs were grouped into three style categories and analysis was carried out regarding respondent's aesthetic responses of a particular style of house samples.

Results of the analysis are illustrated in Figure 7.32 where a definite cluster of the UK responses was found independent from both the Taiwanese and Japanese responses across all three style categories. A slight mixture of young respondent groups from Taiwan (TAM, TAF, TBM and TBF) were found clustered with the Japanese responses for traditional style houses. For the ordinary style house photographs, three distinct nationality clusters were observed which suggests that aesthetic response regarding ordinary style houses are culturally independent. Regarding innovative house style, responses obtained from Taiwan and Japan irregularly clustered together with UK responses clearly clustered separately.

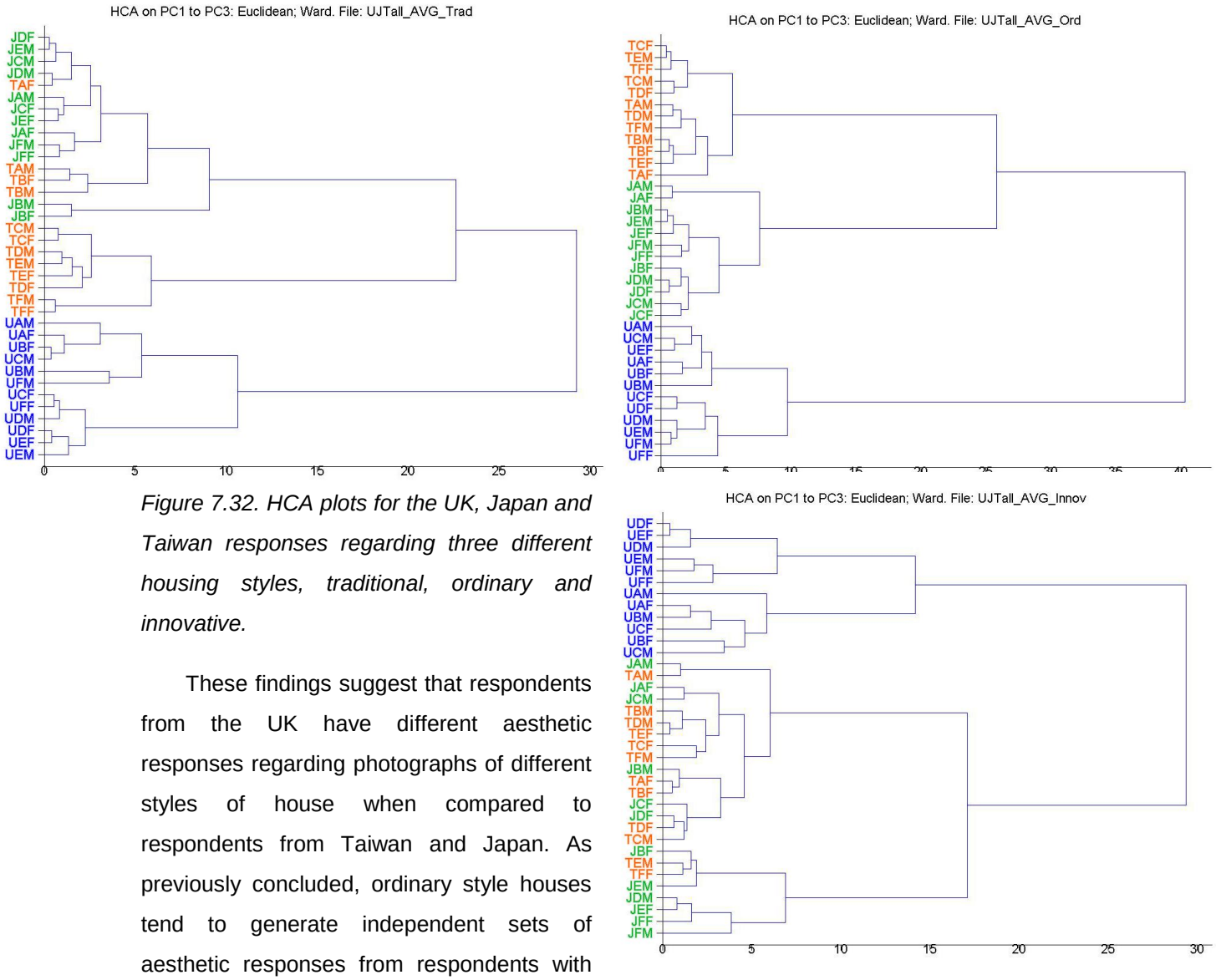


Figure 7.32. HCA plots for the UK, Japan and Taiwan responses regarding three different housing styles, traditional, ordinary and innovative.

These findings suggest that respondents from the UK have different aesthetic responses regarding photographs of different styles of house when compared to respondents from Taiwan and Japan. As previously concluded, ordinary style houses tend to generate independent sets of aesthetic responses from respondents with different cultural background. Similarities in response were found regarding innovative houses between the Taiwanese and Japanese responses which potentially suggest that respondents in Taiwan and Japan have similar aesthetic understanding and perception regarding innovative housing styles which are different from the UK respondents.

It is interesting to observe that younger respondents in Taiwan acquired similar responses to Japanese respondents concerning traditional style houses. This cross-cultural similarity yet limited to only the younger generation and particularly focused on traditional style might be the result of parameters in both Japanese and Taiwanese society which could be a direction for future research.

(c) semantic response diagram

Twenty-seven semantic response diagrams were generated for each house photograph to illustrate the average response obtained for each nationality regarding one particular house photograph appearance. Indications are made in the diagrams when the response to a word

pair from one country is different from the other two countries. The following three pages displayed the 27 semantic response diagrams accordingly with photographs collected from the UK, Japan and Taiwan.

Questionnaires utilizing semantic differential scales are often shown graphically to allow visual comparisons between different respondents, as discussed previously. Differences in responses, either in terms of intensity, and/or which word of the semantic word-pair scale was appropriate for describing a particular house appearance can be easily visualized and compared by overlapping the different response diagrams.

Initially observations were made to identify the house photograph sample that exhibited the most correspondence in response across all three nationalities. House photograph number 7 appeared to have the most agreement in responses using the 15 word-pairs both in terms of intensity and the selection of the word on each semantic word-pair scale. This consistency in response agreement across three different cultures in all the 15 word-pairs suggests a universal aesthetic profile description to be generated based on the word-pairs regarding the appearance of house photograph number 7.

Within each individual house photograph, when any one of the three responses from either the UK, Japan or Taiwan responded on the opposite side of the neutral (4.00) line from the other two responses, a dotted line was drawn with an indication of the nationality of such distinct selection of the word on the particular semantic word-pair. For example, in house photograph number 1, word-pair number 2, the average UK response lies on the right hand side of neutral line (4.00) differing from the average responses given by the Japan and Taiwan datasets. This process through all 27 photographs facilitates analysis to identify house photographs which have disagreements in responses across three nationalities, not only in terms of intensity but also in terms of the word selected from each individual word-pair in describing the perceived house photograph.

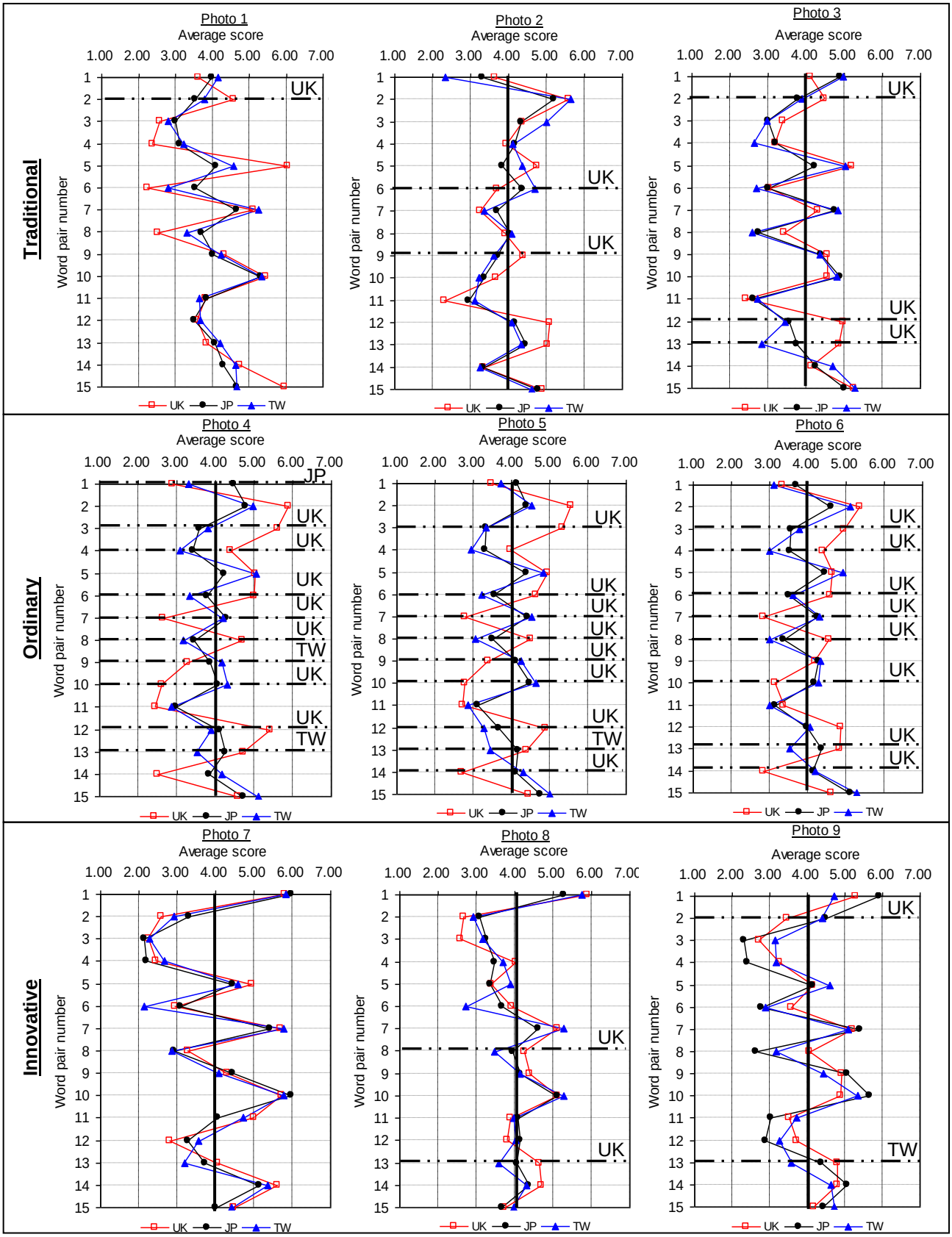


Figure 7.33. Semantic response diagram illustrating average responses obtained from all respondents (UK, Japan and Taiwan) regarding house photographs collected from the UK.

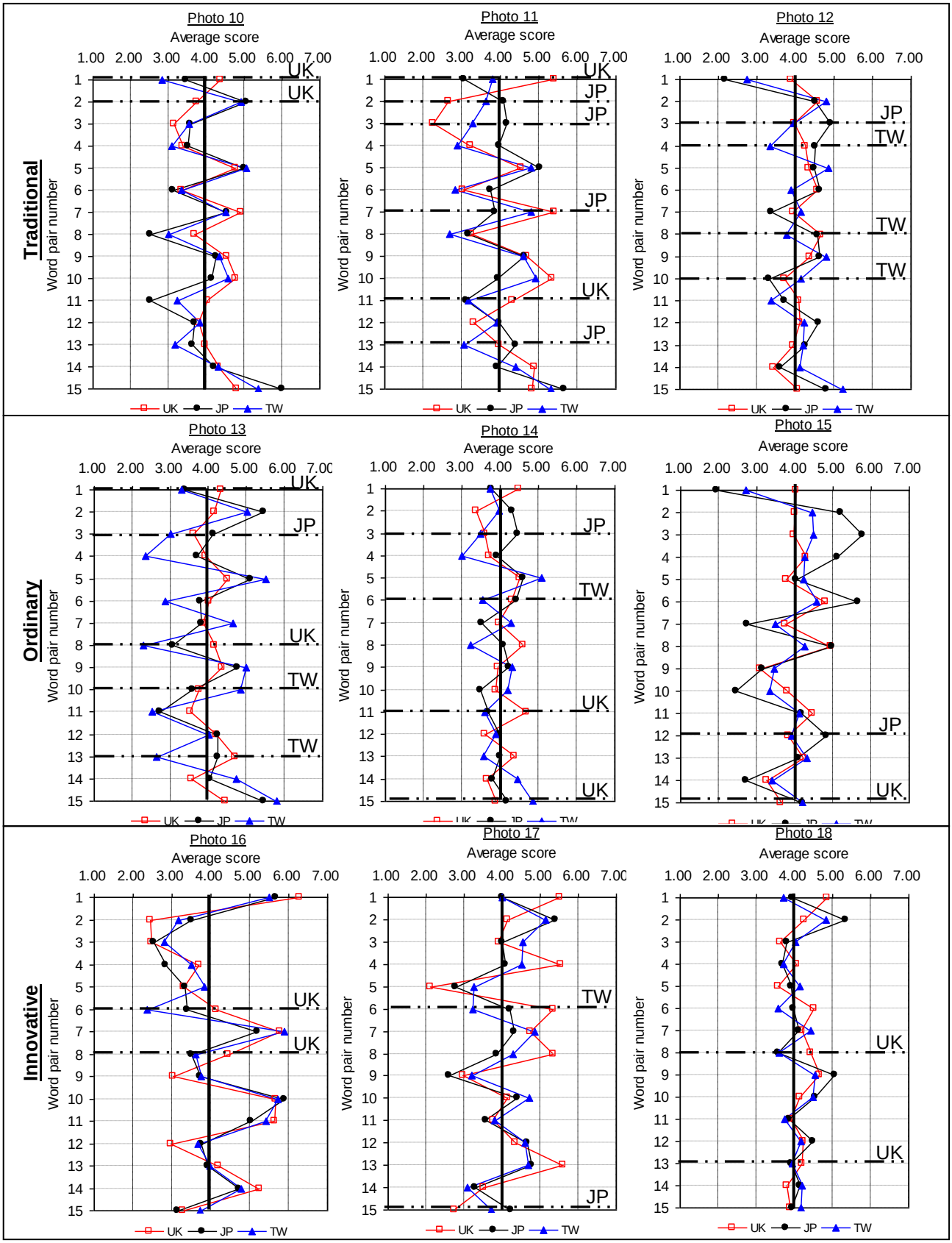


Figure 7.34. Semantic response diagram illustrating average responses obtained from all respondents (UK, Japan and Taiwan) regarding house photographs collected from Japan.

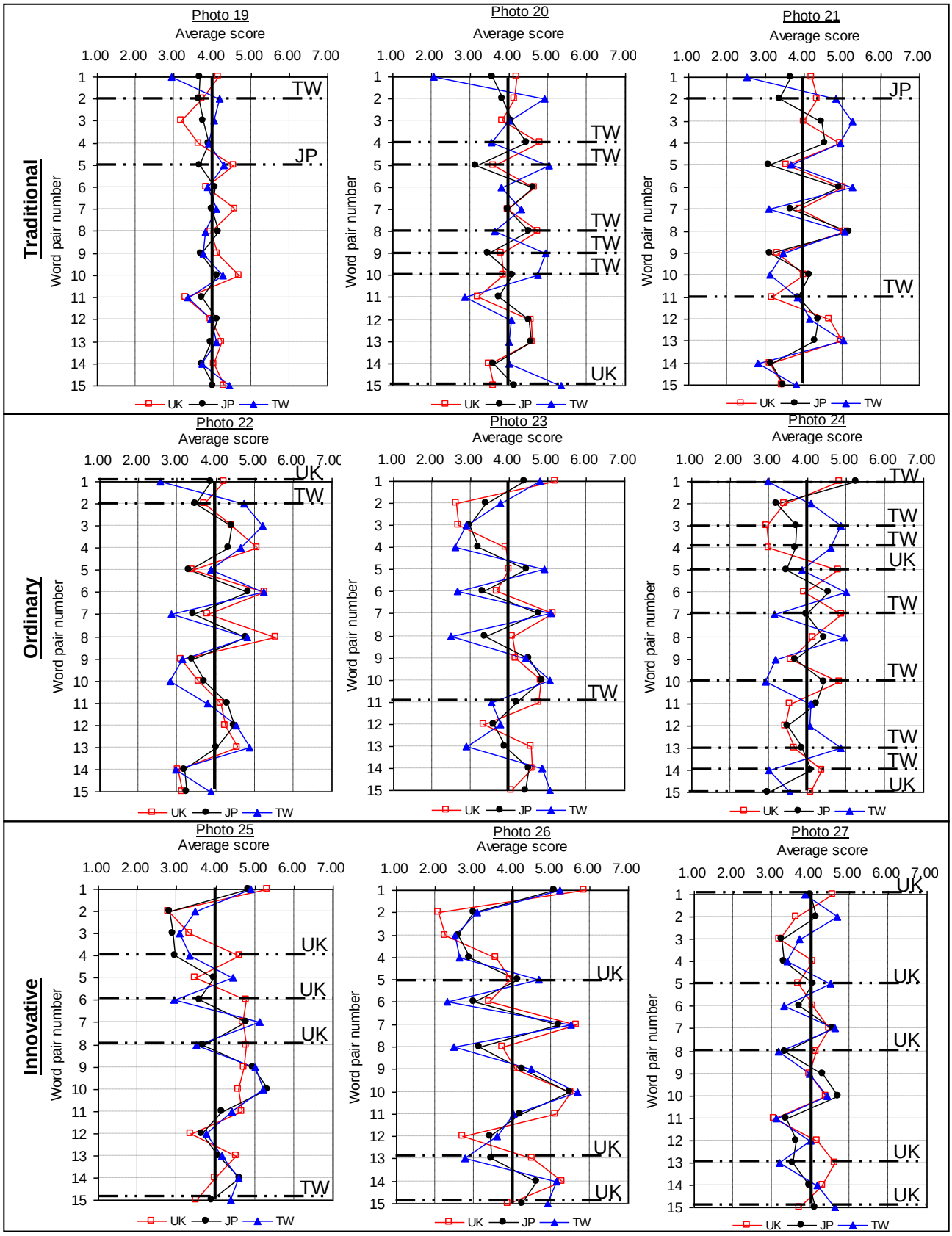


Figure 7.35. Semantic response diagram illustrating average responses obtained from all respondents (UK, Japan and Taiwan) regarding house photographs collected from Taiwan.

Observation made on the semantic response figures for all the photographs indicates that more disagreements in responses regarding the word selection were found in the ordinary style houses and with the most agreement (i.e. least disagreements) in houses with innovative style. In Figure 7.33, concerning photographs collected from the UK, disagreements in the selection of the word in each semantic word-pair scale most often were found with responses given by the UK respondents, i.e. the UK respondents' choice differed from similar choice exhibited by the Japanese and Taiwanese respondents. This was particularly the case in ordinary house photographs number 4, 5 and 6. In Figure 7.35, concerning photographs collected from Taiwan, the majority of the disagreements were found in responses given by Taiwanese respondents. A similar distribution of incidences of disagreement between Taiwan and the UK were found in Figure 7.24 regarding house photographs collected from Japan. These findings suggest that when house photographs were collected from the UK, the UK respondents have selected the opposite words on several semantic word-pair scales in comparison to selections made by Japanese and Taiwanese respondents; and similarly with Taiwanese houses. In terms of the uses of words in describing the aesthetic appearance of a house photograph on each semantic word-pair scale, familiarity and the cultural relationship between the respondent and the source location of the sample seem to cause a difference in people's response. However, this pattern was not found with Japanese respondents regarding Japanese houses, where one could postulate that Japanese respondents tend to be more neutral and blend in better with others regarding their aesthetic responses or in terms of their house appearance. Nevertheless, further investigation was thought necessary to ascertain such cultural influences exist in people's aesthetic response.

Table 7.29. The number of times that a particular country's response differed from that of the other two countries.

Photographs	**Number of times voted differently**		
	UK	**JP**	**TW**
Figure 7.34, UK buildings, Photo's 1 - 9	30	0	5
Figure 7.35, JP buildings, Photo's 10 - 18	12	8	7
Figure 7.36, TW buildings, Photo's 19 - 27	14	2	17
Total	56	10	29

Table 7.29 shows that the response of the UK respondents differed more frequently than respondents from either Japan or Taiwan, while the Japanese respondents exhibited the least number of differences. The responses to the word pairs of respondents from each country differed the most in relation to photographs from their own country. However, for the Japan photographs the number of times the votes differed for Japanese and Taiwanese respondents

were similar. For the Taiwan photographs the number of times the votes differed for UK and Taiwanese respondents were similar.

The last observation made on the twenty-seven semantic response figures identified that house photograph numbers 14, 18, 19, and 27 constantly received fairly neutral responses for all 15 word-pairs cross-culturally. Since these 4 houses do not belong to a particular style from any one source location, no conclusions have been suggested regarding such observation.

7.6.4.2 Subjective Description and Judgment – Ideal house response

(a) correspondence + level of scatter (r-value)

The purpose of this part of investigation was to compare the responses obtained previously for each photograph of the house samples against responses to identical word-pairs when applied to the notion of an ideal house. This comparison could provide a useful guidance in attempts to suggest an ideal house profile utilizing the visual qualities of the particular house sample that has the highest correlation with the ideal word-pair response.

Table 7.30. Correspondence and r-value table comparing ideal house response to responses obtained for each of the 27 house photographs for the UK and Japan.

Sample Style	Slope & r-value	Location and No.		UK	JP	Location and No.		UK	JP	Location and No.		UK	JP
Traditional	**Slope**	UK	1	**0.77**	**0.25**	JP	10	**0.34**	**0.53**	TW	19	**0.20**	**-0.04**
	r			*0.95*	*0.64*			*0.91*	*0.88*			*0.73*	*-0.31*
	Slope		2	**0.09**	**0.03**		11	**0.47**	**0.28**		20	**-0.19**	**-0.18**
	r			*0.16*	*0.07*			*0.70*	*0.64*			*-0.60*	*-0.60*
	Slope		3	**0.41**	**0.44**		12	**-0.08**	**-0.06**		21	**-0.30**	**-0.36**
	r			*0.75*	*0.84*			*-0.37*	*-0.14*			*-0.66*	*-0.86*
Ordinary	**Slope**		4	**-0.27**	**0.23**		13	**0.07**	**0.36**		22	**-0.45**	**-0.35**
	r			*-0.34*	*0.73*			*0.28*	*0.70*			*-0.88*	*-0.96*
	Slope		5	**-0.20**	**0.29**		14	**-0.02**	**0.00**		23	**0.18**	**0.28**
	r			*-0.32*	*0.91*			*-0.08*	*-0.01*			*0.36*	*0.71*
	Slope		6	**-0.16**	**0.30**		15	**-0.25**	**-0.43**		24	**0.23**	**-0.16**
	r			*-0.30*	*0.89*			*-0.75*	*-0.55*			*0.53*	*-0.43*
Innovative	**Slope**		7	**0.55**	**0.46**		16	**0.05**	**0.14**		25	**-0.09**	**0.22**
	r			*0.66*	*0.60*			*0.07*	*0.21*			*-0.20*	*0.44*
	Slope		8	**0.11**	**0.05**		17	**-0.48**	**-0.06**		26	**0.30**	**0.33**
	r			*0.20*	*0.13*			*-0.68*	*-0.14*			*0.38*	*0.57*
	Slope		9	**0.31**	**0.62**		18	**-0.05**	**0.17**		27	**0.05**	**0.24**
	r			*0.62*	*0.78*			*-0.22*	*0.54*			*0.15*	*0.80*

Table 7.30 was drawn by listing the correspondences and r-values calculated for each of the 27 house photographs when comparing them against the average ideal house responses given by the respondents on the 15 word-pairs SD scale. Observations made from the data of Table 7.30 attempts to identify the house photograph number which best matches with and differs the most from the ideal house profile given by the same group of respondents (UK and Japan).

Among the responses given by the UK respondents to all 27 house photographs, the UK traditional house number 1 has the best correspondence and r-value when compared with the responses for the notion of an ideal house using an identical 15 word-pairs SD scale. This suggests that house photograph number 1 has the visual aesthetic profile which is most closely related to the descriptive ideal house profile provided by the UK respondents. For the Japanese context, the photograph of the UK innovative house number 9 best matched the descriptive ideal house profile provided by the Japanese respondents. The responses from both the UK and Japanese respondents displayed the most difference from the ideal house responses for the Japanese ordinary house, photograph number 14, shown in Figure 7.36.

Figure 7.36. House samples representing best (photo 1_UK & photo 9_JP) and least (photo 14_both UK & JP) matched respondents' descriptive ideal house profile.

(b) semantic response diagram

Nine semantic response diagrams were generated separately for both UK and Japan, Figures 7.37 to 7.38. Each semantic response diagram included the average response given by the respondents regarding 3 house photographs collected from the same source location and in the same house style with a red response contour indicating the ideal house responses.

Observations from Figure 7.37 for the UK data set regarding the fitness of the ideal house response in comparison to each of the 27 house photograph responses demonstrated that house photograph number 1 most closely corresponded to responses across all 15 word-pairs for the ideal house response contour both in terms of intensity and the selection of word for each semantic word-pair scale. These findings support observations made previously using the correspondences and r-values from linear regression analysis that house photograph number 1 has the visual aesthetic qualities best corresponding to respondents' ideal house profiles for the UK context.

The semantic response diagrams allow efficient visual comparisons to be made between two sets of responses obtain from the word-paired semantic differential scale. By comparing the fitness of two different response contours, observation regarding how well the perceived physical qualities of the house photograph fit respondents' ideal house description on each of the semantic word-pairs could be made.

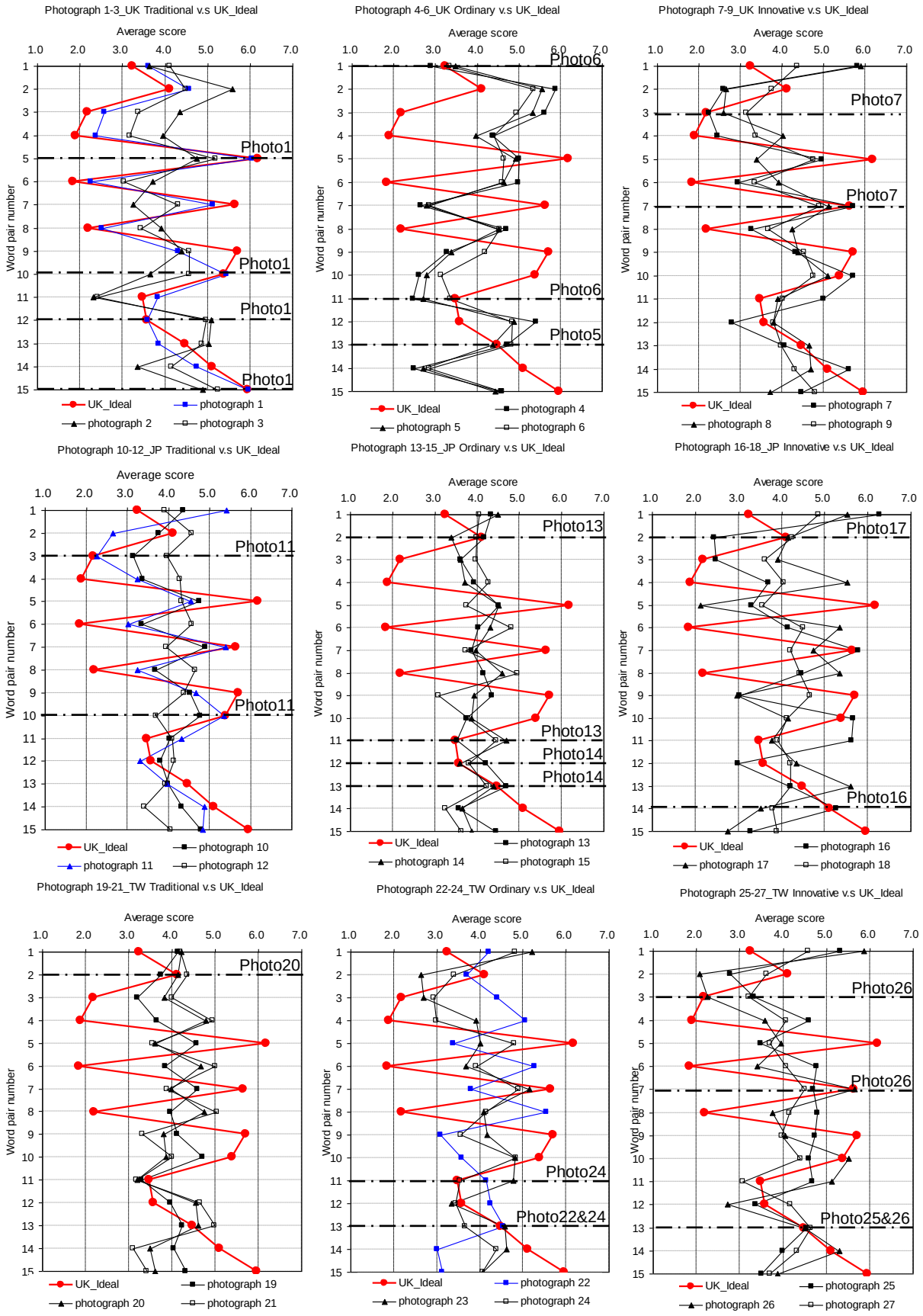


Figure 7.37. Semantic response diagram comparing response obtained from the UK

respondents for all 27 house photographs with the UK descriptive ideal house response.

In Figure 7.37 the semantic responses of the photographs to be discussed have been highlighted as blue lines, while that for the ideal is highlighted as a red line. House photograph number 1 shows a very similar response to the ideal while house photograph number 11 shows a similar pattern of fit with most of the word-pairs of the ideal house response but often with a lower intensity value. However for word-pairs number 1, 2 and 11, responses for the house number 11, shown in Figure 7.37, lay on the opposite side to the ideal response with words *Showy* instead of *Subtle*, *Complex* instead of *Simple*, and *Irregular* instead of *Balance*. These responses suggest that apart from visual qualities expressing *Showy*, *Complex* and *Irregular*, house photograph number 11 has the remaining word-pairs' aesthetic qualities which illustrate respondents' ideal house descriptions visually.

Photograph number 20 appears to have to have the most differences in responses when compared with the ideal house contour. Apart from word-pair number 13 which has exactly the same intensity on word *Robust* as the ideal response, the remaining 14 word-pair responses for photograph 20 lie on the opposite side to the ideal contour. This result suggests that house number 20, shown in Figure 7.38, has the most number of visual qualities which do not match the UK respondents' description for an ideal house in respect to 14 word pairs of the semantic differential scale.

Figure 7.38. Photographs showing house number 1 and 11 with great similarity, and house number 20 with great difference in response with the ideal house profile from the UK respondents.

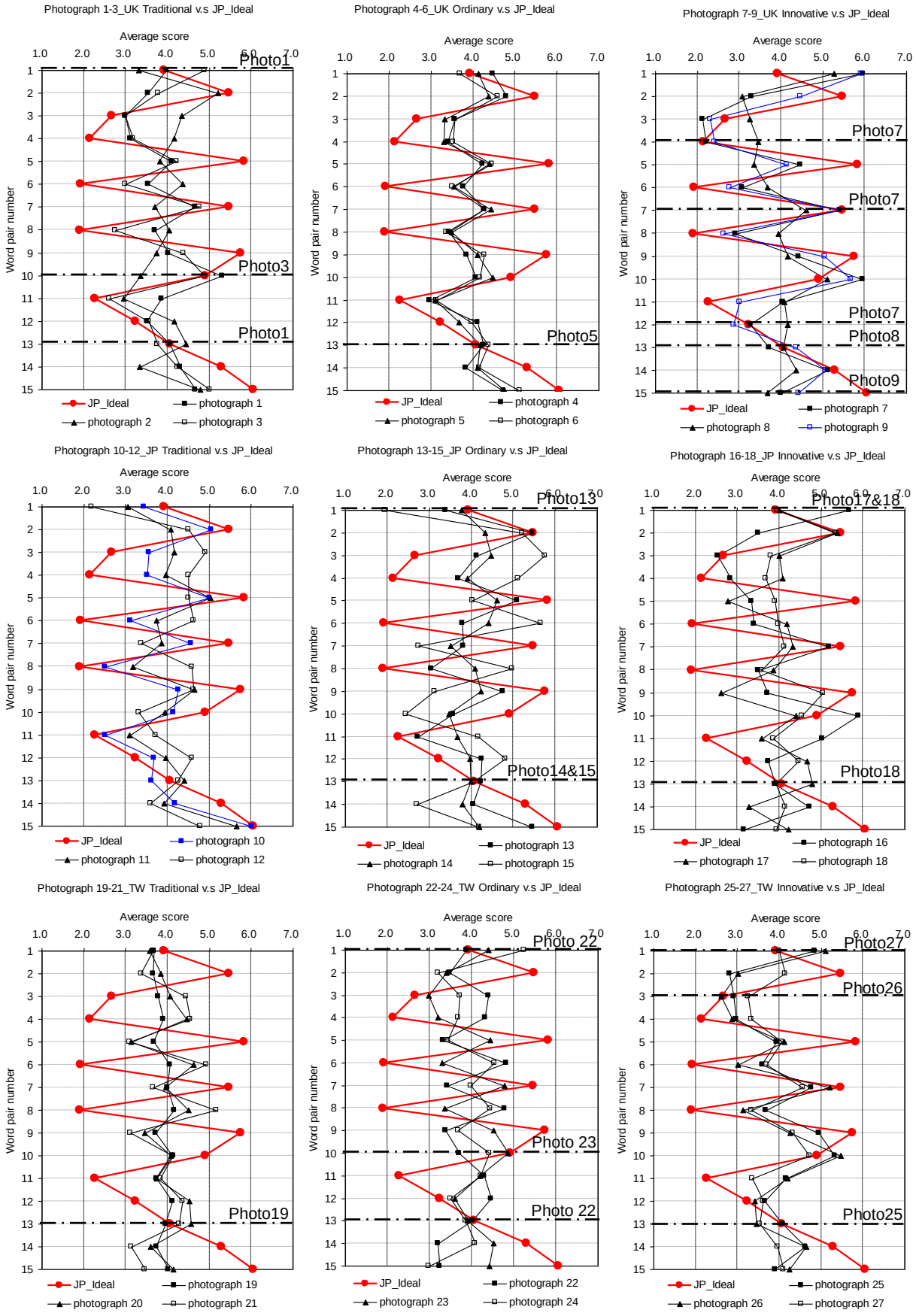


Figure 7.39. Semantic response diagram comparing response obtained from the Japanese

respondents for all 27 house photographs with the Japan descriptive ideal house response.

Analysis of the Japanese data set was illustrated in Figure 7.39 regarding comparisons between the ideal house responses and the responses obtained for each of the 27 house photographs. Observation made previously using correspondences and r-values from linear regression analysis demonstrated that within the Japanese context, house photograph number 9, highlighted in blue, corresponded the most closely with the ideal house responses described by the Japanese respondents. A close fit between the response contour for house number 9 and the ideal response contour is shown in the 3rd sub-figure from left to right on the first row of Figure 7.39, apart from word-pairs 1, 5 and 15 where greater than 1 unit in response intensities were evident yet with similar word choices made from the word-pair.

Observations made on comparing the ideal responses with the average responses obtained for house number 10, highlighted in blue, illustrate a good fit regarding the overall shape of the contours of the two responses but with a systematic difference between the intensities of the responses. The intensities of the responses for house 10 are always lower than those for the ideal house responses. Since both house photographs 9 and 10 demonstrated a good degree of correspondence with the ideal house profile, it is of interest to compare these two houses' visual qualities. Comparing the two photographs, Figure 7.40, result suggests that the Japanese respondents' notion of an ideal house embraces a wide stylistic range.

Figure 7.40. Photographs showing house number 9 and 10 with great similarity in response with the ideal house profile from the Japanese respondents.

7.6.4.3 Preference Judgment – the best and the least preferred house sample

Table 7.23 illustrating the best and the least preferred house photographs selected by each age group generated previously is readdressed here, Table 7.31, by adding colour highlights for different styles of the house photographs (grey as traditional, white as ordinary and yellow as innovative).

No obvious cultural dependent selections related to respondents' choices of most preferred or least preferred house photograph was found. Despite the cultural backgrounds, all respondents tended to choose house photographs (no. 20, 21, 22, and 24) collected from Taiwan as their least preferred selections. House photographs number 3 and 23 were voted frequently as respondents' most preferred choice of house sample.

As discussed previously when making age comparisons, preferences focused on innovative style houses and disfavour in traditional style houses were found from the younger respondents, especially in the male response. Contrarily, for the older respondents, preference was centered on traditional style houses and disfavour in innovative style houses.

These findings suggest that familiarity, i.e. houses from the respondents' own cultures, was not an influential factor when preference judgments were made. However, the style of the house photograph appeared to condition respondents' selection in respect to different age groups.

Consequently, it is concluded that people's preference judgments are not necessarily culturally dependent, despite the cultural differences or similarity in the perceived house photograph. Agreement was observed cross-culturally regarding people's aesthetic selection.

Table 7.31. Respondents' most liked and least liked house photograph selections including the source location and style category of the photograph samples. (Where an age group has been split into two it indicates an equal numbers for each photograph number).

Photograph No. for Most/Least Preferred			Age Group					
			9-11	12-18	19-29	30-49	50-64	65+
Male	Most liked	UK	25	7	23	7		3
		JP	23, 25	9	9	6	9, 11	11
		TW	16, 23	23		26	13	11
	Least liked	UK	21	17		16	22	16
		JP	21	21	24	20	15, 24	8, 9
		TW	20	24	24	24	24	22, 24
Female	Most liked	UK		3, 9	3	3	3	3
		JP	23	23	23	23	3	23
		TW	13	9, 23	21	3	3, 10	10
	Least liked	UK	21	21		16	16, 25	16
		JP	21	21	15	15	25	
		TW	21	20 / 24	22	24	24	24

Blue = UK, Black = JP, Red = Taiwan; Traditional, Ordinary, Innovative

7.6.4.4 Summary conclusions for house photograph sample comparison

Regarding the three style categories of the 27 house photographs, distinct culturally independent clusters in responses were found in ordinary style houses which suggests that ordinary houses are equipped with aesthetic qualities which are perceived and interpreted differently by respondents with different cultural backgrounds. A relationship between traditional and innovative style house and the age group of the respondents was identified in that younger respondents tended to prefer innovative style houses whereas the older generation tended to favour the traditional style house. In addition, the innovative style houses appeared to have the most number of similarities when comparisons were made between different sets of responses, followed by the traditional style. The least number of similarities

occurred in response to the ordinary style houses.

House photographs that best matched respondents' ideal house profiles were elicited using correspondences and r-values derived from linear regression analysis. This part of research would benefit from further investigation and analysis regarding the differences in the perceived house appearance in relation to the level of similarity in response. One potential hypothesis is to expect that the house photograph that best matches the ideal house profile in semantic responses is to be the same sample as the best preferred house photograph selected by the same respondents. However, such observations were not concluded from analysis made in this section, though this might contrarily suggest that differences exist in people's description of an ideal house in respect to their best like house photograph. Such difference between aesthetic description and aesthetic preference judgment was also evident previously when comparison was made between male and female response. Considerable similarities were found in the aesthetic responses between male and female respondents through all 27 photographs and in terms of their descriptions of the ideal qualities when using the provided 15 word-pair semantic differential scale; yet differences were observed in their selection of most and least like house photographs. This suggests that ways in which respondents interpret their preferences may differ even though they response similarly using the semantic difference scale.

7.6.5 Word-pair comparison

A major aspect of the study has been to investigate people's aesthetic perceptions through the collection of the language they used to describe the qualities of buildings in the built environment. Word-pair comparisons between different sets of responses were considered to effectively provide a method that would allow a better understanding of people's aesthetic perceptions in relationship to different variables, e.g. demographic or cultural.

As discussed earlier in the chapter, analyses of questionnaires carried out using the semantic differential scale could be initiated by comparing responses obtained for single demographic group variables, single photographic samples, single word-pairs in the scale, or groups of either. The examination of correspondences across different photographic samples potentially provided the means to elicit semantic response of people's responses to perceived visual qualities. Two house photographs will be similar in visual characteristics to the extent that the responses they engender with respect to specific word-pairs and intensities are the same. Furthermore, two respondents or different groups of respondents will demonstrate similar semantic visual understanding to the extent that their patterns of responses with respect to word-pair, house sample and response intensity are the same.

Consequently, the word-pair comparisons will be analyzed on the basis of examining the relationship between each of the word-pair responses with respect to each of the 27 house photographic samples in the context of different demographic variables (nationality and age

group) of the respondents.

7.6.5.1 Visual Description Data for 27 house samples with 15 word-pairs

(a) correspondence (slope) + regression coefficient (r-value)

Initially, the correspondences (slope) and the regression coefficients (r-value) between the UK/JP, UK/TW and JP/TW responses for each of the six age groups for each individual word-pair were calculated using an Excel spreadsheet and are illustrated in Tables 7.32 and 7.33. The correspondences and r-values for each set of comparison regarding each of the 15 word-pairs were calculated using 27 response intensities obtained from the 27 photograph samples. A significance test for the obtained sample correlation coefficient was applied using the formulas provided previously. In a sample of 27 pairs of responses, to be significant at the 5% level, the coefficient would have to be greater than: ± 2/$\sqrt{}$27 = 2/5.196 = 0.39 ($+/-$); and to be significant at the 1% level, the coefficient would have to be exceed: ± 2.5/$\sqrt{}$27 = 2.5/5.196 = 0.48 ($+/-$). Consequently, any comparisons with either the slopes or r-values or both below 0.50 were highlighted in grey and were considered as displaying a value indicating little or weak correspondence. For each word-pair, the comparisons within individual age groups between two countries with the best correspondences were highlighted in yellow.

An overall observation indicates that word-pair number 1 (Subtle and Showy) has the least number of inadequate correspondence values and the displays the highest overall values for all the slopes and r-values in comparison to other 14 word-pairs. Word-pair number 10 (Characterless and Unique) also displayed good correspondences for 14 out of 18 comparisons made between different groups of respondents. Word-pairs number 12 (Contrast and Uniformity) and 13 (Delicate and Robust) have values below the 0.5 limit for acceptable correspondence for 17 out of 18 of the comparison sets across different age groups and nationalities. These findings suggest that respondents from different cultural backgrounds and different age groups have similar semantic response regarding subtle and showy in the context of describing perceived house photograph. With word-pairs contrast/uniformity and delicate/robust, large differences existed in either the respondents' usage or understanding of the word. It is also possible that these two word-pairs were thought inappropriate in the context of describing the aesthetic quality of houses.

Once again, better correspondences were found when comparisons were made between Japanese and Taiwanese responses. Most of the best correspondences (highlighted yellow), and least number of those designated inadequate (grey highlighted) within one single word-pair appeared to be in the comparison column of JP/TW. However, the patterns of correspondence were not consistent in one particular age group across all 15 word-pairs. Additionally, in word-pairs number 3 (Interesting and Boring), 6 (attractive and Unappealing), 8 (Beautiful and Ugly), 10 (Characterless and Unique), 14 (Dull and Dynamic), and 15 (Unsettling and Calming), good correspondences were observed across all six age groups for

responses collected from Japan and Taiwan. These suggest that in general, respondents from Japan and Taiwan have a similar semantic response of the words used in the word-pairs. This similarity in response and semantic response occur because both the Japanese and Mandarin written languages incorporate Chinese characters in their languages where specific meanings and concepts are attached to each individual or combinations of characters. This is an interesting hypothesis which could be followed up with a more specific investigation in the study of language and perception. However, initial observations of the semantic word-pairs used suggest that Japanese and Mandarin scripts often use different characters to convey the same meaning.

Good correspondences were observed across all three comparisons UK/JP, UK/TW and JP/TW for the younger age group respondents (9-11 and 12-18) regarding word-pair numbers 4(Cheerful/Gloomy), 6 (Attractive/Unappealing) and 8 (Beautiful/Ugly). However, inadequate correspondences existed for word-pair numbers 6 and 8 for respondents from age 19 to 65+ for comparisons made involving UK respondents. This suggests that the semantic response for word-pairs: attractive/unappealing and beautiful/ugly differs between respondents from age groups in the 9 to 18 age band and those in the 19 to 65+ age band in the UK. Insufficient correspondences were identified for the younger age groups across three nationalities regarding word-pair 2 (Complex and Simple) for respondents from 9-11 and 12-18, and word-pair 11 (Balanced and Irregular) for age group 9-11. This suggests that the semantic response of these two pairs of words might be difficult, not clear or simply different for the younger respondents and that this condition occurs cross-culturally.

At last, it is interesting to notice that word-pair number 9 (Confined and Open) is the only word-pair among the 15 pairs that has UK/JP correspondence which is higher than either the UK/TW or JP/TW.

Overall, the results indicate that the use of many of the word pairs showed little correspondence across cultures but that the correspondence was greatest between the Japanese and Taiwanese respondents. However, the results suggest that overall there was little similarity between the use of word-pairs between the UK and Taiwan and Japan, while there may be some similarity in response between the East Asian cultures of Japan and Taiwan.

Table 7.32. Slope and r-value for responses obtained from three countries regarding word-pairs 1 to 12.

Age Group	Slope & r-value		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW
A	**Slope**	WP1- Subtle vs. Showy	**0.48**	**0.63**	**0.86**	WP2- Complex vs. Simple	**0.02**	**0.37**	**0.16**	WP3- Interesting vs. Boring	**0.41**	**0.46**	**0.72**
9-11	*r*		*0.54*	*0.57*	*0.69*		*0.03*	*0.70*	*0.17*		*0.56*	*0.50*	*0.57*
B	**Slope**		**0.30**	**0.62**	**0.66**		**0.20**	**0.42**	**0.31**		**0.53**	**0.55**	**0.62**
12-18	*r*		*0.24*	*0.50*	*0.67*		*0.23*	*0.56*	*0.35*		*0.46*	*0.52*	*0.66*
C	**Slope**		**0.54**	**0.96**	**0.76**		**0.57**	**0.55**	**0.81**		**0.47**	**0.53**	**0.54**
19-29	*r*		*0.50*	*0.79*	*0.67*		*0.70*	*0.75*	*0.90*		*0.49*	*0.60*	*0.58*
D	**Slope**		**0.84**	**1.07**	**0.84**		**0.79**	**0.62**	**0.56**		**0.38**	**0.32**	**0.55**
30-49	*r*		*0.63*	*0.76*	*0.79*		*0.72*	*0.77*	*0.77*		*0.41*	*0.39*	*0.62*
E	**Slope**		**0.77**	**0.78**	**0.82**		**0.51**	**0.55**	**0.68**		**0.33**	**0.48**	**0.83**
50-64	*r*		*0.71*	*0.71*	*0.82*		*0.65*	*0.77*	*0.75*		*0.43*	*0.56*	*0.75*
F	**Slope**		**0.63**	**0.97**	**0.59**		**0.56**	**0.65**	**0.75**		**0.35**	**0.40**	**0.77**
65+	*r*		*0.51*	*0.60*	*0.45*		*0.65*	*0.69*	*0.68*		*0.40*	*0.42*	*0.72*
A	**Slope**	WP4- Cheerful vs. Gloomy	**0.62**	**0.71**	**0.82**	WP5- Intimidating vs. Friendly	**0.50**	**0.33**	**0.60**	WP6- Attractive vs. Unappealing	**0.60**	**0.73**	**0.81**
9-11	*r*		*0.73*	*0.64*	*0.63*		*0.56*	*0.46*	*0.76*		*0.75*	*0.69*	*0.62*
B	**Slope**		**0.85**	**0.76**	**0.59**		**0.18**	**0.51**	**0.56**		**0.76**	**0.71**	**0.85**
12-18	*r*		*0.60*	*0.57*	*0.63*		*0.20*	*0.65*	*0.64*		*0.69*	*0.57*	*0.76*
C	**Slope**		**0.46**	**0.43**	**0.36**		**0.48**	**0.52**	**0.54**		**0.38**	**0.67**	**1.00**
19-29	*r*		*0.46*	*0.50*	*0.42*		*0.49*	*0.65*	*0.65*		*0.34*	*0.49*	*0.80*
D	**Slope**		**0.44**	**0.26**	**0.41**		**0.55**	**0.30**	**0.60**		**0.26**	**0.31**	**0.86**
30-49	*r*		*0.48*	*0.30*	*0.43*		*0.66*	*0.41*	*0.68*		*0.33*	*0.32*	*0.72*
E	**Slope**		**0.31**	**0.33**	**0.68**		**0.39**	**0.30**	**0.67**		**0.36**	**0.25**	**0.82**
50-64	*r*		*0.51*	*0.45*	*0.57*		*0.64*	*0.47*	*0.64*		*0.59*	*0.29*	*0.60*
F	**Slope**		**0.26**	**0.14**	**0.53**		**0.27**	**0.27**	**0.41**		**0.37**	**0.32**	**0.80**
65+	*r*		*0.37*	*0.21*	*0.53*		*0.36*	*0.45*	*0.51*		*0.49*	*0.38*	*0.72*
A	**Slope**	WP7- Unimaginative vs. Intriguing	**0.23**	**0.38**	**0.29**	WP8- Beautiful vs. Ugly	**0.66**	**0.52**	**0.85**	WP9- Confined vs. Open	**0.78**	**0.46**	**0.43**
9-11	*r*		*0.41*	*0.48*	*0.20*		*0.77*	*0.54*	*0.76*		*0.62*	*0.58*	*0.68*
B	**Slope**		**0.43**	**0.43**	**0.90**		**0.81**	**0.91**	**0.72**		**0.59**	**0.33**	**0.55**
12-18	*r*		*0.43*	*0.38*	*0.81*		*0.61*	*0.74*	*0.77*		*0.50*	*0.35*	*0.69*
C	**Slope**		**0.48**	**0.68**	**0.84**		**0.33**	**0.53**	**0.76**		**0.80**	**0.49**	**0.46**
19-29	*r*		*0.57*	*0.73*	*0.77*		*0.28*	*0.44*	*0.75*		*0.57*	*0.45*	*0.59*
D	**Slope**		**0.33**	**0.47**	**0.77**		**0.32**	**0.40**	**0.90**		**0.60**	**0.69**	**0.63**
30-49	*r*		*0.42*	*0.55*	*0.73*		*0.36*	*0.39*	*0.76*		*0.56*	*0.67*	*0.66*
E	**Slope**		**0.44**	**0.58**	**1.05**		**0.49**	**0.41**	**1.02**		**0.49**	**0.41**	**0.57**
50-64	*r*		*0.66*	*0.64*	*0.77*		*0.61*	*0.42*	*0.83*		*0.60*	*0.49*	*0.56*
F	**Slope**		**0.38**	**0.45**	**0.78**		**0.45**	**0.40**	**0.61**		**0.57**	**0.39**	**0.41**
65+	*r*		*0.49*	*0.54*	*0.72*		*0.46*	*0.45*	*0.67*		*0.62*	*0.52*	*0.50*
A	**Slope**	WP10- Characterless vs. Unique	**0.44**	**0.46**	**0.75**	WP11- Balanced vs. Irregular	**0.06**	**0.07**	**0.53**	WP12- Contrast vs. Uniformity	**0.31**	**0.02**	**0.14**
9-11	*r*		*0.62*	*0.55*	*0.63*		*0.10*	*0.10*	*0.47*		*0.41*	*0.03*	*0.14*
B	**Slope**		**0.57**	**0.62**	**0.79**		**0.60**	**0.51**	**0.52**		**0.08**	**-0.22**	**0.42**
12-18	*r*		*0.54*	*0.51*	*0.68*		*0.54*	*0.58*	*0.67*		*0.11*	*-0.31*	*0.42*
C	**Slope**		**0.69**	**0.55**	**0.59**		**0.72**	**0.71**	**0.84**		**0.14**	**0.14**	**0.51**
19-29	*r*		*0.68*	*0.59*	*0.66*		*0.78*	*0.78*	*0.84*		*0.19*	*0.26*	*0.71*
D	**Slope**		**0.64**	**0.50**	**0.55**		**0.51**	**0.52**	**0.87**		**0.24**	**0.24**	**0.46**
30-49	*r*		*0.57*	*0.51*	*0.63*		*0.69*	*0.67*	*0.83*		*0.29*	*0.44*	*0.72*
E	**Slope**		**0.55**	**0.49**	**0.74**		**0.35**	**0.55**	**0.86**		**0.17**	**0.27**	**0.63**
50-64	*r*		*0.57*	*0.50*	*0.73*		*0.58*	*0.73*	*0.69*		*0.35*	*0.49*	*0.57*
F	**Slope**		**0.58**	**0.46**	**0.63**		**0.33**	**0.58**	**0.95**		**0.34**	**0.05**	**0.20**
65+	*r*		*0.61*	*0.51*	*0.68*		*0.61*	*0.80*	*0.72*		*0.48*	*0.12*	*0.31*

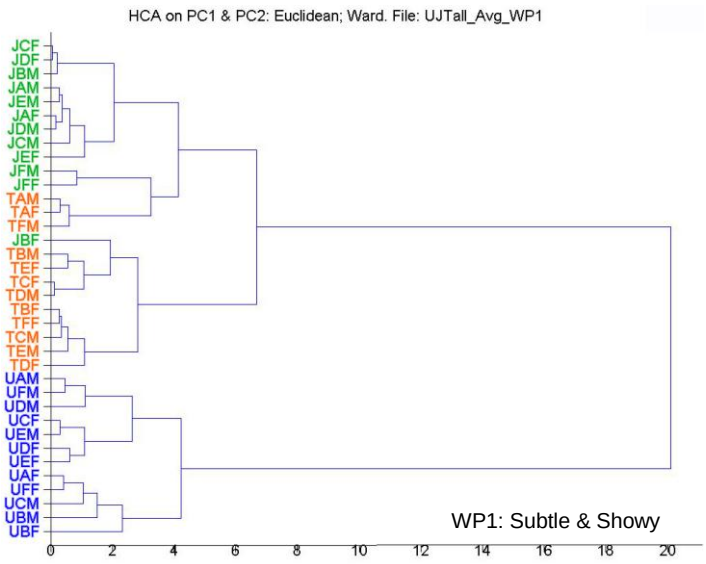
Table 7.33. Slope and r-value for responses obtained from three countries regarding word-pair 13 to 15.

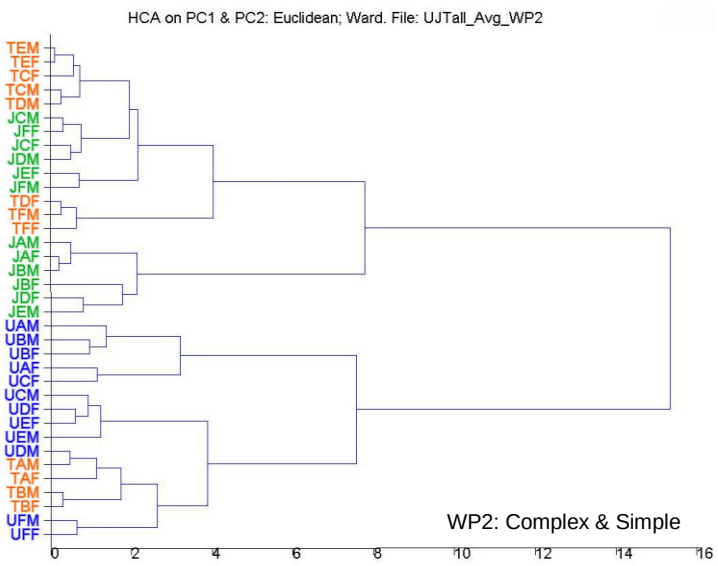
Age Group	Slope & r-value	WP	UK/JP	UK/TW	JP/TW	WP	UK/JP	UK/TW	JP/TW		UK/JP	UK/TW	JP/TW
A	**Slope**	WP13- Delicate vs. Robust	**0.19**	**1.03**	**0.78**	WP14_ Dull vs. Dynamic	**0.44**	**0.43**	**0.96**	WP15- Unsettling vs. Calming	**0.60**	**0.36**	**0.68**
9-11	*r*		*0.19*	*0.51*	*0.38*		*0.61*	*0.49*	*0.78*		*0.75*	*0.53*	*0.80*
B	**Slope**		**0.07**	**0.54**	**0.32**		**0.55**	**0.42**	**0.70**		**0.53**	**0.41**	**0.54**
12-18	*r*		*0.10*	*0.35*	*0.15*		*0.54*	*0.44*	*0.74*		*0.37*	*0.36*	*0.69*
C	**Slope**		**0.40**	**-0.08**	**0.36**		**0.54**	**0.57**	**0.76**		**0.58**	**0.64**	**0.55**
19-29	*r*		*0.45*	*-0.07*	*0.26*		*0.68*	*0.72*	*0.76*		*0.39*	*0.46*	*0.71*
D	**Slope**		**0.17**	**-0.14**	**0.70**		**0.51**	**0.36**	**0.66**		**0.54**	**0.60**	**0.75**
30-49	*r*		*0.20*	*-0.09*	*0.37*		*0.59*	*0.43*	*0.67*		*0.49*	*0.56*	*0.76*
E	**Slope**		**0.20**	**-0.05**	**0.93**		**0.33**	**0.42**	**1.14**		**0.51**	**0.40**	**0.77**
50-64	*r*		*0.48*	*-0.05*	*0.40*		*0.63*	*0.58*	*0.82*		*0.63*	*0.54*	*0.84*
F	**Slope**		**0.18**	**-0.49**	**0.14**		**0.31**	**0.35**	**0.74**		**0.79**	**0.40**	**0.52**
65+	*r*		*0.22*	*-0.39*	*0.09*		*0.53*	*0.48*	*0.60*		*0.74*	*0.57*	*0.79*

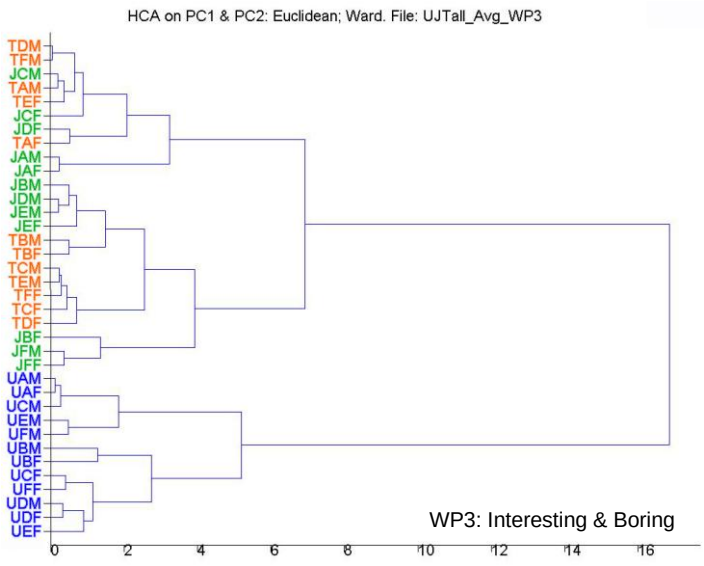
(b) Hierarchical Cluster Analysis (HCA)

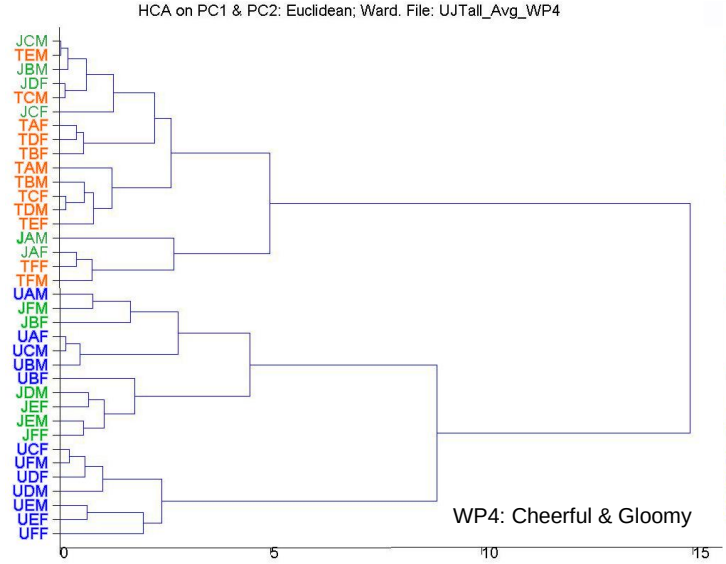
HCA dendrogram plots were generated using PCA scores regarding responses obtained from all three countries including six age groups and genders for each of the 15 word-pairs, shown in Figures 7.41. The plots were coloured in blue, green and orange representing three nationalities, the UK, Japan and Taiwan respectively to facilitate visual comparisons.

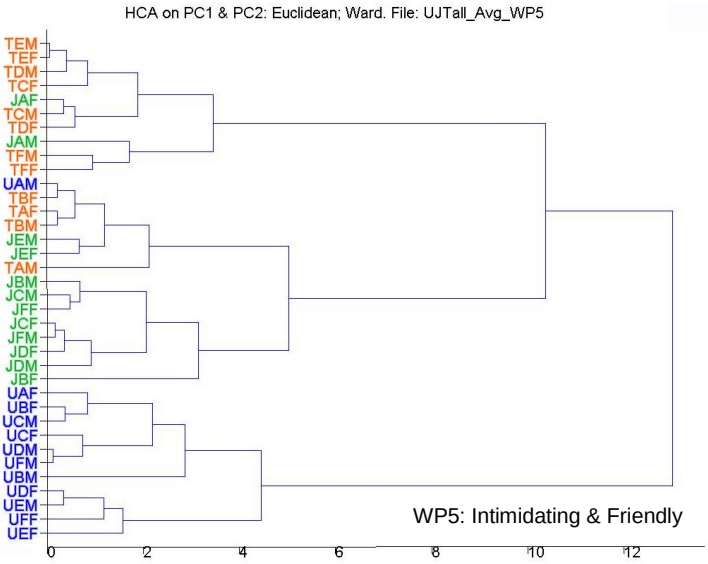
Considering the HCA diagrams related to word-pairs it can be seen that generally the UK responses cluster separately from those of the Japanese and Taiwanese respondents and that this the case for 12 out of the 15 word pairs. In more detail, the UK responses are completely separate in the case of 4 word-pairs, (WP1, WP3, WP7, WP15), and in a further 3 word-pairs (WP5, WP10, WP14) only one UK group response falls into the Taiwan/Japan response cluster. For word pairs WP6 and WP12, the UK responses are shown to cluster with those for the Japanese responses. The results for the word-pair WP9 are mixed and but the responses tend to form a UK/Japan response cluster. For word-pair WP13, the responses from Taiwan create a totally separate cluster. It is not possible to discern clear patterns of behaviour in terms of the mixing of the Japanese and Taiwanese responses, however, the UK group UAM most frequently occurred outside or on the edge of the UK cluster.

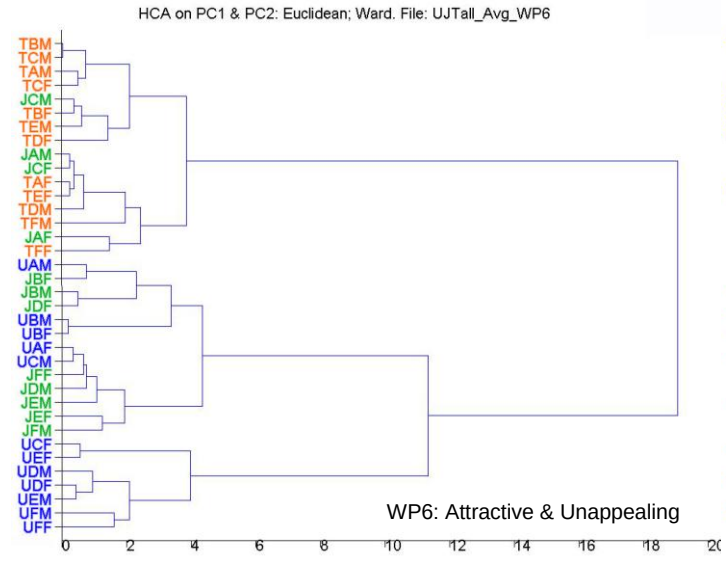



HCA on PC1 & PC2: Euclidean; Ward. File: UJTall_Avg_WP2
TEM
TEF
TCF
TCM
TDM
JCM
JFF
JCF
JDM
JEF
JFM
TDF
TFM
TFF
JAM
JAF
JBM
JBF
JDF
JEM
UAM
UBM
UBF
UAF
UCF
UCM
UDF
UEF
UEM
UDM
TAM
TAF
TBM
TBF
UFM
UFF
0
2
4
6
8
10
12
14
16
WP2: Complex & Simple


HCA on PC1 & PC2: Euclidean; Ward. File: UJTall_Avg_WP3
TDM
TFM
JCM
TAM
TEF
JCF
JDF
TAF
JAM
JAF
JBM
JDM
JEM
JEF
TBM
TBF
TCM
TEM
TFF
TCF
TDF
JBF
JFM
JFF
UAM
UAF
UCM
UEM
UFM
UBM
UBF
UCF
UFF
UDM
UDF
UEF
0
2
4
6
8
10
12
14
16
WP3: Interesting & Boring


HCA on PC1 & PC2: Euclidean; Ward. File: UJTall_Avg_WP4
JCM
TEM
JBM
JDF
TCM
JCF
TAF
TDF
TBF
TAM
TBM
TCF
TDM
TEF
JAM
JAF
TFF
TFM
UAM
JFM
JBF
UAF
UCM
UBM
UBF
JDM
JEF
JEM
JFF
UCF
UFM
UDF
UDM
UEM
UEF
UFF
0
5
10
15
WP4: Cheerful & Gloomy


HCA on PC1 & PC2: Euclidean; Ward. File: UJTall_Avg_WP5
TEM
TEF
TDM
TCF
JAF
TCM
TDF
JAM
TFM
TFF
UAM
TBF
TAF
TBM
JEM
JEF
TAM
JBM
JCM
JFF
JCF
JFM
JDF
JDM
JBF
UAF
UBF
UCM
UCF
UDM
UFM
UBM
UDF
UEM
UFF
UEF
0
2
4
6
8
10
12
WP5: Intimidating & Friendly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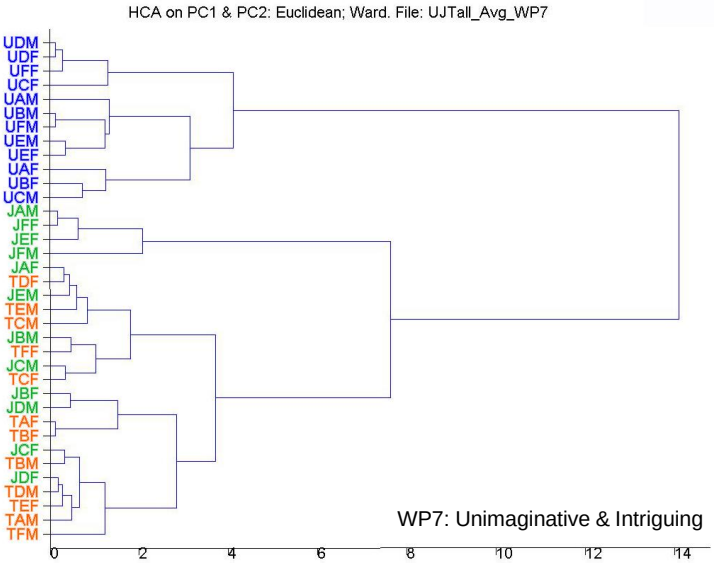
WP6: Attractive & Unappealing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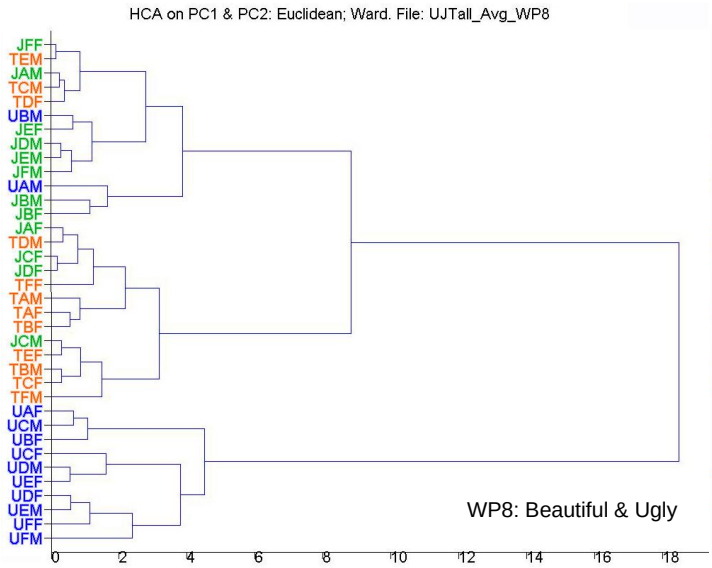
WP7: Unimaginative & Intriguing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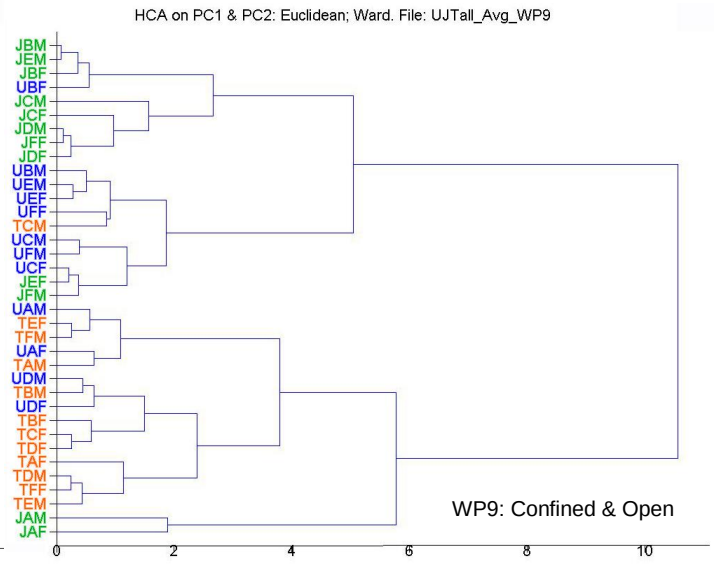
WP8: Beautiful & Ugly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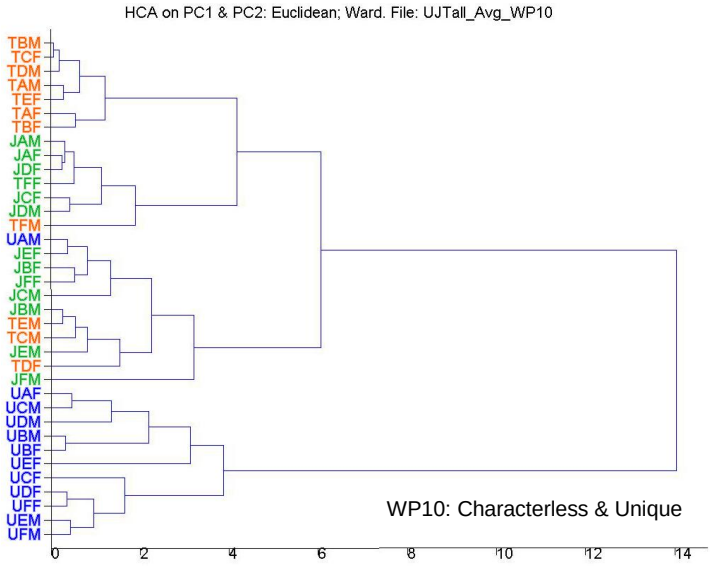
WP9: Confined & Open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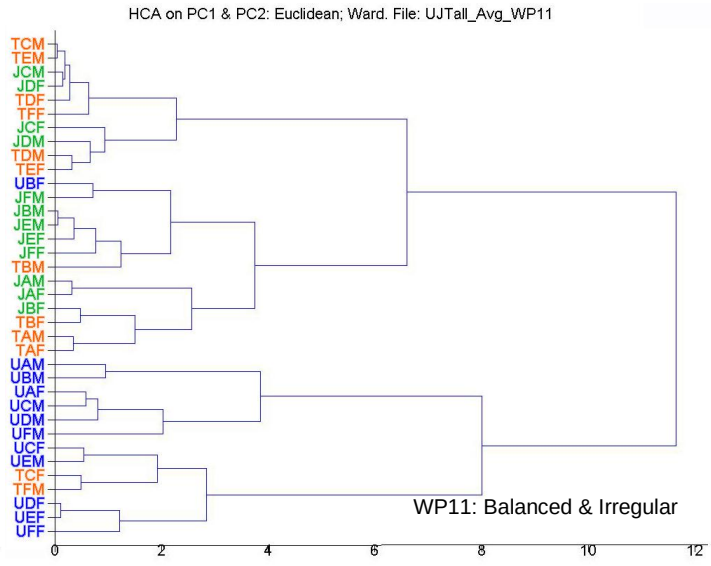
WP10: Characterless & Unique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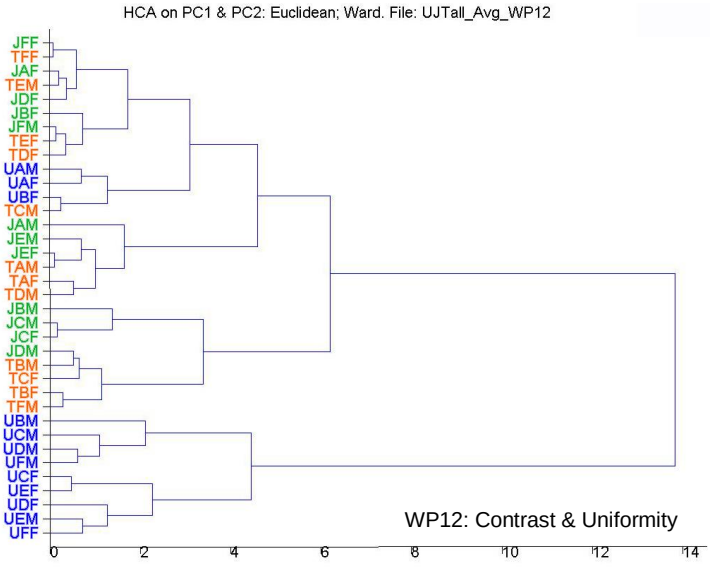
WP11: Balanced & Irregular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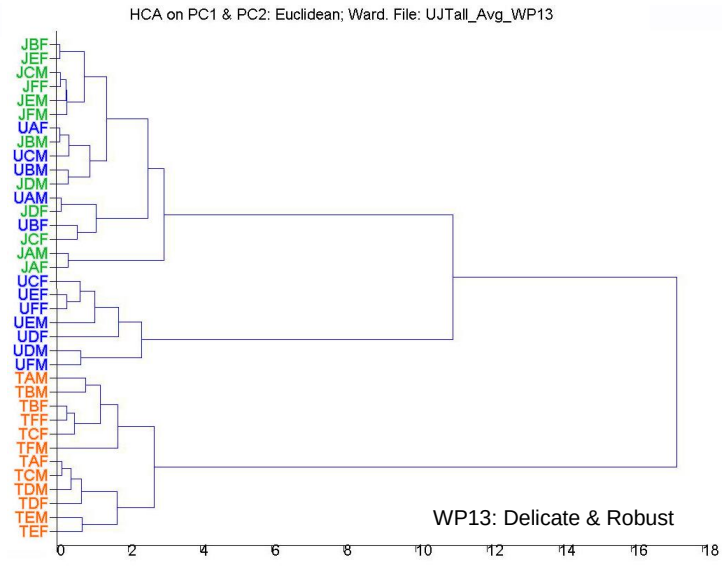
WP12: Contrast & Uniformity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WP13: Delicate & Robust

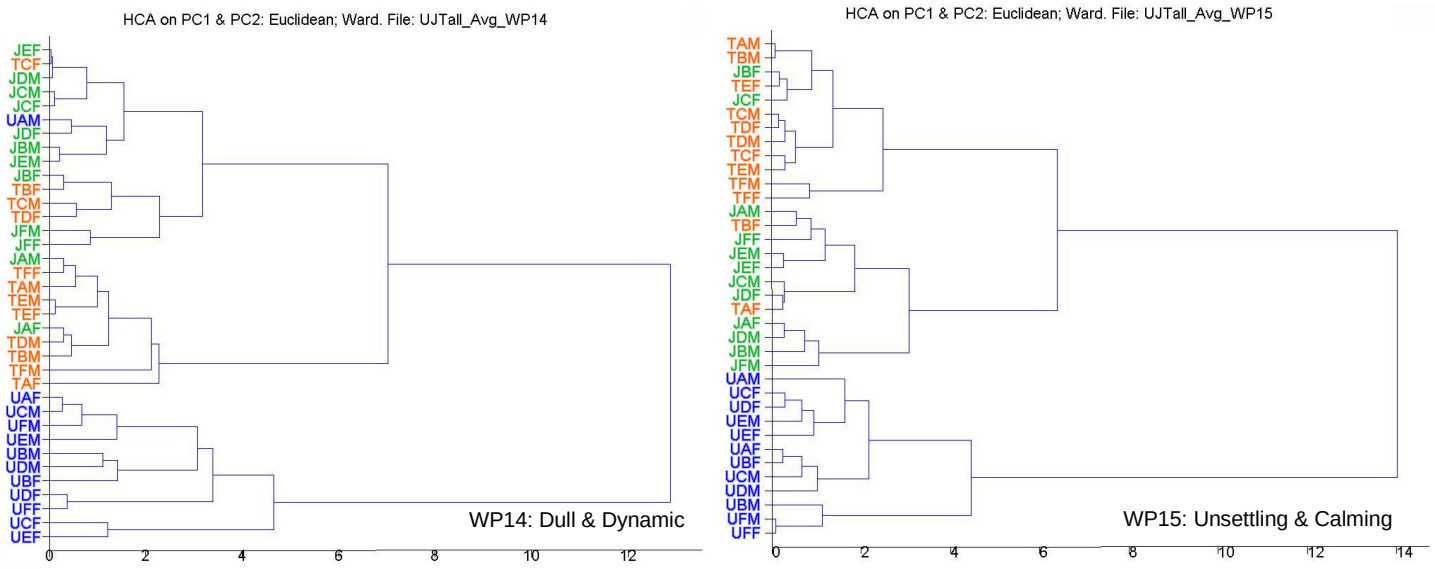


Figure 7.41. HCA plot for all responses regarding word-pair number 1-15.

As discussed previously, two respondents or different groups of respondents having similar responses to the same visual stimulus in terms of their response intensity to a specific word-pair signified that their semantic visual understandings are the same.

The best culturally defined clusters were observed in word-pair number 1, subtle and showy, where the UK respondents clustered separately from both Japanese and Taiwanese respondents. Additionally, most Japanese respondents were clustered together with only the 9-11 female Japanese respondents located within the remaining Taiwanese response cluster, word-pair number 1 in Figure 7.41. This observation suggests that no correspondence of response existed between the three nationalities regarding word-pair 1. However, this conclusion regarding word-pair 1 contradicts the observations derived previously using the linear regression analysis to test for correspondence. Re-examination of the dataset was then initiated to understand the cause of this apparent contradiction in analysis findings.

Accordingly, three sets of comparisons (UK/JP_ Age30-49, UK/TW_ Age19-29 and JP/TW_ Age 50-64) elicited from Table 7.32 regarding word-pair number 1 were plotted and are illustrated in Figure 7.56. These three set of comparisons all generated high values of correspondence (0.84, 0.96, 0.82 respectively) and r-values (0.63, 0.79, 0.82 respectively) when calculation was made in spreadsheet which suggest similarities in responses between the two sets of respondent from same age group but different nationality. Nevertheless, observations made from Figure 7.42 illustrated differences in response intensities between the comparison groups. For example, the slope of the UK/TW, Age 19-20 comparison line is close to unity but the line itself is displaced to the right of the dotted line representing complete correspondence. Consequently, the examination of the slope and correlation coefficient in these cases proved insufficient to allow clear conclusions to be drawn without considering value of the intercept of the comparison line. This contradiction in observations and the

re-examination of results suggests that in general HCA is a more reliable method when dealing with large numbers of variables and large amounts of data.

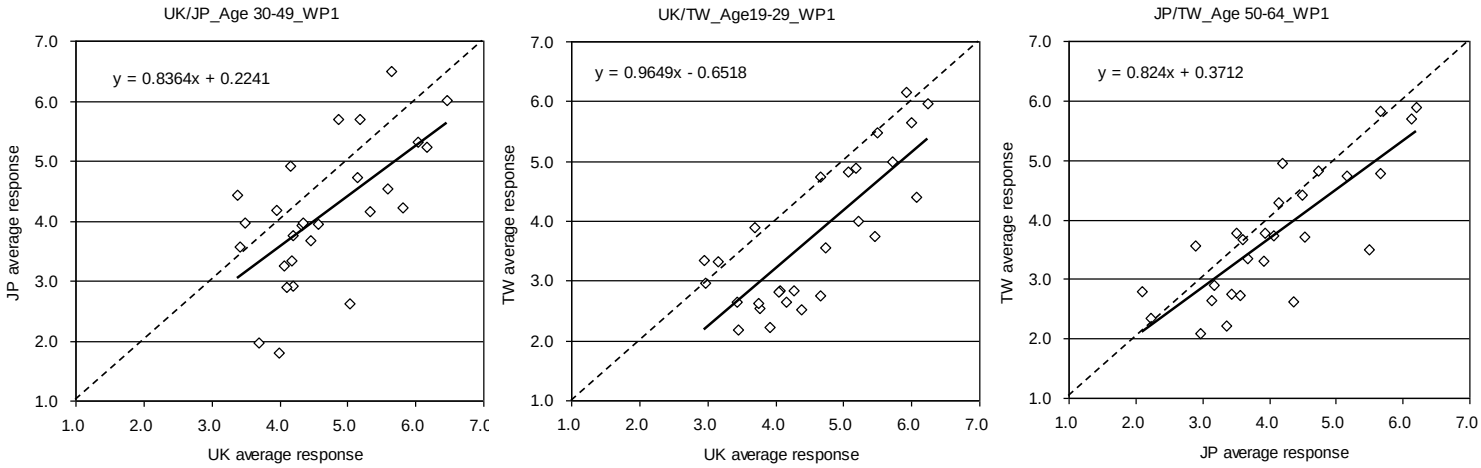


Figure 7.42. Correspondence plots for three specific comparisons (UK/JP_ age30-49, UK/TW_ age19-29 and JP/TW_ age50-64) regarding word-pair number 1 (subtle and showy).

(c) semantic response diagram

The semantic response diagram was incorporated as one of the analysis methods to understand the differences or similarities that exist between responses given by different respondents. This is a graphical analysis tool which allows visual comparison to be made on responses obtained with the semantic differential scale across different word pairs. The agreement and disagreement in response both in terms of intensity and selection of adjective within one word-pair could be identified easily across all word-pairs. Observation made using the semantic response diagrams regarding different word-pairs allows the perceived visual qualities to be related to the respondent's cultural backgrounds and age groups.

Previously in the cross-cultural comparisons in section 7.6.2, semantic response diagrams were drawn in Figure 7.24 to illustrate the absolute difference in responses between respondents from the three countries. Comparison between the UK/TW responses appeared to generate the greatest difference across almost all 15 word-pairs when compared with the differences that existed between the UK/JP and JP/TW responses. Word-pairs number 1(subtle/showy), number 6(attractive/unappealing), number 8(beautiful/ugly), and number 13(delicate/robust) were observed to have differences in response with a magnitude of greater than 0.80 in intensity. This indicates that among all three investigated nationalities, respondents from the UK and Taiwan have the greatest difference in their semantic response regarding word-pairs listed above in terms of their aesthetic responses. In general, responses from Japan and Taiwan corresponded most closely and particularly for word-pair number 12(contrast/uniformity) which has only a magnitude of approximate 0.20 absolute difference in intensity.

When the age parameter was considered and comparisons were generated across six age groups in section 7.6.3, within the UK context shown in Figure 7.28, age group 12-18 appeared to generate the most differences in response when compared with the other five age groups shown in sub-figures (1), (2) and (3). The semantic response diagrams allow observations to be made in eliciting the word-pairs that most frequently have the greatest difference among the total 15 word-pair scales. Across sub-figures (1) to (3) in Figure 7.28, word-pairs number 2(complex/showy), 6(attractive/unappealing), and 11(balanced/irregular) appeared to have the greatest difference in response intensity for age group 12-18 compared to the remaining 12 word pairs. In sub-figure (4) where the greatest difference exists between comparison made for 9-11/50-64 age groups, similarly word-pairs number 6(attractive/unappealing) and 11(balanced/irregular) were identified to have the most disagreement in response among the 15 word-pair scales. All these suggest that in the UK context, the younger respondents ranging from age 9-11 and 12-18 tend to have different semantic response regarding word-pairs complex/showy, attractive/unappealing, and balanced/irregular when compared with respondents from the remaining age groups.

In the Japanese context illustrated in Figure 7.29, age group 9-11 was identified as the group of respondents that generated the most disagreement in responses with respondents from other age groups across sub-figures (1) to (4). The specific word-pairs found to have the greatest difference in response intensity were identified as word-pairs number 5(intimidating/friendly), 6(attractive/unappealing), and 9(confined/open). Such observations suggests that in the Japanese context, respondents from the 9-11 age group have a different semantic response in their aesthetic responses regarding word-pairs intimidating/friendly, attractive/unappealing, and confined/open when compared with the remaining Japanese respondents from other age groups.

Regarding responses obtained from the Taiwanese respondents, similarly to Japanese context the 9-11 age group was identified as the group that responded most differently from the others, illustrated in Figure 7.31 across (1) to (4) sub-figures. The word-pairs that appeared to have the greatest disagreement in responses were word-pair number 1(subtle/showy) and word-pair number 11(balanced/irregular). In

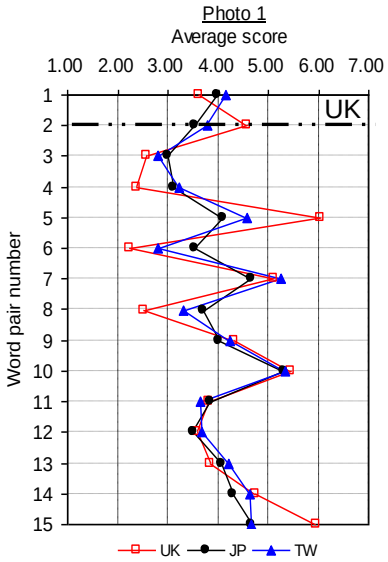


Figure 7.43. semantic response diagram illustrating average responses obtained from all respondents (UK, Japan and Taiwan) regarding house photograph number 1.

terms of Taiwanese respondents, the difference in semantic response was identified in the usage of word-pairs: subtle/showy and balanced/irregular regarding respondents range from 9-11 in compare with others.

Table 7.34 was generated from observations made in section 7.6.4 regarding house photograph comparison analysis utilizing the semantic response diagrams for all 27 photographs illustrated in Figures 7.33, 7.34 and 7.35. The semantic response diagrams regarding the individual house photographs were examined in detail, Any word-pair encountered in the diagrams where the opposite selection of a word from an individual word-pair from a respondent from the UK, Japan or Taiwan was identified, it was noted by drawing a dotted line across the specific word-pair and indicating the nationality of the respondents that created the different response. For example, the sub-figure for photograph number 1 (Figure 7.33) has been re-illustrated here as Figure 7.43. This figure shows that for word-pair number 2(complex/simple) the UK respondents selected *Simple* instead of *Complex* opposite to both Japanese and Taiwanese respondents in describing the visual quality of house number 1.

Observation made from Table 7.34 indicate that word-pair number 8(Beautiful/Ugly) has the highest number (11/27) of opposite selections (highlighted in red) for the use of this particular word-pair across the total of 27 photographs. The disagreements on the selection of adjective between beautiful and ugly in describing the perceived photograph were found mostly between the UK and Taiwanese respondents. Among the total of 11 disagreements for this pair of words, 9/11 opposite selection of adjective were found in the UK responses which suggest respondents from the UK have different semantic understandings regarding the use of the word-pair beautiful and ugly in their aesthetic perception.

None of the 15 word-pairs has zero disagreement from the respondents on their selection of adjectives for each word-pair scale. Word-pair number 5(Intimidating/Friendly), number 9(Confined/Open), number 11(Balanced/Irregular), number 12(Contrast/Uniformity), and number 14(Dull/Dynamic) have the least number (3/27)of disagreements (highlighted in blue) which suggest that regarding these numbers of word-pairs, respondents across three cultural groups have the closest similarity in their semantic understandings and responses to the buildings displayed.

Overall, the UK respondents have a total of 50 disagreements in their selection of adjective on any single word-pair scale across 27 house photographs, whereas Taiwan has 27 counts and Japan with 8 counts. These suggest that across all 15 word-pairs and 27 different house photographs, in general, the UK respondents have a greater degree of difference in their semantic usage regarding the selection of adjective on one single word-pair scale. Among the three cultural groups, Japanese respondents have the least number of counts in terms of differences with respondents from the other countries regarding their selections of

adjectives on the word-pairs. It suggests that in majority of the responses, Japanese respondents have similar perception with the other cultural groups regarding the perceived house photographs.

Table 7.34. Differences regarding the selection of adjectives for each word-pair scale across 27 house photographs.

Sample Info. / WPs			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
UK	Traditional	1		UK													
		2						UK			UK						
		3		UK										UK	UK		
	Ordinary	4	JP		UK	UK		UK	UK	UK					TW		
		5			UK				UK	UK	UK	UK		UK		UK	
		6			UK	UK		UK	UK	UK		UK			UK	UK	
	Innovative	7															
		8								UK					UK		
		9		UK											TW		
JP	Traditional	10	UK	UK													
		11	UK						JP				UK				
		12			JP	TW				TW							
	Ordinary	13	UK							UK		TW			TW		
		14			JP			TW					UK				UK
		15												JP			UK
	Innovative	16						UK		UK							
		17						TW									JP
		18								UK							
TW	Traditional	19		TW			JP										
		20				TW	TW			TW	TW	TW					UK
		21		JP								TW					
	Ordinary	22	UK	TW													
		23											TW				
		24	TW		TW	TW	TW		TW			TW			TW	TW	UK
	Innovative	25				UK		UK		UK							TW
		26													UK		UK
		27								UK					UK		UK
Total/ 15 word-pairs			**6**	**7**	**6**	**6**	**3**	**7**	**5**	**11**	**3**	**6**	**3**	**3**	**9**	**3**	**8**
Total/nationality			**UK = 50**		**TW = 27**		**JP = 8**										

WP1: Subtle & Showy; WP2: Complex & Simple; WP3: Interesting & Boring; WP4: Cheerful & Gloomy; WP5: Intimidating & Friendly; WP6: Attractive & Unappealing; WP7: Unimaginative & Intriguing; WP8: Beautiful & Ugly; WP9: Confined & Open; WP10: Characterless & Unique; WP11: Balanced & Irregular; WP12: Contrast & Uniformity; WP13: Delicate & Robust; WP14: Dull & Dynamic; WP15: Unsettling & Calming.

Further analysis to examine the actual visual difference in the house photograph, i.e. architectural components, composition, and material, in relation to the disagreement in the selection of adjective on the word-pair scales would be useful in an attempt to provide a visual description regarding the differences in semantic understandings displayed across the different cultural groups. Such an understanding could provide useful information for design development in the urban built environment regarding cross-cultural considerations and aesthetic appreciation.

(d) Frequency distribution

A bar graph illustrating the frequency distribution of responses across 27 photographs for each of the 15 word-pair scales was generated using an Excel spreadsheet and shown in Figure 7.44. This analysis attempts to understand respondents' usage of the semantics included in the 15 word-pair scales in respect to different houses collected from the different cultural environments.

The bar graph was drawn with 7 intensity bands covering the response intensity from 1.00 to 7.00. Based on the configuration of the seven-step intensity scale, as illustrated in Table 7.9, an exact value of 4.00 in intensity is considered to represent a neutral response by respondents, i.e. the perceived house quality is neither subtle nor showy for word-pair number 1. In order to capture the exact response of 4.00/neutural, the score bands were laid out as band 1(1) intensities1.00~2.00, and similarly (2) 2.00~3.00, (3) 3.00~3.90, (4) 3.90~4.10, (5) 4.10~5.00, (6) 5.00~6.00, and (7) 6.00~7.00, where the band 3.90~4.10 captured the neutral responses marked by the respondents on each word-pair scale. Accordingly, a total of 15 bar graphs (Figure 7.58) were generated where each graph illustrated the number of counts (over the entire 27 photographs) for each cultural group of respondent as they responded on the seven point intensity score bands for each word-pair.

The neutral zone of response on each frequency bar graph was highlighted using a red rectangle for easy visual comparison of the distribution of response regarding the selection of adjective on each word-pair scale. The positions of the adjectives comprising the word-pairs were indicated to lie either above or below that of the neutral zone and in accordance the intensity bands numbering system.

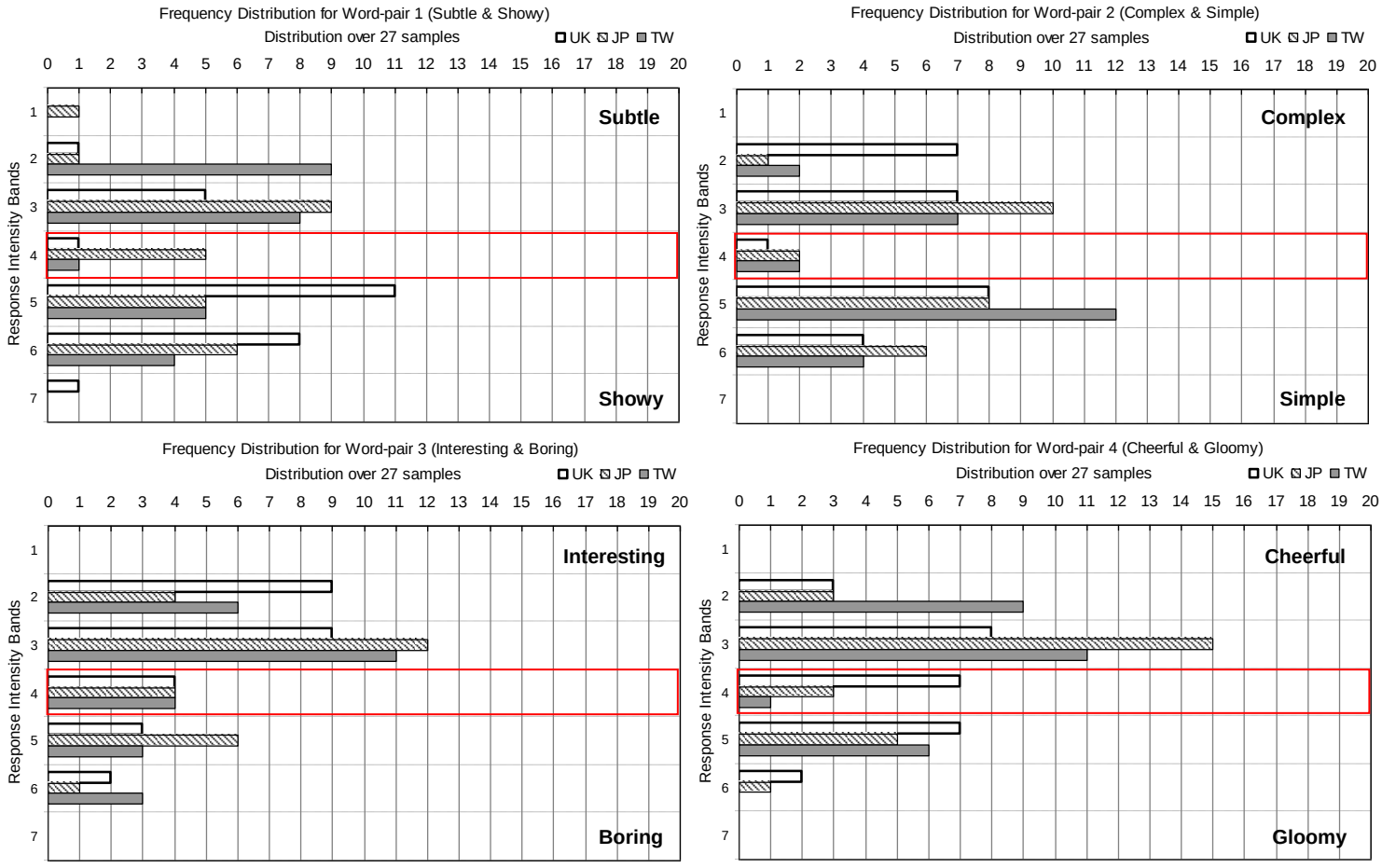
Observations from Figure 7.58 indicate that for word-pair numbers 3, 4, 5, 7, 9, 10 and 11, the majority responses lay on the same side of the neutral zone for respondents from all three countries. This illustrates that when respondents were asked for aesthetic responses to the house photographs then for the majority of the 27 photographs, respondents from all three cultures tended to use the adjectives: interesting instead of boring (no.3), cheerful instead of gloomy (no. 4), friendly but not intimidating (no.5), intriguing rather than unimaginative (no.7), open instead of confined (no.9), unique not characterless (no.10), and balanced instead of irregular (no.11). This finding could potentially indicate a universal semantic understanding with the adjectives listed above regarding the aesthetic perception of the visual quality of houses.

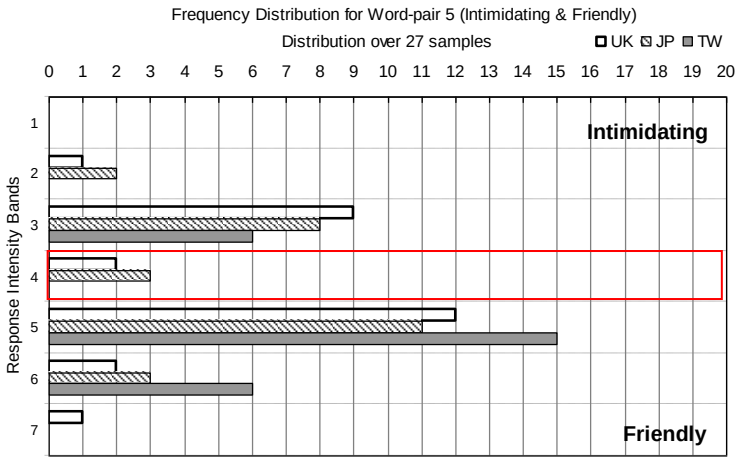
A cultural difference in the selection of adjective across the 15 word-pair scales was observed in word-pair numbers 1, 6, 8, 12, 14 and 15. Regarding these 6 word-pairs, respondents from the UK have selected the opposite adjective from the Japanese and Taiwanese respondents to describe their aesthetic perception. UK respondents used adjectives: showy instead of subtle (no.1), unappealing instead of attractive (no.6), ugly not

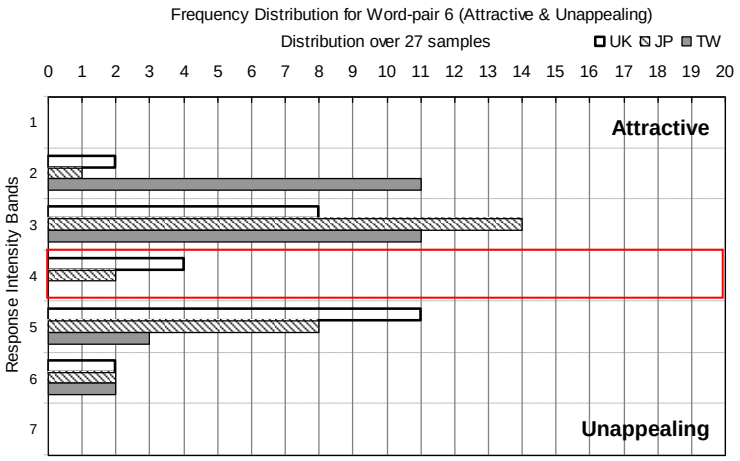
beautiful (no.8), uniformity not contrast (no.12), dull instead of dynamic (no.14), and unsettling instead of calming (no.15) to describe most of the house photographs they viewed throughout the questionnaire.

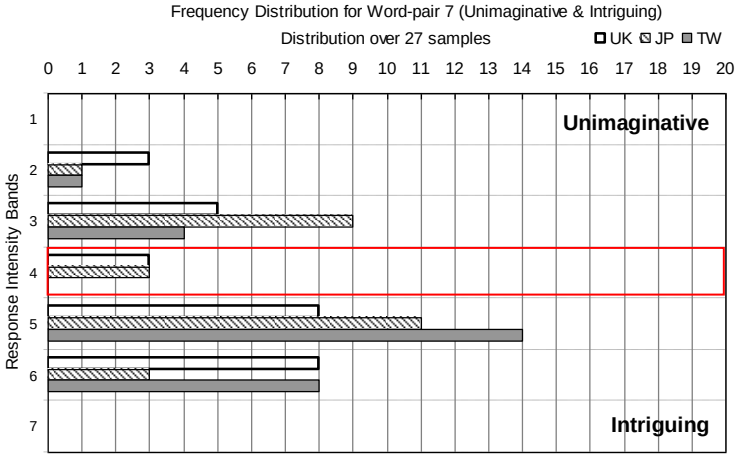
A single observation was made regarding word-pair number 2, complex and simple, that the Japanese respondents more frequently selected complex instead of simple when describing all the 27 perceived house photographs; whereas the UK and Taiwanese respondents select simple rather than complex. Taiwanese respondents selected adjective delicate over robust in word-pair number 13, which differed from selection made by UK and Japanese respondents.

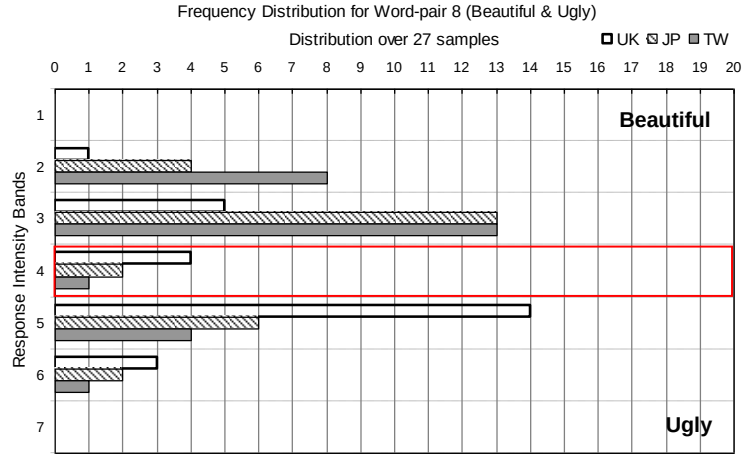
Considering that 27 identical house photographs were shown to all three cultural sets of respondents, these observations suggest that the UK respondents more frequently displayed different semantic understandings regarding selection of adjective from a single word-pair scale when compared to the Japanese and Taiwanese respondents. These results indicated that cross-cultural differences existed in respondents' understanding and usage of the total 30 semantic concepts utilized in adjectives of the 15 word-pairs regarding their aesthetic perception on residential buildings.

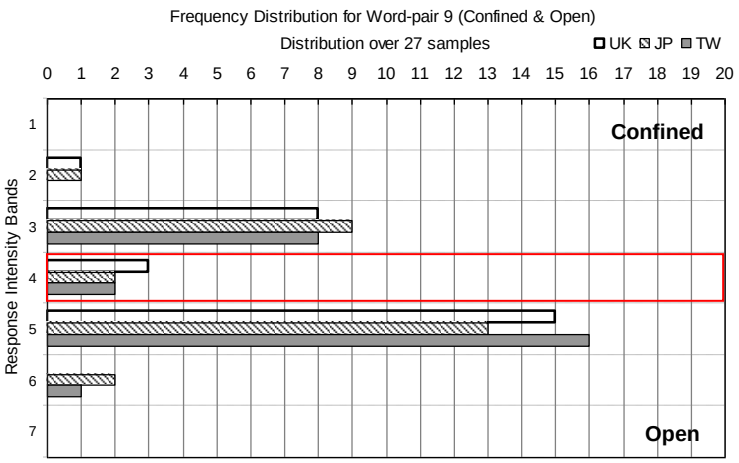


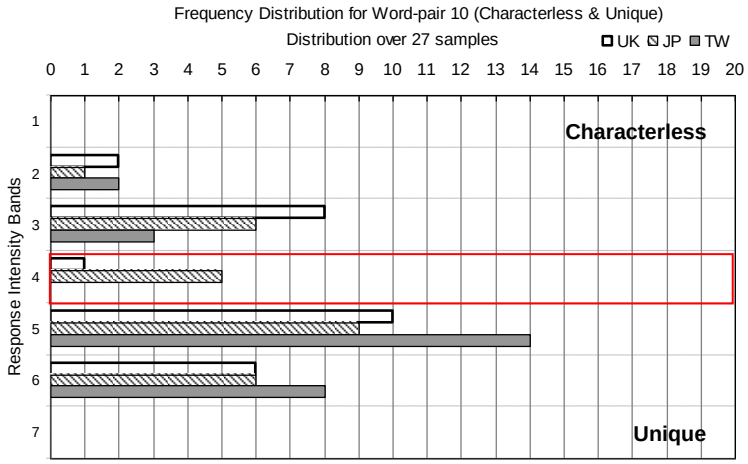

Frequency Distribution for Word-pair 5 (Intimidating & Friendly)
Distribution over 27 samples
UK JP TW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Response Intensity Bands
1 2 3 4 5 6 7
Intimidating
Friendly


Frequency Distribution for Word-pair 6 (Attractive & Unappealing)
Distribution over 27 samples
UK JP TW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Response Intensity Bands
1 2 3 4 5 6 7
Attractive
Unappealing


Frequency Distribution for Word-pair 7 (Unimaginative & Intriguing)
Distribution over 27 samples
UK JP TW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Response Intensity Bands
1 2 3 4 5 6 7
Unimaginative
Intriguing


Frequency Distribution for Word-pair 8 (Beautiful & Ugly)
Distribution over 27 samples
UK JP TW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Response Intensity Bands
1 2 3 4 5 6 7
Beautiful
Ugly


Frequency Distribution for Word-pair 9 (Confined & Open)
Distribution over 27 samples
UK JP TW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Response Intensity Bands
1 2 3 4 5 6 7
Confined
Open


Frequency Distribution for Word-pair 10 (Characterless & Unique)
Distribution over 27 samples
UK JP TW
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Response Intensity Bands
1 2 3 4 5 6 7
Characterless
Unique

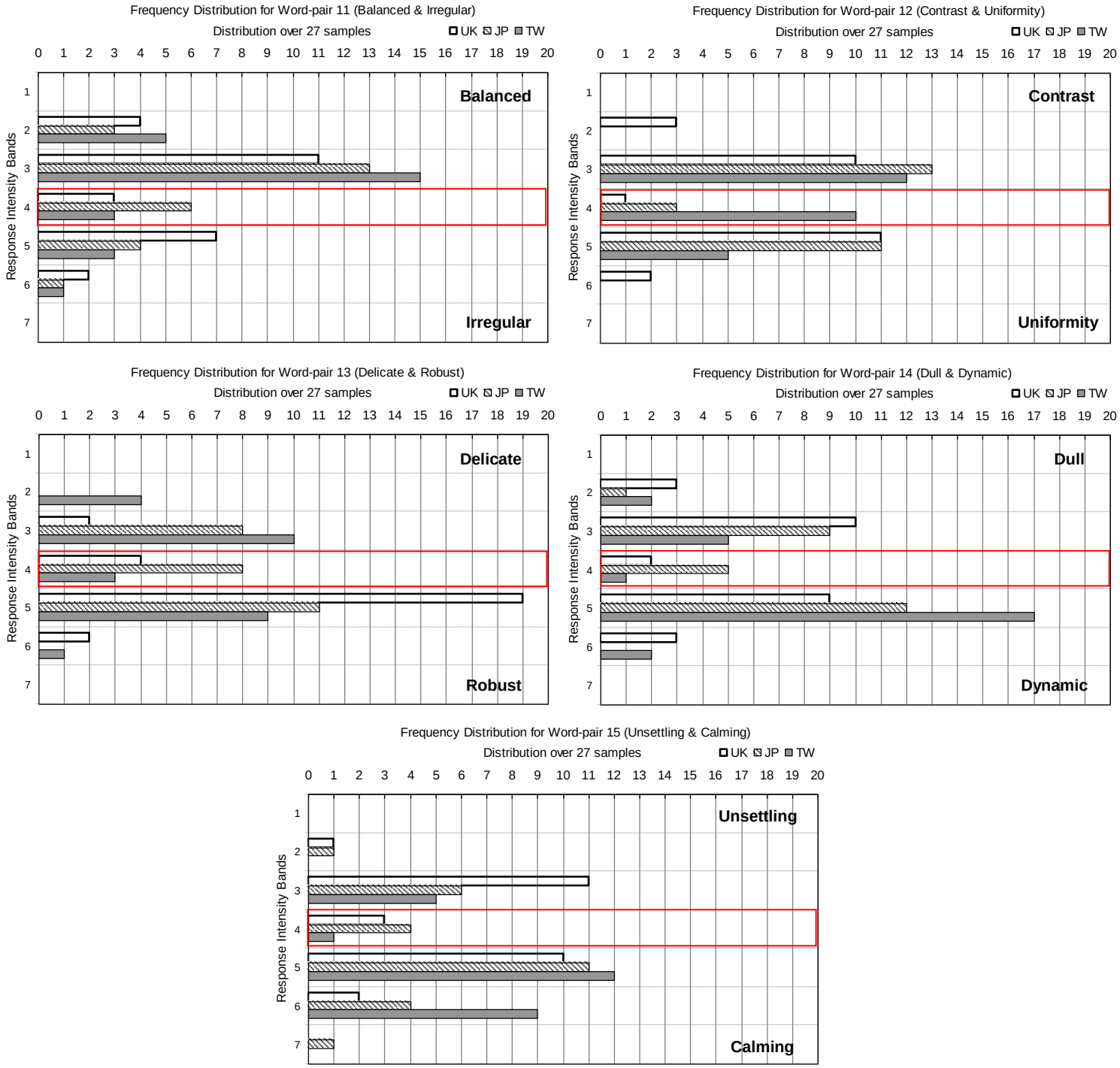


Figure 7.44. Frequency distribution of response across 27 photographs for each of the 15 word-pairs.

A summary bar graph was generated indicating the frequency distribution of all neutral responses obtained across all 15 word-pairs. From the graph, Figure 7.45, Taiwanese respondents have responded neutral for word-pair 12 expressing neither contrast nor uniformity regarding 10 out of the total of 27 photographs. The Japanese respondents have their majority neutral response on word-pair 13 indicating neither delicate nor robust for 8 out

of 27 house photographs perceived. UK respondents have their neutral responses concentrated on word-pair number 4 expressing neither cheerful nor gloomy on 7 out of the total 27 house samples.

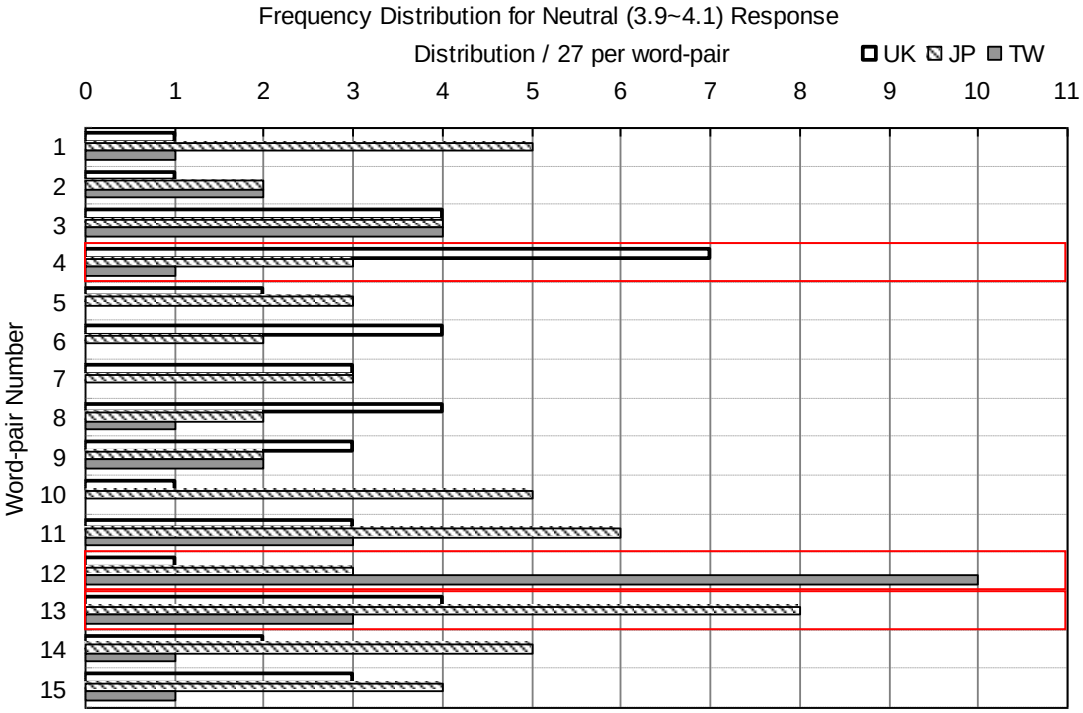


Figure 7.45. Frequency distribution bar graph of neutral response across 27 house photographs for each of the 15 word-pairs.

It is proposed that respondents voted neutral under two possible circumstances: either (i) the specific word-pair was not appropriate in the context of describing the aesthetic quality of houses, or (ii) such a word-pair was not clearly understood and thus could not be used in describing the perceived quality. However, such conclusions required further work to better understand people's aesthetic response in respect to the use of semantic incremental scales.

7.6.5.2 Subjective Description and Judgment – Ideal house response

Previously in the comparisons made regarding the ideal house response on the 15 word-pair semantic differential scales, similarity in response was observed between male and female, across six age groups and between UK and Japan respondents. In attempt to generate an ideal house profile based on the responses obtained, an average score was calculated (across gender, age and nationality) and illustrated graphically using the semantic response diagram in Figure 7.46.

According to Figure 7.46, the respondents' overall notion of the ideal house could be described as: slightly subtle, slightly simple, interesting, very cheerful, very friendly, very attractive, intriguing, beautiful, open, unique, balanced, slightly contrast, slightly robust,

dynamic and finally very calming.

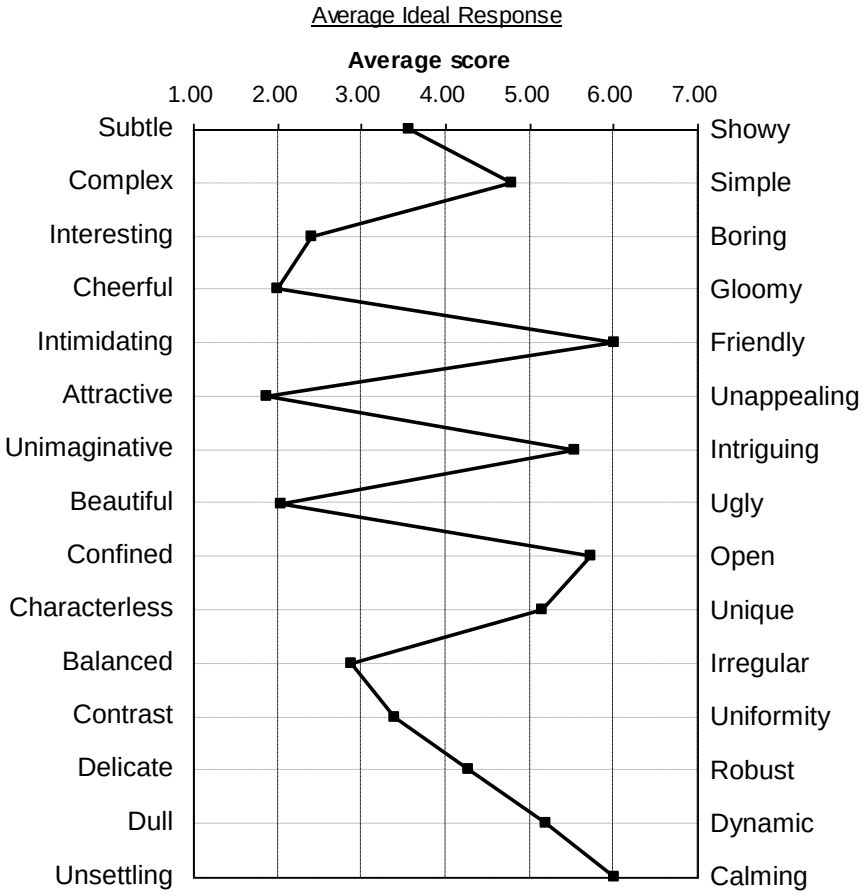


Figure 7.46. Respondent's ideal house profile.

When responses were given regarding the ideal house quality, respondents were asked to indicate their ideal score for each of the 15 word-pairs on the seven-step intensity scale. Such ideal house scores for each word-pair were described by the respondents without a house photograph shown. Comparisons between responses obtained for each house photograph with the ideal house scores were illustrated previously in Figure 7.38 (UK) and Figure 7.39 (JP) to ascertain whether a particular house photograph had the greatest similarity of responses to the ideal house profile obtained. Table 7.35 was devised to indicate the word-pair(s) which had identical score values to the ideal response across all 27 photographs. This table was assembled to examine the visual qualities in any photograph which coincided with the ideal description obtained for each word-pair.

None of the 27 house photographs included in the questionnaire expressed the ideal qualities of very attractive (no.6), beautiful (no.8) and open (no.9) in both the UK and JP responses. The innovative house number 16 collected from Japan expressed the ideal dynamic quality for the UK respondents but not for the Japanese respondents. House photograph number 7 (UK, innovative) demonstrated the ideal quality of very cheerful (no.7) for the Japanese respondents but not in the UK context. However, innovative house number 7

collected from the UK was equipped with the qualities described as intriguing for both UK and Japanese ideal profiles.

A more detail and complete reading of Table 7.35 together with the actual photographs used in the questionnaire would be useful in allowing the ideal description to be matched with actual visual quality in colour photographs.

Table 7.35. House photographs with identical word-pair response scores matched with the ideal house response across 15 word-pairs.

Ideal word-pair description	**UK context**	**JP context**
1 slightly Subtle	6	1, 22, 27
2 slightly Simple	13, 17, 20	13, 17, 18
3 Interesting	7, 11, 26	26
4 very Cheerful	N/A	7
5 very Friendly	1	N/A
6 very attractive	N/A	N/A
7 Intriguing	7, 26	7
8 Beautiful	N/A	N/A
9 Open	N/A	N/A
10 Unique	1, 11	3, 23
11 Balanced	6, 13, 24	N/A
12 slightly Contrast	1, 14	7
13 slightly Robust	5, 14, 22, 24, 25, 26	1, 8, 14, 15, 22, 25, 19
14 Dynamic	16	N/A
15 very Calming	1	9

The purpose of this part of investigation was to compare the responses obtained previously for each photograph of the house samples against responses to the identical word-pairs when applied to the notion of an ideal house. This comparison could provide a useful guidance in an attempt to suggest an ideal house profile utilizing the obtained word-pair intensities in relation to the visual qualities of the particular house sample that has the highest correlation with the ideal word-pair responses.

7.6.5.3 Preference Judgment – the best and the least preferred house sample

The last part of the analysis regarding word-pair comparisons was to examine as to how well people's preference selections fitted with their responses in response to the notion of an ideal house. During the questionnaire procedure, respondents were first asked to respond to all 27 shown house photographs using the 15 word-pair semantic differential scale. As a result, 27 sets of semantic responses were collected related to each photograph. After responding to all 27 photographs, respondents form the UK and Japan were then asked to describe their

ideal house profile using the identical 15 word-pair scales without a photograph been shown. Finally, respondents were asked to pick one house photograph from the 27 as their most preferred house and one as their least preferred.

A hypothesis was proposed that a reasonable degree of similarity should be observed between the ideal house responses and the responses given to the most preferred house number from the same respondent or group of respondents.

A simplified version of Table 7.23 was drawn in Table 7.36 illustrating only the UK and Japan (an ideal house response was not collected for the Taiwan context) choice of most preferred house photograph across six age groups including both male and female. According to results indicated in the table, four sets of semantic response diagrams were generated comparing the ideal house response and the responses given for the most preferred photograph number provided by the same group of respondents, in Figure 7.61 and 7.62.

Table 7.36. The best preferred house photograph selection from UK and Japan respondents.

Age Group			**12-18**	**19-29**	**30-49**	**50-64**	**65+**
Best Preferred			**No. of House photograph**				
UK	Figure 7.61	Male	7	23	7		3
		Female	3 / 9	3	3	3	3
JP	Figure 7.62	Male	9	9	6	9 / 11	11
		Female	9 / 23	21	3	3 / 10	10

Visual analysis was initiated to examine how well respondents' preferred photograph responses corresponded to their responses for the ideal house. Subsequently, a numerical comparison was made to evaluate the overall similarity between the ideal and preferred sets of responses. For each group of respondents an average absolute difference value for all 15 word-pairs was calculated by subtracting the intensity score for the ideal house from the preferred house for each figure comparison that was illustrated in Figures 7.61 and 7.62. It was proposed that a small average absolute difference for a given word-pair would indicate similarity between respondents' ideal and preferred responses.

Observations were first made for the UK context (Figure 7.47) where the average absolute difference value for all 9 comparisons ranged from 0.37 to 1.15 in intensity difference. This suggests that in general, across all 15 word-pairs, a high degree of similarity in responses existed between the ideal voting provided by the respondent with the responses given to their selection of preferred house photograph.

Although in general within the UK context, the two sets of responses corresponded with a level of similarity regarding the average absolute difference values, differences in response were observed across 15 individual word-pairs. On the semantic response diagram, differences in response for each word-pair could occur across the neutral(4.0) line which would indicate the opposite choice of word on one particular word-pair scale. This suggests that the

opposite semantic adjective was used to describe ideal and preferred house parameter which results in changing the shape of the semantic word-pair diagram. When responses occurred on the same side of the neutral, an identical semantic meaning was chosen for that particular word-pair scale. However, a difference in response intensity between the ideal and preferred could be identified as the difference in the level of the semantic qualitative appreciation regarding the preferred and ideal house profile.

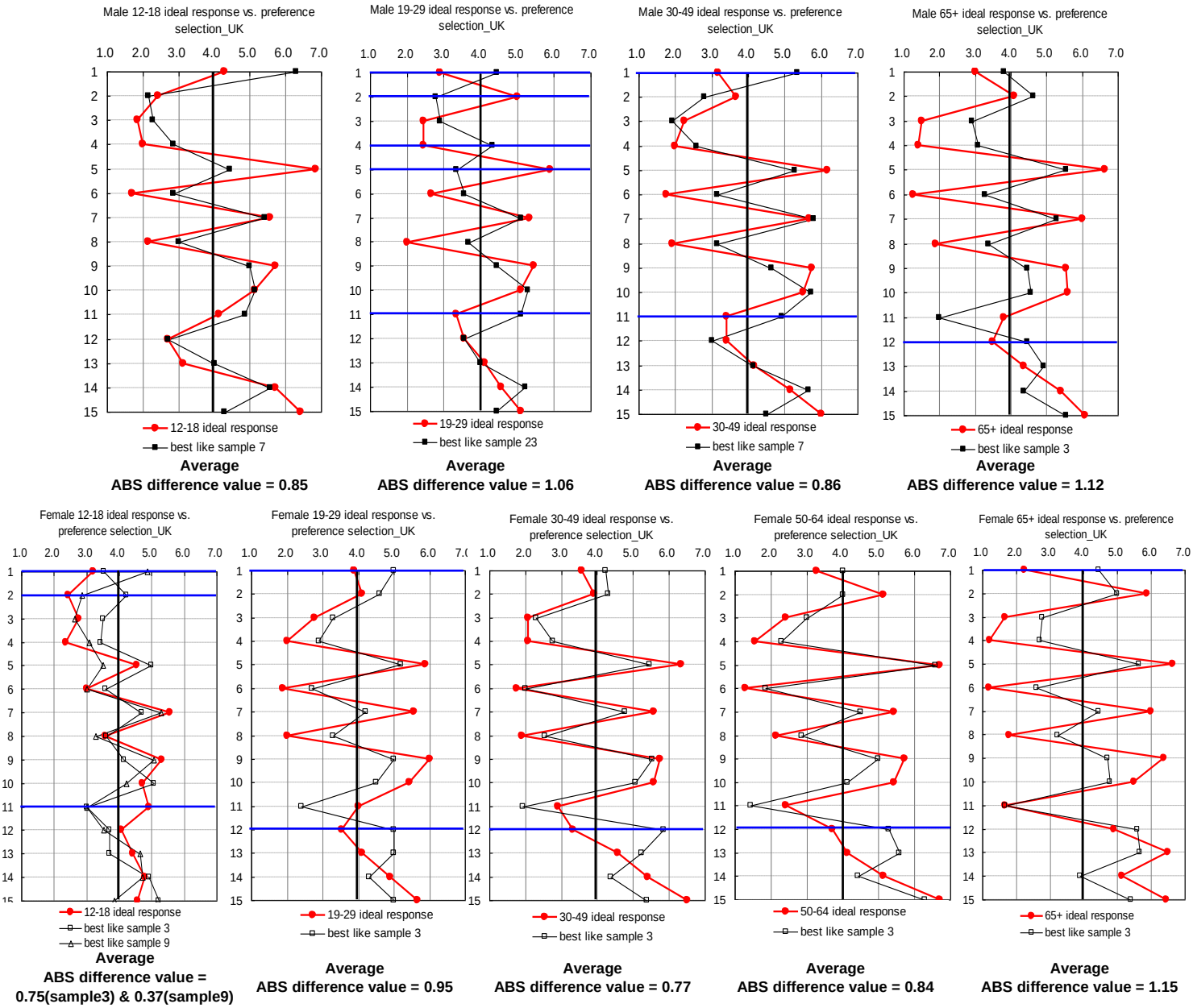


Figure 7.47. Comparison between best preferred and ideal house response for the UK context.

In the Japanese context, Figure 7.48, half of the respondent group displayed a high correspondence between their most preferred and ideal house qualities. Both in terms of the visual similarity in the shape of the semantic diagram and the distance between intensity scores (degree of visual similarity), male respondents from age groups 30-49, 65+, and female

respondents from age group 50-64 all showed a high correspondence between their most preferred and ideal house qualities across 15 word-pairs. However, female respondents from age groups 19-29, 30-49 and 65+ showed a poor level of correspondence regarding their ideal and preferred responses both in terms of intensity and selection of words across 15 word-pairs.

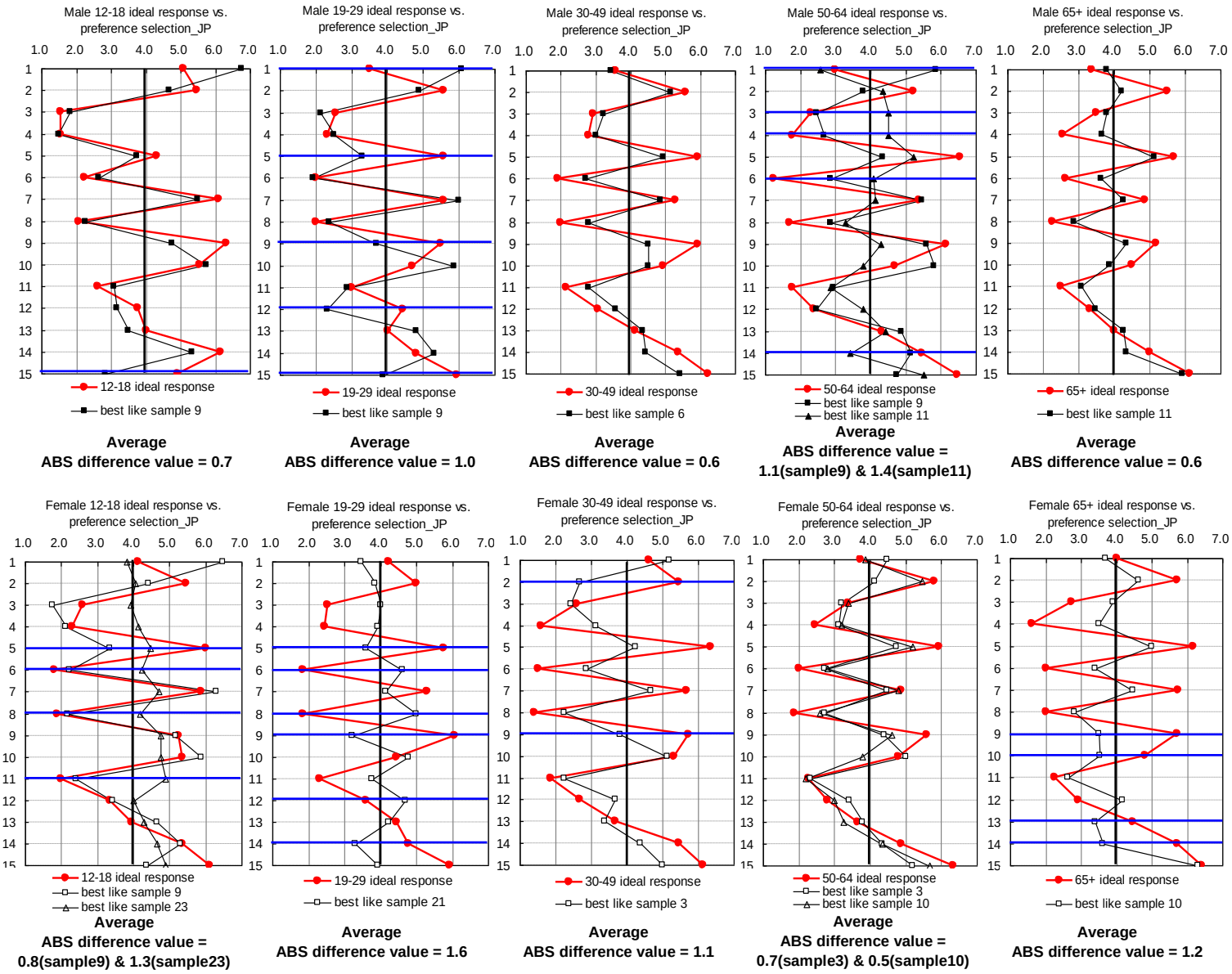


Figure 7.48. Comparison between best preferred and ideal house response for the JP context.

Male respondents from age group 12-18 also responded very similarly for majority of the word-pairs except word-pair number 15 unsettling and calming. For male respondents in age group 19-29, in general, the most preferred and the ideal responses have very similar overall shape as well as intensity values across the majority of the word-pairs except word-pairs number 1(subtle/showy), 5(intimidating/friendly), 9(confined/open), 12(contrast/uniformity), and 15(unsettling/calming). Regarding male age group 50-64 and female age group 12-18

where two most preferred house photograph samples were selected due to equal numbers of votes being given to each of the photographs. In both cases, one of the two selected samples had a close fit with the ideal response while the other differed from the ideal. Both groups selected house photograph number 9 as one of their most preferred photographs and for which their responses closely fitted their ideal house responses.

For the majority of respondent groups among the 10 sub-figure comparisons shown in Figure 7.48, the responses regarding their preferred houses matched the voting for the ideal house on word-pair numbers 4(cheerful/gloomy), 7(unimaginative/intriguing), 8(beautiful/ugly), 11(balanced/irregular), and 13(delicate/robust).

Although no consistent pattern was found regarding differences or similarities between the ideal and preferred house responses for any particular word-pairs, nevertheless, an overall correspondence was observed. In both the Japan and UK contexts, for the majority of respondent groups the overall visual shape and intensity for word pairs on the semantic response diagrams were similar.

7.6.5.4 Summary for word-pair comparison

Results obtained from the first part of the word-pair comparison using linear regression analysis to test correspondence indicated that for word-pair number 1(subtle/showy) and number 10(characterless/unique) good correspondences in response were found across all six age group and three nationalities. However, conversely, low correspondences in response were observed for word-pair number 12(contrast/uniformity) and number 13(delicate/robust).

In general, respondents from Japan and Taiwan have higher levels of similarity in their responses when compared to respondents from the UK regarding the use of the semantic word-pairs in describing perceived house photographs. Responses from Taiwan and Japan respondents corresponded well for word-pair numbers 3(interesting/boring), 6(attractive/unappealing), 8(beautiful/ugly), 10(characterless/unique), 14(dull/dynamic) and 15(unsettling/calming).

With word-pair number 2(complex/simple) and number 11(balanced/irregular), the only groups of respondent with low correspondence in response was the youngest age group (9-11) across all three cultures. Nevertheless, similarity in response was found across all three cultural groups, the UK, Japan and Taiwan for word-pair numbers 4(cheerful/gloomy), 6(attractive/unappealing), and 8(beautiful/ugly) for respondents from age groups 9-11 and 12-18. Yet, such similarity remained constant only between Taiwan and Japan responses for respondents beyond age 19 (including age groups 19-29, 30-49, 50-64 and 65+).

Utilizing the HCA dendrogram plots correspondence between responses across all respondents for each word-pair can be visually compared. In summary, observations made using HCA plots indicated that all the UK respondents across all age groups formed a distinct cluster from a cluster containing the Japanese and Taiwanese respondents for word-pairs

number 1, 3, 7 and 15 which included semantic concepts: subtle/showy, interesting/boring, unimaginative/intriguing, and unsettling/calming. Similarly observations for word-pair numbers 5, 8, 10, 12 and 14, regarding semantic concepts: intimidating/friendly, beautiful/ugly, characterless/unique, contrast/uniformity, and dull/dynamic; the UK respondents clustered separately from Japan and Taiwan apart from one or two younger (9-11, 12-18) age group responses that clustered with either Japanese or Taiwanese respondents. This suggests that all the respondents from the UK have a particular semantic response towards these word-pairs regarding perceived aesthetic qualities where such response is culturally defined in the UK context. The Taiwanese and Japanese respondents appeared to have closer semantic response towards word-pairs mentioned above.

However, observations were also made where word-pair numbers 4, 6 and 13 where Taiwanese respondents responded differently from either Japan or UK respondents resulting in cluster of UK and Japan respondents apart from Taiwan. It suggests that regarding word-pair: cheerful/gloomy(4), attractive/unappealing(6), and beautiful/ugly(8), the Taiwanese respondents have different semantic response from Japan and the UK.

Contradictory observations occurred regarding word-pair number 1(subtle/showy) using the linear regression analysis and HCA methods. Generally it was found that the HCA method had advantages when dealing with datasets containing more than one variable. Although, the linear regression analysis gave a high value of correspondence for word-pair 1, this was misleading. More detailed examination showed the line was parallel to the perfect fit but shifted to the right. Consequently, care is required when drawing conclusions form the linear regression analysis results.

Analysis using the visual semantic response diagram indicated that for 11 out of the total 27 house photographs, the UK respondents selected the opposite adjective from the semantic differential scale from both Taiwanese and Japanese respondents with word-pair number 8(beautiful/ugly). It has also indicated that in total, the UK respondents have most frequently selected the opposite adjective on a word-pair scale across all 27 photographs. In terms of the other countries involved the Taiwanese respondents had the next highest number of different response and finally the Japanese respondents. Cultural difference in the selection of adjectives across 15 word-pairs was analysed further using frequency distribution analysis, which confirmed that UK respondents tend to select different adjectives on any single word-pair and differ from the Japanese and Taiwanese respondents in describing their aesthetic perception. Additionally, the analysis suggests that for majority of the total 27 house photographs, respondents from all three cultural groups used the adjectives: interesting, cheerful, friendly, intriguing, open, unique and balanced from the 15 word-pair scales to describe their perceived aesthetic quality of different house samples.

A cross-cultural (UK and Japan) ideal house profile was assembled from the ideal

responses collected from the respondents. The profile was derived using words from the 15 semantic word-pair scales with an identified intensity level for each of the quality pairs that made up the semantic differential scale. The responses for each of the 15 word pairs that described the ideal house semantic profile was then matched with the semantic differential scale profiles for each of the house photographs in an attempt to assess which house had the closet response score pattern to the ideal.

A hypothesis was proposed that a high degree of similarity should be observed between the ideal house responses and the responses given to the most preferred house selections. The results for the semantic profiles of the respondents' preferred houses suggested that these profiles were close to the ideal but that they were used to express a range of different houses. Consequently, it was difficult to identify and isolate visual attributes or architectural features that represented the notion of "ideal" for residential buildings. Some inconsistencies of the differences in responses across some word-pairs and respondent groups suggest that further investigation is required to better understand the relationships that exist between respondent's ideal and preference response and how these can inform an understanding of what constitutes and "ideal house".

7.7 Reference

1. Hershberger, R. G. (1988). A study of meaning and architecture. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 175-194). New York: Cambridge University Press.
2. Kasmar, J. V. (1970). The development of a usable lexicon of environmental descriptors. *Environment and Behavior*, 153-169.
3. Hershberger, R. G. & Cass, R. C. (1988). Predicting user response to buildings. In J. K. Nasar (Ed.), *Environmental Aesthetics: Theory, Research, and Application* (pp. 195-211). New York: Cambridge University Press.
4. Canter, D. (1969). An intergroup comparison of connotative dimensions in architecture. *Environment and Behavior*, 37-48.
5. Sanoff, H. (1974). Measuring attributes of the visual environment. In J. Lang (Ed.), *Designing for Human Behavior: Architecture and the Behavioral Sciences* (pp. 244-260). Stroudsburg, Pennsylvania: Dowden, Hutchinson& Ross, Inc.
6. Mondragon, S., Company, P. & Vergara, M. (2005). Semantic Differential applied to the evaluation of machine tool design. *International Journal of Industrial Ergonomics*, 35, 1021-1029.
7. Zhang, M. & Kang, J. (2009). Semantic differential analysis of the soundscape in urban open public spaces. *Building and Environment*, 1-8.
8. Skrandies, W. (2004). Brain mapping of evoked potential correlates of semantic meaning – cross-cultural studies. *International Congress Series*, 1270, 61-66.
9. Fraser, J., Bicknell, J. & Sickler, J. (2006). Assessing the connotative meaning of animals using semantic differential techniques to aid in zoo exhibit development. *Visitor Studies Today*, Vol. 9, Issue 3.
10. Pierce, W., Sydie, R. A., Stratkotter, R. & Krull, C. (2003). Social concepts and judgments: a semantic differential analysis of the concepts feminist, man and woman. *Psychology of Woman Quarterly*, 27, 338-346.
11. Yoon, J. (2008). Searching for an image conveying connotative meanings: An exploratory cross-cultural study. *Library & Information Science Research*, 30, 312-318.
12. Osgood, C. E., May, W. H., & Miron, M. S. (1975). *Cross-cultural Universals of Affective Meaning*. University of Illinois Press.
13. Kumata, H. 1957. *A Factor Analytic Investigation of the Generality of Semantic Structure Across Two Selected Cultures*. PhD. Thesis, Psychology, University of Illinois, Champaign-Urbana, IL.
14. Lambert W. E. & Klineberg O. (1967). *Children's views of foreign peoples: A cross-national study*. New York: Appleton Century Crofts.
15. Cantril, H. (1965). *The pattern of human concerns*. New Brunswick, N.J.: Rutgers

University Press.

16. Ibid. 12.
17. Ibid. 12.
18. Ibid. 12.
19. Ibid. 12.
20. Ibid. 12.
21. Ibid. 12.
22. Shaw, P. (2003). *Multivariate statistics for the environmental sciences*. London: Hodder Arnold.

8 The Endurance of Aesthetic Appreciation of Buildings

In previous chapter, various demographic variables and the notion of universal aesthetic response were investigated with results indicating patterns and understandings regarding peoples' aesthetic appreciation across different cultural contexts. In this chapter, the ability to maintain the aesthetic appreciation of a building is examined in Japan utilizing photographic simulation to observe changes in people's aesthetic perception in relation to changes occurred in the built environment.

> *"To understand the significance of any place, whether it is a building, an archaeological landscape, or an urban conservation area, it is necessary to establish its value to society. That value comprises both the relative value of its individual components and the value of the whole in relation to other places. This exercise requires us to measure its significance against a set of values that we as a society hold generally valid."*
>
> *Simon Thurley, Chief Executive of English Heritage*

8.1 Building's Aesthetic Appreciation with Its Changing Context Setting and Condition

The endurance of a building's aesthetic value through time and in relation to changes of its urban context were discussed and considered to be desirable in response to the long-term goal of sustainability. Building for long life means that at some time in the future changes and modifications may occur either to the building itself or to its surrounding urban context. How much change and what kind of changes can be sustained while still allowing the building to maintain its' aesthetic value and for the architecture to continue to receive aesthetic appreciation from future generations?

Beauty could be seen as an inherent property of any aesthetic object, as discussed in chapter 5, and a constant essence of beauty of an object could be said to arise from its unity of dimensions that generates aesthetic expressions across various responses, cultures, social circumstances or though time. This concept suggests that the aesthetic phenomenon exist primarily as a consequence of the properties within objects to which humans react and respond in aesthetic terms. Under this premise, people's aesthetic appreciation should remain constant as long as the particular aesthetic features of the objects are allowed to endure through time. Accordingly, what are the critical features? How are those features perceived differently through changes occurring over time, to the contextual environment or the object's own conditions? In terms of refurbishment, when maintenance and changes are necessary, how can the building be refurbished to allow its aesthetic appreciation to be maintained? Is this a matter of keeping all the building's original features intact or can changes be introduced that may help to maintain or even enhance the aesthetic appreciation?

8.2. Research Setting

This research attempted to examine the effects of changes on a building and also of it's surroundings on observers' aesthetic perceptions. The old Furukawa Mining building, introduced in chapter 4, and its surrounding context, the Wakamatsu south coast area, were selected to be the investigation object for this research activity B due to its accessibility and appropriate building condition.

8.2.1 Wakamatsu ward development

Wakamatsu ward is one of the five wards amalgamated to create the City of Kitakyushu. The historical background of the area was introduced and discussed in the previous case-study chapter 4. Figure 8.1 was derived by the author based on the information provided in the "Wakamatsu Town Planning Guidance" concerning the future development of the Wakamatsu ward area. Occupying nearly 70 square kilometers of land area at the North-West corner of the City, Wakamatsu Ward has its south edge facing the seashore of Dokai bay, its central area containing the old historical district and street landscape. The north part of the ward is the base for the 2nd generation development for international collaboration activity which contains the recent Eco-town recycling industry development, built on reclaimed land and the science and research park development situated on the west corner.

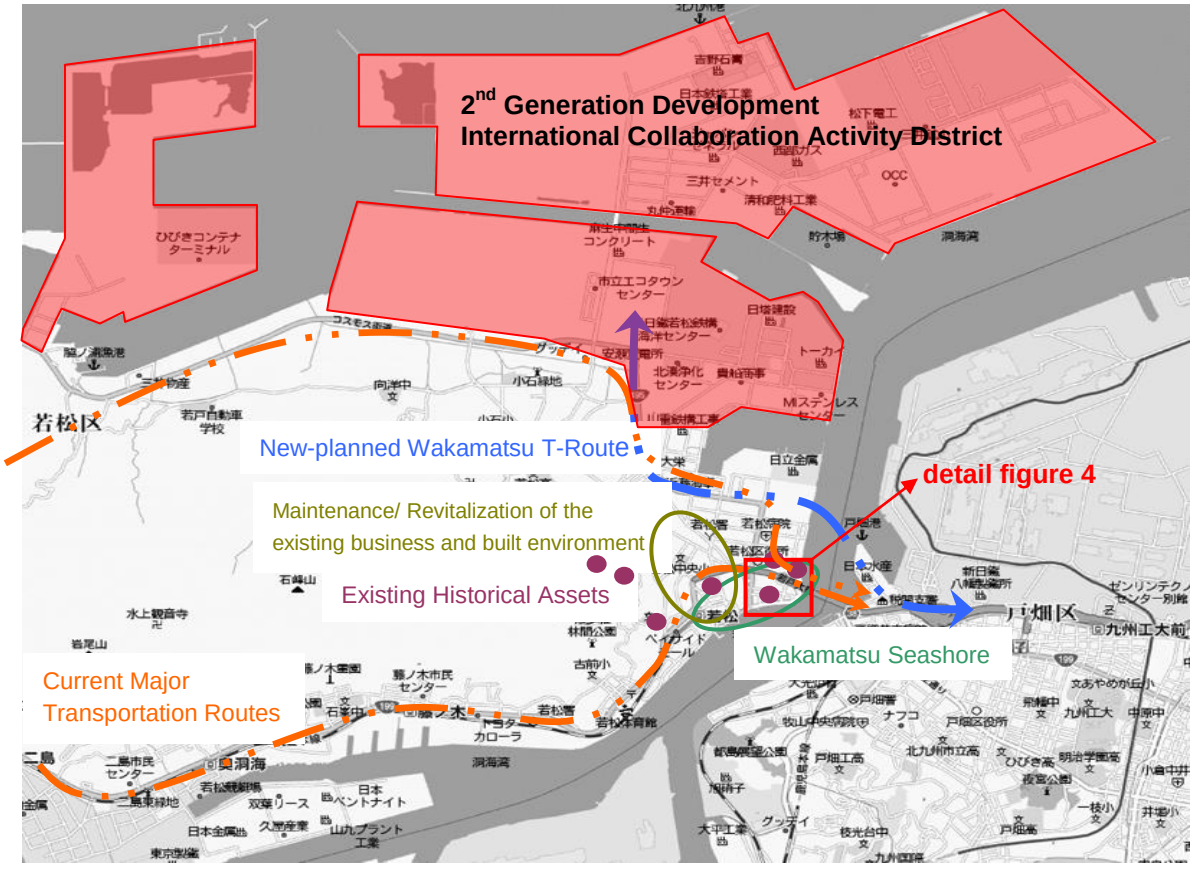


Figure 8.1. Existing condition and future development of the Wakamatsu Ward area.

Currently, two major transportation routes, as shown in orange, wrap around the major part of the ward transporting traffic in and through Wakamatsu onto the Wakato Bridge which connects it to other areas in the City. Because of the continuing development of the international collaboration activity and the sustainable research projects, a new transportation route is planned with a road tunnel structure providing a more direct and easy access to the Tobata side of the Dokai bay and an alternative to the existing Wakato Bridge. This active development on the north edge of the town consequently has generated the need for new industrial, commercial and residential development, as well as plans and strategies to re-generate and refurbish the existing built environment of the old town district.

The “Wakamatsu Town Planning Guidance” was part of the master plan of the Kitakyushu City Urban Planning concept which was formulated by the city government of Kitakyushu in year 2005 to address the future development of Wakamatsu Ward. Several emphasises were identified including regeneration of the existing central urban fabric, refurbishment and revitalization of the seashore area, sustaining the local history and existing resources. Responses concerning the recent sustainability and international collaboration activities in the northern part of the ward were also reviewed where a new traffic route and tunnel connection through the Dokai bay was planned to reduce the current traffic congestion and future traffic load on the existing road loading from Wakato Bridge. The increased pressure on the needs for future housing was not directly addressed in the general guidance provided by the City, however actions have been taken by a local real estate developer to purchase a valuable area of land to construct an apartment complex by demolishing the existing privately owned historical building originally on the site. This new development was to be located adjacent to the Old Furukawa Mining building which was selected to be the research building for the contextual research activity of this study.

8.2.2 Preliminary site survey

A documentation process was first initiated to obtain a basic understanding of the setting of the Wakamatsu Ward “old town” area, shown in Figure 8.2. Color photographs were used to record the current condition of the existing buildings within the area. A wide variety of building styles and building ages can be found within the areas, which provided an excellent context for the research project.

Figure 8.2. Preliminary site survey photographic documentation for the Wakamatsu "Old Town" district.

8.2.3 The old Furukawa Mining building and its surrounding context

During the meeting with officials at the Wakamatsu Ward office, questions were asked by the author concerning the ongoing process of the demolition of the Aso building on land adjacent to the Furukawa building and the new apartment building planned to replace it in relation to the success of the Ward's refurbishment plans and processes.

The Aso building, was constructed in 1936, but did not benefit from the example set by the refurbishment of its neighbour the Furukawa building. Despite public interest in preserving the Aso building it was purchased and demolished (2007) by a speculative developer and has been replaced by a 14-storey apartment building (completed end of 2008). Although planning documents and guidance, provided by the City of Kitakyushu directly addressing buildings in this specific area (the Wakamatsu seashore), do exist concerning the building height and the architectural character of the area. And despite the efforts of academic consultation and the city held urban building landscape evaluation process, the only concession to the existence of the Aso building was that the surface finish of the new apartment building should be the same

as the original building. Additionally, a literal partial imitation of the Aso building façade was used as the entrance gate to the apartment complex, refer to Figure 8.3.

Figure 8.3. The existing Old Furukawa Mining Building and its surrounding context during different phases of changes in the built environment.

The Old Furukawa Mining Building, with its adjacent and surrounding environment was selected as the research object for the research study concerning all the conflicts and changes occurring currently in the Wakamatsu ward and in terms of possible future conditions. The focus of the study was to investigate the effects of changes experienced by an existing building and occurring within its surroundings on observers' aesthetic appreciations of it.

The investigation area of this research activity was chosen as the "Wakamatsu Honmachi 1 chome" which literally translates into English as the "first part of the main village of Wakamatsu ward". It was chosen by the author due to the compactness of the area, which is bounded by the major traffic routes to the west and north and with its south and east boundaries facing the Dokai Bay, as shown in Figure 8.4. The specific boundary for the study was set to contain the east end of the Wakamatsu Seashore area, which was similar to the City government's designated area in the Kitakyushu City Urban Planning document (year 2003) for the Wakamatsu South Seashore district. This specific boundary was set for the

second phase of this research activity to investigate the influence of changes in its direct surrounding context on an observer's appreciation of the appearance of an existing building.

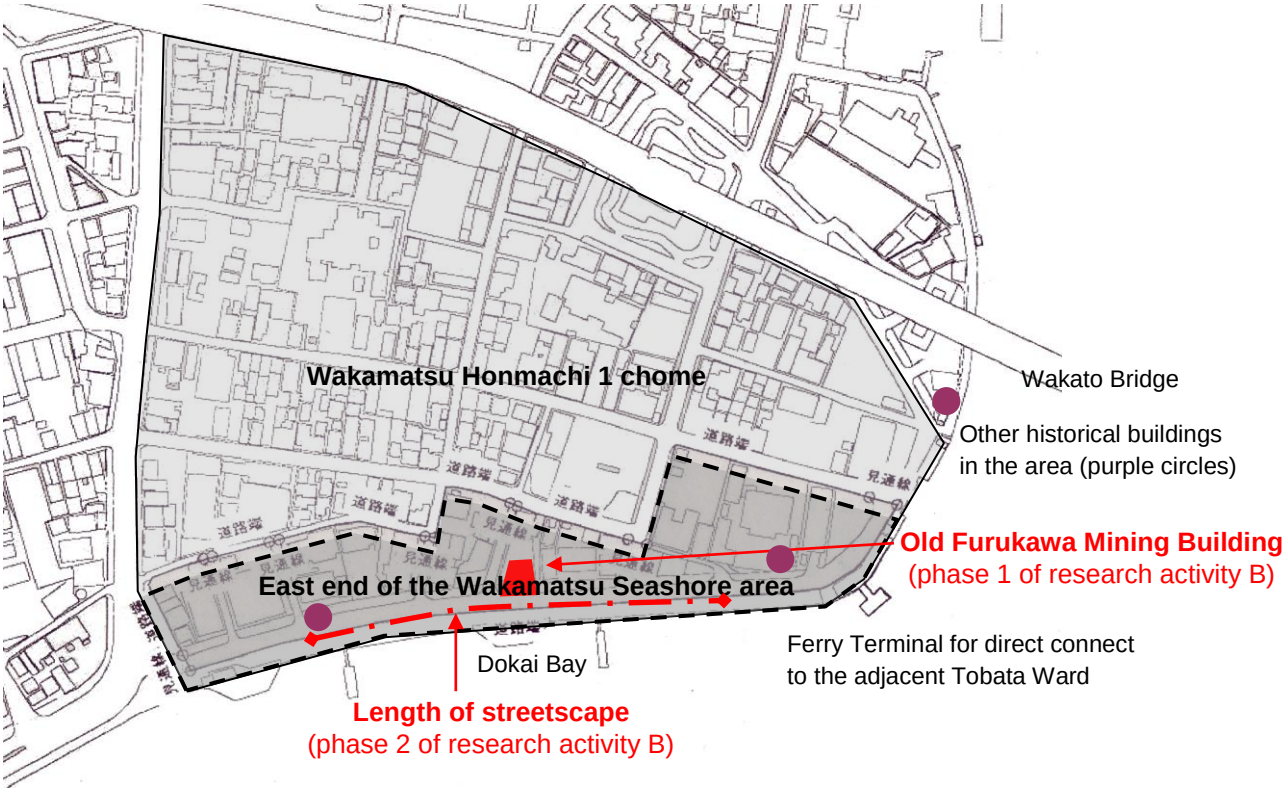


Figure 8.4. Detail map for the designated research area within the Wakamatsu Ward.

8.3. Research Activity Content

Research Activity B (R.B) – Investigating the endurance of a building's aesthetic appreciation through changes made to the building itself and changes in its surrounding context.

8.3.1 Phase 1 – The aesthetic appreciation of an existing building with changes/ maintenance to its façade

8.3.1.1 Research theme - Identify significant building features and suggest potential refurbishment strategies to the individual building façade that may allow the aesthetic appreciation of the building to be maintained or improved.

As discussed previously in chapter 3, maintenance that may include changes and modifications to an existing building are required in order for the building to be used or re-used continually to achieve a long-term goal of sustainability, long life. The default strategy would be to undertake maintenance that accounts for as few changes to its building façade as possible. The building façade is the most obvious aspect of its exterior and serves as the immediate envelope of the building that ultimately requires maintenance and refurbishment for the building to continually endure and serve both functionally and aesthetically into the future.

Additionally, refurbishment may at some time introduce changes to the façade in order to facilitate the needs of a new owner or the requirements of new regulations.

8.3.1.2 Method – Identify key building component

Four key architectural façade components; detail, color, material, and the overall building form were chosen for exanimation in this phase of the research in an attempt to identify how changes in these design features might influence and potentially alter people's perceptions and aesthetic appreciations of the building.

8.3.1.3 Stimulus material

High visual quality stimulus materials are required in environmental aesthetic research. Consequently, preparation of the experimental stimulus materials was considered to be critical. It is necessary to have simulation materials that as far as possible illustrate highly the actual situation that is being simulated. It has been found that peoples' responses to coloured slides and the actual environments that they represent have a correlation of about 0.84 in preference experiments of environmental aesthetics [1]. Hence, four color photographic simulations of the subject building were developed by the author using the Adobe Photoshop software in an attempt to create four different building façades representing four different refurbishment scenarios. Modifications to the original photograph of the Old Furukawa Mining building were made accordingly to the four selected key architectural façade components. An artificial sky and building frontage were prepared and used in the simulation photographs to obtain visual consistency in all of the stimulation photographs to allow fair and objective comparisons.

In the first simulation, details and decorations on the building façade were removed and replaced by a plain concrete surface. The second simulation was created by replacing the original red brick with the green tile which was found in the local neighbourhood. In the third, simulation, none of the building façade was modified but the tower was removed which, changed the original building form into one single rectangular mass. The last collage was assembled by changing the color of the original building façade from red to white, shown in Figure 8.5.

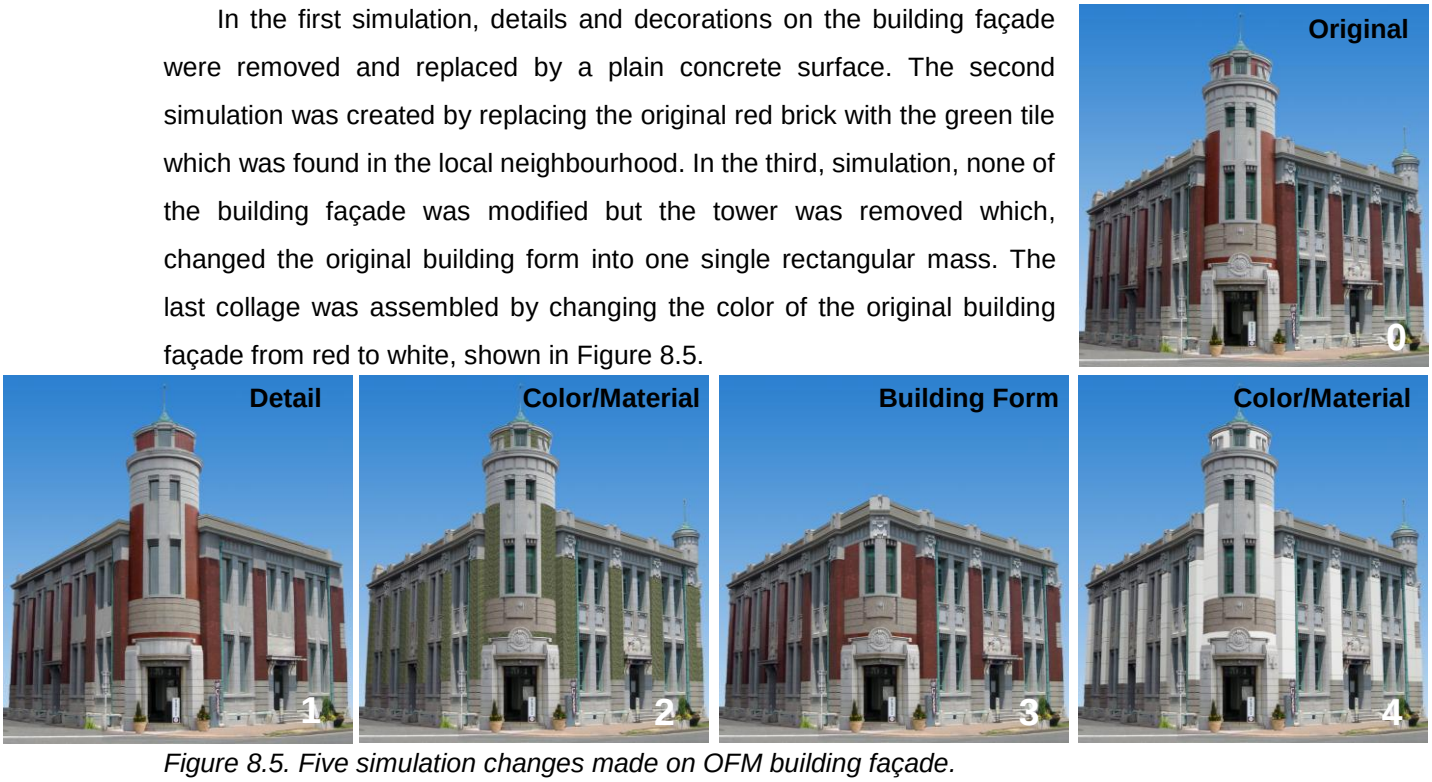


Figure 8.5. Five simulation changes made on OFM building façade.

8.3.1.4 Questionnaire procedure

Respondents were asked to rank all 5 options represented by the colour photographs in order of their preference from 1 to 5, with 1 signifying the most preferred option and 5 as the least preferred building photograph. All of the 5 photographs were shown simultaneously on one A3 page with a blank space adjacent to each photograph for respondents to state reasons for their given responses. (Refer to appendix E for an example of the questionnaire.) This one page of questionnaire was then put together with the questionnaire for the following phase of the research activity before being distributed to the respondent. Analysis and results of this part of the research will be discussed later in this chapter.

8.3.2 Phase 2 – The effects of changes of a building's surroundings on observers' aesthetic perception

8.3.2.1 Research theme– To examine the effects of changes in the building's surrounding context on people's aesthetic appreciation.

> *"'Setting' is an established concept that relates to the surroundings in which a place is experienced, its local context, embracing present and past relationships to the adjacent landscape. Definition of the setting of a significant place will normally be guided by the extent to which material change within it could affect (enhance or diminish) the place's significance."*
>
> *Conservation Principles-policies and guidance for the sustainable management of the historic environment, English Heritage*

When a building is given significance value, whether this is due to its historical or architectural qualities, refurbishment or conservation process are undertaken to allow the building to continue to endure into the future for a longer life-time. Frequently best efforts are made to maintain and preserve the building's original façade appearance i.e., its image, since it serves as the essential building component that generates observers' aesthetic appreciations. That a building and its appearance may evolve with time, through natural weathering or introduced changes is a well understood concept. However society evolves with time also. In human society, values, morals and everyday activities change constantly which may cause the modification of the built environment including both its structure and its image. When the surrounding built environment changes, does the image of a still existing building continue to be appreciated by an observer? Do peoples' aesthetic perceptions alter as a consequence of changes in the streetscape of the building's surrounding context? What kinds of changes in the surrounding built environment visually enhance or diminish the aesthetic appreciation of an existing and/or refurbished building?

8.3.2.2 Method – Selection of key building design feature

Phase 2 of the research proposes to investigate two key building design features of the building streetscape within the built environment - height/scale and skyline - in an attempt to assess the potential visual impacts on the existing historical buildings. Part of the reason for addressing design features such as building height and building skyline when evaluating the Old Furukawa Mining Building with its surrounding context is to respond to the demolition of its adjacent Aso building, as well as the newly completed 14-storey apartment building that has replaced it on the site.

8.3.2.3 Stimulus material

Similar to the development of the stimulus materials in phase 1 previously, coloured photographic manipulation utilizing Adobe Photoshop software was used to assemble numbers of streetscape with the proposed design feature. According to Stamps' analysis [2], *"preferences for coloured slides and simple photographic collages made up of elevation photographs of residences correlate about 0.93 with preferences for slides of the building blocks on which the residences were located"*. Accordingly, sets of coloured photographic collages of the Old Furukawa Mining Building with surroundings made to vary in different ratios of building heights and different shape of overall skylines were compiled and proposed to be adequate for evaluating visual impacts of the changing urban environments.

A process flow-chart was prepared for the development and selection of the stimulus materials, as shown in Figure 8.6. This framework facilitated both the building samples collection and analysis process, as well as the development and assembly of building/street collages and the distributed questionnaire. Equivalent methods and procedures could be ensured when assembling different stimulus samples by following the stages provided in the flow-chart.

Considering the purpose of the study, attempts to understand people's aesthetic perception of the built environment, objective and equitable questionnaire assembly processes are desirable. With the clearly stated process framework, the collected building samples could be analyzed and elicited effectively by utilising their given building numbers while at the same time eliminating potential aesthetic bias or judgements on the part of the stimulation material compilers. Random sample methods were incorporated; building samples to be included in the collages and their relative positions could be generated objectively and verified or regenerated when necessary.

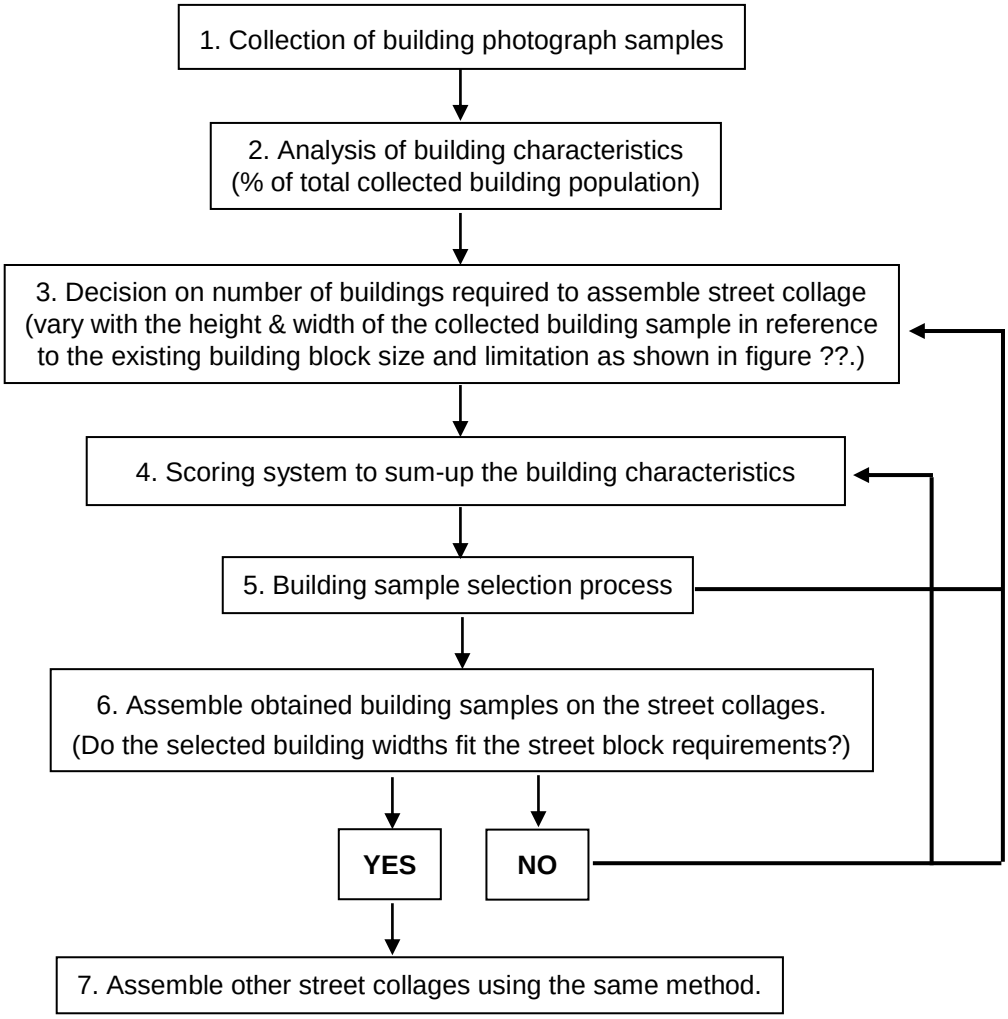


Figure 8.6. Process framework for developing stimulus materials (coloured photograph building street collages).

(1)Collection of building photograph samples

In order to assemble a set of buildings on a streetscape with various building heights, numbers of building photographs with various functions, façade materials, colors, details and shapes were collected. Several riverbank areas within Fukuoka prefecture were selected to be sources of photographs, which were taken at spots where the width of the river fronting a building provided an effective distance to allow the complete building height and/or width to be taken in one exposure without a significant distortion of perspective effecting the building proportions on the photograph, Figure 8.7. Where distortion could not be avoided this strategy also minimised the numbers of montage processes required to remove perspective derived distortions and so reduced the potential bias in responses due to inconsistencies between the stimulus materials developed.

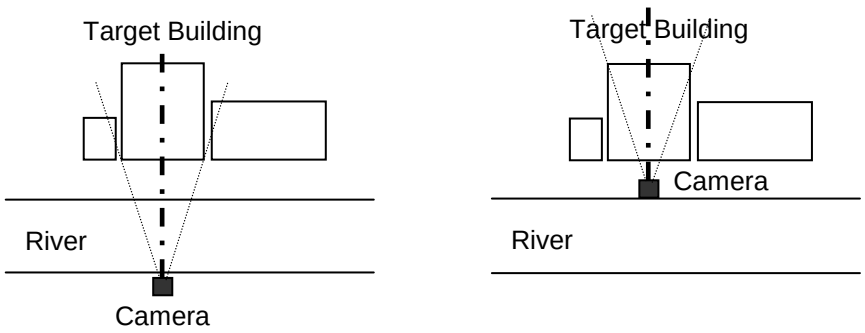


Figure 8.7. Guidelines for assembling on-site sample building photographs.

A total of 157 building photograph samples, each of which included a linear dimension indicator, were collected. Initial processing procedures were undertaken to ensure all the buildings in the sample photographs had equivalent building size proportions; adequate, and as far as possible, equivalent brightness and contrast, had visual obstacles removed, and a consistent building frontage, sky and background.

(2) Analysis and Categorization using building characteristics

(2.1) Building Height

Since this part of the research was an attempt to understand the effects that changes in the surrounding built environment of the Old Furukawa Mining (OFM) Building could have on people's perceptions, the actual building height (3-storey, 10m) of the OFM building was used as the basic height unit, designated X, for this experiment. Accordingly, all the building samples collected were categorized into 3 different building height range groups, as in 1X, 2X and 3X. Table 8.1 shows the range of building heights for each of the groups in number of building storeys. It was proposed that four street collages should be assembled with building heights as, 1X, 2X, 3X and mixed X, to examine how peoples' visual perceptions of the OFM building might change when building heights in its surrounding environment varied.

Table 8.1. Building height categories with total number of collected building samples.

Building height group	# of building storey	height (meter)	Total # of collected sample
X = the sample building (OFM)	3	10	
1X	≦3	≦10	40
2X	4～7	12～21	64
3X	≧8	≧24	56

(2.2)Building façade components

The matrix of each building sample's characteristics, e.g. surface material or colour, were recorded individually as indicated in Table 2. This matrix was then used to allow characteristics of the photographed building samples to be categorised and analysed for each of the building height groups. Example in Table 4 will show this matrix in use.

Table 8.2. Building sample characteristic matrix for building height group.

Character I	**Material**										
Sub-category	Panel	Title	Concrete	Plaster	Brick	Steel	Mix				
Character II	**Colour**										
Sub-category	White	Gray	Brown	Black	Cream	Blue	Pink	Sliver	Mix	Colourful	
Character III	**% of Glass coverage**										
Sub-category	0	10	15	20	30	40	50	60	70	80	90
Character IV	**Repetition of Façade Design**										
Sub-category	High		Medium		Low						

(3)Strategy for deciding and fitting the number of buildings required for each street collage

The total number of buildings required for each street collage varied with the width of the buildings comprising the collected samples both with reference to the width of the existing road frontage building blocks and the necessary spacing between buildings and the preservation of the street pattern. Based on the actual building block size on-site and the existing street condition, a specific number of required buildings for each of the existing building blocks in relationship to the Old Furukawa Building were first proposed in order to allow the development of a scoring system (the next procedure) to be undertaken.

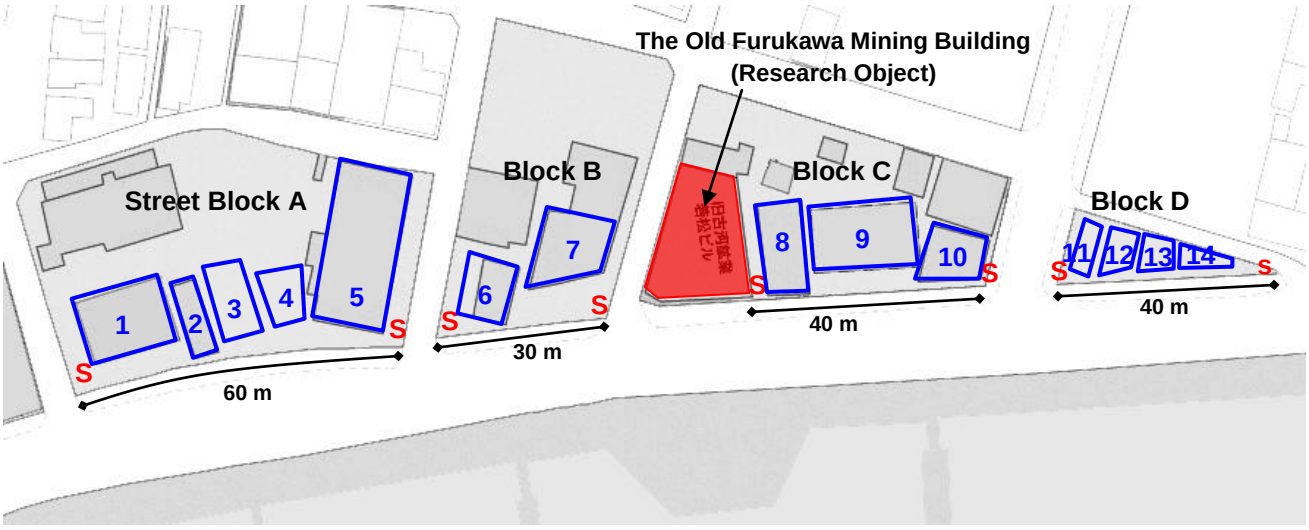


Figure 8.8. Potential numbers of buildings and its arrangement with the current street condition in the designated street scene length.

According to the existing street condition illustrated in Figure 8, a total of 14 buildings could adequately be fitted into the current site plan surrounding the OFM building. Hence, 14 was used as a reference number in deciding and fitting the required number of buildings for street collages with different building heights. The assumption that the street collage which contains building samples with the larger height (3X) would have fewer buildings in total, and

the opposite for similar heights (1X), was made based on the understanding that taller buildings would be expected to be wider and that greater spacing would be required between such buildings. Accordingly, a required number of buildings for each street collage in respect to the building height group was proposed. However, in the case that such a proposed number of required buildings could not provide an appropriate set of building samples for any of the street collages, a new number of required buildings would be proposed, as indicated in the flow chart Figure 6. In this way an objective methodology was developed to ensure that the potential for biased human judgements of which buildings were chosen for inclusion in the collage was reduced. Eventually, the required numbers of buildings for each of the street collages were resolved as: 1X=16 buildings, 2X= 14 buildings, 3X= 12 buildings and mix height= 14 buildings.

(4) Scoring system to sum-up the building characteristics

The scoring system was used to sum-up the building characteristics in order to inform the building sample selection process for developing the street collage. A sample of the scoring system using the proposed number of building samples for one street collage is illustrated in Table 8.3. The scoring system used in this process was based on the proposed number of building samples required to assemble the street collage for 1X building height group.

Score point = Required number of building samples × building character % of sample population

Table 8.3. Scoring system with building character matrix applied on the collected building samples in height group 1X using the proposed 16 as the required number of buildings to assemble the 1X street collage.

Character I	**Material**										
Sub-category	**Panel**	**Title**	**Concrete**	**Plaster**	**Brick**	**Steel**	**Mix**				
%	25	20	15	12.5	10	10	7.5				
Score/16	4	3	2	2	2	2	1				
Character II	**Colour**										
Sub-category	**White**	**Gray**	**Brown**	**Black**	**Cream**	**Blue**	**Pink**	**Silver**	**Mix**	**Colourful**	
%	25	22.5	10	7.5	7.5	2.5	5	2.5	10	7.5	
Score/16	4	4	2	1	1	0	1	0	2	1	
Character III	**% of Glass coverage**										
Sub-category	**0**	**10**	**15**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
%	2.5	10	5	10	12.5	25	12.5	7.5	5	7.5	2.5
Score/16	0	2	1	2	2	4	2	1	1	1	0
Character IV	**Repetition of Façade Design**										

Sub-category	High	Medium	Low	
%	2.5	47.5	50	
Score/16	0	8	8	

%= the percentage of the building samples collected with relevant building character.

Accordingly, any building samples with one or more characters scoring 0 are removed from the selection first as they represent the minority building characteristics in the actual built environment. However, apart from scoring 0, any samples scoring at least 1 are to be considered in the building sample selection process. An example of this procedure is illustrated in Table 8.4.

Table 8.4. Example of building sample selection process.

Scoring system to sum-up the building characteristics for Building number 35. The building was then used in the assembled street collage with 1X building height.

Character	I	II	III	IV
	Material	Colour	% of Glass coverage	Repetition of Façade Design
Sub-category	**Title**	**Pink**	**40**	**Medium**
%	20	5	25	47.5
Score/16	3	1	4	8

(5) Building sample selection process

The score obtained from the scoring system for each building characters on each building sample was used as a reference indicating the actual distribution building characteristics in the built environment. For this reason, although some building samples may have low score due to the rareness of its building design character in the building population, they would still be considered and included (with a lower numbers of building selected in proportion to the high scored building samples).

Apart from the scores for each sample's building character, the existing street and block widths were used as the basic guide for collage development while maintaining the required spacing between each of the buildings. A random sample selection technique was used to objectively select a combination set of buildings for each street block, A-D. A constant spacing, 1m, was set on both side of the block adjacent to the street, as shown in Figure 8.9.

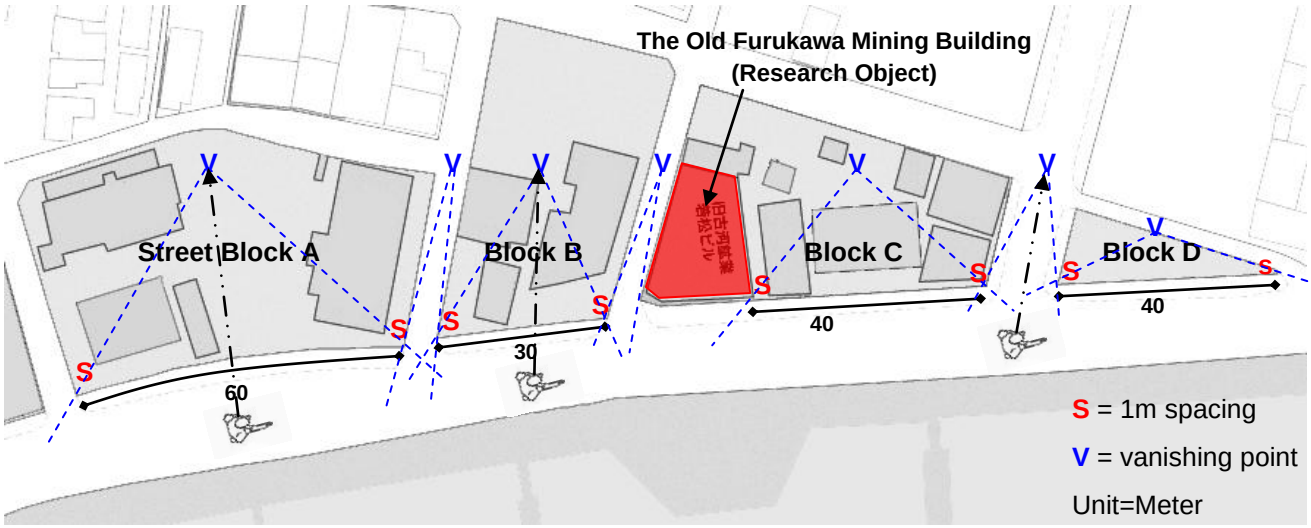


Figure 8.9. Protocol used during the building sample selection process.

The following equation was used to derive the spacing between buildings when certain a combination of building sets were randomly selected.

Total allowed building width =

Existing total block width – (8 street spacing+ total number of building spacing)

Total building space = Required building # - # of street blocks

For example: To calculate the total allowed building width to assemble the 1X street collage,

Total allowed building width = (60+30+40+40) – (8×1 + 16-4) = 150

This calculation facilitates the random sample selection process to assemble a set of buildings with a total building width that adds up as close to 150m as possible for the 1X building height street collage. This process on its own required numbers of repetitions and trials to yield the best fitted set of buildings for the street collage. With random sample selection, the position and order of buildings on-site could also be obtained objectively. In order to avoid potential bias considering the selection process of the visual photograph sample, a building numbering system was used after stage 2 of the analysis and categorization process. Great care was taken to ensure no aesthetic judgments or subjective opinions were involved in developing the stimulus materials.

(6) Assemble obtained building samples on the street collages

Eventually, a set of 16 buildings could now be obtained which then could be fitted on to the street collage with a final evaluation of whether the obtained building samples form an appropriate street collage to be used in the questionnaire.

(7) Assemble other street collages using the same method

Consequently, five street collages were assembled with the Old Furukawa Mining building accordingly based on the proposed 4 building height groups, 1X, 2X, 3X, mix, and one extra

collage representing the original existing streetscape, Figure 10. (Note that this original street collage was made before the new apartment development on the former Aso building site.)

All the street collages were developed using multiple vanishing points as shown in Figure 8.9. Multiple vanishing points allow the simulation photograph to generate streetscape images which illustrate the actual observing conditions when perceivers are walking along the street.

Figure 8.10. Proposed street collages for building height groups, 1X, 2X, 3X and Mix height.

Apart from examining the visual impact of building height variance on the existing refurbished building, this part of research has also investigated the effects of skylines on ratings of preference. Three types of skyline shapes were proposed, concave, random and convex, accordingly three street collages was assembled using exactly same set of building samples with different building arrangements and site locations in relation to the OMF building, as shown in Figure 8.11.

Figure 8.11. Proposed skyline simulations with concave, random and convex overall shapes for questionnaire assembly.

8.3.2.4 Questionnaire procedure

The questionnaire procedure for this part of the investigation is equivalent to the previous color photograph simulations made to consider the effects of changes made to the Old Furukawa Mining building's façade. Respondents were asked to rank all 5 presented color photograph streetscape simulations in order of their preference from 1 to 5, with 1 as the most visually preferred option and 5 as the least preferred streetscape in relation to the OFM building. All of the 5 street collages were shown simultaneously on one A3 page with a blank space adjacent to the photograph to allow respondents to provide reasons for their given responses. A similar questionnaire page was assembled for the three skylines collages.

Finally, the completed questionnaire was assembled, as shown in Figure 8.12, addressing

visual impacts that arise from changes of both the façade of the Old Furukawa Mining building and its surrounding environment.

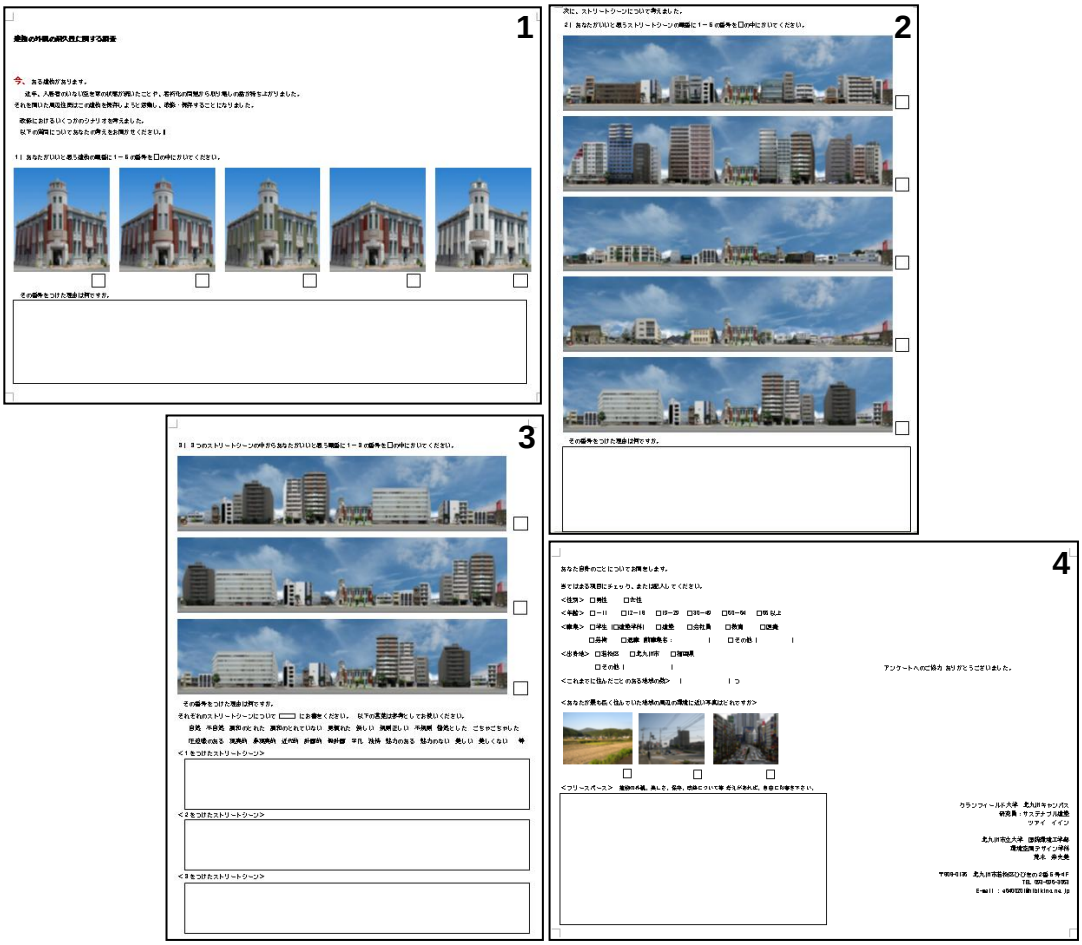


Figure 8.12. Sample of the complete questionnaire. (See Appendix E for full size sample.)

8.4 Respondents

As discussed in previous chapter 6, respondents in this study were broken down to six different age groups including children and adults. Within each age group, a balanced number of 15 females and 15 males or above was the aim of the research, Table 8.5.

Table 8.5. total number of responses obtained for each of the six age group both within and outside of Wakamatsu.

Age Groups	9-11	12-18	19-29	30-49	50-64	65+	Total
Wakamatsu	33	30	30	49	50	32	224
Outside Wakamatsu	31	40	52	63	44	30	260

The potential for bias in responses resulting from respondents from special interest groups within the Wakamatsu area was discussed and was addressed by deriving

respondents from two different geographical groups, those that live and work inside the Wakamatsu area and those that live and work outside Wakamatsu. It was considered that respondents from the Wakamatsu area would have a familiarity and levels of knowledge, awareness and interest concerning the local contextual environment related to the Old Furukawa Mining building that would not be present in respondents from outside the area. Conversely, those living and working outside the Wakamatsu area would be less familiar and aware. One function of the questionnaire was to test whether the preferences of these two groups differed. Table 5 displays the break down of the respondent groups and the number of respondents who participated in answering the questionnaires.

8.5 Analysis

The obtained responses were then analyzed by adopting the preference ranking system in the questionnaire. Scores were given to individual collage simulations based on the ranking provided by the respondent, i.e. *ranking number* = *score point*. Accordingly, the collage photograph receiving the least score points is the most visually preferred scenario, represented by MostP, through to 2ndP, 3rdP, 4thP and LeastP as the total score increased.

8.6. Results

Three phases of analysis were carried out with the obtained results from each part of the questionnaire. The first was to separate respondents in relation to their place of residence and work i.e. inside or outside the Wakamatsu area. Responses related to the respondent age group were also addressed and compared. Reasons provided by the respondents to explain their preference selections were analyzed and further summarized as background understanding for people's aesthetic judgment.

8.6.1 Changes on the building facade of the Old Furukawa Mining Building

8.6.1.1 Geographical comparison

Responses were first grouped geographically based on respondents' place of residence. Comparisons were made between responses collected from inside and outside the Wakamatsu area.

It was proposed that the expected levels of appreciation of the façade condition of the OFM building would differ between respondents from Wakamatsu area, who possessed special interests and perception regarding the original/existing image, and the responses obtained from respondents from outside the Wakamatsu area who were not familiar with the building.

However, as shown in Table 8.6, the results data contradicted this proposal by suggesting that all respondents, both inside or outside Wakamatsu, preferred the OFM building with its

existing façade image. The least preferred option was the simulation with the roof tower removed. The roof tower result is interesting as often such parts of a historical building are generally the first to suffer from the structural deficiency, and so subsequently are likely to be removed as part of a refurbishment strategy.

Table 8.6. Questionnaire preference ranking results concerning simulation changes to the façade of the OFM building.

Preference Ranking	**MostP**	**2ndP**	**3rdP**	**4thP**	**LeastP**
	 **Original**	 **No Details**	 **White**	 **Green**	 **No Tower**
Wakamatsu	Original	No Details	White	Green	No Tower
Outside Wakamatsu (Total)	Original	White	No Details	Green	No Tower

Architectural quality has been identified as often depending on detail [4-6], especially when dealing with an existing context where *"the visual texture, composed primarily of small scale details (ornament) is usually the critical element"* [3]. However, results from Table 6 show that the removal of detail simulation was the second most preferred, which suggest a historical building façade could still retain the aesthetic appreciation from the observers even when refurbishment adjustments or maintenances require the removing of details from. The scattered finding regarding the colour/material simulation suggests that further studies are required regarding the visual impacts of such building features in the context of refurbishment.

8.6.1.2 Age comparison

The results were then compared across age groups. The hypothesis was proposed that the younger age groups would respond differently from the older age groups both within or across geographical context. According to Figure 8.13, this hypothesis was supported generally by the results obtained for the most preferred choice where for respondents from age 9-11 groups both from inside and outside the Wakamatsu area ranked the white finished façade as their first choice compared to a preference shown towards the original building façade voted for by the other age groups. A difference in response from others could also be seen in the 65+ age group for the Wakamatsu respondents and both the 50~64 and the 65+ age groups for the Outside Wakamatsu responses.

This comparison illustrated in Figure 8.13 also provides clear results suggesting that the original building façade is consistently the most preferred choice with the "No Tower" simulation façade being the least preferred choice.

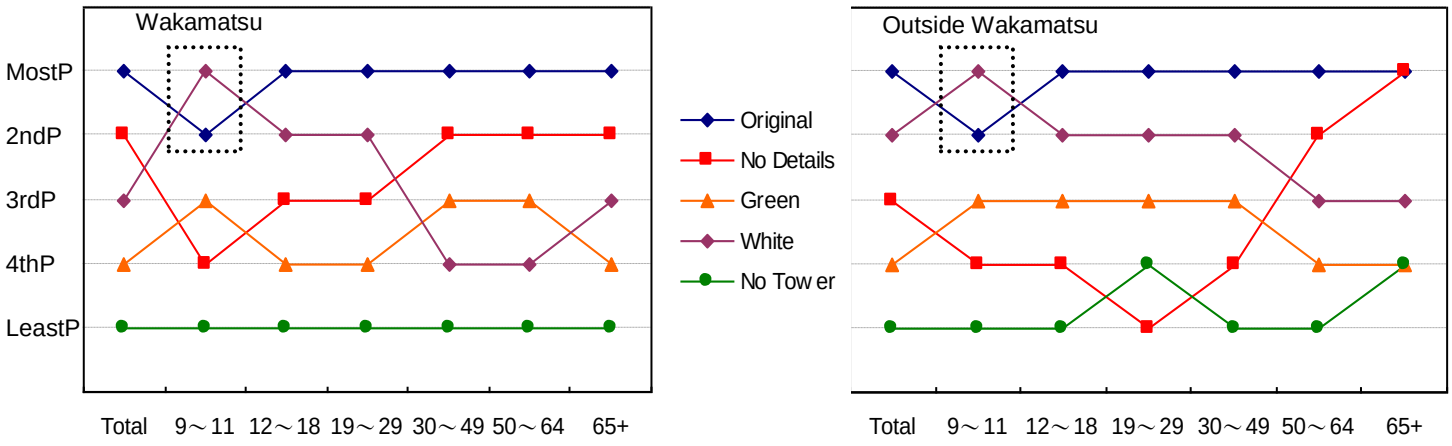


Figure 8.13. Preference ranking results illustrating differences and similarities across different age groups.

8.6.1.3 Reason for preference

A summary of all the reasons provided by the respondents regarding their reasons for their preference rankings is shown in Figure 8.14. as a frequency percentage of the reasons given. These results suggest that colour was the single most influential design component, followed by detail and the existence of the tower when aesthetic judgments were given regarding the façade of this building. This result is interesting in the context that simulation with the details removed was the second most preferred for the Wakamatsu respondents and third most preferred for the outside Wakamatsu respondents. It supports the notion that colour is an important issue that requires further investigation.

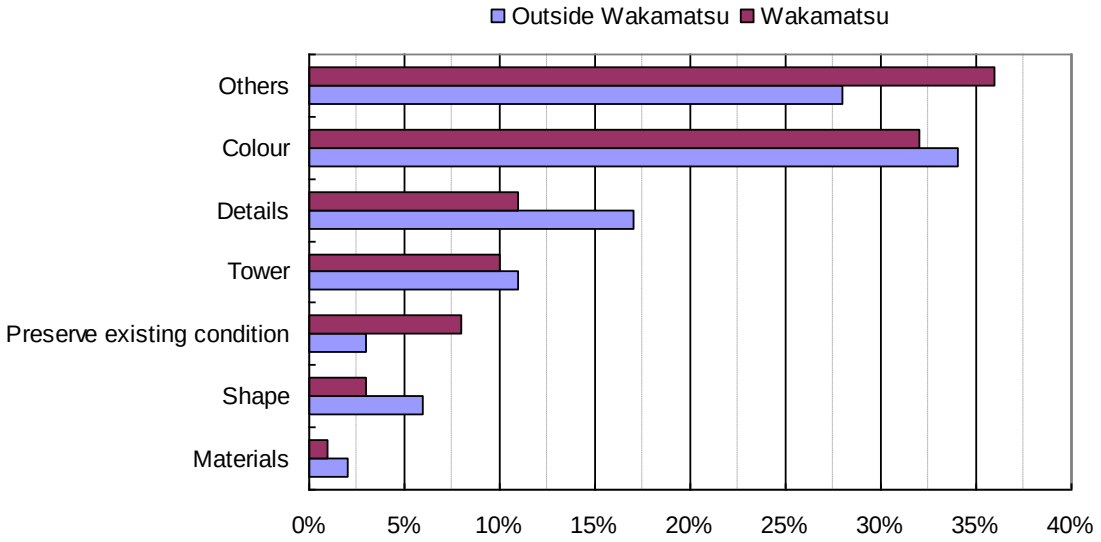


Figure 8.14. Summary diagram illustrating the relative citation of aspects of building components elicited as reasons provided to explain respondents' preference ranking.

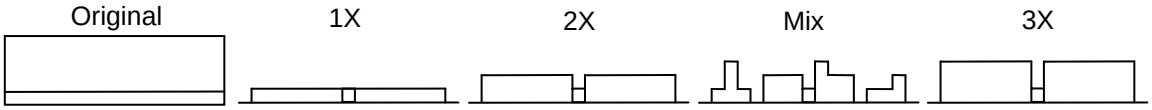
8.6.2 Variances of building heights on the OFM building's surrounding environment

8.6.2.1 Geographical comparison

The preference ranking responses obtained from the part of questionnaire regarding the effects of different building heights in the OFM building's surrounding environment were analyzed and are summarized in Table 8.7. For the two sets of respondents, Wakamatsu and outside Wakamatsu, common patterns of responses emerged. The analysis indicated that the Old Furukawa Mining building is best appreciated with the existing streetscape condition and building heights for both groups of respondents. The second-most preferred response occurred when the OFM building was surrounded with buildings which were either lower or equal to its building height. The third-most preferred streetscape was the street collage made up with buildings having double the height of OFM building. The streetscape assembled using buildings with triple the height of OFM building, i.e. $\geqq$8 storey, was least preferred by all the respondents.

One would expect the streetscape with a mixture building heights would be considered to generate visual variety in the built environment and consequently enhance richness in experience and result in an increase in the appreciation of the respondents. However contrarily, the results displayed that the mixed building heights scenario received the second least preferred ranking, or 4th ranking position. It is interesting that both groups of respondents on average chose the existing streetscape as their most preferred. It might have been expected that those respondents living outside the Wakamatsu area would make a different choice. However, the detailed examination of responses related to age group that follows suggests that the situation is not so straightforward.

Table 8.7. Preference ranking results regarding street collages with different building height groups.



	MostP	2ndP	3rdP	4thP	LeastP
Wakamatsu	Original	1X	2X	Mix	3X
Outside Wakamatsu (Total)	Original	1X	2X	Mix	3X

8.6.2.2 Age comparison

In this part of comparison, an identical hypothesis was tested that the responses from the younger respondents would differ from those of the older generation. The findings as shown in Figure 8.15 supports this age difference hypothesis, where the responses from the 9~11 age group from the Wakamatsu respondents differed completely from those of the other age

groups with the 3X street scene becoming the most preferred. For the outside Wakamatsu respondents both the 9~11 and the 12~18 age groups differ from the other age groups.

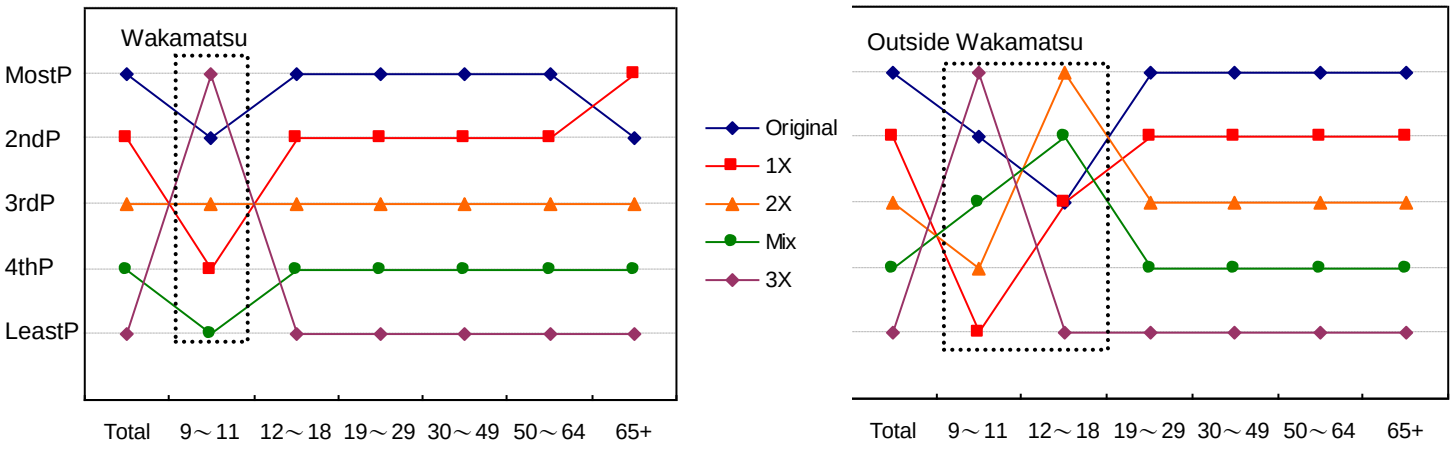


Figure 8.15. Preference ranking results in respect to different age groups for street collages with various building heights.

8.6.2.3 Reason for preference

The reasons given by the respondents regarding their preference ranking responses were analysed and are summarized and displayed in Figure 8.16. The findings are illustrated using the horizontal bar chart displaying reasons and their percentage frequencies of usage. Building height, overall scenery and townscape, and attention to the Old Furukawa Mining building appeared to be the single most important determining considerations for the streetscape preference judgement.

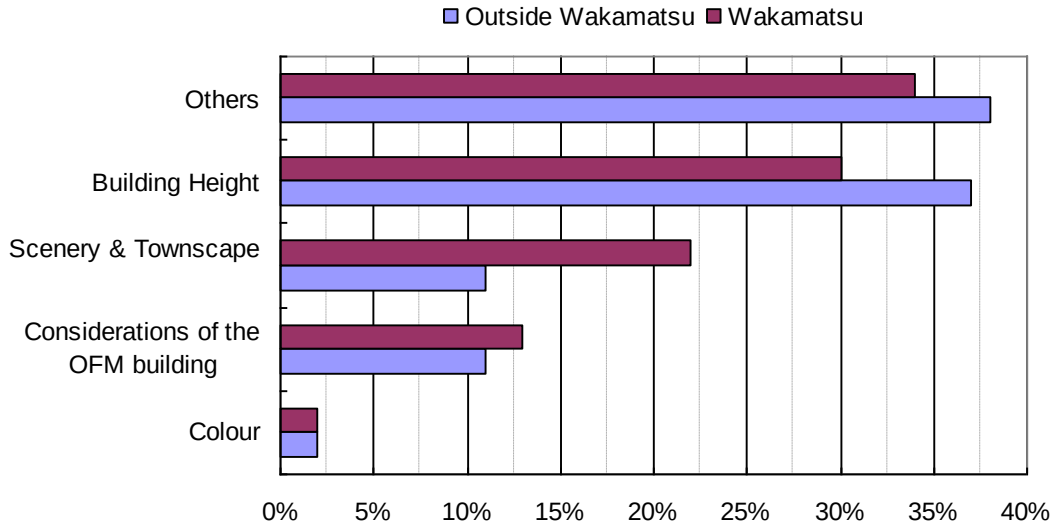


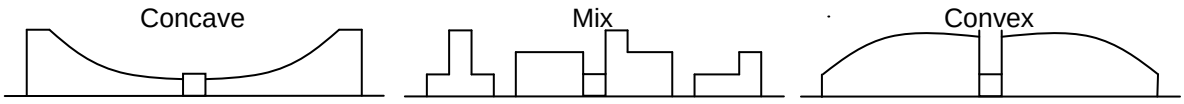
Figure 8.16. Summary diagram illustrating reasons provided for the preference selection regarding street collages with different building heights.

8.6.3 Different overall skyline shapes on the streetscape including the OFM building and its surrounding context.

8.6.3.1 Geographical comparison & 8.6.3.2 Age comparison

Concerning the shapes of the overall skyline, responses from all geographical location and across all age groups are highly consistent, as illustrated in both Table 8.8 and Figure 8.17. With the focus of attention given to the existing Old Furukawa Mining building by locating it in the centre of the skyline collage, all respondents ranked the concave skyline shape as the most preferred choice, followed by the undulating mixture of building heights and with the convex shape as the least preferred choice.

Table 8.8. Preference ranking results for street collage with different overall skyline shapes.



	MostP	2ndP	LeastP
Wakamatsu	Concave	Mix	Convex
Outside Wakamatsu (Total)	Concave	Mix	Convex

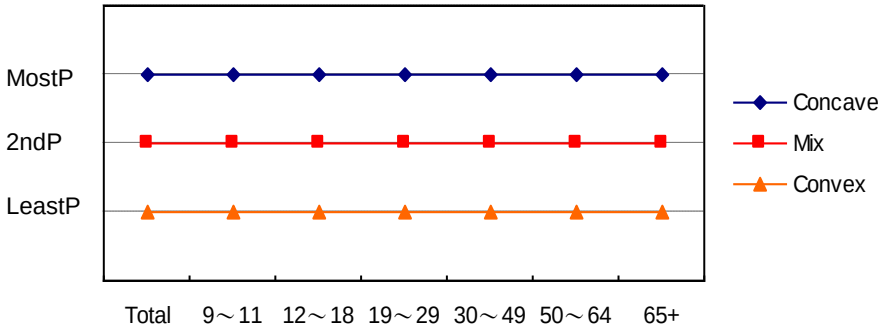


Figure 8.17. Age comparison results regarding preference ranking for street collages with different overall skyline shapes.

8.6.3.3 Reason for preference

Despite the consistency in the preference ranking, a large range of reasons for these responses were given by the respondents, shown in Figure 8.18. Building height, a feeling of the building being overwhelmed and balanced or unbalance of the overall urban environmental geometry were regarded to be the critical reasons related to the obtained preference results.

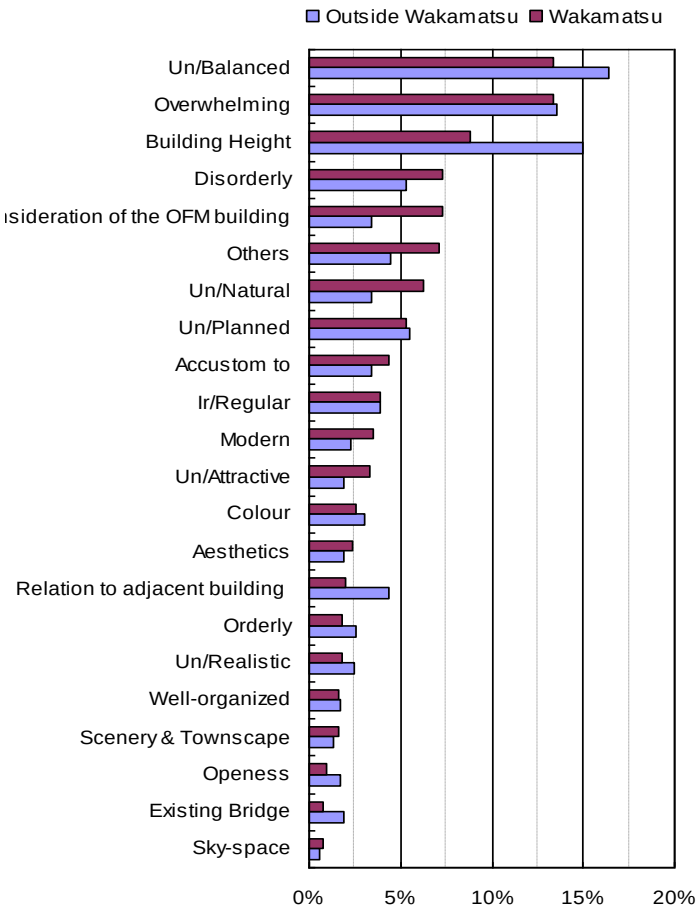


Figure 8.18. Summary diagram illustrating reasons provided for the preference selection regarding street collages with different overall skyline shapes.

8.7 Reference

1. Stamps, A. E. (2000). *Psychology and the aesthetics of the built environment*. Massachusetts: Kluwer Academic Publishers.
2. Stamps, A. E. (1994). A study in scale and character: contextual effects on environmental preferences. *Journal of Environmental Management*, 42, 223-245.
3. Scruton, R. (1979). *The Aesthetics of Architecture*. Princeton University Press.
4. Stamps, A. E. (1999). Architectural detail, van der Laan Septaves, and pixel counts. *Design Studies*, 20, 83-97.
5. Brolin, B. C. (1980). *Architecture in context: fitting new buildings with old*. Van Nostrand Reinhold, New York.

9 Research Conclusions

Previously in chapters 7 and 8, research activities addressing thesis concerns: (i) the contextual and universal aspects of aesthetic response, and (ii) the ability to maintain humans aesthetic appreciation of the built environment, were presented from the research development phase to the data analysis stage. Observations generated from the two activities are examined in an attempt to provide insights and understanding considering the issue of aesthetic appreciation related to future sustainable management of the existing built environment across different cultures.

9.1 The Contextual and Universal Aspects of Aesthetic Appreciation

The aim of this research activity, reported in chapter 7, was to develop a methodological framework to understand human aesthetic perceptions of buildings in the built environment, and to investigate the viability of developing a universal tool that attempts to assess this notion of aesthetic quality across different cultural contexts. Additionally, in response to the subjective and objective debate of aesthetic judgment, the study attempts to examine the question: does aesthetic perception remain constant through changes of context and place?

In summary, the following conclusion could be drawn from the research activities initiated in chapter 7:

- **Gender analysis** – Results from gender comparison suggest that common principles exists regarding male and female's aesthetic interpretation or descriptions when responding through a semantic difference scale, but their preferences of aesthetic objects are not generally consistent.

- **Cross-cultural analysis** – Cultural differences in people's aesthetic responses were observed between the UK respondents and both the Japanese and Taiwanese respondents in their responses on the semantic differential scales. Distinct cross-cultural differences were evident across all three cultural groups regarding their preference selections. Nevertheless, consistent agreements regarding respondent's ideal house qualities were obtained across UK and Japan.

- **Age group analysis** – Observations made from age group analysis demonstrated that age difference is an influential variable regarding people's aesthetic responses including visual description, preference selection, as well as judgments regarding the qualities of the ideal house. Differences can be found particularly between the younger and older generations. A consistent increase in response differences was observed in respect to the increasing difference between respondent age group.

- **House photograph analysis** – Results obtained from the house photograph

comparisons suggest that familiarity is not an influential factor regarding people's aesthetic response. However, people's aesthetic responses do appeared to differ in relation to the style of house photograph perceived both cross-culturally and across different age groups. Cultural difference regarding UK responses in comparison to both Taiwanese and Japanese responses was once again evident across all 27 house photographs.

- **Word-pair analysis** – Regarding observations made from word-pair analysis, similarities in both the Japanese and Taiwanese responses and differences in the UK were once again evident in terms of the selection of the adjective from the semantic scales and the intensity of responses for some of the word-pairs. Both universal similarity and cross-cultural difference regarding the uses and semantic responses of different word-pair adjectives were observed.

- **Semantic differential scale** – The results obtained from this chapter demonstrated the feasibility and potential of the developed 3 language semantic differential scale. None of the respondent groups appeared to have difficult in utilizing the 15 word-pair SD scale to describe their aesthetic response. This suggests that future research could be benefit from such a tool to further understand people's aesthetic perceptions towards buildings in the built environment.

- **Analysis methods** –Three major analysis methods were used in this study: the linear regression analysis leading to the notion of correspondence with scatter level, the principal component analysis with the concurrent hierarchical cluster analysis, and the visual semantic response diagrams. Overall the PCA analysis was effective in processing datasets containing 3 or more variables. The HCA plots were especially useful in providing clear visual clusters regarding dataset with more than one sub-variable (e.g. three cultural groups and six age groups). The semantic response diagram was useful in allowing visual comparison to be made between different sets of response as well as across all the 15 word-pair scales.

- **Preference selection and ideal response**– When respondents were asked to select their most liked and least liked house samples, no clear patterns of agreement on their selection were observed across three cultural groups. For both the UK and Japan contexts, differences in selection were found between males and females, and across the six age groups. Within the Taiwanese context, identical most liked and least liked selections were given by male and female, as well as respondents across all five age groups, except from the 9-11 respondents. Despite the differences found in respondent's visual descriptions and preference selections, consistent agreement on respondent's ideal house qualities were obtained. These results suggest that respondents perceive different features from different photographs as most closely representing their idea house response profile. Although

respondent's preferences differ they are all interpretations of a universal ideal house quality profile which implies that a universal assessment tool to define the qualities of an ideal house could be developed utilizing a semantic differential scale.

9.2 The Endurance of Aesthetic Appreciation of Buildings

The desire to provide buildings with a longer lifetime and to effectively manage the existing building fabric to achieve sustainable future development was recognized in previous discussion with the emphasis on human aesthetic appreciation of the built environment. In chapter 8, the endurance of a building's aesthetic value through changes of its urban context and its façade appearance were investigated. In order to maintain a building for a long life, future changes and modifications may occur or be required either to the building itself or to its surrounding environment. How much change and what kind of changes can be sustained while continuously allowing the building to maintain or enhance its' aesthetic appreciation from the general public?

The following general conclusions could be drawn from the research activities initiated in chapter 8:

- Results regarding changes made to the façade of OFM building indicated that the aesthetic value and the significance of a historical building are generally recognized by the public through visual judgement. No significant differences were found between responses obtained from respondents within or outside of the Wakamatsu area. All respondents, whether familiar with the existing OFM building or whether it was their first acquaintance with the building, have all ranked the original façade as the most preferred choice and the façade simulation without the roof tower as their least preferred.

This finding suggests that preserving the original building façade would definitely ensure people's aesthetic appreciation towards an historical building. However, in the case when refurbishment works are required and changes made to the building façade are necessary, it is important to maintain the shape and figure of the building's original appearance. In order to allow the aesthetic quality of a building façade to be maintained during a refurbishment process, the shape of the overall façade appears to be more important than details or colour. However, when respondents were asked to provide reasons for their preference ranking, colour appeared to be more frequently used than shape as the basis of their aesthetic judgement. This finding suggests that judgments made on a visual stimulus basis, such as colour photographs, could differ from judgments provided by words or description. This could further indicate that the basis or reasoning of human's aesthetic judgment does not directly translate or is not equal to one's aesthetic appreciation.

- Results obtained from the questionnaire regarding the heights of buildings in the surrounding environment of the OFM building suggest that the OFM building is most

aesthetically appreciated when its surrounding buildings are of similar height. It is least appreciated when surrounded by buildings three times its height (≧8 storey or ≧24m) by most of the respondents except the 9-11 age group in Wakamatsu and both the 9-11 and 12-18 age groups outside of Wakamatsu area. When building heights are considered, the younger respondents are generally more aesthetically attracted to the streetscape with taller buildings.

Considering the 14 storey apartment building that has been constructed directly adjacent to the Old Furukawa Mining building, although findings suggested that tall buildings are not aesthetically appreciated, a mixture of height and low buildings is better preferred than one containing tall buildings only. A well balanced building height streetscape in relation to the existing OFM building without strong direct visual conflicts could be the key consideration when the planning and construction of tall buildings are unavoidable.

Consistently, without directly addressing building height as the study issue in the questionnaire, building height was regarded as the main reason behind respondent's preference ranking. It is interesting to note that when the overall street scene is considered, only 2% of the total reasons collected regarded colour as the basis of judgment in comparison to the 34% responses related to changes made to the façade of the OFM building.

- High consistency was obtained regarding the most aesthetically appreciated overall skyline shape across all respondents. With attention focussed on the existing OFM building, the convex shape appeared to generate the most preferred skyline. This finding suggests that when tall buildings have to be fitted into an existing context, a well-balanced streetscape and visually appreciated skyline could be achieved when considerations are made to the building placement and the overall visual street arrangement in relationship to valued existing buildings.

The next chapter will conclude the thesis by discussing the data results in the context of the wider thesis concern regarding human aesthetic appreciation of the built environment. The overall research will be reviewed with implications for future work and the attribution of contribution.

10 Discussions

10.1 Research Discussion and Implications for Future Work

Aesthetic appreciation of existing and new buildings was recognized as a key element in achieving long-term sustainability in the built environment. When a building is aesthetically appreciated by the general public, it has the potential to last longer and to continuously provide service to the society. Building endurance was a concept introduced to describe such a notion regarding the maximum usage of the existing resources, i.e. the existing building fabric. The ability for a building to endure through time accounts for its capability to adapt to changes both within its structure and façade elements and to its surrounding physical environment and social context. Changes made to the building itself, changes occurring within its the surrounding environment as well as changes in ways people perceive buildings all contribute to the variables presented in an attempt to aesthetically manage the existing built environment.

10.2. The Contextual and Universal Aspects of Aesthetic Appreciation

10.2.1 Discussions regarding research activity

The main objective of the thesis is to provide sufficient understanding of human aesthetic appreciation to aid the development of assessment methods for future sustainable development regarding the management of the existing built environment. As previously discussed, the need for an emphasis on a cross-cultural study was suggested as providing potential for generating useful findings across a wider range of application considering people's aesthetic response. Consequently, in this thesis the first research activity focused on addressing the universal and culturally derived aspects of human responses in perceiving the aesthetic qualities of house photographs. The activity was carried out in three separate locations, the UK, Japan and Taiwan to attempt to ascertain whether any universal unity or cultural differences existed regarding humans aesthetic perception across cultures. The investigation aimed to understand people's aesthetic appreciation through language used by respondents when describing their aesthetic responses to different houses.

As discussed in the literature review chapter, previous studies carried out concerning human perception using semantic differential scales were mostly carried out in either one single culture, cross-culture with single language semantic scale, or addressed cross-cultural aspect using respondents with multi-cultural backgrounds yet employing only a single language semantic scale. In addition, examination of previous studies in the methodology review show that the adjectives used to assemble the semantic differential scales were derived from professionally biased language usage. Respondents experienced difficulties in understanding the conceptual meanings of the word-pairs, consequently providing responses that were either misleading or difficult to analyse. In order to address this problem this

research initiated the collection words used by the general public when describing physical aspects and their emotive responses to buildings. An open-ended questionnaire was used to encourage members of the general public across 3 cultural contexts to express their responses to buildings in their own native languages. In this way the research objectively collected unbiased adjectives used by the respondents in describing the perceived aesthetic qualities of various buildings. Subsequently, a 15 word-pair, three-language semantic differential scale was developed utilising the language used by the respective members of the cultures investigated. These equivalent 3-language semantic differential scales were assembled after careful analysis and justification procedures to ensure the compatibility across all three native languages and the appropriateness of the chosen word-pairs for the research purposes. It is considered that this approach to the development of research based on use of a semantic difference scale across several cultures is novel to this research project.

Using the developed 3-language inter-cultural semantic differential scale, a questionnaire was constructed with a total of 27 house photographs, with the request to specify an ideal house profile and with the addition of preference selection questions was assembled to examine general public's aesthetic responses in relation to various demographic parameters. These parameters included gender, age group and nationality. The need to consider the responses of children under 12-years-old, using members of the real general public instead of students training in the building professions and the requirement to focus on buildings and different styles of architecture were indicated from gaps found and conclusions drawn from previous environmental aesthetic studies. Hence, those aspects were incorporated into the research questionnaire and the respondent groups in an attempt to ascertain a wider understanding of human aesthetic appreciation regarding buildings and the built environment.

The research results achieved have demonstrated the effectiveness of the developed 3-lanagued semantic differential scale which effectively aided the study to differentiate between the differences and similarities of responses related to gender, age and culture. The word-pair comparisons analysis results demonstrated that none of the 15 word pairs appeared to generate insufficient responses either cross-culturally or across the other demographic variables. In general, respondents under the age of 12-years-old do appear to have different aesthetic responses when compared with respondents from other age groups.

Differences were observed across different cultural groups for both the aesthetic description and the preference selection. By having one questionnaire including responses concerning different aspects of people's aesthetic perception (the general aesthetic description, ideal house profile and preference selection), comparisons between different types of perceptual responses could be generated. The ideal house profile results generated using the semantic Differential scale showed that the responses of Japanese and UK respondents were almost identical. This suggests that the respondents had a universal

concept of what mix of qualities constitute an ideal house. However, their choices made when ask to select a house photograph to represent their most liked and least liked houses differed. This observation provided a new insight into the way people translate their notion of an ideal house into a choice of house that best fits it. The results suggest a research strategy to study further how people's notion of an ideal condition is translated into their preference response.

10.2.2 Recommendations for future work

Future work regarding this part of research activity could include the following:

- Further development of the semantic differential scale for a wider usage, i.e. including the overall urban environment, to extend the understanding of people's aesthetic appreciation towards different types of buildings, environments or perceptual objects.
- Results for the semantic profiles of respondents' preferred houses suggested that these profiles were close to their responses to the notion of the qualities that define the ideal house. However these attributes were used to express a range of different houses as the most preferred. It was difficult from the results obtained to identify and isolate visual attributes or architectural features that caused the most preferred house responses to align closely with those that represented the notion of "ideal" for houses. Some inconsistencies of the differences in responses across some word-pairs and respondent groups suggested that further investigation is required to better understand the relationships that exist between respondents' ideal and preference response and how these can inform an understanding of what physical features constitute an "ideal house".
- Results from age comparison analysis suggested that gradual changes occur in people's aesthetic responses with an increase of age. Further fuller and more detailed investigations monitoring respondents' changes in aesthetic response in relation to their increase of age could be beneficial. For example, long-term observation could be initiated with a specific set of respondents, but more in detailed, to document changes that occur in their aesthetic responses in relation to their age. Alternatively, such research could be carried out across age groups but using much larger and more demographically defined groups. Such research could provide sufficient information to identify a development pattern of respondent's aesthetic understanding over the duration of a lifetime.
- Regarding adjectives used to assemble the semantic differential scale, future work could be initiated to examine and compare responses to the developed three-language semantic differential with word pairs assembled by experts or collected from previous literature studies.
- Considering similarities and differences in people's aesthetic response cross-culturally, the research included one Western country, the UK, with Taiwan and Japan representing the Eastern cultures. Such coverage of different cultural groups allows

comparison to be made between the west and the east, it also provided the opportunity to compare responses from two very different societies within the Asian context. Conventionally, differences might be expected between responses obtain from the UK to those obtained from both the Taiwanese and Japanese responses. This is indeed the case provided by the observed from the data analysis where comparisons between the UK and the Taiwanese and Japanese respondents demonstrated significant differences in their response while comparisons between Taiwanese and Japanese respondents suggested that they were more closely related to each other. However, detailed observations using HCA plots did illustrate secondary differences between responses obtained from Taiwanese and Japanese respondents. These findings support the conclusion that differences do exist with people's aesthetic responses across different cultural backgrounds but that the magnitudes of these differences may vary in relation to a range of cultural parameters. Future studies are required to understand better the patterns of such variance in detail.

- The semantic differential scale developed in the thesis has demonstrated its effectiveness in obtaining a better understanding of people's aesthetic appreciation. Certainly in the ideal response part of questionnaire, utilizing the 15 word pairs respondents were able to provide a description regarding their ideal house profile both in terms of adjective quality and desirable intensity. By combining and comparing the responses obtained from the semantic descriptions for each of the house photographs with the semantic selections given regarding the most preferred and least preferred house, it may be possible to ascertain the visual qualities of the most and least preferred houses from a detailed examination of the photographs regarding different building features. However, results obtained from this study were inconsistent across cultures, age groups and gender and since the photograph were selected to address cross-culture and house style parameters.

Future work to consider this aspect in more detail could provide a better understanding of the visual and physical qualities of buildings in relation to people's aesthetic preference selections. This would require example photographs that would be chosen to facilitate the understanding of the influences of physical aspects such as form, colour, composition and surface texture, for example. A matrix of language use against visual physical features could then be developed.

- Analysis on the semantic word pairs suggests that across all 15 word-pairs and 27 different house photographs, the UK respondents have a greater degree of difference in their semantic usage regarding the selection of adjective on one single word-pair scale. Further analysis to examine the actual visual difference in the house photograph, i.e. architectural components, composition, and material, in relation to the disagreement in the selection of adjective on the word-pair scales would be useful in an attempt to provide a visual description regarding the differences in semantic understandings displayed across the different cultural

groups. Such an understanding could provide useful information for design development in the urban built environment regarding cross-cultural considerations and aesthetic appreciation.

10.3. The Endurance of Aesthetic Appreciation of Buildings

10.3.1 Discussion of research activity

The endurance of a building's aesthetic value through time was discussed previously and considered to be desirable in response to the long-term goal of sustainability. The thesis recognized the need to develop a methodological framework to examine the concept of aesthetic endurance. Consequently, the second part of the research activity was initiated to develop a methodological framework to understand changes of human aesthetic response in relation to changes in the built environment.

As the location for most of the research study was in Japan, this part of research activity was only carried out in Japan. However, this did allow the researcher the opportunity to explore objectively issues related to the influence of contextual variables in shaping humans aesthetic appreciation, in a society different from that of the researcher. The activities were divided into three sections each address one physical visual aspect of the built environment, building façade, building height and the overall skyline shape of the urban streetscape. With the premise that refurbishment is a sustainable approach in managing the existing urban environment, and since changes are inevitable, it is important to understand how changes made to an existing building may or may not change people's aesthetic perceptions.

Four colour photographic façade simulations of a historical existing building were generated to address four key architectural façade features; detail, color, material and overall building form. Considering changes in a building's surrounding environment, five simulations were generated to examine the effect of building height in a streetscape and three simulations regarding overall shape of street skyline in terms of the changes they may cause in people's perceptions. A process framework and scoring system were developed to objectively assemble the coloured photographic stimuli. In general, the methodology demonstrated the level of effectiveness in delivering streetscape collages which could simulate potential future changes on an existing urban environment.

It is reasonable to assume that people who live in the area where a building exist will have a more personal interest in its demolition or refurbishment than people living outside that area. However, it may also be assumed that a building of value would be appreciated even by people living outside the area (i.e. not familiar with the building) because of its inherent aesthetic quality. The research incorporated the opportunity of working in one cultural context, Japan, to examine whether differences in aesthetic appreciation do exist for respondents with particular interests, for example: personal interest, regarding the existing built environment or refurbishment issues. Consequently, local residents from the location (Wakamatsu ward) of

the existing building sample (the old Furukawa Mining building) were identified to represent people with special interest (the notion of familiarity) regarding the questionnaire setting. Additionally, as discussed previously, children under 12-years-old was considered as one of the age groups for the questionnaire respondent. The same questionnaire based investigation was repeated with people from outside the Wakamatsu area with the assumption that their interest and responses would be more objective

In conclusion, the results obtained from this part of questionnaire support the notion of preserving existing historical buildings to encourage sufficient visual balance of future development in the urban environment. Respondents in general, either from outside or inside of the Wakamatsu Ward and across all 5 age groups except the younger respondent (9-11), all preferred the choice of maintaining the existing building façade for the OFM building. Regarding the surrounding streetscape, similarly, the existing building height condition was most preferred with the concave skyline shape being the most preferred when considering potential future development. These results sufficiently demonstrated that in general all of the respondents aesthetically preferred the original appearance of the existing OFM building with its current streetscape despite the proposition that the responses of special interest groups might differ. In the case of the situation when changes are required, results obtained from respondents' second preference ranking suggest strategies to be used for the maintenance and repair of the existing building façade of a building and the development of its surrounding streetscape to continuously maintain people's aesthetic appreciation.

10.3.2 Recommendation of future work

Future work arising from this research could include the following:

- Similar to the previous research activity based on housing photographs, the younger respondents (9-11) tended to respond differently from the other respondents where for them the most preferred selections were not the existing building façade or the current streetscape. Further investigation addressing such differences and changes in children's preference perception for respondent from age 9-11 to 12-18 would be beneficial to better understand the pattern and potential factor of people's changes in their aesthetic appreciation in relation to age and life experience.
- It would be useful to extend this part of the research activity across different cultural contexts to further examine the notion that special interest groups may respond differently as well as testing the hypothesis that familiarity is an influential factor regarding people's aesthetic preference selection particularly with existing historical buildings.
- The results obtained from the façade simulation activity demonstrated scattered preference selections regarding colour and material variations. Colour was also specifically indicated by the respondents as an important reasoning behind such selections. Therefore, further study is proposed to consider such building feature in more detail regarding the visual

impacts of refurbishment work on existing buildings.

- Despite the overall consistency in respondents' preference selection across all 3 parts of the questionnaire, a large range of reasons for these responses were given by the respondents. It is suggested that further development of the semantic differential scale, assembled previously, to include aspect of urban environment could be incorporated with this part of research activity to help respondents to express reasons behind their aesthetic preference selection.
- Finally, the research work presented in this thesis can be improved further by incorporating the two separated research activities, described in Chapters 7 and 8, to more fully investigate human aesthetic appreciation of the built environment to act as an aid to decision making regarding future urban development in achieving sustainability.

10.4 Conclusion

In conclusion, both research activities demonstrated appropriate methodologies in attempts to understand human aesthetic appreciation regarding different conditions in the built environment. It is considered that the approach to the development of the research questionnaire based on the use of a semantic differential scale across several cultures using the respective native languages is novel to this research project. The use of photographs collected cross-culturally to obtain aesthetic responses from respondents with different cultural backgrounds is also considered unique. The questionnaire was set up to allow the possibility of identifying potential patterns regarding the universal similarities and the differences aesthetic appreciation of people from different cultures. The notion of familiarity could also be examined in this regard to ascertain any changes in response when people encounter buildings collected from their own cultural context. The research activity developed to examine the notion of the endurance of aesthetic appreciation of buildings is also recognized to be unique in this research project. The consideration of time as an important parameter in examining the possibility of changes of human's aesthetic appreciation in relation to changes in the built environment is regarded as significant and novel. Results obtained from both activities have suggested aspects and areas for future consideration and research in the development of the use of aesthetic understanding to guide sustainable development in future urban environments.