AN ANALYSIS OF INTERIOR WOOD PRODUCTS AND THEIR PSYCHOLOGICAL IMPACT

by

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Abstract

This research focused on understanding people's perceptions of wood, particularly in interior applications. The goal was to determine what type of environment wood products create and to determine if they can have a positive effect on an individual's health and well-being. A total of 119 respondents from the Greater Vancouver Regional Area completed the study. The research consisted of four separate sections, of which each subject completed three. Subjects were asked a variety of questions focusing on indoor environments, interior furnishing materials, wood products and perceptions of wood. The main objectives of this study were to: determine if wood environments have an impact on emotional states and, therefore, implications for psychological health; determine if there are any demographic differences with respect to how people emotionally respond to wood (e.g. age, culture, gender); and determine if emotional response to interior wood products can be used in the development of marketing strategies.

The research indicated that people's response to wood is, for the most part, extremely positive. Furthermore, there appears to be a strong belief that wood creates healthful environments. Wood environments were continuously described with the following terms: 'warm', 'homey', 'relaxing', 'natural' and 'inviting'. Perceptions of wood do not appear to be related to any demographic differences, showing people's positive response to wood and wood environments appears to be relatively widespread. Humans have an innate desire to try and replicate nature in their indoor environments either through the use of large windows and views of nature, natural light, plants and natural materials such as wood.

Wood's positive effects on health and well-being need to be added to wood's total product concept. Wood manufacturers have the opportunity to market wood in an entirely new and innovative manner. Secondary processed wood products have many opportunities in today's global market, but it is important that all of wood's positive attributes, including potential psychological benefits, be properly exploited in order for wood to successfully compete against other products.

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1 Introduction

The environment that we live in has a tremendous impact on our lives; it affects us physically, as well as psychologically. Many studies have been conducted to determine the physical health effects of different aspects of our homes (Godish, 2001; Shaw et al., 2001; Small 1983), but little has been done to investigate their psychological impacts. How do the materials that we finish our homes with affect our psychological well-being? Are some materials more beneficial than others in terms of how people emotionally respond to them?

The purpose of this research is to determine if increased psychological well-being can be derived from wood used in interior finishing applications as opposed to the use of other more industrial or synthetic materials. The main objective of this research is to determine if people have an emotional response to wood used in interior environments. The following specific objectives will be explored:

1. To determine if wood environments have an impact on emotional states and, therefore, implications for psychological health.
2. To determine if there are any demographic differences with respect to how people emotionally respond to wood (e.g. age, culture, gender).
3. To determine if emotional response to interior wood products can be used in the development of marketing strategies.

Through scientific studies, it has been proven that nature improves our psychological health, but little is known about the effects that natural materials have on us. Wood has the potential to be beneficial to our well-being, but, to date, little has been proven with respect to this hypothesis.

Only a handful of researchers around the world have looked at the impressions and perceptions that wood has on the psychological well-being of individuals (Masuda and Nakamura, 1990; Masuda, 1992; Ridoutt and Ball, 2002). As the wood

products industry in North America evolves, it is necessary to fully understand peoples' perceptions of wood, as well as the impact that wood can have, in order to properly focus marketing efforts, find new markets and develop new products.

Wood is a versatile material that can be used in many different applications throughout a home. It is important to realize, though, that wood is more than just a material, and it may have benefits that reach beyond just the aesthetic and structural properties generally attributed to it. Wood may affect the environment created in a room which, in turn, can have an effect on the individuals that use the space in terms of stress, productivity and general well-being. As research in this area increases and the true benefits of wood are uncovered, the addition of these factors to wood's total product concept may add to the success of marketing wood for interior applications. The goal for interior wood products producers is to exploit all of the material's attributes to help design successful marketing strategies that reach consumers and convince them to choose wood over other materials.

Chapter 2 first explores the potential markets for healthy home products, with a focus on housing trends and the repair and remodeling sectors. Once the proposed markets for these products have been explored, the concept of healthy homes and what they encompass will be described in detail. From here, the focus shifts to psychological well-being with the concept of stress being described to help explain why designing spaces that increase well-being is important. The environment has a tremendous impact on people, and both natural and built environments will be discussed along with the psychological impact that nature has on humans. Specifically, past wood research in the area of aesthetics and psychological perceptions are explored. The chapter closes with the objectives and hypothesis for this research.

The research methodologies are described in Chapter 3, while the results are given in Chapter 4. Discussion of the results and conclusions are found in Chapters 5 and 6, respectively.

The constitution of the World Health Organization defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (Colburn, 1968). This definition is extremely useful when looking at health in a holistic manner, and is used throughout the remainder of this paper when referring to the term health.

2 Background and Objectives

2.1 Healthful Living

The healthy home concept is slowly increasing in momentum and market demand, but is far from being common practice. People have started to understand the effects their homes can have on their health and are beginning to place a much higher priority on these issues. The concept of furnishing rooms to not only increase aesthetic appeal, but to improve psychological well-being is in its infancy and has not yet been widely researched. While it seems intuitive that our indoor environments affect our psychological well-being, there is currently only a limited understanding of these effects. Consumers capable of considering these factors when building or renovating their homes are those that are not faced with the daily challenges of obtaining shelter and food. Put another way, the issues relating to healthy homes are currently not relevant to a significant portion of the planet, but are of interest to people in developed nations (especially wood-friendly nations) who have reasonably high standards of living. Thus, the regions that may be interest in this study include North America, Europe and Japan.

2.1.1 Trends in Housing in Regions of Interest

Analyzing projected housing starts in the regions of interest is helpful in trying to identify opportunities for interior furnishing materials, as all new homes must be furnished. The repair and remodeling sector offers excellent potential as well, as trends in this area impact on manufacturers of these products.

The North American residential building sector is a cornerstone of its economy and, since the fourth quarter of 2001, prospective homebuyers have been taking full advantage of the 40-year lows in mortgage rates (Taylor, 2002). The strength of the U.S. housing market is expected to continue and a new U.S. record is expected to be realized in 2004 (1.920 million units) before cooling off in 2005

(National Home Builders Association, 2004). As well, Canadian housing starts have been strengthening since 1995 and, while they were projected to moderate somewhat in 2002, they are projected to rebound in 2003 through 2005 (Statistics Canada, 2004). The European housing market is considerably different than that of North America's, as flat housing starts are forecasted for the larger housing markets of Britain, Germany and France (Taylor, 2002). While the Japanese housing market may have lost the appeal it once had, as its economy is in an extended state of malaise, over a million homes a year are still currently being constructed. The people of Japan have an overwhelming fondness for wood, and this factor make the Japanese market attractive to exporters, even in difficult economic times.

Equally as important as new homes for wood producers is the repair and remodeling (R&R) market. In the United States, this market is poised for explosive growth, largely because of the extensive existing stock of aging homes built during the 1960s, 1970s, and 1980s (Taylor, 2002). Statistics indicate that 78% of existing homes in the U.S. are at least 16 years old and will soon be in need of repairs, leading to significant growth in the R&R sector (Taylor, 2002). The Canadian repair and remodeling market is also extremely strong, as many consumers are focusing their attention on improving their homes rather than moving (Taylor, 2002). While Europe is faced with a period of flat housing starts, its repair and remodeling sector is booming. A positive area of growth in the EU is the expanding home improvement market that continues to provide direct stimulus to the consumption of wood products such as flooring, furniture, millwork and other joinery products (Taylor, 2002). Focusing marketing efforts in this sector could prove to be a very lucrative option.

Concurrently, an increased degree of openness worldwide is being experienced in the furniture and value-added sectors (CSIL Milano, 2003). There has been a tremendous evolution in this sector since 1996 as new markets open up, and as the major exporters jostle to maintain and grow market share in the present day global marketplace. The world consumption of furniture is growing and, in 2001,

global production of furniture was worth approximately $200 billion US (CSIL Milano, 2003). Countries such as China, Mexico, Poland, Malaysia and Indonesia are emerging as new and important players, as they rapidly increase production and gain market share from traditional furniture producing countries (CSIL Milano, 2001). Furniture clearly dominates world trade in secondary processed wood products (SPWPs), accounting for 75% of the total (United Nations, 2001). It is noteworthy that the value of world trade of wooden furniture at $29 billion exceeds that of sawn wood ($25 billion) and wood-based panels ($16 billion) (United Nations, 2001).

2.1.2 Healthy Homes

A new movement is slowly beginning to take shape across the continent and around the world. The demand for "healthy homes" is appearing out of concern for the environment and personal health. Humans in developed countries have, in the past few millennia, advanced from depending on rock shelters, caves, and crude huts to protect themselves from the elements, to modern single and multifamily dwellings (Godish, 2001). This advancement in shelter is moving forward yet again to focus on how this built environment is affecting the occupants who inhabit the structures, as well as the natural environment in which they are built. Healthy housing is an approach to building, renovation and operating homes that helps protect the health of the people who live in them and the environment (Canada Mortgage and Housing Corporation, 2001).

Health related housing issues first came to light in the 19th and early 20th centuries in England, as well as across the Atlantic in the Eastern United States. The industrialization of the western world caused a rapid growth in urban populations that was not matched by a sufficient increase in adequate housing, and this, in turn, led to the rise of many diseases. In the early 1800s, the relation between housing conditions and health was recognized among public health practitioners in the United States and Europe, leading to the rise of the

sanitary reform movement (Krieger and Higgins, 2002). Improving the quality of housing and sanitation were important components of the early campaigns to control typhus, tuberculosis and other infectious diseases. It was also seen as a necessary measure in maintaining a healthier work force (Krieger and Higgins, 2002).

In response to this concern, reform began to take place and conditions began to improve. This situation established the basis of public health actions at the local and national levels and clearly established the link between public health and housing (Krieger and Higgins, 2002). In the United States, the sanitary reform movement was carried out mainly by boards of health and, in some cases, by voluntary health associations consisting of physicians, public officials, and other civic-minded citizens (Krieger and Higgins, 2002).

Lead exposure and poisoning within the home became the next major chapter in the history of public health involvement related to housing (Krieger and Higgins, 2002). As early as 1914, the health consequences of lead exposure were discussed in the medical literature. However, it was not until the 1940s and early 1950s that state and local health departments began warning their constituents about the dangers of lead paint. Finally, the Consumer Product Safety Commission prohibited the use of all lead paint after 1978 (Krieger and Higgins, 2002).

Today, we are facing a new era in housing, which is focused on fully understanding how the homes that we live in affect our personal health, as well as the health of our planet. The goal of the healthy home movement is to educate consumers and to give them options on how to build healthier homes in order to improve the quality of life for all occupants.

When new ideas emerge and take shape, it is often extremely difficult to put an exact definition to the concept. There are a variety of different terms that are commonly used when referring to healthy homes, and throughout the industry, words such as "green buildings", "ecological housing", and "sustainable

architecture" are prevalent. The main idea is to foster good health for both the human occupants and the surrounding ecosystem, by taking on a holistic view: we are part of the environment, let's be a healthy part (Echo, 2002).

For healthy homes to become widely accepted and achieve market success, there must be an increase in consumer awareness and knowledge. Real estate professionals will say that their industry is market driven, but when it comes to building homes, the market is largely an uneducated one (Barnett and Seldman, 1998). Buyer demand is important to the future success of the healthy house concept, but even more consumer education is needed as the basis for increasing this demand (Castelli, 2001). For the healthy house concept to succeed in the marketplace, it must be good for the owner, the builder and future generations (Canada Mortgage & Housing Council, 2001). Widespread acceptance of this perspective can only occur through increased consumer demand for practices that promote a healthy and sustainable future and not practices that excessively consume natural and human resources (Barnett and Seldman, 1998).

The market for healthy houses can be divided into two groups: those people who have already been made ill by their house, and those who are healthy and wish to remain so (Bower, 1994). According to Professional Builder magazine's 1997 Consumer Survey, approximately 66 percent of today's buyers want healthy homes (O'Reilly, 1999). While this appears to show a strong market demand, what consumers mean by healthy homes and what they are willing to pay for has yet to be fully determined. Most homeowners want a "generically" healthy house, one that, while not perfect, is far healthier than the average (Bower, 1994). As the buying public becomes more aware of health hazards in the home, and the ways to prevent them through better building practices, an increase in healthy house sales may be seen among builders, both large and small (Castelli, 2001).

A general framework for healthy housing includes a consideration of environmental sustainability, universal design, and occupant health. This framework is synthesized from many sources including Baker et al., 1998 and

Spetic, 2003. Each component is described in turn, with the main focus of this thesis being on occupant health.

2.1.2.1 Environmental Sustainability

As society moves forward into the 21st century, concern for the environment and the impact that we humans have is increasing. Common issues range from saving old growth forests to reducing greenhouse gases. In light of these issues, environmentally sustainable housing is an option that is increasing in popularity as a method for individuals and families to contribute on a personal scale to the health of our planet. This concept involves carefully planned utilization of natural energy systems in order to generate fewer pollutants and, at the same time, preserve the earth's resources for future generations (Baker et al., 1998). The goal is to construct buildings and develop sites in a manner that makes efficient use of raw materials and natural resources, protects the environment and promotes sustainable communities (Wagner, 2002).

2.1.2.2 Universal Design

The demographics of North American society are changing rapidly and the average age of citizens is increasing. This is not a phenomenon specific to NA, for it can also be found in other first world nations, including Japan and Germany. Presently, 13% of Americans are over 65 years of age, but by 2030 this number will increase to 20% (Auriemma et al. 1999). As society ages and life expectancy increases, building homes to facilitate easier living for the elderly is becoming a major issue. Universal design is an approach to creating everyday environments and products that are usable by all people to the greatest extent possible, regardless of age or ability (Trachtman et al. 1999). The focus is to create a home environment that is comfortable and usable regardless of limitations caused by age and health.

2.1.2.3 Occupant Health

The third factor in the healthy home concept focuses on occupant health. A person's home is the core of his/her environment and, from the health viewpoint, inseparable from it (Colburn, 1968). Our health is dramatically affected by our indoor environments, and our homes have a particularly strong impact (Echo, 2002). Homes are our sanctuary and, on average, Americans spend 65% of their time at home, in what is viewed as a safe haven (Healthy House RX, 2001). In this era of unprecedented technological advancement, it stands to reason that we would use our knowledge to create indoor environments with exceptional vitality in order to enhance our health and sense of well being. Yet, to date, this is not the case (Baker et al., 1998).

Beginning with the oil embargo of 1973, a high priority has been placed on energy efficiency and creating buildings that are increasingly airtight (Baker et al., 1998). Housing has developed to focus on this point, without taking into consideration the effect on the overall indoor environment of the home. Efforts to reduce energy loss through air infiltration have resulted in tighter building envelopes that trap emissions from these materials (e.g. formaldehyde and carbon monoxide) inside the interior cavities of the house (Designing Green, 2002). The U.S. Environmental Protection Agency (EPA) has recently stated that "indoor air pollution in residences, offices, schools, and other buildings is widely recognized as one of the most serious potential environmental risks to human health" and is, in fact, many times more of a health threat than outdoor air pollution (Baker et al., 1998).

An evolving body of scientific evidence demonstrates a solid relationship between housing and health (Krieger and Higgins, 2002). A house is much more than four walls and a roof; it is an interactive system made up of many components, including structure, ventilation and filtration (Healthy House Rx, 2001).

Indoor air quality has proven to be the most important factor in eliminating health problems, and a great deal of research has gone into this area. Other areas of importance within the home include water, lighting and acoustics.

Based on the current literature, most models for occupant health in the healthy home generally break down into the following components:

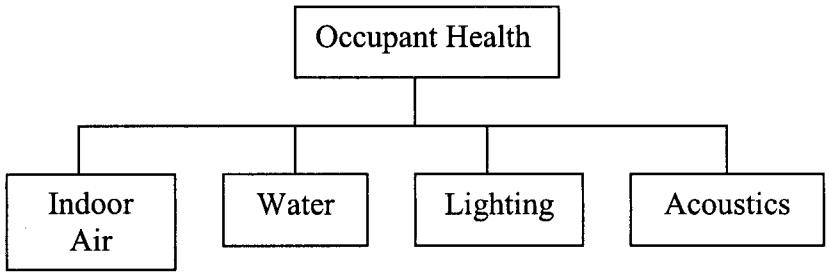

Figure 1: Occupant Health Framework for the Healthy Home

This framework is by no means exhaustive. For example, in Northern climates, thermal comfort is often included. However, for the purposes of this thesis the framework presented in Figure 1 will be used. Each component is discussed in the following sections.

2.1.2.3.1 Indoor Air Quality

The majority of the research done on healthy homes focuses on indoor air quality. Indoor air quality has a tremendous impact on the home's occupants, and has recently been attributed to a number of serious health problems. Continued exposure to toxins in the indoor environment, even at low levels, has been linked to a vast spectrum of illnesses, ranging from chronic sinus infections, headaches, insomnia, anxiety, and joint pain, to full blown multiple chemical sensitivities and other immune system disorders (Baker et al., 1998). People tend to be aware of outdoor pollutants, including smog and ozone, but most are oblivious to the pollutants found indoors (Healthy House Rx, 2001).

Indoor air pollutants can be classified into four main categories: inorganic contaminants, combustion-generated contaminants, organic contaminants, and biological contaminants (Godish, 2001). A description of each of these categories will be given along with the related health issues they can cause.

The main inorganic substances that pose a significant health risk are asbestos, radon and lead. While each is unique, they have in common a mineral or inorganic nature (Godish, 2001). Asbestos is a proven human carcinogen and exposure to high levels of airborne white asbestos fibres can cause asbestosis, a form of lung cancer (National Housing and Town Planning Council, NHTPC, 1993). Commercial and industrial use of asbestos has a relatively long history, and has been used extensively in well over 3000 applications, such as insulation for buildings (Godish, 2001). Radon, on the other hand, is a naturally occurring, gas-phase element found in the earth's crust, water, and air (Godish, 2001). The only known health effect that radon is responsible for is lung cancer, an often terminal disease (Bower, 1994). The primary sources of radon and radon decay products in buildings are the soil beneath and adjacent to buildings, domestic water supplies, and building materials (Godish, 2001). Another problem is with lead exposure, which has been a public health issue dating as far back as 1914, and depending on the dose, can produce colic, shock, severe anaemia, nervousness, kidney damage, irreversible brain damage, and even death (Krieger and Higgins, 2002 and Godish, 2001). Lead is a widely used metal due to its desirable properties, and has been used in a variety of products including paint, storage battery production, gasoline, and metal objects (Godish, 2001). Lead's use has greatly decreased in the past fifty years, but it is still a major health concern (Godish, 2001). While the use of all of these inorganic substances has declined over the years, they still represent health threats.

Combustion contaminants have polluted indoor spaces since humans discovered the utility of fire and attempted to use it under various levels of control to cook food and provide warm living conditions in cold environments (Godish, 2001). Indoor combustion is caused by fireplaces, wood stoves, gas-fired appliances

such as water heaters, and furnaces, all of which produce potentially harmful emissions (Baker et al., 1998). Some of the most common substances produced in most combustion reactions include carbon dioxide, water, carbon monoxide, nitrogen oxides, respirable particles, formaldehyde, acetaldehyde, as well as a variety of volatile organic compounds (VOC's) (Godish, 2001). The health problems associated with combustion contaminants can affect any organ of the body, but the primary effects are depression, fatigue, irritability, inability to concentrate, heart arrhythmia, decreased cognitive abilities, and multiple chemical sensitivities (Baker et al., 1998).

A large variety of natural and synthetic organic compounds can be found in indoor environments, as well (Godish, 2001). Substances that readily release vapours at room temperature are called volatile organic compounds (VOC's). Materials containing VOC's slowly release chemicals into the air (Baker et al., 1998). Most synthetic organic compounds are petrochemicals, that is, derived from oil, gas, and coal (Baker et al., 1998). Many common products found in homes are sources of volatile organic compounds that affect indoor air quality. These products include wood panel products (e.g. oriented strand board, plywood), carpets and carpet pads, insulation, paints, finishes, adhesives, and cleaning products, to name a few (Baker et al., 1998). Health effects commonly caused by VOC's include mucous membrane irritation and neurotoxic effects, asthma, cancer, and multiple chemical sensitivities (Godish, 2001).

There is increasing evidence that a significant proportion of illness symptoms and diseases associated with building environments is due to particulate-phase and, to a much lesser extent, gas-phase exposures to substances produced by a variety of biological organisms (Godish, 2001). The major pollutants in this category include pollen, house dust, bacteria, viruses and mould spores (Baker et al., 1998). There are many physical symptoms associated with biological contaminants. Some of the main ones include asthma, immunological response such as chronic allergic rhinitis, hypersensitivity pneumonitis and inflammatory responses in the respiratory system (Godish, 2001).

At the moment, two of the most troubling issues related to indoor air quality are the increasing levels of asthma and toxic mould syndrome. Asthma incidence, in particular, is increasing at an alarming rate and now affects more than 17 million individuals in the United States and is the most common chronic illness among children (Healthy House Rx, 2001). All indoor air pollutants can cause asthma in individuals. It is, therefore, extremely important to focus on building homes that allow only very limited amounts of these substances to be present. Toxic mould syndrome is a major problem throughout North America; many buildings are infested with mould, which is being blamed for a wide variety of different health issues (Godish, 2001). Mould is commonly assumed to be present only in older homes, but, actually, can be found wherever moisture accumulates (Baker et al., 1998). An increased focus is being placed on improving construction methods in order to eliminate moisture build-up within buildings and, thereby, eradicate mould-related problems (Baker et al., 1998).

2.1.2.3.2 Water

Poor indoor air quality is not the only form of pollution that affects human health. In recent years, the water supply has also become increasingly polluted (Baker et al., 1998). Regardless of whether the water source is a well or municipal water system, the water may be unfit to drink. Currently, water purification is not standard in home construction, and unless water testing and purification is specified, it will not be included (Baker et al., 1998). When building a home, it is far easier to install a water purification system during construction, than to add it after the fact. A whole house water purification system is strongly recommended as an essential feature of the healthy home (Baker et al., 1998).

2.1.2.3.3 Lighting and Acoustics

Comparatively less research has occurred in the areas of acoustics and lighting for healthy homes. Both of these elements can affect the quality of life for residents and are important aspects to consider in home construction and renovation. New wall and floor systems have been developed to reduce sound travel between rooms and from the outside. Unwanted noise can be a cause of stress, and, as a result, can have negative health implications (Wade & Tavris, 2000).

Lighting is another important factor in a home. The amount of natural light versus artificial can greatly affect the atmosphere of the room. Natural light was found to improve student achievement, increase worker productivity and decrease absenteeism (Hathaway et al., 1992). Another consideration is the optimum lighting level, as well as the residential lighting types in use. Lighting which contained a full spectrum with UV supplement was found to increase students' health and academic achievements over high pressure sodium vapour lighting (Hathaway et al., 1992). Definite consideration should go into determining the type of lighting desired and any specific building requirements that are necessary as a result. Final considerations are the amount of energy required for different lighting systems, and finding the most environmentally sound choice (Godish, 2001).

2.1.3 Proposed Addition to Occupant Health Framework

The reader is reminded that the constitution of the World Health Organization defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (Colburn, 1968). How humans perceive and interact with their environment affects their well-being, stress level, and overall health. People derive pleasure and happiness from their environments, and, for most, their primary environment is their home. In light of this, the current occupant health framework (Figure 1) lacks psychological well-

being, and it is proposed that it should be added as it is an important component in the healthy home concept (see Figure 2). To fully encompass the meaning of health within our homes, it is essential that the psychological effects of our homes be uncovered. What affects and increases our well-being? Do the materials we use to furnish our homes affect us and, in turn, our psychological well-being?

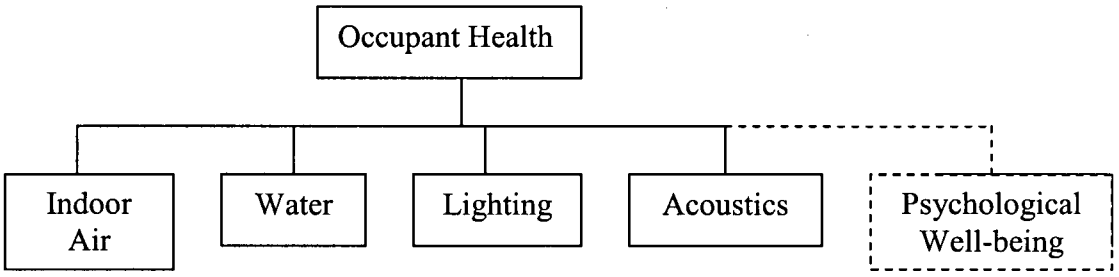

Figure 2: Proposed Addition to Occupant Health Framework for the Healthy Home

These sorts of questions are timely in that architecture is now taking a new approach to design in order to improve the overall performance of a building. The disciplines of architecture and neurology are teaming up to study how people perceive the built environment and why they respond in the ways they do (Penney, 2003). After extensive research, neuroscientists now know that our behaviour, which is influenced by our built environment among countless other things, affects the structural organization of the brain. The brain continues to be shaped by our actions, emotions and perceptions (Jarmusch, 2003).

There is a need to acknowledge and to develop research tools to measure the "proof" of good design objectively; that is, the impact architecture has on our physical, mental, and spiritual well-being (Penney, 2003). If a greater understanding of how the brain works in regards to perceiving our environment can be gained, then greater steps can be taken towards designing buildings that take into account all aspects of human health and well-being. Environmental psychology and some scientific research have already led architects to change

the way they design hospitals, schools and group homes for Alzheimer's patients (Jarmusch, 2003). Researchers are currently working to evaluate physiological and cognitive responses in controlled work environments, to help address how certain attributes of the workplace can impact on creativity, productivity and well-being (Eberhard, 2002). These new research disciplines are extremely promising and could, in the near future, revolutionize the built environment.

In May 2003, a unique research venture called the Academy of Neuroscience for Architecture was launched (Jarmusch, 2003). The organization was awarded the 2003 Latrobe Fellowship Award from the American Institute of Architects to help fund unprecedented studies of the brain's response to the built environment (AIA, 2003). The group's main goal is to determine what is happening in the brain when it responds to environmental factors (Jarmusch, 2003). Architect John P. Eberhard feels that, within ten years, there may be a body of knowledge and instruments associated with it that make it possible for architects to approach design in a new way by connecting it to neurological responses (Jarmusch, 2003).

Examples of the marriage between architecture and psychological responses are becoming more commonplace. For instance, a hospital in Thunder Bay, Ontario, (Figure 3) was recently designed and constructed trying to maximize the amount of wood and natural light present within the interior (Taylor, 2004; T. Farrow, personal communication, March 18, 2003). The architect, Tye Farrow, designed the hospital with the belief that wood has important therapeutic properties (T. Farrow, personal communication, March 18, 2003). Wood has value in the collective psyche that is extremely important, and it causes people to respond to it in a much different way than most other materials (T. Farrow, personal communication, March 18, 2003). The use of wood in Canada is also very symbolic for many communities as it is, and has long been, an integral component of the economy (Taylor, 2004). The use of wood inside hospitals makes many people more comfortable and is often a reminder of home (T. Farrow, personal communication, March 18, 2003). Farrow has also recently designed the addition to the Credit Valley Hospital in Mississauga, Ontario called

the "Tree of Life" (Figures 4 and 5), in which he also features the use of wood due to his strong beliefs in its healing powers (Taylor, 2004).

Another architect with who believes in the positive affects of wood is Lubor Trubka (L. Trubka, personal communication, May 1, 2003). He fosters the belief that wood is the most natural material, and that it does not create a collision with human health or the human psyche. People have a natural, friendly relationship with wood, but steel and concrete are foreign to us and, therefore, we have no such relationship with these materials (L. Trubka, personal communication, May 1, 2003).

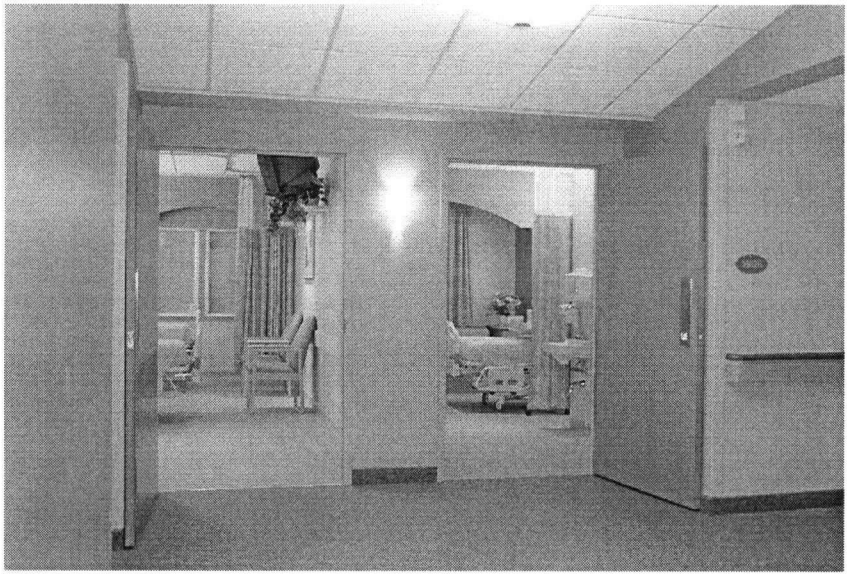

Figure 3: Thunder Bay Hospital (Architect: Tye Farrow; Photo by Tye Farrow)

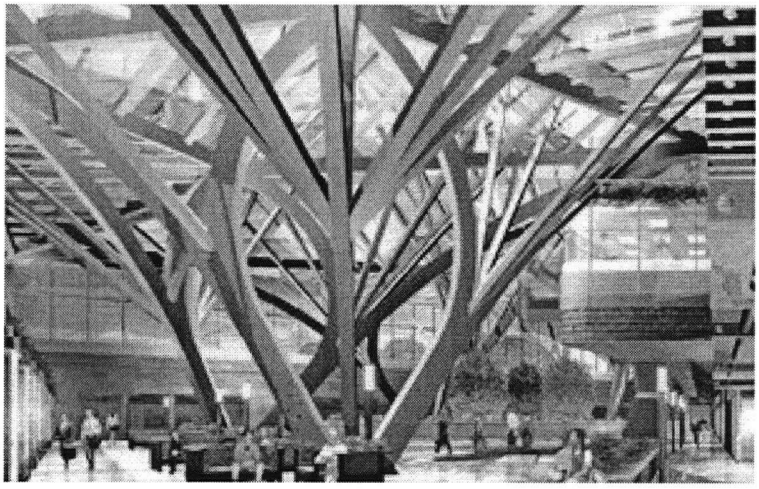

Figure 4: Tree of Life, Credit Valley Hospital (Architect: Tye Farrow; Photo by Tye Farrow)

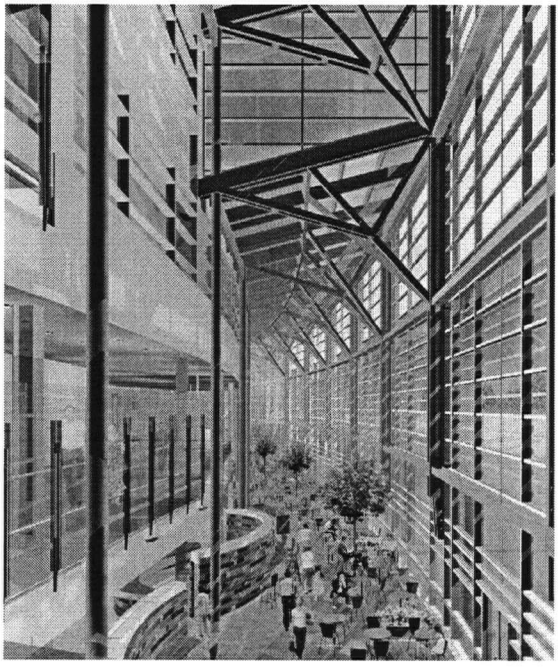

Figure 5: Credit Valley Hospital, Mississauga Ontario (Architect: Tye Farrow; Photo by Tye Farrow)

2.2 Psychological Well-Being and Stress

The field of psychological well-being is currently mushrooming as the community of psychologists show a particularly strong interest in issues of psychological growth and health. There has been a shift away from psychology's focus on the amelioration of psychopathology towards the promotion of well-being and personal growth (Ryan and Deci, 2001). This switch began in the 1960's, with a shift in focus towards prevention and has continued through to the present. The aforementioned periods were times of relative affluence, but it appears that perhaps the move towards issues of psychological growth and health have been brought to the forefront as a result of a generally economically secure population finding that material security and luxury do not necessarily bring with them happiness (Ryan and Deci, 2001).

The term psychological well-being is extremely broad, and has numerous meanings depending on the person, group or culture in question. Well-being is a

complex construct that concerns optimal experience and functioning. There are two relatively distinct, yet overlapping, paradigms for empirical inquiry into well-being that revolve around two distinct philosophies. First, the hedonic approach focuses on happiness and defines well-being in terms of pleasure attainment and pain avoidance. The eudaemonic approach, on the other hand, focuses on meaning and self-realization, and defines well-being in terms of the degree to which a person is fully functioning. In either case, well-being is not the absence of mental illness, but encompasses most aspects of our daily lives (Ryan and Deci, 2001).

Stress is an integral part of everyone's life. However, individual persons are affected differently and, in turn, react in various ways. Regardless of how common stress is in our lives, there is no generally agreed upon definition and much research has gone into this area. Canadian physician Hans Selye began the modern era of stress research in 1956 with his proposal that "stress" consists of a series of physiological reactions that occurs in three phases: the alarm phase, the resistance phase and the exhaustion phase (Wade & Tavris, 2000).

The alarm phase occurs when the body mobilizes to meet the immediate threat or stressor. A series of physiological responses occur including a boost in energy, tense muscles, reduced sensitivity to pain, the shutting down of digestion (so that blood will flow more efficiently to the brain, muscles and skin), a rise in blood pressure, and increased output of the adrenal hormones epinephrine (adrenaline), norepinephrine, and cortisol. Regardless of whether one is faced with real danger or is merely doing a presentation in front of a large audience, the response experienced is generally the same (Wade & Tavris, 2000). In the resistance phase, the body attempts to resist or cope with a stressor that cannot be avoided and which persists over time. Throughout this stage the body is still experiencing the physiological responses of the alarm phase and, as a result, it becomes more vulnerable to other stressors. Generally after a period of time, the body will adapt to the stressor and return to normal (Wade & Tavris, 2000). The exhaustion phase occurs in the case where the body does not adapt to the

stressor and the persistent stress depletes the body of energy, increasing vulnerability to physical problems and, eventually, illness. During the alarm and resistance phases, these reactions allow the body to respond efficiently, but prolonged responses are unhealthy for the body. A variety of health problems, including headaches, neck pain, increased blood pressure, chronic hypertension and digestive disorders, can occur (Wade & Tavris, 2000).

Even in the face of tremendous stress, the majority of individuals do not face serious health problems. Some people appear to be far more susceptible than others. Due to these issues, the above three-phase stress model has been improved over the past few decades to address this issue. Specifically, the following three areas have been the subject of investigation: (1) individual variations in the body's cardiovascular, digestive, endocrine, and immune systems; (2) psychological factors, such as personality traits, perceptions and emotions; and (3) how people behave under stress and how they manage it.

From the modern view of stress, it becomes apparent that stress and the body's response is not simply affected by external factors, but is also, to a large extent, controlled by internal factors. Due to these findings, the modern model of "psychological stress" has been revised to include these factors (see Figure 6).

Chronic low levels of stress can also have an extremely detrimental effect on the body (McEwen and Krahn, 1999). Prolonged stress has been shown to weaken the immune system, strain the heart, damage memory cells in the brain and deposit fat at the waist, rather than the hips and buttocks (a risk factor for heart disease, cancer and other illnesses) (Goode, 2002). Sustained stress and the resulting overproduction of cortisol can have chilling effects on the hippocampus, (a key brain structure involved in the formation of episodic spatial and contextual memories), shrinking these nerve cells and halting the creation of new hippocampal neurons (Goode, 2002). Recent studies have provided increased support for the notion that stress contributes to heart disease, and researchers have tied psychological stress, directly or indirectly, to diabetes, rheumatoid

arthritis, fibromyalgia, severe depression and other mental disorders (Goode, 2002). While acute stress can have beneficial affects such as increasing alertness, chronic stress generally only has negative effects, causing premature aging and leaving individuals chronically fatigued or depressed (McEwen and Krahn, 1999).

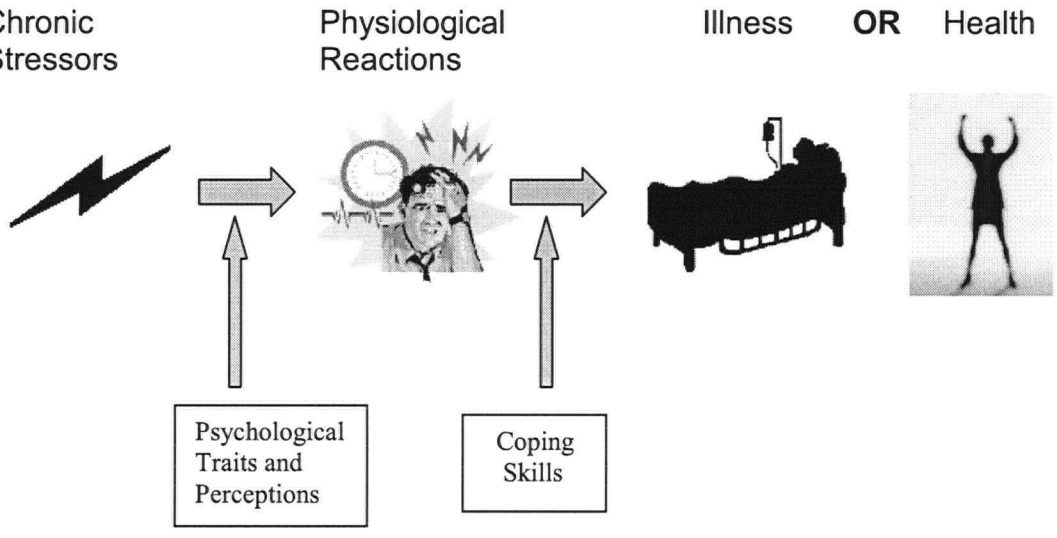

Figure 6: Modern View of Stress (Source: Wade & Tavris, 2000)

2.2.1 Psychology and the Environment

The rise of environmental psychology over the past thirty years shows a universal acceptance that the environment has a tremendous impact on humans and well-being. Environmental psychology is the study of transactions between individuals and their physical settings (Gifford, 1987). In these transactions, individuals change the environment and, conversely, their behaviours and experiences are changed by the environment (Gifford, 1987). By increasing our knowledge about the effects of the environment on our health and well-being, it will become possible to focus building design on increasing these benefits to occupants.

The relationship between stress and health is complicated, affected by numerous factors. As stress is an unavoidable and important factor in everyone's life, the goal is not to eliminate stress, but to minimize its wear and tear on the system. Certain aspects of our lives can help to counteract the negative effects of stress, and one of these is the environment in which we surround ourselves (Wade & Tavris, 2000). While a great deal of research has gone into determining the types of stressful environments that are harmful to our health, we do not yet know what types of environments can be beneficial. It is important to determine how best to create a home environment that, in all respects, improves our overall well-being. As the average American spends approximately 65 percent of their time at home, it is vital that the home environment is a healthy one (Healthy House RX, 2001). The materials that we use in our homes are likely to have a tremendous effect on how we perceive and view our surroundings and how they, in turn, affect us. Investigating which materials are most beneficial to people is important in helping to create relaxing, healthy homes that are conducive to a feeling of well-being.

2.2.1.2 Psychology and Nature

Research in the area of the environment's impact on psychological health all points to a clear finding that people show a consistent preference for natural scenes with vegetation over views of manmade environments (Ulrich, 1984; Kaplan et al., 1972). To many, this point seems somewhat intuitive, but the area of aesthetic preference has become an important area of research (e.g. Ulrich, 1986; Kaplan and many others). This preference for nature leads to the hypothesis that, within our homes and other buildings, natural materials may lead to the same sort of preferences and provide a sense of well-being.

A great deal of research has been conducted over the past few decades to evaluate the impact that nature has on our health (Ulrich et al., 1991; Ulrich, 1984; Ulrich et al., 1990). Researchers have tried to uncover the psychological benefits that nature has on humans and, in turn, their overall health. To measure the health benefits of nature, investigations have revolved around stress reducing

factors, as stress reduction in our daily lives can help to improve our health. To test stress reduction and the effects of natural scenes, methodologies measuring individuals' physiological responses to scenes is used. Physiological activity is typically gauged from aspects or levels of four major bodily response systems: (1) the electrocortical; (2) autonomic; (3) skeleto-muscular; and (4) endocrine (Ulrich et al., 1990). A second approach has been to monitor and compare the recovery rates of patients after surgery (i.e., patients with a view of trees versus those with a view of a building) (Ulrich, 1984). In both cases, nature appears to have a strongly favourable impact on our well-being and helps humans in ways that are not fully understood or articulated.

Plants have an effect on human beings that is not fully understood, but due to increasing research in this area, their positive benefits are beginning to become widely accepted. Not only has it been found that people feel that plants are important in improving satisfaction within indoor spaces, but findings have shown visual contact with vegetation (even through windows) increases psychological well-being and is beneficial for people in states of stress or anxiety (Ulrich, 1984). Research shows that the effects that plants can have on health and well-being are numerous and should not be underestimated (Frumkin, 2001). The most dramatic finding found that surgery patients with a window view of a stand of trees had statistically faster recovery times than similar patients with a view of a building. In addition, they required fewer moderate or strong analgesics and had more positive comments from the nurses (Ulrich, 1984).

The presence of plants was also found to reduce the physical discomfort in a study by Lohr and Pearson-Mims (Lohr and Pearson-Mims, 2000). Subjects were more willing to keep their hand submerged in ice water for a period of 5 minutes when in a room with plants present compared to when they were in a room without plants. This was found to be the case even when the room without plants had other colourful objects that might help the subject focus on something other than the discomfort (Lohr and Pearson-Mims, 2000). The implications of this finding

are extremely relevant for hospitals, dentist offices and other areas where physical discomfort is common.

Horticulture therapy is common tool used in the treatment of a wide variety of conditions, and has roots as far back as 1768 (Relf, 1973). The ultimate goal of these programs is to improve the physical and mental health of the individual, through the use of plants and gardening activities. The findings show that the benefits may be seen in four areas: intellectual, social, emotional, and physical development (Relf, 1973). From being around plants and observing their growth, people acquire an understanding of life and the rhythms that maintain it. It would appear that the specific response to plants and the aesthetic response to the environment may have similar origins in human's evolution (Relf, 1981).

Indoor plants in offices have been linked to increased worker productivity and decreased stress levels. Office employees report that plants make them feel calmer and more relaxed, and that an office with plants is a more desirable place to work (Frumkin, 2001). A study by Lohr et al. (1996), found that adding plants to a windowless work place increased productivity by 12% and lowered stress (as measured by systolic blood pressure readings). Subjects also reported feeling more attentive than those in an identical work place without plants. Yet another study found that a room with plants facilitated persistence at a puzzle task (Genereux, 1982). The addition of plants to work spaces appears to have many benefits to its occupants.

Despite the intuitive appeal of trees, little research has dealt explicitly with human responses to trees (Orians and Heerwagen, 1992). An evolutionary-ecological approach to aesthetics suggests that the incorporation of trees and tree forms, actual or symbolic, into the built environment should have a strong positive impact on people (Orians and Heerwagen, 1992). Assuming this is the case, then the use of wood and wood products in the interior of homes might also have a positive impact on the occupants and their overall well-being as wood is arguably the ultimate symbol of a tree.

As with plants, the use of animals in the treatment of human ailments has been reported for centuries. In 1792, animals were integrated into treatments for psychiatric patients at the York Retreat in England in an attempt to reduce the use of harsh drugs and restraints. The first use of animals in treatment in the United States was in 1919 at St. Elizabeth's Hospital in Washington D.C., where dogs were used as companions for the psychiatric hospital's resident patients. Extensive use of animals was used in 1944 to 1945 at an Army Air Corps Convalescent Hospital at Pawling, New York to help patients recovering from war experiences. During the 1970's, numerous case studies of animals facilitating therapy with children and seniors were reported, and this began the tremendous body of research that continues today (Robb, 1987). This recent research lends credibility to the centuries-old belief that the association of people with animals and the natural environment contributes to overall health and well-being (Bustard, 1996).

Animals are an important part of nature and, in turn, have been found to have considerable influence over our health. A great number of studies have been conducted recently linking companion animals to greater health and well-being for their owners. The bond between pet and owner appears to be exceptionally strong, affecting not only individual's mental well-being, but also showing a positive impact on physical and social health (Bustad, 1996).

Animals have been proven to have an astonishing effect on our health. They are objects of nurturing, promoting touching, playing and sharing, and filling a void left by modern society for a large portion of the population (Bustad, 1996). Numerous studies in the area of companion animals have shown that animals have been linked to the following benefits:

- Improved survival after coronary heart disease and coronary operations (Friedmann and Thomas, 1995, Friedmann et al., 1980);

- Reduction in blood pressure and stress levels in healthy individuals (Anderson et al., 1992);
- Improved quality of life for elderly individuals (Robb, 1987; Ory and Goldberg, 1983);
- Improved socialization of young children with their peers (Nielsen and Delude, 1989);
- Development of nurturing behaviour and humane attitudes in children (Melson, 1990);
- Improved social behaviour in prisoners (Katcher et al., 1989);
- Reduction in minor health problems (Serpell, 1991); and
- Increases in recreational walks (Serpell, 1991).

These are but a few of the numerous benefits that animals have been found to have on human health and well-being. Forms of psychotherapy using animals have become a common tool to help individuals cope with and overcome a wide array of different issues and are, in some cases, becoming the therapy of choice (Bustad, 1996).

The significance of animals in the lives of people everywhere is becoming extremely difficult to ignore, and even more difficult to put a value on. Currently in the United States, it is estimated that there are an astounding 55 million dogs and 60 million cats (Bustad, 1996). As our society becomes more and more urban, the great increase in pet ownership may reflect an often unsatisfied need for intimacy, nurturance, and contact with nature (Robb, 1987).

Just as horticulture and pet ownership were married with psychology and have been shown to have benefits to health and well-being, it is now time to look at wood and natural materials in the same light.

2.2.1.3 Psychology and Wood

Delving into people's psychological perceptions of wood is a new and largely unexplored area of research. To date, only a handful of researchers around the world have looked at the impressions and perceptions that wood has on individuals. As the wood industry in North America evolves, it is necessary to fully understand people's perceptions of wood, as well as the impact wood can have, in order to properly focus marketing efforts, find new markets and develop new products. What research has been done comes mostly from different corners of the globe, with the common tie being that they are all wood producing and consuming countries, such as Sweden, Canada, Japan and New Zealand.

In order to understand the psychological impacts that wood may have, it is first important to consider its aesthetic attributes. Wood surfaces have a variety of different features that make it a unique material and give it its aesthetic properties. Colour and figure are two very important features of wood (Fell, 2002). Grain refers to the surface appearance of a piece caused by the early wood-late wood contrast of the growth rings (Hoadley, 1990). Figure refers to any distinctive grain pattern on the longitudinal wood surface, and it is also an important feature in giving wood its aesthetic quality (Hoadley, 1990; Broman, 2000). Other aesthetic properties of wood include knots or any machining marks that may be apparent on the surface of a piece (Broman, 2000). The combination "or absence" of these features gives wood its overall aesthetic appeal (Broman, 2000).

Wood is a unique natural material, having a wide variety of attributes that contribute to its beauty and popularity. Due to its biological properties, wood has a tremendous amount of variability, meaning that no two pieces are exactly alike. Many attributes of wood are seen as extremely positive and as enhancing wood's overall appeal, but others are seen as negative, such as knots and mineral streaks. In the end though, wood's inherent and unique aesthetic properties can give products made of wood a competitive advantage over other materials (Broman, 2002).

One of the goals of this research project is to gain a detailed understanding of how people perceive wood so that the full potential of wood products can be unleashed. Research out of Sweden performed by Olof Broman focused on trying to develop methods for measuring people's preferences toward different looks of wood and to connect the subjective preference data with objective measurements of wood features (Broman, 2002). The main conclusions of this research are that people prefer different blends of wood features, and that there are two qualitative differences that are of importance in determining people's impressions and valuations of wood. The first factor is the overall blend of wood features, while the second, and more important, aspect is that of divergent features that mismatch in a surface. Clear surfaces were generally found to be rather harmonious, as opposed to knotty surfaces which were seen as less so. The properties of harmony, simplicity, balance, as well as the ability to be stimulating, were all found to be of importance in evaluating the appeal of wood surfaces.

Research focused on trying to evaluate the consumer acceptance of some of the lesser-used Canadian wood species with respect to value-added applications found that colour and grain are the most important attributes that consumers consider (Fell, 2002). Top ranked descriptors were "warm" and "classic", whereas lower ranked descriptors were "modern" and "cool" (Fell, 2002). The ranking of descriptors in terms of preferred wood surfaces is important, but the next step of Fell's research will focus on trying to measure exactly what is meant by these terms. This will hopefully make the evaluation of wood surfaces a more quantitative, rather than qualitative, matter.

The most extensive research focusing on wood and psychological impressions was carried out by Minoru Masuda at Kyoto University in Japan. His work attempts to determine a scientific link between wood use and individual interpretations and feelings about the environments created by its use.

Interior spaces with high ratios of wood are often referred to as 'warm'; however, research shows that a simple directly-proportional relationship between the proportion of wood and the degree to which a room was considered 'warm' was not found (Masuda and Yamamoto, 1988). The same was true for the image of 'calming' (Masuda and Yamamoto, 1988). There was, however, a strong relationship between the colour of the wood and these two psychological descriptors, especially for wood that possesses the average colour value of 2.5 on the yellow-red spectrum (YR). As the colour of wood approached this value, the more it was associated with these terms (the correlation coefficients were 0.60 for 'warm', and 0.54 for 'calming') (Masuda and Yamamoto, 1988). The image of 'calming' came not just from wood, but also from other factors, like the amount of cloth and foliage plants present and the level of brightness of light (Masuda, 1992).

Other material ratios and hue values were evaluated to compare with those of wood. The 2.5YR colour value was found to contribute highly to the perceived values of 'warm' both for wood and textiles (including carpet), while concrete showed a negative correlation (Masuda and Yamamoto, 1988). Concrete was found to produce the psychological perception 'cold' (Masuda and Yamamoto, 1988). Which supports the theory of a latent belief that 'stone is cold, wood is warm' and that this strongly influences our psychological impressions (Nakamura et al., 1994). Why we associate yellow-red hues with warmth is possibly subconsciously linked in our minds to ancient times, when humans depended upon the warmth of the sun and fire for heat and comfort (Masuda, 1992).

As technology and urbanization become more and more prevalent in our lives, many people strive to create a home environment that is as natural as possible. Nature views have been proven to have a far more positive influence on our psycho-physiological state than urban scenes (Ulrich and Addoms, 1981). While it is definitely possible, it has not yet been proven that natural materials have the same effect in homes. The higher the wood ratio present in a room, the stronger the 'natural' image that is conveyed (Masuda and Nakamura, 1990). Hues in the range of 2.5YR convey a more natural image than other colours, but the wood

ratio is actually far more effective in influencing this image (Masuda and Nakamura, 1990). It should be noted that a high wood ratio causes the average hue of a room to approach a wood colour, which is an important influence on the strength of the 'natural' image projected by a room (Masuda and Nakamura, 1990). However, it appears that the image of 'naturalness' is more strongly related to the amount of plant-derived organic products in the room than merely the amount of wood present (Masuda, 1992).

Wood is a natural living material with varying features, each of which can produce different psychological impressions in people. These perceptions can vary among people and definitely across cultures. Typically, Japanese people prefer clear wood, as knots inspire the image of 'cheapness' (Masuda, 1992). Knots are seen as blemishes, defects or scars, and do not seem to fit with the Japanese people's love of 'pureness' (Masuda, 1992). On the contrary, in Europe and North America, wood products containing knots are widely sold and are associated with such images as 'natural', 'rustic' and 'simple' (Masuda, 1992).

The interdependence between people and their physical environment is an intricate and complex relationship, to the extent that people receive part of their personal identity from their surroundings (Ridoutt et al., 2002a). Research out of New Zealand was able to demonstrate that wood has qualities apart from its physical and functional properties. It was found that the use of wood for interior office decoration leads to an overall more favourable first impression of the occupant (Ridoutt et al., 2002a). There was an overwhelming preference to work for organizations that had significant utilization of wood products in their interiors, and organizations without wood were the least preferred places of potential employment (Ridoutt et al., 2002b). It is important to note that there are meanings connoted by wood in the office environment that are largely positive, and should be considered in design. The office environment is far more than just a static setting that has little psychological impact upon its users; it is rich with cues and may be very influential in communicating an organization's culture, capabilities and purpose (Ridout et al, 2002b).

2.3 Summary of Relevant Literature

There has been a great deal of research concerning the concept of healthy homes and healthful living (Spetic, 2003; Baker et al., 1998; Godish, 2001). As consumers become more educated about the effects that their homes can have on their health and well-being, the demand for healthy homes is poised to increase (Spetic, 2003). Scenes of nature have been proven to have beneficial effects on stress reduction and health (Ulrich, 1986). Likewise, plants, horticulture therapy and pet ownership have also all been linked to improved well-being, leading to the conclusion that nature and natural elements may have positive effects on humans. Just as horticulture and pet ownership have been linked to psychological well-being, it is perhaps now time to look at wood and natural materials in the same light. There is a realistic possibility that natural materials possess health benefits, and this concept needs to be further explored. This thesis is primarily focused on taking a new and unique approach to looking at wood products in interior applications, and the benefits they may hold for the inhabitants.

2.4 Objectives

Understanding the reasoning behind people's psychological images and perceptions is extremely important for the wood industry. Armed with this information, producers will be better able to manufacture products that go above and beyond consumer expectations. Only once there is a solid understanding of the relationship between wood and humans can wood for interior applications reach its fullest potential.

Main Study Objective:

To determine if people have an emotional response to wood used in interior environments.

Specific Objectives and Hypotheses:

Objective 1: Determine if wood environments have an impact on emotional states and, therefore, implications for psychological health.

Hypotheses 1: Wood environments positively impact peoples' emotional states and psychological health.

Objective 2: Determine if there are any demographic differences with respect to how people emotionally respond to wood (e.g. age, culture, gender).

Hypotheses 2: Humans' response to wood is universal and, therefore, demographic differences are irrelevant.

Objective 3: Determine if emotional response to interior wood products can be used in the development of marketing strategies.

Hypotheses 3: Humans have an innate desire to try and replicate nature in their indoor environments by bringing the outside in, through the use of natural materials (like wood).

3 Methodology

To meet the objectives of this research, four methodologies were employed on a sample of 119 individuals. These are listed below along with the number of subjects that participated in each experiment: 1) q-sort (40 individuals); 2) interviews (119 individuals); 3) conjoint analysis (79 individuals); and 4) self-administered survey (119 individuals). All subjects completed the interviews and self-administered survey, while every third person who arrived at the study location was asked to complete the q-sort section and the remaining two-thirds completed the conjoint analysis. Each part of the study was designed to uncover different types of information so that each of the three hypotheses could be investigated. Both qualitative and quantitative data were collected in order to gain insight into these complex research questions.

Prior to undertaking this investigation, an exploratory analysis was carried out. Specifically, a pilot study was performed in June 2003 to test the appropriateness of the q-sort methodology (q-sort will be describe in a later section), and to gather preliminary data to focus the direction of this research. Information uncovered from this small exploratory analysis helped determine the hypotheses for this thesis (see Appendix I for results). It became apparent from the data that humans are influenced by their indoor environments, and that they prefer rooms that bring nature inside. This can be accomplished by two means: either through the use of large windows and views of the exterior, or through the use of natural materials within. The q-sort methodology was determined to be very appropriate for this research as a great deal of relevant information could be gathered through this process. The exploratory analysis was extremely helpful in deciding which combinations of methodologies to use, and in determining the specific research questions.

3.1 Study Population and Sample

3.1.1 Definition of Population

The focus of this research was on individual opinions, impressions and feelings concerning interior environments, with a focus on how they affected their sense of well-being. In order to explore this question, it was necessary to realize that interior environments affect almost everyone and, therefore, data from a diverse sample was necessary. The research question focused on wood's effect on all people and was more than just a marketing question about which segments of society would be the most attractive to target with respect to wood usage in homes. Thus, it was important to sample a wide cross-section of society. Due to the requirements of this research and the limitations of time and money, the Greater Vancouver Regional Area (GVRA) was chosen as the population under study.

The sample frame for this research consisted of all individuals living in the GVRA over the age of 20 who could be reached by telephone. In this era of mass communication, it was assumed that the majority of the GVRA population could be reached this way. The total population in this region is approximately 2,283,125 people, with twenty-five percent of this population being under the age of twenty, leaving approximately 1,712,343 people potentially eligible for this study (BC Stats, 2004).

3.1.2 Sampling

3.1.2.1 Sampling Methods

Bengtson Market Research Ltd., a Vancouver based market research firm, was used to obtain the sample subjects for this study. Households were contacted through random digit dialling by the firm. The individual in the household over twenty years of age whose birthday was next up-coming was requested. When

they were reached, a brief description of the study was given. Also, questions pertaining to interest in the study were asked, and some demographic information was obtained. At this point, time slots to conduct the study were set up for individuals who were interested in the study and who also fit the demographic profile.

The research was conducted over a two week period, March 9th, 2004 to March 21st, 2004, at the University of British Columbia's Robson Square Campus. The Robson Square Campus was chosen based on a recommendation from Bengtson Market Research Ltd., as past research indicated that it was a much easier site than the U.B.C. main campus for individuals from various locations around the Vancouver region to reach.

In order to achieve the desired sample size, additional recruiting of 19 subjects occurred on March 20th, 2004 on the corner of Robson and Howe Streets in downtown Vancouver. Pedestrians at this location were approached and the study was described to them. They were then asked if they would be interested in participating. Those who responded favourably were brought down to the Robson Square Campus where the study was being conducted. An effort was made to approach a wide variety of individuals in terms of age, gender and ethnic background. All participants in this study received a $40 gift for the half hour to hour of their time that was required.

Rarely, in studies such as this, are subjects taken into the environment that they are evaluating, generally due to cost and time limitations (Ulrich et al., 1991). Rather, a series of photographs and slides are generally used to simulate environments and induce reactions and ratings from the individual (Ulrich et al., 1991). The validity of using color photographs to simulate real outdoor scenes, as well as indoor environments, has been verified in a number of different studies (Shuttleworth, 1980; Genereux, 1982). As a result, it seemed appropriate to complete this research using photographs in the place of real rooms.

3.1.2.2 Sample Size

As with many experiments, the limiting factor for sample size determination is the amount of time and money available. For a study where each experimental participant is paid for participation, this practicality must be acknowledged. With these limitations in place, it was necessary to determine the minimum sample size that could yield an acceptable error and the required precision.

To determine the appropriate sample size for this study, two different components of the research (requiring the largest sample sizes) were considered as limiting factors. The total sample size for this study was the combination of required sample size for the q-sort and conjoint analysis sections of the research.

First, the required sample size for the q-sort is explored. The formula used to determine sample size is (Bluman, 2001):

$$n = \frac{t^2_{\alpha/2(v)} S^2}{E^2} \qquad \text{[Eq. 1]}$$

$$\alpha = 0.05$$

Where: t = t-statistic
S = standard deviation for sample
E = error
α = the maximum probability of committing a type I error

To determine standard deviation, it was necessary to make an approximation as no previous studies on this topic could be uncovered. Using the 9-point scale in the q-sort, an approximation of standard deviation can be given by:

$$Std = \frac{range - 1}{4} \qquad \text{[Eq. 2]}$$

$$\frac{9-1}{4} = 2.00$$

This appeared to be a reasonable estimate as the Empirical Rule states that 95% of all observations in a normal distribution will fall within two standard deviations of the mean (Bluman, 2001). We would assume that very few observations would

fall at the extremities of the range (3 standard deviations) and, therefore, this approximation seemed appropriate.

When determining the error, it was necessary to consider the feasible number of subjects that could practically be put through the experiment. The error was iteratively manipulated until an acceptable range of sample sizes was determined. A precision of 0.65 on a 9-point interval scale seemed reasonable for detecting significant differences.

Therefore, the sample size required to meet a precision of 0.65 was:

$$n = \frac{(1.960)^2 (2.00)^2}{(0.65)^2}$$

$$n = 37$$

Based on this, it was conservatively decided that forty subjects be tested for the q-sort.

To determine the required sample size for the conjoint analysis, a simple rule-of-thumb was used. For choice-based conjoint, the following is recommended when deciding on a sample size (Orme, 1998):

$$\frac{nta}{c} \geq 500 \qquad \text{[Eq. 3]}$$

Where: n = number of respondents
t = number of tasks
a = number of alternatives per task
c = largest number of levels for any one attribute

Due to financial limitations, eighty subjects appeared to be the maximum that could be tested.

$$\frac{(80)(30)(2)}{3} = 1600$$

This number of individuals well surpassed that required by the general rule-of-thumb. In addition, between thirty and sixty respondents is an acceptable range

in choice based conjoint analysis for investigational work and developing hypotheses about a market (Orme, 1998). That being the case, eighty subjects for this portion of the research was deemed acceptable[1].

3.2 Experiments

3.2.1 Magazine Living Room Pictures: Q-Sort

The q-sort methodology was chosen as it provides researchers with a systematic and rigorously quantitative means for examining human subjectivity (McKeown and Thomas, 1988). Other benefits of this methodology are that it is relatively low cost, and it is transportable due to use of small, lightweight cards (McKeown and Thomas, 1988). Q-sort is a commonly used methodology in the field of psychology (McKeown and Thomas, 1988), but has not been used before in terms of researching wood products and preferences.

For the q-sort portion of this research, subjects were given a deck of twenty-five numbered cards, each containing a picture of a living room. All of the pictures were taken from current home and design magazines, and were printed onto five by seven inch hard-backed cards. The goal in selecting and preparing the images was to maintain some consistency between the pictures in order to limit some of the sources of variation. The following is a list of elements that we attempted to standardize:

- low ceilings
- at least one window
- plant life present
- abstract paintings absent
- no electronic equipment present
- no animals nor people present

[1] Due to unusable data, a total of 79 individuals completed the choice-based conjoint portion of the study.

The decorations that were selected depended on the pictures available for this study, and the most appropriate selections were made to try and encompass an extensive variety of flooring, furniture and wall covering materials.

Below is a description of the twenty-five rooms used in this section of the study[2]. Each number corresponds to the number assigned to the picture throughout the entire research.

Picture #	Description
1	Stone wall with large wood wall unit in front, black coffee table with yellow flowers in a vase on it, dark grey tiled floor with a grey area rug over it, grey upholstered couch and chair.
2	Modern style, white walls, a beige jute rug covering most of the floor, beige day bed in foreground, white chair and a plain coffee table, tulips visible in the rear of room.
3	Wood ceiling with visible wooden beams, white adobe style walls, slate stone floor, a fireplace, one white wicker chair, one classical wooden chair with an upholstered seat, a chest used as the coffee table.
4	Back wall is painted green, floors are wood, large window in back wall, brown couch and two beige chairs with an occasional table in between them, low bookshelves line the walls.
5	Medieval style, white stone walls, while pillars, light marble tile floor, two large white upholstered couches
6	Wood wall paneling on back main wall with a fireplace, side wall is off-white with wood trim and wood windows, wood columns, terracotta ceramic tile floor, black and white striped upholstered couches and ottoman, coffee table is glass over wood.
7	Green painted walls, french doors with blinds, yellow upholstered couch and chair with a floral pattern, green upholstered coffee table/ottoman, small chair with red upholstered seating cushion, floor is off white concrete, orange tree in corner of room.
8	Modern style, grey concrete floor, long brown couch and two chairs, glass coffee table on a cream coloured round shag rug, walls are painted white except back wall which has horizontal dark wood slat paneling.
9	Classic style, beige floor rug, light brown classical upholstered sofa, two chairs and ottoman, coffee table is glass top with cast steel, plant at back of room, large book shelf on back wall.
10	Wood ceiling, columns and support beams visible, wood floors, two sofas and chair are upholstered cushions on a wood frame, marble coffee table, large windows looking into side room, large open air window looking onto a garden with a large tree.
11	Large wood beams visible in ceiling, walls painted beige, brown leather chair, grey upholstered couch, large brown coffee table, dark but natural lighting in picture.
12	Large windows surrounding room, white ceiling, curtains and window frames, two white upholstered couches with green throw pillows, two brown leather chairs, two brown leather ottomans, marble coffee table with a green rug on the floor.
13	Walls painted white and beige stripes, white shag area rug, cream leather L-shaped couch with a square back coffee table, three lamps behind couch, no natural light.

[2] The majority of the pictures used in the q-sort could not be included in this thesis as the rights to these images could not be obtained. The rights for six images were obtained, and these pictures can be seen in Appendix II.

14	Entire room is white, large white round upholstered couch, two white modernist chairs, round silver coffee table, white carpeting, white cupboards, white curtains.
15	Old fashioned style, floral patterned curtains around windows, green upholstered couch with floral throw pillows, beige carpeting, upholstered coffee table, four individual chairs three with some wood accents, large mirror behind couch with ornate gold frame.
16	Beige carpet, one wicker chair, rustic wood coffee table, wood wall paneling with a brick ledge, one built-in couch with brown upholstered cushion on a wood bench frame, bright throw pillows.
17	Rustic style, some wood walls, some off-white painted walls, exposed wooden columns, beige stone/ceramic flooring, grey leather couch, two black coffee tables with wooden legs, one brown upholstered couch with green leaf pattern.
18	Rustic Style, wood floors, wood walls and window frames, wood coffee and side tables, stone fireplace, black leather couches, area rug under coffee table/chest, two upholstered chairs, three green plants.
19	Wood floors, zebra print area rug under wood coffee table with steel legs, white couch and chair, two modernist black leather chairs, two large back windows, white painted walls.
20	White painted walls, white upholstered couch with three similar chairs, blue print throw pillows, white door, white coffee table with glass top, area rug, large grey bookshelf against wall.
21	Wood floor mostly covered by area rug, white upholstered couches, walls are brick painted white, white ottoman as coffee table.
22	Wood slat flooring, black leather chair, beige printed upholstery couch, black coffee table and side tables, textured walls, silver pillar, window with blinds drawn.
23	Colonial style, wood wall paneling and windows, white painted ceiling, two brown leather chairs, large brown leather bench as table, two upholstered couches.
24	Light yellow painted walls, area rug, glass coffee table, bay windows, upholstered couch and chair, cactus.
25	White painted ceiling with exposed wood beams, area rug over wood floor, light yellow painted walls, two pink plaid upholstered couches, two cream upholstered chairs with wood accents, pink plaid curtains and side table cover, glass coffee table top on an ornate pedestal.

Table 1: Descriptions of 25 Rooms used in the q-sort

The subjects were asked to look through the cards and sort them into three categories: most preferred, neutral and least preferred. This was done only to simplify the next step. At this point, subjects were asked to place the cards on a normal distribution with a scale ranging from -4 to +4, and record the order on the form provided. This forced subjects to decide between cards and choose their absolute most and least preferred rooms.

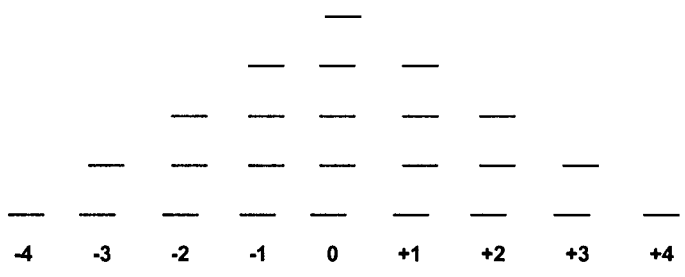

Figure 7: Normal Distribution for q-sort

3.2.2 In-depth Qualitative Analysis: Interview

Subjects were next given one of three pictures and were interviewed about the environment created by each room and what they liked and/or disliked about the room. As subjects were interviewed on one of three pictures, the photos were rotated in order and each successive subject was shown a different one than the person before or after him/her. The goal was to obtain as much qualitative information as possible about the atmosphere and environment of the three rooms. All of the pictures used in this section of the study came from the magazine rooms used in the Q-sort. The three pictures[3] varied extensively in the materials used to furnish them, and the aim of this part of the study was to delve into these differences.

The first room used in the interviews corresponded to room #8 from the q-sort and could best be described as "modern". The living room has a very modern, albeit stark, appearance. There is one sofa and two chairs all with the same brown upholstery and modernist styling. In the centre of the room is a glass coffee table standing on an off-white shag rug. The back wall is done in horizontal dark wood panelling, but the rest of the room has white painted walls. On the right hand side of the photograph, a small tree in a rock garden is present, while on the opposite side of the picture, one can see the attached kitchenette. The floors appear to be a grey concrete-type material.

The second room used in the interviews corresponded to room #9 from the q-sort and could best be described as "traditional". This living room has a very classical feel to it. The room is dominated by brown/beige tones, which is present in the classic style sofa, two chairs and ottoman. A simple rug of similar colour covers the majority of the floor. The coffee table in the centre of the room has a glass top over delicately carved wood and wooden legs. Very little of the walls can be

[3] The three pictures used in this section could not be shown in the thesis, as it was not possible to obtain their copyright releases.

seen in this photo as the back wall is covered by a large bookshelf, and the rest is not visible from this angle. A large green plant is seen in the back of the room beside a window.

The final picture used in the interviews corresponded to room #10 from the q-sort and could best be described as "rustic". This room is predominantly made from wood. The wood beams and columns supporting the structure are exposed, along with a wood ceiling. The flooring is in wood and, while the cushions on the two sofas and one chair are upholstered, their visible frames are also made of wood. The coffee table appears to be made from marble, but the side tables beside the couches are wooden. There are windows looking into the attached room, and a large open-air window looking out into a garden dominated by a large tree.

The information gathered at this stage of the research was used to gain a better understanding of the features that individuals like and dislike about living rooms and their reasons for these feelings. Below are the five questions that were asked during the interview:

- What is the first word that comes to mind when looking at this room?
- Give an overall assessment of the room in terms of the atmosphere and feeling you get from this room.
- What are the positive elements within this room?
- What are the negative elements within this room?
- In your opinion what are the most important factors in creating a room that you would want to live/spend time in?

3.2.3 Designed Rooms: Conjoint Analysis

Conjoint analysis, also known as trade-off analysis, was used in an attempt to determine the perceived values of three different room attributes: furniture, walls, and flooring. Conjoint analysis is a technique that attempts to determine the

relative importance that consumers attach to salient attributes and the utilities that they attach to the levels of these attributes (Malhortra, 1999).

For the conjoint analysis, a description of a living room was given in terms of the materials that would be used to furnish this room. While the magazine rooms used in the q-sort experiment were helpful in displaying realistic environments, the described rooms used in the conjoint analysis helped to establish total control over the environments as material use was the only factor considered. Three attributes were chosen for the conjoint analysis (furniture, walls, and flooring), and each attribute had only three levels. This gave a total of 27 different room design combinations. Table 2 shows all of the different levels for each attribute that was tested.

Furniture	**Walls**	**Flooring**
Rustic (wood)	Wood	Wood
Classical (upholstery)	Paint	Carpet
Modern (steel, glass, etc)	Wall-paper	Tile

Table 2: Factors in Conjoint Analysis

Choice-Based Conjoint Systems software, manufactured by Sawtooth Software, Inc., was used to design and run this portion of the research. The subjects used a laptop computer to complete this section. On the screen, two boxes appeared side-by-side, each of which contained a randomly generated flooring material, wall material and style of furniture for a hypothetical living room (Figure 8). Using the mouse, the subject selected his/her preferred room by clicking on the box containing the materials which they would choose to furnish a living room. The next room combination would then immediately appear on the screen. In total, each person was required to make thirty choices. A variety of samples for each type of material was displayed around the computer station to help eliminate any confusion about the materials being described, as well as to give a wide variety of the options available for a consumer. In addition, each subject was given sample pictures of the three types of furniture, to clarify the researcher's definition of each style. It was determined that displaying samples and examples rather that showing mock pictures of the rooms, was a superior option as this

more closely mimics the actual decision process that consumers face when furnishing a room.

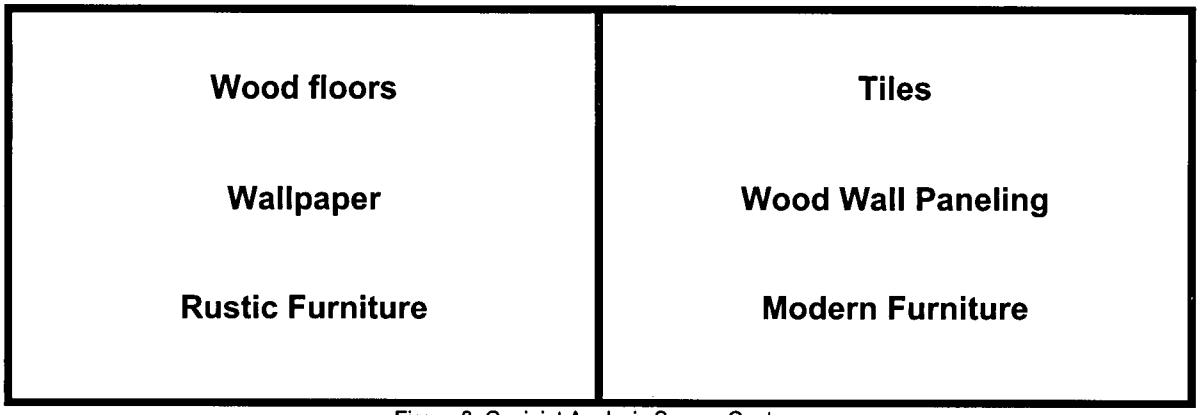

Figure 8: Conjoint Analysis Screen Capture

Data from the laptop was retrieved and analyzed using Sawtooth Software. From this process, it could be determined which aspect (furniture, walls or flooring) is most important in a room, as well which materials (from the ones given) were preferred for each application.

3.2.4 Subject Profiles and Attitudes: Self-Administered Survey

Surveys are an extremely common tool used in assessing environmental preferences and effects on well-being (Brown and Daniel, 1987). In this context, a survey is designed to record the subject's ranking, preference and feelings attached to given environments (Daniel and Boster, 1976).

The final section of this research was a self-administered questionnaire. This survey was used to gain information on a variety of topics from demographics and preferences for furniture and furnishings to feelings about different materials and environments created. The survey comprised two sections. The first section asked a variety of questions concerning material preferences and environments. The second section focused on background information for each subject. Please refer to Appendix III to see the complete survey.

Different styles of questions were used throughout this survey to collect varying types of information. A series of five-point scales were used in a variety of forms to assess the individual's evaluation of different concepts. The end points for these questions ranged from not important to very important, strongly disagree to strongly agree (Likert scale), not at all appropriate to very appropriate and, finally, least preferred to most preferred. Open-ended questions in surveys are used to help delve deeper into the reasons associated with specific options, in order to improve the researcher's understanding (Babbie, 2001). In this survey, two open-ended questions were used to elicit individuals' impressions of wood and to describe their specific decorating styles. A variety of different statistical methods were used to analyze the data collected including: analysis of variance, descriptive statistics, principle components analysis and cluster analysis.

3.3 Limitations of Study

As with all research, especially ones that are qualitative in nature, this study was limited by a number of factors. Funding was the first limitation as it restricted the number of subjects that could be recruited and limited the research to only one location. Time was the second major factor, forcing the size and scope of the study to be limited so that it could be completed in a timely fashion. Difficulties were encountered when trying to obtain a sample that accurately depicted that of the Vancouver population. Some subjects that were initially contacted did not appear for their appointments and this affected the demographic composition of the sample (initial recruits were chosen based on their demographic profile, while it was not possible to do this for replacements).

The next limitation was related to the use of the magazine pictures and conjoint descriptions. Total control over the stimuli set was not possible as the study was limited by the available pictures found in various magazines. Magazine pictures most often appear staged, and this was a factor that needed to be considered. This meant that total control could not be gained and compromises were made to ensure that furnishing materials were the most prominent variables. In the

conjoint study, word descriptions were used instead of pictures as it was not possible to portray rooms on the computer that varied strictly according to the three set factors and still have the rooms look realistic. Instead of facing the difficulties associated with this problem, descriptions were used to ensure that control was obtained. However, despite all of the issues listed above, this was an exploratory/qualitative assessment which has produced some very useful insights.

It should be noted that there are inherent biases in both the q-sort and conjoint analysis methodologies. For instance, the q-sort is imperfect due to the fact that the different elements within the pictures can confound and interact with each other. It is impossible to determine if a subject's preference for a photo is due to the materials used, the view, plants within the room or the interaction between these elements. As well, it is difficult to isolate specific experimental factors since all of the elements within an environment act together to create a preference for a room and the effect that it has on the occupants. The major issue with the conjoint analysis used in this research was that the exclusive use of words to describe environments meant that it was potentially linguistically biased. For example, at the mere mention of wood wall paneling, many individuals had a negative reaction because of associations with paneling that was popular in the 1970's. To mitigate against the aforementioned flaws, a breadth of different experiments was used to help counter these problems.

One other means of eliminating the problems with q-sort and conjoint methodologies would be to create controlled visualizations. Photographing a room and simply changing the required factors, while controlling for all other elements, could accomplish this. Use of an appropriate computer visualization program, where surfaces such as walls and floors could be altered to display desired materials, would be necessary. This method would allow for complete control and eliminate the interactions between different factors within a room. However, resource constraints precluded the use of visualization as a methodological tool.

4 Results

4.1 Magazine Living Room Pictures: Q-Sort

The q-sort yielded some very interesting results. The average preference value for each picture was found, and an F-max test was performed to ensure that the variances for each treatment were equal prior to carrying out an analysis of variance (ANOVA) to test differences between means. The ANOVA (α=0.05) found that there were significant differences between the average preference values for the 25 pictures (Table 3). Using a Bonferroni critical distance test (α=0.05), the critical distance was found to be 1.56. This revealed that the top six photos (10, 18, 12, 20, 4, and 24) were all significantly different from the bottom five living rooms (14, 13, 5, 22, and 11). In Table 4, the average preference scores for all twenty-five rooms are shown in descending order, those shaded at the top are significantly different from those shaded at the bottom. The rooms ranked in the middle, that are not shaded, were not found to be significantly different from all of the top six or bottom five rooms. The separation of the pictures revealed that there is an important distinction found between rooms that are very bright and those that are somewhat dark. As well, a strong dislike for rooms that appear to be decorated in a very modern style was observed.

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	668.2039	24	27.84183	8.178659	5.31E-26	1.528576
Within Groups	3298.674	969	3.404205			
Total	3966.878	993				

Table 3: Q-sort ANOVA Table

Groups	Average
10	6.875
18	6.500
12	6.075
20	5.718
4	5.675
24	5.625
3	5.475
23	5.475
19	5.425
9	5.205
17	5.205
6	5.103
21	5.075
7	5.000
2	4.923
1	4.800
8	4.575
16	4.375
15	4.350
25	4.350
14	4.100
13	4.075
5	4.000
22	3.700
11	3.625

Table 4: Ranking of q-sort Pictures

The top six rooms share some remarkable similarities. They all have large windows or are extremely bright, giving the impression of a large window off the side of the photo. For the most part, the views from these windows are of trees, grass and other natural elements. The top two rooms, with very high scores at 6.875 and 6.500, respectively, are completely wood dominated rooms displaying very few artificial materials. Plants are found in, or can be viewed from, all of the top six rooms. Interestingly, the top half of the pictures from the q-sort contained the majority of the wood, large windows and natural materials found in the pictures. There also appeared to me a marked flooring effect, with almost all of the wood, tile, and slate floors appearing in the top half of the rooms and mainly carpet found in the bottom half.

A lack of light is the most dominant feature in the bottom five rooms. In addition, these rooms all appear to be decorated in modern styles, and in most cases, contain many artificial materials. Room eleven, which was ranked last, is not overly modern and does have wood displayed, but the photo is extremely dark. There is almost a complete lack of greenery seen from or displayed in these five rooms, as well as a marked lack of anything natural. The scores from these living rooms were found to be significantly different from those of the top six rooms.

4.2 In-depth Qualitative Analysis: Interview

Room #8 (modern) from the q-sort was not widely liked and was found to be, by far, the least preferred room of the three. This room received almost twice as many negative comments as Room #10 (rustic) and 1.66 times more negative comments than Room #9 (traditional). Of the 40 subjects interviewed, the most common response induced by this room (12.5%) was 'cold', followed by 'modern' (10%) (Table 5). Table 6 shows the most common descriptors of the environment and feelings created by this room, coming from answers to the second question of the interview. The most positive elements within Room #8 are shown in Table 7, while the most negative elements are displayed in Table 8. In some cases, the percentages total more than a hundred percent due to the fact that, excluding the first question, subjects were able to give multiple responses.

Descriptor	Percentage of Respondents
Cold	12.5%
Modern	10.0%
Open/spacious	5.0%
Stark	5.0%
Clean	5.0%

Table 5: First Word Induced by Room #8

Descriptor	Percentage of Respondents
Cold	25.0%
Spacious/open/big	17.5%
Modern	15.0%
Uncomfortable	15.0%
Clean/neat	12.5%
Hotel like/doctor's office/waiting room	12.5%

Table 6: Atmosphere and Feeling of Room #8

Descriptor	Percentage of Respondents
Lamp	17.5%
Spacious/openness/sense of space	15.0%
Plant/stone garden with tree	15.0%
Kitchenette/kitchen area	12.5%

Table 7: Positive Elements of Room #8

Descriptor	Percentage of Respondents
Furniture/couches/sofa	32.5%
Back wood wall	25.0%
Cold/coldness	20.0%
Rug	17.5%
Too dark/warmer lighting needed	12.5%
Lacks colour/colours are monotone	12.5%
Glass coffee table	12.5%

Table 8: Negative Elements of Room #8

The second living room picture used in the interviews was Room #9 (traditional). This room received neutral to positive responses from the 40 subjects interviewed. The most common first words triggered by this photo were 'warm' and 'old' or 'older' at 12.5% each, followed by 'nice' at 10% (Table 9). The atmosphere and feeling created by this room was generally described favourably with 25% of respondents calling it 'comfortable' (see Table 10 for the most common descriptors of the environment and feelings created by this room). The most common positive and negative elements within Room #9 can be seen in Table 11 and Table 12, respectively.

Descriptor	Percentage of Respondents
Warm	12.5%
Old/older	12.5%
Nice	10.0%
Comfortable/comfort	7.5%

Table 9: First Word Induced by Room #9

Descriptor	Percentage of Respondents
Comfortable/comfort	25.0%
Warm	20.0%
Older generation/old/grandparents	20.0%
Bright	15.0%
Expensive/money/upper class	15.0%

Table 10: Atmosphere and Feeling of Room #9

Descriptor	Percentage of Respondents
Natural light/bright/a lot of light	45.0%
Plants/greenery	25.0%
Layout/layout of furniture/well spaced	17.5%
Colours/neutral colours	17.5%
Sofa/furniture/seating	15.0%

Table 11: Positive Elements of Room #9

Descriptor	Percentage of Respondents
Monochromatic/need more colour	30.0%
Need more space/too crowded	20.0%
Too old fashioned/too old	17.5%
Too tidy/too clean/too neat.	10.0%
Can't relax, afraid to mess it up	10.0%

Table 12: Negative Elements of Room #9

The most liked room, by far, was the final interview room, Room #10 (rustic). Eighteen percent of the respondents reported 'warm' as the first word that came to mind when looking at this room, followed by 'wood' at 15.4% (Table 13). The atmosphere of this room was described in very favourable terms, with 28.2% calling it 'warm', 23.1% describing it as 'relaxing' and 20.5% saying it was 'comfortable' (Table 14). The most positive elements within this room were the view of the tree and plants, the natural lighting and the incorporation of the outdoors into the room (Table 15). Most subjects had few complaints about this room, but the negative elements within this room are shown in Table 16.

Descriptor	Percentage of Respondents
Warm/warmth	18.0%
Wood	15.4%
Open/spacious	10.3%
Inviting	5.1%
Natural	5.1%
Dark	5.1%

Table 13: First Word Induced by Room #10

Descriptor	Percentage of Respondents
Warm	28.2%
Relaxing/relaxed/relaxation	23.1%
Comfortable/comfy	20.5%
Cozy	12.8%
Peaceful/calm	12.8%
Open/spacious	12.8%

Table 14: Atmosphere and Feeling of Room #10

Descriptor	Percentage of Respondents
Tree/plants/greenery/view	43.6%
Natural lighting/lots of light	28.2%
Incorporation of the outdoors	23.1%
All the wood/wood	17.9%
Windows	15.4%
Warm	12.8%
Columns and beams	12.8%

Table 15: Positive Elements of Room #10

Descriptor	Percentage of Respondents
Lack of colour	17.9%
Bit dark	17.9%
Furniture	15.4%
Table	15.4%
Uncomfortable furniture	12.8%

Table 16: Negative Elements of Room #10

When asked what the important factors were in creating a room that respondents would want to live or spend time in, a tremendous variety of responses emerged. From these responses a variety of themes were uncovered (Table 17). For instance, colour appears to be an extremely important factor to many people. It was mentioned by 49.6% of the subjects, of whom 23.7% specifically required warm colours. Lighting was also seen to be a key factor as 42.0% of the individuals stressed its importance, while 27.7% explicitly mentioned the need for

natural light. Comfort understandably plays a central role in creating liveable rooms, but warmth also appears to be required. The need for wood and plants also came in the top ten most common responses.

Descriptor	Percentage of Respondents
Colours/colour	49.6%
Lighting	42.0%
Comfortable/comfort	27.7%
Natural lighting	27.7%
Furniture/sofa	25.2%
Warm/warmth	21.0%
Windows	18.5%
Spacious/space	16.0%
Wood	15.1%
Plants/flowers	13.4%
Efficient/functional layout	13.4%
Not cluttered/not crowded	12.6%
Clean/tidy	10.9%
Open space/openness	10.1%

Table 17: Important Factors in Creating a Room You Would Want to Live in

4.3 Designed Rooms: Conjoint Analysis

Two-thirds of the entire sample completed this section of the research giving a total of 79 usable responses[4]. The conjoint analysis yielded some simple, but useful, results.

The main effect utilities (Table 18) revealed that wood flooring is far more popular than either carpet or tile, both of which received negative utilities. The main effect utilities in Table 18 can be interpreted as follows: the closer to 1, the more that level was preferred, and the closer to -1, the less the level was liked or chosen by the subjects. Painted walls were found to be positive and preferred, whereas both wallpaper and wood wall paneling were negative. For furniture, 'classic' proved to be the preferred style, while 'modern' furniture was perceived

[4] 80 subjects completed this section, but data from one was removed as he was under the age of twenty.

slightly negatively and 'rustic' was found to be the most negative and the least preferred.

Attributes	Attribute Levels	Effect	Importances
Flooring	Wood floors	0.646	0.407
	Carpet	-0.266	
	Tile floors	-0.380	
Walls	Wood wall paneling	-0.269	0.311
	Wallpaper	-0.246	
	Painted walls	0.515	
Furniture	Modern furniture	-0.008	0.282
	Classic furniture	0.360	
	Rustic furniture	-0.352	

Table 18: Main Effect Utilities and Importances for Three Attributes of Living Rooms

The relative importance of each attribute was calculated to determine which was the most important for people when selecting their preferred living rooms. Flooring was found, by far, to be the most important attribute, with 40.7% of the decisions being based on this. Walls and furniture were very similar in terms of importance, with walls at 31.1% and furniture at 28.2% (showing almost equal importance in the decision making process).

Wood floors were chosen 65.3% of the time, when displayed as an option. Carpet was chosen 43.6% of the time, followed closely by tile floors which were selected only 41.7% of the time. It should be noted that the study showed two rooms at a time, meaning that the chance of selecting any given attribute randomly was 50%. At 65.3%, wood floors were selected at a rate greater than chance, and tiles at 41.7% were selected at a rate less than chance. For walls, painted walls were chosen 61.9% of the time, while wallpaper and wood wall paneling were chosen 44.4% and 43.9% of the time, respectively. Finally, for furniture, classic furniture was chosen 58.7% of the time it was displayed, whereas rustic furniture was chosen only 41.4% of the time. Modern furniture was chosen 49.9% of the time and, therefore, cannot be ruled out as occurring by chance only.

For each combination of flooring, walls, and furniture, the proportion of time that each combination was chosen was calculated. These results logically reflect the previous results, but also show the most and least preferred combinations. At 86%, the most chosen combination was wood flooring, painted walls and classic furniture, followed by wood flooring, painted walls and modern furniture at 74.5%. At 21.7%, the least chosen combination was carpet, wallpaper and rustic furniture, followed by tile floors, wood walls and rustic furniture at 30.1%. Table 19 displays the results for all of the combinations.

Flooring	Walls	Furniture	Percentage of Time Chosen
Wood	Painted	Classic	86.0%
Wood	Painted	Modern	74.5%
Wood	Wallpaper	Classic	72.6%
Wood	Painted	Rustic	67.3%
Wood	Wood	Classic	66.1%
Tile	Painted	Classic	62.9%
Carpet	Painted	Classic	61.8%
Wood	Wallpaper	Modern	61.7%
Carpet	Painted	Modern	56.9%
Tile	Painted	Modern	56.8%
Wood	Wood	Rustic	55.7%
Carpet	Wood	Classic	52.7%
Wood	Wood	Modern	52.0%
Wood	Wallpaper	Rustic	49.4%
Carpet	Wallpaper	Classic	48.5%
Tile	Painted	Rustic	48.1%
Carpet	Wallpaper	Modern	45.6%
Tile	Wood	Classic	41.1%
Carpet	Painted	Rustic	40.9%
Tile	Wallpaper	Classic	36.2%
Tile	Wallpaper	Modern	35.4%
Tile	Wood	Modern	34.9%
Carpet	Wood	Modern	33.7%
Carpet	Wood	Rustic	33.7%
Tile	Wallpaper	Rustic	30.5%
Tile	Wood	Rustic	30.1%
Carpet	Wallpaper	Rustic	21.7%

Table 19: Three Way Combinations: Percentage of Time Chosen When Displayed

Two fixed questions were also asked of all 79 conjoint subjects comparing a so-called average room to a wood dominated room and to a more modern room.

Tables 20 and 21 show the attribute combinations being compared, along with the percentage of times each was chosen.

Room 1a (Modern Room)	**Room 2 (Avg. Room)**
Wood floors	Carpet
Painted walls	Painted walls
Modern furniture	Classic furniture
54.4%	**45.6%**

Table 20: Fixed Question #1

Room 1b (Wood dominated Room)	**Room 2 (Avg. Room)**
Wood floors	Carpet
Wood walls	Painted walls
Rustic furniture	Classic furniture
44.3%	**55.7%**

Table 21: Fixed Question #2

From this, it can be seen that the average room (room 2) is preferred to the wood dominated living room (room 1b), but is somewhat less popular than the more modern room (room 1a), which contained wood floors and modern furniture. As these percentages do not equal 50%, it appears that these results are not due to chance alone. Nevertheless, this possibility must be considered due to the close proximity of these percentages to that of chance.

4.4 Subject Profiles and Attitudes: Self-Administered Survey

The self-administered questionnaire was an excellent tool for compiling a large variety of data from the test subjects. A total of 119 respondents completed the survey section of the study. First, the demographic profile of the respondents will be presented followed by a discussion and analysis of the key findings from the survey, including: decorating styles, material attributes, importance of attributes within homes, level of agreement on attitudinal statements, feel of a wood dominated room, and wood's appropriateness and preference in various applications.

4.4.1 Demographic Profile

The goal was to have a sample that gave a representative cross-section of the Greater Vancouver Regional Area (GVRA). The final sample used in this research was very diverse and was representative of this population in many areas, but it did deviate in some respects (education and ethnicity). This means that from this research, generalizations can be made about the population of the GVRA. As specific data on the GVRA population was unattainable, comparisons have been made between that of the British Columbia population, with figures taken from the last census in 2001 (BC Stats, 2004).

The gender breakdown of the sample was similar to that of the B.C. population. For B.C., the population is 49% male and 51% female, whereas the sample was 52.1% male and 47.9% female (BC Stats, 2004).

A direct comparison of the age breakdown between the sample and the survey respondents was not possible because of differing categories used to collect this information. A general comparison was made and this revealed that the largest portion of individuals in the BC population falls between the ages of 20 and 44, followed by those between the ages of 45 and 64. This general trend mimicked the research sample (Figure 9) (BC Stats, 2004).

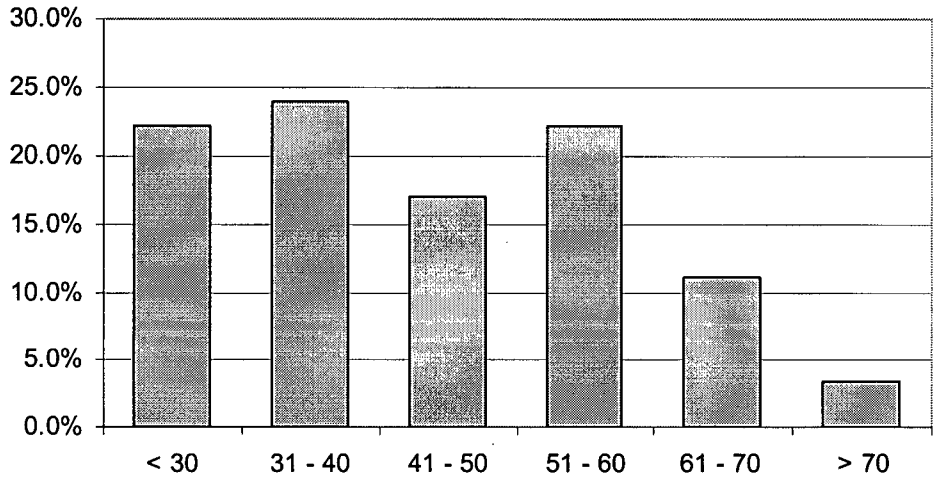

Figure 9: Age Breakdown of Test Subjects (Sample)

The marital status breakdown differs from that of the general B.C. populations due to the fact that only individuals over the age of 20 were surveyed, and the census data looks at those over the age of 15 (BC Stats, 2004). The two largest categories in both cases are married and single individuals showing that the survey sample is, by and large, representative of the greater population (Figure 10) (BC Stats, 2004).

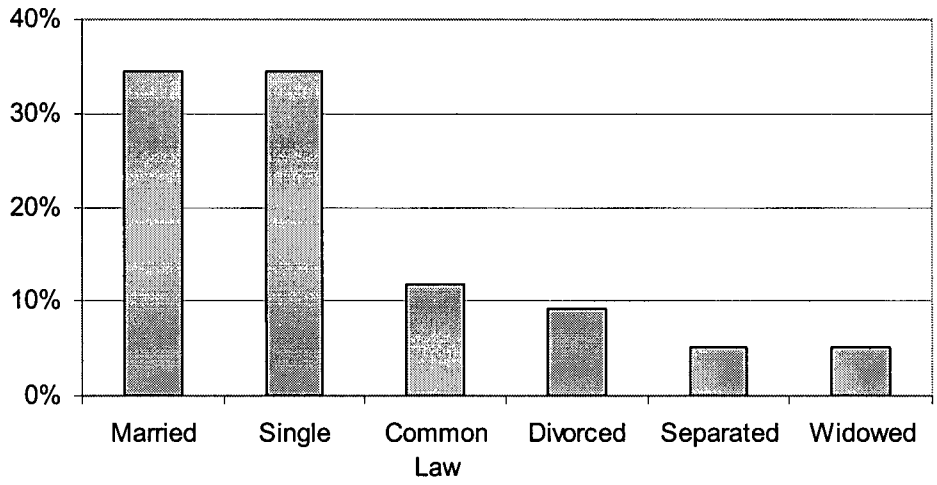

Figure 10: Martial Status of Test Subjects (Sample)

The average number of children living at home per census family in British Columbia was 1.1 in 2001 (BC Stats, 2004). For the sample, the average number

of children per individual surveyed was 1.14 (only 53.4% of those surveyed had children), and of those with children, an average of 0.85 children per family were living at home.

The annual family income of those surveyed found the largest proportion of families in the $25,000 to $49,999 category, which is also where the majority of British Columbian families fall (BC Stats, 2004). The total breakdown of family income from the sample can be seen in Figure 11.

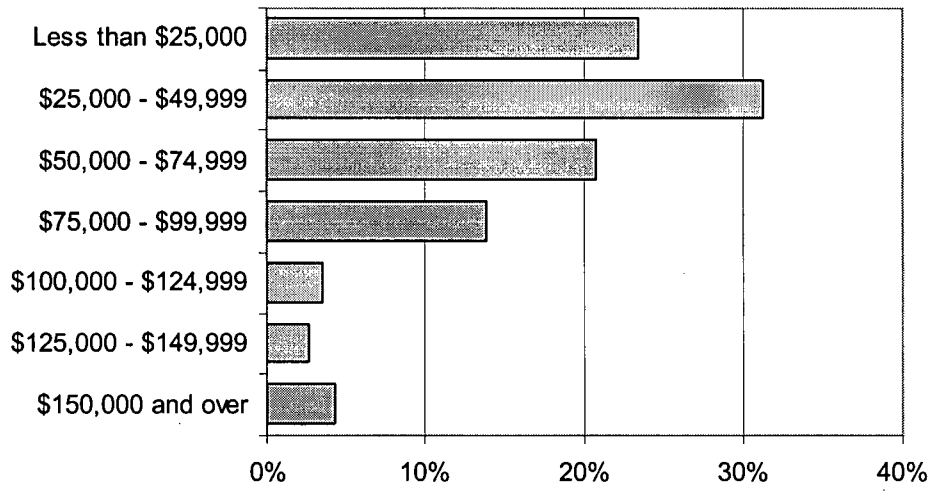

Figure 11: Income Distribution of Test Subjects (Sample)

One area where the survey sample differed greatly from that of the general B.C. population was in terms of education. Less than 20% of British Columbians have a bachelors degree or higher, but the survey sample appeared to be biased towards more educated people, with 60.5% having been to college or university (Figure 12), and just less than 10% having attended graduate school (BC Stats, 2004). Due to the different category definitions, it is impossible to accurately compare the survey sample to the general population.

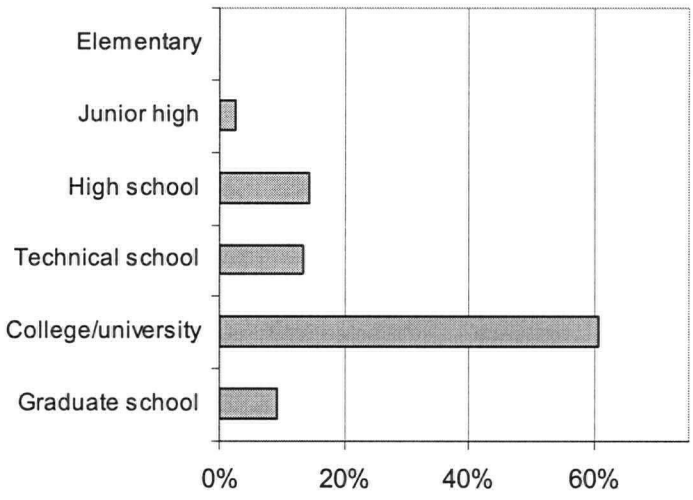

Figure 12: Education Level of Test Subjects (Sample)

The survey sample was far less diverse in terms of ethnicity than the general population, but a wide variety of ethnic groups were represented (Figure 13).

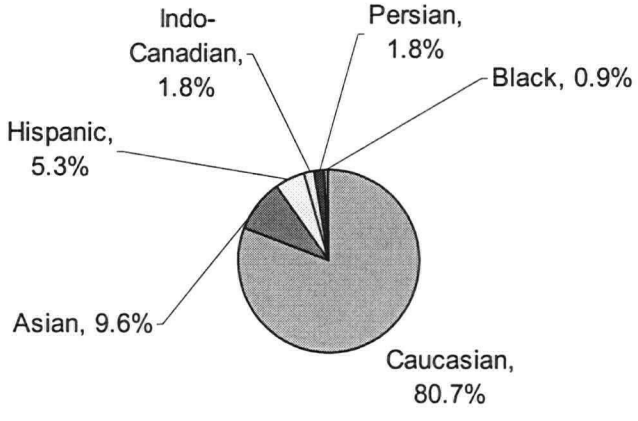

Figure 13: Ethnicity of Test Subjects (Sample)

The comparison between sample and population seems to indicate that the sample was representative and generalizations can be made.

4.4.2 Housing

The types of dwellings occupied by the respondents were recorded, as was whether they rented or owned (Figure 14). It appeared that a slightly higher proportion of British Columbians live in detached houses than in the sample (and a lower proportion in apartments), likely reflecting the difference between the more urban GVRA population and the entire population of B.C. (BC Stats, 2004). In terms of ownership, 66.3% of British Columbian families own their residence versus only 46.5% of those sampled (BC Stats, 2004). 55.1% of the sample lived in urban locations and 44.9% lived in suburban/rural areas, but no exact comparison figures to the general B.C. population could be found. The average amount spent per year on home renovations by those surveyed was $2,342, but there was tremendous variation in this response as the standard deviation was $3,243.

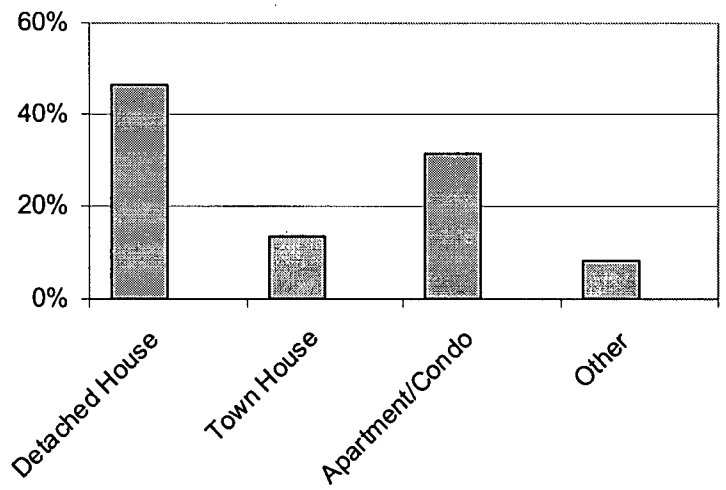

Figure 14: Type of Dwelling of Test Subjects (Sample)

4.4.3 Decorating Styles

Respondents were asked to describe their individual decorating style and a wide variety of responses were given to this open-ended question. Table 22 gives the top twelve responses.

Descriptor	Percentage of Respondents
Modern	25.2%
Classical/traditional	21.9%
Comfortable	18.5%
Warm/warmth	16.0%
Wood	14.3%
Bright/light/natural light	12.6%
Simple/basic	12.1%
Inviting/welcoming	7.6%
Natural/organic	7.6%
Spacious/openness	6.7%
Functional/practical	6.7%

Table 22: Individual's Decorating Style

4.4.4 Material Attributes

Test subjects judged a variety of materials in terms of the attributes they possessed and lacked. The question was displayed in tabular form, with the attributes listed along the top and the materials along the left hand side. For each material, the respondent was asked to place a check mark under the attributes the material possessed, and a cross under those it lacked. Attributes the subject thought the material neither possessed nor lacked were to be left blank. From this data wood has been pulled out and compared to all other materials on all attributes (Figures 15-18). The wood data was further analyzed by looking at all of its correlations between the different attributes, along with its specific score for each attribute. A score above zero shows a positive rating or the possession of the attribute, while a score below zero displays a negative rating or lack of the attribute. A positive correlation describes the relationship between two attributes, meaning that as one increases so does the value of the

other. Conversely, a negative correlation displays an opposite relationship; as one increases the other decreases in value.

Wood, ceramics, stone and leather were all rated positively on the attribute 'natural', and have, therefore, been grouped together as natural furnishing materials (Figure 15). Wood is rated higher than the other materials in terms of 'warmth', 'natural', 'homey', 'relaxing' and 'inviting', but less than the others on the 'modern', 'industrial' and 'artificial' attributes. On the 'stylish' and 'contemporary' attributes, it is rated relatively equal to the other three materials.

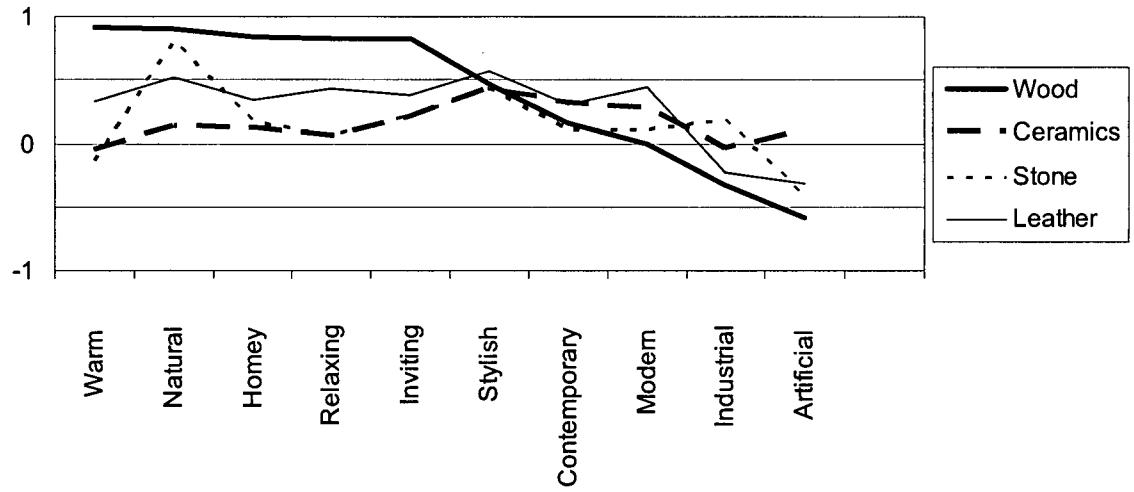

Figure 15: Perceived Attributes of Natural Furnishing Materials

Wood, steel and concrete have been grouped together in Figure 16 as they are all used in construction. Again, wood rates higher than the others in the attributes 'warm', 'natural', 'homey', 'relaxing' and 'inviting, but below the others in terms of the attributes 'modern', 'industrial' and 'artificial'.

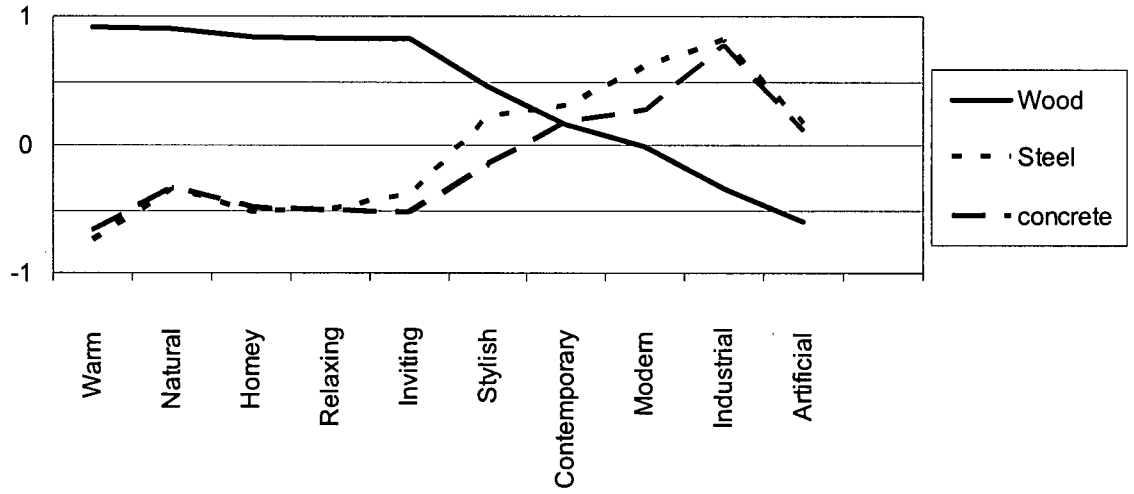

Figure 16: Perceived Attributes of Construction Materials

Figure 17 shows wood in comparison to the more artificial furnishing materials, plastic and glass. Wood scored much higher than both on the attributes 'warm', 'natural', 'homey', 'relaxing' and 'inviting'. Glass was seen as the most 'contemporary', while both glass and plastic scored above wood in terms of 'modern', 'industrial' and 'artificial'. Plastic was deemed to be the most 'artificial' of all the materials in the study.

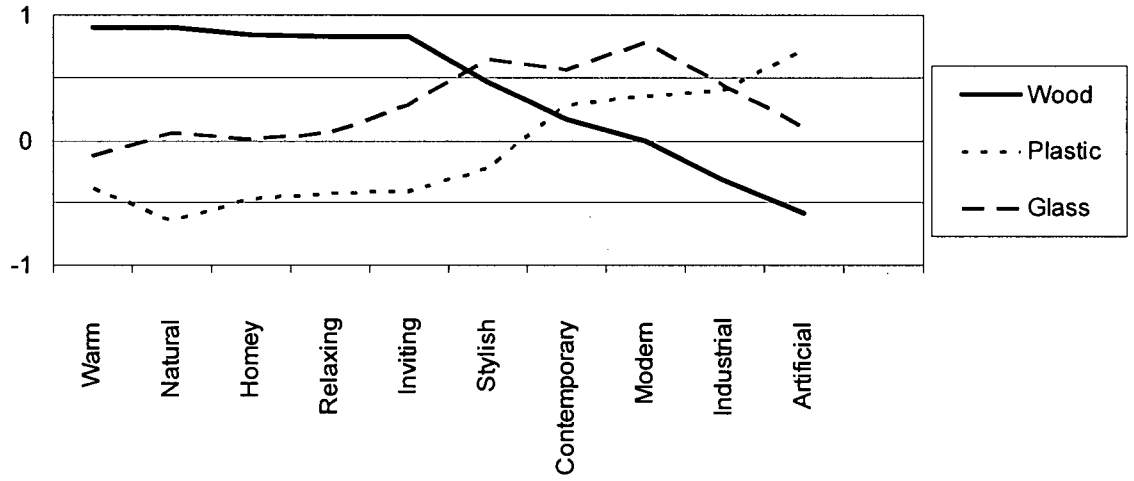

Figure 17: Perceived Attributes of Artificial Furnishing Materials

The final category of materials is wall materials which includes painted surfaces and wallpaper. Wood again scored highest on the first five attributes, while wallpaper scored lowest on all attributes except 'artificial' (Figure 18).

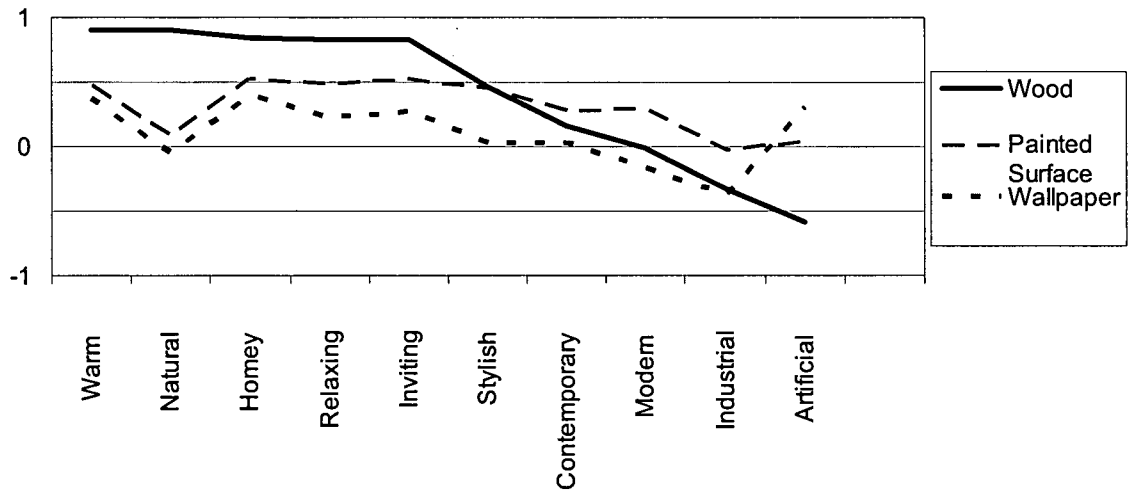

Figure 18: Perceived Attributes of Wall Materials

Table 23 displays a correlation table for the perceived attributes of wood, along with a significance table showing which correlations were significant. The two tables correspond to each other and those values that are shaded are correlations that are significant at an $\alpha = 0.05$ level. It should be noted that wood scored positively and was seen as possessing all of the attributes listed with the exception of 'industrial' and 'artificial' (see Figure 15 to Figure 18). The following are some of the key correlations for wood:

- The strongest correlation was a positive one between 'homey' and 'relaxing', while 'homey' also had a strong positive correlation with 'inviting'.
- The second strongest correlation was a positive one between 'relaxing' and 'inviting'.

- 'Warm' was positively correlated with 'homey' and 'inviting' (the correlation was slightly stronger with 'homey').
- 'Natural' was positively correlated with 'homey', 'relaxing' and 'inviting'.
- 'Natural' was negatively correlated with 'artificial' and 'industrial'.
- 'Artificial' was negatively correlated with 'stylish' and 'relaxing', but was positively correlated with 'industrial'.
- 'Contemporary' had a strong positive correlation with 'modern'.
- 'Modern' was strongly positively correlated with 'stylish'.

		WARM	NATURAL	ARTIFICI	CONTEMP	MODERN	STYLISH	HOMEY	RELAXING	INVITING
Correlation	WARM	1								
	NATURAL	-0.0896	1							
	ARTIFICI	0.027	-0.198	1						
	CONTEMP	0.140	-0.003	0.0716	1					
	MODERN	0.034	-0.004	0.1457	0.339	1				
	STYLISH	0.049	0.110	-0.1799	0.105	0.211	1			
	HOMEY	0.274	0.256	-0.0460	0.117	-0.034	0.270	1		
	RELAXING	0.144	0.388	-0.1522	0.185	0.116	0.332	0.612	1	
	INVITING	0.200	0.368	-0.0678	0.176	0.110	0.247	0.434	0.590	1
	INDUSTRI	-0.108	-0.158	0.3282	0.041	0.106	-0.066	-0.040	-0.120	-0.049
Sig. (1-tailed)	WARM									
	NATURAL	0.166								
	ARTIFICI	0.387	0.015							
	CONTEMP	0.064	0.487	0.2195						
	MODERN	0.356	0.484	0.0569	0.000					
	STYLISH	0.300	0.116	0.0251	0.129	0.011				
	HOMEY	0.001	0.003	0.3098	0.103	0.358	0.001			
	RELAXING	0.059	0.000	0.0492	0.022	0.105	0.000	0.000		
	INVITING	0.014	0.000	0.2319	0.028	0.117	0.003	0.000	0.000	
	INDUSTRI	0.120	0.043	0.0001	0.327	0.125	0.236	0.335	0.100	0.297

Table 23: Wood's Correlation and Significance Table

A principle components analysis was also attempted on the data from this question, but nothing could be derived (in terms of explained variation) from the results and, therefore, it has not been included in this thesis. The data did not appear to be suitable for this type of analysis.

In the final open-ended question, individuals were asked to list wood's top three attributes. In total, 71 different answers were given (these responses can be

seen in Appendix VIII. Table 24 shows the top six answers that were given, along with the corresponding proportion of respondents who chose that attribute.

Attribute	Percentage of Respondents
Warm	46.6%
Natural	33.6%
Attractive	26.7%
Durability	17.2%
Strength/sturdiness	15.5%
Colour/colour variety	10.3%

Table 24: Wood's Top 3 Attributes

The final question in the survey focused on what subjects considered to be the most important attributes when purchasing a wood product for a home. Nine attributes were listed and respondents were asked to check off all that applied. Figures 19 and 20 show these results in two different ways. Figure 19 shows the percentage of times an attribute was chosen as a percentage of all attributes chosen, while Figure 20 shows the results in terms of proportions of respondents who chose the attribute. Interestingly, both quality and durability were ranked above price in both cases. While high rankings show areas where wood is already perceived as strong, low rankings are equally as important as they display areas where marketing efforts could be focused in order to help wood outperform competitive products. These rankings display the public's current perception of wood and both low and high rankings are extremely important in terms of understanding wood's strengths along with its areas of opportunity.

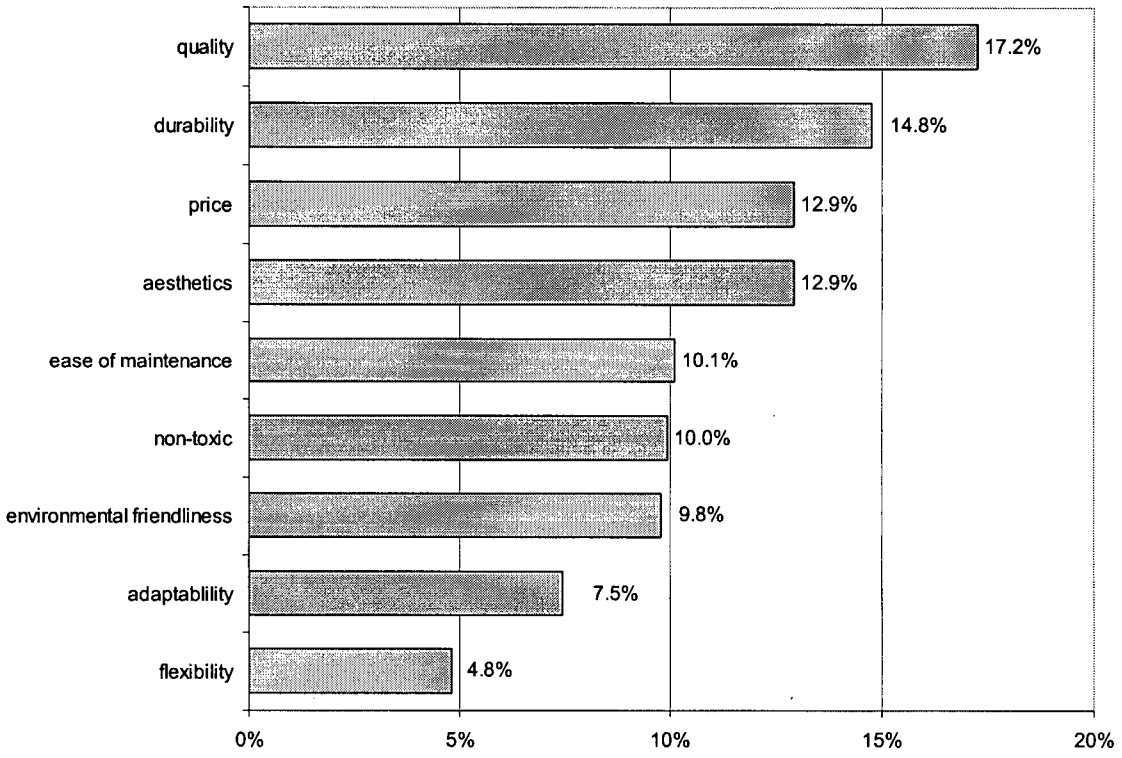

Figure 19: Wood's Most Important Attributes: By Percentage of Total Responses

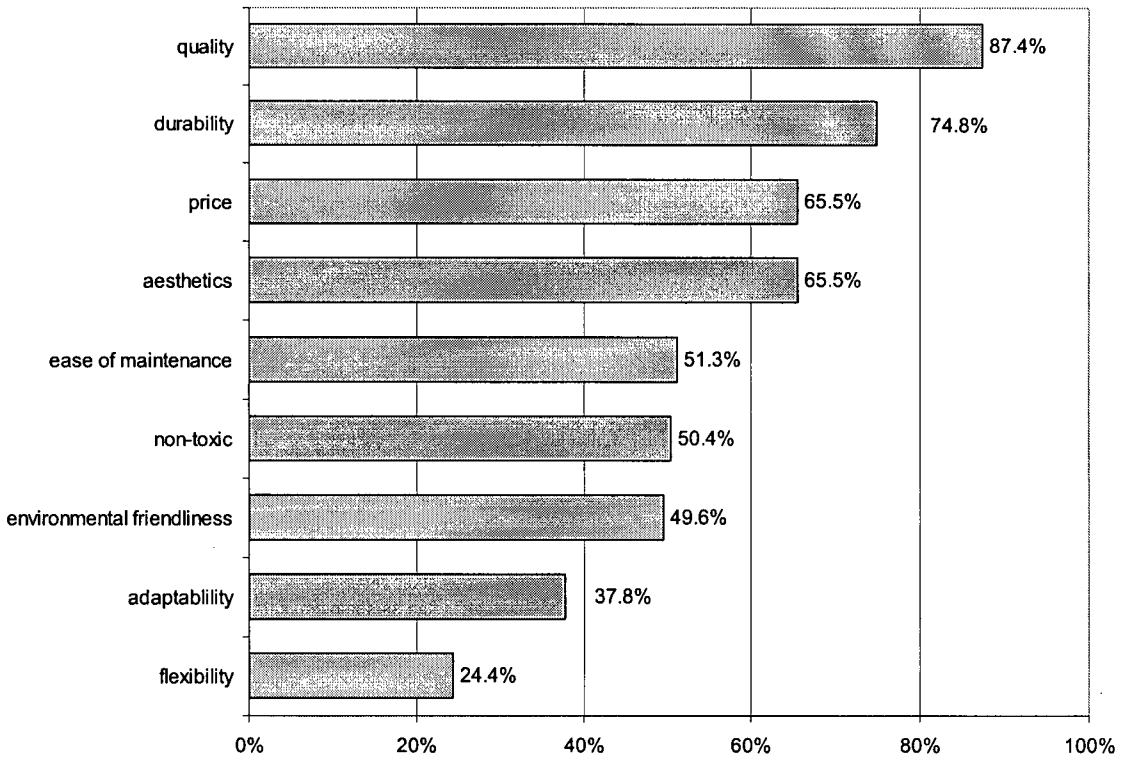

Figure 20: Wood's Most Important Attributes: By Percentage of Respondents

4.4.5 Importance of Attributes within Homes

Respondents were asked how important it is that their home reflects a variety of different attributes. They were asked to rank each attribute from 1=not important, to 5=very important (Figure 21). The 95% confidence limits on the graph show that people did not feel neutral in terms of any of the attributes (each was significantly different from a neutral value of 3). The vast majority of respondents felt that it was extremely important that their homes possess the following attributes: 'warmth', 'comfort', 'relaxing', 'inviting', 'homey' and 'reflective of their personality'. It was seen as only somewhat less important that their homes reflect 'practicality' and be 'entertaining'. People felt that it was much less important that their homes possess 'classical' and 'modern' styles. Finally, it was seen as unimportant that their homes reflect 'coolness', 'status' and 'wealth'.

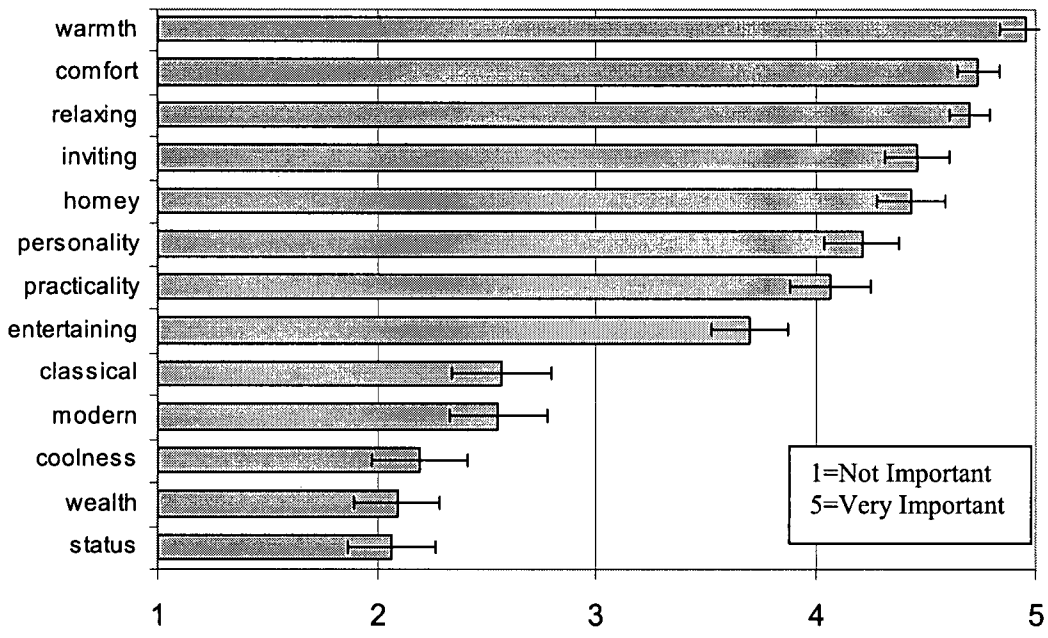

Figure 21: Importance of Attributes within Home

A cluster analysis was performed, yielding three distinct groups. Both assumptions for cluster analysis were considered. The data was tested to ensure that no multicollinearity existed between the variables. As well, it was

assumed that this was a representative sample. The first cluster consisted of 43 people who felt that the attributes 'relaxing', 'homey' and 'comfort' were all very important, and rated all other attributes either a three or four on a five-point scale. This group contained the most moderate individuals. The second cluster consisted of 41 individuals that did not feel neutral about any of the attributes. They felt that both 'wealth' and 'status' were not very important, while 'warmth', 'relaxing', 'homey feeling', 'inviting feeling', 'comfort' and 'practicality' were very important. This group rated 'modern', 'classical' and 'coolness' two on a five-point scale, and 'reflects personality' and 'entertaining atmosphere' a four. The final cluster was a more negative group which did not rate any of the attributes as very important while rating 'coolness', 'wealth' and 'status' all as not important. 'Modern' and 'classic' were also seen by this group as not overly important, and they were neutral on 'entertaining atmosphere' and 'practicality'. Cluster three gave an average rating of four on a five-point scale to 'reflects personality', 'warmth', 'relaxing atmosphere', 'homey feeling', 'inviting feeling' and 'comfort'.

In addition to the attitudinal differences uncovered by the cluster analysis, an attempt was made to distinguish these clusters in terms of demographic profiles, but nothing separating these groups could be uncovered. The only difference that was significant was that cluster 3 was found to be more urban than cluster 2.

4.4.6 Level of Agreement on Attitudinal Statements

Subjects were asked to rate their level of agreement on a variety of different statements using a scale of 1=strongly disagree to 5=strongly agree (Figure 22). The 95% confidence limit is used to show which of the statements significantly differ from a neutral point of 3 (α= 0.05).

In general, individuals strongly agreed with the following statements:

- Wood is an attractive material to have in a home.
- Wood brings a feeling of warmth to rooms.

- I believe that the way a room is furnished affects the way that I feel.
- The variation in wood gives rooms a natural feel.

They also agreed with the following statements, on average:

- It is important to have aspects of nature represented in a room.
- Wood is an environmentally friendly material.
- I have more of a connection with wood than I do with other materials.
- When sitting in a room that contains a lot of wood I feel very relaxed.

On average, the respondents were somewhat neutral on the following statement:

- I find it easier to concentrate in a room that contains a lot of wood.

Finally, respondents generally only disagreed with the following statement:

- I equate the use of wood in rooms with destruction of our forests.

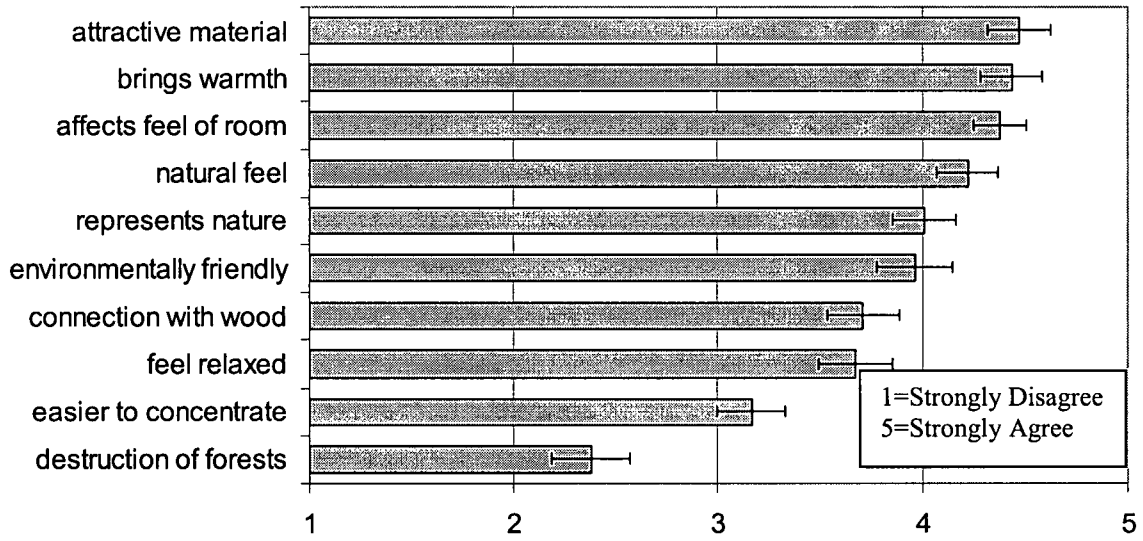

Figure 22: Level of Agreement on Attitudinal Statements

A cluster analysis was run on the data from this question and again three clusters emerged: two large clusters and one extremely small one. Cluster 1 contained 52 individuals that tended to be moderate individuals, giving four of the ten statements a neutral ranking. They generally agreed with the remaining six

statements. Cluster 2 only consisted of three people with very negative views. They were neutral on three statements including the statement referring to the destruction of our forests. They either strongly disagreed, or disagreed with all of the other statements. Cluster 3 was the largest group consisting of 60 subjects. This group was very positive, strongly agreeing or agreeing with all statements except the one referring to the destruction of our forests. An attempt to distinguish these groups in terms of demographics was unsuccessful. The only difference found was that cluster 1 contained a higher proportion of individuals with incomes of less that $25,000 than cluster 3. It appears that the respondents within the separate clusters basically vary on opinion alone.

4.4.7 Feel of a Wood Dominated Room

The survey asked respondents to describe, in their own words, how a room with a lot of wood details and furnishings feels. In total, 111 different categories of responses were recorded (see Appendix IX), with 75.6% of the comments being deemed positive, 8.0% of the comments being neutral, and 14.6% of the comments having a negative connotation. Table 25 shows the top five responses, with almost 50% of the individuals saying that a wood room has a warm feeling, and nearly a quarter of the subjects saying it has a comfortable feel.

Comment	Percentage of Respondents
Warm	47.9%
Comfortable	23.5%
Relaxing	21.0%
Natural	21.0%
Inviting/Welcoming	10.1%

Table 25: The Feeling of a Wood Room

4.4.8 Wood's Appropriateness and Preference in Various Applications

The survey also looked at how appropriate people felt wood was for a wide variety of applications. The scale for this question ranged from 1=not at all appropriate to 5=very appropriate. The error bars show the 95% confidence intervals for each application and were used to test against a neutral value of 3 (α= 0.05). Figure 23 shows that wood is seen as very appropriate in the following applications:

- Doors
- Flooring
- Dining room furniture
- Kitchen cabinets
- Moldings
- Railings
- Bedroom furniture

It is seen as appropriate for the following applications:

- Stairs
- Structural
- Living room furniture
- Windows

Finally people feel neutral about the appropriateness of wood used in wall paneling applications.

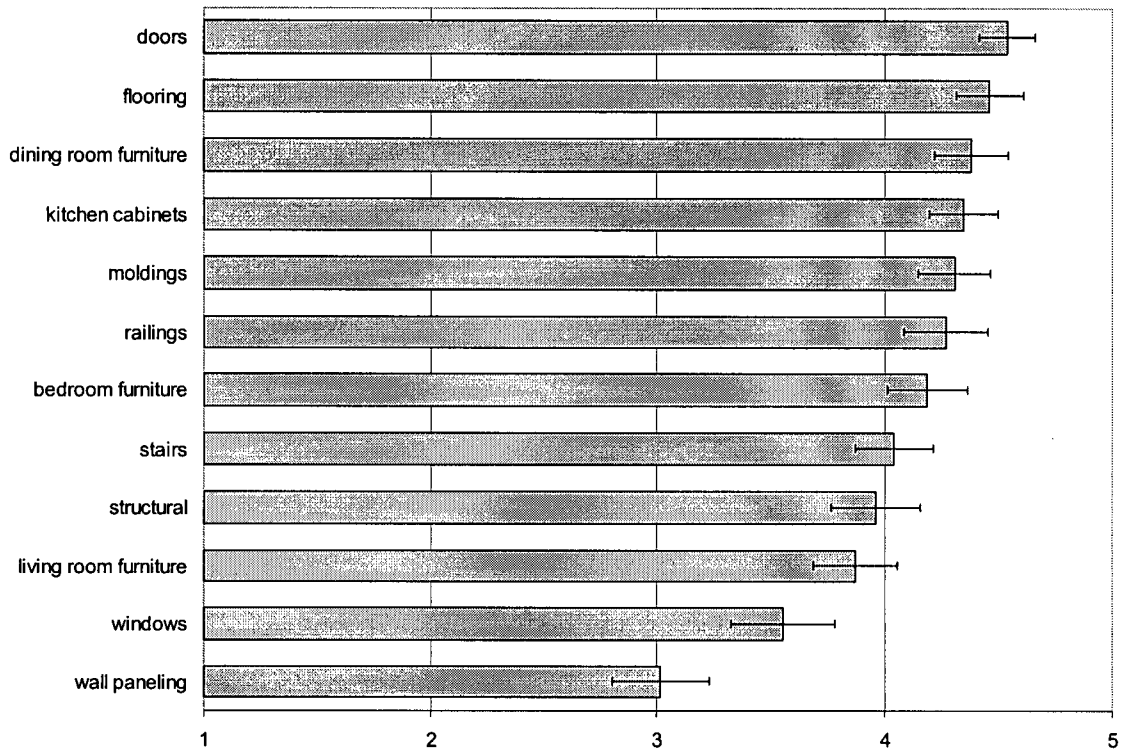

Figure 23: Wood's Appropriateness in Various Applications

Respondents were also asked about the applications for which they preferred wood over other materials, and the results can be seen in Figure 24. The scale for this question was also a 5-point scale ranging from 1 least preferred to 5 most preferred. Again, the error bars on the graph display the 95% confidence limit for each application.

People most prefer wood in the following applications:

- Dining room furniture
- Doors
- Kitchen cabinets
- Flooring
- Bedroom furniture

They also prefer it in the following applications, but to a lesser degree:

- Moldings

- Railings
- Stairs
- Structural applications
- Living room furniture
- Windows

Finally, the respondents do not prefer wood wall paneling at all, echoing the results from the previous question.

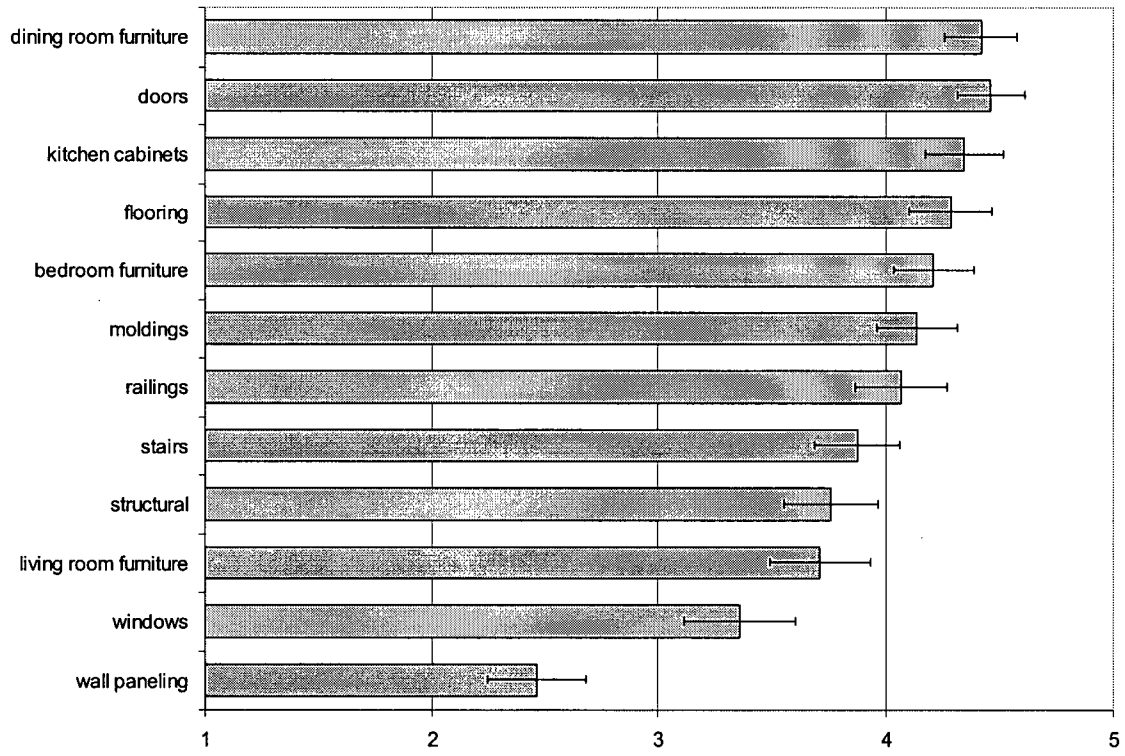

Figure 24: Preference for Wood in Various Applications

The final question in this section looked at actual use of wood in their homes in all of the above applications. Table 26 shows the division of where wood is currently most and least used within subjects' homes.

Application	Yes	No
Doors	93.2%	6.8%
Dining room furniture	85.7%	14.3%
Bedroom furniture	82.1%	17.9%
Kitchen cabinets	81.4%	18.6%
Structural	75.7%	24.3%
Living room furniture	75.2%	24.8%
Moldings	70.1%	29.9%
Flooring	58.0%	42.0%
Stairs	41.9%	58.1%
Railings	50.0%	50.0%
Windows	44.1%	55.9%
Wall Paneling	23.5%	76.5%

Table 26: Current Wood Use in Various Applications

5 Discussion

Information gathered in the four sections of this study yielded diverse information on the topics of interior environments, wood products and perceptions of wood. This chapter will focus on discussing the information gathered in this study in the context of the literature related to this topic and the three objectives of this research: 1) to determine if wood environments have an impact on emotional states and, therefore, implications for psychological health; 2) to determine if there are any demographic differences with respect to how people emotionally respond to wood (e.g. age, culture, gender); and, 3) to determine if emotional response to interior wood products can be used in the development of marketing strategies. An in-depth look at how results from this research can open up a new and innovative way of marketing wood products will also be provided. Finally, this section will conclude with a brief look at the limitations of the research along with recommendations for further studies.

5.1 Impact of Wood Environments

The concept that the environment that surrounds people affects their overall health and well-being is a generally accepted one. The home is a revered place where the average American, for example, spends approximately 65% of his/her time (Health House RX, 2001). Therefore, it is important to comprehend how the home truly affects the inhabitants. Not only is it essential that the physical relationship between inhabitants and home be fully understood, it is equally as important that the psychological relationship be explored. This study has indicated that people do believe that how a room is furnished affects the way that they feel. Subjects generally strongly agreed with this sentiment, giving it an average rating of 4.38 on a five point scale.

The hypothesis, that wood environments positively impact people's emotional states, productivity and psychological health, was explored and the data from this

series of studies generally supports this statement. Emotionally, individuals appear to respond very favourably to wood and wood environments. When asked to describe what a room with a lot of wood details and furnishings feels like, the top five answers were all positive; wood was thought of as 'warm', 'comfortable', 'relaxing', 'natural', 'inviting/welcoming'. Fully, 75.6% of the responses to this question were positive in nature versus only 14.6% which were deemed negative, indicating that people respond positively to wood environments and implying that these environments can have beneficial effects on emotional states. As interactions between individuals and their physical settings affect one's behaviours and experiences (Gifford, 1987), it appears that wood has the potential to play a favourable role in determining one's well-being.

When asked what the important factors in creating a room where respondents would want to live or spend time were, almost one-quarter of the responses related to warmth. At the same time, almost half of the subjects chose 'warmth' as one of wood's top three attributes, far more than all other attributes. The attributes related to homes being 'warm', 'comfortable', 'relaxing', 'inviting' and 'homey' were rated as the most important, while the attributes related to wood being 'warm', 'comfortable', 'relaxing' and 'inviting' were all included in the top five descriptors of how a wood dominated room feels. This shows that there is a consistency between those attributes that people desire within their homes and the environments that wood products can help to create. Further cross-cultural studies need to occur to determine if this phenomenon is truly universal. By conducting similar studies in different areas around the world it may be possible to replicate these results and find a commonality amongst people everywhere.

Certain aspects of our lives can help to counteract the negative effects of stress, and one of these is the environment in which we surround ourselves (Wade & Tavris, 2000). Respondents consistently showed a preference for wood-based rooms, as seen in the results of the q-sort and interviews. In fact, the top two ranked rooms in the q-sort were wood dominated. There appears to be a strong

relationship between wood and the attributes 'warm', 'comfortable', 'relaxing' and 'inviting'; all of which are attributes that would likely decrease the overall stress level within an environment and have beneficial effects on the inhabitants. Farrow states that there is something intangible that results from using wood that resonates as an aesthetic element, but is probably comforting as well (Taylor, 2004). Stress plays a major role in everyone's life, and it is evident that the relationship between stress and both physical and mental health is complicated, affected by numerous factors (Wade & Tavris, 2000). However, it does appear that wood environments do have a positive effect on individuals. While there is still not a complete understanding of the relationship between wood used in built environments and the people that occupy them, it can be concluded that humans generally respond favourably to wood and this, in turn, may have beneficial psychological effects.

5.2 Demographic Differences in Perceptions of Wood

The hypothesis, that human response to wood is universal and, therefore, demographic differences are irrelevant, was generally supported by the data collected. While individuals varied greatly from one another, there appeared to be no trend in responses based on demographic differences.

One question from the survey focused on ten statements pertaining to individual perceptions of wood. From the data gathered for this question, respondents were clustered into three groups, but it was not possible to distinguish between these clusters based on any demographic information collected. However, these groups did appear to differ perceptually (in terms of how negative or positive the group was). This supports the broad observation that people have a general preference for natural settings that usually carries across individuals, groups, and even varying western cultures (Ulrich 1986).

Respondents were also clustered into three groups based on the attributes that they felt were most important for their homes to reflect. Again, these groups could not be differentiated based on demographic profiles, but simply by opinions. Only one statistically significant difference in demographics could be found (location of home). This gives the idea that the qualities that people desire to have displayed within their homes are not specific to a single group, but are much more widespread. From the data collected, it was not possible to distinguish between respondents in terms of anything other than the options that they prefer.

5.3 Desire to Bring Nature Indoors

One of the basic principles underlying this research was people's connection to nature. The hypothesis, that humans have an innate desire to try and replicate nature in their indoor environments by bringing the outside in through the use of natural materials (like wood), was also supported by the data collected. The picture q-sort yielded much data to support this claim. The top two rooms in this study were both completely wood dominated, containing little to no artificial materials and had large windows with views of nature. In addition, the top half of the rooms from the q-sort contained the majority of the wood, large windows and natural materials found in the pictures. In the bottom five rooms, there was almost a complete lack of greenery viewed or displayed, as well as a marked lack of anything natural. During the interviews, both the need for plants and wood were mentioned in the top ten requirements for creating a room in which the respondents would want to live or spend time. Individuals appear to respond in fundamentally different ways to natural versus man-made materials (Ulrich, 1986). This preference for natural materials and wood supports previous conclusions that people have an innate preference for nature (Ulrich, 1986; Ulrich 1984).

A second area where people's preference for bringing nature indoors was found was in the desire to have large amounts of natural light present in rooms. Over one-quarter (27.7%) of the respondents explicitly mentioned the need for natural light within a room where they would want to live or stay for prolonged periods. Moreover, lighting in general appears to be an important factor as it was mentioned by 42.0% of subjects. These results were echoed by the q-sort findings as a lack of light is the most dominant feature in the bottom five rooms, whereas the top six rooms all have large windows or are extremely bright.

5.4 Opportunities for Wood Products

As Canada's wood industry looks for ways to grow and change in the new global economy, it is necessary that the way in which wood products are marketed also be adapted. Consumers are granted the choice of numerous competing products, so it is essential that marketers not focus solely on the core product, but also look to the total product concept in order to help wood to compete (Solomon et al., 2001). In the past, wood has been seen as simply an aesthetic and structural material, but, through this research, it can be seen that wood is much more. With the addition of appealing attributes related to health, wood has the opportunity to be viewed in a new light and gain new competitive advantages over other manufactured and unnatural products.

A product is a bundle of attributes in addition to a physical good, including packaging, brand name, all benefits and supporting features (Solomon et al., 2001). It is not enough to simply focus on the core product, or basic benefits, when trying to compete in today's marketplace. One of the aims of this research was to find additional attributes to add to wood's total product concept.

As consumers become more aware of the physical and psychological impacts that indoor environments have on them, more emphasis will be placed on the overall health of furnishing materials and finishes. In terms of perception when

compared with nine other furnishing materials, wood was ranked first on the following attributes: 'warm', 'natural', 'homey', 'relaxing' and 'inviting'. This shows tremendous opportunities for wood to be promoted in terms of the positive environment that it creates. Stress and pressure are integral parts of modern society, and if wood can be promoted by its ability to create relaxing, homey environments, it stands to benefit greatly from the trend towards healthier homes and buildings (Spetic, 2003). This message is strengthened even further as we move towards harvesting wood in a sustainable and ecologically sensitive manner.

The general public appears to have a solid understanding of the health benefits associated with wood environments. In general, they have a perception that wood creates healthy, warm and relaxing environments. As perception is reality in the minds of consumers, this means that wood products have a tremendous market opportunity upon which the industry can capitalize. The seemingly high degree of consumer awareness found in this study indicates that marketers do not need to focus on educating the public on the benefits of wood, but rather need to find new and innovative ways to use these attributes to promote wood products. The appropriate promotion would stress more ownership utility to buyers, thereby accentuating the product's value (Beckman et al., 1982). Promoting wood by focusing on the health and well-being benefits that it creates is an entirely new way of looking at wood and wood products. It is essential that all of wood's positive attributes be exploited in order to help wood succeed over competing products in the marketplace.

While wood is already well perceived by the public with respect to many attributes, it is important that marketers promote wood in a manner that exhibits all of wood's benefits. In this research, different attributes were studied to determine what wood's most important attributes were perceived to be. Currently, these are 'quality', 'durability', 'price' and 'aesthetics'. Marketing focus needs to be turned towards promoting some of the lesser known attributes such

as 'ease of maintenance', 'flexibility', 'adaptability', 'non-toxicity' and 'environmental friendliness' in order for wood to gain increased acceptance by the general public. In addition, campaigns focusing on wood's ability to promote human well-being could gain general acceptance and prove very successful. Wood is an exceptional material that has numerous benefits to users, all of which need to be exploited to successfully compete in today's global marketplace.

The current market for secondary processed wood products (SPWPs) shows tremendous opportunities for producers. The North American housing industry is booming. The United States is expected to have a record number of housing starts in 2004 with 1.920 million (National Associoation of Home Builders, 2004). The Canadian market is also strong, and housing starts are expected to boom through 2005 (Taylor, 2002). While the Japanese housing market has been in decline over the past decade, housing starts still sit at over a million a year (Taylor, 2002). A further area of opportunity is the repair and remodelling (R&R) industry which is poised for growth in Europe, North America and Japan (Taylor, 2002). The R&R sector in the United States alone is expected to increase steadily, reaching 17.6 billion board feet in 2006, a 1.3 billion board feet increase from 2001 (Taylor, 2002). Armed with new innovative marketing plans, which encompass not only wood's classic attributes, but focus on all of wood's benefits, SPWPs are capable of capturing a larger portion of market share.

Canadian producers of SPWPs are faced with an extremely competitive marketplace. Not only are they forced to fight for market share with competition from the standard U.S. and Western European producers, but there has recently been an influx of competitive manufacturers from China, South East Asia and Eastern European Nations (Taylor, 2002). In order for Canadian companies to compete, it is essential that they go beyond the typical marketing strategies and look to market their wood products in a way that shows these products have a wide variety of benefits, including those related to health. This is not to say that Canadian wood products are healthier than those from other countries, but that

Canadian producers need to focus on new marketing strategies to stay competitive.

Results from this research show that all interior wood products can benefit by being promoted on health attributes, but certain applications show much promise. Wood was not only seen as very appropriate, but was also most preferred in the following applications: flooring, doors, dining room furniture, kitchen cabinets and bedroom furniture. The conjoint results also found that, not only was wood flooring highly preferred, but flooring was found, by far, to be the most important feature, with 40.7% of the decisions being based on this alone. This shows that consumers already desire wood flooring, giving flooring manufacturers tremendous opportunities, if properly exploited. Wood mouldings and railings are seen as extremely appropriate and are also preferred, although to a somewhat lesser extent than the above applications. Applications such as stairs, living room furniture, windows and structural components, are seen as appropriate and generally preferred and, with proper promotion, stand to compete successfully. Wood wall paneling faces the toughest challenge, as it was seen as neutral, appropriate but not preferred. However, by focusing on the health benefits of wood products, producers of wood wall paneling may be able to increase consumer preference.

In summary, wood products have the opportunity to promote themselves in a completely new light. The perception that wood creates environments of increased psychological well-being and health is prevalent, and this point needs to be included in wood's total product when marketing strategies are devised. The concept of healthy homes and green buildings is increasing steadily in popularity and wood products have the chance to capitalize on this movement. Marketers need to show consumers that wood products are more than they appear and possess benefits to health that other competing products do not.

5.5 Recommendations for Further Studies

This research touched on a relatively new concept of wood and its psychological impacts. Further research in this area would be extremely beneficial for designers, architects and wood products marketers. First, the results of this study need to be replicated in different cities and countries to ensure that the effects of wood are truly universal. Larger studies, that either use real rooms that vary strictly on furnishing materials or rendered rooms (using computer technology) that ensure these environments appear realistic, are important as they would enable researchers to gain control over more factors. This would allow researchers to obtain more definitive results. Finally, it would be useful to conduct research that focuses on determining the physiological responses to different environments and materials to help quantify the effects of wood products on end users. Quantitative data generally gains wider acceptance in the scientific community, and would, therefore, allow more rigorous conclusions to be made.

6 Conclusion

The focus of this research was to examine people's perceptions of wood, specifically in indoor applications. An examination of the type of environments that wood products can create was undertaken in order to determine if these environments could have positive effects on human well-being and health. This research was the groundwork for a new area of research in wood products, examining the psychological impact of wood. A sample of a 119 individuals from the Greater Vancouver Regional Area was taken and these subjects were asked a variety of different questions related to interior furnishing materials, living environments, wood products and perceptions of wood. The study included four experiments, of which each subject completed three. The main objectives of this study were to: determine if wood environments have an impact on emotional states and, therefore, implications for psychological health; determine if there are any demographic differences with respect to how people emotionally respond to wood (e.g. age, culture, gender); and, determine if emotional response to interior wood products can be used in the development of marketing strategies. Results from this research seem to indicate that our current thinking on, and framework for, healthy housing could be expanded to include psychological health.

People appear to have developed an understanding that wood creates healthful environments. Wood was rated above nine other furnishing materials on the attributes 'warm', 'natural', 'homey', 'relaxing' and 'inviting', with the top descriptors of a wood environment being 'warm', 'comfortable', 'relaxing', 'natural', and 'inviting/welcoming'. The results of this study found that wood environments appear to have a positive impact on emotional states and psychological health. While an attempt was made to separate subjects based on demographic differences, this was unsuccessful. People's positive response to wood and wood environments appears to be relatively widespread. Humans appear to have an innate desire to try and bring nature into their indoor

environments through the use of windows and views of nature, natural light, plants and natural materials, such as wood.

Wood is a material that goes beyond just the aesthetic and structural properties generally associated with it. The environments in which people surround themselves have a tremendous impact on their overall health and well-being, and wood environments appear to have positive effects. From a marketing point of view, promotions need to focus on all of wood's positive attributes. As the average consumer's awareness of the healthy home concept grows, there are outstanding opportunities for wood products to capitalize on their ability to create healthful environments. Wood marketers have the chance to market wood products in an entirely new manner, focusing on the increased psychological health benefits associated with this material. Wood is more than just a building material, it has a multitude of positive attributes, all of which need to be conveyed to consumers in order for wood to successfully compete in today's increasingly complex marketplace.

Currently, there are exceptional opportunities for producers of secondary processed wood products. Housing starts in North America are extraordinarily strong at the present, along with a world repair and remodelling industry that is growing in North America, Europe and Japan. Canadian wood products manufacturers have the opportunity to succeed in this marketplace with carefully thought out marketing plans that focus on the total product concept of wood. The Canadian wood industry is extremely important to this country's economy, so it is essential that the industry be innovative in promoting these products. There is extremely tough competition in today's global economy, but there are clear opportunities if properly approached.

Wood is an exceptional material that has benefits beyond the imagination. This study has indicated that it is time to look at this material in a different light and focus on its ability to create relaxing, healthy environments for people to live in.

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APPENDIX I: EXPORATORY ANALYSIS

Wood Use In Interior Applications and its Psychological Impact: An Exploratory Assessment

J. M. H. RICE and R.A. KOZAK

INTRODUCTION

The environment we live in has a tremendous impact on our lives; it affects us physically as well as psychologically. Preference research clearly points to the finding that people show a consistent preference for natural scenes with vegetation over views of manmade environments (Ulrich, 1984). This astounding preference for nature leads to the theory that, within our homes and other buildings, natural materials may lead to the same preference and provide a sense of well-being. Bringing nature inside through the use of natural materials, natural light and plants may prove to have benefits to our health that exceed our knowledge and expectations.

Through scientific studies, it has been proven that nature increases our psychological health, but little is known about the affects that natural materials have on us. Many feel convinced that the use of wood is beneficial to our well-being, but to date, little has been proven.

OBJECTIVES

MAIN OBJECTIVE – Exploratory Assessment

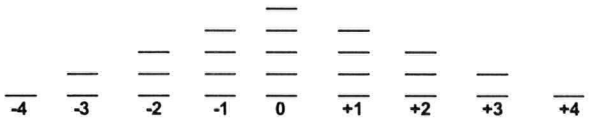
To determine if people have an emotional response to wood used in interior environments and to test the Q-sort methodology in achieving this objective.

LONG TERM RESEARCH OBJECTIVES

1. Determine if wood environments have an impact on emotional states, productivity and psychological health.
2. Measure the degree to which the impacts are beneficial to users of wood.
3. To determine if demographic/psychographic differences affect how people emotionally respond to wood (e.g. culture, lifestyle).
4. Determine if emotional response to interior wood products can be used in the development of marketing strategies.

METHODOLOGY

- Subjects were given a deck of 25 cards each numbered and containing a picture of a living room.
- An unstructured Q-sort was performed where the subjects were told to sort the cards in any way that they wanted, into as many or few categories as required. They then recorded the numbers of the rooms in each category and explained what the categories stood for.
- Next, the subjects were asked to sort the cards into three categories: most favorite, neutral and least favorite. They then described the attributes and environments created by their most favorite and least favorite rooms.
- Subjects were then asked to place the cards on a normal distribution ranging from -4 (least favorite) to +4 (most favorite). This forced subjects to decide between cards and choose their absolute most and least favorite rooms.



- Finally, a brief questionnaire was administered containing questions on their preference for wood, the environments created by wood, and a variety of demographic items.
- A convenience sample was used for this study (n = 35).

RESULTS

ROOM RANKINGS (see side poster)

Five distinct clusters are apparent

Top 8 rooms appear to mimic natural environments by bringing the outside in:
- Natural materials (wood and stone)
- Large windows giving views of nature and increasing the amount of natural light
- Top room scored 1.2 points higher than the next highest ranked room

Rooms 9-12 are generally very nondescript, containing no special features.

Rooms 13-17 are generally distinct rooms that vary in style.

Rooms 18-20 are all old fashioned, with dated appearance.

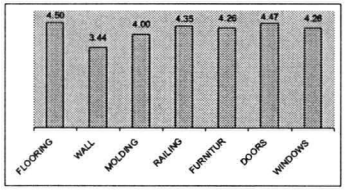
Bottom 5 rooms are all very modern styles:
- Lack of natural materials
- Either lack of colour or bright clashing colour combinations
- Use of metal

CLASSIFICATION

Respondents almost unanimously classified rooms according to style. Other descriptors included **materials** (mentioned by **50%** of the respondents), with **41%** explicitly mentioning **wood**.

HOME APPLICATIONS

Wood was found to be strongly liked in most applications specified. The graph below shows the score of each application on a scale of 1 (do not like at all) to 5 (like very much).



DESCRIPTIVES

When asked to describe a room with wood details, the following were the most common adjectives used:

Adjective	% of Respondents
Warm	51.5
Natural	36.4
Relaxing	27.3
Comfortable	27.3
Cozy	18.2
Homey	12.0

CONCLUSION

As the wood industry in North America evolves, it is necessary to fully understand peoples' perceptions of wood as well as the impact that wood can have in order to properly focus marketing efforts, find new markets and develop new products.

A hypothesis for future research has been derived from this exploratory research:

- Humans have an innate desire to try and replicate nature in their indoor environments by bringing the outside in, through the use of natural materials (like wood).

Research study will take place in Fall 2003.

Improvements to the methodology include:

- Ensuring that all cards show the majority of the living room

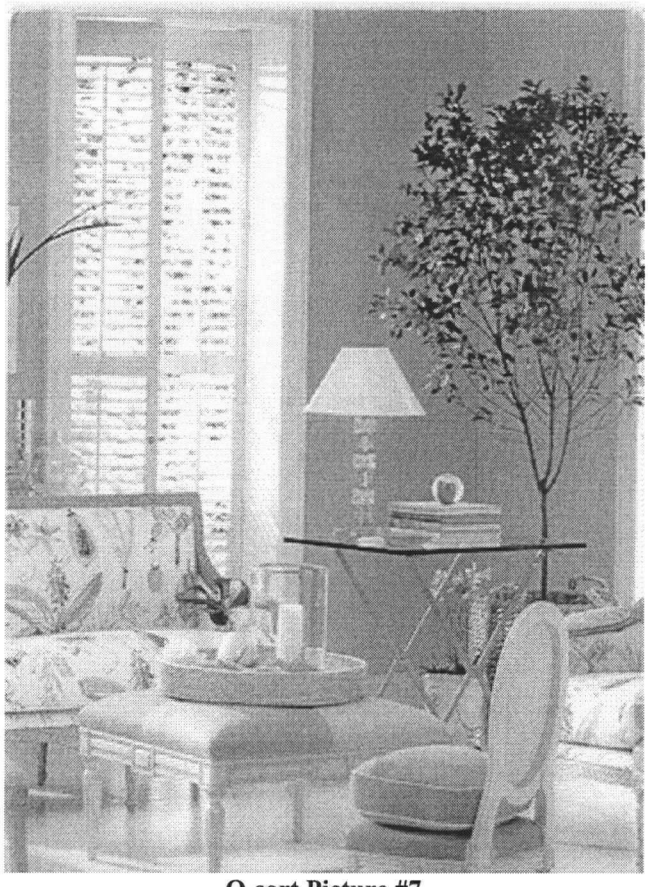
REFERENCE

ULRICH, R. S. 1984. The Psychological benefits of plants. Garden. 8(6): 16-21.

Research was funded by the International Environmental Institute

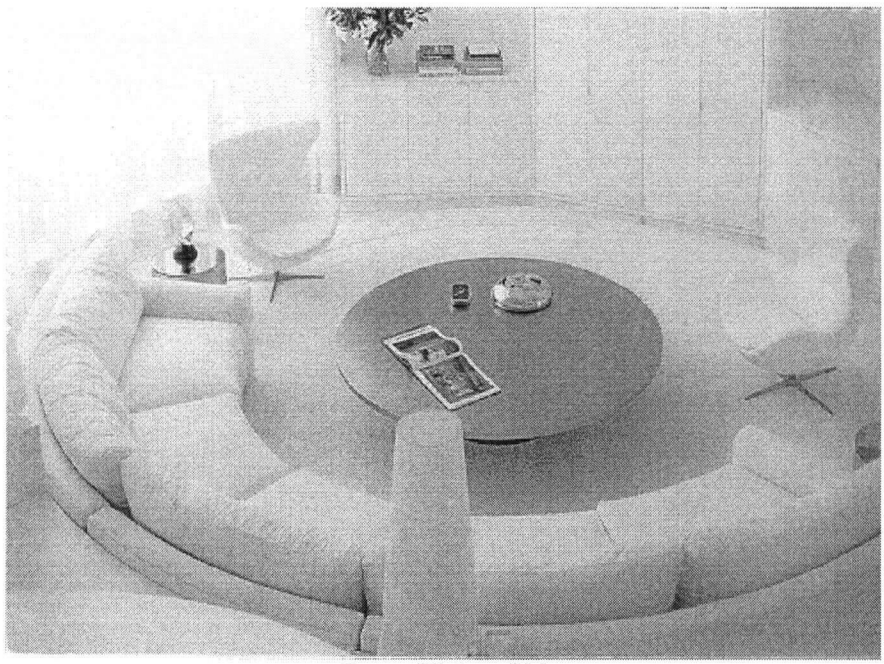
APPENDIX II: Q-SORT PICTURES

Q-sort Picture #1
Photographer: Jeff McNamara **Magazine**: Metropolitan Home



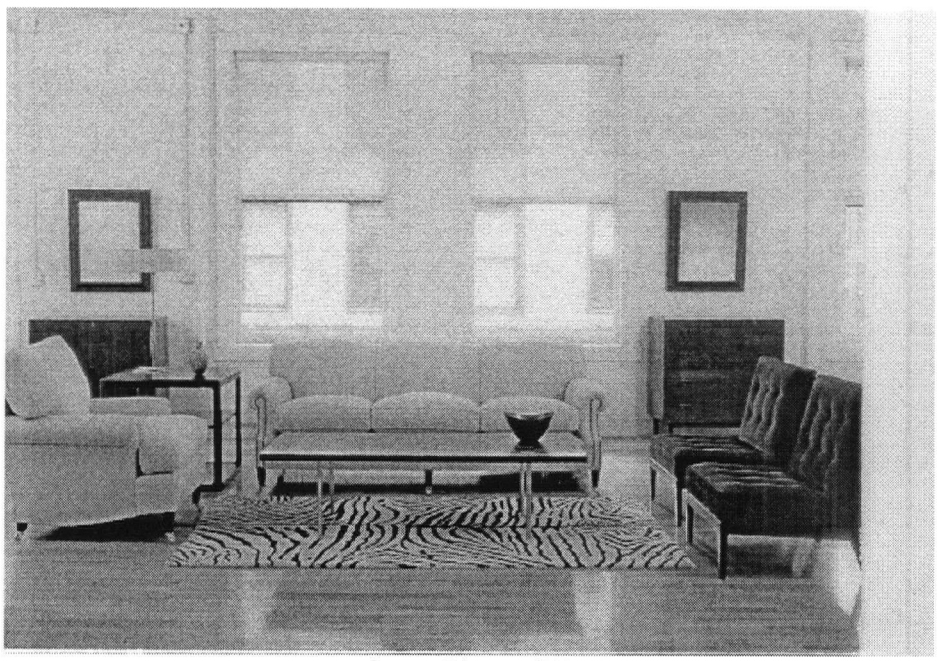
Q-sort Picture #7

Q-sort Picture #13



Q-sort Picture #14
Photographer: Carlos Domenech **Magazine**: Metropolitan Home

Q-sort Picture #16
Photographer: Tim Street-Porter **Magazine**: Metropolitan Home



Q-sort Picture #19

APPENDIX III: SELF ADMINISTERED SURVEY

Interior Design Survey

The University of British Columbia

Subject Number: _____

Section I - Furnishing material preference

1. In decorating your home, how would you describe your style?

2. For each attribute below (a through k), please rate the materials listed. For each attribute, put a "✓" below the materials that most represent that quality and an "x" below the materials that least represent that quality. Leave the remaining materials blank. Note that you can select more than one material in each case.

	Glass	Plastic	Steel	Wood	Painted surface	Wall-paper	Leather	Concrete	Ceramic	Stone
a. Warm										
b. Industrial										
c. Natural										
d. Artificial										
e. Contemporary										
f. Modern										
g. Stylish										
h. Homey										
i. Relaxing										
j. Inviting										

3. How important is it that your home reflects the following? (Please indicate the importance by circling the appropriate number)

	not important				very important
a. Reflects personality	1	2	3	4	5
b. Modern style	1	2	3	4	5
c. Classical style	1	2	3	4	5
d. Warmth	1	2	3	4	5
e. Coolness	1	2	3	4	5
f. Entertaining atmosphere	1	2	3	4	5
g. Relaxing atmosphere	1	2	3	4	5
h. Homey feeling	1	2	3	4	5
i. Inviting feeling	1	2	3	4	5
j. Comfort	1	2	3	4	5
k. Practicality	1	2	3	4	5
l. Wealth	1	2	3	4	5
m. Status	1	2	3	4	5

4. Please indicate your level of agreement for each of the statements below. (For each statement, check whether you strongly disagree, disagree, neither agree nor disagree, agree, or strongly agree)

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
a) Wood is an attractive material to have in a home.					
b) Wood is an environmentally friendly material.					
c) The variation in wood gives rooms a natural feel.					
d) Wood brings a warmth to rooms.					
e) I equate the use of wood in rooms with destruction of our forests.					
f) I have more of a connection with wood than I do with other materials.					
g) When sitting in a room that contains a lot of wood, I feel very relaxed.					
h) I find it easier to concentrate in a room that contains a lot of wood.					
i) It is important to have aspects of nature represented in a room.					
j) I believe that the way a room is furnished affects the way that I feel.					

5. In your own words, please describe what a room with a lot wood details and furnishings feels like.

6. Beside each of the applications presented below, please indicate how appropriate you feel wood is for the application as well as your preference for using wood by circling the appropriate numbers. Then check *Yes* (Y) or *No* (N) to indicate if wood is used in this application in your home.

Application	Appropriateness not at all appropriate … very appropriate	Preference least preferred … most preferred	Do you have it in your home?
a. Flooring	1 2 3 4 5	1 2 3 4 5	Y N
b. Wall Paneling	1 2 3 4 5	1 2 3 4 5	Y N
c. Moldings	1 2 3 4 5	1 2 3 4 5	Y N
d. Railings	1 2 3 4 5	1 2 3 4 5	Y N
e. Dining room furniture	1 2 3 4 5	1 2 3 4 5	Y N
f. Living room furniture	1 2 3 4 5	1 2 3 4 5	Y N
g. Bedroom furniture	1 2 3 4 5	1 2 3 4 5	Y N
h. Doors	1 2 3 4 5	1 2 3 4 5	Y N
i. Windows	1 2 3 4 5	1 2 3 4 5	Y N
j. Kitchen cabinets	1 2 3 4 5	1 2 3 4 5	Y N
k. Stairs	1 2 3 4 5	1 2 3 4 5	Y N
l. Structural	1 2 3 4 5	1 2 3 4 5	Y N

7. In your opinion, what are wood's top three attributes.

1. _____

2. _____

3. _____

8. In purchasing a wood product for a home, what do you consider to be the most important attributes? (Check **all** that apply)

Price	☐
Environmental friendliness	☐
Aesthetics	☐
Durability	☐
Non-toxic	☐
Quality	☐
Adaptability	☐
Flexibility	☐
Ease of maintenance	☐

Other (specify) _____

_____

Section II - Background Information (Strictly Confidential)

Please answer the following personal questions to the best of your ability

1. What is your gender?

Male	☐
Female	☐

2. What is your current age? (Please check one box). _____ years

3. What is your martial Status? (Please check one box).

Married	☐	Common law	☐	Single (never married)	☐
Separated	☐	Divorced	☐	Widowed	☐

4. Do you have any children? (Please check one box).

Yes ☐ → ↓ ↓

No (Go to question #6) ☐

5. How many children do you have? _____
How many live at home? _____

6. Annual family income:
(Please place a check mark beside the category indicating your annual family income)

Less than $25,000	☐	$100,000 - $124,999	☐
$25,000 - $49,999	☐	$125,000 - $149,999	☐
$50,000 - $74,999	☐	$150,000 and over	☐
$75,000 - $99,999	☐		

7. What is the highest level of formal education that you have completed?
(Please place a check mark beside the category that best describes your level of education. Please check only one box)

Elementary school	☐	Technical school	☐
Junior high school	☐	College/university	☐
High school	☐	Graduate school	☐

8. How would you describe your ethnic background?

_____

9. Which of the following best describes your primary residence? (Please check only one box)

Detached house	☐	Town House	☐
Apartment/condominium	☐	Other (please specify) _____	

10. Do you currently own or rent your primary residence? (Please check only one box)

Own	☐	Rent	☐	Other (please specify)_____	

11. How would you describe the location of your home? (Please check only one box)

Urban	☐	Suburban	☐	Rural	☐

12. Approximately, how much do you spend annually on home improvement?
$_____

APPENDIX IV: INTERVIEW TRANSCIPTS

Room #8

Subject #1

1. open
2. comfortable atmosphere, not a lot of variety of colours, colours are warm, more like shady colours than bright colours
3. rug and table
4. don't like back dark wood panels
5. the lighting, open space, a lot of natural light comes through

Subject #3

1. Cold
2. Unwelcoming
3. Spacious
4. wooden wall behind chair, pillar like decorations and colour of chairs
5. Warm, comfortable, welcoming, wooden and rock materials, and warm colours

Subject #6

1. Clean
2. not cluttered, semi-comforting not overly cozy, very spacious, open, in away peaceful cause it is very clean
3. difference of materials used, the neutral colours and the flooring, it's very simple
4. it lacks a little bit of colour, there is contrast but it is all minimal
5. keeping it clean, clean lines, very modern, very spacious not much going on in the room at all, doesn't like rooms that are a little to expressive

Subject #9

1. Unpleasant
2. Cold, old fashioned, industrial, kind of corporate
3. Stone garden with tree (on far right), round glass coffee table, clock and counter with stools and hanging lights in kitchen
4. Square edges on sofa and chairs, back wood wall, not cozy, no clear separation between living room and kitchen area (in terms of furniture) furniture is not grouped, rug, wood cupboards, colours of furniture
5. Child friendly, lots of storage, nice colours, cozy, more art, colour, warmth, practical

Subject #15

1. cold
2. very stark, artificial looking, really cold colours, understated, looks really empty
3. wood grain on wall, plants, table in corner with wood (warmth), and openness (space)
4. floor looks very cold, area rug is featureless, the gerter type thing coming across separating from kitchen is stark, the furniture is too modern
5. warmth, warm colours, textures, not tile or polished concrete type flooring, a hard wood or something that has an organic feel to it, space

Subject #18

1. furniture
2. pleasant
3. comfortable to sit, clock
4. can't see an exit
5. enough light, comfortable place to sit

Subject #21

1. clean and neat
2. not very warm
3. it is a nice room, matching colours
4. not warm, doesn't look like anyone lives there, not homey
5. colours, big windows and view, warm colours

Subject #22

1. uninviting
2. uninviting, not very much of a conversation area, finds it very open, very individualistic, different areas and you're all by yourself, could be by yourself at all times, lacks a focal point
3. table, bar area has potential but too plain, the openness of the bar/ kitchen area flow a bit
4. back wall panel, rug, colours of sofa, too plain, nothing to stop and catch the eye
5. focal point of room is important, colour scheme, fabrics, lighting and amount of light, large windows and natural light

Subject #24

1. no life
2. cold, like a hotel
3. plant and maybe window which you can't see
4. colour too grey, like doctors waiting room, modern furniture looks cheap, no class
5. warm atmosphere, wood, windows, plants, most wood possible, wood floor, wood moldings, bright with big windows

Subject #28

1. minimalist
2. not very personal
3. like neutral colours
4. could be dressed up with more colour, sharp angles on furniture (chairs)
5. Needs to be cozy and comfortable, place for personal things, but not too many, interesting things but not cluttered, needs to be light, natural light is nice

Subject #31

1. modern
2. austere, I guess comfortable somewhat
3. furniture looks comfortable, lots of light, clean not cluttered
4. doesn't feel very warm or very homey, bit too structured like show room
5. environmental health, comfort

Subject #34

1. cozy
2. warm
3. likes back wall wood grain, carpet and kitchenette, likes most of it, nice coffee table, plant, lamp, pleasant to look at
4. nothing
5. must have warm feeling to it: that includes walls, furniture, lighting. colours, plants

Subject #37

1. modern
2. spacious, looks like designed for just a couple, looks warm
3. likes wood in the background and how it complements steel gerter that is next to it, likes the lighting and the lamp stand and the banister (nook)
4. everyone would be sitting some distance apart and coffee table is impractical, would want to include more of the terrarium in the site line (terrarium is on the right)
5. colours and how warm it would feel, room is practical in design, good lighting and sense of having a bit of nature in the room

Subject #40

1. cold
2. not lived in, very pristine and organized, minimalist, not children, professionals, hardly at home, cleaning service, very COLD, unfriendly, modern, reminds her of Jetsons
3. No Clutter
4. coldness and very sharp, too futuristic feeling, someone's old-fashioned interpretation of what it would be like today
5. comfort, warmth, hominess, being surrounded by things you like, a piece of who you are

Subject #42

1. stylish
2. like the look and overall atmosphere, likes consistency in styles and colours, clean and quite bare, doesn't like colours themselves, a bit cold, hates colour of sofa, a little too stark, too bare doesn't look comfy, really cold colours
3. simplicity of design, and how everything goes together really well and how everything fits nothing is out of place in this room, pretty stylish, it is a cool room, funky things like lamp shade
4. cold colours, uncomfortable furniture, back wood wall, doesn't like colour of wood it looks a little strange
5. light/natural light, warm colours, lots of plants, really livable feeling, furniture that looks nice but is also more utilitarian, more comfy more functional

Subject #46

1. money
2. semi inviting, but kind of uncomfortable, concrete flooring does not give it a homey kind of feel
3. everything goes together, all the same kind of style
4. carpet, shag carpet
5. practicality of room, used for what it is intended for, as sense of home/some where you can relax

Subject #51

1. gorgeous
2. doctors office, very almost sterile, hotel like, calming at the same time, colours are monochromatic and they are restful to the eye
3. sense of calm organization, loves central conversation area finds it inviting even though it looks doctors offishy, likes kitchen being right there too and the open kitchen concept
4. too cold for a home, even though wood does warm it up quite a bit, not soft enough, comfort level isn't there
5. the way the furniture is positioned for good conversation, don't want to be half a mile across the room trying to have an intimate conversation, likes smaller rooms with tighter arrangements, loves wood because it has a warming and organic feel to it

Subject #53

1. antiseptic
2. waiting room, not a living area, very barren, colours are not very vibrant
3. wood, carpet looks fairly nice
4. colours are bland, lack of ornamentation, monotone colours, doesn't seem like a lived in room
5. sensual rooms, full of rich materials, rich furnishings, colours, velour couches, fireplaces, paintings, Persian rugs

Subject #56

1. not very happy, too dark, rainy day
2. quiet, like reading room, could listen to soft music, read book in it
3. carpet, lampshade and clock
4. hates sofa and the colour of sofa, room is too dark, white sofa would be better
5. room makes sense, bright and clean is very important, not very colourful, if too red or purple doesn't like that, likes a white room makes it bright and clean, many flowers, plants, pictures and lots of light

Subject #57

1. spacious, a little bit metallic, neutral colours
2. a little bit cool, modern, fairly spacious look with mirror there for its size
3. back wall likes the wooden strips it is not a harsh wall, looks bigger than it really is so you don't feel confined
4. don't like tile or stone floor (it looks cold), there are a lot of lines that are sharp, the coffee table doesn't help with this sharp lines, the shiny aspect of mirror and table make it a little on the modernistic, shiny harsh side a little bit
5. spaciousness, warmth, not harshness the opposite of harshness (would say softness but that is too simple of a concept), visual analog of comfort which in his mind is warm tones and softness

Subject #62

1. organized
2. organized, not cozy
3. it is spaced to socialize; kind of comforting, soothing; chairs look comfortable
4. a little bit cold, not a homey type feeling, needs a bit more colour or plant or personal things
5. cozy; sturdy, comfortable furniture; warm colours; some plants, soft type curtains, soothing, relaxing

Subject #64

1. soft
2. neat, clean lines
3. tone on tone, textures, space
4. glass (for cleaning)
5. comfort (this is the big one), relaxing colours, efficient layout

Subject #68

1. Modern
2. not terribly interesting, sterile

3. glass table
4. boring, what we had in the 50's 60's, uninteresting,
5. warmth and colour (some interesting colours); comfortable furniture, pictures on walls, personalizing room to things that are interesting to owners

Subject #70

1. pleasant
2. spacious and a little bit of warmth though it has cool undertones
3. wood back wall and stone floor, natural light
4. warmer lighting needed, at bit too low lit, carpet
5. needs natural light, good airflow and not a lot of clutter

Subject #71

1. coffee table is breakable and is not safe for kid
2. not homey
3. likes bar chairs and floor is not bad
4. doesn't like texture of material on sofa and chairs, wood looks out of place, would like a lighter colour of wood (honey colour), doesn't like the carpet much, doesn't like much of this room
5. Wooden floors (light wood colour, not dark wood), space and light (likes natural light), space not closed in, big windows

Subject #76

1. comfortable
2. money, peaceful, fresh
3. sofa and colour of sofa and floor, lamp fits nicely with room and so does the table, colours combine perfectly, very fresh place
4. dark areas, not too many plants, clock makes it look like a lonely place and doesn't like the carpet
5. windows, can see outside and see nature, carpet, colour of room and space and size of room, good layout easy to access things

Subject #79

1. nice
2. looks comforting and inviting
3. overall design of room
4. glass coffee table doesn't fit room a wood one would look nicer
5. space, go as feel, lots of windows

Subject #81

1. dull
2. boring, want to get away from it, if I was in this room I would be looking forward to leaving it
3. functional and dry
4. uninspiring, blasé , industrial environment
5. natural elements, things to remind him of his relationship with nature, things that motivate him to get out in nature, need to feel inspired, secure, warm, uplifting, inspiring

Subject #83

1. office type manner
2. not very warm, business/office type meeting room
3. space and coffee table
4. sofa, back wood wall makes it like an office (too much wood)
5. comfort, free style spirit, leather couch to relax, not too official, TV and entertainment center, good lighting you can control and area rug

Subject #88

1. quiet
2. really good feeling, peaceful, pretty, nice surroundings, and elegant
3. clean, looks tidy, and its an inviting atmosphere
4. a little dark, wood paneling at back makes it darker, too dark
5. absolutely light, nice soft colours, neutral colours, nice furnishings, clean, **light**, bright, peaceful, calm surroundings

Subject #91

1. impersonal
2. looks like a waiting room, not someone's home, looks big, modern decorations, not much colour
3. lots of seating, clean, colour coordinated

4. not very comfortable, doesn't like décor, seems kind of cold
5. colour, light (lots of light), windows that open, comfortable furniture, pictures, electronics and electrical light and heat

Subject #94

1. stark
2. uncomfortable, formal, kind of lobbyish
3. carpet makes it a little more warm, lots of seating
4. colour and back wall, wood wall make it too dark, stools look uncomfortable
5. comfort, layout (a nice easy layout not cramped), soft colours, seating

Subject #99

1. cold
2. modern, slightly stark, cold floor, functional, carpeting looks warm, seating looks modern but uncomfortable, wall panel rather stark
3. likes top left area and glass table, rug and lamp
4. steel girder and combination of wood wall makes it like a garage, stark
5. light, plenty of natural light, adjustable artificial light so you can read by it but can also soften it, tiled affect or soft warm feeling from carpet, walls should be soften with artwork, occasional tables to give flexibility within room setting, space to move within room so you are not falling over coffee tables etc., enjoys natural wood not dark stained wood

Subject #98

1. modern
2. relatively warm, colours are a little bit drab, seems a little bare
3. likes glass table and the openness, floors are ok
4. couches and colour
5. comfort, aesthetics, wood floors and throw rug (usually a Persian one), glass tables, glass/wood mixture, lots on the walls (pictures)

Subject #103

1. hideous
2. ugly, not comfortable, creepy
3. there is a plant in the corner
4. colour, textures, design, everything is ugly, materials, glass coffee table, no warmth to it
5. colour (green, forest green), materials (rich looking materials), likes things and colours to match and coordinate, being comfortable is important, lots of plants, gold (likes gold), likes lots of art work, lines should not be sharp industrial lines, no beige, no grey, no rocks, no orange and blue too, and no modern or industrial materials, no hideous sixty's colour combinations, antiques are good, likes old dark wood no light wood, likes Victorian style and antiques, love mahogany

Subject #107

1. living room
2. spacious
3. bright, comfortable
4. hospital like, dull
5. comfort, warmth, light (natural light)

Subject #109

1. stark
2. tight ass, ok for children cause there are no sharp edges or corners, colours are bland, cold even though it has warm tones, people who don't spend time at home, show home not a lived in home, no personal items
3. the lamp and wood wall paneling, the plant
4. cold concrete floor, would feel cold being in there, fabric on couches looks uncomfortable, wouldn't want to be there
5. Prefers all materials to be natural and organic, rounded corners (even walls and doorways), warm colours (autumn colours and greens), a few bright colours, lots of comfy cushions, fireplace, good air ventilation

Subject #112

1. cool (as in cold)
2. its ok, may not be comfortable to sit in, a little stark

3. it all fits together well, colours go well together, monochromatic, looks very neat
4. doesn't look comfortable to use, looks like a show room
5. comfortable to sit in (the chairs), have interesting things to look at, warm colours

Subject #116

1. don't like it
2. too modern, reminds him of 1950's, cold
3. carpet, nothing really (or slate flooring)
4. doesn't like wood wall, furniture, art deco piece, steel I-beams
5. colours, wall and floors must have cozy atmosphere (must be warm)

Subject #118

1. warm
2. clean, sanitary, formal
3. peaceful colour tones, soft
4. organized
5. comfort (sitting down), brightness (lots of natural light for day, subdued light for night), fireplace, conversation oriented, comfortable furniture, colours (light ceilings, contrasting walls, and contrast colours in furniture), soft room (don't hear your feet when you walk in), quiet room

Room #9

Subject #2

1. nice, beautiful, expensive
2. well established, elegant, nice taste, money, nice taste, expensive
3. square footage, looks like a house not just a room, size
4. stuffy, too nice and not comfortable, afraid to mess it up, a professors house
5. TV: room circulates around that, fireplace, nice furniture, view, lighting (likes a bit of both natural and artificial lighting)

Subject #5

1. Comfortable
2. nice wood accents, plants give it a homey feel, looks like a room that you can go in and curl up on the couch and read a book, some of the furniture is nice, pleasant to look at, nice little knickknacks on the tables that accent the furniture, it looks a bit brown and could use more colour which makes it look a bit drab
3. furniture looks very cozy, nice lite coming in from the window in the corner
4. too tidy, needs some colour added to make it a bit brighter, not very bright
5. looks like a well lived in room, a room that invites people into it, but doesn't look like it needs to be kept tidy all the time, a room for friends to be in not special company to be in, where dust bunnies gather underneath the couch

Subject #10

1. bland
2. not warm, but still not cold, sort of inviting, not taken with browns a little pink or purple would be nice, nice table, nice colonial furniture, looks fairly bright
3. bright, looks open, fair bit of space around it so it doesn't feel crowded even thought there are lots of things in it
4. lack of colour, lack of warmth in colour and basically all the colours are the same except for books and plant
5. would prefer to have 2 rooms, booth with warm colours, one that is closed and cozy feeling the other open and airy, did is difficult to achieve both with one room but maybe it could be done with blinds

Subject #11

1. Monotonous, monotone
2. very formal, it looks comfortable, some what cozy
3. textures of carpets and textures and fabric of furniture, colours give room a warm feeling, a warm comfortable feeling
4. Colours are very similar
5. natural light, warm natural tones, earth tones, natural fabrics, natural materials, comfortable furniture comfortable to sit in, plants, table to put things on

Subject #13

1. warm
2. it's a little to clustered, could be a little open in spacing, could change the carpet at the bottom too put a little bit of colour to it
3. the sofas are very nice and classic, the lamp shade is beautiful with the candles it gives a very warm effect, greenery brings in a lot of colour into the room, wall frame is very contemporary
4. the table could be just glass on top with out frills on the bottom, and too many things on the table
5. sofas need to be comfortable and soft colouring, not too much clustering in room, more open space, plants, lots of windows for natural light in room

Subject #17

1. Light
2. Airy, very pleasant, a room I'd like to be in
3. a lot of light, colours that go well together, restful, the colours don't jar, comfort, convenient to read or have coffee (to do different things) handy, plant life which gives pleasant atmosphere as well as good for the air quality, plenty of light from the window and from lamp if you want to read

4. hate to have to clean the table in the middle of room, a great dust collector (curly thing at the side) and things on the shelves and knickknacks on the tables
5. light and feeling of warmth, a wooden ceiling that has a pleasant shape, good night lighting that shows pleasant shape of room (ceiling particularly), comfortable chairs and couches, convenient tables for mugs and books, a pleasant view out of the windows

Subject #19

1. comfortable
2. bright, inviting (he repeated this)
3. coffee table, sofa, back book shelf and ottoman
4. none
5. warmth and comfortable

Subject #23

1. very nice
2. warm, comfortable
3. sofa, table, carpet
4. not too many –ve elements, doesn't like book case
5. feels inviting, soft warm colours

Subject #26

1. parents
2. reasonably warm, inviting, won't get too comfortable, be afraid to live in it
3. cohesive style, ,colours are neutral and no offensive, inviting, brightness
4. a little crowded, too clean, wouldn't want to mess it up, too ordered
5. space, openness, airiness, light, loft like characteristics

Subject #30

1. warm
2. colours make it a warm environment, neatness and lines make it a comfortable place to socialize, feels like a show room though not used much for people
3. natural light and plants as well as it being relatively friendly, seating is set up for conversations, carpet on floor over the different floor surface gives it nice break in terms of this is the sitting area and this is not the sitting area
4. looks almost too clean or too contrived, bookshelf looks intimidating against back of couch , does not looked used
5. pleasing to look at, comfortable, easy reach of things you use most, uncluttered as possible, safe feeling environment (wouldn't be worried about kids going in and hurting themselves on things)

Subject #32

1. comfort
2. quietness
3. artwork, colour scheme, plushness of upholstery, light through window (if window was removed there would be a dullness to the room)
4. in darkness of night must sit on sofa to read, no TV or indication of CD player, music etc.
5. comfort and pleasantness. Window which provides some vibrancy, fireplace

Subject #35

1. beautiful
2. cozy, relaxing, comfortable looking
3. loves the colours, not hard to match colours, well put together, well spaced, not over crowded with odds and ends, very comfortable looking
4. none
5. things match, some big things instead of a whole lot of little ornaments and things like that, not too busy a room with too many colours

Subject #38

1. brown
2. nice place, kind of crowded, not enough space to walk around
3. only one colour
4. need more space
5. not crowded, space, not so many things

Subject #41

1. boring
2. looks outdated but cozy, traditional
3. clean, neat, lets lots of light in through windows, plant

4. colour is all the same, mostly browns, no particular interest or focal point in room, furniture looks like it has been there a long time
5. comfortable furniture, space to store things so they are not out , tidy, space for stereo (music) or entertainment (visual, listening)

Subject #44

1. nice
2. sophisticated, not really my style, clean and organized
3. money, very inviting
4. wouldn't want to spill or get it dirty, would take his shoes of, would feel uneasy about spilling something, would have to be careful
5. colour, size of room, space, room to spread out cause I'm a big guy, warmth

Subject #47

1. clean
2. cold, I could never live there, afraid to touch things
3. likes the colours
4. looks not lived in/showroom
5. likes colours, comfortable, make it comfortable, wouldn't want people to walk in and not want to sit on her furniture, where you can throw your feel up on the couch and cuddle up with a blanket and have the fireplace going, comfortable

Subject #50

1. old
2. very stuffy, not family oriented, older generation, neat, no kids
3. clean
4. uninviting, very stuffy, not family oriented, older generation, neat, no kids feels very uncomfortable to be sitting in
5. colours, flooring (wood laminate)

Subject #54

1. colour
2. colour is warm and mild, too warm
3. generally comfortable, plant and light from window in corner
4. crowded, colour is all the same, colour of carpet and sofa are same doesn't like that, would prefer a little bit of difference in the colours
5. colour and materials-soft materials on sofa not too feel cold and hard
   colours- light and creamy colours not too dark and red
   bright rooms

Subject #55

1. old
2. home of grandparents, peaceful, settled, stable you feel secure in this environment, earth tones are pretty nice, earth tones tend to give people more a peaceful feeling
3. colours, earth tones are peaceful, plants help, green plants help decorate and create a refreshing
4. decorations, too old fashioned, not modern
5. design, colour (likes earth tones, or maybe a light lavender), decoration (how things are arranged and organized, in terms of furniture)

Subject #59

1. formal
2. not a room for kids, place for afternoon tea, people who are interested in art and want everything just so, appearance more important than hominess, nice and bright which is good
3. brightness, art, plants, the people obviously care about there place and want it to look nice, a room a man might like with colour that are there
4. fact you can't relax and put your feet up as comfortably as you can in some places, everything is just so just so, appearance is so important that you wouldn't want to move anything
5. comfort (sofa), can relax and put your feet up, colours are not too bright and wild but soothing, likes things clean, but not too too neat, lighting bright enough to read not too dark, and outside light coming in, so enough windows, prefers carpets to hardwood floors as she finds them more cozy, comfortable pillows, chairs set up for conversation

Subject #61

1. old
2. warm, but for someone in sixties
3. inviting and cozy
4. lacks a little bit of colour
5. needs to reflect your lifestyle; tidy; bright and cheery

Subject #65

1. brown
2. looks comfortable but classic, perhaps more upper class
3. very bright, lots of room
4. it seems too antique, too old
5. has to be personal, should reflect who you are not just what looks good, should reflect personality, not too cluttered enough space so you can move around

Subject #67

1. crowded
2. kind of formal, crowded and bland
3. likes furniture and colour, just too much of it
4. too crowded, all beige all the same colour
5. it all has to fit together, all elements in harmony; likes food' floor or walls (some wood); brightness, colour , vibrancy; colour accent, visual stimulation; good sense of space

Subject #73

1. elegant
2. very warm, good lighting, nice accessories, beautiful room
3. definitely the light, everything ties in nicely, nice carpet , loves tables, furniture is nicely placed in the room, gorgeous fabrics on furniture
4. too much clutter by window
5. furniture must be comfortable, colours must be warm, natural lighting plays a very big part in being comfortable in any room, want to see things in the room that make you feel certain things (such as art work), does placement of furniture encourage discussion if people are over

Subject #74

1. flat colours
2. calm, quiet, old people
3. makes you feel relaxed, quality of furniture style is very good
4. colours all the same
5. colour, simple, high quality furniture, but not too much furniture, don't fill room with too much furniture leave some space, wall colour (not white, not too dark) not too flat

Subject #77

1. warm
2. high class, kind of old
3. sunshine
4. not too modern, doesn't look like it is for young people
5. modern style, comfortable sofa, entertainment system, bright, lots of light (prefers natural light)

Subject #78

1. closed in
2. airy, rustic, colonial
3. bookcase, trim on armchair and coffee table in back
4. too closed in for comfort, doesn't look comfortable, too neutral
5. airiness of room, colour, smell, lots of wood

Subject #86

1. monochromatic
2. cold but affluent, upper middle class, boring, too monochromatic
3. mix of materials in table (glass and wood) and shelving, couch fits in nicely and perk things up a bit
4. too monochromatic, all blends into one, feels too stark, not very warm and the negative aspects outweigh the positives
5. colour, texture and windows, lots of natural light, lighting

Subject #84

1. stylish
2. very warm, clean, inviting, classic
3. it matches in terms of colours, its warm, inviting, safe, clean, professional
4. too old style, it is not modern
5. feel good in my home, feel welcome, clean, matching furniture and colours,

hardwood floors, big windows, nice lighting, lots of light, natural light

Subject #89

1. earth tones
2. warmth, livable, comfortable
3. comfortable couch, good light
4. doesn't like the bushy plant, doesn't like books on stool
5. uncluttered, lived in , comfortable seating and good lighting (natural day and artificial night)

Subject #92

1. earth tones
2. formal, classy but friendly
3. light, the plant and colour
4. a bit too rigid, perhaps formal
5. light (brightness) natural light is better, comfort and colour

Subject #97

1. bright
2. open, inviting and comfort
3. brightness of it, the layout is somewhat open
4. nothing too negative
5. open feeling, relaxed, comfortable, not cluttered, bright, lots of light, clean space

Subject #96

1. older
2. seems to be more of a show room, formal sitting room not every day type of room, looks cozy but not relaxed, ok amount of light, setup is conducive to having people over, neutral very bland, not a lot of colour to set things apart
3. light, windows, plants, furniture arrangement is not bad, bookshelf
4. coffee table, colour, fabric on couch
5. bright, lots of **natural light** (this is a big one), warm, inviting, comfortable, some sort of colour within room to set things apart or catch your eye, windows, rooms with lots of natural wood, cottage feeling not modern

Subject #101

1. antique
2. elegant
3. colour effect, small ornamental antiques
4. small space
5. furniture and sofa, light effect (bright) natural light, a window to look outside, plants to make room and air fresh, needs a bookcase for books

Subject #104

1. restful
2. luxurious, bright, older
3. likes brightness, looks calm/calming
4. too old
5. has to be bright, colours should be restful, fair amount of space, comfortable furniture

Subject #106

1. old
2. stuffy
3. comfortable couches, classic looking, old person living room
4. not very open or warm
5. bright (well lit, natural if possible), comfortable, open

Subject #110

1. stuffy
2. feels it a solid room, old fashioned, yet nice clean straight lines, looks neat
3. bright and open
4. old fashioned, doesn't like style of furniture
5. comfortable, bright, wants colours he likes with a bit of variety in them, conveniences in room (listen to music, read books, have a bookshelf)

Subject #113

1. warm
2. comfortable, maybe needs a little contrast in colour
3. good sitting arrangement, greenery in far corner
4. all browns, needs contrast somewhere
5. things in room which he can relate to, old rancher style not modern and flashy, comfortable (visually), needs his special chair, effective placement of furniture in terms of stereo, TV, bookcase

Subject #115

1. nice
2. comfortable
3. has calming feel to it, likes monochromatic choice of colour, likes combination of antique and modern, nicely decorate but not cluttered looking
4. nothing
5. comfortable furniture, likes classic furniture, loves wood in a room over glass (coffee tables, end tables), autumn warm colours, uncluttered not too much stuff everywhere

Subject #120

1. warm
2. comfortable, classic, bright, earth tones
3. the look of comfort of furniture, windows, spacing of the furniture, shelving
4. bit cluttered, quite monochrome
5. atmosphere and comfort, colour, texture, warmth, natural light, texture of material and finishing

Room #10

Subject #4

1. warm
2. comfortable, natural
3. natural lighting, tree, various shades of colour
4. a lot of sharp edges
5. lighting, layout: being able to get around it easily, not having to step over things (a functional layout)

Subject #7

1. natural lighting
2. lots of wood, tree, furniture and floor, beams, windows:
   peaceful atmosphere
3. lots of light, natural looking (all the wood)
4. May be cold in colder temperatures
5. warmth and comfortableness

Subject # 8

1. soothing
2. very calm, relaxing, meditative
3. warm neutral colours, the view, lovely pink tones coming through from the flowers or lighting
4. a little overdone with windows coming from inside of the house could be the black framing of the windows, the way the windows and furniture are square, seems harsh as far as the lines go
5. room that is calming and soothing and relaxing and loves to have a view, a window with a view of a garden, even if you put plants and flowers inside and furniture comes second to the garden aspect.

Subject #14

1. teak
2. fairly warm
3. natural materials, earthy, no plastics, tree creates serenity
4. colour is a bit monotonous, could be slightly brighter
5. feeling it creates when you walk, I'm quite partial to natural materials, you can't recreate something natural like wood, need the real thing

Subject #12

1. warmth
2. cozy and relaxed, perhaps being comfortable
3. windows, brightness
4. furniture
5. brightness, light, colour, furniture the right type, paintings, need stimuli but not an over abundance of anything, room that is serene

Subject #16

1. bright, airy
2. good feeling, warm, looks comfy
3. lots of wood, natural light, light wood too which is nice, windows
4. furniture and marble table
5. lots of wood, earthy tones, windows, lots of light, room #10 is almost a perfect room

Subject #20

1. mostly wood products
2. warm, cozy
3. natural
4. none
5. something easy to maintain, keep clean, livable not afraid of breaking anything, fairly bright

Subject #25

1. inviting
2. airy, very warm, more than cozy, friendly place due to all the wood
3. set up as conversation area, wood floors, wood frames and wood around the windows gives it a very rich look
4. may only be useable in the summer
5. likes a water view (this is calming feature to room), lots of wood and warm wood, wood burning fireplace, not a cluttered look, but simple clean look, natural materials, adjustable lighting, soft lighting, good art

Subject #27

1. wood
2. goes out doors, covered patio, wood gives feeling of warmth and nature(trees and garden)

3. design construction with beams, nice table and wine, wood floor, windows into other room, design of room
4. wet from rain if windy, need something to prevent rain coming in, being exposed to elements
5. size, large enough, lots of light, natural light (this is very important), view of garden and trees, likes wood floors easy to keep clean and no allergies from them, really likes wood all around

Subject #29

1. warm
2. comfortable, relaxed
3. find it very relaxing
4. too much wood, a bit overkill
5. space, practical space, comforting, warm

Subject #33

1. Spacious
2. wilderness, adventure, camping
3. incorporates the exterior or outside
4. looks like ground level or basement suit, may feel closed in
5. not feeling closed in, comfortable furniture, modern furniture doesn't not look as comfortable as plush furniture, used of wood adds to feeling of openness, strategic use of materials

Subject #36

1. beautiful
2. comfortable, fine place to live
3. view
4. none
5. view of the outside, get fresh air and sunlight, big enough for people in it and enough space to store things, and comfortable, beauty is very important

Subject #39

1. rustic
2. natural
3. open space that you see on to, the outdoors coming in
4. sharper corners on furniture and it looks like it would be cold, cool as it is open to elements
5. comfortable furnishings, enough visual differences in the room, variety of textures and shapes in room, likes a fair bit of wood in room for warmth, natural products, more of nature elements in room and colours in that respect

Subject #43

1. wood
2. nice, open, partially outside, calm, Zen like, clean lines, linear qualities to it
3. natural, natural light, wood, stone table, plants and rocks, looks comfortable, could entertain well there, room to move around no wall
4. very neutral colours, needs more accents of colour, kind of beige
5. creating a good atmosphere through using proper furniture to complement the room, mostly in scale and size, clean and nice lines, style and simplicity

Subject #45

1. living room
2. it looks like a château, hotel, lodge, looks good
3. the look, furniture, the greenery
4. looks a bit dark, not much sunlight coming in
5. nice and large room and bright, nice furniture in it

Subject #48

1. wood and brown, earthy
2. warm, a little dark on a rainy day perhaps
3. the large natural light source with reflective window surfaces, looking out on the greenery and tree, can see how room is built so no insecurities, fairly comfortable
4. furniture doesn't look comfortable, marble table, maybe a bit dark
5. natural light at least from 2 sides so not a signal light source, good natural ventilation, light coloured walls depending on which way the room is facing and how much light there is, not an l-shape, shape should be fairly open, not long and narrow, fairly high ceilings, probably higher than 8 feet if possible

Subject #49

1. doesn't fit together
2. cold, too square, too blocked, doesn't look comfortable, too much wood, there is no breaking in the room
3. tree outside, the single orchid, there is some light and vine
4. too much wood, everything is too dark there doesn't seem to be any colour, lack of colour, too square, too blocked, doesn't look comfortable, too much wood, there is no breaking in the room
5. must be warm, must feel grounded, have to feel safe, must feel like someone would want to share this space, likes fun shay so more oriental works, oriental being minimalistic (only likes a few pieces)

Subject #52

1. natural
2. impractical, cool
3. connection to outside
4. impractical, not always useful
5. sense of comfort and tranquility and creativity, furnishings, quality of light, quality of natural light, proportion of the room, size of place, well proportioned room

Subject #58

1. natural
2. relaxed, very very leisurely
3. feeling you are outdoors, almost warm, very comforting
4. a little dark
5. use of space, open space, likes big areas, feeling you aren't closed in, feeling you can go wherever you want

Subject #60

1. homey
2. likes it, clean and spacious, likes wooden form and simplicity of furniture and the design of the windows, and likes the geometric forms, and the integration of the outdoor space with indoor space, nice light which is very warm, and the feeling is a very open place with windows between two rooms and light coming in from garden, organic looking
3. likes the wooden finish, likes openness of space, likes use of plants and part of landscape, likes the different look from what most houses would look like, looks very modern, very cosmopolitan, likes doors between rooms, how they aren't solid, likes how the structure of the building is exposed the pillars and supports on the ceiling; likes wooden form and simplicity of furniture and the design of the windows, and likes the geometric forms, and the integration of the outdoor space with indoor space, nice light which is very warm
4. couches look a bit uncomfortable, the table is maybe a little severe and cold looking, furniture has a stilted look
5. lighting is important, much prefers natural to fluorescent lighting, prefers lamps to overhead ceiling lights, looks like a relaxed space as opposed to formal, tend to like a simple design

Subject #63

1. money, expensive
2. relaxing, someone's porch
3. outdoorsy , big tree, all wood
4. stone table kind of looks out of place
5. layout, things out of way so you can't trip, convenience to get around, lighting is important not too bright

Subject #66

1. brown
2. relaxing
3. relaxing, you want to sit down and enjoy it read, talk
4. nothing or possibly the end table (but it does fit), needs toss cushions
5. a place you don't have to worry about, can spill a drink, relaxing room, casual, comfortable sofa, things close together, fresh cut flowers, everything natural from fabric to flooring likes natural products

Subject #69

1. Cozy
2. homey
3. the softness of wood, seems comfortable, rather euphoric so too speak, would like to live there
4. too much furniture, it interrupts flow

5. comfort, cleanliness, plants and natural light

Subject #72

1. wood
2. airy, bright, but not too comfortable
3. airiness, not too cluttered, clean looking
4. too much wood, appears a bit dark
5. clean, organized, bright (light and colours), openness, not cluttered

Subject #75

1. peaceful
2. homey
3. wood, trees, like placement of furniture
4. needs a bit of colour, perhaps area rug under table to add more colour
5. feeling comfortable, mostly colour, having some wood, not too much plastic or anything artificial looking, likes windows, lots of light (prefers natural light)

Subject #80

1. wood
2. warmth
3. floor, columns and beams
4. the uncomfortable sofa (no place to rest head)
5. comfort, ergonomical

Subject #82

1. likes ambiance in the background with tree
2. warm, cozy, very west coast
3. light, tree, space is going beyond the just the room
4. furniture, black outline of windows, steel part of framing
5. wood, light

Subject #85

1. warm
2. cozy, outdoorsy, rustic, nature, lots of wood, browns earthy tones, both spacious and filled (due to all the furniture)
3. big windows, window and nature with tree, window into next room
4. furniture, would like more plants, a bit dark
5. place to entertain (lots of seating area), plants, pine furniture, brightness in terms of colours (so that it is happy), likes big windows

Subject #87

1. dark
2. sleepy, relaxed
3. combination of colours, being close to nature
4. colour seems dark
5. must look fresh, lots of lights, natural light, big window and view

Subject #90

1. open
2. open, away from city, casual, nice feeling, relaxed
3. relaxing, calming, affluent
4. none
5. laid back, comfortable, rustic feeling, with outdoorsy feeling

Subject #93

1. warm
2. comfortable, none western style (not in a typical Canadian home)
3. light (natural light) and the colours of the wood
4. too monochromatic
5. soft lighting, some bright colours as well as neutral colours, wood is nice, wood accents, candles, not too cluttered, fairly modern style, no metal, no glass

Subject #95

1. colour
2. calm, very calm, colours are very neutral
3. combination of nature, trees, very relaxing
4. table
5. combination of furniture with environment of room, colour (neutral ones, cream, light green), classic furniture with wood not carpet, wood floor

Subject #100

1. earthy

2. very warm, colours calming, sense of relaxation, almost as if outdoors
3. cleanliness (wood adds cleanliness feeling), nice open atmosphere, nice warm feeling, relaxing atmosphere
4. none
5. colours are important (earth tones) creates nice warm environment, openness and windows, natural light is very important, plants to add earthy feeling

Subject #102

1. a little bit dark, the colour
2. not enough light, colours and lighting make room a little bit depressing
3. style, open to outdoors makes the room feel fresh
4. colour of furniture , skylight would make room better
5. furniture, bookshelves etc. (comfortable furniture), plants (even just one depending on size of room), colour (light colours, light blue), wants a relaxing room, big window even door to outside, sunshine in room is very important

Subject #105

1. homey
2. very comfortable with the wood tones and the look out into the courtyard with the tree
3. beams and wood that connects them all, hardwood floors and furniture and everything matches nicely
4. possibly too much wood
5. simplicity, no carpet, nice clean finished lines, no clutter nor figurines, very minimalist

Subject #108

1. open
2. friendly, open, bright, warm
3. looks warm, friendly, lots of seating: centered together so people are looking at each other; all colours match
4. couches don't look too comfortable, looks a bit stiff, outside of chairs there is not much to the room, outside of center of room there is not much else there
5. comfortable, uncluttered, not using dark colours, no real flashy patterns, colours or designs; not make it somatic, enough seating

Subject #111

1. Warm
2. feels comfortable, a little bit cramped due to one post, beautiful view of tree, semi-rustic feel
3. windows (can see into other room), likes a lot of wood, plants, view of tree, nice fencing/railing
4. coffee table, ceiling might be a bit low, could use a little bit more colour for contrast
5. plants, smoothness of surfaces, flow of room, warm colours (warm or bright), type of lighting (not too bright, a little bit soft, more red than blue), effective use of space

Subject # 114

1. blah in colour
2. a bit cold looking,
3. window out to tree (likes looking out to tree), ceiling, wooden post and wooden blinds (slats)
4. furniture (furniture is too modern), yellow glassy window on left side, all too much one colour, doesn't like glass on other side
5. warm, homey and inviting, relaxed atmosphere don't have to worry about were to sit, furnishings are important to create the atmosphere, fireplace

Subject #117

1. Warm
2. happy, airy, bright, look outside and see things
3. very simple, just a happy room, easy to care for
4. furniture looks uncomfortable
5. brightness, lots of light, simplified things, looks wide open and airy, not dark, elegant and simple

Subject #119

1. open

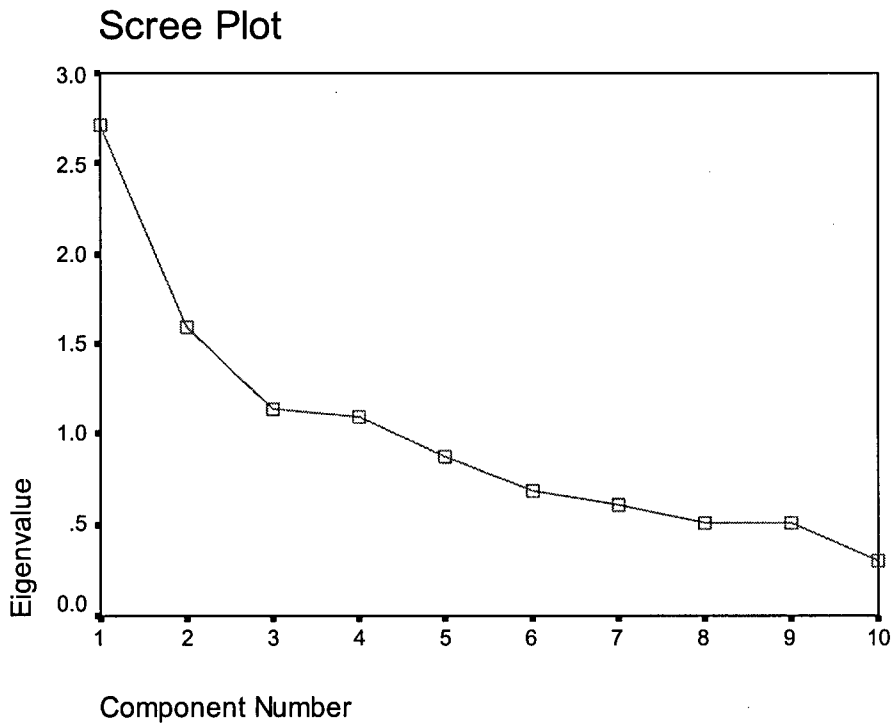
2. natural (due to wood and light and fiber in furniture and wood floor and natural materials)
3. quite light, airy, goes together well, ties together well (in terms of materials)
4. appears to be very open to next yard, so not a lot of privacy
5. comfort, appropriate size for what you are doing (for what you are using it for), coloured appropriately (this sets the mood properly, grays and greens), appropriate surroundings and furnishings for type of room, to sit he prefers man made materials

APPENDIX V: PCA OUTPUT FOR SURVEY QUESTION #2

Total Variance Explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.713	27.127	27.127	2.453	24.529	24.529
2	1.584	15.843	42.970	1.470	14.701	39.229
3	1.133	11.329	54.298	1.435	14.351	53.580
4	1.095	10.951	65.249	1.167	11.670	65.249
5	.873	8.735	73.984			
6	.681	6.812	80.796			
7	.604	6.036	86.832			
8	.512	5.119	91.951			
9	.503	5.033	96.985			
10	.302	3.015	100.000			

Extraction Method: Principal Component Analysis.



Rotated Component Matrix(a)

	Component			
	1	2	3	4
WARM	.176	.050	-.063	.882
NATURAL	.609	-.077	-.201	-.428
ARTIFICI	-.092	.052	.796	.146
CONTEMP	.093	.697	.075	.219
MODERN	-.016	.834	.133	-.083
STYLISH	.338	.470	-.299	-.089
HOMEY	.779	-.030	.026	.289
RELAXING	.841	.172	-.113	.038
INVITING	.777	.151	.001	.067
INDUSTRI	-.013	.060	.794	-.178

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 5 iterations.

Component Transformation Matrix

Component	1	2	3	4
1	.915	.290	-.250	.126
2	-.060	.678	.692	.241
3	.195	-.598	.365	.686
4	.348	-.312	.571	-.675

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

APPENDIX VI: CLUSTER ANALYSIS FOR SURVEY QUESTIONS 3 & 4

CLUSTER ANALYSIS FOR QUESTION #3

Initial Cluster Centers

	Cluster		
	1	2	3
PERSONAL	5	1	5
MODERN	5	1	1
CLASSIC	5	1	1
WARMTH	5	5	5
COOLNESS	5	5	1
ENTERTAI	5	5	3
RELAXING	5	5	5
HOMEY	5	5	1
INVITING	5	5	3
COMFORT	5	5	4
PRACTICA	5	5	1
WEALTH	5	1	1
STATUS	5	1	1

Iteration History(a)

	Change in Cluster Centers		
Iteration	1	2	3
1	4.529	4.511	4.331
2	.293	.251	.255
3	.135	.155	.087
4	.072	.078	.000
5	.000	.000	.000

a Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 5. The minimum distance between initial centers is 8.544.

Final Cluster Centers

	Cluster		
	1	2	3
PERSONAL	4	4	4
MODERN	3	2	2
CLASSIC	3	2	2
WARMTH	4	5	4
COOLNESS	3	2	1
ENTERTAI	4	4	3
RELAXING	5	5	4
HOMEY	5	5	4
INVITING	4	5	4
COMFORT	5	5	4
PRACTICA	4	5	3
WEALTH	3	1	1
STATUS	3	1	1

ANOVA

	Cluster		Error		F	Sig.
	Mean Square	df	Mean Square	df		
PERSONAL	3.299	2	.863	107	3.820	.025
MODERN	20.710	2	1.214	107	17.055	.000
CLASSIC	14.610	2	1.420	107	10.288	.000
WARMTH	.756	2	.467	107	1.620	.203
COOLNESS	20.378	2	1.072	107	19.009	.000
ENTERTAI	2.165	2	.960	107	2.254	.110
RELAXING	.828	2	.245	107	3.379	.038
HOMEY	8.240	2	.638	107	12.913	.000
INVITING	2.561	2	.637	107	4.020	.021
COMFORT	1.783	2	.260	107	6.864	.002
PRACTICA	18.927	2	.681	107	27.772	.000
WEALTH	32.165	2	.546	107	58.887	.000
STATUS	40.490	2	.540	107	74.967	.000

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

Number of Cases in each Cluster

Cluster	1	43.000
	2	41.000
	3	26.000
Valid		110.000
Missing		9.000

CLUSTER ANALYSIS FOR QUESTION #4

Initial Cluster Centers

	Cluster		
	1	2	3
ATTRACTI	2	1	5
ENVIRONM	3	1	5
NATURAL	2	1	5
WARM2	5	1	4
DESTRUCT	4	3	1
CONNECT	3	1	5
RELAXED2	2	1	3
CONCENTR	2	1	3
NATURE	5	1	1
FEEL	5	1	5

Iteration History(a)

	Change in Cluster Centers		
Iteration	1	2	3
1	3.545	1.732	3.603
2	.446	1.633	.374
3	.171	.000	.153
4	.121	.000	.107
5	.030	.000	.028
6	.000	.000	.000

a Convergence achieved due to no or small change in cluster centers. The maximum absolute coordinate change for any center is .000. The current iteration is 6. The minimum distance between initial centers is 7.348.

Final Cluster Centers

	Cluster		
	1	2	3
ATTRACTI	4	1	5
ENVIRONM	4	2	4
NATURAL	4	2	5
WARM2	4	1	5
DESTRUCT	3	3	2
CONNECT	3	2	4
RELAXED2	3	1	4
CONCENTR	3	1	4
NATURE	4	3	4
FEEL	4	3	5

Distances between Final Cluster Centers

Cluster	1	2	3
1		6.278	2.456
2	6.278		8.548
3	2.456	8.548	

ANOVA

	Cluster		Error			
	Mean Square	df	Mean Square	df	F	Sig.
ATTRACTI	19.847	2	.436	112	45.474	.000
ENVIRONM	20.363	2	.761	112	26.748	.000
NATURAL	15.724	2	.419	112	37.507	.000
WARM2	25.207	2	.265	112	95.032	.000
DESTRUCT	11.244	2	.952	112	11.805	.000
CONNECT	19.659	2	.616	112	31.922	.000
RELAXED2	24.394	2	.552	112	44.155	.000
CONCENTR	17.168	2	.519	112	33.067	.000
NATURE	5.922	2	.635	112	9.322	.000
FEEL	6.220	2	.415	112	14.989	.000

The F tests should be used only for descriptive purposes because the clusters have been chosen to maximize the differences among cases in different clusters. The observed significance levels are not corrected for this and thus cannot be interpreted as tests of the hypothesis that the cluster means are equal.

Number of Cases in each Cluster

Cluster	1	52.000
	2	3.000
	3	60.000
Valid		115.000
Missing		4.000

APPENDIX VII: DEMOGRAPHIC DIFFERENCES OF CLUSTERS FOR QUESTIONS 3 & 4

Question #3

Gender

	Cluster 1	Cluster 2	Cluster 3
# Men	28	17	15
# Women	15	24	11
%Men	0.65116279	0.414634146	0.576923077
%Women	0.34883721	0.585365854	0.423076923

Age

	Cluster 1	Cluster 2	Cluster 3
30 and under	13	10	3
%	0.30952381	0.25	0.115384615
31-40	7	9	9
%	0.16666667	0.225	0.346153846
41-50	10	7	3
%	0.23809524	0.175	0.115384615
51-60	7	8	9
%	0.16666667	0.2	0.346153846
61 and over	5	6	2
%	0.11904762	0.15	0.076923077
Average age	**41.3333333**	**44.025**	**43.76923077**

Income	Cluster 1	Cluster 2	Cluster 3
Less than $25,000	10	8	4
%	0.24390244	0.2	0.16
$25,000 - $49,999	11	13	11
%	0.26829268	0.325	0.44
$50,000 - $74,999	11	6	5
%	0.26829268	0.15	0.2
$75,000 - $99,999	5	8	3
%	0.12195122	0.2	0.12
$100,000 - $124,999	2	2	0
%	0.04878049	0.05	0
$125,000 - $149,999	1	1	0
%	0.02439024	0.025	0
$150,000 and over	1	2	2
%	0.02439024	0.05	0.08

Rent/Own	Cluster 1	Cluster 2	Cluster 3
Own	17	18	15
%	0.4047619	0.461538462	0.6
Rent	25	21	10
%	0.5952381	0.538461538	0.4

Urban/Suburban	Cluster 1	Cluster 2	Cluster 3
Urban	28	16	18
%	0.65116279	0.390243902	0.692307692
Suburban/rural	15	25	8
%	0.34883721	0.609756098	0.307692308

Home Improvement	Cluster 1	Cluster 2	Cluster 3
Average	$ 1,738.16	$ 2,433.75	$ 2,653.00

	Men cluster 1 & 2	Men cluster 1 & 3	Men cluster 2 & 3	not sig
	0.108861334	0.120385853	0.125225433	
z-test	2.172751662	0.616681376	-1.295974201	
z-crit=2.39				

	Wmen cluster 1 & 2	Wmen cluster 1 & 3	Wmen cluster 2 & 3	
	0.108861111	0.120385121	0.125225545	not sig
z-test	-2.172756122	-0.616685129	1.295973038	
z-crit=2.39				

Nothing is Significantly different

	cluster 1 & 2	<$25,000 cluster 1 & 3	cluster 2 & 3
		0.103736331	
z-test		0.808804769	
z-crit=2.39			
	cluster 1 & 2	25-50 cluster 1 & 3	cluster 2 & 3
		0.119619399	
z-test		-1.435447076	
	50-75 cluster 1 & 2	cluster 1 & 3	cluster 2 & 3
	0.090500286		
z-test	1.307097331		
	75-100 cluster 1 &	cluster 1 & 3	cluster 2 & 3
	0.081578273		
z-test	-0.956734896		
	100-125 cluster 1 &	cluster 1 & 3	cluster 2 & 3
			0.044027815
z-test			1.135645737
	>$150 cluster 1 &	cluster 1 & 3	cluster 2 & 3
		0.052852428	
z-test		-1.052170316	

	own cluster 1 & 2	Own cluster 1 & 3	own cluster 2 & 3
		0.126175924	
z-test		-1.547348246	
z-crit=2.39			

	Urban cluster 1 & 2	Urban cluster 1 & 3	Urban cluster 2 & 3	
	0.109016172		0.125337186	
z-test	2.39339616		**-2.410009349**	**SIG**
z-crit=2.39				

Cluster #3 is significantly more urban than cluster #2

Question #4

Gender

	Cluster 1	Cluster 3
# Men	29	30
# Women	23	30
%Men	0.55769231	0.5
%Women	0.44230769	0.5

	Men cluster 1 & 2	
	0.094596913	
z-test	0.609875161	not sig
z-crit=1.960		

Age

	Cluster 1	Cluster 3
30 and under	15	9
%	0.29411765	0.152542373
31-40	13	14
%	0.25490196	0.237288136
41-50	7	9
%	0.1372549	0.152542373
51-60	9	17
%	0.17647059	0.288135593
61-70	5	8
%	0.09803922	0.13559322
71-80	2	1
%	0.03921569	0.016949153
81-90	0	1
%	0	0.016949153
Average Age	**41.5686275**	**46.57627119**
stdev	**15.1739974**	**14.40091399**

Z-test for means		
Z-test	-1.767188571	not sig different
z-crit-1.960		

Cluster 1 has significantly more lowest income individuals

Income	Cluster 1	Cluster 3
Less than $25,000	16	9
%	0.32	0.155172414
$25,000 - $49,999	12	22
%	0.24	0.379310345
$50,000 - $74,999	10	13
%	0.2	0.224137931
$75,000 - $99,999	7	8
%	0.14	0.137931034
$100,000 - $124,999	1	2
%	0.02	0.034482759
$125,000 - $149,999	2	1
%	0.04	0.017241379
$150,000 and over	2	3
%	0.04	0.051724138

	cluster 1 & 2	
<$25,000	0.081397359	
z-test	**2.024974629**	Significant!
z-crit=1.960		
	cluster 1 & 2	
$25-$50	0.089627012	
z-test	-1.554334367	no sig
z-crit=1.960		
	cluster 1 & 2	
$50-$75	0.079004033	
z-test	-0.305527832	not sig
z-crit=1.960		

Rent/Own	Cluster 1	Cluster 3
Own	19	31
%	0.38	0.543859649
Rent	31	26
%	0.62	0.456140351

	cluster 1 & 2	
own	0.096673779	
z-test	-1.694975101	not sig
z-crit=1.960		

Urban/Suburban	Cluster 1	Cluster 3
Urban	33	27
%	0.63461538	0.457627119
Suburban/rural	19	32
%	0.36538462	0.542372881

	cluster 1 & 2	
Urban	0.09478847	
z-test	1.86719192	not sig
z-crit=1.960		

Home Improvement	Cluster 1	Cluster 3
Average	2030.43478	2705.701754
stdev	3421.0375	3259.077356

Z-test for means		
Z-test	-1.017116607	not sig
z-crit-1.960		

APPENDIX VIII: WOOD'S TOP 3 ATTRIBUTES

Comment	# of People	Percentage
Durability	20	17.24%
burns	1	0.86%
colour and colour variety	12	10.34%
ease of maintenance	10	8.62%
quality	6	5.17%
comfortable	6	5.17%
warm	54	46.55%
calming	1	0.86%
wide range of variations	8	6.90%
flexibility	8	6.90%
attractive	31	26.72%
environmentally friendly/renewablility	10	8.62%
ease of use	4	3.45%
ability to change colour easily	1	0.86%
ease of workablility	5	4.31%
strength/sturdy	18	15.52%
natural	39	33.62%
easy to clean	4	3.45%
doen't trap odours	1	0.86%
creative	1	0.86%
texture	10	8.62%
practicality	5	4.31%
organic nature/tone	1	0.86%
appealing	1	0.86%
homey	2	1.72%
relaxing	6	5.17%
clean	4	3.45%
inviting	4	3.45%
close to nature	3	2.59%
adaptibility	4	3.45%
versitility	7	6.03%
value of use	1	0.86%
cozy	2	1.72%
doesn't get too hot or too cold	1	0.86%
useful/functional	1	0.86%
supply/abundant	6	5.17%
longevity	7	6.03%
building qualities (can create many things)	3	2.59%

Comment	# of People	Percentage
stylish	2	1.72%
smell	3	2.59%
plain	1	0.86%
can be formal, but not uptight	1	0.86%
non-gassing	1	0.86%
unique	1	0.86%
can be redone (ie. Paint, refinish)	1	0.86%
size	1	0.86%
form	1	0.86%
aged (antique)	1	0.86%
class	1	0.86%
recyclable/reusable	2	1.72%
unique finishes to grain and colour	1	0.86%
employment	1	0.86%
non-toxic	1	0.86%
breathable	1	0.86%
healthy	2	1.72%
has interest	1	0.86%
can take a variety of finishes	1	0.86%
easy to process	1	0.86%
craftmanship	1	0.86%
can hid a lot of faults	1	0.86%
grain, visual pattern	2	1.72%
variation in design	1	0.86%
opens a room up	1	0.86%
diverse	1	0.86%
maleable	1	0.86%
robustness for various products	1	0.86%
light weight	2	1.72%
clean lines	1	0.86%
rich look	2	1.72%
never too dark or too light	1	0.86%
good contrast	1	0.86%

APPENDIX IX: THE FEEL OF A WOOD ROOM

Comment	# of People	Percentage
comfortable	28	23.53%
calm	7	5.88%
dark	6	5.04%
warm	57	47.90%
natural	25	21.01%
cottage/cabin/log house	10	8.40%
relaxing	25	21.01%
homey	10	8.40%
close to nature	9	7.56%
inviting/welcoming	12	10.08%
cozy	10	8.40%
elegant	1	0.84%
crowded	4	3.36%
country	3	2.52%
memory of childhood	2	1.68%
camping	2	1.68%
old	4	3.36%
dry	1	0.84%
soft	3	2.52%
soothing	1	0.84%
comforting	3	2.52%
casual	2	1.68%
friendly	3	2.52%
unpleasant	1	0.84%
pleasant	4	3.36%
environmental concerns	3	2.52%
importance of colour	1	0.84%
cold	2	1.68%
too earthy	1	0.84%
organic	2	1.68%
classy	3	2.52%
quality	1	0.84%
medieval	1	0.84%
rugged	1	0.84%
1970's	1	0.84%
boring	4	3.36%
stylish	4	3.36%
greedy	1	0.84%
living in forest/outdoors	2	1.68%
peaceful	2	1.68%

Comment	# of People	Percentage
not homey	1	0.84%
closed in	2	1.68%
improves mood	1	0.84%
stuffy	1	0.84%
suburban	1	0.84%
family place	1	0.84%
hard	1	0.84%
serious	1	0.84%
ecologically sound	1	0.84%
focused	1	0.84%
old Nordic ship	1	0.84%
office	1	0.84%
too much is overwhelming	3	2.52%
earthy	3	2.52%
distracting	1	0.84%
messy	1	0.84%
modern	1	0.84%
visual variety	1	0.84%
beautiful	3	2.52%
pleasure	1	0.84%
wonder	1	0.84%
patterns/designs	1	0.84%
rustic	5	4.20%
rural	2	1.68%
rich	1	0.84%
dark wood oppressive	1	0.84%
overpowering	1	0.84%
mellow	1	0.84%
approachable	1	0.84%
secure	1	0.84%
strong/solid	2	1.68%
value	1	0.84%
art	1	0.84%
history	1	0.84%
personality	1	0.84%
communicative	1	0.84%
too much wood	1	0.84%
unsafe (fire)	2	1.68%
old country influence	1	0.84%
craftsmanship	3	2.52%
old world charm	1	0.84%
colourful	1	0.84%
attractive	2	1.68%

Comment	# of People	Percentage
happy	1	0.84%
caring	1	0.84%
detract from room	1	0.84%
regal	1	0.84%
rough	1	0.84%
potentially too busy	1	0.84%
like opening a window	1	0.84%
sensual	1	0.84%
practical	1	0.84%
versatile	1	0.84%
at home	4	3.36%
clean	5	4.20%
simple	1	0.84%
overbearing	1	0.84%
personal	1	0.84%
artistic	1	0.84%
aesthetic	1	0.84%
at ease	1	0.84%
fresh	1	0.84%
classic	4	3.36%
healthy	1	0.84%
longevity	1	0.84%
ages beautifully	1	0.84%
interest	1	0.84%
can be overdone	1	0.84%
expensive	1	0.84%
not dated	1	0.84%
not relaxing	1	0.84%