VISUAL AND EMOTIONAL ENVIRONMENTAL INTERPRETATION OF LANDSCAPES AND NATURE SCENES BY AMERICAN AND JAPANESE ELEMENTARY SCHOOL CHILDREN

by

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Abstract

With the advancement of urbanization, many children today have limited or no experiences with nature or survival instincts as described by the nature (Biophilia) hypothesis. Today, children's preference toward landscapes may be more reflective of cultural experiences learned from family, teachers, or classmates, and referred to as the nurture hypothesis. In this research study, two visual surveys were used to investigate the nature vs. nurture hypotheses.

In the first survey, 93 multicultural American children were asked to identify their preferred colors for symbols of bananas, tulips, birds, and trees. In the second survey, 202 children from American and Japanese schools were asked their visual preferences and emotional responses to photographs of landscapes, trees, homes, and nature scenes. Subjects were first, third, and sixth grade elementary school students in America and Japan. The effects of culture, age, and gender were evaluated. In addition, the relative preference and emotional impact of plants and landscapes were examined.

In the first study, younger children preferred all colors that exist in nature. However, responses of the older children would support the nurture hypothesis. Older children selected fewer and more appropriate colors, such as yellow bananas, reflecting a learned behavior. Also, boys preferred blue symbols while girls selected red with higher frequency than other colors.

In the second study, American children preferred the Japanese landscape and tree scenes, and reported more positive emotion than Japanese children toward the American and Japanese tree scenes. Younger American children showed more positive emotions toward the American home scene. Although first and third grade Japanese children preferred Japanese scenes, more sixth grade Japanese children preferred American scenes. In conclusion, visual preferences and emotional responses are influenced by content of photographs, and evidence supports both the nature and the nurture hypothesis among Japanese and American children.

Table of Contents

List of Figures

List of Tables

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CHAPTER 1 - INTRODUCTION

A few decades ago, the majority of children grew up in rural and suburban environments. Their childhood memories may have included many interactions with nature. These nature experiences may have produced positive or negative effects and were important educational tools for children. However, with the advancements in urbanization, children today have limited or no experiences with nature or survival instincts. Furthermore, children today prefer indoor play, like video games, rather than outdoor play. Therefore, children's preferences toward landscapes, such as density, form, and color may be more reflective of cultural experiences than individual differences.

Although previous research has reported that humans have innate preference for landscapes (Biophilia Hypothesis), an alternate Nurture Hypothesis for flower, plants, and landscape preferences describes conditioning and implanting of color preferences, etc. by parents. Thus, the Nurture Hypothesis may be of similar importance as the Biophilia Hypothesis. Herzog et al. (2003) suggested that one of the best ways to examine the interpretation of Nature and Nurture Hypotheses is to make cross-cultural comparisons of landscape preferences. Nature should show up in broad similarities across cultures that are consistent with evolutionary thinking. Nurture should appear primarily in cross-cultural differences that can be traced to cultural, social, and other experiential influences.

Many studies have examined the landscape preferences of various populations. However, most research has focused on North American or European populations. Furthermore, most of the subjects of these studies were adults. This study focuses on the landscape preferences and emotional responses of American and Japanese elementary school children. While sharing a common status as developed and industrialized nations, America and Japan have differences in cultures and physical environments (Canter and Canter, 1971). The information presented in this work will be helpful in understanding the relationship between children and nature. Furthermore, this research examines the psychology of children's preferences for various landscapes.

CHAPTER 2 - BACKGROUND

LANDSCAPE PREFERENCE

Visual preferences and responses for landscapes

Past research studies have examined the visual landscape preferences for many demographic groups. In most of the studies there have been comparisons of landscape preferences, age, gender, subculture, and cross-cultures. Most of the comparisons have been of age and gender. Macia (1979) found significant differences between male and female landscape preferences. A conclusion of the study was that there were some significant differences of personalities between male and female adults. Balling and Falk's (1982) study of the savanna hypothesis was based on an age-group comparison of preference for five biomes. Subjects were American children and adults. The age groups were students in grade three, six, and nine, college students, adults, and retired citizens. The result of their study was that people prefer savanna-like environments to the other complex landscapes. Moreover, younger population showed stronger preferences for savanna- like environments than older population. Balling and Falk hypothesized that humans have an innate preference for savanna-like environments that arises from their long evolutionary history on the savannas of Africa. Later research by the environmental psychologists, Kaplan and Kaplan (1989) and Ulrich (1993), et al. also showed similar results regarding various age groups. Their conclusion led to the Biophilia Hypothesis, which described gender differences in visual sensory perception and preferences for landscape designs associated with the survival of the human species.

In the meanwhile, some studies have focused on diversity of subculture in the landscape preferences. Kaplan (1973) examined the differences between experts and non-experts in landscape preferences. In the study, Kaplan found that compared with landscape architecture and psychology majors, architecture majors were less likely to prefer wooded-nature settings while they were more likely to prefer building complexes.

The landscape architecture majors preferred settings consisting partly of buildings and partly of landscaping.

Although some studies examined cross-cultural comparisons, most of them focused on North American and European populations. Kaplan and Herbert (1987) compared three groups (American and Australian college students and members of the wildflower society of Western Australia). The first two groups permitted a cross-cultural comparison, and the last two groups permitted a sub-cultural comparison. All groups provided preference ratings for 60 scenes of Western Australian forests and open areas. The results showed that there were no significant differences between Australian and American students, demonstrating similarity in the Australian and American cultures. On the other hand, the wildflower society members preferred native plants to imported species, but the students made no distinction. Chang (2002) reported about psychological reactions of Taiwanese and Americans toward various landscapes. Views of nature such as mountains, water, and forests resulted in higher psychological benefits. In particular, Americans showed higher psychological benefits when they viewed mountains and forests. On the other hand, Taiwanese showed high psychological benefits when they viewed pictures of water and parks. Nasar (1984) examined the visual preferences of urban street scenes in Japanese and American populations. Subjects both in Japan and the United States were asked their preferences of urban street scenes. As a result, both Japanese and American foreign scenes were preferred to native street scenes.

Comparisons between American and Asian populations were expected to show various differences because these countries have very different alphabets, languages, environments, and design traditions. More research should be done on cross-cultural studies regarding landscape preferences. Thus, while it is clear that age, gender and personality can influence choices, some aspects are still relatively unexplored, particularly children's landscape preferences (Zube et al., 1983).

Psychological aspects on landscapes

Preference and response to landscapes may have emotional and psychological connections. Little is known about the psychological determinants of preferences for landscapes of the natural environment that appeal to people. However, a body of research is slowly generating interesting theories (Parry-Jones, 1990). In particular, psychological effects of landscape and nature environments have been found by numerous researchers. Outdoor visual environments can influence an individual's psychological well-being, and visual landscapes give rise to a wide range of emotional states (Ulrich, 1979). Many researches pointed out that viewing and attending nature is very important for well-being, restoration and aesthetical pleasure (Herzog et al. 2003). One of the most remarkable benefits of providing nature-like views is a higher level of positive effect (Ulrich, 1979). Another study by Ulrich et al. (1991) pointed out the importance of viewing nature for stress recovery. Thus, it is clear that viewing nature is important, as well as nature experience, for our well-being. Studies that examine the landscape preferences may provide information of variations in human psychology.

Ulrich (1979) examined the effects of viewing nature on various psychological states, particularly on mood affect. As a result, participants who viewed slides of unspectacular scenes of nature had an increase in positive mood affect, while those who viewed scenes of urban areas experienced a decline in positive mood affect. Ulrich concluded, in his later research (Ulrich, 1983), that scenes of nature, particularly which include water landscape, had a beneficial influence on the psychological state of participants. In addition, higher preferences were found to be connected with affective restoration in natural environments as well as in built environments (Van Den Berg et al., 2003). Regarding structural aspects, settings which are too open do not provide protective cover, and closed settings make movement and visual access difficult. Water and trees provide information about the availability of food, basic resources, and places of safety and refuge in an unfamiliar setting. Lack of trees or water may result in negative affective evaluations of urban environments (Parsons, 1991). Structural aspects of landscapes may also affect human psychological and emotional responses. Therefore, it seems reasonable to think that preferences for landscapes have a relationship with emotional responses to landscapes.

RELATIONSHIP OF CHILDREN AND NATURE

Children's preferences of landscape

As shown before, there are differences in landscape preferences in age groups. Children usually have a different sense for environment than adults. Sobel (1990) noted that childhood favorite places provided feelings of security, privacy, and control. These studies reported that a need to be alone, the importance of hiding places, and the need to escape from social demands.

Moore (1986) reported about the favorite places of children in age 9-12. Children were asked to make a map or draw their favorite places. The results showed that 96% of the illustrations were of outdoor places. In addition, children's most favorite places were lawns, playgrounds and schoolyards, their own home, local parks, and single trees. In the later research, Johnson et al. (1994) examined the child's view for the outdoor world. Subjects of the study were elementary school children who live in three regions (urban, suburban, and rural area) in Minnesota. Children were asked to take photographs of their favorite things or places. As a result, a high percentage of the photographs which were taken by all grades of children included trees. Moreover, younger children photographed more people and playgrounds than older children did. Sobel (1993) documented similar findings about the preference for natural play spaces among British and Caribbean children.

Research by Thurber and Malinowski (1999) showed the relationship between emotion and environment in children. They found that 8-16-year-old boys with higher levels of negative emotion were more likely to favor places where they could be alone, whereas happier boys favored places where they could socialize. Sommer's (1990) study showed that 11-13-year-old Estonian children preferred natural places more than 15-17-year-olds. Thus, children seem to change their preference and responses to landscape because of their process of development.

Previous studies also focused on the gender differences in children. Smith and Barker (2000) et al. suggested that age 5-12-year-old boys tend to prefer outdoor places whereas girls prefer indoor places. Sommer (1990) stated that 11-12-year-old boys preferred more than girls to mention not only natural settings as their favorite place but

also to mention relaxation, quiet and comfort as feelings experienced while in a favorite place. Moreover, 13-17-year-old girls preferred private favorite places, whereas boys prefer public spaces (Lieberg, 1994).

Benefits of nature on children

Today, many children's lives are disconnected from the natural world. Their experiences are predominately mediated in media, written language, and visual images (Chawla, 1994). TV games and the other indoor play have replaced outdoor play. However, there are many studies demonstrating the benefits and importance of nature for children. Educators have also realized the importance of nature education and outdoor experiences for children.

Middle childhood (about age 5 to 12) is described as a unique stage in the development of the relationship between the person and the natural world (Sobel 1990). That age may also be a time to learn about the self as well as a time for exploration and socialization. A number of studies showed that nature has beneficial effects on this stage of children's psychological or cognitive well-being (Wells, 2000, et al.).

Wells (2000) demonstrated that children who view nature and have contact with nature showed higher scores for concentration and self-discipline. Children scored higher on scenes of nature which had more green colors. Moore (1996) indicated that children who play in nature have more positive feelings about each other. Exposure to the natural environments improves children's cognitive development by improving their awareness, reasoning, and observational skills (Pyle, 2002). Ignatiuk (1978) also demonstrated a positive relationship between eleventh grade biology students' attitudes toward science and environmental concepts and their exposure to field trip activities. The study showed that there were significant differences in children's attitudes between pre- and post-test measurements.

Many children interacting with nature gain a respect for living things. They stimulate their curiosity and learn meaningful life experiences that influence adult responses to nature (Bullock, 1994). Moreover, Jaus (1984) stated that environmental

education for the elementary school children provides positive attitudes toward the environment. These attitudes are retained during childhood. Bixler et al (2002) examined the relationship between play environments and environmental preferences of adolescents within the domains of work, leisure, and school. Their conclusion led to the idea that childhood play location influences later interest in wild lands, environmental preferences, outdoor recreation, and occupations in outdoor environments. Adolescents who had more often played in wilderness areas in childhood were more likely to prefer a wild land.

LANDSCAPE STRUCTURE

Elements

There are many reasons that make factors of human's preferences and responses to the landscapes. One of the factors may be the landscape elements. The word 'Landscape' refers to the appearance of the land, including its shape, texture, and colors. It also reflects the way these components combine to create specific patterns and pictures that are distinctive to certain areas. Landscape is not just a visual phenomenon; it relies on a number of other features or influences that will have shaped its character. In addition, landscape is not just confined to rural areas (Shetland Islands Council, 2006).

Bulut and Yilmaz (2007) assessed the visual quality of various landscape scenes in Turkey. Various landscape photographs were evaluated in terms of landscape characteristics and landscape attributes and elements. Evaluation was made to scale the variety of features (vividness, landscape variety, harmony, naturalness, being interesting, impressiveness, originality, mystery, and historical value). Their conclusion was that urban scenery was the highest visual quality, the second was geological structure scenery, and the third was natural scenery. In their study, urban scenes had authentic urban identity with traditional houses, streets, and unique natural beauties.

However, Hammitt et al. (1994) mentioned that as the texture level decreased in natural landscapes and as the green areas increased in geological structure, visual

preferences ratio increased. Wherrett's (2000) study was conducted for making landscape preference models and it indicated the similar findings. In the study, landscape components were categorized into several items (sky, mountain, hill, water, flatland, vegetation) to examine the factor of preferences. The results lead to the conclusion that mountain and water views were found to have significant importance in landscape preferences.

Colors

To think about preferences and responses toward landscape and nature, preference of colors should be considered. In the previous study, a general order of color preference was demonstrated. Eysenck's (1941) research suggested that there was a color preference order ranging from "blue, red, green, purple, orange, and yellow". The study of comparison of gender showed similar results. Therefore, there were no significant differences of color preference between male and female. This study also indicated that there were no differences between races. However, a later study (Saito, 1996) which examined color preference in Japan, China, and Indonesia, found some diversity between them. Commonly, they preferred white the best, and they also preferred vivid blue, vivid red, and light green, as well. While they tend to prefer white the best, people of each country have their own preference. In particular, Japanese preferred pale tone colors, such as pale sky, pale green, pale greenish sky. In addition, Japanese preferred dark color such as deep blue, deep red purple, dark blue, dark blue green, and silver.

The other study by Child et al. (1968) examined the age and gender differences in one to 12-year-old children's color preferences and found some differences in age and gender. As a result, they demonstrated that females preferred light colors. Moreover, with increasing age, children decreased preference for high saturation, and increased consistency of hue choices, and increased tendency to resolve conflicts in flavor of hue rather than saturation. Thus, since there are differences of color preferences in age and gender, color preferences may affect landscape preferences.

CHAPTER 3 - PRELIMINARY STUDY

Prior to conducting the cross-cultural research project, a children's color preference survey was conducted on April, 2006 at the Kansas State University Open House. This survey measured two demographic factors and preferences for four colors by young children.

RESEARCH OBJECTIVES

This preliminary study had two objectives:

1. To examine the children's preferences for colors of easily recognized illustrations of bananas, birds, tulips, and trees.
2. To learn if changes occur in color preferences of children whose ages range from three to twelve.

SURVEY PROCEDURES

A total of 93 children, age three to twelve, were asked to participate. The survey had illustrations of a banana, bird, tulip, and tree, each of which were blue, green, red, or yellow (See Appendix A). Children were asked to choose their most favorite picture color from each group. Before the survey was done, parents and guardians were informed about this survey and they consented to allow their children to participate. Oral instructions were then given to children about how to complete the survey.

To compare the influences of age and gender, children were grouped by gender, and each gender was divided into three age groups (ages 3-6, 7-9, and 10-12 years) Percentages of color preference responses for each group were calculated and placed in graphic form to evaluate trends of children's responses.

RESULTS AND DISCUSSION

Banana colors

Yellow bananas were thought to be symbolic of food and perhaps as universally recognized by children as are red apples. Yet, in this study, younger children chose all four colors for the banana symbol (See Figure 3.1). These results would not support the Biophilia Hypothesis because among the ancient hunter-gatherer clans, women and children searched for fruits, berries or other plant parts with bright colors. Many of the youngest children in this study selected blue and green colors and did not show a high affinity toward bright red or yellow colored bananas.

A higher percentage of older children selected yellow as the color for the "banana" symbol which would indicate a learned behavior and support for the Nurture Hypothesis. Older boys were more likely to prefer yellow bananas. More girls than boys preferred red and blue as "banana" colors, and some older girls continued to show a preference for colors other than yellow. For older girls, red is a warm emotional color and has stress reducing effects (Kim and Mattson, 2002). Boys may not be as conditioned to prefer alternative colors and have learned through experience that bananas are supposed to be yellow and without any emotional effects.

Bird colors

As shown in Figure 3.2, color preference toward the "bird" symbol indicated a difference between boys and girls. Many boys chose red as the "bird" color, whereas more girls chose blue. This was especially true for ages 3 to 6 (male: red=50%, blue=10%; female: red=10%, blue=50%). For birds, girls chose cool color, such as blue, and boys preferred warm color, such as red and yellow. Perhaps, boys may identify the "red bird" as a cardinal, whereas girls may identify the "blue bird" as a bluebird.

Birds may be symbolic of outdoor activities and wildlife. Is it possible that older boys are identifying an emotional connection with nature by selecting the color red for birds? Older girls, by selecting the color blue for birds, may be less emotionally

connected with the hunter aspect of nature which they perceive as a male role that older boys may do.

Tulip colors

As shown in Figure 3.3, while both genders of children preferred red tulips, the response of older girls was especially high (80% of 7 to 9-year-olds and 70% of 10 to 12-year-olds). On the other hand, compared with older children, 3 to 6-year-old children showed no particular preference toward tulip colors. From the results that 3 to 6-year-old boys chose blue, green, and red, younger children seemed not to have images of the color of the flower.

Flowers are symbolic of socially accepted horticultural products that older girls begin to understand. Red flowers, in particular, have deep emotional interpretations. Younger children have not yet learned these cultural effects of the Nurture Hypothesis.

Tree colors

Regarding illustrations of a tree, most of 7 to12-year-olds preferred a green tree (See Figure 3.4). However, 30% of 10 to 12-year-old males preferred a "blue tree". In addition, there were significant differences between 3 to 6-year-old and 7 to 12-year old children. Three to 6-year-old children chose a variety of colors for the tree. This result was similar as the responses toward the tulip colors.

The predominate preference of blue-green tree colors by boys of all ages in this study may support the Biophilia Hypothesis that human survival was influenced by hunter-gatherer clans. Hundreds of thousands of years ago, men were hunters in the blue-green canopies of forests and woodlands. Most boys in this study also preferred these same colors, but most girls preferred a variety of tree colors.

Thus, there were differences between age and gender in color preference toward plants, animals, and foods. Especially younger children showed different responses from older children. The results of this preliminary study will effect on children's landscape preference and responses. Therefore, these results will be useful for analyzing and discussing the results of this research.

In summary, the majority of older children selected the primary colors of yellow for the banana fruit, red for tulip flowers, and blue and red for the bird symbol. The secondary color of green was selected primarily for the tree symbol. These results would support the learned behavior concept (Nurture Hypothesis).

For younger children, color preferences were more equally distributed for all symbols indicating that they did not know what the correct colors should be for the perspective symbols. It is not clear that these results would support the Biophilia Hypothesis or simply reflects that children are selecting their favorite colors.

Figure 3.1 Percentage of 93 multicultural American children who preferred blue, green, red, and yellow colors for a symbolic banana

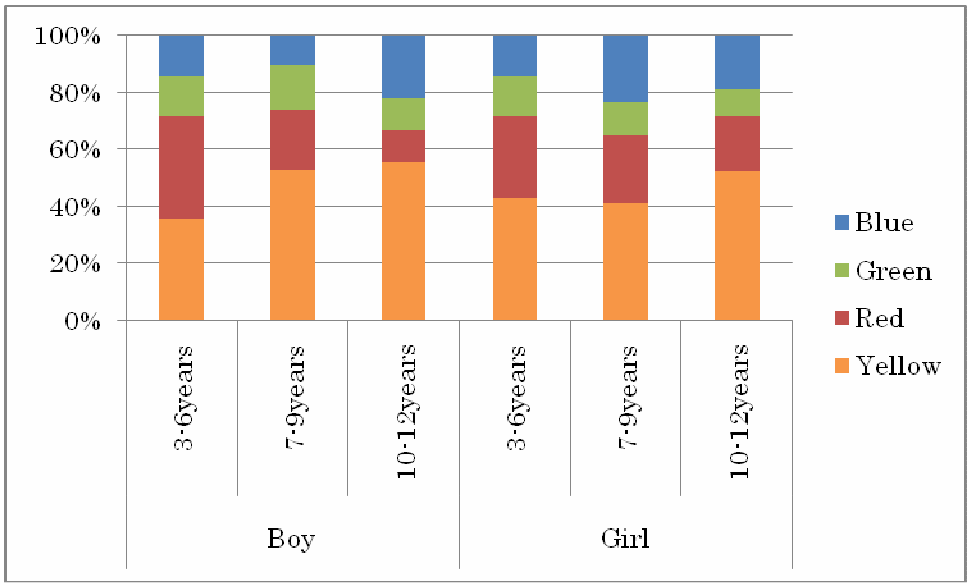


Figure 3.2 Percentage of 93 multicultural American children who preferred blue, green, red, and yellow colors for a symbolic bird

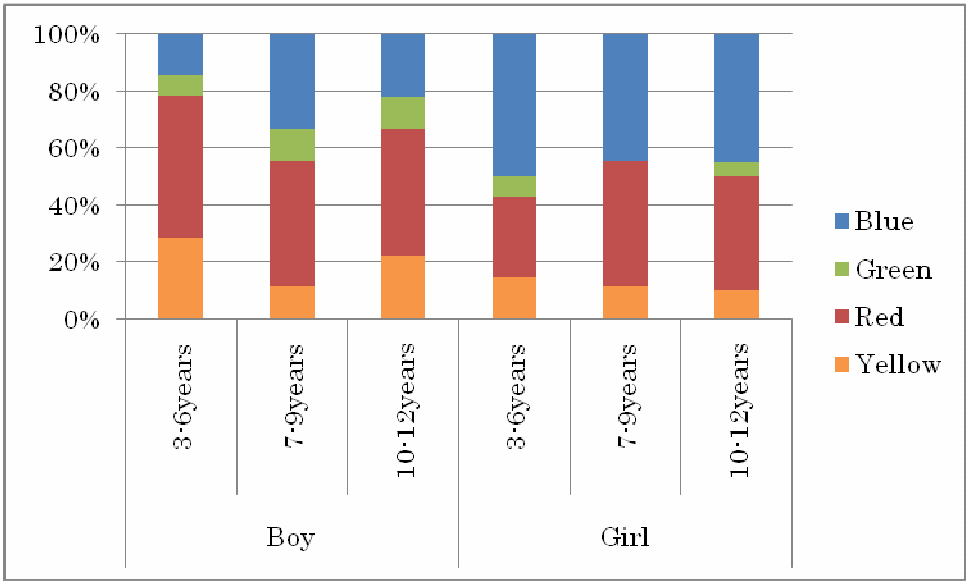


Figure 3.3 Percentage of 93 multicultural American children who preferred blue, green, red, and yellow colors for a symbolic tulip

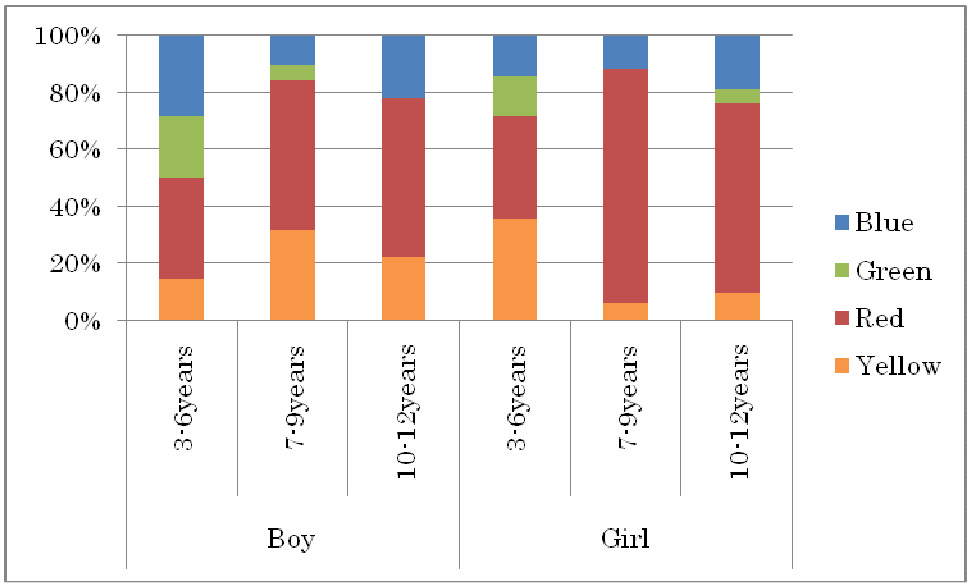
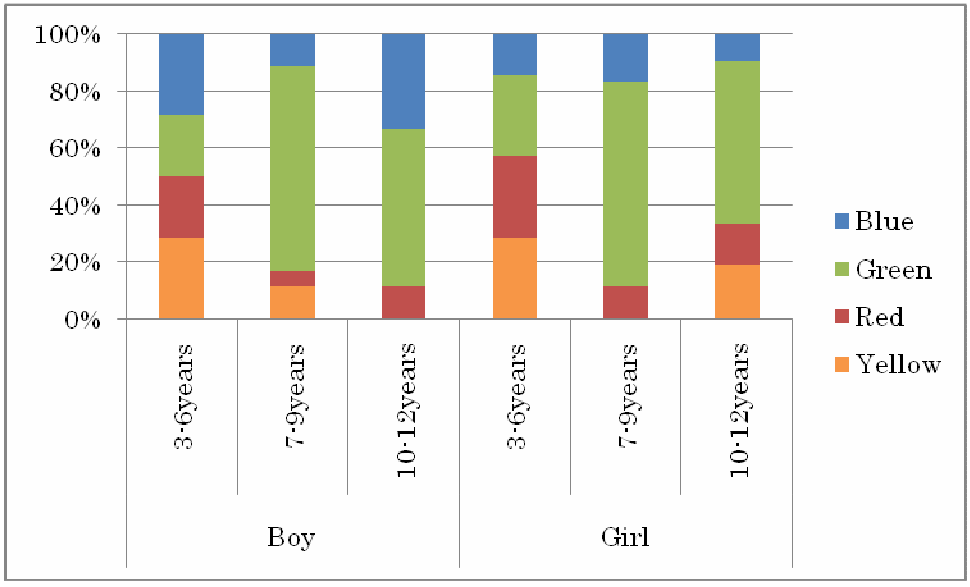


Figure 3.4 Percentage of 93 multicultural American children who preferred blue, green, red, and yellow colors for a symbolic tree



CHAPTER 4 - METHODOLOGY

RESEARCH OBJECTIVES

This research had the following four objectives:

1. To compare preference responses toward plant and landscape photographs representing the Nature (Biophilia) and the Nurture Hypotheses.
2. To evaluate cultural diversity by comparing the responses of Japanese and American elementary school children to these photographs.
3. To determine effect of age by comparing the responses of younger children and older children.
4. To examine the relative preference and emotional impact of photographs of plants and landscapes.

RESEARCH HYPOTHESES

Three research hypotheses were tested in this study. They were:

1. Cultural and educational experiences of American and Japanese children produce different visual preferences and interpretations of plants and landscapes.
2. Younger children respond differently than older children in terms of emotional responses (safety/stress) and visual interpretations of plants and landscapes.
3. Preferences and emotional responses of boys and girls will be different.

SUBJECTS

A total of 202 children took part in this study. All students were in the first, third, or sixth grades in elementary schools, either in the United States or in Japan. Thirty-nine students (18 male, 21 female) participated from Lee Elementary School in Manhattan, Kansas, and 163 students (85 male, 76 female) from Keno Minami Elementary School in Ashikaga City, Japan.

Lee Elementary School is located ten blocks from Kansas State University in Manhattan, Kansas, a city of approximately 45,000 people. Approximately 280 elementary students, kindergarten through sixth grade students attend this school. Special education and regular school gardens were started in 1980. Teachers and children at this school have maintained a school garden for more than 25 years. Students at Lee Elementary School represented various ethnicities (white, black, Hispanic, Asian, and others), and many were children of graduate students and faculty at Kansas State University.

Keno Minami Elementary School is located in Ashikaga City, Japan, which has a population of approximately 160,000 people. Ashikaga City is an inland province 70 miles north from Tokyo. Approximately 300 elementary students attend Keno Minami Elementary School. It is an average sized Japanese elementary school. Participants at Keno Minami Elementary School were all Japanese. The school had some small flower gardens which were maintained by teachers and used in the science class. One of the Student Councils is working on beautifying the entire school, and greening is a part of their job.

SURVEY AND QUESTIONNAIRE

The questionnaire has seven-item photographs of Japanese and American plants and landscapes, with one additional photograph of a desert (See Appendix E). Figure 4.1 displays the combination of each photograph and describes their content. The photograph of a desert was used to contrast with a landscape containing water.

Participants were asked to choose their favorite photograph from the each pair. Following the question, they were asked how they feel about all of the eight photographs.

They used a five-point Leikert scale using facial expression (Figure 4.2) instead of words or numbers. Before the survey started, a letter of consent (See Appendix C) and an informed consent form (See Appendix D) were given to the parents/guardians. Only the children whose parents/guardians signed the informed consent form took part in this study. The questionnaire was completed in the classroom by the home room teachers.

Figure 4.1 Questionnaire

1. Landscape

A. Prairie	B. Cherry blossom

2. Tree

A. Single "Bonsai"	B. Multiple American trees

3. Home

A. American home	B. Japanese home

4. Mountain and Dune

A. Mt. Fuji and lake	B. Desert

Figure 4.2 Measurement (Facial Expression)

CHAPTER 5 - RESULTS AND DISCUSSION

VISUAL PREFERENCE

Country

Significant differences were found in the visual preferences for landscape and tree photographs among the 202 children in the study (Table 5.1). American children preferred the Japanese cherry blossom landscape three times more frequently than the prairie scene. In contrast, the Japanese children preferred the two scenes similarly (chi-square; p=0.03). In comparisons of the tree photographs, the American children preferred the bonsai tree over the grove of trees. Japanese children preferred the grove of trees twice as much as the bonsai photograph (chi-square; p=0.003).

Preferences of the 202 children were similar and non-significant for the photographs of Japanese and American homes, and of nature scenes. The Japanese home landscape was preferred slightly more than the American home landscape. The scene of Mount Fuji was preferred four times more frequently than the desert scene.

Table 5.1 Chi-square analysis of visual preferences of 202 American and Japanese school children to landscapes, trees, homes, and nature scenes.

Item	School	American scene		Japanese scene		Chi-square
1.Landscape	Lee	9	25.0%	27	75.0%	p=0.03
	Keno Minami	72	44.4%	90	55.6%	
2.Trees	Lee	14	40.0%	21	60.0%	p=0.003
	Keno Minami	108	66.7%	54	33.3%	
3.Homes	Lee	12	34.3%	23	65.7%	NS
	Keno Minami	72	44.4%	90	55.6%	
4.Nature	Lee	6	17.1%	29	82.9%	NS
	Keno Minami	25	16.6%	126	83.4%	

Grade

Comparison of children's preferences of photographs in the first, third, and sixth grades in Lee Elementary School showed no statistically significant differences in choices "A" and "B" (See Table 5.2). In all grades, the preferred choices were photographs of Japanese scenes. The frequency of selection increased linearly with each grade. For example, the preference of the cherry blossom tree landscape increased from 69.2% in the first grade to 100% by the sixth grade. 70% of the sixth graders preferred the bonsai and Japanese home landscape, and 90% preferred the scene of Mount Fuji.

Children of Keno Minami Elementary School showed statistically significant differences between classes for the landscape, tree, and home photographs (See Table 5.3). First and third grade children significantly preferred photographs of a traditional Japanese cherry blossom landscape (chi-square; $p=0.0003$) and a bonsai tree (chi-square; $p=0.01$), but by the sixth grade, higher percentage of preferences were for the American prairie and a grove of trees. Also, first graders preferred the American home landscape, but third and sixth graders selected the Japanese home landscape (chi-square; $p=0.016$). Children in all grades preferred the photograph of Mount Fuji over the American desert landscape.

Table 5.2 Chi-square analysis of visual preferences of Lee Elementary School children to landscapes, trees, homes, and nature scenes.

Item	Grade	American scene		Japanese scene		Chi-square
1.Landscape	1st	4	30.8%	9	69.2%	NS
	3rd	5	41.7%	7	58.3%	
	6th	0	0.0%	11	100.0%	
2.Tree	1st	5	38.5%	8	61.5%	NS
	3rd	6	50.0%	6	50.0%	
	6th	3	30.0%	7	70.0%	
3.Home	1st	6	46.2%	7	53.8%	NS
	3rd	3	25.0%	9	75.0%	
	6th	3	30.0%	7	70.0%	
4.Nature	1st	3	23.1%	10	76.9%	NS
	3rd	2	16.7%	10	83.3%	
	6th	1	10.0%	9	90.0%	

Table 5.3 Chi-square analysis of visual preferences of Keno Minami Elementary School children to landscapes, trees, homes, and nature scenes.

Item	Grade	American scene		Japanese scene		Chi-square
1.Landscape	1st	17	34.7%	32	65.3%	p=0.00003
	3rd	20	32.8%	41	67.2%	
	6th	35	67.3%	17	32.7%	
2.Tree	1st	28	57.1%	21	42.9%	p=0.01
	3rd	37	60.7%	24	39.3%	
	6th	43	82.7%	9	17.3%	
3.Home	1st	30	61.2%	19	38.8%	p=0.016
	3rd	24	39.3%	37	60.7%	
	6th	18	34.6%	34	65.4%	
4.Nature	1st	10	20.4%	39	79.6%	NS
	3rd	9	15.0%	51	85.0%	
	6th	6	11.5%	46	88.5%	

Gender

Lee Elementary School showed no significant differences between boys and girls (See Table 5.4). In each of the four items, Japanese photographs were selected by more than 70% children. In particular, girls preferred Mount Fuji strongly, whereas boys showed higher preference rate to the cherry blossom trees landscape than Mount Fuji. In addition, boys showed strong preference to the bonsai tree than the girls. That rate was the same as the responses to the Japanese home.

Results of Keno Minami Elementary School showed that there were significant differences between boys and girls in the photographs of trees (See Table 5.5). Girls preferred the grove of trees more than boys did. In the other words, the bonsai tree was not preferred by girls even it is Japanese photograph. Most of the children preferred Japanese scenes, except the bonsai tree. Graph in the figure indicated that both genders' responses to the scene of home and nature appeared to follow the same trend. Mount Fuji was the most preferred and the desert scene was the least.

Table 5.4 Chi-square analysis of visual preferences of Lee Elementary School children to landscapes, trees, homes, and nature scenes.

Item	Gender	American scene		Japanese scene		Chi-square
1.Landscape	Male	3	18.8%	13	81.3%	NS
	Female	6	30.0%	14	70.0%	
2.Trees	Male	5	31.3%	11	68.8%	NS
	Female	9	47.4%	10	52.6%	
3.Homes	Male	5	31.3%	11	68.8%	NS
	Female	7	36.8%	12	63.2%	
4.Nature	Male	4	25.0%	12	75.0%	NS
	Female	2	10.5%	17	89.5%	

Table 5.5 Chi-square analysis of visual preferences of Keno Minami Elementary School children to landscapes, trees, homes, and nature scenes.

Item	Gender	American scene		Japanese scene		Chi-square
1.Landscape	Male	41	47.7%	45	52.3%	NS
	Female	31	40.8%	45	59.2%	
2.Trees	Male	51	59.3%	35	40.7%	p=0.05
	Female	57	75.0%	19	25.0%	
3.Homes	Male	38	44.2%	48	55.8%	NS
	Female	34	44.7%	42	55.3%	
4.Nature	Male	16	18.8%	69	81.2%	NS
	Female	9	11.8%	67	88.2%	

In summary of the results of the visual preferences, the cherry blossom tree landscape was preferred to the grassland prairie by most of the American and Japanese children. The factor of the preference is not only the culture and country, but also the contrast of cherry blossom flower colors and landscape elements. However, American children possibly recognize the beauty of cherry blossom tree by experiences as well as Japanese children.

Bonsai is an ancient horticultural practice associated with elderly Japanese, but natural scenes of a grove of trees were also visually preferred by Japanese children. Older Japanese children are beginning to think that a nature scene is as important as a nurtured scene. Also, they may have learned more about bonsai more than American children.

Overall, differences were mainly shown in the landscape and tree scenes, and there were no statistically differences shown in comparisons of homes and nature scenes. Although influences of country and age were found, boys and girls in both schools showed very similar preferences.

In the process of development, elementary school children did not show differences of gender toward landscapes, homes, trees, and nature scenes. Therefore, learned and experienced environments may effect their preferences. Older children showed different preferences from younger children. Older children were undergoing a process of development which resulted in the acceptance of alternative visual scenes.

EMOTIONAL RESPONSES

Each photograph was rated independently for emotional response after the paired comparisons for preferences were completed. Thus, a child might prefer a photograph, but give it a high or low emotional rating. Regarding analyzing data, a chi-square test was used to examine the differences between each group.

A Leikert Scale was used to evaluate children's emotional responses to photographs with 5 = happy, positive response, 3 = neutral, to 1 = a sad, negative feeling (See Figure 5.1). Data and chi-square analysis are presented in the following sections: (1) the overall emotional responses of American and Japanese children were compared concerning age and gender and (2) the separate comparisons of American and Japanese children by age and gender.

Figure 5.1 Scale of Facial Expression

5 4 3 2 1

Country

As shown in Table 5.6, results from comparisons of Lee Elementary School and Keno Minami Elementary School showed significant differences in the prairie scene and Japanese home (chi-square; p=0.001). Mean responses of Japanese children to the prairie scene were higher than for American children. Frequency distribution indicated that many of Americans responses were 3 (mode=3, median=4.0) whereas most of Japanese responses were 4 and 5 (mode=5, median=4.0). On the other hand, Japanese children had various emotions toward Japanese home (10 to 20 children responded as 2 and 3).

Mount Fuji had the highest mean response and the cherry blossoms landscape was second. In addition, Mount Fuji was also the most preferred scene by both American and Japanese children (See Table 5.6). All of the mean scores were represented in the 3.00 to 4.50 range, while the desert scene was always the least preferred.

Table 5.6 Chi-square analysis of mean emotional responses of 202 American and Japanese elementary school children to landscapes, trees, homes, and nature scenes.

	1		2		3		4	
	A	B	A	B	A	B	A	B
Lee	3.72	4.34	3.81	4.03	3.85	3.92	4.51	3.48
Keno Minami	4.17	4.47	3.54	3.89	3.87	4.18	4.52	3.11
Chi-square	p=0.001	NS	NS	NS	NS	p=0.001	NS	NS

1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Grade

As shown in Table 5.7, there were significant differences between age groups of Lee Elementary School children in viewing American and Japanese homes (chi-square; p= 0.008, p= 0.03). Younger children had positive emotions toward the American home (mean of first grade was 4.58), whereas older children had more negative emotions to it (mean of third grade was 3.75, sixth grade was 3.00). In addition, first grade children showed the highest responses to the American home scene. Regarding the Japanese home scene, the first grade children showed lower mean responses as did the sixth grade children, however, the mode of first grade children was 5, and mode of sixth grade children was 3. Therefore, more younger children showed positive emotion toward the Japanese home scene than older children.

Children in all grades of Keno Minami Elementary School showed similar mean responses except to the desert scene. The prairie scene, cherry blossom tree landscape, and Mount Fuji were rated with high emotional responses, and the bonsai, grove of tree scene, American home, and Japanese home were rated with medium emotional responses (See Table 5.8). The desert scene revealed significant differences between grades (chi-square; p=0.006). While first grade and third grade children showed similar scores (3.40 and 3.37), the sixth grade children had extremely negative emotional response. Similar response was shown with the bonsai scene. First and third grade children had the same mean responses (3.69), whereas sixth grade children had more negative emotion (3.13).

Table 5.7 Chi-square analysis of mean emotional responses of American elementary school children to landscapes, trees, homes, and nature scenes.

	1		2		3		4	
	A	B	A	B	A	B	A	B
1st	3.82	4.17	4.00	4.18	4.58	3.73	4.42	3.64
3rd	3.92	4.50	3.58	4.08	3.75	4.17	4.42	3.33
6th	3.33	4.36	3.83	3.82	3.00	3.86	4.69	3.50
Chi-square	NS	NS	NS	NS	p=0.008	p=0.03	NS	NS

1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Table 5.8 Chi-square analysis of mean emotional responses of Japanese elementary school children to landscapes, trees, homes, and nature scenes.

	1		2		3		4	
	A	B	A	B	A	B	A	B
1st	4.06	4.49	3.69	3.78	4.04	4.06	4.38	3.40
3rd	4.23	4.58	3.69	4.02	3.84	4.38	4.79	3.37
6th	4.23	4.25	3.13	3.87	3.67	4.09	4.34	2.38
Chi-square	NS	NS	NS	NS	NS	NS	NS	p=0.006

1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Gender

Male and female children at Lee Elementary School had similar mean responses, and the results indicated that there were no significant differences between them (See Table 5.9). Mount Fuji was rated with the highest mean responses, the cherry blossom tree landscape was the second, and the desert scene was the lowest.

As shown in Table 5.10, there were significant differences toward the bonsai scene between male and female children in Keno Minami Elementary School (chi-square; p=0.00002). Mean responses were similar (3.59 and 3.48), however, mode and median of female was 5, mode and median of male was 4. Therefore, girls had more positive emotion than boys.

Table 5.9 Chi-square analysis of mean emotional responses of American elementary school children to landscapes, trees, homes, and nature scenes

	1		2		3		4	
	A	B	A	B	A	B	A	B
Male	3.60	4.39	3.76	4.06	3.80	3.89	4.47	3.56
Female	3.82	4.30	3.84	4.00	3.89	3.95	4.55	3.41
Chi-square	NS	NS	NS	NS	NS	NS	NS	NS

1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Table 5.10 Chi-square analysis of mean emotional responses of Japanese elementary school children to landscapes, trees, homes, and nature scenes

	1		2		3		4	
	A	B	A	B	A	B	A	B
Male	4.01	4.34	3.59	3.71	3.78	4.21	4.50	3.35
Female	4.36	4.62	3.48	4.09	3.98	4.15	4.53	2.80
Chi-square	NS	NS	p= 0.00001	NS	NS	NS	NS	NS

1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Overall mean Leikert emotional rankings

As shown in Table 5.11, overall mean emotional responses are presented to all of the eight photograph scenes. In both American and Japanese schools, responses of the younger children and older children were different. American first grade children had the highest emotional response and it decreased linearly with increasing grade. Emotional responses of Japanese children also showed difference in age classes. Third grade children had the highest positive emotion among both American and Japanese children, and six grade children had the lowest emotional responses. On the other hand, American boys and girls had similar emotional ratings, as well as did the Japanese boys and girls. Although there were differences between the age classes, overall mean emotional responses between the countries (cultures) were very similar (3.95 and 3.96). Therefore, emotional ratings changed with increasing age, and children of both countries had similar emotional ratings.

Table 5.11 Overall mean emotional rankings of American and Japanese elementary school children to landscapes, trees, homes, and nature scenes

	Lee	Keno Minami
1st	4.07	3.99
3rd	3.97	4.11
6th	3.80	3.75
Boys	3.94	3.97
Girls	3.94	4.00
Overall	3.95	3.96

5=Positive, 4=Somewhat positive, 3=Neutral, 2=Somewhat negative, 1=Negative

Overall, no significant influences of gender were found, however, influences of country and age were found in emotional responses toward home and nature scenes. In this study, homes and nature had a connection with children's emotions.

Japan has many historical sites such as temples, shrines, and monuments. Japanese children recognize these as the typical Japanese home style, and also perceive them mentally and spiritually. Japanese children may include these emotions toward their home scene and experience higher positive emotions than American children. In addition, the color of the home and the combination of trees may have influenced their emotions.

The white color of the American home is more preferred for younger children rather than the cooler brown color of the Japanese home. The American home is also open to the road, while the Japanese home is open to a small path and is located in a wooded landscape.

Moreover, homes are symbolic of a safe place to live. Both American and Japanese younger children have more positive emotions toward a home scene by instinct, or by experiences. Therefore, younger children may interpret the homes both emotionally and visually, while the older children see the homes visually. On the other hand, the desert is an unsafe place to live, and water is necessary for survival in their lives. Children in all grades recognized the concept of water and dune by learned and experienced environments, especially older children recognized it well.

PREFERENCES AND EMOTIONAL COMPARISONS

Figure 5.2 Percentages of 202 Lee and Keno Minami Elementary School children who preferred American and Japanese landscapes, trees, homes, and nature scenes

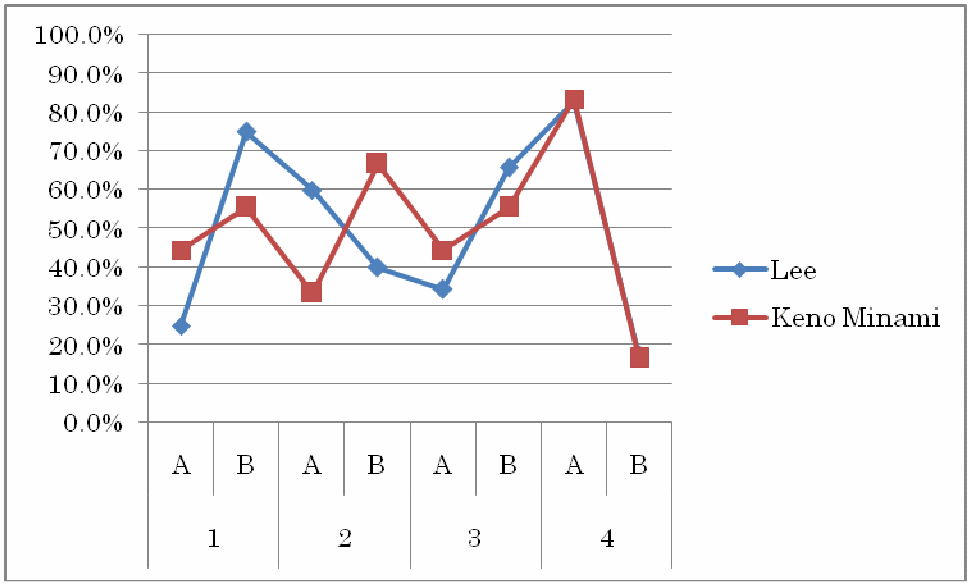
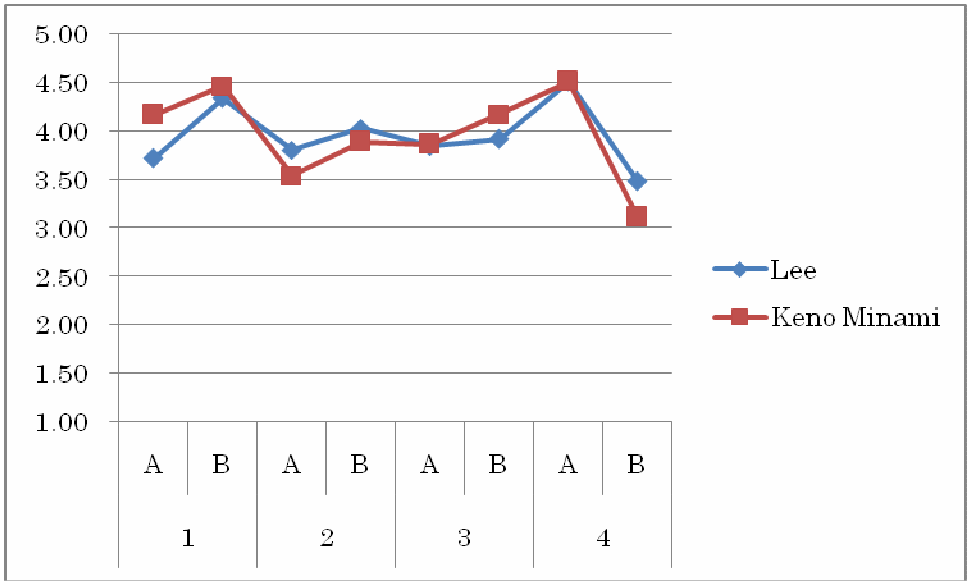


Figure 5.3 Mean emotional responses of 202 Lee and Keno Minami Elementary School children to landscapes, trees, homes, and nature scenes



1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Figure 5.4 Percentages of Lee Elementary School children who preferred American and Japanese landscapes, trees, homes, and nature scenes

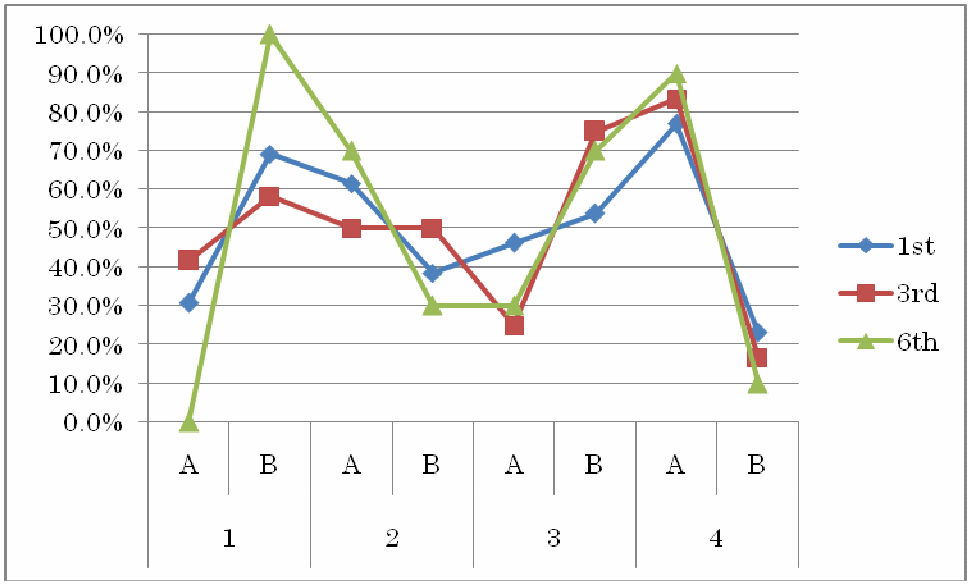
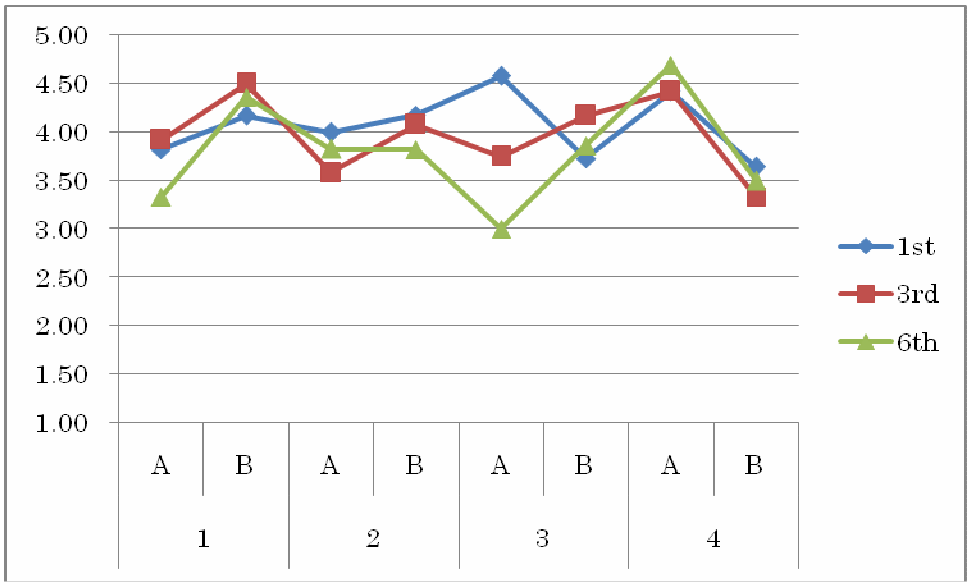


Figure 5.5 Mean emotional responses of Lee Elementary School children to landscapes, trees, homes, and nature scenes



1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Figure 5.6 Percentages of Keno Minami Elementary School children who preferred American and Japanese landscapes, trees, homes, and nature scenes

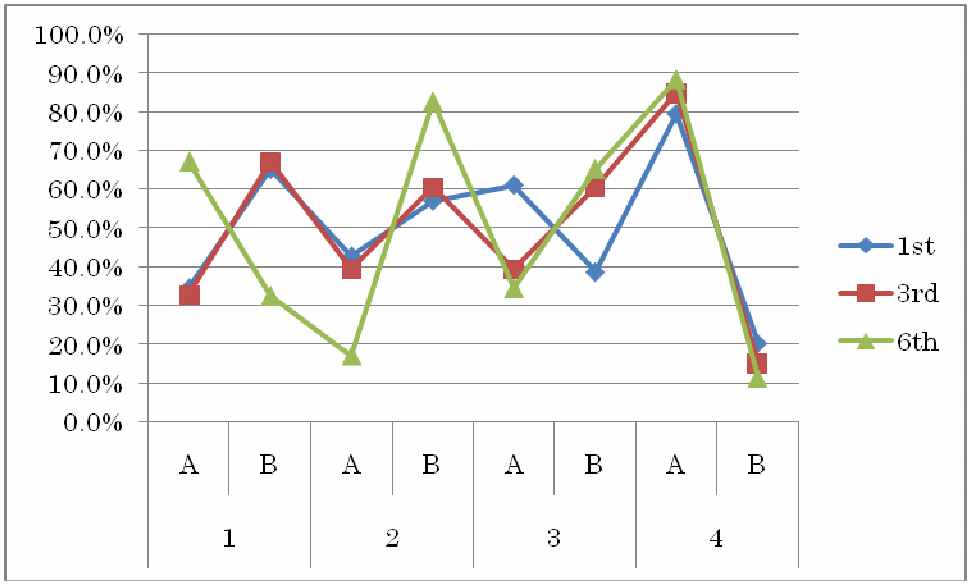
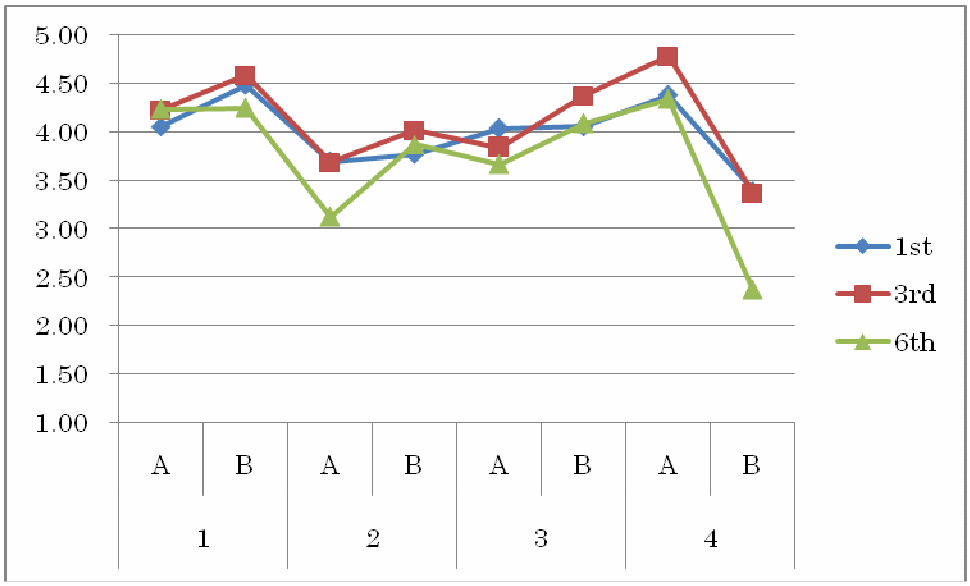


Figure 5.7 Mean emotional responses of Keno Minami Elementary School children to landscapes, trees, homes, and nature scenes



1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Figure 5.8 Percentages of Lee Elementary School children who preferred American and Japanese landscapes, trees, homes, and nature scenes

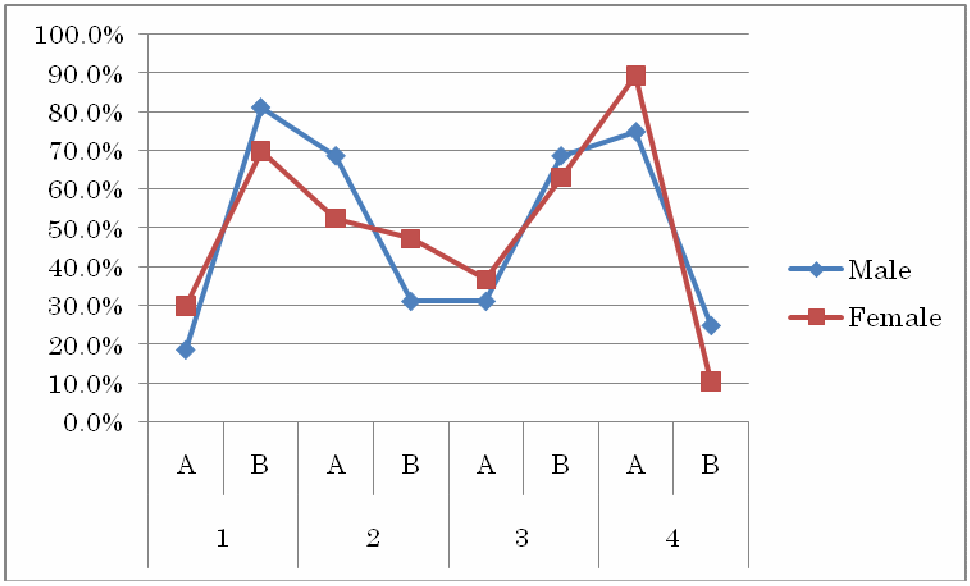
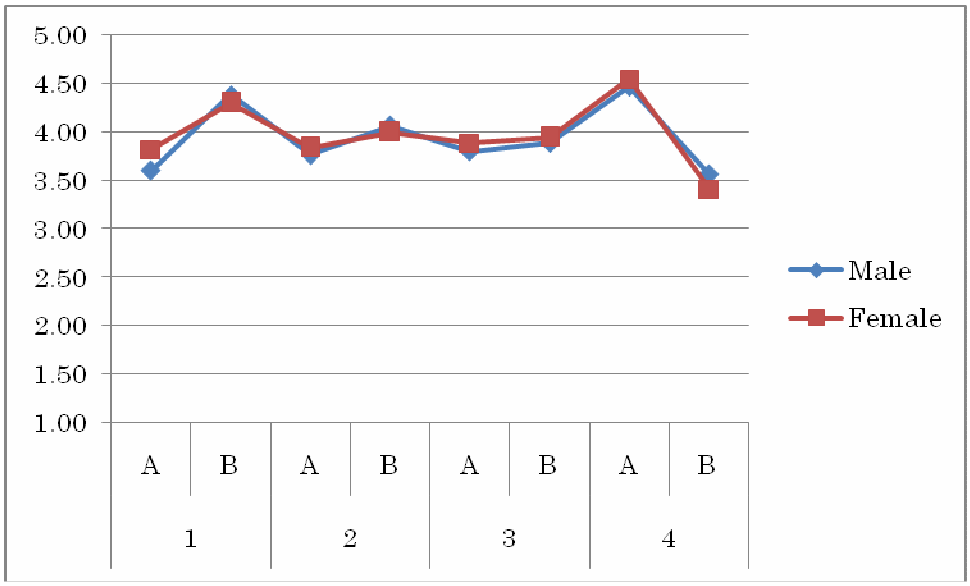


Figure 5.9 Mean emotional responses of Lee Elementary School children to landscapes, trees, homes, and nature scenes



1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

Figure 5.10 Percentages of Keno Minami Elementary School children who preferred American and Japanese landscapes, trees, homes, and nature scenes

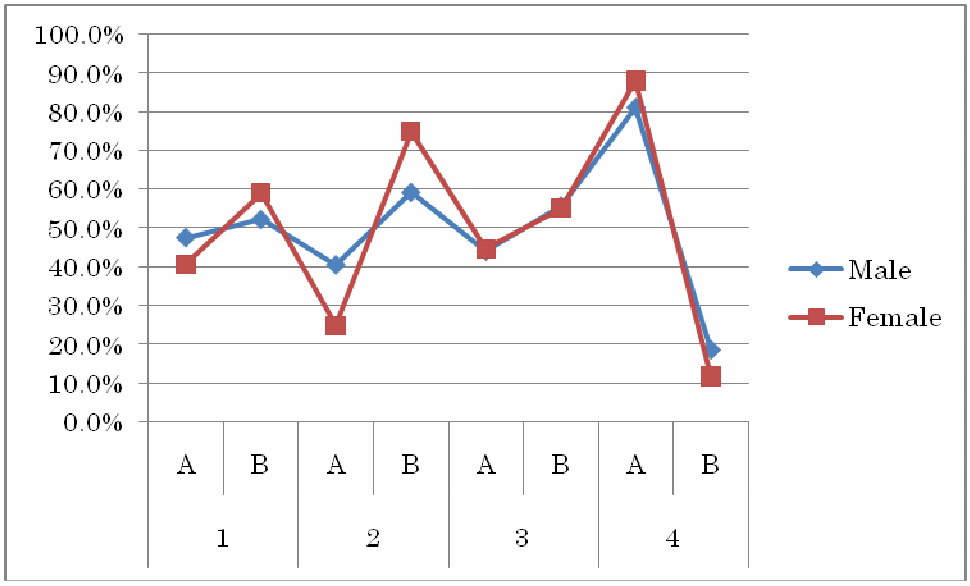
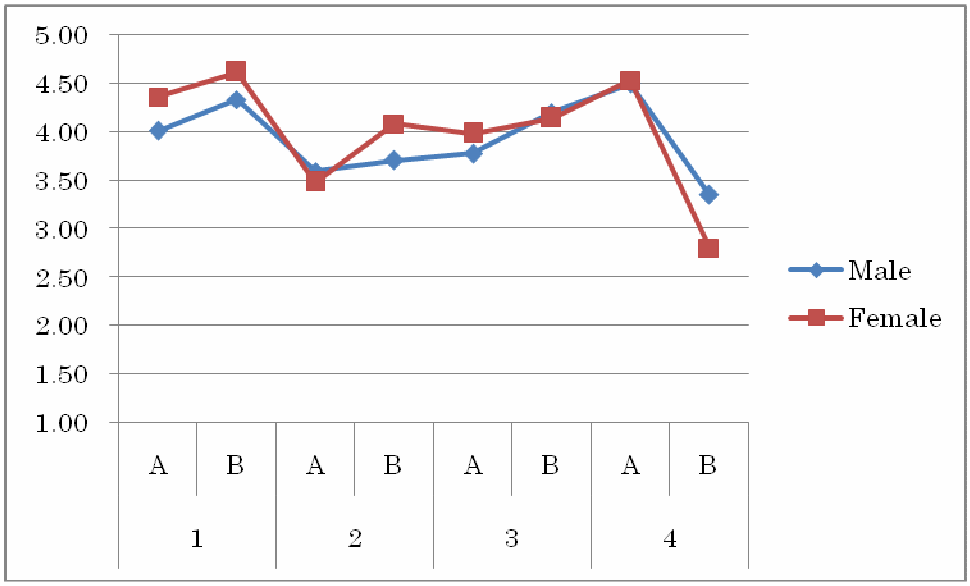


Figure 5.11 Mean emotional responses of Keno Minami Elementary School children to landscapes, trees, homes, and nature scenes



1A = American prairie, 1B = Cherry blossoms, 2A = Bonsai, 2B = Tree grove, 3A = American home, 3B = Japanese home, 4A = Mount Fuji, 4B = Desert

In summary, visual preferences and emotional responses were similar in most of the comparisons. Visual preferences for landscapes and nature scenes were especially influenced by strong positive emotions.

The cherry blossom tree landscape was preferred by all children and produced high positive emotions. In addition, the scene of Mount Fuji produced the highest emotional responses from all children. Cherry blossom trees and Mount Fuji are symbolic of Japan, and they have close connection with our spirit. Both American and Japanese children possibly feel this spiritual connection as shown by high preferences and emotions to these scenes.

On the other hand, the desert scene with minimal plants had the highest negative emotional responses. The meaning of the desert may be recognized by all children. The desert is symbolic of an unsafe place to live and children gave negative emotional ratings toward the desert scene.

The American and Japanese home scenes were considered as a safe place to live. Preferred scene of homes had higher emotional responses. The place which children feel safe produces their highly positive emotion, and may be their favorite place.

CHAPTER 6 - CONCLUSION

In conclusion of the two studies, results provide evidence that younger children's visual preferences are influenced by both the Nature and the Nurture Hypotheses. Visual preferences and emotional responses of sixth grade children were more likely to change in both American and Japanese schools as compared to first and third grade children. Older children are more influenced by conditioned responses reflected in the Nurture Hypothesis. On the other hand, differences in gender were not found as on thirteen of the sixteen comparisons, boys and girls had similar emotional ratings.

While comparing two accepted hypotheses in this research, a third hypothesis may also be operative and was suggested by the data. Visual preferences and emotional responses toward landscape and nature scenes may also include a spiritual concept. Elementary school children in this study possibly have this concept already. It is a different concept which children may use to interpret environments. But more investigation is needed in this area.

From the two studies, close connections between children's emotions and the nature were demonstrated. However, the relationship between nature and children today is very considerable. With increasing urbanization, all children must continue to have opportunities to experience nature in school gardens and to learn the nurturing benefits of growing plants.

References

Balling, J. D., & Falk, J. H. (1982). Development of visual preference for natural environments. *Environment and Behavior, 14*, 5-38.

Bixler, R. D., Floyd, M. F., & Hammitt, W. E. (2002). Environmental socialization: Quantitative tests of the childhood play hypothesis. *Environment and Behavior.* 34(6), 795-818.

Bullock, J. R. (1994). Helping children value and appreciate nature. *Day Care and Early Education, 21*(4), 4.

Bulut, Z., & Yilmaz, H. (2007). Determination of landscape beauties through visual quality assessment method: A case study for Kemaliye (Erzincan/Turkey). *Environmental Monitoring and Assessment.* http://www.springerlink.com/content/vm658qx912738612/

Canter, D., & Canter, S. (1971). Close together in Tokyo. *Design Environment, 2*(2), 60.

Chang, C.Y. (2002). Psychophysiological responses to different landscape settings and a comparison of cultural differences. *International Society for Horticultural Science.*

Chawla, L. (1994). Editors' Note, *Children's Environments*, (11) 3.

Child, I. L., Hansen, J. A., & Hornbeck, F. W. (1968). Age and sex differences in children's color preferences. *Child Development*, 39(1), 237-247.

Eysenck, H. J. (1941). A critical and experimental study of color preferences. *The American Journal of Psychology, 54*(3), 385.

Hammitt, W. E., Patterson, M. E., & Noe, F. P. (1994). Identifying and predicting visual preference of southern Appalachian forest recreation vistas. *Landscape and Urban Planning*, 29(2–39), 171–183.

Herzog, T. R., Herbert, E. J., Kaplan, R., & Crooks, C. L. (2000). Cultural and developmenal coparisons of landscape perceptions and prefrences. *Environment and Behavior, 32*(3), 323-346.

Herzog, T. R., Maguire, C. P., & Nebel, M. B. (2003). Assessing the restorative components of environments. *Journal of Environmental Psychology*, 23, 159–170.

Ignatiuk, G. T. (1978). Influence of the amount of time spent in field trip activities on student attitude toward science and the environment. Regina, Saskatchewan: Saskatchewan School Trustees Association, ED 180 758.

Jaus, H. H. (1984). The development and retention of environmental attitudes in elementary school children. *The Journal of Environmental Education, 15*(3), 33.

Johnson, G. R., & Monear, J. (1994). A child's view of the urban forest. *Journal of Arboriculture.* 20(6): 336-340.

Kaplan, R. (1973). Predictors of environmental preference: Designers and "clients." *Environmental design research*. p. 265-274

Kaplan, R., & Herbert, E. J. (1987). Cultural and sub-cultural comparisons in preferences for natural settings. *Landscape and Urban Planning*, *14*, 281-293.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. New York: Cambridge University Press.

Kim, E, & Mattson, R. H. (2002). Stress recovery effect of viewing red-flowering geraniums. *Journal of Therapeutic Horticulture,* 13, 4-12.

Lieberg, M. (1994). "Appropriating the city: Teenagers use of public place." In Neary, S.J., M.S. Symes and F.E. Brown, eds. *The Urban Experience: A People-Environment Perspective*. London: E and FN Spon, 321-333.

Macia, A. (1979). Visual perception of landscape: Sex and personality differences. *Our National Landscape, USDA Forest Service General Technical Report PSW-35,* 279-285.

Moore, R. (1986). *Childhood's domain*. London: Croom Helm.

Moore, R. (1996). Compact Nature: The role of playing and learning gardens on children's lives, *Journal of Therapeutic Horticulture*, 8, 72-82.

Nasar, J. L. (1984). Visual preferences in urban street scenes: A cross-cultural comparison between Japan and the United States. *Journal of cross-cultural psychology, 15*(1), 79.

Parry-Jones, W. (1990). Natural landscape, psychology well-being and mental health. *Landscape Research*, 15(2), 7–11.

Parsons, R. (1991) Potential influences of environmental perception on human health. *Journal of Environmental Psychology.* 11(1), 1-23.

Pyle, R. (2002). Eden in a vacant lot: Special places, species and kids in community of life. In: *Children and Nature: Psychological, Sociocultural and Evolutionary Investigations*. Kahn, P.H. and Kellert, S.R. (eds) Cambridge: MIT Press.

Saito, M. (1996). A comparative study of color preferences in Japan, China and Indonesia, with emphasis on the preference for white. *Perceptual and Motor Skills, 83*(1), 115.

Shetland Islands Council (2006). Basic principles of landscape and visual impact assessment for sponsors of development. http://www.shetland.gov.uk/developmentplans/documents/Landscape.pdf

Smith, F. & Barker, J. (2000). Contested spaces: Children's experiences of out of school care in England and Wales. *Childhood*, 7, 315-333.

Sobel, D. (1990). A place in the world: Adults' memories of childhood special places. *Children's Environments Quarterly*, 7, 5-12.

Sobel, D. (1993). *Children's special places: Exploring the role of forts, dens, and bush houses in middle childhood*. Tucson, AZ: Zephyr.

Sommer, B. (1990). Favorite places of Estonian adolescents. *Children's Environmental Quarterly*, 7, 32-36.

Thurber, C. A. & Malinowski, J. C. (1999). Environmental correlates of negative emotions in children. *Environment and Behavior*. 31, 487.

Ulrich, R. S. (1979) Visual landscapes and psychological well-being. *Landscape Research,* 4(1), 17-23.

Ulrich, R. S. (1983). Aesthetic and affective responses to natural environment. In: Altman, I., Wohlwill, J.F. (Eds.), *Behavior and the Natural Environment*. Plenum, New York, pp. 85–125.

Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A. & Zelson, M. (1991) Stress recovery during exposure to natural and urban environments. *Journal of Environmental Psychology*, 11, 231–248.

Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. *The Biophilia Hypothesis*, ed. Kellert, S. R, & Wilson, E. O. pp. 73–137. Washington, DC: Island Press.

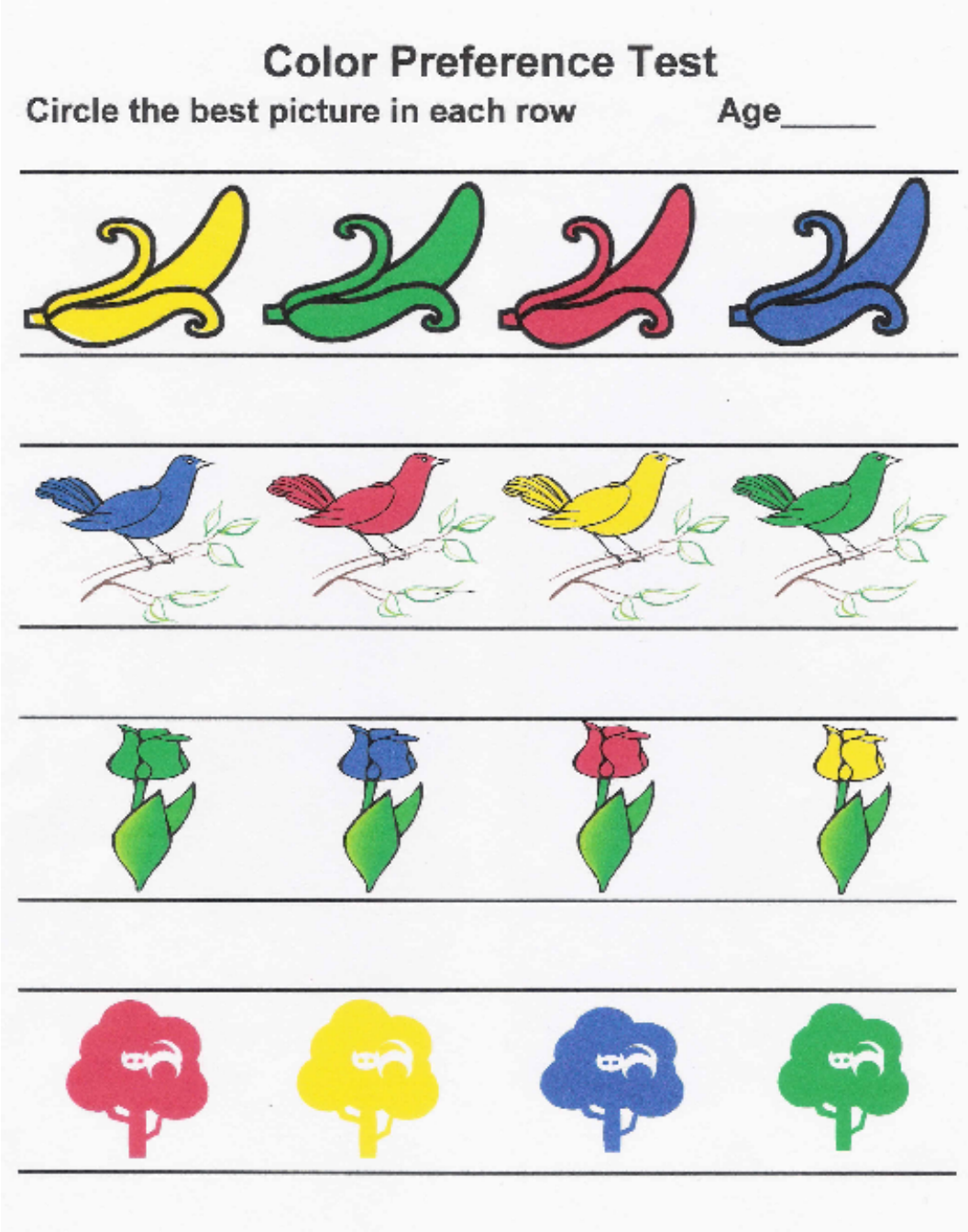
Van Den Berg, A.E., Koole, S.L., & Van der Wulp, N.Y. (2003). Environmental preference and restoration: (How) are they related? *Journal of Environmental Psychology*. 23(2), 135-146.

Wells, Nancy M. (2000). At home with nature, effects of "greenness" on children's cognitive functioning, *Environment and Behavior*, 32(6), 775-795.

Wherrett, J. R. (2000). Creating landscape preference models using internet survey techniques. *Landscape Research*, 25(1), 79–96.

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

Appendix A - QUESTIONNAIRE (COLOR PREFERENCE TEST)



Appendix B - RESULTS OF PRELIMINERY STUDY

		Male			Female			Male and Female		
		3-6 years	7-9 years	10-12 years	3-6 years	7-9 years	10-12 years	3-6 years	7-9 years	10-12 years
Banana	blue	2	2	2	2	4	4	4	6	6
	green	2	3	1	2	2	2	4	5	3
	red	5	4	1	4	4	4	9	8	5
	yellow	5	10	5	6	7	11	11	17	16
Bird	blue	2	6	2	7	8	9	9	14	11
	green	1	2	1	1	0	1	2	2	2
	red	7	8	4	4	8	8	11	16	12
	yellow	4	2	2	2	2	2	6	4	4
Tulip	blue	4	2	2	2	2	4	6	4	6
	green	3	1	0	2	0	1	5	1	1
	red	5	10	5	5	14	14	10	24	19
	yellow	2	6	2	5	1	2	7	7	4
Tree	blue	4	2	3	2	3	2	6	5	5
	green	3	13	5	4	13	12	7	26	17
	red	3	1	1	4	2	3	7	3	4
	yellow	4	2	0	4	0	4	8	2	4

Appendix C - LETTER OF CONSENT

April 16, 2007

Dear parents/guardians:

As a professor of Horticulture at Kansas State University, I have been advising Tomoko Tsunoda, a Masters of Science graduate student in Horticulture, who is studying children and their preference for photographs showing different plant landscapes in Japan and the United States.

Enclosed you will find an informed-consent statement describing a research study that may involve your child. If you approve of your child's participation, then please sign the form and return the document by Friday of this week. Upon completion of the study, results will be made available, if requested.

Shown below, you will see an example of a typical landscape photograph shown on the questionnaire. A five-point rating scale will be used.

Thank you for your consideration.

Richard H. Mattson
Professor, Horticulture

Examples of landscape photographs on the questionnaire

Appendix D - INFORMED CONSENT FORM

Your child will be asked to participate in a research activity designed to study preferences of elementary school children toward landscape scenes. Opinions provides by your child will be compared to those of children in Japanese public schools.

After you sign the informed-consent form and return it to the school teacher or researcher, your child or guardian will look at eight landscape scenes presented on a one-page questionnaire. They will be asked to identify their favorite landscape from four matched pairs of colored landscape scenes. Finally, they will be asked to identify how they feel about each of the eight photographs. For first and third graders, faces will be used to depict emotions ranging from happy to sad. Six graders will select words to describe their feelings using a five point evaluation system.

The study is strictly voluntary and requires only completion of the questionnaire once. Identities will be kept confidential. A coded number will be assigned to each child. The record will be kept by the researcher in a locked storage file cabinet until the end of the study, and after completion, they will be shredded.

This study is being conducted under guidelines established by Kansas State University. If you have any questions, please contact Tomoko Tsunoda or Dr. Richard Mattson at the Department of Horticulture, Forestry and Recreation Resources, 2021 Throckmorton Plant Science Center, Manhattan, KS 66506 or (785)532-1420.

If you have any questions about this research or the manner in which the study is being conducted, I may contact Dr. Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 203 Fairchild, KSU, Manhattan, KS 66506 (785)532-3224.

Parent or Guardian Name **Child's Name**

Parent or Guardian Signature **Date**

Appendix E - QUESTIONNAIRE (VISUAL PREFERENCES AND EMOTIONAL RESPONSES)

PREFERENCES AND FEELING TOWARD NATURE QUESTIONNAIRE ©

Instructions: 1. Circle your favorite photo A or B in each paired group.
2. Darken circle to show how each photo makes you feel.

Name (**)** **Gender (** male / female **)** **Age (** **)**

1. Landscapes

A

B

2. Trees

A

B

3. Homes

A

B

4. Mountains and Dunes

A

B