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Holistic Versus Analytic Expressions in Artworks: Cross-Cultural Differences and Similarities in Drawings and Collages by Canadian and Japanese School-Age Children

Sawa Senzaki[1], Takahiko Masuda[2], and Kristina Nand[2]

Abstract

Previous research has documented systematic cultural variations in adults' cognitive processes. In particular, research on culture and aesthetics suggests that East Asian adults' aesthetic expression tends to be holistic and context-oriented, whereas North American adults' aesthetic expression tends to be analytic and object-oriented (Masuda, Gonzalez, Kwan, & Nisbett, 2008). However, research focusing specifically on the developmental processes of such cultural differences in children's artworks is lacking, with the notable exception of an empirical study conducted by Rübeling et al. (2011). Our current research examined whether school-age children in Grades 1 through 6 exhibit these culturally unique patterns of expression, and if so, when. Children were asked to produce either landscape drawings (Study 1, $n = 495$) or landscape collages using ready-made items (Study 2, $n = 376$). The results indicated that children in both cultures gradually develop expressions unique to each culture. Although Grade 1 children's artworks were still similar across cultures, artworks in Grade 2 and higher showed substantial cultural variations. Japanese children were more likely than their Canadian counterparts to place the horizon higher in the visual space and to include more pieces of information. The higher placement of the horizon is linked to the context-oriented visual attention style seen in adults' drawings and historical paintings in East Asian cultures, as opposed to object-focused drawing styles commonly seen in North American cultures. We also report culturally similar patterns in the developmental trajectory and discuss the internalization process of culturally dominant patterns of perception.

Keywords

cultural psychology, developmental: child/adolescent, developmental: cognitive, perception

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A plethora of research in cultural psychology in the past two decades has demonstrated systematic cultural variations in cognitive processes such as visual perception and attention, particularly among adult members of North American and East Asian cultures (Ji, Peng, & Nisbett, 2000; Kitayama, Duffy, Kawamura, & Larsen, 2003; Masuda & Nisbett, 2001, 2006; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005). Recent research has further documented that once culturally shaped, the members of a given culture produce *cultural products*—tangible, public, shared representations of culture—that convey dominant cultural ideologies (Morling & Lamoreaux, 2008). For example, Masuda and colleagues (Masuda, Gonzalez, et al., 2008) targeted a particular type of cultural products (drawings) and demonstrated that adult members of North American and East Asian cultures produce artworks and designs that are congruent with dominant cultural messages shared by people in their respective cultures. However, at what age, if at all, children's artworks diverge across cultures has not been fully investigated. The current research attempts to answer this question by examining school-age children's artworks.

Cultural Products

A large number of studies have documented cross-cultural differences in cognitive processes between members of North American and East Asian cultures (Nisbett, 2003; Nisbett & Masuda, 2003; Nisbett & Miyamoto, 2005; Nisbett, Peng, Choi, & Norenzayan, 2001). Among the variety of cognitive processes, cultural differences in visual attention and perception have been studied widely. Masuda and colleagues (Masuda, Ellsworth, et al., 2008; Masuda & Nisbett, 2001, 2006) suggested that adults from North American and Western societies (e.g., Canada, the United States, and the United Kingdom) tend to engage in an analytic and object-oriented perceptual style, attending to focal objects to a great extent. However, adults from East Asian cultures (e.g., China, Japan, and Korea) tend to engage in a holistic and context-oriented perceptual style, attending to contextual information in the visual field in addition to focal information.

Recent studies further suggest that people who internalize culturally unique patterns of cognition produce, in turn, cultural products that reflect their cultural ideologies (Masuda, Gonzalez, et al., 2008; Tsai, Louie, Chen, & Uchida, 2007; Tsai, Miao, & Seppala, 2007). Cultural products can be conceptualized as tangible public representations of culture (Morling & Lamoreaux, 2008). Aesthetic expressions such as drawings, photography, poster presentations, and webpage designs are examples of pictorial cultural representations (Masuda, Gonzalez, et al., 2008; Wang, Masuda, Ito, & Rashid, 2012).

Masuda, Gonzalez, et al. (2008) examined the aesthetic expressions in East Asian and Western landscape painting masterpieces from the 15th to 19th centuries. In the Western societies, the linear perspective was invented in the 16th century in Italy, and has been one of the most popular techniques used in Western landscape drawings. The prominent characteristics of this drawing style are that it (a) produces the illusion of distance (i.e., depth of field) on a two-dimensional canvas by fixing the viewer's standpoint; (b) increases the apparent size of nearby objects and reduces the apparent size of distant objects as they approach the vanishing point, so that nearby objects are more salient than distant objects; and (c) places the horizon, the line that separates earth and sky, below the viewer's eye level, which limits the number of objects in the field (Giedion, 1964; Kubovy, 1986). By contrast, East Asians have historically developed a variety of holistic perspectives (e.g., the bird's eye view and the "hukinukeyatai" view that depicts images from the upper right) that capture the whole field (Paine & Soper, 1955). The prominent characteristics of this drawing style are (a) production of a flat image, which allows the viewer to perceive that all the objects are interrelated to each other; (b) de-emphasis of the difference in size between closer objects (usually the main persons or target themes of the image) and distant objects, by freeing the viewer's standpoint; and (c) placing the horizon at the top part of the frame, which results in allowing the painter to include much field/contextual information. The

results of Masuda, Gonzalez, et al.'s archival data analyses indeed suggested that, in general, East Asian landscape paintings place the horizon in the top part of the pictorial field, so that much contextual information is included at the expense of depth of field. In contrast, Western paintings in general placed the horizon line in the lower part of the pictorial field and included less contextual information. Masuda, Gonzalez, et al. further demonstrated that non-art major college students, who represented as the contemporary members of each cultural group, also applied these culturally unique aesthetics when they were asked to draw a landscape image. That is, East Asian college students placed the horizon significantly higher and included a greater amount of contextual information than did American college students.

These findings suggest that a mutual relationship between culture and the human psyche is observable in the production of artworks (Shweder, 1991). On one hand, our cognitive processes are shaped by shared meanings, practices, and institutions, which are reflected by dominant ideologies in a given culture. On the other hand, people in a given culture actively participate in cultural practices and have access to cultural resources, and by using such cultural resources, they produce a variety of cultural products such as artworks, advertisements, and designs (e.g., Masuda, Gonzalez, et al., 2008; Wang et al., 2012).

But at what point in the course of their development, if at all, do young members of a given cultural community acquire culturally dominant patterns of expression? Recent cross-cultural findings are beginning to demonstrate that cultural variations in cognition emerge at an early age (Duffy, Toriyama, Itakura, & Kitayama, 2009; Imada, Carlson, & Itakura, 2013; Kuwabara & Smith, 2012). However, the number of studies focusing specifically on cultural differences in children's artworks is still limited (for research assessing cross-cultural differences in personal relationships, see, for example, Pinto & Bombi, 2007; Pinto, Bombi, & Cordioli, 1997). Of these, an empirical study conducted by Rübeling et al. (2011) is highly relevant to the current investigation. Rübeling et al. examined self-portraits drawn by German and Cameroonian Nso preschool children (M_{age} = 52 months). Although the developmental level of human figurative drawing did not differ across cultures, Nso children depicted themselves as considerably smaller than did German children, indicating that the way the children drew themselves was strongly influenced by cultural values shared by their respective sociocultural groups. Rübeling et al. maintained that German children's large-sized self-portraits reflected the independent self-construal dominant in Germany, whereas Nso children's small-sized self-portraits reflected the interdependent self-construal dominant in Nso.

Although Rübeling et al. (2011)'s research provides us with insights into cultural effect on children's figurative drawings, it is still unclear how children organize and depict spatial information. To advance this line of research into children's artistic expressions, we adapted Masuda, Gonzalez, et al.'s (2008) investigation of culture and landscape drawings. We conducted a cross-cultural investigation of Canadian and Japanese school-age children's landscape drawings (Study 1) and landscape collages (Study 2). In Study 1, we examined the location of the horizon line, and in Study 2, we measured the location of the horizon line and the amount of contextual information as indicators of culturally divergent types of expression in North American children's object-oriented versus East Asian children's context-oriented artworks.

Hypotheses

Whereas children's ability to draw self-portraits emerges during preschool years at around the ages of 4 or 5 (Cox, 1993; Rübeling et al., 2011), previous research on children's landscape drawing suggests that children learn the concept of a horizon slightly later in their development, sometime around the early elementary school years (Cox & Chapman, 1995; Lewis, 1990). Research on cognitive development also gives credence to this assertion, suggesting that around early school age, rather than drawing imaginary representations based on what they *know*, children start to

draw visual representations based on what they *see*, transferring the scene onto a two-dimensional canvas (Goodenough, 1926; Luquet, 1913, 1927; Piaget & Inhelder, 1956). Furthermore, children may have increased opportunities to interact with cultural products in school settings. For example, Imada (2010) examined storylines used in elementary school textbooks in the United States and Japan, and found that stories used in American textbooks tended to highlight themes of individualism whereas stories in Japanese textbooks highlighted themes of collectivism. Imada demonstrated that textbooks used in elementary education carry cultural messages and suggested that the frequent exposures to individualism and collectivism foster children to develop culturally appropriate values and cognitive tendencies. Based on these findings, we targeted elementary school-age children for the current study. In particular, we conducted our studies with Canadian and Japanese children in Grades 1 through 6 to investigate cultural differences and similarities in drawing styles. We predicted that, in the early school-age period, both Canadian and Japanese children would start to produce culturally unique landscape drawings and collages consistent with adults' data (Masuda, Gonzalez, et al., 2008), while also exhibiting a conventional understanding of the horizon (e.g., Cox & Chapman, 1995; Lewis, 1990). That is, Canadian children would place the horizon in the lower part of the frame and put fewer objects in the image, whereas Japanese children would place the horizon in the higher part of the frame and put more objects in the image. Study 1, by analyzing the location of the horizon in children's products, examined at what age the cultural divergence in landscape drawing styles could be observed. We used the drawing task originally developed by Masuda, Gonzalez, et al. (2008) but with simplified instructions for children. Study 2 further attempted to replicate the findings of Study 1 by using a newly developed collage task in which we analyzed the location of the horizon and counted the number of items the children placed in their visual representation.

Study 1

Method

Participants. A total of 495 school-age children (258 Canadians and 237 Japanese) participated in Study 1. The Canadian sample consisted of 30 first graders (14 boys, 16 girls), 36 second graders (17 boys, 19 girls), 48 third graders (22 boys, 26 girls), 40 fourth graders (20 boys, 20 girls), 49 fifth graders (25 boys, 24 girls), and 55 sixth graders (24 boys, 31 girls). The Japanese sample consisted of 35 first graders (16 boys, 19 girls), 38 second graders (26 boys, 12 girls), 36 third graders (20 boys, 16 girls), 31 fourth graders (17 boys, 14 girls), 50 fifth graders (26 boys, 24 girls), and 47 sixth graders (24 boys, 23 girls).[1] Additional children were tested but were not included in the final sample because they did not follow the instruction described in the procedure (i.e., three children used the paper vertically, and 21 children did not include required items in their drawings).

Of the Canadian children, 96.12% were of European descent, 2.71% were of Asian descent, 0.38% were Aboriginal, and 0.78% were of African descent. All of the Canadian children spoke English as their first language. In the Japanese sample, all of the children reported that they were Japanese citizens and spoke Japanese as their first language. Both the Canadian and the Japanese children were recruited in public schools in suburbs of comparable size (Sherwood Park, Alberta, Canada, and Kamakura, Kanagawa, Japan). The differences between Canadian and Japanese samples in the distribution of gender and grade were not statistically significant, $\chi^2(1) = 2.52$, $p = .11$, and $\chi^2(5) = 2.81$, $p = .73$, respectively. The distribution of gender was also not significantly different across grades in both cultures, $\chi^2(5) < 1$, *ns*, and $\chi^2(5) = 4.43$, $p = .49$, for Canadian and Japanese samples respectively; thus, gender was collapsed in the following analyses.

Materials and procedure. The study was conducted in a classroom setting in both countries. A female experimenter, accompanied by two research assistants, visited each classroom, where 20 to

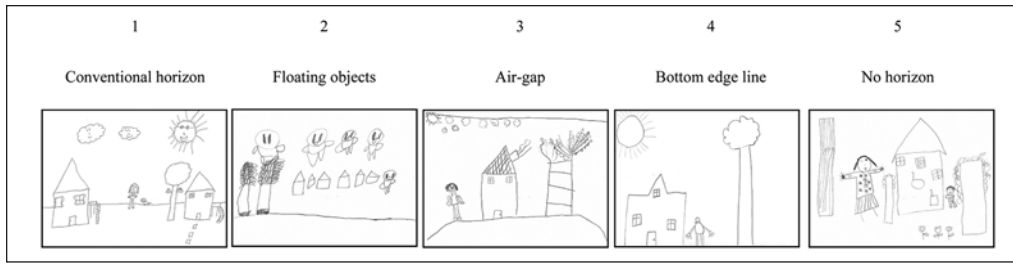


Figure 1. Five categories of horizon lines used in Studies 1 and 2.
Note. Example pictures are drawings from Study 1.

40 children were tested together in their own classroom. The teacher was present to observe but not to instruct the experiment. Children who participated in the study were provided with a pencil and a 392 mm × 271 mm sheet of paper on which to draw a landscape picture. Although children participated in a classroom setting with others sitting close by, they were instructed not to talk to their neighbors. The experimenter also emphasized that there was no right way or wrong way to draw the picture, and that the children were free to create their own artwork as they wished.

The drawing task was adapted from Masuda, Gonzalez, et al. (2008). Children were instructed to draw a landscape image including at least a house, a tree, a person, and a horizon. They were also told that they could incorporate any other objects into their pictures. To standardize children's understanding of the concept of horizon, the experimenter explained what a horizon is, using the following instruction: "When you go outside, you see the sky comes down and meets the ground, and makes one line. That line is called a horizon." The experimenter then showed two examples of a landscape image that contained a horizon line: one with a lower horizon line and one with a higher horizon line. The same two sample images were used in Canada and in Japan. The children were then given the drawing materials and given 30 min to complete their landscape drawings (see Appendix A for examples).

Location of the horizon. Masuda, Gonzalez, et al. (2008) measured the location of the horizon by taking the ratio of the height of the horizon line against the frame. The majority of children drew a landscape image with a conventional horizon; however, small numbers of children produced several other patterns of drawings. Based on previous research (Cox & Chapman, 1995; Eisner, 1967; Lewis, 1990; Toku, 2001) which discussed different developmental levels of children's artworks, we applied the following rule to systematically measure the location of the horizon (see Figure 1 for examples). When children drew the single line representing a horizon, this was considered a conventional horizon and the height of the horizon line was measured (conventional horizon). If children drew a horizon line with floating objects, such that a single horizon was drawn but objects were floating above the horizon, the height of that single line was measured as the location of the horizon (floating objects). If children drew the air-gap line (a second line in the sky in addition to the line representing the ground), only the ground line was measured (air-gap). If children used the bottom edge line as a horizon line and placed objects on it, a value of 0 (i.e., a height of 0 cm) was given for the location of the horizon (bottom edge line). This was because previous research suggested that children at the early level of drawing competency use the bottom edge of the paper to represent the ground and place the objects there (Eisner, 1967; Toku, 2001). Last, if children drew only floating objects, we categorized the image as having no horizon line (no horizon); these data were excluded from the analysis of the location of the horizon ($n = 7$),[2] because there is no clue to identify where the ground is in such images. Intercoder agreements in measuring these values were $r = .97$ for Canadian drawings and $r = .91$ for Japanese drawings. As shown in Table 1, the majority of children drew a conventional horizon.

Table 1. Developmental Levels of Understanding the Concept of Horizon in Study 1.

	Canada								Japan							
			Grade distribution (*n*)								Grade distribution (*n*)					
	n	%	1	2	3	4	5	6	*n*	%	1	2	3	4	5	6
Conventional horizon	205	79.46	8	32	36	38	42	49	184	77.64	11	26	28	26	48	45
Floating objects	10	3.88	2	2	3	1	2	0	10	4.22	4	2	2	0	2	0
Air-gap	26	10.08	12	2	4	0	2	6	20	8.44	5	8	5	2	0	0
Bottom edge line	17	6.59	8	0	5	1	3	0	16	6.75	10	1	1	2	0	2
No horizon	0	0.00	0	0	0	0	0	0	7	2.95	5	1	0	1	0	0

Results

The location of the horizon was defined by taking the ratio of the height of the horizon line against the frame. Intercoder agreements in measuring these values were $r = .97$ for Canadian drawings and $r = .91$ for Japanese drawings.[3] A 2 (Culture) × 6 (Grade) ANOVA was applied to the ratio of the location of the horizon. As shown in Figure 2, there was a significant main effect of culture, $F(1, 476) = 85.24$, $p < .001$, $\eta_p^2 = .152$.[4] The results indicated that Japanese children overall placed the horizon higher ($M = 0.48$, $SD = 0.30$) than did Canadian children ($M = 0.28$, $SD = 0.22$). There was also a significant main effect of grade, $F(5, 476) = 22.18$, $p < .001$, $\eta_p^2 = .189$, such that as grade level increased, the location of the horizon was depicted higher. More importantly, these main effects were qualified by the significant interaction effect between culture and grade, $F(5, 476) = 3.52$, $p < .01$, $\eta_p^2 = .036$, reflecting the fact that cultural differences in the location of the horizon depended on grade. As most children in Grade 1 did not understand the concept of horizon, the location of the horizon depicted by Canadian and Japanese children in Grade 1 was not significantly different across cultures, $F(1, 58) = .37$, $p = .55$, $\eta_p^2 = .006$. However, significant cross-cultural differences emerged for the location of a horizon among children in Grade 2 and higher. Japanese children depicted the horizon significantly higher than did Canadian children in Grade 2, $F(1, 71) = 23.55$, $p < .01$, $\eta_p^2 = .249$; Grade 3, $F(1, 82) = 28.91$, $p < .001$, $\eta_p^2 = .246$; Grade 4, $F(1, 68) = 8.02$, $p < .01$, $\eta_p^2 = .106$; Grade 5, $F(1, 97) = 10.81$, $p < .005$, $\eta_p^2 = .100$; and Grade 6, $F(1, 100) = 36.90$, $p < .001$, $\eta_p^2 = .270$.

The results of Study 1 indicated that most children understood the concept of a horizon by the second grade. This finding is consistent with previous research (Cox & Chapman, 1995; Lewis, 1990). Furthermore, we also observed a significant cross-cultural difference in the location of the horizon among children in Grade 2 and higher. Together, these results suggest that when children understand the concept of a horizon, they do so in a way that is more dominant in their cultural groups, which is analytic in Canada and holistic in Japan. However, there was a methodological limitation in Study 1. Although Masuda, Gonzalez, et al. (2008) found that college students from East Asian cultures placed the horizon significantly higher and included more contextual information in their landscape drawings than their North American counterparts did, we were unable to accurately count the number contextual objects included in children's drawings. This was largely due to the quality of the drawings (i.e., we often could not identify the object boundaries or what the children actually intended to draw). To articulate the possible cultural variation in the amount of information included in the landscape image, we devised a collage task in Study 2.

Study 2

The results of Study 1 revealed that cross-cultural differences in how children depicted a horizon in their landscape drawings developed during early elementary school years. The location of the

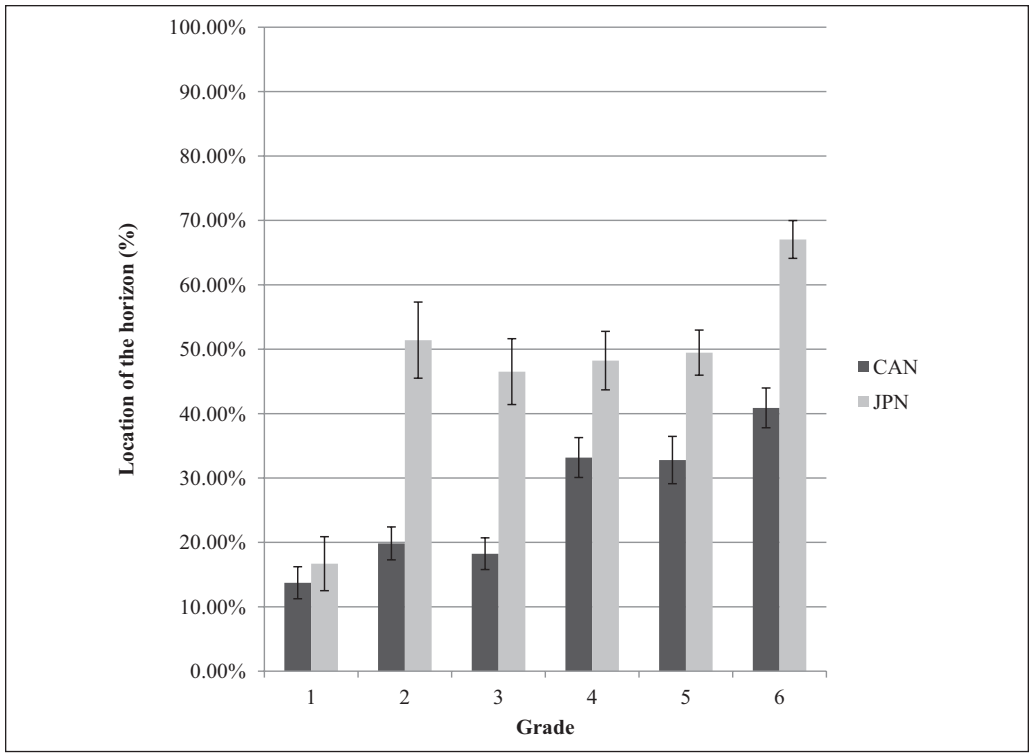


Figure 2. Location of the horizon in Study 1.

horizon did not differ among Canadian and Japanese first graders, but beginning in Grade 2, the location of the horizon differed significantly, such that Japanese children placed the horizon significantly higher than Canadian children. We hypothesized that this was due to cross-cultural differences in the way individuals organize information; however, it was still unclear whether the quality of children's drawing skills had affected the results of Study 1. To exclude the effect of drawing ability, we developed new experimental materials in Study 2 in which participants were given premade collage items to use in their landscape images.

In the collage task, children were asked to create a landscape image by placing ready-made images of items, so that the researchers could count the exact number of objects included in the artwork. While attempting to replicate the findings of culturally similar patterns in development of aesthetic expression in Study 1, we also predicted that compared with Canadian children, Japanese children would be more likely to (a) draw the horizon line higher and (b) include a larger number of items in their landscape images after gaining the conventional understanding of the concept of horizon.

Method

Participants. Participants were 377 school-age children (214 Canadians and 163 Japanese). The Canadian sample consisted of 33 first graders (19 boys, 14 girls), 33 second graders (17 boys, 16 girls), 37 third graders (21 boys, 16 girls), 33 fourth graders (11 boys, 22 girls), 43 fifth graders (20 boys, 23 girls), and 35 sixth graders (14 boys, 21 girls). The Japanese sample consisted of 23 first graders (13 boys, 10 girls), 30 second graders (15 boys, 15 girls), 30 third graders (13 boys,

17 girls), 27 fourth graders (14 boys, 13 girls), 29 fifth graders (16 boys, 13 girls), and 24 sixth graders (12 boys, 12 girls). Additional children were tested but were not included in the final sample because they did not include required items ($n = 4$) or did not follow the instruction to create an outdoor scene ($n = 19$).

The children were recruited from the same elementary schools as in Study 1 but from different classes. Of the Canadian children, 97.20% were of European descent and 2.80% were of Asian descent. All of the Canadian children spoke English as their first language. All Japanese children self-identified as Japanese citizens and spoke Japanese as their first language. The slight differences between Canadian and Japanese samples in the distribution of gender, $\chi^2(1) < 1$, *ns*, and grade, $\chi^2(5) < 1$, *ns*, were not statistically significant. The distribution of gender was also not significantly different across grades in both cultures, $\chi^2(5) = 6.29$, $p = .28$, and $\chi^2(5) = 1.28$, $p = .94$, for Canadian and Japanese samples respectively. Thus, gender was collapsed in the following analyses.

Materials and procedure. Participants were given a set of small collage items consisting of 30 objects, including houses, trees, people, small animals, vehicles, and other objects (see Appendix B), and a laminated 392 mm × 271 mm sheet of paper, sticky tags to adhere the collage items onto the laminated paper, and a china marker to draw the horizon (see Appendix A for examples). Collage items were created by the first author. We carefully selected items commonly found in both Canadian and Japanese cultures, such as people, plants, cars, bicycles, and household pets. As previous research suggested the use of color may be different across these cultural groups (Ishii, Miyamoto, Rule, & Toriyama, 2014), collage items were created in black and white. Other than the new set of materials, the procedure was exactly the same as in Study 1.[5]

Results and Discussion

Understanding of the horizon concept. Children's collages were categorized into the same five categories used in Study 1 (see Figure 1). Intercoder agreement for children's understanding of the horizon concept was $\kappa = .87$ for Canadian collages and $\kappa = .92$ for Japanese collages. As shown in Table 2, the distribution of the frequencies of developmental levels did not differ between Canadian and Japanese children, $\chi^2(4) = 5.81$, $p = .21$. We replicated the results of Study 1, and more than two thirds of children in Grade 2 and higher depicted a conventional understanding of the horizon in both Canada and Japan.

Location of the horizon. As in Study 1, drawings coded as 5 (no horizon; $n = 1$), which is the lowest level of understanding of the concept of horizon, were not included in the further analysis. Intercoder agreements regarding the location of the horizon were $r = .93$ for Canadian collages and $r = .92$ for Japanese collages. A 2 (Culture) × 6 (Grade) ANOVA was applied to the ratio of the location of the horizon (Figure 3). Consistent with the findings of Study 1, there were significant main effects of culture, $F(1, 364) = 66.21$, $p < .001$, $\eta_p^2 = .154$, and grade, $F(1, 364) = 11.17$, $p < .001$, $\eta_p^2 = .133$. Overall, Japanese children placed the horizon significantly higher ($M = 0.68$, $SD = 0.31$) than did Canadian children ($M = 0.46$, $SD = 0.26$). Again, both of these main effects were qualified by a significant interaction between culture and grade, $F(5, 364) = 2.76$, $p < .05$, $\eta_p^2 = .037$. The effect of culture was not significant in Grade 1, $F(1, 54) < 1$, *ns*. However, significant cross-cultural differences in the location of the horizon were observed in Grade 2, $F(1, 60) = 6.31$, $p < .02$, $\eta_p^2 = .095$; Grade 3, $F(1, 65) = 46.45$, $p < .001$, $\eta_p^2 = .417$; Grade 4, $F(1, 58) = 34.38$, $p < .001$, $\eta_p^2 = .372$; Grade 5, $F(1, 70) = 7.13$, $p < .001$, $\eta_p^2 = .092$; and Grade 6, $F(1, 57) = 23.52$, $p < .001$, $\eta_p^2 = .292$. Consistent with the findings of Study 1, Japanese children in Grades 2 to 6 depicted the horizon significantly higher than did their Canadian counterparts.

Table 2. Developmental Levels of Understanding the Concept of Horizon in Study 2.

	Canada								Japan							
			Grade distribution (*n*)								Grade distribution (*n*)					
	n	%	1	2	3	4	5	6	*n*	%	1	2	3	4	5	6
Conventional horizon	168	78.50	15	20	30	30	41	32	122	75.31	14	18	22	24	23	21
Floating objects	25	11.68	11	5	5	1	1	2	21	12.96	0	3	7	3	5	3
Air-gap	18	8.41	5	8	2	2	0	1	11	6.79	5	6	0	0	0	0
Bottom edge line	3	1.40	2	0	0	0	1	0	8	4.94	4	2	1	0	1	0
No horizon	0	0.00	0	0	0	0	0	0	1	0.62	0	1	0	0	0	0

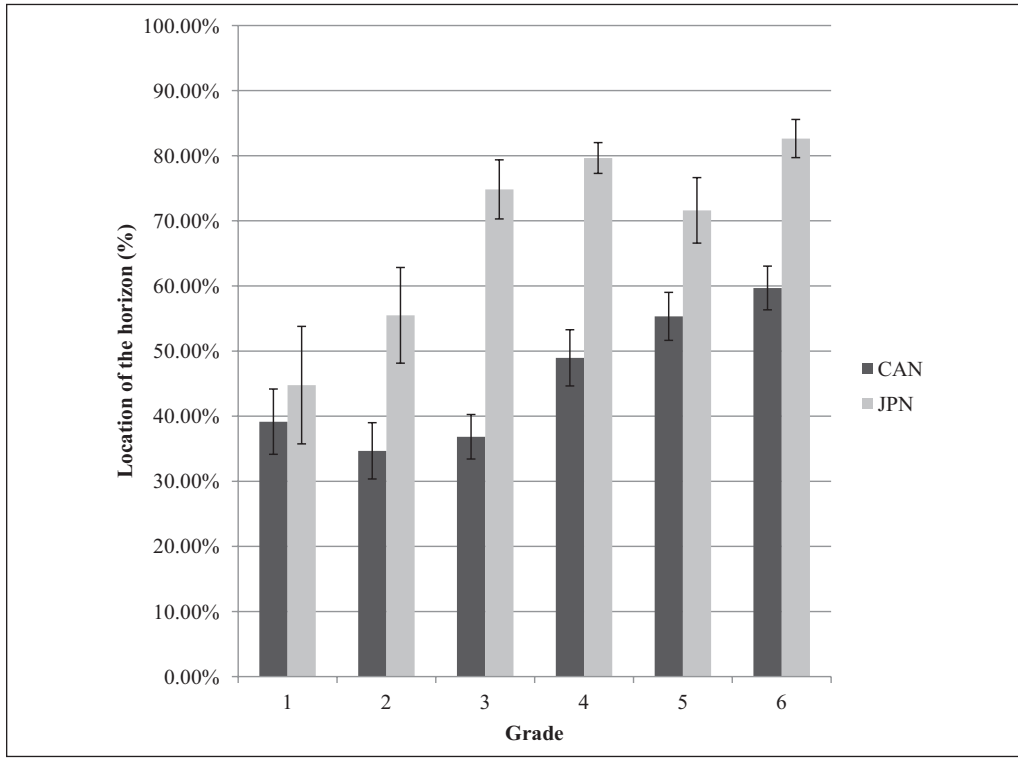


Figure 3. Location of the horizon in Study 2.

Number of items. We also examined the number of collage items included in the landscape collage across cultures as well as across grades. Two coders who were blind to the hypotheses independently counted the number of collage items included in children's artworks, and the agreements were $r = .98$ for Canadian collages and $r = .99$ for Japanese collages. A 2 (Culture) × 6 (Grade) ANOVA indicated a significant main effect of culture, $F(1, 364) = 57.74$, $p < .001$, $\eta_p^2 = .137$, such that Japanese children included a larger number of objects ($M = 20.77$, $SD = 6.31$) in their artworks than did Canadian children ($M = 15.75$, $SD = 6.37$). There was also a significant main effect of grade, $F(1, 364) = 3.71$, $p < .001$, $\eta_p^2 = .048$. Both of these main effects were qualified by a significant Culture × Grade interaction, $F(5, 364) = 4.01$, $p < .01$, $\eta_p^2 = .052$ (Figure 4). The

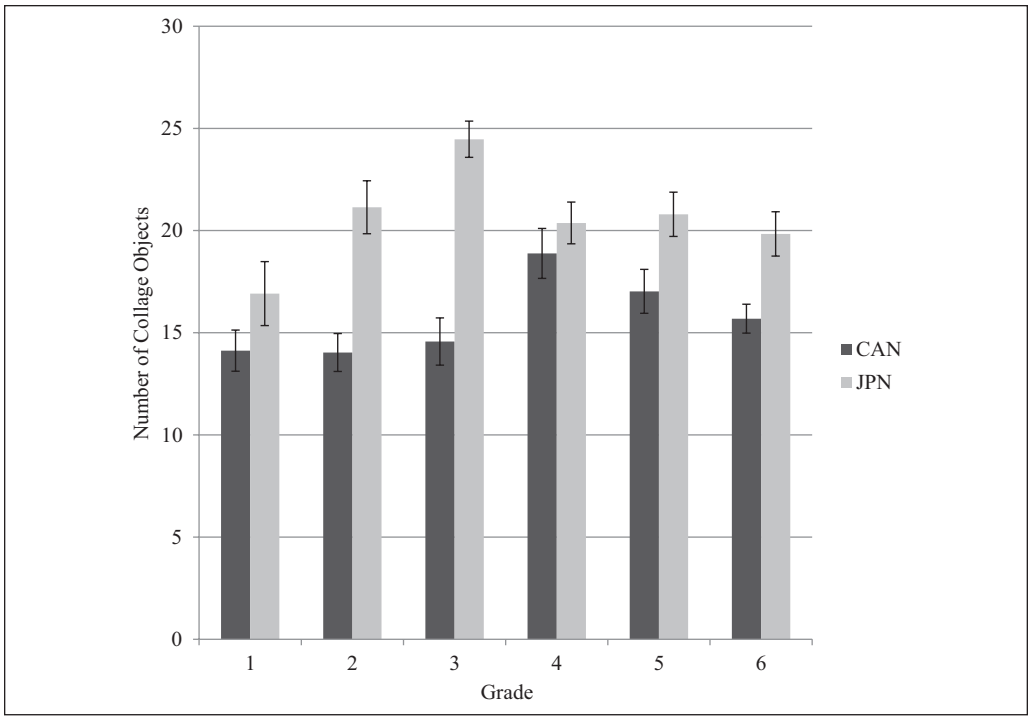


Figure 4. Number of objects in Study 2.

effect of culture was not significant among children in Grade 1, $F(1, 54) = 2.47$, $p = .12$, but significant cultural differences emerged in Grade 2, $F(1, 60) = 20.59$, $p < .001$, $\eta_p^2 = .255$; Grade 3, $F(1, 65) = 42.85$, $p < .001$, $\eta_p^2 = .397$; Grade 5, $F(1, 70) = 5.67$, $p < .02$, $\eta_p^2 = .075$; and Grade 6, $F(1, 57) = 11.21$, $p < .001$, $\eta_p^2 = .164$. In these grades, Japanese children included a larger number of objects than Canadian children in their landscape collages. The data in Grade 4 did not reach statistical significance, $F(1, 58) = 1.46$, $p = .23$.[6]

Area covered by collage items. To further examine cross-cultural differences in context sensitivity, we also examined the area covered by collage items. We first measured the area of each premade collage item in centimeters. Then two coders independently coded the type of items included (the agreements were $r = 1.00$ for Canadian collages and $r = .99$ for Japanese collages), and the size of each collage item was added for each landscape image.[7] The total area covered by collage items was submitted to a 2 (Culture) × 6 (Grade) ANOVA, and the results yielded a significant main effect of culture, $F(1, 364) = 86.67$, $p < .001$, $\eta_p^2 = .192$, such that the area covered by collage items was significantly larger for Japanese children's landscapes ($M = 509.70$, $SD = 130.44$) than for Canadian children's landscapes ($M = 382.24$, $SD = 130.73$). There was also a significant Culture × Grade interaction, $F(5, 364) = 3.94$, $p < .01$, $\eta_p^2 = .051$. Similar to the results for the number of collage items, further detailed analyses demonstrated that the effect of culture was not significant among children in Grade 1, $F(1, 54) = 1.94$, $p = .17$; however, significant or marginally significant cross-cultural differences emerged in Grade 2, $F(1, 60) = 37.68$, $p < .001$, $\eta_p^2 = .382$; Grade 3, $F(1, 65) = 38.81$, $p < .001$, $\eta_p^2 = .374$; Grade 4, $F(1, 58) = 3.41$, $p = .07$, $\eta_p^2 = .055$; Grade 5, $F(1, 70) = 12.91$, $p < .01$, $\eta_p^2 = .156$; and Grade 6, $F(1, 57) = 21.59$, $p < .001$, $\eta_p^2 = .275$. Thus, there were significant differences in the amount of contextual information among children

in Grade 2 and higher, and the area covered by collage items was significantly larger for Japanese children than for Canadian children. Finally, the main effect of grade was not significant, $F(1, 364) = 1.18$, *ns*.[8]

General Discussion

Two experiments demonstrated both similarities and differences in cognitive development represented in artworks across two cultures. The results suggest that the number of children who understood the concept of horizon increased with grade, and this rate of development was similar across cultures. However, as expected, children's artistic expressions start to deviate across cultures at the early part of the school-age period. Examining Grades 1 to 6, we found that at Grade 2 and higher, children's artworks were already influenced by culturally unique expressions that corresponded to dominant cultural ideologies. The location of the horizon line and the amount of contextual information varied based on the holistic ideologies in Japan versus the analytic ideologies in Canada. This pattern of cultural variation in aesthetic expressions generally continued as children got older, and the location of the horizon line and amount of contextual information in Grade 2 and higher were similar to those of adult members in the respective cultural groups (Masuda, Gonzalez, et al., 2008). Based on the findings, we speculate that once children acquire a culturally unique drawing style, they retain the style over their life course and apply it when they are called upon to draw a landscape image.

In addition to systematic cultural variations in landscape drawings, we also found cultural similarities in the development of artistic expressions, in that the number of children who drew a conventional horizon line gradually increased through the developmental trajectory. The timing when children showed an understanding of the concept of horizon was consistent with previous research (Cox & Chapman, 1995; Lewis, 1990). As we expected, an almost equal ratio of Canadian and Japanese children produced non-conventional drawings such as drawings with air-gap, no horizon, or floating objects. Piaget and Inhelder (1956) claimed that the transition from drawings of what children know to drawings of what they see occurs universally at around the same age. Thus, we maintain that future research into when and how children produce culturally unique products should focus equally on cultural universals and specificity.

It is also worth noting that although the results of the drawing task (Study 1) and the newly developed collage task (Study 2) were similar to each other, we identified substantial differences in patterns of artistic expressions; in general, children in both cultures placed the horizon higher in the collage task than in the drawing task. We believe that this pattern can be partially explained by the procedural differences. In Study 1, children were asked to draw all the pictures themselves, whereas children in Study 2 only had to place ready-made collage items on the paper. We assume that when presented with abundant collages items, the children were motivated to include many items, which resulted in creating context-rich landscapes. In spite of these differences, we maintain that the validity of both the drawing task and the collage task is high, and these simple tasks should be used for further investigations of cultural products in other cultural groups.

Implications and Future Research

The current studies have three major implications for the literature of culture and development research. First, although cultural psychologists have examined systematic cultural variations in human behaviors for more than 20 years, much of this type of research has focused primarily on young adults recruited from the undergraduate student body (Henrich, Heine, & Norenzayan, 2010), and it is only recently that researchers have cross-culturally examined how and when the differences in cognition, emotion, and motivation emerge. Perhaps this gap between cultural and developmental research has persisted partly because of the resource issue (e.g., it is often more

challenging to work with child participants than with university students) and partly because of the lack of theoretical and empirical support to investigate the origin of cultural similarities and differences in behaviors. Heine and Norenzayan (2006) suggest that there are two stages of the scientific inquiry into cultural psychology. The first stage is to identify cultural differences in psychological processes, and the second stage is to explain such cultural differences. As cultural psychologists in the past two decades have provided us with a large body of systematic cross-cultural comparisons in various psychological processes, we are now able to examine the developmental origin of such cross-cultural differences. In line with recent advances in developmental research in cultural contexts (e.g., Duffy et al., 2009; Imada et al., 2013; Kuwabara & Smith, 2012), the current article plays a role in bridging the gap between cultural and developmental research, as collaboration between these research fields is indispensable for future advances in human science.

Second, developmental researchers often emphasize a universal theory of human development (e.g., Bowlby, 1969-1980; Kohlberg, 1973; Piaget, 1932, 1936, 1945, 1957). Given that previous research has concentrated on cultural variations in aesthetic expressions among adults (e.g., Masuda, Gonzalez, et al., 2008; Wang et al., 2012), those who emphasize universal patterns of development might speculate that cultural variations in aesthetic expressions emerged only among adults, with few, if any, differences in children's aesthetic expression. However, our findings provide important empirical evidence for developmental researchers that artistic expressions do not necessarily occur in a universal pattern throughout development. Rather, we demonstrated that substantial cultural variations in artwork expressions appear in childhood. Of course, children's artwork is just one of the media by which the issue of culture and development can be investigated. However, consistent with recent findings (e.g., Pinto & Bombi, 2007; Rübeling et al., 2011), our findings demonstrated that artworks are a useful medium that can provide cultural and developmental researchers with important information to further understand how children in various cultures perceive their world and themselves situated within it.

In fact, children are highly influenced by their cultural environment, and our research supports the notion that cultural learning processes are situated within children's daily practices in which culturally important ideologies are embedded (Lave & Wenger, 1991; Rogoff, 2003). For example, the current findings indicated that as early as Grade 2, young children who can draw a conventional horizon already place the horizon in the area consistent with that of adults' drawings. We therefore speculate that children do not develop their understanding of the horizon concept abstractly or in a vacuum; rather, they use available cultural resources as exemplars. Indeed, some developmental researchers maintain that children learn various concepts in sociocultural contexts through interaction with concrete material and symbolic tools developed by their local culture (Bruner, Olver, & Greenfield, 1966; Cole, 1996; Gauvain, 2001; Rogoff, 1998; Vygotsky, 1978; Wertsch, 1985). We maintain that the findings of the current article provide supportive evidence of the importance of research on human behavior in sociocultural contexts, which indicate the necessity of carefully attending to both universal and culturally specific aspects of human behavior (Imai & Masuda, 2013; Senzaki, Masuda, & Ishii, 2014).

Third, the results of the current study may speak to educators, particularly those who teach art to children in multicultural societies. Children are influenced from an early age by culturally accessible resources—that is, cultural products—through cultural practices. As aforementioned, such cultural products are tangible, public, and shared representations that reflect dominant cultural meanings (Morling & Lamoreaux, 2008). Our results demonstrated that children do not develop artistic expressions consistently across cultures; rather, there are substantial cultural variations in their expressions, and older children's drawing styles are already similar to those of adult members of their respective cultures. Our findings are applicable to educational settings, and they are consistent with the assertion that educators need to synthesize their universal perspective on child development and education with an understanding of the importance of culture in shaping children's development (e.g., Lee & Johnson, 2007). In the field of art education,

Pariser, Kindler, and van den Berg (2008) also posited that children and art educators may be at cross purposes with regard to art, as children value graphical representations found in media over artistic conventions taught in school. Thus, art educators need to be aware that children have many opportunities to learn about artistic expressions outside of the class by directly accessing resources available in their society. Substantial portions of such resources are culturally specific, such as picture books, mass media, and the paintings hanging in one's living room. Future research should explore the relationship between education and cultural products in influencing children's aesthetic expressions.

Limitations of the Current Research

Although the current findings have a variety of implications, there are several limitations. First, it is too early for us to identify exact reasons as to why Grade 2 is a critical period in children's production of cultural products. However, some findings suggest that this age period is particularly important for children to learn cultural values and ideologies. In fact, children develop key conceptual skills during early elementary school years, and the developmental transition between the ages of 5 and 7 years is substantial in both cognitive and social capacities (Sameroff & Haith, 1996). In terms of cultural learning, Senzaki and Masuda (2013) recently examined parent–child joint activities during a visual attention task and found that even with children as young as age 4, parents in Canada and Japan communicated with and attempted to direct their children's attention in culturally unique ways. However, children did not demonstrate the effects of cultural learning until around age 8. These findings suggest that in addition to parents' active instruction, children's active participation in interpersonal communication is also necessary to cultural learning. Furthermore, most 7-year-olds are able to perform theory-of-mind tasks (Wellman, Cross, & Watson, 2001), and peer relationships become especially intense and complicated during elementary school (Berndt & Ladd, 1989). Therefore, we speculate that the early elementary school years will be a fruitful period for further investigations of cognitive development and its socialization processes, and we further encourage cultural researchers to conduct developmental research in cultural contexts.

Second, the current studies did not measure the temporal order of object placement and drawing of the horizon, and therefore, we do not know when the children drew the horizon during the production of their artwork. A future study should examine whether children draw the horizon before placing objects, and whether doing so is associated with the number of objects included in their artworks. We should also examine which objects (collage items) children initially place on a sheet. According to previous findings (Imada et al., 2013; Masuda & Nisbett, 2001; Senzaki et al., 2014), East Asians were more likely than North Americans to state contextual information first when they were asked to describe a scene. Thus, we may speculate that East Asian children place contextual objects (e.g., trees in the background) and draw the horizon before they place main objects (e.g., people and houses in the foreground). Such examination may help us better understand the learning process for the concept of horizon and when children learn the procedure for creating pictorial materials.

In addition, the current collage items were restricted to the objects that need to be grounded on land (see Appendix B for collage items). This selection of objects was based on the types of objects drawn in Study 1. Although children in Study 1 were free to draw any objects, they drew fewer items that are usually found in the sky, such as clouds, birds, or airplanes. In future research, it would be informative to examine whether the location of the horizon changes if sky-related items are added to the existing items, and whether there is any cultural variation in how often specific types of items are used. This information, in turn, could contribute to identifying the interplay between culture and available materials for constructing a landscape collage.

Finally, we intentionally attempted to differentiate the issue of information organization from the issue of artistic competence, because the main target of our research was not whether children in a specific culture are more skilled at drawing than children in other cultures. Although various researchers have attempted to cross-culturally examine artistic competence, the relationship between art, education, and culture has not been fully investigated, and previous findings in cross-cultural variations in art education suggest mixed results. Some data indicated that East Asian children were more likely than their North American counterparts to be competent in their artistic expressions (Cox, Koyasu, Hiranuma, & Perara, 2001; Jolley, 2010; Jolley & Zhang, 2012), but other data indicated that there was no cultural variation in artistic competence among children (Cox, Perara, & Xu, 1998, 1999). In the current studies, we attempted to exclude the question of artistic competence. Especially in Study 2, we prepared the collage materials in advance so that we could focus only on how children organized available resources to create a landscape collage regardless of their drawing skills.

With respect to children's learning environments in the current studies, there were similarities in the time allocated for art education in all schools (averaging 80 min/week in Canada and 76 min/week in Japan). By contrast, structures of teaching curriculum differed across cultures. In Canada, the Alberta government provides specific guidelines for teachers to instruct the concept of horizon in Grades 1 and 2 (Alberta Education, 1985); however, how teachers follow these guidelines is largely variable, and the Alberta government does not provide any supplemental materials such as textbooks. In Japan, elementary school teachers use supplementary textbooks that are certified by the Minister of Education in their art classes, but the teachers are not given specific guidelines for curriculum (Japanese Ministry of Education, Culture, Sports, Science, and Technology, 2008). Therefore, in both cultures, individual teachers often apply their own teaching philosophy, and there is a large variety in classroom practices. Due to these inconsistencies, it is difficult to determine instructional influences on the current findings of cross-cultural differences in children's artworks.

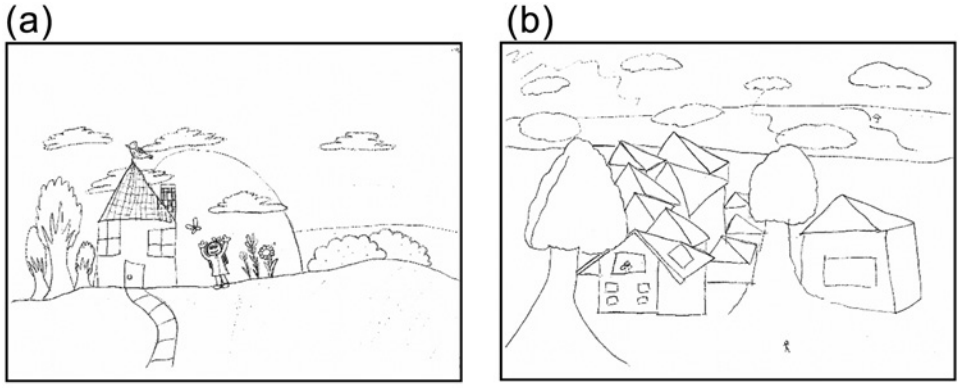
Although the direct examination of instructional influences on the current findings is beyond the scope of our research, we conducted a content analysis of children's art textbooks in Japan. We examined one of the most popular art textbooks in Japan, and the analyses indicated that the average location of horizons used in Grades 1 and 2 supplemental textbooks was 45.5%, in Grades 3 and 4 textbooks was 65.4%, and in Grades 5 and 6 textbooks was 58.7% (Nihon jido bijyutu kenkyukai [Japanese Association of Children's Art], 2010, 2012a, 2012b), suggesting that the location of the horizon in these images correspond to that of typical Japanese children's drawings. This anecdotal evidence provides one example of how educational institutions may play an important role in cultural learning processes, and that future research should examine the relationship among education, culture, and children's development. In particular, it is important to investigate how and to what extent educational practices directly contribute to the development of culturally unique perspectives.

Final Remarks

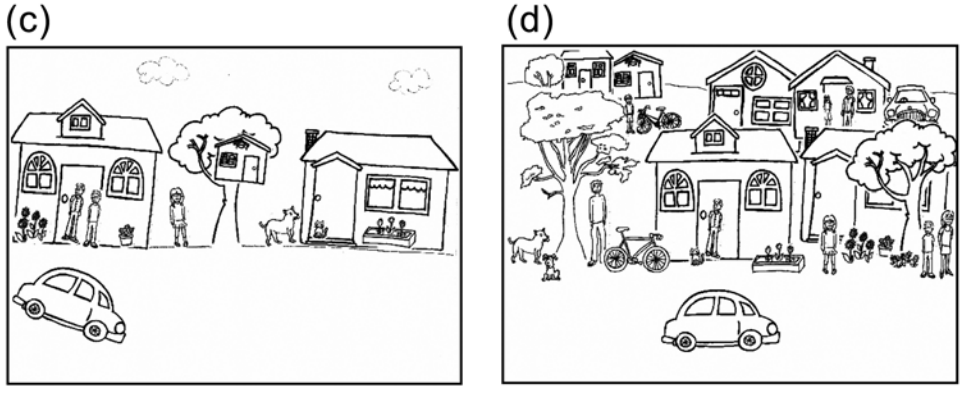
For more than three decades, cross-cultural researchers have identified how culture shapes the human mind. However, many researchers acknowledge the importance of research on culture and development (e.g., Rogoff, 2003), as well as research on cultural products, to understand how the human mind produces and maintains culture (e.g., Morling & Lamoreaux, 2008). Although we targeted only a single cultural product—artworks—we regard pictorial expressions as an informative tool for assessing even interpersonal relationships (Kawai & Tanaka, 2013; Pinto & Bombi, 2007; Pinto et al., 1997). Along with these investigations, the current research highlighted the importance of research on culture, art, and psychology in further advancing the examination of the human mind.

Appendix A

Examples from Studies 1 and 2.

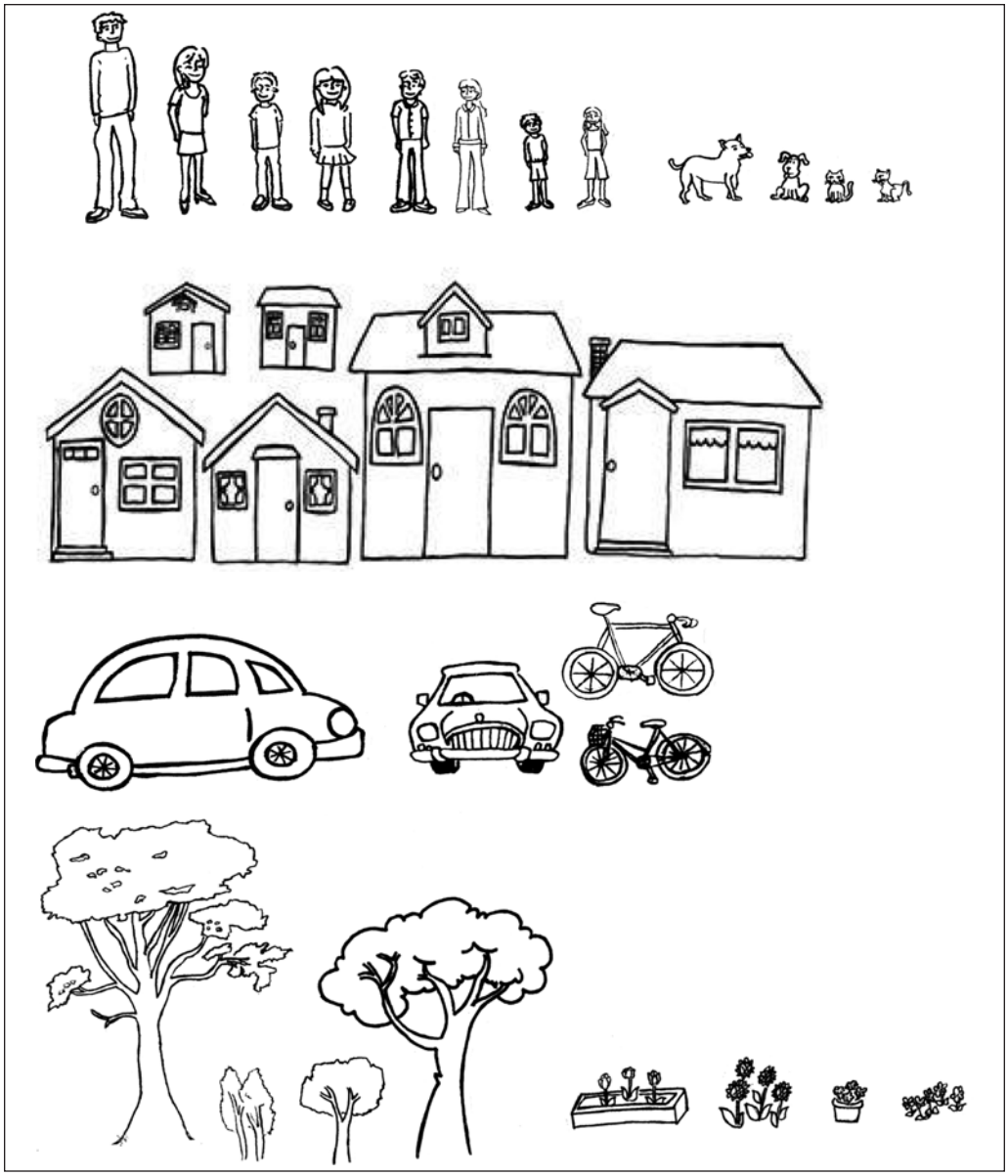


Study 1: A Canadian child's landscape drawing (a) and a Japanese child's landscape drawing (b) at Grade 4.



Study 2: A Canadian child's collage work (c) and a Japanese child's collage work (d) at Grade 4.

Appendix B



Collage items

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Notes

1. Due to differences in school systems in Alberta, Canada, and Kanagawa, Japan, children's ages in each grade were slightly different across cultures. Using Cox and Chapman's (1995) analysis categorization criteria, we treated children in the same grade equally, and their artworks were matched according to grade.
2. In both cultures, more than two thirds of participants from Grade 2 onward drew a conventional horizon, and the frequencies of developmental levels did not differ between Canadian and Japanese children, $\chi^2(4) = 8.07$, $p = .09$. In both Studies 1 and 2, we also conducted an analysis that included the drawings coded as 5 (no horizon) by giving a value of 0 as the location of the horizon. The results yielded the same patterns as the analysis conducted without these drawings.
3. All disagreements about coding were discussed until an agreement was reached.
4. Gender did not significantly predict the understanding of the horizon concept, or the location of the horizon; thus, we collapsed gender for all further analyses.
5. Because we designed a novel set of stimuli, we tested the validity of the new stimuli with undergraduate students in Canada and Japan as the adult sample. Participants were 36 Canadian undergraduate students (16 females) at the University of Alberta, who self-identified as European Canadians and spoke English as their first language; and 40 Japanese undergraduate students (21 females) at Kobe University, who self-identified as Japanese citizens and spoke Japanese as their first language. Intercoder agreements for the ratio of the location of the horizon ($r = .96$ for Canadian and $r = .95$ for Japanese collages) and the number of objects ($r = .99$ for both Canadian and Japanese collages) were high. As expected, Japanese students placed the horizon significantly higher ($M = 0.68$, $SD = 0.22$) than did Canadian students ($M = 0.58$, $SD = 0.19$), $F(1, 74) = 4.90$, $p < .05$, $\eta_p^2 = .062$. The results also indicated that Japanese students included a significantly larger number of objects ($M = 18.48$, $SD = 4.52$) than did Canadians ($M = 14.14$, $SD = 4.28$), $F(1, 74) = 12.36$, $p < .001$, $\eta_p^2 = .143$. We thus confirmed that the task is valid for examining culturally unique perceptual tendencies between North American and East Asian adults.
6. Canadian children in Grade 4 showed an irregular pattern in their landscape collages. In particular, many of these children ($n = 16$) made collages that included a tree house (e.g., placing houses, people, and animals among the branches of a tree). In other grades, only one to three children created such collages with tree houses. This may have influenced our current results among children in Grade 4.
7. Although some items were placed on top of another (e.g., a person standing in front of a house, flowers placed in front of a tree), we added the total surface area of all collage items used in participants' landscapes, because each additional item contributed to the complexity of the landscape images.
8. We also conducted an item analysis to examine whether types of items included were different across cultures. We divided collage items into the following five categories: people (eight items), houses (six items), animals (four items), plants (eight items), and vehicles (four items). Because the number of items in each category was different, we examined the percentage of items used in each category. For example, if a participant used two of the eight people, the percentage was calculated as 2/8 = 25%. Also, in general, Japanese children used more items overall than Canadian children; thus, we used the total number of objects as a covariate. We conducted a mixed 2 (Culture) × 6 (Grade) × 5 (Item) ANOVA, with culture and grade as between-subject variables and item as a within-subject variable, using the total number of objects as a covariate. The main effect of grade was not significant, and grade did not interact with culture or item; therefore, we collapsed the grades in the following analysis. The results demonstrated a significant Culture × Item interaction, $F(4, 1496) = 13.68$, $p < .001$, $\eta_p^2 = .035$. Further simple effect analysis demonstrated that there were no cross-cultural differences in the proportion of people and vehicles, Fs < 1; however, the results showed significant cross-cultural differences with houses, plants, and animals after controlling for the total number of items. First, Japanese children

used more houses ($M = 0.58$, $SD = 0.015$) than did Canadian children ($M = 0.46$, $SD = 0.013$), $F'(1, 33) = 23.25$, $p < .001$. Second, Japanese children used more plants ($M = 0.68$, $SD = 0.016$) than did Canadian children ($M = 0.61$, $SD = 0.014$), $F'(1, 33) = 11.73$, $p < .001$. Finally, Canadian children used more animals ($M = 0.75$, $SD = 0.017$) than did Japanese children ($M = 0.66$, $SD = 0.020$), $F(1, 33) = 7.49$, $p < .01$. Although it is difficult to offer a clear explanation for these cross-cultural differences, we believe that they can be explained by cultural affordance (Nisbett & Miyamoto, 2005). Perhaps Japanese children included a larger proportion of houses because typical Japanese cities tend to be more context-rich, with a larger number of buildings and other objects (Miyamoto, Nisbett, & Masuda, 2006), compared with North American cities. Also, because of space constraints, Japanese families may be less likely to own household animals than Canadian families, which could offer an explanation for the larger proportion of animals included by Canadian children. Future research should control the number of possible items for each category and investigate how culturally unique practices and environments may influence children's creativity.

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