

Physical Objects as Vehicles of Cultural Transmission: Maintaining Harmony and Uniqueness Through Colored Geometric Patterns

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Abstract

We examined how cultural values of harmony and uniqueness are represented and maintained through physical media (i.e., colorings of geometric patterns) and how individuals play an active role in selecting and maintaining such cultural values. We found that colorings produced by European American adults and children were judged as more unique, whereas colorings produced by Japanese adults and children were judged as more harmonious, reflecting cultural differences in values. Harmony undergirded Japanese participants' preferences for colorings, whereas uniqueness undergirded European American participants' preferences for colorings. These cultural differences led participants to prefer own-culture colorings over other-culture colorings. Moreover, bicultural participants' preferences acculturated according to their identification with their host culture. Furthermore, child rearers in Japan and Canada gave feedback about the children's colorings that were consistent with their culture's values. These findings suggest that simple geometric patterns can embody cultural values that are socialized and reinforced from an early age.

Keywords

cultural products, preference, uniqueness versus harmony, acculturation, socialization

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Cross-cultural studies have documented cultural differences in a wide range of psychological processes (Markus & Kitayama, 1991; Triandis, 1995). For example, the self is considered to be independent and separate from other people in Western cultural contexts, whereas it is considered to be interdependent and connected with others in Eastern cultural contexts. These culturally-divergent views are closely associated with various psychological processes, including preferences for harmony or uniqueness. Previous studies have shown that North Americans tend to prefer things that represent uniqueness (e.g., an uncommon pen), which is a key concept related to the independent view of the self, whereas East Asians tend to prefer things that represent conformity (e.g., a common pen), which is a major notion related to the interdependent view of the self (Kim & Markus, 1999; Kim & Sherman, 2008). Compared with the large amount of evidence for cultural differences in psychological processes, relatively little is known about the *processes* supporting and maintaining cultural differences; how do cultural values get transmitted and maintained within each culture? Core cultural values and beliefs have been assumed to be embodied

in the things and events that surround individuals in their daily lives (Fiske, Kitayama, Markus, & Nisbett, 1998; Kroeber & Kluckhohn, 1952; Markus & Kitayama, 1994). Repeated and prolonged exposure to such cultural products likely influences and shapes individuals' habitual ways of thinking, such as preferences for harmony or uniqueness. At the same time, individuals may not only be passively influenced by cultural products, but may also actively shape and select cultural products. By doing so, people actively maintain cultural values and retransmit them to others (e.g., Dawkins, 1989). The present research sought to illuminate the process through which individuals actively maintain and

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select cultural values of harmony and uniqueness by examining how such cultural values are embodied in cultural products created by members of Eastern and Western cultures and how those cultural products are selected by members of both cultures.

Embodiment of Cultural Values in Geometric Patterns

Previous studies that examined the embodiment of cultural values and beliefs in cultural products have focused on various sources of written narratives (for review, see Lamoreaux & Morling, 2012; Morling & Lamoreaux, 2008), such as advertisements (Kim & Markus, 1999), newspaper articles (Lee, Hallahan, & Herzog, 1996; Morris & Peng, 1994), and religious texts (Tsai, Miao, & Seppala, 2007). For example, reflecting cultural differences in values of harmony and uniqueness, East Asian magazine advertisements tend to convey the theme of conformity, whereas American magazine advertisements tend to convey the theme of uniqueness (Kim & Markus, 1999). Although such narrative themes must play a powerful role in transmitting and maintaining cultural values (e.g., Norenzayan, Atran, Faulkner, & Schaller, 2006), cultural values might also be represented and maintained through physical media that are stripped of social context and do not rely on explicit verbal messages. In fact, researchers have shown that cultural differences in styles of attention are represented in patterns of visual art or physical environments (Masuda, Gonzalez, Kwan, & Nisbett, 2008; Miyamoto, Nisbett, & Masuda, 2006). At the same time, these findings are limited to the representation of specific cognitive processes, such as analytic or holistic thinking. Thus, it is as yet unknown whether cultural differences in values and beliefs, such as the values of harmony and uniqueness, can be represented and maintained through physical media devoid of social context or explicit verbal messages. If values of harmony and uniqueness can be represented in such physical media, it would suggest pervasive ways through which cultural values are maintained in daily life.

In the present research, we first examined whether people really do generate physical objects in a way that reflects their cultural values of harmony and uniqueness. That is, we examined whether physical objects produced in an Eastern culture reflect the value of harmony, whereas physical objects produced in a Western culture reflect the value of uniqueness. As a physical medium that does not involve social context or explicit verbal messages, we employed colorings of geometric patterns. Colorings do not require any skills and are accessible and popular across cultures. Moreover, they can provide an efficient physical medium for representing values of harmony or uniqueness; by the choice and patterning of colors, people can create colorings that are harmonious or unique without relying on social context or verbal messages. We thus asked Japanese and North

American participants to create colorings and analyzed characteristics of those colorings.

Preference for Geometric Patterns That Embody Cultural Values

In addition to examining the embodiment of cultural values in geometric patterns, the present research also went beyond previous work by exploring maintenance processes of cultural values. That is, we explored how products that embody cultural values are selected and survive in the marketplace of products. To do so, we examined how people select objects produced by members of their own culture and members of another culture. To the extent that cultural values are embodied in cultural products and are shared by members of one's own culture, people should prefer own-culture products over other-culture products—thus contributing to the selection and maintenance of cultural values. In an increasingly globalized world where own-culture products and other-culture products are often competing, preference for own-culture products should contribute to the reinforcement and maintenance of cultural values.

Although previous studies have indicated that cultural values are embodied in products (e.g., uniqueness and harmony are embodied in themes of magazine advertisements; Kim & Markus, 1999) and are reflected in individual preferences (e.g., people prefer uncommon versus common pens or shapes; Kim & Markus, 1999; Kim & Sherman, 2008), cultural products and individual preferences have never been examined simultaneously within the same design. Moreover, previous studies examined preferences for controlled stimuli that were developed by researchers to represent certain cultural values or traits (Kim & Markus, 1999; Kim & Sherman, 2008; Masuda et al., 2008), rather than examining preferences for cultural products actually generated by members of each culture. Therefore, it is unknown whether people play an active role in maintaining cultural values by selecting products generated by members of their own culture. The present research aimed to provide direct empirical evidence of the relationship between cultural products and individual preferences by examining people's preferences for products generated by members of either their own or another culture within the same design. If people prefer own-culture products over other-culture products, it should contribute to the survival and maintenance of cultural values embodied in own-culture products. The present research therefore contributes to filling a gap in the literature by illuminating the relationship between the generation of cultural products and individual preferences, which works as a foundation for maintaining cultural systems.

Moreover, if people play an active role in maintaining cultural values by selecting products generated by members of their own culture, their preferences for own-culture products may vary and change with acculturation. Do individual preferences acculturate as a result of one's identification with a

new, host culture? Or are the individual preferences that are anchored in values of one's heritage culture persistent regardless of exposure to a new, host culture? Given the increased globalization of the international community, these questions are crucial for better understanding cultural change and persistence as they are led by exposure to various cultural products and individuals' preferences for those products. To explore how these two mechanisms shape one's preference according to cultural values (assimilation into a host culture and persistence of a heritage culture), we also tested students of Asian descent studying at North American universities and examined their preferences for colorings produced by Japanese and Americans.

Socialization and Reinforcement of Geometric Patterns That Embody Cultural Values

The present research also explores whether geometric patterns that embody cultural values can be observed even in children and whether adults who rear children play a role in maintenance processes of cultural values by providing feedback that encourages the values emphasized in one's culture. Children may acquire cultural values through socialization and learn to produce them through physical media. Moreover, children's products may be refashioned in families and schools so that they become aligned with feedback provided by adults, particularly parents and teachers who rear children. Past studies have found that cultural differences in context sensitivity emerge around 4 to 6 years of age (Duffy, Toriyama, Itakura, & Kitayama, 2009; Imada, Carlson, & Itakura, 2013; Kuwabara, Son, & Smith, 2011). However, it is as yet unknown whether cultural differences in values of harmony and uniqueness are acquired and can be represented in the products of children around the same age. We therefore also recruited 4- to 6-year-old children and examined whether Western children's colorings of geometric patterns reflect the value of uniqueness, whereas children's colorings produced in an Eastern culture reflect the value of harmony.

In addition, to explore the role that adults who rear children at home or school play in maintaining and reinforcing cultural values, we also examined the feedback that adults give to children about their colorings. If adults tend to provide feedback that embodies own-culture values, their feedback would guide children to produce cultural products and thus play a role in maintaining and reinforcing cultural values at home and at school. This examination will therefore provide additional evidence for the maintenance and transmission processes of cultural values.

Present Research

In our studies, we first asked Japanese and European American participants to color geometric figures as they liked and analyzed the physical properties of these

colorings with regard to the hue and intensity of the colors used (Study 1). A different group of Japanese and European American participants then judged the produced colorings in terms of preference and harmony (Study 2a) and in terms of preference and uniqueness (Study 2b). Reflecting differences in cultural values, we hypothesized that Japanese colorings would be evaluated as more harmonious than European American colorings according to both objective (Study 1) and subjective (Study 2) assessments, whereas European American colorings would be evaluated as more unique than Japanese colorings. Moreover, if cultural values foster individual preferences, harmony should underlie Japanese participants' preferences for colorings, whereas uniqueness should underlie European American participants' preferences for colorings. Consequently, Japanese individuals were expected to prefer Japanese colorings, whereas European Americans were expected to prefer European American colorings.

In addition, international students in the United States, who were born and raised in East Asia (Study 2b), and Asian Canadians in Canada, who varied in their level of identification with their host and heritage cultures (Study 2c), also judged the Japanese and American colorings on preference, harmony, and uniqueness. By testing these bicultural participants, we examined whether their preferences were closer to North Americans' preferences as a result of acculturation, or whether their preferences were closer to Japanese preferences, reflecting the cultural values of their East Asian heritage cultures.

Furthermore, we collected colorings produced by Japanese and European Canadian children. We then asked a group of Japanese and European Canadian students to judge the children's colorings in terms of harmony, uniqueness, and preference (Study 3a). We further recruited a group of Japanese and European Canadian child rearers and examined their feedback on the children's colorings (Study 3b). If cultural values are embodied in children's products through socialization, European Canadian children's colorings would be evaluated as more unique than Japanese children's colorings, whereas Japanese children's colorings would be evaluated as more harmonious than European Canadian children's colorings. Moreover, given the influence of child rearers in transferring cultural values to children, child rearers were expected to provide feedback that embodies the values of their own culture.

Study 1

The purpose of Study 1 was to collect colorings from Japanese and American individuals. Moreover, we analyzed the characteristics of these colorings and tested for cultural differences using an objective index that was implicitly related to cultural values of uniqueness. If uniqueness is expressed by something standing out, the contrast of colors may play a key role. Given this, if uniqueness is an important

cultural value among Americans that is embedded in their products, color contrast may be more emphasized in American colorings than in Japanese colorings. To test this expectation, all of the colors used in the Japanese and American colorings that we collected were coded for hue and intensity. If our hypothesis is correct, contrasts among hues of colors in American colorings may be larger than those in Japanese colorings. Moreover, colors with a low intensity (i.e., whitish colors or pastels) are likely to be perceived as “weak,” whereas colors with a high intensity (i.e., dark colors) are likely to be perceived as “strong” (D’Andrade & Egan, 1974). Assuming that strength perceived from colors is associated with the perception of “standing out,” we could also expect that colors used in American colorings would be higher in intensity than those used in Japanese colorings.

Method

Materials. Colorings were generated by asking 70 Japanese students at a Japanese university and 48 European Americans at an American university to color patchwork-like patterns. Respondents received one or two sheets of paper on which 1 of 12 patchwork-like patterns was printed; they colored the pattern according to their individual preferences using any combination of a set of 24 colored pencils. The same set of 24 colored pencils was used for Japanese and European Americans. In total, 95 colorings were collected from each culture. Each pattern was composed of 9 squares (3×3) with some squares being divided by a single short, diagonal line. Figure 1 shows examples of Japanese and American colorings.

Coding procedure. We prepared an array consisting of 144 color stimuli made up of 6 intensity levels and 24 hues in Hue, Saturation, Lightness (HSL) color space, where saturation was consistent at 50%. Each hue was 15 degrees apart in the hue circle. For each color in the 190 pictures, two coders indicated an approximate match by selecting 1 of the 144 color stimuli in the array. Seven Japanese colorings and seven American colorings were excluded from the data coding because the participants used only achromatic colors that have no hue or saturation (i.e., white, gray, or black). Two Japanese colorings and four American colorings that used gradation in the coloring were also excluded due to difficulty with coding the data.

Results and Discussion

Hues of colors. The number of hues of colors used was counted for each coloring by two coders blind to hypotheses. Because the two coders’ ratings were highly correlated ($r = .91$), they were averaged. The number of hues of colors was larger in Japanese colorings ($M = 6.25$, $SD = 3.39$) than in American colorings ($M = 4.57$, $SD = 2.24$), $F(1, 169) = 14.52$, $p < .001$, $r = .28$. Thus, more colors were present in Japanese colorings than in American colorings.

To estimate contrasts among the hues of colors used in each coloring, the colors were sorted into the six major categories of the color wheel (red, orange, yellow, green, blue, and purple), and the distance between pairs of colors was computed, ranging from 0 to 3, based on the circular relationship between the colors. If two colors were identical, the distance was coded as 0. If two colors were adjacent (e.g., purple and red), the distance was coded as 1. If two colors were complementary (e.g., red and green), the distance was coded as 3. Distance was computed for all combinations of two colors in each coloring in this way and then averaged. Larger distances corresponded to higher contrasts among the hues of colors in a participant’s coloring.

Before computing the distance, we excluded one Japanese coloring and two American colorings because they were monochromatic and presented no distance between colors. As above, the two coders’ ratings of color distance were highly correlated ($r = .92$) and subsequently averaged. As predicted, the mean distance was larger in American colorings ($M = 1.56$, $SD = 0.57$) than in Japanese colorings ($M = 1.39$, $SD = 0.51$), $F(1, 166) = 4.11$, $p < .05$, $r = .16$. This suggests that the contrast of colors was larger in colorings produced by Americans than it was in the colorings produced by Japanese, even though the Japanese participants used a larger variety of colors overall.

Intensity. The mean levels of intensity, ranging from 1 (dark) to 6 (light), were computed for Japanese and American colorings by averaging the levels reported by the two coders and were then analyzed. Because the two coders’ ratings were highly correlated ($r = .72$), they were again averaged. As predicted, American colorings ($M = 3.11$, $SD = 0.95$) were darker than Japanese colorings ($M = 3.73$, $SD = 0.88$), $F(1, 169) = 19.37$, $p < .0001$, $r = .32$, consistent with an emphasis on uniqueness and standing out (e.g., D’Andrade & Egan, 1974).

Study 2

In Study 1, we collected colorings from Japanese and American participants and found differences in the contrast of hues of colors and intensity between them. The differences showed that, compared with Japanese colorings, American colorings were higher in intensity and the contrast of hues. These are associated with “standing out,” a form of uniqueness. In Study 2, we sought to investigate cultural differences regarding subjective judgments of the colorings by Japanese and Americans in terms of uniqueness and harmony. Moreover, we also assessed participants’ preferences for Japanese versus American colorings to examine whether cultural values underlie one’s preference for colorings, leading individuals to prefer own-culture colorings. We tested a group of Japanese and European American participants in terms of preference and harmony in Study 2a and preference and uniqueness in Study 2b. We

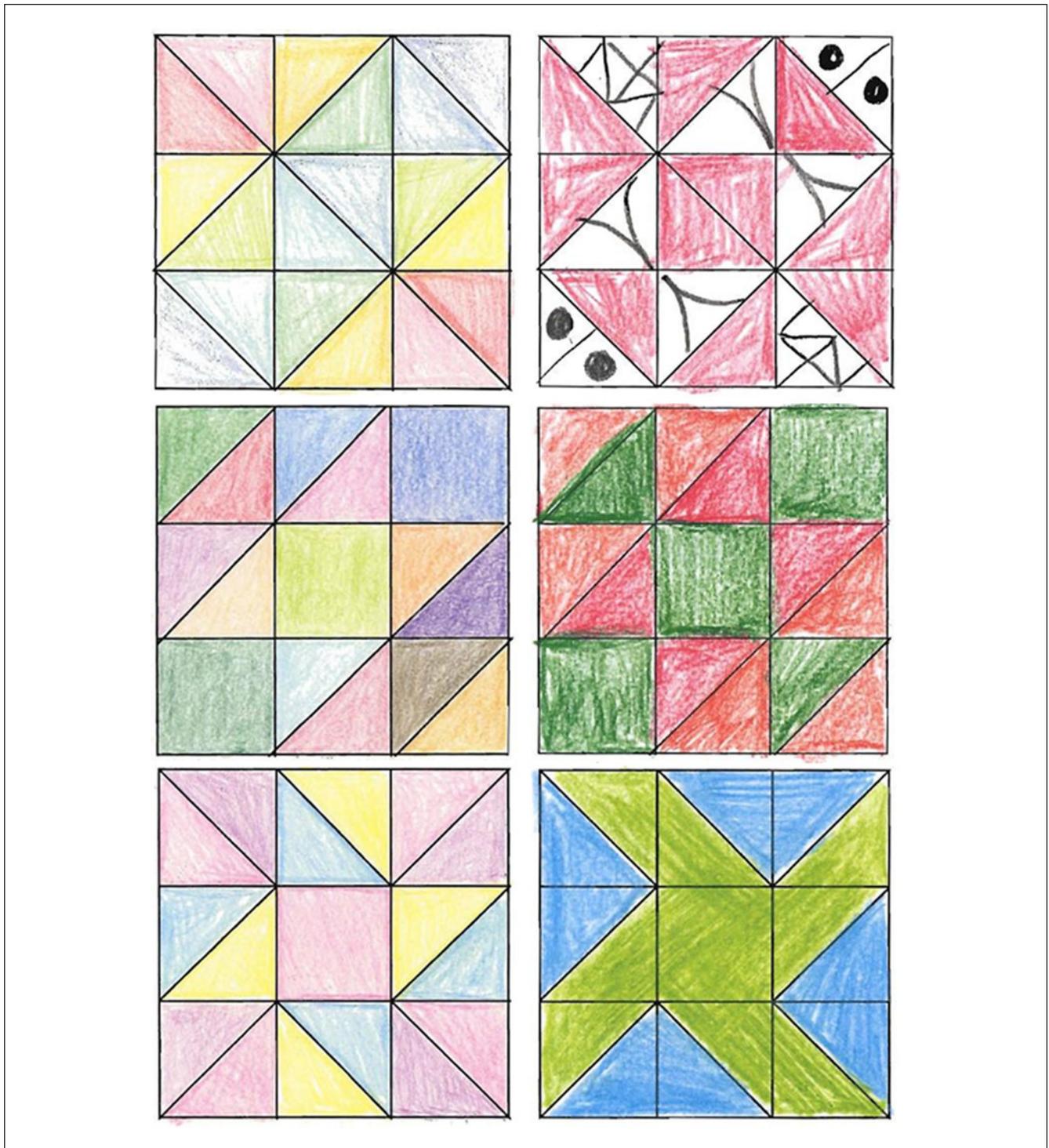


Figure 1. Examples of colorings collected in Study 1 and used as stimuli in Study 2.
 Note. Left: Japanese colorings. Right: European American colorings.

also tested Asian Canadian undergraduates in Canada to investigate whether, and to what extent, individual preferences vary and change with acculturation to Western culture in Study 2c.

Study 2a

Method. Twenty-eight Japanese students (9 men and 19 women) at a Japanese university and 30 European American

students (7 men and 23 women) at an American university participated in the study. Japanese students were paid 500 yen (about US\$5), whereas American students were given course credit for their participation. Participants were tested individually.

Participants were instructed to view and judge pairs of pictures. They were not given information about who produced the pictures. They performed the preference task by judging which of the two pictures, labeled "A" and "B," they liked better. After completing this task, they engaged in the harmony task, in which they were asked to judge which of the two pictures, A or B, they thought was more harmonious. The judgments were blocked according to judgment type.

Each task included the presentation of the 95 pairs of Japanese and American colorings collected in Study 1. The order of the experimental trials was randomized for each participant. There were two sets of Japanese and American coloring pairs matched arbitrarily, one of which was randomly assigned to each participant. There were no differences between the sets in the results reported below. We split the sets of the combined Japanese and American coloring pairs so that approximately half of the colorings from each culture were presented on the left side of the screen, whereas the remaining colorings were presented on the right side of the screen. All experimental programs were developed with Microsoft Visual Basic 6.

Results and discussion. We first calculated the proportion of Japanese colorings chosen for the judgments in the preference and harmony tasks, respectively. We then performed a 2 (participant culture) \times 2 (participant gender) ANOVA on the proportions for each task. Moreover, to explore the underlying mechanism of preference, we conducted two sets of analyses. First, we computed the correlation between the aforementioned two proportions to examine the relationship between preference and harmony at the individual level. Second, we examined the relationship between preference and harmony at the level of coloring, or item, by computing the proportions of colorings that participants conjointly chose for both types of judgments (i.e., the proportion of cases in which participants chose the same coloring in the preference task and in the harmony task).

Harmony. Overall, participants judged Japanese colorings as more harmonious (i.e., they judged American colorings as less harmonious) at a level significantly greater than chance, $M = 58.9\%$, $SD = 9.4\%$; $t(57) = 7.20$, $p < .01$, $d = 1.91$. We found no differences between the participants based on culture, $M_{\text{Americans}} = 60.7\%$, $SD = 10.2\%$; $M_{\text{Japanese}} = 57.0\%$, $SD = 8.4\%$; $t(56) = 1.51$, $p = .14$, $d = 0.40$, or gender, $M_{\text{women}} = 59.1\%$, $SD = 9.7\%$; $M_{\text{men}} = 58.4\%$, $SD = 8.9\%$; $t(56) = 0.25$, $p = .80$, $d = 0.07$. Thus, consistent with our hypothesis, colorings generated by Japanese were perceived as more harmonious than those generated by the Americans.

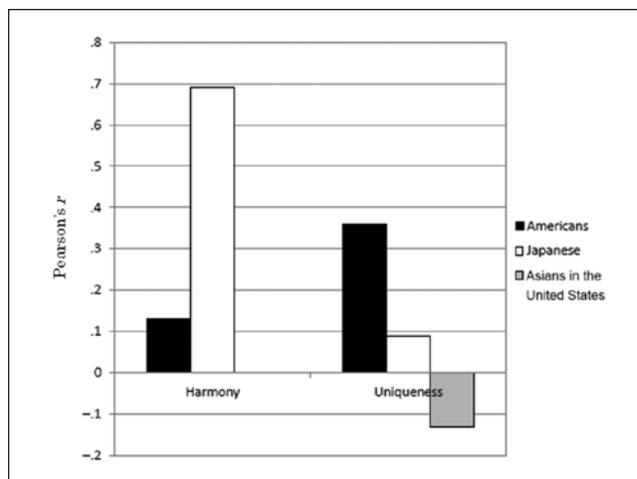


Figure 2. Correlations between coloring preference and harmony ratings in Study 2a and between coloring preference and uniqueness ratings in Study 2b.

Individual preference. There was a main effect of participants' culture in terms of preferences for the colorings, $F(1, 54) = 11.73$, $p < .005$, $r = .42$. The Japanese participants ($M = 60.4\%$, $SD = 10.3\%$) liked Japanese colorings more than the American participants did ($M = 50.3\%$, $SD = 9.9\%$), which also means that the American participants ($M = 49.7\%$, $SD = 9.9\%$) liked American colorings more than the Japanese participants did ($M = 39.6\%$, $SD = 10.3\%$). Thus, participants preferred own-culture colorings. We observed no effects of participant gender, $ps > .80$.

Relationship between harmony and preference: Participant-level association. As shown in Figure 2, the proportions of colorings that Japanese participants chose in the preference task were positively correlated with the proportions of the colorings that they selected in the harmony task, $r = .69$, $p < .01$. This means that Japanese participants who perceived Japanese colorings to be harmonious were more likely to prefer Japanese colorings (and Japanese participants who perceived American colorings to be harmonious were more likely to prefer American colorings), suggesting that harmony underlies Japanese preferences. However, this tendency was very weak among American participants, $r = .13$, $p = .49$.

Relationship between harmony and preference: Coloring-level association. In addition to the participant-level correlational analysis, we also examined the conjoint proportion of colorings that participants chose for both preference and harmony judgments to measure the association between preference and harmony at the level of coloring, or item. The proportions of Japanese colorings chosen in both the preference and harmony judgments were higher among Japanese ($M = 45.0\%$, $SD = 10.3\%$) than American ($M = 38.0\%$, $SD = 10.9\%$) participants, $F(1, 54) = 4.02$, $p < .05$, $r = .26$. Japanese participants were therefore more likely than American participants

to prefer those Japanese colorings that they also judged to be harmonious, suggesting that harmony underlies Japanese participants' preferences for Japanese colorings. In contrast, we found no cultural differences regarding the proportion of American colorings chosen in the two tasks ($F < 1$), suggesting that harmony is less relevant for explaining cultural differences in preferences for American colorings.

Study 2b

In Study 2b, we tested Japanese and European American participants' judgments of preference and uniqueness. Moreover, we included a group of Asians born and raised in Asian countries but now residing in the United States. This allowed us to test the effects of acculturation by examining whether the participants would choose European American colorings, in accord with their recent cultural exposure, or East Asian colorings, in accord with their initial enculturation.

Method. Thirty-seven Japanese students (20 men and 17 women) at a Japanese university and 22 Asian (6 men and 16 women) and 36 European American (12 men and 24 women) students at an American university participated in this study. Japanese students were paid 500 yen (about US\$5), whereas Asian and American students in the United States were given course credit for their participation. All Asian participants were born and raised in East Asia (China, Korea, Taiwan, and Malaysia). None of the Asian participants had lived in the United States for more than 4 years. The procedure was the same as that used in Study 2a with one exception. Instead of engaging in the harmony task, participants judged the colorings for uniqueness by selecting which of the two pictures, A or B, they thought was more unique.

Results and discussion

Uniqueness. Overall, participants judged American colorings as more unique at a level significantly greater than chance, $M = 56.0\%$, $SD = 7.5\%$, $t(94) = 7.55$, $p < .01$, $d = 1.56$, and neither the culture ($M_{\text{Americans}} = 54.4\%$, $SD = 7.4\%$; $M_{\text{Asian residents}} = 56.8\%$, $SD = 7.3\%$; $M_{\text{Japanese}} = 57.0\%$, $SD = 7.8\%$) nor the gender ($M_{\text{women}} = 55.5\%$, $SD = 8.1\%$; $M_{\text{men}} = 56.3\%$, $SD = 7.2\%$) of the participants influenced this tendency, $ps > .20$; thus supporting our expectations.

Individual preference. A 3 (participant culture) \times 2 (participant gender) ANOVA showed a main effect of participant culture, $F(2, 89) = 11.39$, $p < .0001$, $\eta_p^2 = .20$. American participants ($M = 53.4\%$, $SD = 7.8\%$) preferred American colorings more than Japanese participants, $M = 43.4\%$, $SD = 9.6\%$; $t(89) = 4.78$, $p < .01$, $d = 1.01$, or Asian residents of the United States did, $M = 44.4\%$, $SD = 9.5\%$; $t(89) = 3.72$, $p < .01$, $d = 0.79$. This also means that Japanese (56.6%) and Asian residents of the United States (55.6%) preferred Japanese colorings more than Americans (46.6%) did. Thus, replicating the findings of Study 2a, the participants preferred

own-culture colorings. We found no effects involving the gender of participants, $ps > .20$.

Relationship between uniqueness and preference: Participant-level association. The proportions of American colorings selected in the preference task were positively correlated with the proportions selected in the uniqueness task among Americans, $r = .36$, $p < .05$. Those Americans who perceived American colorings to be unique were more likely to prefer American colorings (and those Americans who perceived Japanese colorings to be unique were more likely to prefer Japanese colorings), suggesting that uniqueness underlies Americans' preferences (see Figure 2). However, we found no correlation between the two tasks among Japanese participants ($r = .09$, $p = .60$) or among Asians residing in the United States ($r = -.13$, $p = .56$).

Relationship between uniqueness and preference: Coloring-level association. We also examined the proportions of colorings that participants chose for both preference and uniqueness judgments, which indicates the association between preference and uniqueness at the level of coloring. The proportions of American colorings chosen in both the uniqueness and preference tasks were higher among American participants ($M = 30.2\%$, $SD = 11.6\%$) than among Japanese participants ($M = 23.1\%$, $SD = 8.3\%$) or among Asian residents of the United States ($M = 22.0\%$, $SD = 7.6\%$): $F(2, 89) = 5.53$, $p < .01$, $\eta_p^2 = .11$; $t_s(89) = 3.20$ and 3.19 , $ps < .01$, $d_s = .68$ for the comparison between Americans and Japanese and the comparison between Americans and Asian U.S. residents, respectively. These results suggest that Americans are more likely than Japanese or Asians living in the United States to prefer those American colorings that they also judged to be unique, indicating that uniqueness underlies Americans' preferences for American colorings. In contrast, we found no cultural differences in the proportions of Japanese colorings chosen in both of the tasks ($F < 1$). Uniqueness therefore seems less relevant for explaining cultural differences in preferences for Japanese colorings.

Overall, our hypotheses about cultural differences in preferences for unique (Study 2b) and harmonious (Study 2a) colorings were supported: American participants' preferences of colorings were related to how unique they were perceived to be, and Japanese participants' preferences of colorings were related to how harmonious they were perceived to be. Interestingly, the responses of the East Asian U.S. residents in this study were similar to those of the Japanese participants in this study, which suggests that their preferences were shaped more by their earlier socialization in East Asian cultures than by their recent exposure to U.S. culture.

Study 2c

The results from Asian participants in Study 2b indicated that the preferences fostered by their initial enculturation to East

Asian cultures were sustained, regardless of current daily exposure to American culture. This suggests that these Asian participants did not appear to acculturate to American preferences, perhaps due to either their age of immigration or short length of time in the United States. However, there might be individual differences among Asian participants in the extent to which their preferences have acculturated. To better explore the influence of enculturation and acculturation upon individuals' preferences, Study 2c tested Asian Canadians in Canada who varied in their level of identification with their host culture (i.e., Canadian culture), and their heritage culture and examined their preferences for Japanese and American colorings.

Method. Seventy-four Asian Canadian students (20 men, 50 women, and 4 no response) at a Canadian university participated in exchange for partial course credit or monetary compensation.¹ Participants were asked to engage in the preference task used in Studies 2a and 2b, which was followed by the harmony task used in Study 2a and the uniqueness task used in Study 2b. The order of the harmony and uniqueness tasks was counterbalanced across participants. They were then asked to complete the Vancouver Index of Acculturation (VIA). The VIA is a 20-item questionnaire developed by Ryder, Alden, and Paulhus (2000) to assess the extent to which individuals participate in and identify with their heritage and mainstream (host) cultures. Each of the two subscales (i.e., heritage- and mainstream-culture identifications) has 10 items, which are identical except for the culture referenced (e.g., *I often participate in my heritage cultural traditions* versus *I often participate in the mainstream Canadian cultural traditions*). Participants were asked to write down their heritage culture (other than Canadian)² and to then indicate the extent to which they agreed with each item on 9-point Likert-type scales (1 = *disagree*, 9 = *agree*). We computed mean scores for the two subscales. The heritage-culture and mainstream-culture items had acceptable reliabilities ($\alpha = .87$ and $.86$, respectively).

Results and discussion

Harmony, uniqueness, and preference. As in Study 2a, participants judged Japanese colorings as more harmonious at a level significantly greater than chance, $M = 57.5\%$, $SD = 11.9\%$; $t(73) = 5.43$, $p < .01$, $d = 1.27$. In addition, participants judged American colorings as more unique at a level significantly greater than chance, as in Study 2b: $M = 54.1\%$, $SD = 9.3\%$; $t(73) = 3.79$, $p < .01$, $d = 0.89$. Moreover, participants tended to prefer Japanese colorings at a level that was greater than chance at the trend level, $M = 52.4\%$, $SD = 11.6\%$; $t(73) = 1.79$, $p < .10$, $d = 0.42$.

Relationship with VIA. Mean scores on the heritage-culture and mainstream-culture subscales of the VIA were 7.03 ($SD = 1.16$) and 6.57 ($SD = 1.15$), respectively. They were positively correlated, $r = .60$, $p < .01$. The mean score of the

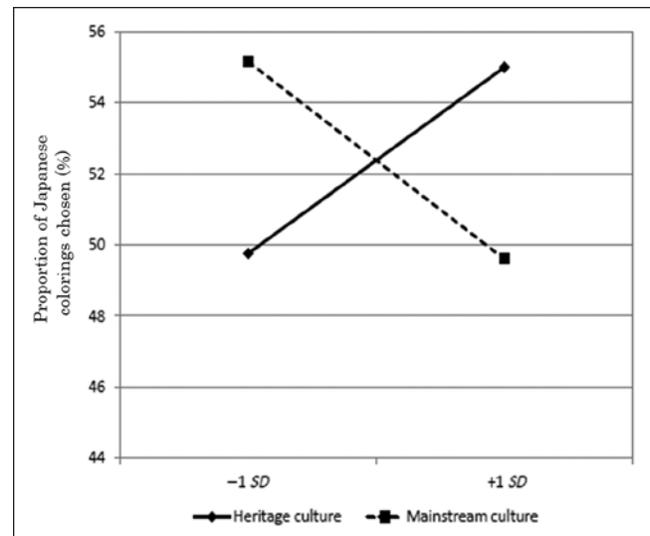


Figure 3. The proportion of Japanese colorings chosen in the preference task according to participants' identification with their heritage and host (mainstream) cultures among Asian Canadians in Study 2c.

heritage-culture subscale was significantly higher than that of the mainstream-culture subscale, $F(1, 73) = 8.08$, $p < .01$, $r = .32$.

The proportion of Japanese colorings chosen in the preference task was positively correlated with the mean score on the heritage-culture subscale ($r = .23$, $p = .05$), whereas it was negatively correlated with the mean score on the mainstream-culture subscale, $r = -.24$, $p < .05$. Moreover, the proportion of Japanese colorings chosen in the preference task was significantly predicted by scores on both the heritage-culture subscale, $\beta = .31$, $t(71) = 2.74$, $p < .01$, and mainstream-culture subscale, $\beta = -.32$, $t(71) = -2.83$, $p < .01$, in a simultaneous regression. Thus, Asian Canadians who identified more with their heritage culture (i.e., East Asian culture) were more likely to prefer Japanese colorings. In contrast, Asian Canadians who identified more with their mainstream culture (i.e., Western culture) were more likely to prefer American colorings (and less likely to prefer Japanese colorings; Figure 3). The proportions of colorings chosen in neither the harmony task nor the uniqueness task were correlated with the participants' scores on the VIA.

Relationships between harmony, uniqueness, and preference. The proportions of Japanese colorings selected in the preference task were positively correlated with those in the harmony task and those in the uniqueness task: $r_s = .28$ and $.34$, $p_s < .02$, respectively. There was a negative correlation between harmony and uniqueness, $r = -.24$, $p < .05$. Moreover, the proportions of colorings selected in the preference task were significantly predicted by judgments of both harmony and uniqueness independently: $\beta_s = .43$ and $.38$, $t(71) = 4.12$ and 3.65 , $p_s < .001$, respectively. Thus, Asian Canadians

who perceived Japanese colorings to be harmonious were more likely to prefer Japanese colorings (and those who perceived American colorings to be harmonious were more likely to prefer American colorings). Also, Asian Canadians who perceived American colorings to be unique were more likely to prefer American colorings (and those who perceived Japanese colorings to be unique were more likely to prefer Japanese colorings). This suggests that both harmony and uniqueness underlie Asian Canadians' preferences.³

Study 3

Studies 1 and 2 showed that people produce colorings that reflect the dominant values in a given culture and that they prefer colorings produced by the members of their own culture. Study 3 focuses on how these cultural values may be socialized and transmitted in this context. Specifically, if children acquire cultural values through socialization and produce them in physical media, colorings produced by children in a Western culture should be perceived as more unique than colorings produced by children in an East Asian culture, whereas East Asian children's colorings should be perceived as more harmonious than the Western children's colorings. Moreover, if child rearers play a role in transferring cultural values to children and refashioning children's products, they should provide feedback about children's colorings that embody their own cultural values.

In Study 3, we collected colorings from Japanese and European Canadian children. To examine whether children's colorings embody cultural values, we then asked a group of Japanese and European Canadian undergraduates to judge the children's colorings in terms of harmony, uniqueness, and preference in Study 3a. In Study 3b, we further recruited a group of Japanese and European Canadian child rearers and examined what kind of feedback they would provide on the children's colorings to add evidence for the maintenance and transmission processes of cultural values.

Study 3a

Materials. Thirty-four Japanese children (19 boys and 15 girls) and 18 European Canadian children (7 boys and 11 girls) aged 4 to 6 years ($M_{\text{Japanese}} = 62.53$ months, $SD = 6.88$; $M_{\text{Canadians}} = 59.57$ months, $SD = 6.84$) participated in the study. There was no cultural difference in the ages of the children, $p > .10$. Japanese children were recruited in a Japanese kindergarten, whereas Canadian children were recruited via the research participant database of a Canadian University. Children received one to three sheets of paper on which 1 of 6 patchwork-like patterns was printed; they colored the pattern according to their individual preferences using any combination of a set of 24 colored pencils; the same set of 24 colored pencils was used in the two cultures. Each pattern was composed of four squares (2×2) with some squares divided by a single short, diagonal line. Forty-eight colorings

were generated from each culture. Figure 4 shows examples of Japanese and Canadian children's colorings.

Method. Thirty-six Japanese undergraduates (16 men and 20 women) at a Japanese university and 51 European Canadian undergraduates (16 men and 35 women) at a Canadian university participated in the study. Japanese undergraduates were paid 500 yen (about US\$5), whereas Canadian undergraduates were given course credit for their participation. Participants were tested individually. They were asked to engage in the preference task, which was followed by the harmony and uniqueness tasks used in Study 2. The order of the harmony and uniqueness tasks was counterbalanced across participants. Each task included the presentation of the 48 pairs of Japanese and Canadian colorings produced by children.

Results and discussion

Harmony and uniqueness. Overall, participants judged Japanese children's colorings as more harmonious at a level significantly greater than chance, $M = 62.0\%$, $SD = 6.8\%$, $t(86) = 16.35$, $p < .0001$, $d = 3.53$. In contrast, participants judged Canadian children's colorings as more unique at a level significantly greater than chance, $M = 59.9\%$, $SD = 8.3\%$, $t(86) = 11.21$, $p < .0001$, $d = 2.42$.⁴ These patterns are consistent with those found for Japanese and American undergraduates' colorings in Study 2.

Individual preference. Although both Japanese, $t(35) = 8.68$, $p < .0001$, $d = 2.93$, and Canadian, $t(50) = 3.24$, $p < .01$, $d = 0.92$, undergraduates liked Japanese colorings at a level that was greater than chance, there was a main effect of participants' culture in terms of preferences for the colorings, $F(1, 85) = 12.69$, $p < .001$, $r = .36$. Japanese undergraduates ($M = 61.3\%$, $SD = 7.7\%$) liked Japanese children's colorings more than Canadian undergraduates did ($M = 55.0\%$, $SD = 8.7\%$), which also means that Canadian undergraduates ($M = 45.0\%$, $SD = 8.7\%$) liked Canadian children's colorings more than Japanese undergraduates did ($M = 38.7\%$, $SD = 7.7\%$).⁵

Relationship between harmony and preference. The proportions of Japanese children's colorings selected in the preference task were positively correlated with the proportions selected in the harmony task among Japanese, $r = .45$, $p < .01$. Consistent with the relationship found among Japanese participants in Study 2a, this suggests that harmony underlies Japanese individuals' preferences for children's colorings. However, we found no correlation between the two tasks among Canadians ($r = .07$, $p = .31$).

Relationship between uniqueness and preference. The proportions of Canadian children's colorings selected in the preference task were positively correlated with the proportions selected in the uniqueness task among Canadians, though the relationship only trended toward statistical significance: $r = .24$, $p < .10$. Consistent with the relationship found among

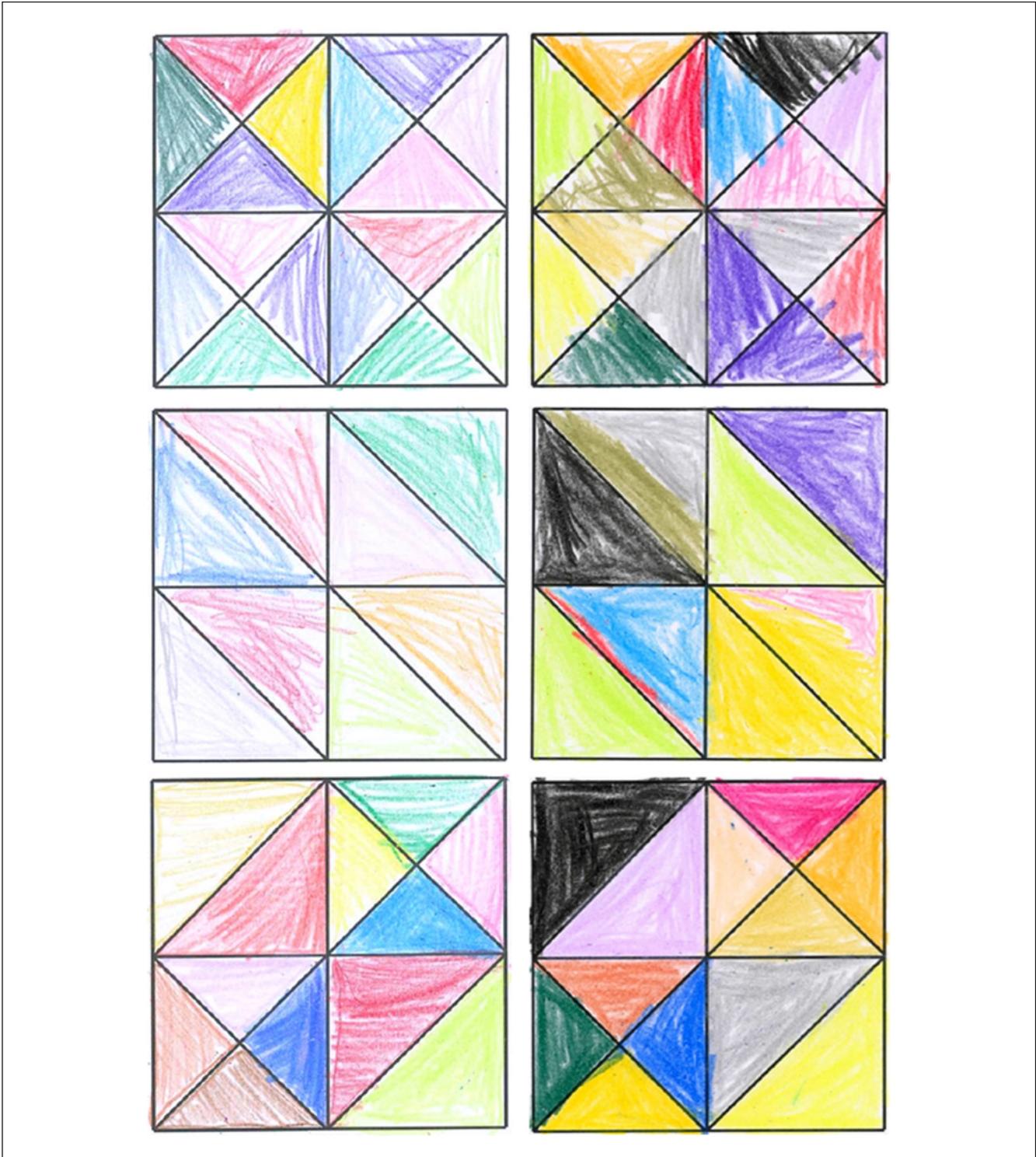


Figure 4. Examples of colorings collected and used as stimuli in Study 3.
 Note. Left: Japanese children's colorings. Right: European Canadian children's colorings.

Americans in Study 2b, this suggests that uniqueness underlies Canadians' preferences for children's colorings. However, we found no correlation between the two tasks among Japanese ($r = -.10, p = .28$).

Study 3b

Method. A total of 103 Japanese child rearers (40 men and 63 women) and 56 European Canadian child rearers (17 men

and 39 women) participated in the study. Japanese participants were recruited from a website posted on Micromill, a Japanese web survey company, and Canadian participants were recruited from a website posted on Amazon's Mechanical Turk. Participants were compensated with a small amount of money and were all parents with children. Canadian child rearers ($M = 34.34$ years, $SD = 9.60$) were younger than Japanese child rearers ($M = 41.34$ years, $SD = 7.81$), $t(157) = 4.98$, $p < .0001$, $d = 0.79$. Based on the ratings collected in Study 3a, two unique colorings and two harmonious colorings from each culture were selected and used in Study 3b. For each child's coloring, participants were presented with seven statements that could be given as feedback. Three of the seven statements related to uniqueness ("express himself or herself freely," "use colors that are distinct from each other," and "make the coloring stand out") and another three related to harmony ("use colors in a harmonious manner," "color along the frame border or stay inside the lines," and "use soft colors or pastels"). The remaining statement was "simply compliment the coloring without encouraging anything." Participants were then asked to rank the likelihood of the statements as feedback so that "1" is the most likely feedback that they would provide. They could add an eighth statement if they liked and then rank all of the statements including the eighth statement.⁶ They were not allowed to use each number more than once for each coloring.

Results and discussion. An ANOVA was performed on child rearers' likelihood rankings for the statements about children's colorings with one between-subject variable (culture of participant: European Canadian and Japanese) and three within-subject variables (culture of coloring: European Canadian and Japanese, feature of coloring: unique and harmonious, statement: uniqueness-related and harmony-related). Results showed a significant interaction between participant culture and statement, $F(1, 157) = 15.14$, $p < .0001$, $r = .30$. Overall, as predicted, Canadian child rearers ($M = 3.85$, $SD = 0.78$) rated uniqueness-related statements as more likely feedback compared with the Japanese child rearers ($M = 4.36$, $SD = 0.76$), $t(157) = 4.62$, $p < .0001$, $d = 0.73$. In contrast, as predicted, Japanese child rearers ($M = 4.35$, $SD = 0.89$) rated harmony-related statements as more likely feedback compared with the Canadian child rearers ($M = 4.52$, $SD = 0.90$), although the difference merely trended toward statistical significance, $t(157) = 1.56$, $p = .12$, $d = 0.25$. The interaction was not qualified by either culture of coloring or feature of coloring.

For each of the statements, an ANOVA with three variables (culture of participant, culture of coloring, and feature of coloring) was also performed. Table 1 shows the mean rankings for the statements. Compared with Japanese child rearers, Canadian child rearers rated two of the three uniqueness-related statements as more likely feedback—"express freely," $F(1, 157) = 12.81$, $p < .001$, $r = .27$; and "stand out," $F(1, 157) = 10.77$, $p < .005$, $r = .25$. In contrast, Japanese

child rearers rated a harmony-related statement ("color along the frame border or stay inside the lines") as marginally more likely feedback than did Canadian child rearers, $F(1, 157) = 3.50$, $p = .063$, $r = .15$.⁷

One potential reason for the weaker cultural difference on child rearers' likelihood rankings for harmony-related statements may be that Japanese child rearers rated the seventh statement "simply compliment the coloring" as more likely feedback than did Canadian child rearers, $F(1, 157) = 7.47$, $p < .01$, $r = .21$. This is consistent with past studies observing that, in Japan, preschool children are likely to be allowed indulgence due to a shared belief that they should be free from frustration and tensions (Benedict, 1946; Lebra, 1976). Such permissiveness in Japanese child-rearing practices might mitigate the extent to which they provide any direct feedback to children about their colorings. Similarly, Rothbaum, Pott, Azuma, Miyake, and Weisz (2000) have described how Japanese children are expected to learn through indirect modeling of behaviors more so than are North American children. Thus, it may be less common for Japanese child rearers to give explicit feedback, relying instead on implicit messages of what is acceptable or desired.

General Discussion

We investigated cultural differences in the relative emphases on uniqueness and harmony at both individual and product levels by using physical objects produced by people in East Asian and Western cultures (i.e., colorings made by Japanese and North American participants). Consistent with our hypotheses, analyses of the physical properties (Study 1) and participants' subjective judgments (Study 2) of the colorings indicated that those produced by Japanese participants were judged as relatively more harmonious, whereas those produced by European Americans were judged as relatively more unique. Moreover, individual preferences were connected to cultural values. These preferences were positively associated with harmony among Japanese participants, while they were positively associated with uniqueness among European Americans. Importantly, even when people were not informed about the cultural origin of colorings, they were likely to prefer those produced by members of their own culture.

The present research provides initial evidence that people produce physical objects in a way that reflects the values and ideas of a given culture and also prefer own-culture physical products over other-culture physical products, even when such physical products do not involve any social context or explicit verbal messages. The preference for own-culture products suggests that individuals play an active role in supporting their own cultural values. The present findings thus propose that cultural systems are maintained through (a) cultural values embodied in products and (b) people's preference for own-culture products that reflect shared cultural values.

Table 1. Japanese and Canadian Child Rearers' Likelihood Rankings for Statements on Children's Colorings in Study 3b.

	Mean ranking (<i>SD</i>)		<i>F</i>	<i>p</i>	<i>r</i>
	Japan (<i>n</i> = 103)	Canada (<i>n</i> = 56)			
Uniqueness-related statement					
Express himself or herself freely	3.54 (1.67)	2.71 (1.46)	12.81	<.001	.27
Use colors that are distinct from each other	4.48 (1.34)	4.41 (1.38)	0.18	.67	.03
Make the coloring stand out	5.04 (1.51)	4.43 (1.46)	10.77	<.005	.25
Harmony-related statement					
Use colors in a harmonious manner	4.11 (1.34)	3.94 (1.34)	1.05	.31	.08
Color along the frame border or stay inside the lines	4.07 (1.61)	4.50 (1.95)	3.50	.06	.15
Use soft colors or pastels	4.87 (1.40)	5.12 (1.48)	2.06	.15	.11
General statement					
Compliment the coloring without encouraging anything	2.29 (1.95)	3.14 (2.18)	7.47	<.01	.21

On a different note, the results obtained in Study 2b from Asians living in the United States and the results obtained in Study 2c from Asian Canadians in Canada suggest that two mechanisms (assimilation into a host culture and persistence of a heritage culture) coexist and influence individuals' preferences depending on their assimilation into a host culture. Participants identifying more with the Western host culture were more likely to prefer products that represented the cultural value of uniqueness (i.e., colorings by North American participants). However, to the extent that participants showed greater levels of identification with their heritage culture, they preferred products more representative of the cultural value of harmony that is characteristic of East Asian culture. Both harmony and uniqueness thus undergirded the preferences of Asian Canadians, who varied in identification with their host and heritage cultures in Study 2c. This suggests the possibility that people's conscious thoughts about their identification with a given culture are linked to the extent to which dominant values and ideas of the culture are selected and maintained through physical objects. Thus, people's identification with their host and heritage cultures may play a role in the relationship between cultural products and individual preferences, thereby forming a basis for cultural change and persistence.

Given that people's identification with their host and heritage cultures influences their preferences, it may also influence their physical products. Thus, it would be informative to collect physical products from bicultural participants and examine how properties of those products relate to harmony and uniqueness in future research. People may be more likely to generate physical products judged as unique if their identification with a Western culture is high. However, people may be more likely to generate physical products judged as harmonious if their identification with an East Asian heritage culture is high. If cultural systems are

maintained through cultural values embodied in physical products and people's preferences for own-culture physical products reflect shared cultural values, then acculturation should have an impact on both of these processes.

Studies 3a and 3b also provide initial evidence that even children produce physical objects in a way that reflects the values and ideas of a given culture and that children's colorings were preferred more by own-culture adults than by the other-culture adults. Moreover, individual preferences for children's products were connected to cultural values. Furthermore, child rearers rated statements related to own-culture values as more likely feedback on children's colorings. These findings suggest that children acquire cultural values and learn to produce them through socialization and that child rearers play an active role in transmitting cultural values to children by refashioning of the products through providing feedback congruent with own-culture values.

Given the findings of Studies 3a and 3b, it would be informative to further examine how and when individuals acquire cultural values, learn to reproduce them through physical media, and then learn to select and maintain them. In the present research, cultural differences in the relative emphases on uniqueness and harmony were present in children aged 4 to 6 years. This difference may also be present in children's preferences for cultural products such that even children may prefer own-culture products. Moreover, given cultural differences represented in patterns of visual art or physical environments to which children have been frequently exposed since they were born (Masuda et al., 2008; Miyamoto et al., 2006), the cultural differences in emphasis on uniqueness versus harmony may emerge among children who are younger than 4 years old. Future research is thus needed to see whether socialization may have an impact on not only physical products embodying cultural values but also on preferences for those cultural products and how early

the cultural difference in emphasizing uniqueness versus harmony might develop.

It is also important to investigate how culturally sanctioned individual preferences and aesthetics emerge during socialization in a given culture. Studies 3a and 3b addressed the socialization process relating to the kinds of values that are encouraged in families in a given culture. Another issue of the socialization process concerns the kinds of cultural products to which children are exposed in their daily lives. In the present globalized world, people have access to cultural products originating from a variety of international sources. Nevertheless, own-culture products, which the current results suggest adults prefer unconsciously, might be more accessible to children than are other-culture products.

In summary, our data directly show, for the first time, the relationship between the generation of physical products and individual preferences. Moreover, they also show that bicultural participants' preferences for colorings depend on their identification with either their heritage culture or their host culture. Furthermore, children also produce physical objects that embody one's cultural values, and the products of children were preferred more by own-culture adults than by the other-culture adults. Children's products were also likely to get feedback from child rearers that fit with own-culture values. Such findings have implications for cultural change and maintenance. In today's globalizing societies, people are constantly exposed not only to own-culture products but also to other-culture products via various media in daily life. One may expect that such globalization leads to a convergence of cultural values and diminishment of cultural differences. However, this view may be too simplistic. Rather, people may create cultural products that embody their cultural values, select own-culture products over other-culture products depending on their identification with a given culture, and transmit them to others. By doing so, people may actively contribute to the maintenance and reinforcement of cultural systems.

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Notes

1. Accidentally, data on the length of stay in Canada were not collected.
2. The heritage cultural backgrounds were as follows: Chinese ($n = 47$), Korean ($n = 10$), Filipino ($n = 4$), Taiwanese ($n = 3$), Japanese ($n = 2$), Vietnamese ($n = 2$), and Pakistani ($n = 1$). Five participants did not report their heritage culture but were identified by the experimenters as East Asian. The results were nearly identical to those reported in the main text if we exclude these five participants.
3. As in Study 2a, we examined the proportion of colorings participants chose conjointly for *both* preference and harmony judgments, which indicates the association between preference and harmony at the level of coloring. The proportions of Japanese colorings chosen in both the harmony and preference tasks were predicted by participants' heritage-culture scores, $\beta = .26$, $t(71) = 2.23$, $p < .05$, and marginally by their mainstream-culture scores, $\beta = -.22$, $t(71) = -1.84$, $p = .07$. In contrast, the proportions of American colorings chosen in both the harmony and preference tasks were predicted only by participants' mainstream-culture scores, $\beta = .35$, $t(71) = 3.00$, $p < .005$, and not by their heritage-culture scores, $\beta = -.02$, $t(71) = 0.86$, $p = .39$. Moreover, as in Study 2b, we also examined the proportions of American colorings that participants chose for *both* the preference and uniqueness judgments, which indicate the association between preference and uniqueness at the level of individual colorings. The proportions of American colorings chosen in both the uniqueness and preference tasks were predicted only by the participants' heritage-culture scores: $\beta = -.32$, $t(71) = -2.71$, $p < .01$. However, the proportions of Japanese colorings chosen in both the uniqueness and preference tasks were predicted by neither the heritage-culture scores nor the mainstream-culture scores ($ts < 1$). Thus, harmony strongly predicted preferences for Japanese colorings among Asian Canadians, who identified more with their heritage culture, and for American colorings among Asian Canadians, who identified more with their mainstream culture. Moreover, Asian Canadians who identified more with their heritage culture were less likely to prefer those American colorings that they also judged to be unique.
4. We also found a main effect of participant culture in the uniqueness task. Japanese participants perceived Canadian children's colorings as more unique ($M = 62.5\%$, $SD = 7.1\%$) than did Canadian participants ($M = 58.1\%$, $SD = 8.6\%$), $F(1, 85) = 6.26$, $p < .05$, $r = .26$. In contrast, harmony ratings did not differ by participant culture, $p > .40$ ($M_{\text{Japanese}} = 62.7\%$, $SD = 6.1\%$; $M_{\text{Canadians}} = 61.5\%$, $SD = 7.3\%$).
5. One unexpected finding is that Canadian children's colorings were not preferred over Japanese children's colorings by Canadian undergraduates. One potential reason for the unexpected finding may be that Canadian children did not color as neatly as the Japanese children did. Indeed, Canadian children's colorings (10 out of 48) were more likely to run off the edge (e.g., the top-right coloring in Figure 4) than Japanese children's colorings (2 out of 48), $\chi^2(1) = 4.64$, $p < .05$. However, it is important to note that, despite the cultural difference in the neatness of the colorings, Canadian children's colorings were still preferred more by Canadian adults than by Japanese adults, and Japanese children's colorings were preferred more by Japanese adults than by Canadian adults.

6. A total of 146 statements (93 from Japanese child rearers and 53 from Canadian child rearers) were collected as the eighth statement. Japanese child rearers were likely to add statements that encouraged children to explain what the coloring is meant to be (20 out of 93) and to color neatly (12 out of 93), whereas no Canadian child rearer added these statements, $\chi^2(1) = 13.21$ and $7.45, p < .001$ and $.01$. Canadian child rearers (22 out of 53) were more likely than the Japanese child rearers (14 out of 93) to add statements that specified compliments such as “compliment on great job done” and “compliment on neatness,” $\chi^2(1) = 12.72, p < .001$.
7. A three-way interaction among culture of participant, culture of coloring, and feature of coloring was significant for a harmony-related statement (“color along the frame border or stay inside the lines”), $F(1, 157) = 4.79, p < .05, r = .17$. A tendency whereby Japanese child rearers rated it as more likely feedback than did Canadian child rearers trended for unique colorings conducted by the Japanese children, $M_s = 3.69$ vs. $4.30, t(157) = 1.72, p < .10, d = 0.27$, and harmonious colorings conducted by the Canadian children, $M_s = 4.40$ vs. $5.07, t(157) = 1.92, p < .10, d = 0.31$. Except for this, any statistically significant interaction including culture of participant was not found in the analyses of each statement.

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