# The Leopard Cannot Change His Spots, or Can He? Culture and the Development of Lay Theories of Change

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*Chinese and Canadian children were compared to examine cultural and developmental differences in lay theories of change: implicit beliefs about how the world develops and changes over time. Chinese and Canadian children (ages 7, 9, and 11 years) made predictions about future performance, relationships, happiness, and parental incomes based on a series of scenarios. Overall, the Chinese children predicted greater change than did the Canadian children, indicating that they believed more in change than did the Canadians. Moreover, cultural differences increased significantly with age: In comparison with their Canadian counterparts, Chinese children made no more change predictions at age 7, made slightly more change predictions at age 9, and made significantly more change predictions at age 11. This was true for questions starting with an extremely positive or negative state and those starting with a neutral state. Reasons for cultural and developmental differences were discussed.*

***Keywords:*** *culture; lay theories of change; development; prediction*

"You can't teach an old dog new tricks." "The leopard cannot change his spots." These popular sayings suggest that North Americans believe in stability. In contrast, there are many popular Chinese sayings reflecting their belief in change. For example, "Only the wisest and stupidest of men never change" and "A person changes so much in 3 days that you have to look him/her over carefully." A person's implicit beliefs about how the world develops and changes form that person's lay theories of change (Ji, 2005). These theories of change influence how a person predicts the future, interprets events, and makes decisions and judgments, which consequently have further impact on the person's emotions and motivation. Research with adults indicates that culture can affect how people reason about the world, but so far research has not addressed the role of culture in the development of lay theories of change in childhood. This article investigates how cultural background and age can influence children's beliefs about change.

### *Culture, Reasoning, and Lay Theories of Change*

Nisbett and his colleagues (Nisbett, 2003; Nisbett, Peng, Choi, & Norenzayan, 2001) argued that European North Americans tend to think analytically by attending to focal objects and individual entities, neglecting the context, and attributing behaviors to fixed disposition, whereas East Asians (including Chinese) tend to think holistically by attending to the context and the relationship between the object and the context instead of focusing on the object or event in isolation. In addition, they attribute behaviors to situations more than do North Americans. In their reasoning processes, they emphasize relationships, change, and contradictions

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rather than logic (see also Ji, Peng, & Nisbett, 2000; Kitayama, Duffy, Kawamura, & Larsen, 2003; Peng & Nisbett, 1999).

Culture also affects people's predictions about how future events will develop. North Americans tend to believe more in inertia, that is, they believe that objects and events tend to remain in their current state (no change) or continue in the same trajectory (linear change). In contrast, Chinese tend to believe that objects and events are constantly changing in both the rate and direction of their development. Empirical evidence is consistent with such distinctions. In one study (Ji, Nisbett, & Su, 2001), European American and Chinese university students read scenarios and then predicted the likelihood that an opposite future event will occur. For example, "Two kids are fighting in kindergarten. How likely is it that they will become lovers some day?" Compared with European American participants, Chinese participants predicted a greater likelihood for change in the development of interpersonal relationships. Specifically, compared to American participants, Chinese participants thought it more likely that the two fighting children would become lovers someday (42.7% vs. 22.3%) and that two people dating in university would break up later on (60.5% vs. 43.4%). In another study (Ji et al., 2001, Study 3), when told that money spent on advertising directed to children has been increasing during the past 5 years, Americans tended to predict that it would continue to increase at a similar rate and in the same direction (going up); in contrast, Chinese tended to predict a reversal in the development of events. Such cultural differences have been found not only for individual behaviors but also for group and institutional behaviors, such as the behavior of the stock market (Ji, Zhang, & Guo, 2008).

### *Age Differences in Reasoning*

North Americans tend to view behavior as a product of the actor's dispositions and often ignore important situational determinants of behavior (Choi, Nisbett, & Norenzayan, 1999; Morris & Peng, 1994), whereas Asians tend to attend more to contextual factors and explain behavior in terms of situations. To examine the development of these thinking styles, J. G. Miller (1984) studied Hindu and American 8-, 11-, and 15-year-old children and adults and found that cultural differences increased with age. All participants produced narratives on two prosocial and two deviant behaviors and then explained why the behaviors took place. J. G. Miller observed that American adults made more references to general dispositions than did Hindu adults. However, the cross-cultural differences were less pronounced among the children, suggesting that the influence of culture increased with age.

Similarly, research into the development of social cognition has shown that young children are usually reluctant to infer consistency and stability in a person's behavior. In a study of psychological/intentional causal relations, Kalish (2002) found that American children between the ages of 4 to 5 and 7 to 8 years often predicted change rather than stability: They expected people to behave differently in the future than they had behaved in the past. Relative to 4- and 5-year-olds, however, the 7- and 8-year-olds predicted more consistency and less change. In addition, the adults in the study made predictions of stability more than either group of children. Thus, Kalish's study suggests that cultural beliefs about stability and change are learned and reinforced with age.

### *Cultural Difference in Child Rearing and Socialization*

One important cultural difference in child rearing is beliefs about success and failure. Many Chinese believe that success (or fortune) and failure (or misfortune) can transform into each other, as reflected in some Chinese proverbs. For example, "Failure proceeds success" (see *Great Dictionary of Chinese Idioms* published by China Publishing House in 1985) and "The gem cannot be polished without friction, nor can man be perfected without trials" (see "the Classic of Rites" compiled by numerous Confucian scholars during the Warring States Period). It is a common belief among Chinese people that if a person is too proud and stops trying after having succeeded, then that person is likely to fail next time. Conversely, they believe that learning from failure and trying harder can lead one to subsequent success.

This belief is illustrated in Chinese culture by parental responses to children's successes and failures. The following scenario should sound familiar to most Chinese people (see also Stevenson & Stigler, 1992). If a Chinese child scored 98 out of 100 on a test, the Chinese parent would likely respond, "How come you lost two points? You need to study harder and score higher next time." Indeed even if the child achieved a perfect score, a Chinese parent might still say, "Don't become too proud; otherwise you will do poorly next time." After repeatedly experiencing these reactions to their achievements, Chinese children learn that success does not guarantee success and may lead to failure, and vice versa. In contrast, a North American child would receive a much warmer response from his or her parents for a similar level of performance. The parents are more likely to become excited and praise the child, "Good job! You are so smart! You will have a bright future." Thus, a North American child may be less likely to associate current success with future failure and, instead, assume continued success.

Chinese parents and teachers firmly believe in the power of effort and its relationship to success in performance; such a view is also shared by Chinese children (Stevenson & Lee, 1996). Chinese students put greater effort into academic pursuits than do Anglo-Australian and Euro-American students (D. A. Rosenthal & Feldman, 1991). In addition, Chinese children are more likely to attribute academic success to their effort, whereas American children are more likely to attribute academic success to ability (Stevenson & Stigler, 1992). Heine and colleagues (Heine et al., 2001) also reported that Americans are less likely to view their performance as susceptible to change by effort.

These types of parental response are not limited to academic performance. They apply to many other aspects of the socialization process. Research has found that North American parents or caregivers are likely to emphasize what the child is able to accomplish. They help provide affirmation to the child by emphasizing success and downplaying failure or transgression (P. J. Miller, Wiley, Fung, & Liang, 1997). In contrast, Chinese parents place more emphasis on how the child can improve and are more likely than North American parents to discuss failure and transgression with the child and describe ways to correct them in the future (P. J. Miller et al., 1997).

In addition, Chinese (and Japanese) teachers are more likely than American teachers to discuss students' mistakes in public and regard mistakes as an indicator of what still needs to be learned and as a natural part of the learning process (Stevenson & Stigler, 1992). They hold the belief that everyone can improve and succeed. In contrast, North American teachers are reluctant to air their students' mistakes in public for fear of harming a student's self-esteem. Indeed, research with American elementary school students has shown that effective teachers use positive motivation (such as praising students for specific accomplishments) more often than less effective teachers, whereas publicly criticizing students is associated with less effective teaching (Bohn, Roehrig, & Pressley, 2004).

Research also has shown that American and Chinese mothers have different ways of dealing with their children's emotional experiences (Wang, 2001). American mothers are more likely to work with a child to explain and understand why the child feels the way he or she does. In contrast, Chinese mothers focus on teaching the child the moral appropriateness of his or her emotional experience or behaviors. When discussing negative emotional events, Chinese mothers are more likely than American mothers to finish the discussion by reestablishing the relationship between the child and the person who caused the negative emotion (e.g., "Dad didn't let you step in the water because he was worried that you might get a cold. He loves you"), impressing on the child that there are ways for emotion or a relationship to change.

Thus, the socialization process is quite different for Chinese and North American children. In particular, Chinese socialization focuses on the idea of transformation between failure and success, the importance of effort and self-improvement, and the harmonizing of negative emotional experience. In contrast, North American socialization emphasizes children's success and good feelings about themselves (especially about their abilities) and values self-expression and self-understanding. These cultural differences in socialization may, in turn, lead to differences in reasoning among Chinese and North American children.

### *Current Research*

The present research attempted to further investigate the relationships between culture and lay theories of change. Specifically, how do children in different cultures develop these lay theories and when do cultural differences in predictions start to emerge? A developmental study of school-age children was conducted to answer these questions. Canadian and Chinese children were recruited from three age groups: 7-, 9-, and 11-year-olds. Seven-year-olds were selected as the youngest age group because past research has suggested that 7-year-olds (North Americans) often make predictions of change, rather than stability, and they do so in a nonrandom manner (Kalish, 2002). In addition, both Canadian and Chinese children were included in the study because past research has largely relied on comparisons between North Americans and East Asians (including Chinese, Japanese, and Koreans). Participants of the study were asked to make predictions in the following domains: individual and group performance, interpersonal relationship, personal happiness, and parental income. These domains were selected because they were considered familiar to both Canadian and Chinese children.

Based on past research (Ji, 2005; Ji et al., 2001), we predicted that Chinese participants would predict greater change than would Canadians. Moreover, cultural differences in lay theories of change would increase with age, assuming that socialization is responsible for cultural differences in reasoning.

## METHOD

### *Participants*

One hundred eight Mandarin-speaking Chinese children (54 boys, 54 girls) were recruited in 2002 from an elementary school in a small city in Northeast China, and

67 English-speaking European Canadian children (31 boys, 36 girls) were recruited between 2002 and 2003 from two elementary schools at a southeastern Ontario city of comparable geographical size (but with a much smaller population). These children belonged to three different age groups: 7-year-olds (36 Chinese, 22 Canadians), 9-year-olds (36 Chinese, 24 Canadians), and 11-year-olds (36 Chinese, 21 Canadians).

The Chinese children were recruited from a school located in a historical city. Unlike large cities or coastal cities, the city was not well developed and was falling behind in terms of social economic reforms. The city was chosen partly because the actual change in people's lives was less dramatic in comparison to many other places in China. Most of the parents of the Chinese students had received some high school or college education. The two schools in Canada were located in a historical city in southeastern Ontario. The Canadian city had been expanding in recent years. The Canadian parents had high school or college education.

### Materials

The questionnaire contained five scenarios dealing with individual performance in a game, relationships between two children, happiness, parental income, and group performance in a game (see details in the appendix). These scenarios were chosen because they were familiar to both Chinese and Canadian children. For each scenario, children were told that five possible states existed (similar to a 5-point scale). For example, children were first told that a character could be *very unhappy* (1), *unhappy* (2), *so-so* (or not happy or unhappy) (3), *happy* (4), or *very happy* (5). Then children were told that the character (or group) in the scenario was at one of these states (such as *very happy*). The children's task was to predict the state for the next period of time. Within each of the five scenarios, children made predictions for three different characters (or groups) corresponding to three different starting states (1, 3, and 5). The order of these starting states was randomized across different scenarios. In total, five questions started with a neutral state (3), five questions started with an extremely positive state (5), and five questions started with an extremely negative state (1). For example, "Lily was not happy or unhappy (feeling so-so) at age 6," "Lynn was very unhappy at age 6," and "Jill was very happy at age 6." After learning about each character's past happiness state, the children predicted future happiness for the character.

The different states were presented verbally and visually for each scenario. For example, different states of happiness were represented visually using a set of pictures of unhappy and happy faces. The experimenter would point to a *very unhappy* face while telling the participant that "Lynn was very unhappy at age 6." Children would then make their predictions in words and by pointing to the picture representations.

Pictures were used with all verbal questions to ensure that the young children understood the scenarios and could provide clear responses. Pictures of ribbons of different sizes were used to depict different states of individual or group performance (e.g., the best performance received the biggest ribbon and the second best received the second biggest ribbon); pictures of two children in different states were used to depict different interpersonal relationships (e.g., hugging or holding hands for a very good or good relationship and turning away from each other for a bad relationship); and pictures of piles of money were used to indicate the state of parental income (e.g., a huge pile of paper money for a high income and a small pile of paper money for a small income).

The questions were first developed in Chinese and then translated into English by the author. Two bilingual research assistants examined both versions of the questions to ensure that the meaning was equivalent in both English and Chinese. Originally, the ribbons in the Chinese version were called "red flowers" because Chinese teachers reward student performance with little red flowers (on paper in red ink, usually). To accommodate the Canadian practice, we decided to call them "ribbons." Fortunately, the pictures looked like both (flowers and ribbons) and thus we were able to use the same pictures. Data collection only started after the translation was deemed satisfactory.

### Procedure

*Prediction task*. The study was conducted by native speakers in both countries. The experimenter led the individual child to a designated quiet room and then explained the task, making clear that this was not a test and that there was no right or wrong answer. If the child had questions, the experimenter answered them. Then the experimenter started reading the questionnaire while pointing to the accompanying pictures. Before beginning the questions for each scenario, the experimenter asked questions to ensure that the child understood the scenario and the pictures. For example, the experimenter asked the child after the instruction for the individual performance scenario, "If someone got the fourth highest score, which ribbon, among these five on the picture, do you think he/she should receive?" The children were then asked to make verbal predictions while pointing to the pictures. They rated only same-gender characters.

*Qualitative justification of responses*. To understand the process behind their predictions, the experimenter

**TABLE 1:** Absolute Change Scores for Different Scenarios

| | *Canadians* | | | *Chinese* | | |
|---|---|---|---|---|---|---|
| Age | 7 | 9 | 11 | 7 | 9 | 11 |
| Individual performance | 1.56 | 1.04 | 0.95 | 1.30 | 1.68 | 1.67 |
| Relationship | 1.67 | 1.07 | 0.87 | 1.58 | 1.15 | 1.44 |
| Happiness | 1.61 | 1.06 | 0.87 | 1.81 | 1.15 | 1.41 |
| Income | 1.88 | 1.17 | 0.89 | 1.69 | 1.17 | 1.34 |
| Group performance | 1.77 | 0.97 | 0.95 | 1.62 | 1.19 | 1.57 |

asked children to justify their predictions for some questions. All Canadian children were given the opportunity to justify their predictions for two different questions pertaining to different scenarios; however, not all Chinese children provided justifications for two questions. As a result, some Chinese children were asked once ($n = 39$) or twice ($n = 15$) to explain their explanations, whereas other Chinese children were not asked at all ($n = 54$). Thus, there were more responses from Canadian children than from Chinese children.

The Chinese children's justifications were translated into English first and then the justifications by both Chinese and Canadian children were examined together to identify the major themes. A coding scheme with categories was developed to correspond to these themes. Two independent coders who were not aware of the research hypotheses coded all of the justification data. Consistency between the two coders was 88%. Disagreement was resolved by discussion until consensus was reached.

## RESULTS

### *Data Transformation*

Based on a 5-point scale design, we computed the absolute difference between children's predictions and the given state. For example, if a participant predicted that the target would be *very happy* (labeled as 5) after being told that that target was currently *very unhappy* (labeled as 1), then the participant would receive a change score of 4 for this prediction.

Overall, there was high within-participant consistency across different questions and scenarios (Cronbach's $\alpha = .85$ for Canadians and .80 for Chinese), indicating that the children were consistent in their responses and were not giving answers randomly.

### *The Degree of Change: Overall Response*

A preliminary 2 (culture) × 3 (age) × 5 (scenario) × 2 (gender) repeated-measures ANOVA showed no main effect for scenario or gender, $F$s < 1, although there were Age × Scenario × Gender, $F(8, 322) = 2.72$, $p < .01$, and Culture × Scenario × Gender interaction effects, $F(4, 160) = 2.74$, $p < .05$. These effects were due to age and gender differences on the relationship scenario. Specifically, boys predicted greater change than did girls at age 7, whereas 11-year-old boys predicted less change than did 11-year-old girls. Also, Canadian boys predicted greater change than did Canadian girls for this scenario, whereas Chinese showed no gender difference. Despite these interactions involving scenario and gender, the same general pattern of results was found for each scenario, as shown in Table 1, so that these factors were not considered further.

A 2 (culture) × 3 (age) ANOVA was conducted with the mean change score across all 15 questions as the dependent variable. There was a main effect of culture, $F(1, 169) = 10.04$, $p = .002$. Overall, Chinese children had higher change scores ($M = 1.38$, $SD = 0.44$) than did Canadian children ($M = 1.17$, $SD = 0.52$). There was a significant main effect of age, $F(2, 169) = 19.34$, $p < .001$, such that 7-year-old children ($M = 1.55$, $SD = 0.46$) had higher change scores than did either 9-year-olds ($M = 1.14$, $SD = 0.42$) or 11-year-olds ($M = 1.20$, $SD = 0.47$), $p$s < .001; the two latter groups did not differ from one another. There was also a Culture × Age interaction, $F(2, 169) = 7.49$, $p = .001$. Specifically, as expected, there was no cultural difference in change scores for the 7-year-olds ($M$ difference = 0.10), $F(1, 56) < 1$. The cultural difference became marginal for the 9-year-olds ($M$ difference = 0.19), $F(1, 58) = 3.18$, $p = .08$, and it became significant for the 11-year-olds ($M$ difference = 0.53), $F(1, 55) = 23.89$, $p < .001$. To examine whether cultural differences changed in a linear fashion with age increase, a linear contrast analysis (R. Rosenthal & Rosnow, 1991) was conducted with contrast coefficients of –1, 0, and +1 for ages 7, 9, and 11. The result further confirms that with increasing age, cultural differences became greater, $t(172) = 5.43$, $p < .001$.

### *The Direction of Change: Response to Questions Starting With Extreme States*

We have shown that with increasing age, Chinese children made more change predictions than did Canadian

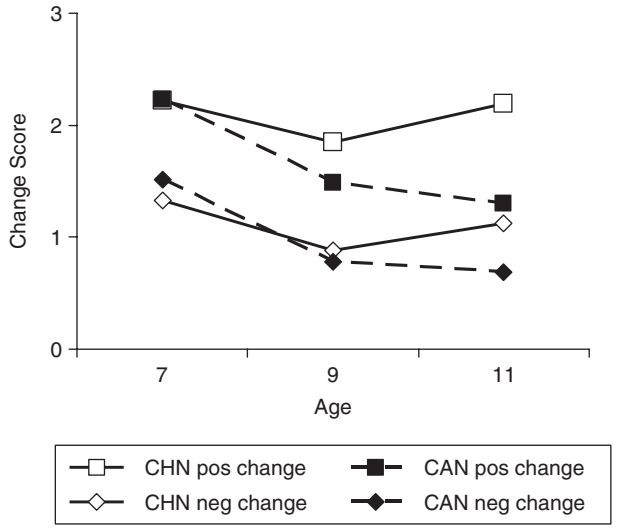


**Figure 1** Directional change scores for questions starting with an extremely positive and negative state.
NOTE: CHN = Chinese; CAN = Canadian.

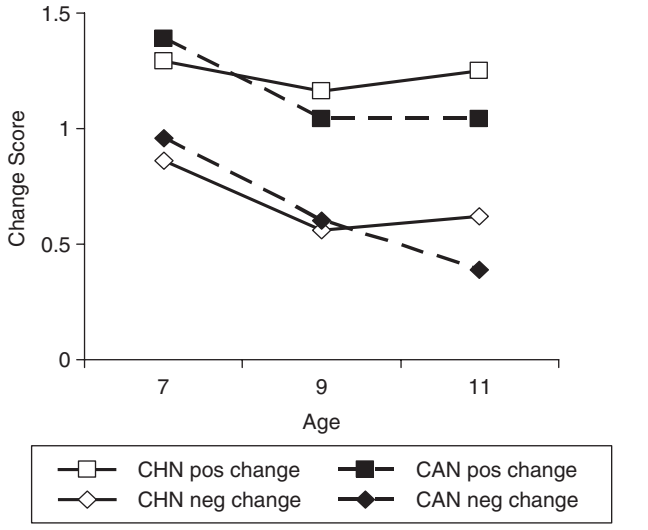


**Figure 2** Directional change scores for questions starting with a neutral state.
NOTE: CHN = Chinese; CAN = Canadian.

children. But are Chinese children making more change predictions than are Canadian children in both positive and negative directions? The following analysis indicates that the answer is "yes."

The same patterns of results were obtained when data analysis was conducted separately for questions starting with an extremely positive state (5) and for questions starting with an extremely negative state (1; see Figure 1). For questions starting with the most positive states (e.g., the biggest ribbon, very happy, very good relation, and very large amount of money), there was a marginally significant interaction effect of Culture × Age on the change prediction, $F(2, 169) = 2.92$, $p < .06$. The cultural difference was not significant at age 7, $F(1, 56) < 1$, or at age 9, $F(1, 58) < 1$, but became significant at age 11, $F(1, 55) = 5.76$, $p = .02$, such that Chinese children predicted greater change in the negative direction than did Canadian children.

For questions starting with the most negative states (e.g., the smallest ribbon, very unhappy, very bad relations, and very small amount of money), a significant interaction effect of Culture × Age was found, $F(2, 169) = 4.42$, $p = .01$. The cultural difference was not significant at age 7, $F(1, 56) < 1$, showed a weak trend at age 9, $F(1, 58) = 2.71$, $p < .11$, and became significant at age 11, $F(1, 55) = 19.76$, $p < .001$. Thus, Chinese 11-year-olds also predicted greater change in the positive direction than did their Canadian counterparts.

Figure 1 also shows that regardless of culture or age, children were more likely to predict positive change than negative change, $F(1, 169) = 192.01$, $p < .001$. These results probably reflect an optimistic view of life commonly held by both Chinese and Canadian children.

### *The Degree and Direction of Change: Response to Questions Starting With a Neutral State*

A similar pattern of results was obtained for questions starting with a neutral state. Overall, the Chinese ($M = 1.15$, $SD = 0.32$) had higher change scores than did the Canadians ($M = 1.01$, $SD = 0.44$), $F(1, 169) = 8.26$, $p < .01$, and there was a significant effect of age, $F(2, 169) = 18.69$, $p < .001$. These main effects, however, were qualified by an interaction effect of Culture × Age, $F(2, 169) = 7.61$, $p = .001$. Specifically, the cultural difference was not significant at age 7 ($M = 1.25$, $SD = 0.31$ for Chinese and $M = 1.35$, $SD = 0.35$ for Canadians), $F(1, 56) = 1.39$, $p > .24$, showed a trend at age 9 ($M = 1.07$, $SD = 0.37$ for Chinese and $M = 0.92$, $SD = 0.35$ for Canadians), $F(1, 58) = 2.66$, $p < .11$, and became significant at age 11 ($M = 1.14$, $SD = 0.24$ for Chinese and $M = 0.74$, $SD = 0.39$ for Canadians), $F(1, 55) = 22.36$, $p < .001$.

For questions starting with a neutral state, if children predicted change, then the change could be in either a positive or a negative direction. Most of the Chinese (105 out of 108, or 97.2%) and Canadians (65 out of 67, or 97%) made at least one positive change prediction (the possible range was from 0 to 5). For positive change scores, a 2 (culture) × 3 (age) ANOVA revealed a significant Culture × Age interaction, $F(2, 169) = 3.01$, $p = .05$. Specifically, the two cultural groups did not differ at age 7, $F(1, 56) < 1$, *ns*, or at age 9, $F(1, 58) = 1.49$,

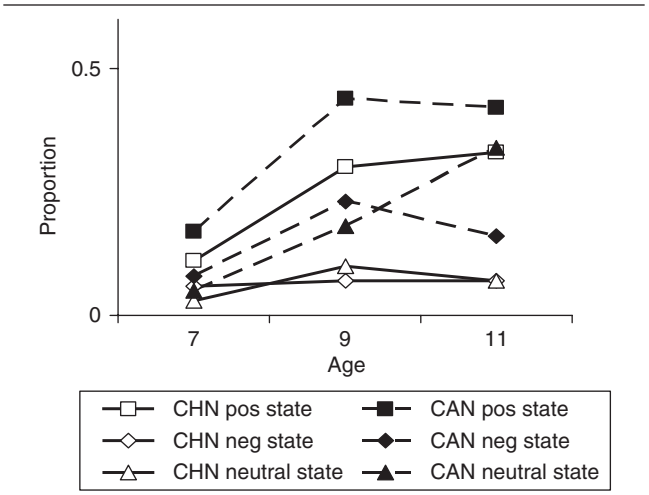


**Figure 3** Proportions of no-change responses.
NOTE: CHN = Chinese; CAN = Canadian.

$p > .22$. The cultural difference was significant at age 11, $F(1, 55) = 7.88$, $p < .01$, such that Chinese 11-year-olds predicted more positive changes than did their Canadian counterparts (see Figure 2). Fewer Canadians (35 out of 67, or 52.2%) and Chinese (66 out of 108, or 61.1%) made at least one negative change prediction. As a result, the variance was greater in this condition, resulting in no significant cultural differences' being found in the data analyses, although it can be seen from Figure 2 that the pattern of results for both Chinese and Canadians was very similar to that for positive changes.

### *Proportion of No-Change Responses*

The proportion of no-change responses was computed for each of the three states (extremely positive, extremely negative, and neutral). A 2 (culture) × 3 (age) × 3 (state) × 2 (gender) repeated ANOVA was conducted. Overall, Canadian children ($M = 0.23$, $SD = 0.22$) gave more no-change responses than did Chinese children ($M = 0.13$, $SD = 0.15$), $F(1, 163) = 14.59$, $p < .001$. In addition, 7-year-olds ($M = 0.08$, $SD = 0.12$) provided fewer no-change responses than did either 9-year-olds ($M = 0.21$, $SD = 0.22$) or 11-year-olds ($M = 0.21$, $SD = 0.19$), $F(2, 163) = 12.74$, $p < .001$. Children gave more no-change responses for the questions starting with a positive state ($M = 0.28$, $SD = 0.30$) than those starting with a negative ($M = 0.10$, $SD = 0.19$) or neutral state ($M = 0.11$, $SD = 0.21$), $F(2, 326) = 58.20$, $p < .001$.

In addition, there was a significant Age × State interaction effect, $F(4, 326) = 5.06$, $p = .001$, but this was qualified by a Culture × Age × State interaction, $F(4, 326) = 2.86$, $p < .05$. Specifically, 9-year-olds and 11-year-olds were not different from each other except for questions starting with a neutral state where 11-year-old Canadians provided more no-change responses than did the 9-year-old Canadians, as seen in Figure 3.

There was a significant State × Gender interaction effect, $F(2, 326) = 5.97$, $p < .01$, but this was qualified by a State × Age × Gender interaction, $F(4, 326) = 3.94$, $p < .01$. Specifically, for questions starting with a negative state, 11-year-old boys ($M = 0.16$, $SD = 0.23$) gave more no-change responses than did 11-year-old girls ($M = 0.06$, $SD = 0.11$).

Thus, apart from the 11-year-old Canadians in the neutral state condition, overall, Chinese and Canadian children showed similar developmental trends in the frequencies of no-change responses they provided. This indicates that the cultural differences in the developmental patterns of change predictions, as reported in the earlier section, were not due to the frequency of making change predictions but instead were due to the degree of change in children's predictions, as will be shown below.

### *Frequencies of Extreme Change Scores*

Table 2 shows the distributions of different change scores for the 10 questions starting with an extreme state. It is particularly interesting to examine how often children made large change predictions (prediction scores were 3 or 4). Overall, 7-year-olds made more extreme change predictions than did the older groups, $F(2, 169) = 8.34$, $p < .001$, and the Chinese children ($M = 2.23$, $SD = 2.18$) made more extreme change predictions than did the Canadian children ($M = 1.64$, $SD = 1.91$), $F(1, 169) = 3.78$, $p = .05$. However, the Chinese made significantly more extreme change predictions than did the Canadians at age 11 but not at age 7 or 9, $F(2, 169) = 6.12$, $p < .01$.

### *Qualitative Justification Data*

In total, Canadians provided 105 (27, 41, and 37 for ages 7, 9, and 11, respectively) and Chinese provided 51 (11, 20, and 20 for ages 7, 9, and 11, respectively) meaningful justifications. Generally, 7-year-olds were more likely to give no answers ("I don't know" or "I guessed") compared to the older groups. No single category captured the majority of justifications given by either group of children for their responses (see Table 3). Following are the most frequently given categories of justifications.

*Stability versus change*. The two categories most relevant to this article are "stability" and "change." Stability is defined as "any mention of no change, stability, or consistency," such as "It will stay the same" or "They will not change." Change is defined as "any mention of beliefs in change," such as "It has to change" or "She can't always be unhappy." Overall, Canadian children (17.1%) mentioned belief in stability more often than did Chinese children (2%), $\chi^2(1) = 7.40$, $p < .01$. For example, a

**TABLE 2:** Change Score Mean Frequency Distributions for the 10 Questions Starting With the Extreme States

| | *Canadians* | | | *Chinese* | | |
|---|---|---|---|---|---|---|
| Change score | 7 | 9 | 11 | 7 | 9 | 11 |
| 0 | 1.27 | 3.33 | 2.90 | 0.83 | 1.83 | 2.00 |
| 1 | 3.77 | 4.08 | 5.00 | 4.50 | 5.28 | 3.64 |
| 2 | 1.86 | 1.33 | 1.52 | 2.14 | 1.33 | 1.75 |
| 3 | 1.18 | 0.42 | 0.43 | 1.14 | 0.53 | 1.00 |
| 4 | 1.91 | 0.83 | 0.14 | 1.39 | 1.03 | 1.61 |

**TABLE 3:** Explanations by Canadian and Chinese Children

| | *Canada* | | *China* | | *Cultural Difference Significance Test* |
|---|---|---|---|---|---|
| | *Frequency* | *%* | *Frequency* | *%* | |
| Stability | 18 | 17.1 | 1 | 2.0 | $p < .01$ |
| Change | 39 | 37.1 | 21 | 41.2 | *ns* |
| Effort | 11 | 10.5 | 13 | 25.5 | $p < .02$ |
| Pride | 0 | 0 | 7 | 13.7 | $p < .001$ |
| Trait | 7 | 6.7 | 0 | 0 | $p < .10$ |
| Personal | 5 | 4.8 | 0 | 0 | $p = .11$ |
| Other | 25 | 23.8 | 9 | 17.6 | *ns* |
| Total # of meaningful explanation | 105 | 100% | 51 | 100% | |

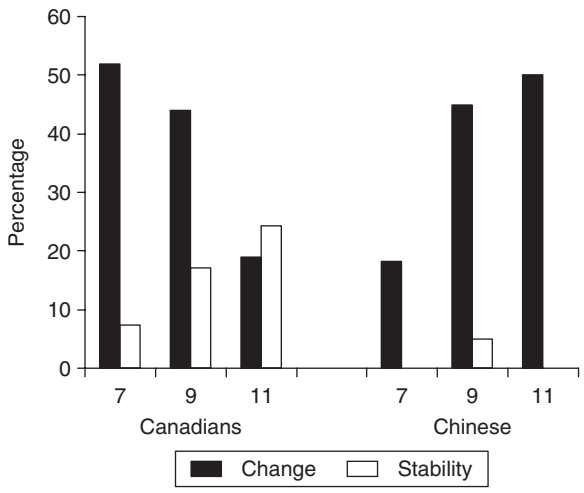


**Figure 4** Percentage of change and stability justifications given by Canadian and Chinese children.

Canadian child might say, "If they don't like each other now, they won't like each other later" or "They play the same game and usually will get the same place again." Chinese children (41.2%) mentioned beliefs in change slightly more than did Canadian children (37.1%) but the effect was not significant, $\chi^2(1) < 1$, *ns*. An examination of the data reveals that this was due to a different developmental pattern in the two cultures. As seen in Figure 4, Canadian children at a younger age (7 and 9) mentioned belief in change often, but this tendency decreased with age, Wald (1) = 7.43, $p = .006$, odds ratio = .47, whereas there was a trend for Canadian children to believe more in stability as age increases, Wald (1) = 3.00, $p = .08$, odds ratio = 1.88. In contrast, Chinese children showed a trend of mentioning more belief in change with age increase, Wald (1) = 2.50, $p = .11$, odds ratio = 1.88, whereas there was no significant trend in mentioning stability across age groups, Wald (1) = .05, $p > .81$.

*Other significant categories*. Effort and pride were two other categories mentioned frequently by Chinese children. Effort is defined as "any mention of effort (or lack of it), working hard, and practice." Pride is defined as "any mention of pride, or feeling good about oneself after success." Overall, Chinese children (25.5%) mentioned effort more often than did Canadian children (10.5%), $\chi^2(1) = 5.94$, $p < .02$. In addition, 13.7% of the Chinese children's justifications referred to pride, whereas no Canadian children mentioned it, $\chi^2(1) = 15.09$, $p < .001$. For example, a Chinese child might say, "He performed the best last time. He felt too proud of himself and stopped working hard, so he will be the last this time."

Personal and trait were categories provided by Canadian children. Personal is defined as relating to personal experience, such as "I was not happy when I was 7" or "because when I broke my classmate's stuff we became friends"; 4.8% of the Canadian justifications were coded as personal. Trait is defined as inferring traits or internal characteristics, such as "because he is competitive" or "because he doesn't seem like a very

enthusiastic person"; 6.7% of the Canadian justifications were coded as trait. No Chinese children offered these types of responses, even though these cultural differences did not reach statistical significance, $\chi^2$s > 2.51, $p$s ≤ .11.

## DISCUSSION

Overall, we found that Chinese children predicted change more often than did Canadian children. Moreover, such cultural influences on predictions of stability and change increased with age. Although there were no differences between Chinese and Canadian children's predictions at age 7, significant differences appeared by the age of 11. This finding strongly suggests that different cultures cultivate different lay theories of change and that children learn and master these theories over time. As a result, cultural differences become greater with age.

It is also important to note that the Chinese children, especially the 11-year-olds, predicted both positive and negative change more often than did their Canadian counterparts. This indicates that the Chinese children did not believe that change would happen only in one direction; instead, they believed that change could happen in both directions, from good to bad and from bad to good, suggesting a nonlinear understanding of the world.

These findings are complemented by the justifications for their responses given by the children. Cultural differences in child rearing are apparent in the types of justification given by the children. Canadian children gave justifications that signify stability, whereas Chinese children, especially the 11-year-olds, gave more responses that signify change. Canadian and Chinese children also showed an opposite developmental trend across age: Canadian children's belief in change decreased with age, whereas Chinese children's belief in change increased with age. Given the emphasis placed on effort and pride by parents and teachers in China, it is not surprising that these categories of justification arose fairly often in the answers of Chinese children.

One alternative explanation for the cultural differences observed in the present study is response bias, such that a strong preference for the midpoint on a scale may lead Chinese children to make predictions that resemble change. In a study with 5,162 11th-graders, Chen, Lee, and Stevenson (1995) reported a small but significant bias in responses of Japanese and Chinese participants who were more likely than Americans and Canadians to endorse the midpoint on a scale. However, the authors noted that the huge cross-cultural differences between Chinese/Japanese and North Americans remained even when they controlled for the response bias. Such a midpoint preference response bias has not been found in other cross-cultural studies (e.g., Ji, Schwarz, & Nisbett, 2000) or in the present study where the Chinese children did not show a preference for the midpoint on the 5-point scale but gave the same pattern of responses regardless of whether the starting state was the midpoint or the extreme point on the scale. In addition, when examining large change predictions (absolute change scores of 3 or 4), we found that overall, Chinese children made large change predictions more often than did Canadian children, especially among the 11-year-olds. These large change predictions are pulling the state from one extreme to the other and once again suggest that the Chinese children showed no more midpoint response bias than did the Canadian children.

Previous attribution research has shown that East Asians (including Chinese) believe more than do North Americans that behavior can change across situations (e.g., Morris & Peng, 1994). The findings presented in this article indicate that Chinese also have a greater belief that behavior can change across time. This adds a new perspective to understanding people's perceptions of social behavior from past to present to future. Indeed, in making sense of social events, Chinese people are found to pay greater attention to information along the time dimension than are North Americans (see Ji, Guo, Zhang, & Messervey, 2008).

In addition, the data from this study suggest that cultural differences generally become apparent around ages 9 to 11. Together with J. G. Miller's (1984) study, the present study suggests that cultural influences on reasoning processes follow a developmental pattern and that a period may exist in which the socialization or acculturation process starts to exert significant influence. Of interest, in a large-scale investigation for a potential sensitive period for learning a new culture, Minoura (1992) examined the relationship between the age of moving to the United States of Japan-born Japanese children living in the United States and the degree to which the Japanese children internalized American ways. She found that Japan-born Japanese children became largely "Americanized" if they moved to the United States before age 9. If they moved to the United States between ages 9 and 15, then they retained some Japanese cultural ways and were Americanized to a lesser degree than the younger group. Children who moved after age 15 were never able to fully embrace the American culture. The critical age range identified by Minoura is similar to what has been found in the present study.

Although other societal characteristics, such as societal stability and socioeconomic change, may have contributed to the cultural differences seen in the present study, these possible effects remain to be explored. In summary, the present study has demonstrated a clear change in cultural patterns of predicting future happenings from ages 7 to 11 years. Cultural differences were found among older children but not among younger children, suggesting a gradual learning pattern for the acquisition of lay theories of change. In conclusion, we are born

with an innate capacity to think, but the way we think is determined, at least in part, by the cultural environment into which we are socialized.

## APPENDIX

Scenarios used in the study:

All of the scenarios are presented with pictures (such as drawings of different sizes of ribbons, drawings of different relationships, drawings of different amounts of money, and drawings of different faces indicating happiness).

1. Five good friends (Julie, Nancy, Lynne, June, and Kate) play games every weekend. Before each game, they prepare five ribbons of different sizes. Whoever gets the highest score in the game gets the biggest ribbon and whoever gets the second highest score gets the second biggest ribbon; likewise, whoever gets the lowest score gets the smallest ribbon.

Julie got the *biggest/third biggest/smallest* ribbon last week. Guess which one she's going to get this week?

2. The relationship between two classmates can be described using one of the following:

*Very good Good Average (So-So) Bad Very bad*

Emily and Hannah's relationship is *very good (average/very bad)* this semester. Guess what their relationship will be like next semester? _____

3. A person's happiness can be described as one of the following:

*Very unhappy Unhappy Average (So-So) Happy Very happy*

Angela was *very unhappy/feeling so-so/very happy* at the age of 6. Guess how she would feel at the age of 7?

4. The amount of money a person makes can be described as one of the following:

*Very small Small Medium Large Very large*

Erin's mom earned a *very large/medium/very small* amount of money 3 years ago. Guess how much she earns now? _____

5. Students in a class are divided into five groups and they have a reading contest every month. The leaders of the five groups are Shirley, Esther, Caroline, Jane, and Mary. The group who wins the first place receives the biggest ribbon, the group who wins the second place receives the second biggest ribbon, and so on. The group who ranks the last receives the smallest ribbon.

Shirley's group received the *smallest/3rd biggest/biggest* ribbon last month. Guess which ribbon they will get this month? _____

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