

## Research Article

## CULTURE, CHANGE, AND PREDICTION

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**Abstract**—Five studies showed that Chinese and Americans perceive change differently. Chinese anticipated more changes from an initial state than Americans did. When events were changing in a particular direction, Chinese were more likely than Americans to predict change in the direction of change. Moreover, for patterns with changing slopes, Chinese predicted greater change in the way slopes changed, in comparison to Americans. In addition, people who predicted change were perceived as wise by Chinese more than by Americans. Implications for social attribution, tolerance for contradiction, persistence on tasks, and the illusion of control are discussed.

There is an ancient Chinese story about an old Chinese farmer. One day his horse ran away. His neighbors came to comfort him, but he said, "How can you know it isn't a good thing?" A few days later, his horse came back, bringing a wild horse with it. His neighbors came to congratulate the old man, who said, "How can you know it isn't a bad thing?" A few weeks later, the old man's son tried to ride on the new horse and fell off, breaking his leg. Again, the neighbors came to comfort the old man, who said, "How can you know it isn't a good thing?" Some months later, a war broke out, and all the young men in the region were recruited for the war. The old man's son was spared because of his broken leg. The story goes on in the same way, as long as the audience's patience holds up! This famous Chinese story suggests that things are changing all the time and people should not be misled by a local state of events. Indeed, an extreme state of events suggests that its opposite is about to occur.

## VIEWS ON CHANGE: EAST VERSUS WEST

The East and the West have different views on change. The idea of change and transformation between two opposite states is the main theme of the *I Ching* (Ritsema & Karcher, 1994), or *Book of Changes*. The book not only discusses change in one direction (from young to old or from small to large), but also discusses changes from one extreme to another extreme. For example, when a moon is full, it starts to wane; when a moon is new, it starts to wax. This is the relationship between *yin* and *yang*: When *yin* reaches its extreme, it becomes *yang*; when *yang* reaches its extreme, it becomes *yin*. The pure *yin* is hidden in *yang*, and the pure *yang* is hidden in *yin* (see Wei, 1939 version). This also applies to human events. "For misery, happiness is leaning against it; for happiness, misery is hiding in it . . . The righteous suddenly becomes the vicious, the good suddenly becomes the bad" (chap. 58). Therefore, *yin* and *yang* are dependent on each other, and transformations between the two occur when one of them becomes extreme.

In the eyes of ancient Chinese, the world we live in is never a stagnant world. The energy keeps moving, and the *ch'i* (spirit) keeps changing. So does *Tao*, which is the ultimate principle of change that

encompasses everything and functions in everything (Liu, 1974). According to *Tao Te Jing* (Lao Tsu, 2000 version), *Tao* moves in endless cycles:

To shrink something  
You need to expand it first  
To weaken something,  
You need to strengthen it first  
To abolish something  
You need to flourish it first  
To take something  
You need to give it first (chap. 36)

The heavy is the root of the light  
The unmoved is the source of all movement. (chap. 26)

This kind of dialectical thought has a long history among the Chinese people. Objects are understood as unstable and inseparable from subjects. This type of thought emphasizes not only the coexistence and interpenetration of the two parts of a contradiction, but their change and transformation into one another as well. It also emphasizes considering things from a long-term and systematic perspective and deemphasizes immediate gain and loss (Li, 1999).

Given that the Chinese emphasize change more than stability, it would not be surprising that "irregularity, but not regularity, attracts the Chinese attention. For example, they looked for irregularities in nature—earthquakes, novae, and eclipses—as signs from heaven. Consequently, when they discovered that lunar eclipses followed a regular pattern, their interest in this phenomenon decreased" (Cromer, 1993, p. 93).

Western traditions are quite different. For example, Parmenides (born 515 B.C.?) thought that everything that existed had always existed. Nothing could come out of nothing, and nothing that existed could become nothing, nor even become anything other than what it was. Parmenides demonstrated that change was impossible with the argument that for something to change it would have to cease to be what it was, but nonbeing is self-contradictory and therefore nonbeing cannot exist. He trusted his reason more than his senses, as did Plato, who was concerned with what is eternal and immutable in nature and morality.

Thus, "the Greek thinkers . . . became captives of their own methods. They rejected the validity of empirically observed phenomena such as motion and change because of the logical arguments of Parmenides . . . The Greeks in a sense became slaves to the linear either-or orientation of their logic" (Logan, 1986, p. 153).

Earlier Greek philosophers, to be sure, were concerned with change. Heraclitus (ca. 540–480 B.C.) thought that constant change, or flow, was in fact the most basic characteristic of nature. "Things are in flux" and we cannot "step into the same river twice" (Heraclitus, 1962 version, pp. 14,17). Aristotle was also preoccupied with natural processes having to do with changes. But most Greeks were not inclined to emphasize cyclical or oppositional change, as the Chinese did. For the Greeks, if the world changed from one state to another, this was an indication that it would continue on the same path, in a linear fashion (see Fisher, 1964).

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## LINEAR VERSUS CYCLICAL REASONING

The view that things change from one extreme to the other extreme has long been popular in the East, whereas notions of linearity and irreversibility continue to be dominant in the West (Gurevich, 1969). One example of the difference between the East and the West can be found in their Utopian views. For Confucius, the golden time was in the past, and we need to return to it. He was proposing a U-shape life model. In contrast, for the West, Utopia is in the future, and we rise toward the perfect society, which we then maintain forever (a linear understanding of life).

Western linear thinking may be linked to the belief that each cause has an effect and each effect is tied to a cause, and therefore each event can be described as an effect of a preceding event or a cause for a consequent event. Nisbett and his colleagues (Nisbett, Peng, Choi, & Norenzayan, 2001) have argued that linear thinking is more congenial to Westerners in part because of an analytic thinking style. They focus on a relatively narrow range of objects and environmental factors and build simple, explicit causal models. Easterners (including Chinese, Japanese, and Koreans) attend to a broader range of factors (Ji, Peng, & Nisbett, 2000) and therefore are more inclined to assume contradiction, change, and nonlinear development of events.

## HYPOTHESES

The considerations we have summarized lead to several expectations: First, Chinese would be more likely than Americans to predict changes in events. Second, for patterns with changing slopes (derivatives), Chinese would be more likely than Americans to predict change in the rate of change. Third, when things are changing in a particular direction, Chinese would be more likely than Americans to predict change in direction of movement—from up to down or vice versa. Finally, people who predict changes would be more likely to be perceived as wise by Chinese than by Americans.

## STUDY 1

In Study 1, we examined the hypothesis that Chinese would be more likely than Americans to predict changes in events.

### Participants

In all five studies, the American participants were recruited from the psychology subject pool at the University of Michigan and received credit toward a course requirement for their participation. The Chinese participants were recruited from various departments at Beijing University, Beijing, China, and received payment for their participation. Fifty-six American students (32 females) and 63 Chinese students (40 females) participated in Study 1.<sup>1</sup>

### Materials

Four simple scenarios were presented in an attempt to examine to what extent people expected change:

Lucia and Jeff are both seniors at the same university. They have been dating each other for two years. How likely is it that they will break up after graduation?

Two kids are fighting at kindergarten. How likely is it that they will become lovers some day?

Richard grew up in a poor family but he managed to go to college. How likely is it that he will become rich one day?

Vincent has been the chess champion for 3 years in high school. How likely is it that he will lose in the next game against his strongest opponent?

All the English names were replaced with Chinese names in the Chinese version without changing the genders. Participants were asked to provide a probability judgment for each question (from 0% to 100%).

## Results

For all the scenarios, Chinese gave higher probability judgments than Americans,  $F(1, 117) = 75.34, p < .001$ . The mean probabilities for the four scenarios, in order, were 60.46%, 66.48%, 42.71%, and 52.70% for Chinese, and 40.43%, 52.89%, 22.3%, and 29.49% for Americans. Thus, the Chinese thought it was more likely for things to change in the future than did the Americans.

## STUDY 2

Studies 2 and 3 were designed to examine how people perceive patterns that are changing. If some trend is increasing, would this trend be expected to remain the same or to change? We anticipated that Americans would expect trends to continue more than would Chinese.

### Participants

Forty-eight American students (29 females) and 63 Chinese students (26 females) participated in Study 2.

### Materials

We presented 12 graphs in a booklet, with each graph indicating the trend of some event, such as growth rate of the world economy or worldwide death rate for cancer. On each graph, three points were given to indicate the development of the rate across three periods of time. For example,

The global economy growth rates (annual percentage change in real GDP) were 3.2%, 2.8%, and 2.0% for 1995, 1997, and 1999, respectively, as indicated on the graph below.

Participants were then asked to predict the probability for the trend to go up, to go down, and to remain the same, in comparison to the last point on the graph. The instructions indicated that the three probabilities should sum up to 100%. Participants were also asked to indicate their confidence about their predictions on a scale from 1 (*not confident at all*) to 8 (*extremely confident*).

The trends presented were of four types: positively accelerated growth, negatively accelerated growth, positively accelerated decay, and negatively accelerated decay. Slope changes become progressively larger in positive acceleration and smaller in negative acceleration. We predicted that the greater the increase in acceleration in a

1. There was no reliable gender difference in any of the studies reported here.

## Culture, Change, and Prediction

particular direction, the more likely Chinese would be to anticipate slowing or reversal of the trend. For Americans, however, increases in acceleration should be a particularly strong indicator of continued movement in a particular direction, or perhaps even continued increases in acceleration. Thus, we expected differences between Chinese and Americans to be greater in the positively accelerated conditions than in the negatively accelerated conditions.

### Results

Figure 1 shows that Americans made more predictions consistent with the given trends than Chinese, whereas Chinese made more predictions opposite to the given trends than Americans. Compared with Chinese, Americans predicted higher probabilities that current trends would continue for both negatively accelerated trends,  $t(109) = 5.33$ ,  $p < .001$ , and positively accelerated trends,  $t(109) = 6.57$ ,  $p < .001$ . Indeed, the same cultural effect was significant for all 12 graphs. If a particular trend went up, the Americans were more likely than the Chinese to predict that the trend would continue going up. If a given trend went down, the Americans were more likely than the Chinese to predict that the trend would continue going down. The interaction effect between culture and acceleration (positive vs. negative) was significant, too,  $F(1, 109) = 4.30$ ,  $p < .05$ , indicating that the cultural difference was greater in the positively accelerated condition than in the negatively accelerated condition. In addition, the Chinese reported greater confidence about their predictions than did the Americans,  $F(1, 108) = 6.53$ ,  $p < .05$ .

Thus, Americans were more likely than Chinese to make predictions consistent with suggested trends, whereas Chinese were more likely than Americans to predict a reversal in trends. This was especially true when trends were accelerating positively.

### STUDY 3

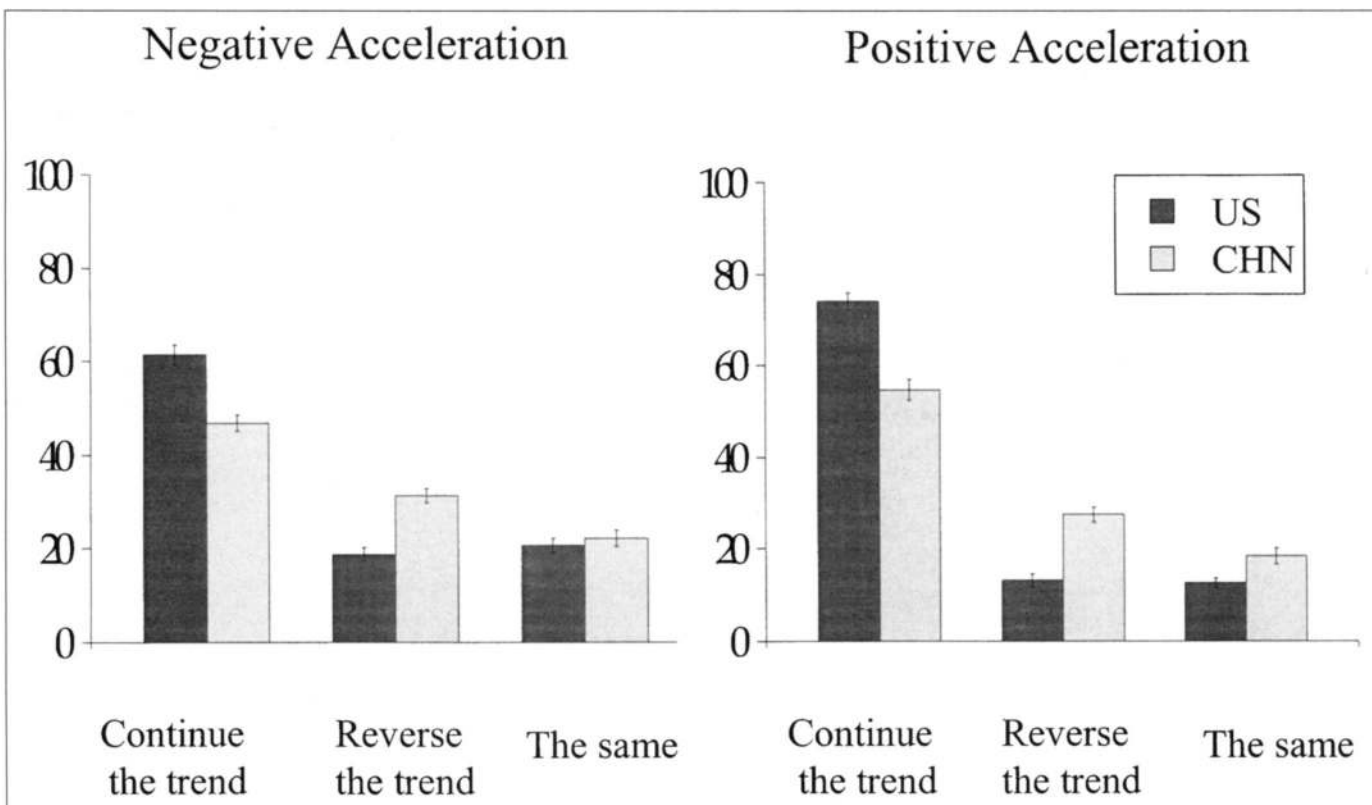
Study 3 was intended to extend Study 2 by providing a more fine-grained analysis of predictions. Three points were given on each graph, and participants were asked to indicate what they thought the next two points would be. We expected that American predictions would reflect the belief that change would continue in the same direction and at the same rate, whereas Chinese predictions would be more likely to reflect the belief that the rate of change, and possibly even the direction of change, would change.

### Participants

Seventy-five American students (41 females) and 58 Chinese students (25 females) participated in Study 3.

### Materials

The same graphs used in Study 2 were presented in Study 3, but participants were asked to mark two points on each graph to indicate what they thought would happen in the near future. They were also asked to indicate their confidence levels about their predictions.



**Fig. 1.** Predicted probability that negatively accelerating (left) and positively accelerating (right) trends would continue, reverse, or stay the same (Study 2). Results are shown separately for American (US) and Chinese (CHN) participants. Error bars represent standard errors of means.

**Results**

Figure 2 shows that American predictions continued the trends suggested by the second and the third points on the graphs. Chinese predictions were more likely to deviate from the trends. The difference between the two cultures is quite clear by Period 5 for all four conditions. The interaction effects between period (Periods 4 and 5) and culture were significant for positively accelerated growth,  $F(1, 131) = 10.47, p < .01$ ; positively accelerated decay,  $F(1, 131) = 25.96, p < .001$ ; and negatively accelerated decay,  $F(1, 131) = 21.81, p < .001$ ; the interaction effect was marginally significant for negatively accelerated growth,  $F(1, 131) = 2.98, p < .09$ . Chinese predictions thus departed more from American predictions in Period 5 than in Period 4, and American predictions followed the trends in both periods. This cultural divergence was stronger for positive acceleration than for negative acceleration,  $F(1, 131) = 5.07, p < .05$ , for growth, and  $F(1, 131) = 5.52, p < .05$ , for decay. We also looked at the percentage of participants in each culture who

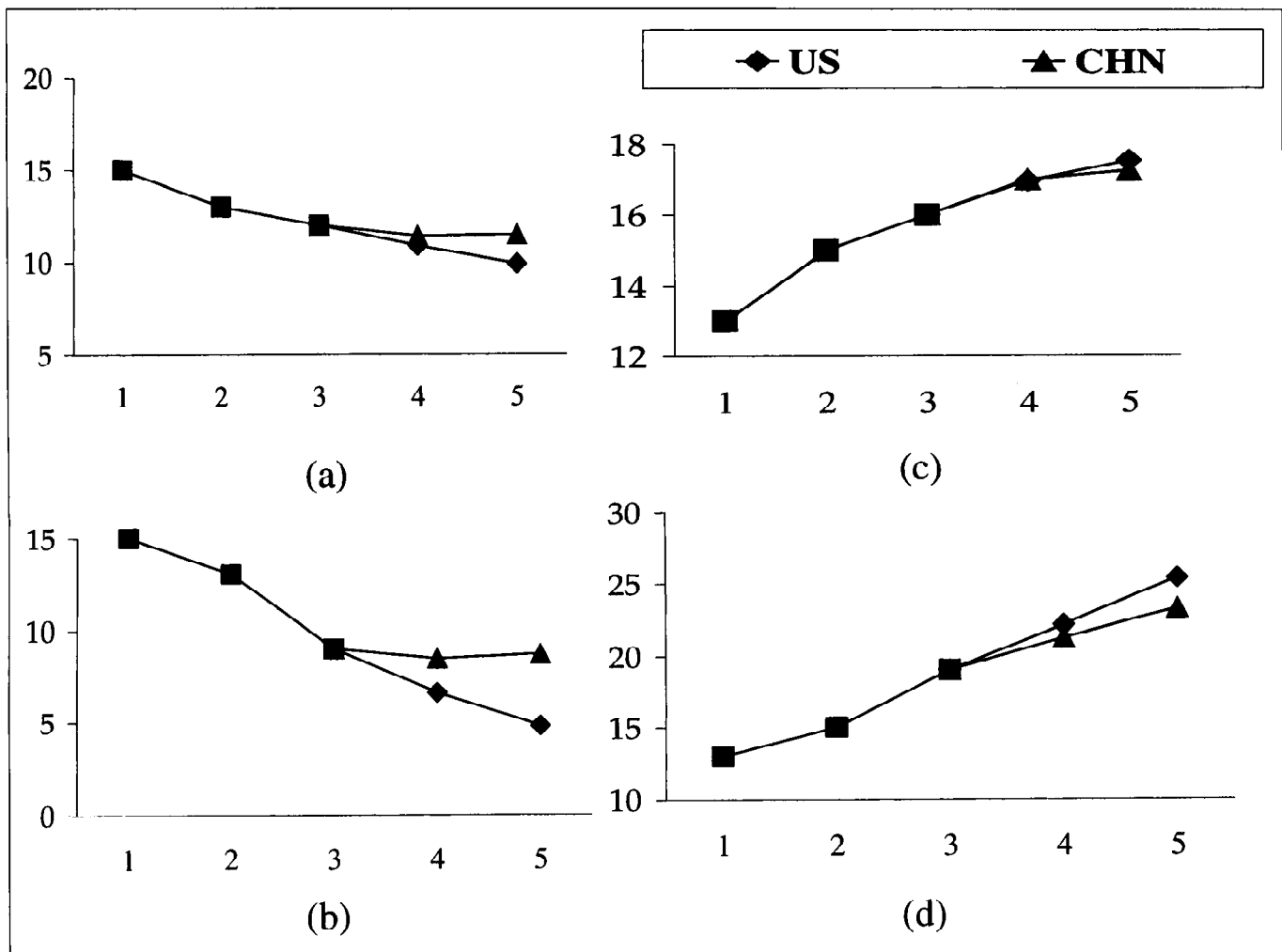
predicted a reversal in trend (see Fig. 3), and found that for all four conditions, a greater percentage of Chinese participants than American participants predicted at least one reversal in trend (overall  $p < .001$ ).

In addition, Chinese reported they were more confident about their predictions than did Americans,  $F(1, 131) = 18.14, p < .001$ . This was the case for each of the four conditions.

Again, Study 3 shows that American participants followed the trends suggested by the graphs more than did the Chinese, and this was especially true for positively accelerated trends. The Chinese were more likely to predict a reversal in the trends suggested by the last two points, or to make predictions indicating that at least the rate of change would change.

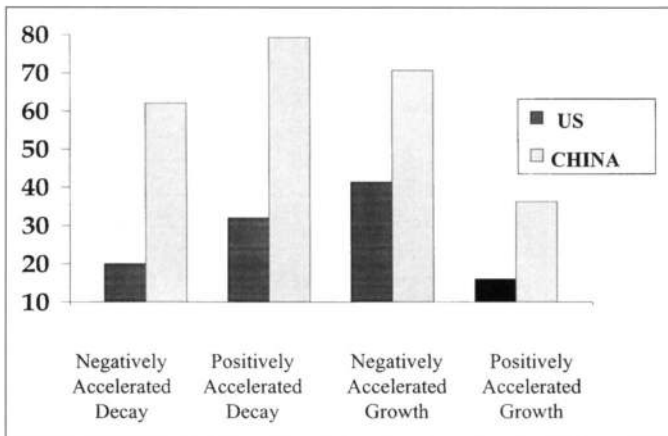
**STUDY 4**

Recall that the Confucian view of history is that it has, or should have, a U shape. Things were best in a golden age in the past, and one



**Fig. 2.** Predictions by Americans (US) and Chinese (CHN) for two future periods of time (Study 3). The first three points in each graph were given by researchers, and participants predicted the last two points (corresponding to Periods 4 and 5). The x-axis indicates the time period. Because different graphs were labeled with different units along the y-axis, the predictions were measured in unit distance from the bottom lines so that results for the graphs could be combined. Participants' predictions are shown for graphs in which four different kinds of trends were represented by the given data: (a) negatively accelerated decay, (b) positively accelerated decay, (c) negatively accelerated growth, and (d) positively accelerated growth.

## Culture, Change, and Prediction



**Fig. 3.** Percentage of American and Chinese participants who predicted at least one reversal in Study 3. Results are shown separately for negatively and positively accelerated decay and growth.

can only hope to recover that time. In contrast, for Westerners, things are in general improving all the time, or ought to be, and Utopia lies in the future. In Study 4, we examined participants' predictions about the course of their own life happiness. Would curvilinear predictions, with life happiness altering course, be more likely for Chinese, and would linear ones be more likely for Americans?

### Participants

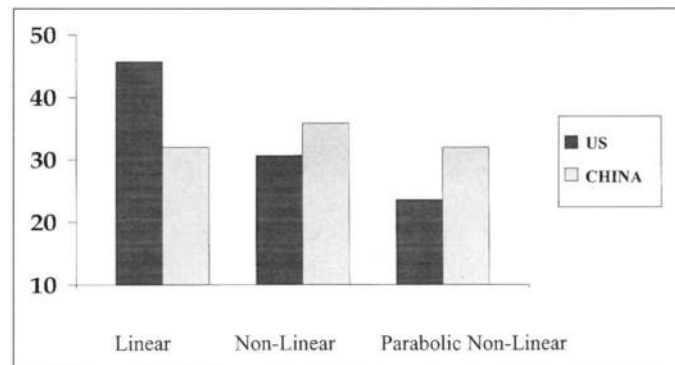
One hundred eighty-one Chinese students (98 females) and 140 American students<sup>2</sup> participated in Study 4.

### Materials

Participants were presented with 18 trends, 6 linear and 12 nonlinear. Among the 12 nonlinear trends, 4 were parabolic nonlinear; that is, they actually reversed course rather than merely altering rate of change. Participants were asked to select the trend that best represented their happiness through their lifetime, from the beginning to the end. Linear trends should indicate an expectation that life happiness will likely move in only one direction—from happy to unhappy or the reverse, and in a steady pace. Nonlinear trends should indicate an expectation that life happiness will likely change in either rate of change or direction of movement. Parabolic nonlinear trends suggest expectations of change for both rate and direction of change. We expected that Chinese would endorse more nonlinear trends than Americans, and would be especially likely to endorse more parabolic nonlinear trends than Americans.

### Results

Figure 4 shows that Chinese endorsed nonlinear choices more than Americans, and Americans endorsed linear choices more than Chinese,  $\chi^2(2, N = 321) = 6.51, p < .05$ . For example, the data for one of the U-shaped curves showed that Chinese were nearly twice as likely



**Fig. 4.** Percentage of American and Chinese participants endorsing linear, nonlinear, and parabolic nonlinear descriptions of the happiness they would experience throughout their lifetime (Study 4).

to endorse it as Americans were (22.1% vs. 12.1%), exact  $p < .05$ . This suggests a quite different expectation about life and life happiness. For the Chinese, life does not become more and more happy or more and more unhappy. Happiness and unhappiness are likely to transform into each other.

We also analyzed whether Americans were more or less optimistic than Chinese by examining endorsements of lines that started high and ended low and lines that started low and ended high, but found no cultural difference.

### STUDY 5

As shown by Studies 1 through 4, Chinese tended to predict change more than Americans. Culture may encourage belief in change in China and in nonchange in the United States. Thus, predictions of change may be perceived differently in China and in the United States. People who predict change may be more likely to be perceived as wise by Chinese than by Americans. Study 5 was designed to examine this issue.

### Participants

The same participants as in Study 1 participated in Study 5.

### Materials

Participants were presented with two positive scenarios (e.g., someone inherited a large amount of money from his great uncle and became rich) and three negative scenarios (e.g., someone has had a smooth life but recently lost her job). For the positive events, an observer said, "This could be a bad thing" for the person; for the negative events, an observer said, "This could be a good thing" for the person. Participants were asked to rank the likelihood of several possible reasons for each observer's comment, such as the observer "was jealous" (in positive scenarios) or "was envious" (in negative scenarios), "was wise," "was concerned about the person" (in negative scenarios), and "thought this could provide an opportunity for the person to become more mature" (in negative scenarios) (see the appendix).

### Results

Figure 5 shows that across all the five scenarios, Chinese thought "the observer was wise" was a more likely reason for the observer's

2. Because of a human error, gender information was not collected for all American participants. Of the first 56 participants, 32 were females.

comment than Americans did,  $t(113) = 5.58, p < .001$ , and Americans thought “the observer was jealous” (or envious of the person’s past success) was a more likely reason than Chinese did,  $t(111.6) = 4.78, p < .001$ . The same pattern was found in the percentages for each individual scenario.

Across the three negative scenarios, Chinese thought it more likely than Americans that the observer thought this could provide the person an opportunity to become more mature,  $t(105.43) = 3.41, p = .001$ . This opinion reflects the belief that people become mature and wise by going through pain and loss—that is, something good comes from something bad.

In addition, Americans tended more than the Chinese to think the reason was that the observer was concerned that the job, girl, or pressure was not right for the person anyway,  $t(115) = 2.94, p < .01$ , whereas Chinese thought dislike was a more likely reason,  $t(114) = 1.81, p = .07$ . These results suggest that the Americans did not always attribute negative things (such as jealousy) to the observer, and the Chinese did not always attribute positive things (such as wisdom) to the observer.

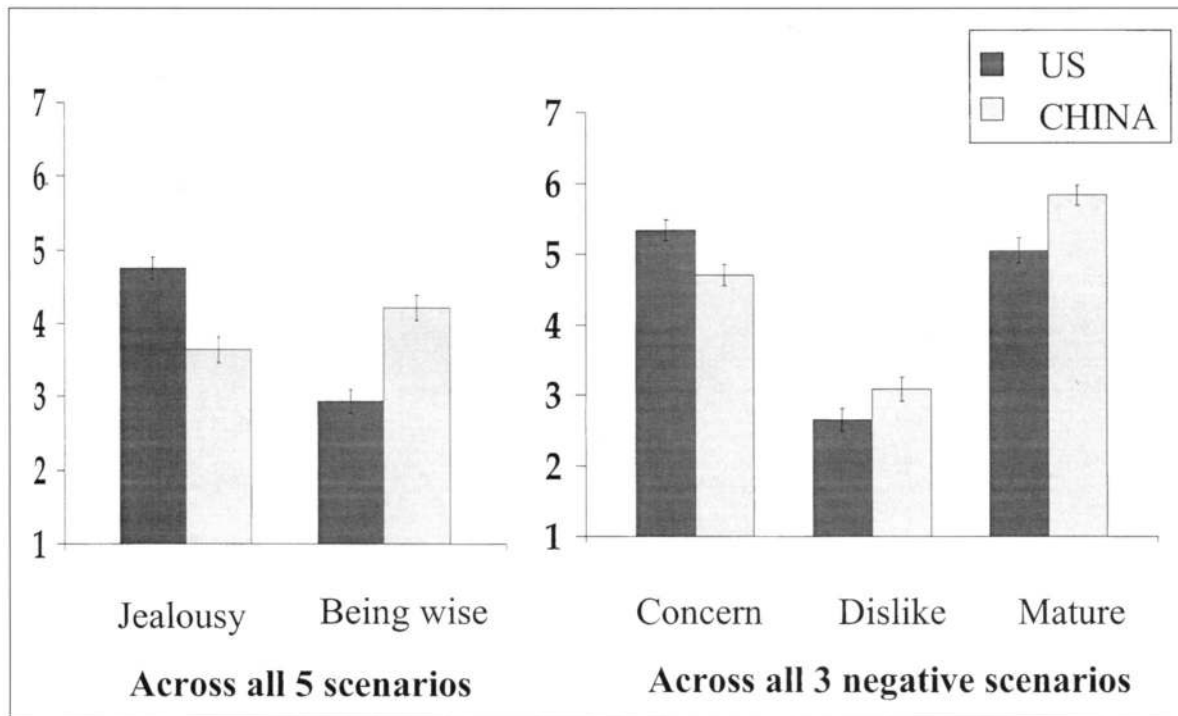
## DISCUSSION

As expected, we found that Chinese were more likely to predict change in events than Americans. Chinese also tended to predict more

change in the direction of trends and more change in the rate of change. In addition, people who predict changes were more likely to be perceived as wise by Chinese than by Americans.

The idea of change allows Chinese to have a fluid and open-minded view of people and events. One implication is that one would not think that a criminal will always be a criminal, or that an honest person will always be honest. In other words, people are changeable depending on context. This may help to explain the situational attributions made by East Asians. In many studies it has been found that East Asians make more situational attributions than European Americans do (e.g., Morris & Peng, 1994; Norenzayan, Choi, & Nisbett, 2000). This view of change is also consistent with the finding by Norenzayan et al. (2000) that East Asians believe in the malleability of dispositions more than Americans do. Indeed, East Asians believe in continuous shaping of personality traits by situational influences. In contrast, belief in no change may lead Americans to believe in dispositionism, and to believe that personality traits are fixed, as indicated by Norenzayan et al. (2000).

Belief in constant and oppositional change may also lead Chinese to believe that extreme states can be transformed to each other, and therefore their coexistence is likely. This may explain the fact that Chinese tolerate contradiction more than Westerners do. For example, a Chinese proverb says, “Beware of your friend, not your enemy.” As Peng and Nisbett (1999) have argued, belief in contradiction is an im-



**Fig. 5.** American and Chinese participants’ likelihood rankings for selected possible reasons for the observer’s comment in Study 5. Higher numbers indicate greater likelihood (reversed from the original test version). Results are shown separately for the positive and negative scenarios combined and for the three negative scenarios. Error bars represent standard errors of means. Following are examples of the reasons given: jealousy—“B was jealous” (in positive scenarios), “B was envious of A’s previous smooth life” (in negative scenarios); being wise—“B was wise”; concern—“B was worried about A” (in positive scenarios), “B was concerned about A” (in negative scenarios); dislike—“B disliked A”; mature—“B thought A was not mature enough to handle this” (in positive scenarios), “B thought this could provide an opportunity for A to become more mature” (in negative scenarios).

Culture, Change, and Prediction

portant part of naive dialectical thinking among East Asians, and much less common among Americans.

Belief in change, especially in reversal or cyclical change, may lead East Asians to remain hopeful when suffering hardship and to remain alert when experiencing good fortune. This may have implications for psychological well-being, such as responses to frustrations or losses. Compared with Westerners, East Asians might be less distressed by negative outcomes and less elated by positive ones. For the same reason, East Asians might not give up easily simply because they are not successful now, nor would they be content simply because they are successful. This is well reflected in Chinese proverbs, such as "be prepared for danger while staying in peace" and "when you succeed don't be conceited; when you fail don't be dejected." Thus, East Asians might tend to be persistent when they are not doing well, and Americans might tend to be persistent when they are doing very well. Heine et al. (in press) found that Japanese who received failure feedback persisted more on a similar follow-up task than those who received success feedback, and Americans exhibited an opposite pattern.

Americans' belief in the stability of events may encourage them to think that things are more predictable than they really are and that they have greater control over outcomes than they do. This may explain the illusion of control that Americans are subject to (see Presson & Benassi, 1996, for a review). And the illusion of control might in turn reinforce Americans' belief that things are happening in the way they expect, that is, that there is no change in state, no change in direction, or no change in rate of change. Whether the Chinese are less subject to the illusion of control would be an interesting topic for future research.

Studies 2 and 3 showed that Americans predicted a continuation of the immediate trends suggested by the graphs more than Chinese did. Studies 1 and 4 showed that Americans were more anchored by the given, or initial, states than were Chinese. All four studies suggest that Americans respond to immediate information more than Chinese do, whereas the Chinese belief in change may allow them to look at things holistically and from a long-term perspective, both retrospectively and prospectively.

The data also suggest that people from different cultures may have different views about wisdom. It seems that belief in change and a tendency to think regressively are valued as important aspects of wisdom by Chinese, but not Americans.

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APPENDIX: EXAMPLES OF SCENARIOS USED IN STUDY 5

1. Mike and Sharon are classmates. Sharon bought a lottery ticket at the super market and won \$10,000. Mike heard about it and said, "It could be a bad thing for her."

Mike said so because:

- a)  He was jealous.
- b)  He was worried about Sharon.
- c)  He disliked Sharon.
- d)  He realized bad things could come from good things.
- e)  He thought Sharon was not mature enough to handle the money.
- f)  He was wise.
- g)  He was in a bad mood.
- h)  Other:

3. Jack and Joan are former classmates. Joan has had a smooth life, but recently she lost her job. Jack heard about it and said, "It could be a good thing for her."

Jack said so because:

- a)  He was envious of her smooth life.
- b)  He was concerned that the job was not right for Joan anyway.
- c)  He disliked Joan.
- d)  He realized good things could come from bad things.
- e)  He thought this could provide an opportunity for Joan to become more mature.
- f)  He was wise.
- g)  He was in a bad mood.
- h)  Other: