

Research Report

Dynamic Influences of Culture on Cooperation in the Prisoner's Dilemma

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ABSTRACT—*This study tested whether priming of cultural symbols activates cultural behavioral scripts and thus the corresponding behaviors, and also whether the behaviors activated are context-specific. Specifically, to activate the cultural knowledge of Chinese-American bicultural participants, we primed them with Chinese cultural icons or American cultural icons. In the control condition, we showed them geometric figures. Then, the participants played the Prisoner's Dilemma game with friends or strangers (the context manipulation). As expected, participants showed more cooperation toward friends when Chinese cultural knowledge was activated than when American cultural knowledge was activated. By contrast, participants showed a similarly low level of cooperation toward strangers after both Chinese and American culture priming. These findings not only support previous evidence on culture priming of social judgment and self-construals, but also (a) provide the first evidence for the effects of culture priming on behaviors and (b) demonstrate the boundary condition of culture priming.*

Recent research has shown that culture affects social judgments and behaviors, even those as basic as cognitive dissonance and fundamental attribution error (see reviews by Kashima, 2001, and Lehman, Chiu, & Schaller, 2004). However, the study of cultural influence has often been restricted to comparisons of the cognition, emotion, and behavior of demarcated human groups defined by certain geographic, national, or ethnic characteristics. In this practice, culture is operationalized as a delineated population, and the concept of culture is associated with an inordinate degree of boundedness and homogeneity.

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Criticisms of this approach have been voiced in anthropology (e.g., Friedman, 1994) and psychology (e.g., Bandura, 2002). Against this backdrop, Hong and her colleagues (Hong, Benet-Martinez, Chiu, & Morris, 2003; Hong & Chiu, 2001; Hong, Morris, Chiu, & Benet-Martinez, 2000) have proposed a dynamic constructivist approach to cultural influences. This approach assumes that culture consists of a network of shared knowledge that is produced, distributed, and reproduced among a collection of interacting individuals (e.g., Hong & Chiu, 2001; Kashima, Woolcock, & Kashima, 2000; Shore, 1996; Sperber, 1996). As such, culture is comparable to a tool kit that can be put to manifold uses, rather than an entity that exerts sweeping influences on people belonging to a cultural group (DiMaggio, 1997).

Moreover, the cultural-knowledge tools that are sampled and applied would depend on the relative accessibility of the cultural frames at the time. Indeed, it has been shown that contextual cues may increase the temporary accessibility of a body of knowledge and momentarily raise the likelihood that this body of knowledge will be used. For example, research (Gardner, Gabriel, & Lee, 1999; Trafimow, Triandis, & Goto, 1991) has shown that Americans and Chinese possess both independent (or individualistic) self-construals and interdependent (or collectivistic) self-construals, and the two self-construals can be selectively activated by contextual cues.

Further, according to the dynamic constructivist approach, people who have acquired shared knowledge of two cultures are able to use two tool kits and switch between cultural frames. Hong and her colleagues (Hong, Chiu, & Kung, 1997; Hong et al., 2000) primed bicultural individuals (Hong Kong Chinese, Chinese Americans) with either Chinese cultural icons (e.g., the Chinese dragon) or American cultural icons (e.g., Mickey Mouse). Participants primed with Chinese cultural icons were more inclined than those primed with American cultural icons to interpret an ambiguous event in terms of a group-agency model (vs. an individual-agency model); they made more group attributions and fewer individual attributions. Analogous culture

priming effects have been found on spontaneous self-construal (Ross, Xun, & Wilson, 2002), values (Briley & Wyer, 2001), and preferences (Briley, Morris, & Simonson, 2003). In addition, the culture priming effect has been replicated in studies using different bicultural samples (Chinese-Canadians, Dutch-Greek bicultural children) and a variety of cultural primes (e.g., language, experimenter's identity; Ross et al., 2002; Verkuyten & Pouliasi, 2002).

One area of uncertainty, however, is whether culture priming has an effect on behavioral tendencies. Previous research has revealed some evidence of priming of behaviors. For example, in a study by Bargh, Chen, and Burrows (1996), participants who were primed with the construct "rude" (in a scrambled-sentences task) were more likely to interrupt a conversation than participants who were primed with a neutral trait construct (Experiment 1), and participants who were primed with stereotypes of the elderly walked more slowly down a hallway than did those who were primed with labels that were not age-specific (Experiment 2). In other work (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trötschel, 2001, Experiment 2), participants who were primed with the goal to cooperate cooperated as much as those who were explicitly instructed to cooperate. These findings suggest that mere perception of constructs or traits can activate corresponding actions or motor representations, which are then translated into behavior quite automatically. These findings as a whole support Dijksterhuis and Bargh's (2001) notion of "perception-behavior expressway."

In light of these findings, it is not only interesting but also theoretically important to test whether culture priming can activate culture-specific behaviors. To the extent that cultures are syndromes of cognition, affect, and behavior (cf. Triandis, 1996), culture priming should affect behavior. More important, some researchers (e.g., Kitayama, 2002) have questioned the pervasiveness of culture priming effects because research to date has demonstrated such effects only on self-construals, cognitive judgments, and attributions. An effect of culture priming on behavior has yet to be demonstrated. In the present study, we sought to fill this important gap.

In addition, this research was designed to test whether social context plays a role in moderating the perception-behavior link. The dynamic constructivist approach assumes that the accessibility of cultural knowledge sets up a necessary but not sufficient condition to affect subsequent judgments and behaviors. Whether the activated knowledge will be used also depends on its applicability in the immediate social context. For instance, Hong et al. (2003) found that among Chinese American bicultural individuals, culture priming affected the likelihood of making group attributions or individual attributions only when the tension between group agency and individual agency in the stimulus event was highlighted, rendering implicit theories of group versus individual agency applicable in the judgment task. Likewise, in the present study, we expected that the context would determine whether the activated cultural knowledge

would affect subsequent behavior, thereby resulting in culture-specific situation-behavior patterning (cf. Mischel & Shoda, 1995) instead of sweeping behavioral tendencies across situations.

Specifically, to test our ideas, we focused on cooperative behaviors toward friends versus strangers among Chinese-American bicultural individuals, because Oyserman, Coon, and Kimmelmeier (2002) found that North Americans on average felt less sense of duty toward in-group members (such as friends) and had fewer concerns about maintaining in-group harmony than did Chinese. Moreover, Leung and his associates (Leung, 1988; Leung & Bond, 1984) have shown that Chinese allocate a bigger reward to friends than to strangers, whereas Americans' reward allocation differentiates less between friends and strangers. It is possible that interdependence among friends is more normative in Chinese culture than American culture (cf. Gardner et al., 1999). Thus, it is likely that Chinese cultural primes would heighten bicultural participants' expectation that friends would cooperate, and hence increase the participants' motivation to cooperate in return. We therefore predicted that bicultural participants would be more likely to cooperate with friends when their Chinese cultural knowledge was activated than when their American cultural knowledge was activated. However, we expected that this difference would disappear when they interacted with strangers.

METHOD

This experiment had a 3 (prime: Chinese, American, neutral) \times 2 (context: friend, stranger) between-subjects design. Participants were randomly exposed to pictures of Chinese cultural icons, American cultural icons, or neutral (geometric) drawings. Next, they were asked to play a Prisoner's Dilemma game with friends or strangers. Three dependent variables were measured: (a) choice of *cooperation versus defect strategies* in each trial, (b) *expectation* of cooperation from the game partners, and (c) *motivation to maximize joint outcome*.

Participants

One hundred seventy-one (67 males, 104 females; mean age = 20) Hong Kong Chinese college students participated in this study. Hong Kong is an international city with a large population of American expatriates. In addition, American culture has a prominent presence there. Therefore, Hong Kong Chinese have been exposed extensively to both the Chinese and American cultures. Furthermore, most Hong Kong Chinese college students began learning English in kindergarten and have been exposed extensively to English, which is the primary medium of instruction in schools. To the extent that language is a primary medium for transmitting cultural knowledge (e.g., Ervin-Tripp, 1964), Hong Kong Chinese college students have had ample opportunities to receive American cultural influence through

the media and textbooks. They are suitable bicultural participants, as shown in previous studies (Hong et al., 1997, 2000).

Measures and Procedures

Culture Priming

Participants were exposed to seven slides of Chinese cultural icons (e.g., a Chinese dragon and a person performing kung fu), American cultural icons (e.g., the American flag and a scene showing an American football game), or neutral primes (geometric figures). The assignment of the participants to the two experimental conditions and the control condition was random. During the slide presentation, participants in the Chinese and American priming conditions were required to answer questions, such as naming the objects shown in the pictures or the ideas represented by the cultural icons. Previous studies (Hong et al., 2000, 2003) have shown that these procedures effectively activate cultural knowledge systems among individuals with bicultural experience. In the control condition, participants were asked to trace the outline of the figures on their worksheets that resembled those shown in the slides.

Cooperation Versus Defection in the Prisoner's Dilemma Game

Participants were introduced to the Prisoner's Dilemma game and were shown the payoff matrix designed by Hemesath and Pomponio (1998; see Table 1). In the game, the outcomes of the players depend on the strategies that both players have chosen. According to the payoff matrix, defecting (choosing Strategy B) always brings a better individual outcome for the participant, regardless of whether the partner chooses Strategy A (4 points for the participant) or Strategy B (1 point for the participant). However, cooperating (choosing Strategy A) generates a higher joint outcome if the partner also cooperates by choosing Strategy A (the players get 3 points each), but results in maximum individual loss if the partner defects by choosing Strategy B (no points for the participant and 4 points for the partner).

Immediately after the culture priming procedure, participants were asked to choose one of the two strategies for each of five partners assigned to them at the beginning of the session. As an incentive, the participants were told that they would be awarded the amount of (Hong Kong) dollars equivalent to the points they scored in the game. In addition, we reduced the

social pressure to act in a friendly way by instructing participants that only the total points received in the five trials would be announced, making it impossible for participants to figure out what strategy a particular partner had chosen. The frequency with which the participants chose Strategy A was taken as an indication of their cooperative behavioral tendency.

Participants in the friend condition played the game with five friends (group-mates in a class project), whereas participants in the stranger condition played the game with five strangers (people they had not met before the experiment).

Expectation of Partner's Strategy

Previous research on the Prisoner's Dilemma game has shown that players are more likely to cooperate if they expect their partners to cooperate rather than to defect. In this study, we were interested in testing if culture priming can affect participants' expectations of their partners' strategies. Immediately after playing the Prisoner's Dilemma game, participants were asked to guess the strategy each of their partners had chosen. They rated their expectations from 1 (*very confident that the partner has chosen Strategy B*) to 8 (*very confident that the partner has chosen Strategy A*), with a higher rating indicating a stronger expectation for the partner to cooperate.

Motivation to Maximize the Joint Outcome

Participants were also asked what they would have chosen on each trial of the game if the partner on that trial had chosen Strategy A (the cooperative strategy). Choosing the cooperative strategy in this situation would indicate a preference to maximize the joint outcome rather than personal gains, given that a higher individual outcome could be obtained by choosing to defect.

RESULTS AND DISCUSSION

Cooperation Versus Defection

The top panel of Figure 1 shows the mean percentage of cooperation (vs. defection) in the six Prime \times Context conditions. To test our prediction that Chinese culture primes would elicit more cooperation than American culture primes in the friend condition, we performed a logit regression. The Prime (Chinese vs. American) \times Context (friend vs. stranger) interaction was

TABLE 1
Payoff Matrix of the Prisoner's Dilemma Game

| Your choice | Partner's choice | |
|-------------|---|---|
| | Strategy A | Strategy B |
| Strategy A | Both you and your partner will each receive 3 points. | You will receive 0 point, and your partner will receive 4 points. |
| Strategy B | You will receive 4 points, and your partner will receive 0 point. | Both you and your partner will each receive 1 point. |

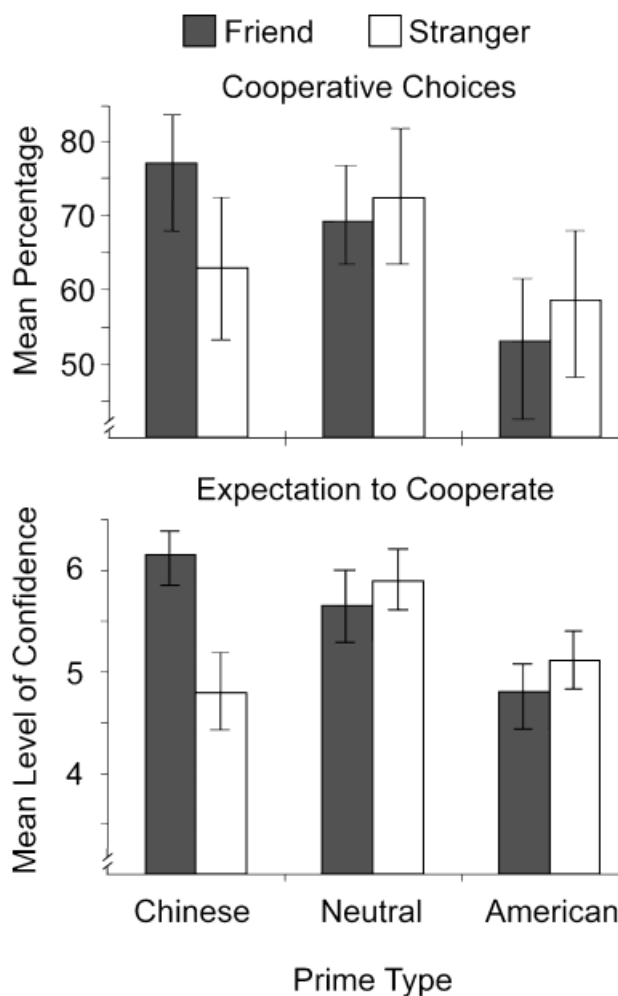


Fig. 1. Mean percentage of cooperative choices (top panel) and mean expectation that partners would cooperate (bottom panel) as a function of prime and social context. The error bars indicate standard errors of the means.

significant, Wald $\chi^2(1, N = 115) = 5.95, p < .05$. As predicted, when the partners were friends, Chinese primes elicited significantly more cooperation (76.9%) than did American primes (53.0%), $F(1, 59) = 7.16, p < .01$, for the arsin-transformed proportions of cooperation; the percentage of cooperation after neutral priming fell between the percentages in the two culture priming conditions (69.1%). In addition, we performed the test for a linear trend in proportions (Snedecor & Cochran, 1980, pp. 206–208) to examine whether the proportion of participants who cooperated when the partners were friends decreased as a function of the culture primed, from Chinese primes through neutral primes to American primes. This test revealed a reliable linear trend ($Z = -2.0, p < .05$, two-tailed).

When the partners were strangers, participants in the Chinese and American priming conditions had a similar likelihood of cooperation (62.9% for Chinese primes and 58.5% for American primes), $F(1, 53) = 0.74$, n.s., for the arsin-transformed proportions of cooperation. The test for a linear trend in

the proportions of the three priming conditions, from Chinese primes through neutral primes to American primes, was also not significant ($Z = -0.49$, n.s.).¹

Expectation of Partner's Strategy

To test if participants' expectations were also a function of the priming and context manipulations, we submitted the expectation ratings to a Prime \times Context analysis of variance. Again, the Prime \times Context interaction was significant, $F(2, 161) = 4.83, p < .01$. As shown in the bottom panel of Figure 1, when the partners were friends, participants in the Chinese priming condition were more confident ($M = 6.15, SD = 1.56$) that their partners would choose cooperation strategies than were those in the American priming condition ($M = 4.80, SD = 1.83$), $t(59) = 3.10, p < .01$, Cohen's $d = 0.79$. The mean confidence of participants in the neutral condition fell between the mean confidence in the two culture priming conditions ($M = 5.65, SD = 1.67$). When the partners were strangers, the mean expectations in the two priming conditions did not differ significantly.

There was a very strong association between the frequency of cooperation and the expectation that the partners would cooperate, $r(166) = .80$. Similarly high correlations were found in all the six Prime \times Context conditions.

Motivation to Maximize Joint Outcome

A Prime \times Context analysis of variance was performed on the participants' motivation to cooperate when cooperation from partners was ensured. The main effect of priming was significant, $F(2, 164) = 3.96, p < .05$, showing that participants in the Chinese priming condition were more motivated to cooperate ($M = 4.42, SD = 1.56$) than were their counterparts in the American priming condition ($M = 3.40, SD = 2.15$), $t(113) = 2.93, p < .01$, Cohen's $d = 0.54$; the mean in the neutral priming condition ($M = 3.84, SD = 1.95$) was between the means of the two culture priming conditions.

However, the Prime \times Context interaction was not significant, $F(2, 164) = 1.59$, n.s., and neither was the main effect of context, $F(1, 164) = 0.43$, n.s. It is possible that Chinese

¹Previous research has shown that people who have high dispositional competitiveness are less likely to choose cooperative strategies in the Prisoner's Dilemma game than are those who have low competitiveness (Neuberg, 1988). Therefore, we also tested the effects of the culture priming and group-context manipulations on participants' cooperative strategies when competitiveness was statistically controlled. Participants were asked to fill out a competitiveness scale (Neuberg, 1988) several weeks before they participated in the main experiment. Findings from a logit regression showed that although individual competitiveness was a strong predictor of cooperative behavior, $\chi^2(1, N = 112) = 19.8, p < .001$, the Prime \times Context interaction was still significant after controlling for gender and the competitiveness of the players, $\chi^2(1, N = 112) = 7.67, p < .01$. The odds ratio showed that players who received the Chinese primes and played the game with friends were nearly 3 times more likely to choose the cooperative strategy than were players in the other conditions, suggesting that the Chinese culture primes were able to activate cooperative tendencies toward friends beyond the chronic personal tendencies of the participants.

culture primes activated a stronger preference to cooperate in general than did American culture primes, but that the activated preference was manifested in cooperative behavior only when the partners were friends.

CONCLUSION

The findings supported our predictions: Chinese culture primes activated more cooperation with friends than did American culture primes, whereas there was no systematic effect of prime on cooperation with strangers. As a whole, these findings are consistent with the basic premises of the dynamic constructivist approach. First, contextual cues (culture primes) can heighten the accessibility of cultural norms and theories (preferences to cooperate, expectations toward friends vs. strangers). Second, the accessible cultural theories influence behaviors when the immediate context (interacting with friends) matches the theories' range of applicability. Furthermore, by attending to the friend-versus-stranger context, this research has contributed to a more nuanced understanding of the perception-behavior link. Our findings suggest that cultural icons can activate higher-order goals (such as motivation to maximize joint profit) and expectations (such as expectation of whether partners will cooperate), but that the activated goals and expectations are translated into behaviors only in specific relational contexts.

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