CULTURE, DIALECTICS, AND REASONING ABOUT CONTRADICTION

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ABSTRACT

Chinese ways of dealing with seeming contradictions result in a *dialectical* or compromise approach—retaining basic elements of opposing perspectives by seeking a "middle way." European-American ways, on the other hand, deriving from a lay version of Aristotelian logic, result in a *differentiation* model that polarizes contradictory perspectives in an effort to determine which fact or position is correct. Empirical studies showed that dialectical thinking is a form of folk wisdom in Chinese culture: Chinese preferred dialectical proverbs containing seeming contradictions more than did Americans. Chinese were also found to prefer dialectical resolutions to social conflicts, and to prefer dialectical arguments over classical Western logical arguments. Furthermore, when two apparently contradictory propositions were presented, Americans polarized their views and Chinese were moderately accepting of both propositions. Origins of these cultural differences and their implications for human reasoning in general are discussed.

Consider the following statements about recent scientific discoveries:

Statement A. Two mathematicians have discovered that the activities of a butterfly in Beijing, China, noticeably affect the temperature in the San Francisco Bay Area.

Statement B. Two meteorologists have found that the activities of a local butterfly in the San Francisco Bay Area have nothing to do with temperature changes in the same San Francisco Bay Area.

What would be your intuitive reaction to these statements? Do you see an implicit contradiction between the two pieces of information? What strategy would you use to deal with such contradictions? What is the rationale for using such a strategy? Does your cultural background affect your reasoning and judgments about contradiction? If so, how?

Theoretically, there are four possible psychological responses to apparent contradiction. The first, and perhaps easiest, is not to deal with contradiction at all, or to pretend that there is no contradiction, a psychological stance that could be labeled denial. A second approach is to distrust or discount both pieces of information because they seem to contradict each other, a stance that could be called discounting. However, both of these stances can be counter-normative because the full set of information might have important implications for behavior.

A third response involves comparing both items of information, then deciding that one is right and the other is wrong. Psychologists have found that, in group decision-making, people exposed to opposing propositions often increase their preference for the proposition they were inclined to believe initially and decrease their preference for the less favored proposition (see Isenberg, 1986; Kaplan, 1987; for reviews). Psychologists have also found that people sometimes change opinions in order to reduce the cognitive dissonance caused by two contradictory cognitions. Such polarizing strategies could be characterized as differentiation.

Theoretically, however, a fourth response to contradiction is possible: a person might retain basic elements of the two opposing perspectives and believe that both perspectives might contain some truth, even at the risk of tolerating a contradiction. Such an approach would not regard the two statements about the association between the activities of a butterfly and temperature changes as a contradiction, but would rather attempt a reconciliation, with the result that both are believed to be true. This cognitive tendency toward acceptance of contradiction could be defined broadly as dialectical thinking. We address four questions about dialectical thinking in this paper: 1) Is tolerance of seeming contradictions a real form of dialectical thinking? 2) What are the principles underlying dialectical thinking? 3) Are there cultural differences in the way people reason about contradiction? 4) What are the psychological and social implications of various approaches to reasoning about apparent contradictions?

We explore dialectical thinking by comparing lay Chinese reactions to apparent contradictions to those of lay Americans. We argue that reasoning about contradiction is guided by tacit ontologies or folk wisdom about the nature of the world. Chinese believe the world is in constant flux and that the part cannot be understood except in relation to the whole (e. g., Nakamura, 1964/1978). Both change and complexity imply contradiction. Chinese deal with contradiction by what might a compromise approach, showing tolerance of contradiction by finding a "middle way" by which truth can be found in each of two competing propositions. Westerners believe in constancy of the world, and believe it is possible to decontextualize propositions, understanding them just in relation to one another rather than attending also to a larger field of facts and theories in which they are embedded (e. g., Cromer, 1993; Logan, 1986). Contradictory propositions are unacceptable by the laws of formal logic which have been part of the Western tradition since Aristotle, and Westerners respond to propositions that have the appearance of contradiction by differentiation—deciding which of two propositions is correct.

DIALECTICAL THINKING AND NAÏVE DIALECTICISM

Dialectical Thinking in Western Philosophy and Psychology

There is a long tradition of concern with dialectical reasoning in Western philosophy and more recently in the psychological literature (reviewed recently by Peng, 1997; in press). Dialectical thinking is considered to consist of sophisticated approaches towards seeming contradictions and inconsistencies. The key feature of Western dialectical thinking is *integration,* starting with the recognition of contradiction, then moving on to the reconciliation of basic elements of the opposing perspectives. Its rational foundation is still the law of non-contradiction, so that a satisfactory solution to contradiction is a non-contradictory one.

The best-known dialectical tradition in philosophy is that of Marx and Engels, who applied dialectical perspectives to the analysis of civilization and cultures. In their scheme, a proposition or historical fact (thesis) gives rise to an opposing one (antithesis), which is resolved by a synthesis. Marxist dialectical thought emphasized the permanence of opposition and contradiction in the real material world, and therefore in thought about reality. According to Marx and Engels, the process of historical development is endless because the synthesis itself becomes a new thesis and is in turn negated by a new antithesis producing a new synthesis, and so on ad infinitum. The dialectics of Marx and Engels can be characterized as "aggressive" or "assertive" in that there is constant negation.

In the late 1970s and early 1980s, a school of developmental psychologists started to look for cognitive development beyond Piaget's adolescent "formal operations" stage. Klaus Riegel (1973) argued that adult thought, particularly creative scientific activities, "are dominated by playful manipulations of contradictions and by conceiving issues integratively which have been torn apart by formal operational thinking (p. 363)." An empirical approach to dialectical thinking was offered by Michael Basseches (1980; 1984), who abstracted 24 "dialectical schemata," such as recognition of part-whole relationships, reciprocal relationships, and the progression thesis-antithesis-synthesis (Basseches, 1980). It has been

found that dialectical thinking becomes increasingly important and common with age (e.g., Baltes & Staudinger, 1993; Basseches, 1984; Chandler & Boutilier, 1992; Kramer & Woodruff, 1986). Middle-aged and older people are more likely to accept contradiction in reality and to synthesize contradiction in their thinking than are young people. An allied tradition in the field of individual differences focuses on "integrative complexity" (Tetlock, 1983, 1985), or ability to view problems from multiple perspectives and use multiple rules for thinking about them.

The philosophical tradition and the psychological one make similar fundamental assumptions. They regard contradiction as a temporary state that will be replaced by integrated thoughts—using reasoning that is linear, logical, and moves in one direction—from a contradiction to a synthesis. (Even Marx and Engles' constant negation assumes at least temporary integration.) They also assume that integration or synthesis are higher levels of cognitive functioning, such as philosophical ways of thinking—sophisticated, advanced models of thought used by older, wiser people and cognitive elites. They are still constrained by the laws of formal logic, which do not tolerate literal contradiction.

Dialectical Thinking in Chinese Thought

The Chinese have had an enduring reputation for being dialectical thinkers, reasoning in ways that are distinct from the formal logic paradigm dominating the Western tradition (e.g., Liu, 1974; Lloyd, 1990; Needham, 1962; Zhang & Chen, 1991). Due to the very nature of the approach, it is difficult to identify the principles of Chinese dialectical epistemology -- the concepts and rules are highly flexible, with a multiplicity of meanings and functions. Hence the existence of such a tradition has been generally assumed but never proven, and the contents of such principles have been touched on occasionally (e.g., Zhang & Chen, 1991), but never explicitly theorized.

We take a rather non-dialectical approach in order to decompose Chinese dialectical epistemology. This approach, we have to admit, is analytic and logical, and not consistent with the spirit of dialectical thinking. The principles identified may not cover all aspects of

Chinese dialectical epistemology, but only the ones that are the easiest to abstract and analyze for the purpose of empirical research.

Principle of change (*Bian Yi Lu*).This principle holds that reality is a process. It does not stand still but is in constant flux. According to Chinese folk belief, existence is not static but dynamic and changeable. At the deepest level of Chinese philosophical thinking, "to be or not to be" is not the question because life is a constant passing from one stage of being to another, so that to be is not to be, and not to be is to be (e.g., Cao, 1982; Liu, 1988; Wang, 1987). Because reality is dynamic and flexible, the concepts that reflect reality are also active, changeable, and subjective rather than being objective, fixed, and identifiable entities.

Principle of contradiction (*Mao Dun Lu*). This principle states that reality is not precise or cut-and-dried but is full of contradictions. Because change is constant, contradiction is constant. Old and new, good and bad, strong and weak, and so on, co-exist in everything. One of the first mandatory books for literate ancient Chinese was the Yi Jing /I-Ching (The Book of Changes), in which the principle of contradiction is clearly expressed. For example, its basic theme is that the world is simply a single entity, integrated over opposites. The founder of the Daoist school, Lao-zi (570?-490?BC/1993), said: "When the people of the world all know beauty as beauty, there arises the recognition of ugliness; When they all know the good as good, there arises the recognition of evil. And so, being and nonbeing produce each other…. (p. 16)." According to the Daoists, the two sides of any contradiction exist in an active harmony, opposed but connected and mutually controlling.

Principle of relationship or holism (*Zheng He Lu*). This principle probably constitutes the essence of dialectical thinking. It is a consequence of the principles of change and contradiction. It holds that nothing is isolated and independent, but everything is connected. If we really want to know something fully, we must know all of its relations -- how it affects and is affected by everything else. Or, to borrow a slogan from Gestalt psychology, the whole is more than the sum of its parts. Anything regarded in isolation is

distorted because the parts are meaningful only in their relations to the whole, like individual musical notes embedded in a melody. The holistic mode of thought rests on the assumption that everything exists in mystical integration of *yin* and *yang*, entities that are opposed to one another and yet also are connected in time and space as a whole.

Contrast Between Dialectical Thinking and Formal Logic

The three principles of Chinese dialectical thinking are related. It is because of change that contradiction becomes inevitable; it is because change and contradiction are inevitable that it is meaningless to discuss the individual part without considering its relationships with other parts. To many people in the West, this description may sound interesting, reasonable, and even a bit familiar, particularly the idea of holism. However, when one contrasts the principles of Chinese dialectical thinking with the laws of formal logic, the significance of the cultural difference becomes obvious. The rational foundation of Chinese dialectical thought is quite different from the rational foundation of Western thought (including Western dialectical thought). Western thought rests in substantial part on Aristotelian logic, which emphasizes three different principles: the law of identity, the law of noncontradiction, and the law of the excluded middle.

The law of identity. This law holds that if anything is true, then it is true; thus A = A. In other words, everything must be identical with itself. Leibniz has given expression to the law of identity that "Everything is what it is." For example, "A student is a student" is a logical assertion because "student" and "student" are identical.

The law of noncontradiction. This law declares that no statement can be both true and false; thus $A \neq \neg A$. For example, "A student is not a non-student" is an expression of the law of non-contradiction because "student" and "non-student" are contradictory, hence cannot both be true. Other common expressions of the law are that “Contradictory statements (e.g., A is B, A is not B) cannot both be true,” and that "It is impossible for the same thing to be both true and false at the same time." Aristotle actually declared the law of noncontradiction to be the first and most certain of all three laws of logic.

The law of the excluded middle. This law expresses the rule that any statement is either true or false; thus (A v B) & ¬ (A & B). A common expression of this law of the excluded middle is "A is either B or not-B." For example, "A person must either be a student or non-student" because "student" and "non-student" are mutually contradictory and complementary so that anybody must belong to either one of these two categories. Other expressions of the law of the excluded middle are that "Of two contradictory judgments (A is B, A is not B) the one must be true, the other false," and Aristotle's statement that "Between the two members of a contradiction, there is no middle term."

Differences between the two traditions. It is obvious now to readers that these laws of formal logic are not congruent with the principles of Eastern naïve dialecticism. For instance, the principle of change suggests that life is a constant passing from one stage of being to another, so that to be is not to be, and not to be is to be. The law of identity, on the other hand, assumes cross-situational consistency; A must be A regardless of the context.

According to Chinese belief, the law of non-contradiction of formal logic works only in the realm of concepts and abstraction. Even in these cases, the rejection of conceptual contradiction based on formal logic can be mistaken, because concepts are reflections of things. As Liu (1974) put it, "... it is precisely because the Chinese mind is so rational that it refuses to become rationalistic and...refuses to separate form from content (p.325)." There is nothing which does not contain contradiction, and, therefore, there is no concept which does not contain contradiction. A student, in many ways, is not a student, as illustrated by the experience of many graduate student instructors.

Finally, if change and contradiction are constant, then real understanding of truth and reality must be relational. Hence, for a dialectical thinker, both A and B may be right, or both A and B may equal a third element C that may not be part of the initial contradiction. We believe such fundamental differences in ontology and epistemology lead to substantial cognitive differences. We expected that Western stances for dealing with contradiction should be consistent with Westerners' intuitive understanding of the law of

noncontradiction, whereas the Chinese stances for dealing with contradiction should be based on naïve dialecticism. Five studies were designed to demonstrate the effects of culture-specific epistemology on reasoning about apparent contradictions.

FOLK WISDOM AND CONTRADICTION

A shortcut for studying culture-specific habits of thought is to study folk wisdom as embodied in proverbs. Proverbs have been defined as short expressions of cultural wisdom, truth, morals and norms in a "metaphorical, fixed and memorable form" which are shared and "handed down from generation to generation" (Mieder, 1993, p. 5). Proverbs can sum up a situation, pass judgment, recommend a course of action, or serve as past precedents for present action (Taylor, 1965). Anthropologists have often studied proverbs in different cultures and contexts as public representations of cultural wisdom (see Dundes, 1989).

Study 1: Differential Preferences for Dialectical Proverbs

Study 1 was designed to show that dialectical thinking is reflected in Chinese folk wisdom, and that dialectical proverbs are more common in Chinese everyday language than in American everyday language and more preferred by Chinese than by Americans. Examples of proverbs containing contradictions include "Beware of your friends not your enemies," which contradicts the very definition of friendship, and the proverb "Too humble is half proud," which explicitly contradicts the very meaning of the word “humble.” In comparison, a non-dialectical proverb has no such contradiction. For example, the proverb "One against all is certain to fall" stresses the inequality of one versus many; the proverb "For example is no proof" makes a distinction between mere examples and more convincing proofs. Such proverbs may surprise or prompt thought, but they contain no internal contradiction, nor do they point to the inevitability of opposing factors in everyday existence.

Method

Participants. Participants were 70 white American undergraduate students (US citizens) at the University of Michigan and 41 Chinese undergraduate students from Taiwan

who identified themselves as Chinese and were currently attending the same university, and who were comparable in age, gender, and GPA.

Materials. Two compendia of proverbs were selected as the sources of the stimuli (Hirsch, Kett, & Trefil, 1988; Lian, 1964). Proverbs were coded as dialectical and non-dialectical by four trained coders having inter-coder reliability of .92 as indicated by Kendall's index of harmony. Eight Chinese and eight American dialectical proverbs were randomly selected from the pools of dialectical proverbs agreed upon by all four coders. Five Chinese and five American non-dialectical proverbs were also randomly selected from the rest of the Chinese and American proverbs as controls. Both the dialectical and non-dialectical English proverbs were translated into Chinese by an independent translator who was fluent in both languages. The Chinese proverbs were already translated by that book's author (Lian, 1964).

Procedure. Participants made four judgments: 1) "How familiar is this proverb to you in exact words?", 2) "How well do you think you understand this proverb?", 3) "How much do you like this proverb?", and 4) "How often do you use this proverb?" Participants rated their responses on a 7 point scale ranging from "not at all" (1) to "very much" (7).

Results

We found that there were nearly four times as many dialectical proverbs in the Chinese book (about 12%) as in the American book (fewer than 3%), suggesting that contradiction plays a larger role in Chinese than in American folk wisdom. The pattern of participants' judgments on all four questions -- familiarity, comprehensibility, usage and likability--was the same, so an index of overall preference for each proverb was created by taking the mean of the four judgments. The means of these indices were submitted to a 2 (culture) X 2 (type of proverb) X 2 (language) omnibus analysis of variance, broken down by culture and type of proverb. The means are illustrated in Figure 1. We found a significant main effect of Culture such that the American participants showed a dislike of the Chinese proverbs, regardless of whether they were dialectical or non-dialectical,

whereas the Chinese rated the American proverbs as favorably as the Chinese ones, F (1, 109) = 8.59, $p < .01$.[1] Perhaps the Chinese students who were studying in the US were self-selected for liking American culture or had simply developed a taste for it. The major prediction was supported by a significant three-way interaction of Culture by Language by Type of Proverb; Americans greatly preferred non-dialectical to dialectical American proverbs, and the Chinese preferred dialectical to non-dialectical Chinese proverbs, F (1, 109) = 12.45, $p < .001$.

Study 2: Differential Preferences for Dialectical Yiddish Proverbs

It is possible that the results of Study 1 might be due to mere familiarity. The Chinese might simply have had more exposure to the dialectical Chinese proverbs and Americans to the non-dialectical American proverbs. More linguistically neutral, unfamiliar proverbs were chosen for a follow-up study, namely Yiddish proverbs.

Method

Participants. Participants were 32 Chinese and 34 white (non-Jewish) American natural science graduate students living in the University of Michigan Family Housing. The two groups were comparable in age, gender, and education.

Materials and procedure. The same coders who worked on Study 1 were asked to mark each proverb that they thought was dialectical. Eight dialectical proverbs and eight non-dialectical proverbs were randomly selected from a Yiddish dictionary of proverbs (Ayalti, 1963). Proverbs were presented to all participants in their English form. The instructions and procedure were the same as in Study 1.

Results

The means for the general preference indices are presented in Figure 2. We found a significant interaction of Culture by Type of Proverb indicating a significant cultural difference in responses to the dialectical Yiddish proverbs, which the Chinese preferred more than Americans did, and no difference regarding non-dialectical Yiddish proverbs, F (1, 64) = 9.17, $p < .01$. The results can be seen in Figure 2.

RESOLUTION OF SOCIAL CONTRADICTIONS

Social contradiction can be defined loosely as a condition in which two parties or two aspects of one social system (e.g., a relationship, an institution, or a social function) are in conflict with each other. Interpersonal conflicts are examples of social contradiction. Cross-cultural comparisons of indigenous preferences for conflict resolution methods have shown strong cultural variations, with Asians favoring harmonious procedures. For example, Leung (1987; Leung & Lind, 1986) found that Chinese participants in his studies were more in favor of resolving disputes through informal procedures, such as mediation and bargaining, because they believed that such methods reduce animosity whereas Americans were more likely than Chinese to favor adversarial methods of conflict resolution.

We suspected that Chinese might adopt a compromise approach towards social contradictions because of their naïve dialecticism. If the Chinese really have a holistic approach towards life and a tendency to tolerate contradiction, then they would be less likely to take sides in a conflict and perhaps not even to regard a social conflict as a contradiction. Ethnographic analyses of Chinese law practices have suggested that Chinese law permits the "middleman" to become the key figure in Chinese legal disputes, while barring the way for Western-model lawyers and the rule of impersonal law which often requires that only one party may win (Hsu, 1981). The dialectical resolution of social contradiction is encouraged by an aspect of Chinese culture, namely the *Doctrine of the Mean*, which emphasizes moderation, sincerity, and, most importantly, a “reasonable” middle of the road approach. In dealing with social contradiction, it is not enough that a proposal or solution be "logically correct," or "true," or "effective." It is much more important that it be "reasonable."

Study 3: Dialectical Resolution of Social Contradictions

In Study 3, participants from both cultures were asked to write down what they thought about two everyday life contradictions, including the origin and resolution of the

conflict. Their responses were then coded as dialectical or non-dialectical. Our prediction was that the Chinese would apply the "doctrine of the mean" in their analysis of the social contradiction whereas Americans would be less likely to do so. Participants were the same 32 Chinese graduate students and 34 American graduate students as in Study 2.

Method

Two everyday life scenarios were provided for participants to analyze: one was a mother-daughter value conflict and the other was a conflict between having fun and going to school (see Appendix A for the texts, which were drawn from Basseches, 1984). A simple coding scheme was created for analyzing participants' responses that distinguishes dialectical resolution from non-dialectical resolution of each contradiction. A dialectical response was defined as one which 1) addressed the issues from both sides, and 2) attempted to reconcile the conflicts from by compromising. A dialectical resolution usually included sentences that attributed the cause of the problem to both sides and attempted to reconcile the contradiction, for example, a response such "Both the mothers and the daughters have failed to understand each other." Nondialectical responses generally found exclusive fault with one side or the other, for example, "mothers have to recognize daughters' right to their own values." The inter-coder reliability was measured by Kendall's index of harmony. The indices were .89 ($p < .01$) for the Chinese responses and .84 ($p < .01$) for the American responses.

Results

We found that cultural differences in dealing with social contradiction were remarkably strong, as can be seen in Figure 3. For the mother-daughter conflict, many more American responses were coded as non-dialectical (74%) than as dialectical (26%), z ($n = 34$) = 2.74, $p < .01$. In contrast, for the same conflict, many more Chinese responses were coded as dialectical (72%) than as non-dialectical (28%), z ($n=32$) = 2.47, $p < .05$. A 2 X 2 Chi-square test showed that the cultural differences were highly significant, χ^2 (1, 64) = 13.61, $p < .001$. For the school-fun conflict, many more American responses were coded as

non-dialectical (88%) than dialectical (12%), z (n=34) = 4.45, $p < .001$. Although an almost equal number of Chinese responses were coded as dialectical and non-dialectical, the cultural differences were still significant, χ^2 (1, 64) = 8.50, $p < .01$.

The results of Study 3 indicate that cultural differences in dealing with social contradiction at the interpersonal level may be substantial. Most of the American participants' resolutions of contradictions in everyday life were non-compromising, blaming one side for the causes of the problems, demanding changes from one side to attain a solution, and offering no compromise in dealing with interpersonal conflicts. In contrast, most of the Chinese responses were much more dialectical, usually blaming both sides and preferring a compromise approach to resolve the contradictions.

FORMAL ARGUMENTATION

It has been suggested by scholars in many fields of science that the Chinese and people from other Eastern Asian cultures are less likely than Westerners to engage in debates and formal argumentation (e.g., Becker, 1986; Nakamura, 1964). There are social, historical, linguistic, and philosophical barriers to the acceptance of argumentation and debate as a method of intellectual discourse or as a strategy for the consideration of new proposals for social or political change (Becker, 1986). Some of the barriers are easy to identify, such as the Chinese emphasis on harmony and hierarchy, and the lack of proper forums or institutions for debate. Others are more philosophically rooted, such as the influence of naïve dialecticism, which assumes that there can be some truth to both of two opposing propositions, and hence implies that no side should win in a debate. Perhaps most importantly, naïve dialecticism implies that concepts and words are flexible and only auxiliary to human actions, and hence verbal debate and argumentation are not meaningful tools for understanding truth and reality.

Study 4: Differential Preferences for Argument Forms

In Study 4 we attempted to address the question of whether Chinese preferences for dialectical thinking affect the way they approach matters of formal argumentation. Which

are more persuasive to the Chinese: logical arguments or dialectical arguments? Do Chinese scientists accept logical argument for scientific questions as much as American scientists? In Study 4, American and Chinese participants were asked to judge two types of arguments which reached the same conclusions. These arguments were similar in length, style, and structure. Both started from issues and premises, and then proceeded to examples and conclusions. The difference was that one argument applied the law of non-contradiction whereas the other applied naïve dialecticism, namely the principle of holism. We hypothesized that Americans would be more favorable toward arguments complying with the law of non-contradiction and that Chinese would be relatively more favorable toward dialectical arguments.

Method

Participants. The 32 Chinese and 34 American natural science graduate students from Studies 2 and 3 also participated in Study 4. It is important to note that none of the participants were physicists.

Materials and procedure. Two types of arguments -- logical and dialectical -- were used in Study 4 (see Appendix B for full texts of these arguments). One argument was Galileo's famous discussion concerning the falsity of Aristotle's assumption that a heavier object falls to ground first. A modern version of Galileo's thought experiment was used (adapted from Fisher, 1986): Suppose one puts a heavier object on top of a lighter object: as a joint entity, they should fall faster than the heavier object alone according to Aristotle's assumption. However, in the joined entity, the lighter object is below the heavier object so it should also act as a "brake" to slow down the heavier object, making both fall slower than the heavier object alone. Because this is a contradiction, the initial assumption by Aristotle must be false. A parallel dialectical argument was generated to argue the same position but applying the principles of holism and stressing the importance of contexts. The argument suggested that since Aristotle isolated objects from possible surrounding factors (e.g., wind, weather and height), his initial assumption must be wrong.

The logical argument for the existence of God is another modified version of a classical argument (adapted from Fisher, 1986), cited (but ultimately rejected) by David Hume in his Dialogues Concerning Natural Religion. It uses the law of non-contradiction to argue "the first causality" of the universe, suggesting that since everything has a cause, and a mere succession of causes and effects is impossible, there must be a first or ultimate cause of the universe which must be God. The dialectical argument applying the principle of holism argues that when two people see a cup from opposite perspectives, one sees a cup with a handle, and the other sees a cup without a handle. But there must be a God above individual perspectives who can see all and who decides the truth. The participants were instructed to read the two arguments for each topic, then to indicate "Which argument is more persuasive (convincing) to you personally?" and 2) "Which argument do you like more?"

Results

Figure 4 shows that American participants preferred the arguments that applied the law of non-contradiction and Chinese participants preferred the arguments that applied the principle of holism. We used participants' judgments of both persuasiveness and likability as indications of preference and summed the two judgments across the two issues to create a single index based on responses to the four questions which could range from 0 (no dialectic preference on any item to 4 (greater dialectic preference for all four items. It was found that Chinese preferred the dialectical arguments (Mean = 2.22, SD = 1.07) more than did the Americans (Mean = 1.56, SD = 1.05), $t(1, 65) = 2.53$, $p < .05$.

Inasmuch as the Chinese participants, like the American participants, were scientists living in the West, it is particularly striking that they preferred the dialectical arguments, even for the scientific topic. These findings demonstrate again the power of folk theories in the scientific understanding of physical phenomena (e.g., Champagne, Klopfer, & Anderson, 1980; McCloskey, 1983; Peng & Nisbett, 1996).

JUDGMENTS ABOUT CONTRADICTORY INFORMATION

Empirical studies conducted in Western cultural contexts have found that people exposed to two items of contradictory information often increase their preference for the item of information they were inclined to believe initially and decrease their preference for the less favored item. Such a tendency has been characterized as "group polarization" in the group decision making literature (see Isenberg, 1986; Kaplan, 1987; for reviews) and "disconfirmation bias" in the cognitive literature (e.g., Edwards & Smith, 1996; Lord, Ross, & Lepper, 1979). But do Chinese have different tendencies regarding contradictory information? A dialectic stance implies that Chinese would not show polarization and disconfirmation biases but rather a tendency to tolerate contradiction.

Study 5: Differential Approaches towards Contradiction

In Study 5, we presented apparently contradictory research findings on various topics. The purpose was to determine whether Chinese and Americans have different approaches for dealing with contradiction in scientific matters. The expectation was that when presented with opposing items of information, Americans would use a differentiation strategy, deciding that one of the sides was correct and the other was not, whereas Chinese would use a compromise strategy, finding truth in both sides.

Method

Participants. One hundred and two American undergraduate students at the University of Michigan and 136 undergraduate students at Beijing University participated in this study. The two groups were comparable in age and gender composition, and received course credit for their participation.

Materials. The information was presented in the form of brief descriptions of the findings of scientific studies. The opposing statements were superficially incompatible but were not true contradictions of one another. This left room for a dialectical approach -- for finding some degree of truth to both statements. The first issue concerned whether strong or weak family ties are optimal for individual social ability. The second issue was about smoking and weight. Two findings were presented, one of which suggested a high

correlation between smoking and being thin and the other of which suggested otherwise. The third issue concerned whether eating "white meat" is healthier than eating no meat at all. The fourth issue dealt with whether older or younger inmates should be released first in a prison overcrowding crisis. The fifth issue concerned whether there is currently a trend toward global warming. The statements are presented in Appendix C.

Procedure. Participants were randomly assigned to one of three conditions. In two of the conditions, participants only read information on one side of the five contradictions (A or B), so that their judgments of the plausibility of each finding could be regarded as baseline judgments. In the third condition, participants read information on both sides (A and B), so that they were confronted with a seeming contradiction. All participants were instructed to indicate how much they believed each of the statements to be true on a 9-point scale from 1 (strongly disbelieve) to 9 (strongly believe).

Results

Plausibility in no-contradiction conditions. The plausibility of each statement was established by analyzing participants' ratings of their beliefs about the accuracy of each statement in the “A” or “B” Conditions. The statement that received the higher rating in each pair was defined as the more plausible one. It was found, somewhat surprisingly, that the Americans and Chinese both had the same intuitions about which statement was more plausible for each topic. (The more plausible statement is always the first listed in Appendix C.) The mean of the participants' judgments on the five "more plausible" statements was calculated as the aggregate rating of "more plausible findings" and the mean of participants' judgments on the five "less plausible" statements as the aggregate rating for "less plausible findings." A 2 (Culture) X 2 (Condition) X 2 (Plausibility) omnibus analysis of variance (ANOVA) showed a significant interaction of Culture by Condition, F (1, 237) = 7.90, p < .01, indicating that the American and Chinese judgments about the contradictory information were differentially influenced by the contradictions.

Culture-specific effects of contradiction. It may be seen in Figure 5a that American participants followed a differentiation approach toward contradictory information. The difference was entirely due to higher plausibility ratings for the "more plausible" statements, F (1, 101) = 5.10, $p < .05$, and there was no difference for ratings of the "less plausible" statements. Thus, Americans presented with evidence against a plausible state of affairs actually judged it to be more likely than if they saw no contradictory evidence.

The aggregated ratings of plausibility by Chinese participants showed a quite different pattern (Figure 5b), which suggests a compromise approach toward contradictory information. In effect, the Chinese behaved as if they believed that both statements might be (somewhat) true. This pattern was due both to higher ratings of the less plausible statements in the "A and B" Condition, F (1, 101) = 6.90, $p < .01$, and to lower ratings for more plausible statements, F (1, 101) = 6.53, $p < .01$. Thus, Chinese presented with evidence against a rather implausible state of affairs actually judged it to be more plausible than if they had not seen the evidence.

Discussion

The results of Study 5 clearly indicate that Americans and Chinese can have very different approaches to dealing with contradictory information. American participants who read brief accounts of two contradictory studies expressed beliefs that were more polarized than those expressed by participants who read about only one study. Chinese participants who read about two contradictory studies, in contrast, expressed beliefs that were intermediate between those expressed by participants who read about only one of the studies.

The explanation for this pattern that we prefer is that both groups used heuristics in dealing with contradiction, but that these heuristics are culture-specific. For Americans, the simple heuristic might be that, if there is an apparent contradiction between two opposing perspectives, one must be right and the other must be wrong. The heuristic suggests that, consistent with the laws of non-contradiction and excluded middle, you cannot have it both

ways. For the Chinese, the pattern might be due to the dialectical reasoning style of compromising between the elements of opposing perspectives. The Chinese heuristic for dealing with apparent contradiction may consist of believing that both sides of a contradiction might be right, and that the truth lies between the two perspectives. Such an approach could be derived from the dialectical epistemology, which advocates tolerance of seeming contradiction.

The results suggest that both Americans and Chinese are prone to make mistakes in dealing with contradictory information. For the Americans, the mistake concerns the more plausible statements. The American patterns found in Study 5 are reminiscent of the results of a classic study by Lord, Ross, and Lepper (1979). In that experiment, participants read about two different studies concerning the deterrent value of capital punishment. The two studies had different methodologies and came to opposite conclusions. Participants who favored capital punishment believed that the study which found capital punishment to be ineffective for deterrence was flawed methodologically; and they were little moved by its conclusions. The same pattern of biased evaluation was found for opponents of capital punishment who read the study indicating that capital punishment was effective. Remarkably, after reading about the two contradictory studies, participants reported being more convinced about the correctness of their initial view than were control subjects who did not read about any study.

For the Chinese, the mistake concerns the less plausible statements. It can scarcely be normatively correct to judge an implausible view as more plausible when one has just read evidence for another, more plausible stance than if one has read only evidence supporting the less plausible view. Nevertheless, this is what Chinese participants did in Study 5.

The current findings are consistent with basic intellectual frameworks in both cultures. Characteristics of Western thinking include: 1) pursuit of a single truth, 2) construction of counterarguments, 3) preference for consistency. For Americans, since any

argument can look better by comparison, there is a strong desire to generate counterarguments against a position that one doubts, in order to find a more secure basis for belief in some other position. A good part of Western education in fact consists of teaching children how to generate arguments and counter-arguments concerning a given position. In contrast, there is very little emphasis on constructing counter-arguments in the Asian tradition (Becker, 1986; Yates & Lee, 1996; Yates, Lee, & Bush, 1997). Instead, the emphasis is on finding "the middle way" (Liu, 1974; Lloyd, 1990; Nakamura, 1965/1984).

GENERAL DISCUSSION

We have found empirical support for claims long made by scholars in a variety of fields about the different intellectual traditions of East and West. The evidence provides confirmation from the psychological laboratory to support the historical, ethnographic and philosophical work suggesting that there are two very different cognitive traditions in East and West regarding the treatment of seeming contradictions. The differences we have found, it should be noted, are actual qualitative ones. Chinese preferred dialectic proverbs whereas Americans preferred non-dialectical ones; Chinese preferred compromise solutions to conflicts whereas Americans preferred non-compromising ones; Chinese preferred dialectical arguments for a scientific proposition and a spiritual one whereas Americans preferred logical arguments; Chinese moderated their views when confronted with opposing propositions whereas Americans became more extreme. It should also be noted that the differences we have found are almost surely muted with respect to the Chinese and American populations as a whole. The Chinese participants were all students and thus would have been exposed to Western forms of thought to a greater degree than would be true of other Chinese. In addition, all except the participants in Study 5 had been living in the U. S. for several years.

Holistic vs. Analytic Epistemologies

We believe that dialectic vs. non-dialectic reasoning will turn out to be only one of a set of interrelated cognitive differences between Asians and Westerners. We and our

colleagues are pursuing the general notion that East Asians influenced by the Chinese cultural tradition are cognitively integral and holistic, attending to the perceptual and cognitive field as a whole. In contrast, Westerners are prone to differentiate the object from the field and to reason analytically about its behavior, categorizing it and using rules about categories to understand its behavior (Nisbett, 1998; Nisbett, Peng, Choi, & Norenzayan, 1999). There is now considerable evidence, for example, that causal attribution differs across cultures, with Asians being inclined to attribute to context the sorts of actions that Westerners attribute to dispositions of the object -- whether the object is human (Choi & Nisbett, 1998; Lee, Hallahan, & Herzog, 1966; Miller, 1984; Morris and Peng, 1994; Norenzayan, Choi, & Nisbett, 1999; animal (Morris & Peng, 1994) or physical (Peng & Nisbett, in press). See Choi, Nisbett, & Norenzayan (1999), Morris, Nisbett & Peng, 1995, and Norenzayan, Choi, and Nisbett (in press) for reviews.

There is also evidence that Asians attend more closely to the field, whereas Americans attend more closely to the focal object in the field. Abel and Hsu (1949) found that Chinese Americans tended to give "whole card" responses on the Rorschach whereas Caucasian Americans tended to give responses based on only a part of the card. Ji, Peng, and Nisbett (1999) found that Chinese participants were more capable of detecting covariation among arbitrary events than Americans, but more field dependent as indicated by the fact that they were more influenced by the position of the frame when judging the verticality of the rod in the Rod and Frame Test. In addition, Westerners learn arbitrary categories more readily using rules (Norenzayan, Nisbett, Smith, & Kim, 1999), make more use of categories for purposes of induction than do Asians (Choi, Nisbett, & Smith, 1997), are more likely to use categories for purposes of grouping objects than to use relationships among the objects (Chiu, 1972; Ji & Nisbett, 1999; Norenzayan, et al., 1999), and are more willing to set aside their preconceptions when these are contradicted by logical argument (Norenzayan, et al., 1999).

The tendency toward dialecticism of Easterners may thus be seen as part of a general system of thought in which attention is directed outward toward the environment, and complexity and change and contradiction are therefore salient. The Western tendency toward logical reasoning may be seen as due to a focus on the object, with its presumably fixed attributes, resulting in a general system of thought in which rules and categories concerning the object are viewed as essential.

A Paradox in the History of Science

Our contention that East Asians are inclined toward holism and dialecticism whereas Westerners are inclined toward analytic thought focusing on the object may be helpful in resolving “Needham's paradox” (Capra, 1975; Needham, 1962; Zukav, 1980). British historian of science Joseph Needham noted that the ancient Chinese had rich concepts concerning "field" and "force over distance" and understood phenomena such as magnetism, acoustic resonance, and the true reason for the tides more than 1,500 years before these things were understood in the West. Such understanding would seem to flow from a focus on the field and a commitment to holistic thought. However, the Chinese did not discover the modern physics of electromagnetism or quantum physics (Needham, 1962).

One of the factors contributing to "Needham's paradox" could be naïve dialecticism. By emphasizing change, contradiction, and covariation, naïve dialecticism restricts any reductive, analytic, and logical quest for understanding nature and the world. The reductionism of quantum physics recognizes one force, namely the mechanical force, as the manifestation of momentum and energy exchange of all physical movements. According to many historians of physics, it was because of the prior development of "billiard-ball" physics that the modern scientific revolution could take place at the beginning of the 20th century (e.g., Qian, 1985). Indeed, the major aims of Faraday, Lord Kelvin, and James Maxwell were actually to eliminate "action at a distance" and provide electric and magnetic actions with the tangibility of "billiard-ball interactions." They initiated and mathematized the concept of "field" and "forces over a distance" in the process of establishing

electromagnetism and found that the force in a "field of force" is the same Newtonian force that governs billiard-ball interactions (Qian, 1985). Such a linear persistence and logical approach are not congruent with the principles of naïve dialecticism. This may be one of the cognitive reasons, among many other factors, that the Chinese themselves did not develop modern physics. Intriguingly, however, the dialectic orientation may have been important to the development of modern quantum theory. At any rate, Nils Bohr maintained that his thinking was influenced by Chinese metaphysical approaches (Bohr, 1958; 1958/1987).

Normative Questions

One of the inevitable questions stemming from this research is "Which approach to dealing with contradiction is better, the (flawed) Chinese way or the (flawed) American way?" The best answer to such a linear question seems to be a dialectic one. On the one hand, life is full of contradictions. Even in science, the concept of a "complex system" reflects the reality of the world we are living in, a reality that is multi-layered, unpredictable, and contradictory. Therefore, a dialectical approach may enable us to tolerate and even appreciate contradiction, consequently maintaining a view of the big picture. On the other hand, the dialectical approach may be accompanied by a tendency to accept too much at face value, failing to generate counterarguments for a statement and trying to reconcile opposing views, even when one viewpoint is inferior in terms of the evidence supporting it.

It seems apparent that the Western, non-dialectical approach is more congruent with Western scientific reasoning and research. In fact, the laws of formal logic form the foundations of scientific investigation (e.g., Popper, 1959/1972). Many other intellectual tasks in the West have been tacitly framed in adversarial terms so that results and conclusions can be "falsified." This is true of the adversarial and argumentative approaches that operate in law and public policy analysis.

The Western tradition of counterargument construction seems likely to result in more specific hypotheses and consequently more solutions than naïve dialecticism could

(Choi and Nisbett, 1999). Its emphasis on non-contradiction may also enable people to reason rationally to reject false statements (even ones they may like) and accept true statements (even ones they may not like). In fact, a large body of research on decision making has shown that argument, debate, or conflict in general can improve decision quality in Western societies (e.g., Johnson & Tjosvold, 1983; Janis & Mann, 1977; Mason & Mitroff, 1981; Schwenk, 1990). Unfortunately, though, many Westerners may not know their own strength or do not use it wisely. Their ability to generate counterarguments and their fear of the appearance of contradiction may cause them to reject a statement simply because they can readily generate counterarguments. Their analytic orientation may lead them to focus too much on one side of an argument and to blind them to compromise solutions—when the truth does indeed lie somewhere between or above the opposing facts or viewpoints.

Therefore, the dialectical response to the linear question regarding which is the better way of thinking is “it depends.” Paul Baltes has expressed to us the view that logical ways of dealing with contradiction may be optimal for scientific exploration and the search for facts because of its aggressive, linear, and argumentative style. On the other hand, dialectical reasoning may be preferable for negotiating intelligently in complex social interactions. Therefore, ideal thought tendencies might be a combination of both -- the synthesis, in effect, of Eastern and Western ways of thinking.

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Appendix A

Two vignettes used in Study 3

Mother-daughter conflict:

Mary, Phoebe, and Julie all have daughters. Each mother has held a set of values which has guided her efforts to raise her daughter. Now the daughters have grown up, and each of them is rejecting many of her mother's values. How did it happen and what should they do?

School-fun conflict:

Kent, James, and Matt are college juniors. They are feeling very frustrated about their three years of routine tests, paper assignments, and grades. They complain that going through this process has taken its toll, undermining the fun of learning. How did it happen and what should they do?

Appendix B

Arguments used in Study 4

Galileo's argument against Aristotle's assumption

Aristotle believed that the heavier a body is, the faster it falls to the ground. However, such an assumption might be false. Suppose that we have two bodies, a heavy one called H and a light one called L. Under Aristotle's assumption H will fall faster than L. Now suppose that H and L are joined together, with H on top of L. Now what happens? Well, L + H is heavier than H so by the initial assumption it should fall faster than H alone. But in the joined body L + H , L and H will each tend to fall just as fast as before they were joined, so L will act as a "brake" on H and L + H will fall slower than H alone. Hence it follows from the initial assumption that L + H will fall both faster and slower than H alone. Since this is absurd the initial assumption must be false.

Dialectical argument against Aristotle's assumption

Aristotle believed that the heavier a body is, the faster it falls to the ground. However, such an assumption might be false because this assumption is based on a belief that the physical object is free from any influences of other contextual factors ("perfect condition"), which is impossible in reality. Suppose that we have two bodies, a heavy one called H and a light one called L. If we put two of them in two different conditions, such as H in windy weather (W) and L in quiet weather (Q), now what happens? Well, the weights of the body, H or L, would not make them fall fast or slow. Instead, the weather conditions, W or Q, would make a difference. Since these kinds of contextual influences always exist, we conclude that the initial assumption must be false.

Hume's argument for the existence of the God

Whatever exists must have a cause or reason of its existence, since it is absolutely impossible for anything to produce itself or be the cause of its own existence. In moving from effects to causes, therefore, we must have two options. One is to go on in tracing an infinite succession, without any ultimate cause at all; the other is that we at last have recourse to some ultimate cause that is necessarily existent. However, the first option is impossible. Because, in the infinite chain of succession of causes and effects, each single effect is determined to exist by the power and efficacy of that cause which immediately preceded. But if the whole eternal chain of succession, taken together, is not determined or caused by anything, this is absurd. Is nothing the ultimate cause? But that can never produce anything, which contradicts the cause-effect succession we have. We must, therefore, have recourse to a necessarily existent Being who carries the reason of his existence in himself, and who cannot be supposed not to exist, without an express contradiction. There is, consequently, such a Being -- that is, there is a God.

Dialectical argument for the existence of the God

Whatever exists must exist in its own time and location, and with unique properties. Because of these facts, any particular entity would have entities competing with it and contradicting it in terms of viewing the truth, just as two people watch a cup on the table, one sees a cup with a handle, the other must see a cup without a handle if he is looking from the opposite perspective. Then who is going to tell the truth? It cannot be one of the particular entities because each one of them can only see a part of the truth. Is nothing the ultimate truth? But that can never tell us anything. We know the truth will eventually come out. Therefore, there must be a way to add up all the different perspectives to assist at an absolute truth. Such a sum or "whole" consists of every idiosyncratic perspective, but reveals the truth as a whole. This marvelous "whole" cannot be designed or found by any individual alone. We must, therefore, have recourse to a necessarily existent Being who is above every idiosyncratic entity, and who cannot be supposed not to exist as argued above. There is, consequently, such a Being -- that is, there is a God.

Appendix C

Contradictory findings used in Study 5

Statement 1A:

A social psychologist studied young adults and asserted that those who feel close to their families have more satisfying social relationships.

Statement 1B:

A developmental psychologist studied adolescent children and asserted that those children who were less dependent on their parents and had weaker family ties were generally more mature.

Statement 2A:

A sociologist who surveyed college students from 100 universities claimed that there is a high correlation among college female students between smoking and being skinny.

Statement 2B:

A biologist who studied nicotine addiction asserted that heavy doses of nicotine often lead to becoming overweight.

Statement 3A:

A health magazine survey found that people who live a long life eat some sorts of white meat, e.g., fish or chicken.

Statement 3B:

A study by a health organization suggests that it is much more healthy to be a strict vegetarian who does not eat meat at all.

Statement 4A:

A survey found that older inmates are more likely to be ones who are serving long sentences because they have committed severely violent crimes. The authors concluded that they should be held in prison even in the case of a prison population crisis.

Statement 4B:

A report on the prison overcrowding issue suggests that older inmates are less likely to commit new crimes. Therefore, if there is a prison population crisis, they should be released first.

Statement 5A:

A group of environmental science undergraduate students examined fuel usage in a large number of developing countries and asserted that recent practices are likely to multiply already worsening environmental problems such as "global warming."

Statement 5B:

A meteorologist studied temperatures in 24 widely separated parts of the world and asserted that temperatures had actually dropped by a fraction of a degree each of the last five years.

Figure Captions

Figure 1. Index of Preferences for American and Chinese Proverbs by American and Chinese undergraduate students.

Figure 2. Index of Preferences for Yiddish Proverbs by American and Chinese Undergraduate Students.

Figure 3. Percent of Participants Preferring Dialectical Resolution.

Figure 4. Percent of American and Chinese Participants Preferring Dialectical Arguments.

Figure 5a. American Participants Ratings of Plausibility in Both "A or B Conditions" and "A and B Condition".

Figure 5b. Chinese Participants Ratings of Plausibility in Both "A or B Conditions" and "A and B Condition".

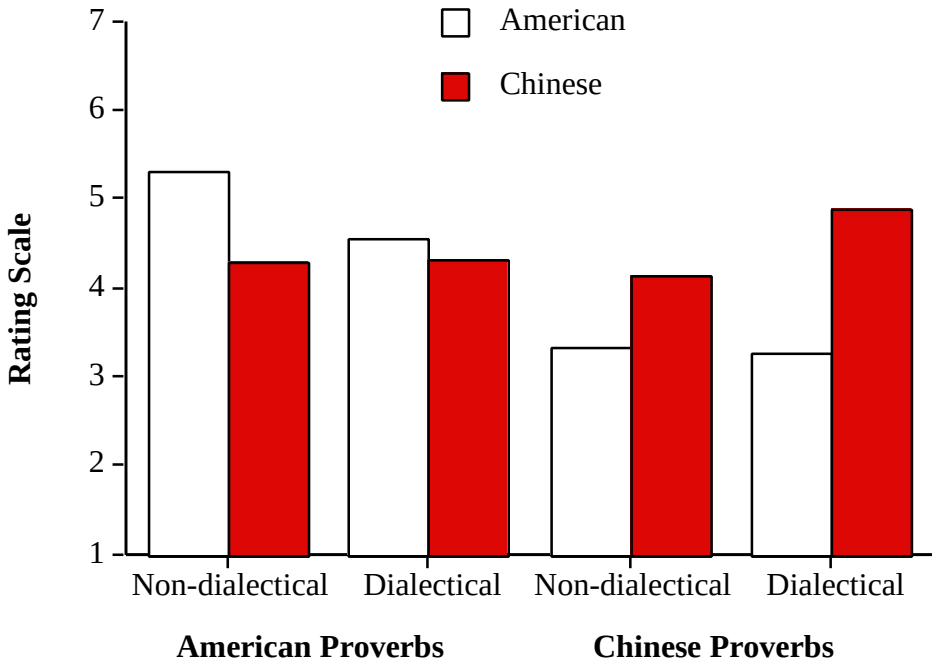

Figure 1. Index of Preferences for American and Chinese Proverbs by American and Chinese undergraduate students

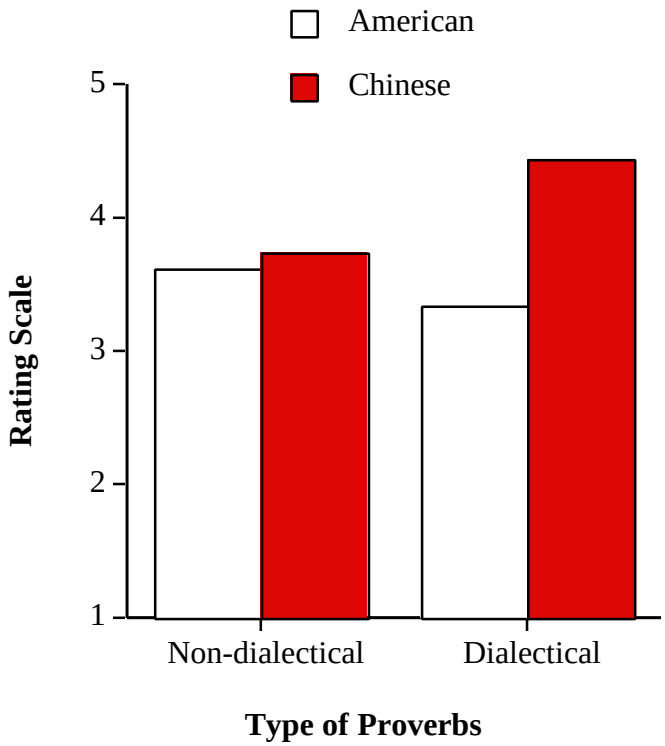

Figure 2. Index of Preferences for Yiddish Proverbs by American and Chinese Undergraduate Students

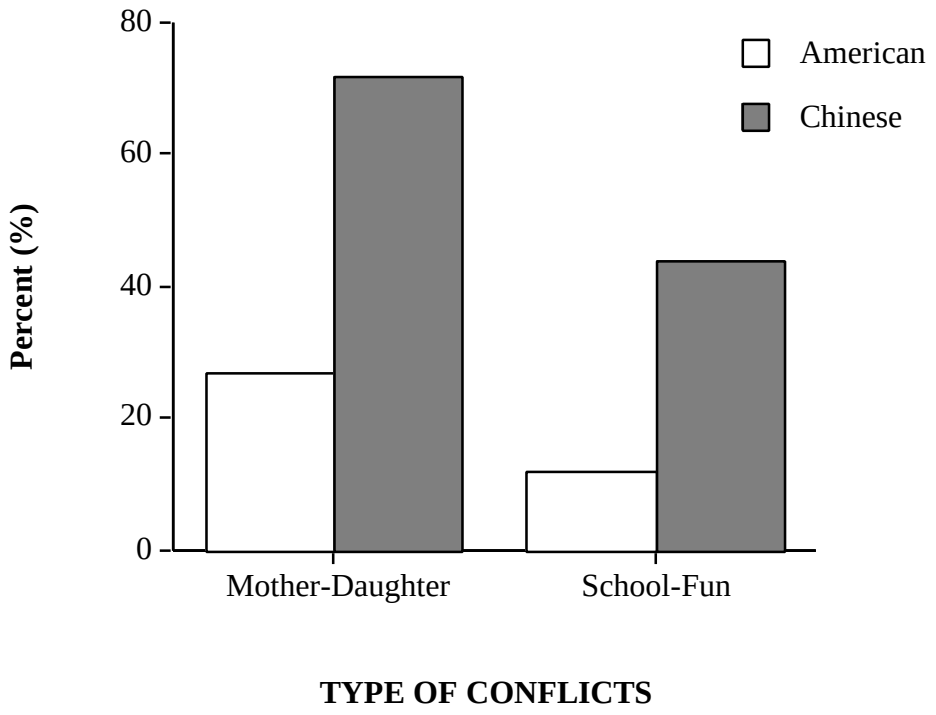

Figure 3. Percent of Participants Preferring Dialectical Resolution

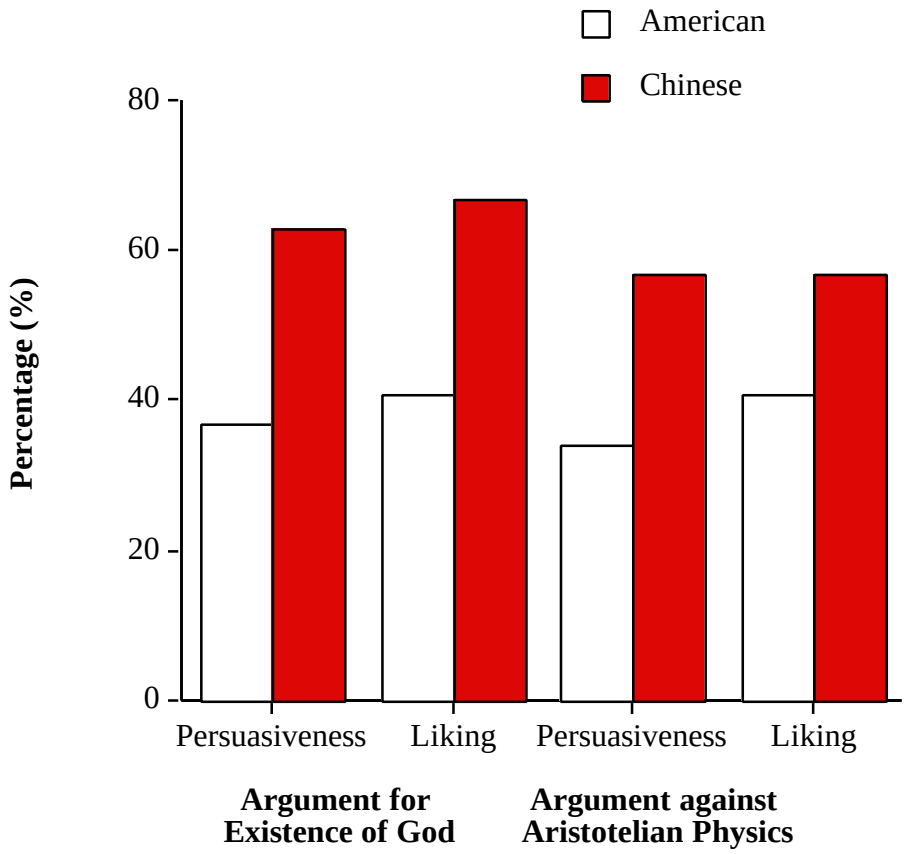

Figure 4. Percent of American and Chinese Participants Preferring Dialectical Arguments

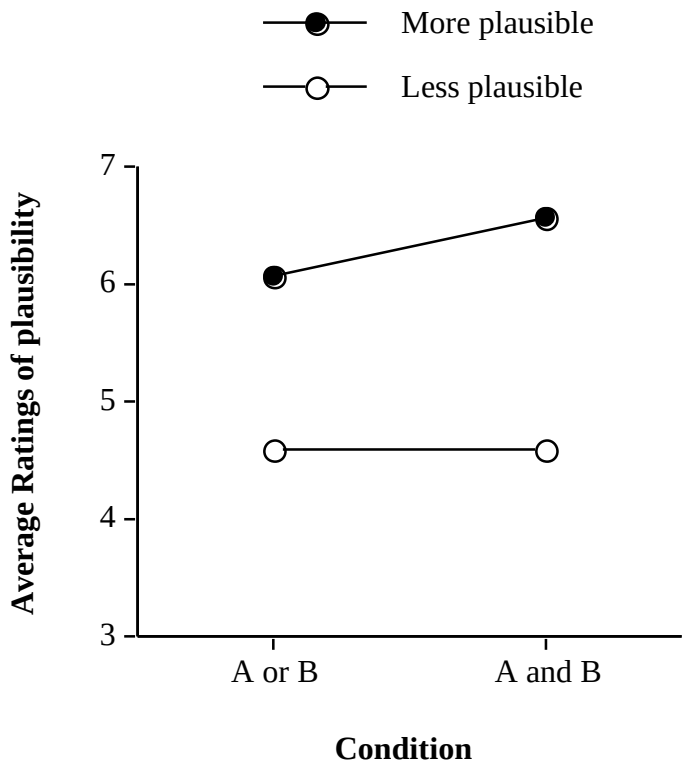

Figure 5a. American Participants Ratings of Plausibility in Both "A or B Conditions" and "A and B Condition"

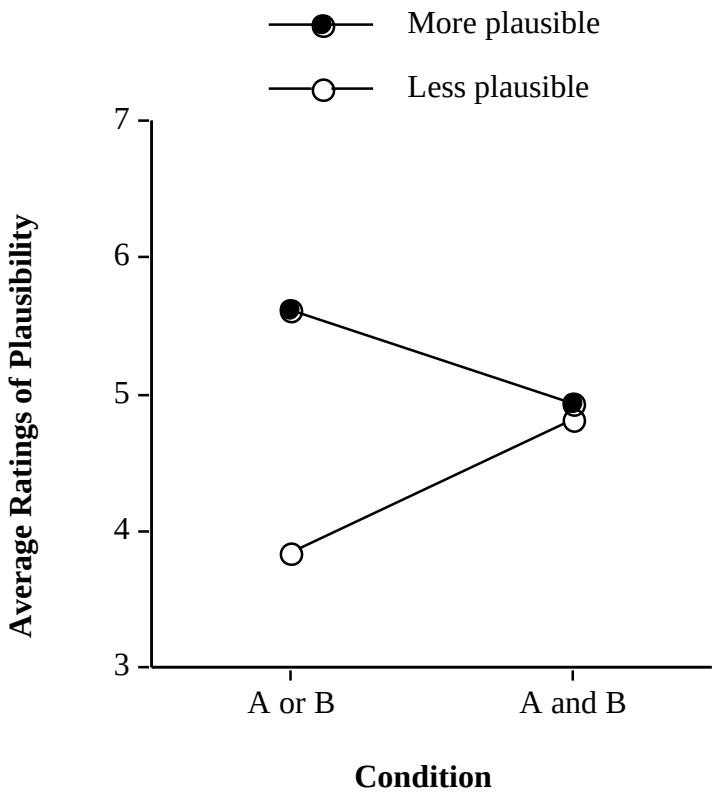

Figure 5b. Chinese Participants Ratings of Plausibility in Both "A or B Conditions" and "A and B Condition"

Footnotes

[1] All p levels are based on two-tailed tests.