

# Cultural Difference in the Application of the Diagnosticity Principle to Schematic Faces

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## ABSTRACT

Tversky's (1977) diagnosticity principle implies that categorization affects similarity, and that similarity in turn is based on context. However, Nisbett, Peng, Choi, and Norenzayan (2001) suggest that Chinese and Westerners differ in their sensitivity to context and categorization. Because of these differences, it is not clear whether Chinese should follow the diagnosticity principle. To explore these possibilities, we conducted a cross-cultural experiment using participants from Australia and China to repeat the experiment of Tversky (1977) using schematic faces as stimuli. Results showed that Australians, but not Chinese, made similarity judgments in a manner compatible with the diagnosticity principle. We suggest that: 1) the use of the diagnosticity principle depends upon contextual variables for Chinese people; and 2) Chinese participants judged neutral schematic faces as more positive than Western participants did.

## Introduction

Tversky's (1977) diagnosticity hypothesis is that features that are diagnostic for a relevant categorization will have a disproportionate influence on judgments of similarity. Evidence for this hypothesis came from a study

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of schematic emotional faces (see Figure 1). Participants (Israeli) were given two sets of faces. Three of the four faces in each set were identical; one neutral (*a*), one unhappy (*b*), and one happy (*c*). The only difference between the sets was the fourth face; in Set 1 it had a happy expression (*p*) and in Set 2 it had an unhappy expression (*q*). Participants were given two tasks to perform with each set. First, they were asked to arrange them in two categories; for Set 1 they tended to put *a* and *b* in one group and *c* and *p* in the other, whereas Set 2 was partitioned into *a* and *c* versus *b* and *q*. Participants then were asked determine the face that *a* was most similar to in each set (thus, they could choose *b*, *c*, and *p* or *q*). For Set 1, *b* was picked as most similar to *a* 44% of the time, compared with 42% for *c*. In Set 2, however, *b* was picked only 12% of the time, compared 80% for *c*. That is, judgments of the similarity of the neutral face to the happy and unhappy faces were greatly influenced by the category structure of the other faces; when two formed a happy “group”, the neutral face was judged as more unhappy, and vice versa.

The diagnosticity principle nicely accounts for the results just described. When *p* is part of the choice context, the natural categorization is in terms of smiling (smiling faces vs. non-smiling faces) and *a* and *b* share the property of non-smiling. When *q* is part of the choice context, frowning becomes a more natural method of categorization, and *a* and *c* share non-frowning proximity. That is, similarity shifts in a systematic manner with categorical context. Results of Goldstone, Medin, and Halberstadt (1997) further indicated significant context effects on similarity judgments.

At issue in this paper is whether the diagnosticity principle applies universally across culture, and at the heart of the issue is whether categorization processes have similar influences across different cultural populations. Nisbett, Peng, Choi, and Norenzayan (2001) suggested that categorization and context have different influences on the performance of participants from different cultural backgrounds. In their study, East Asians were found to be more holistic, attending to the entire field and assigning causality to it, making relatively little use of categories and formal logic, and relying on “dialectical” reasoning, whereas Westerners were more analytic, paying attention primarily to an object and categories to which it belongs and using rules including formal logic to understand its behavior. It is not clear how this analysis applies to Tversky’s diagnosticity principle. On the one

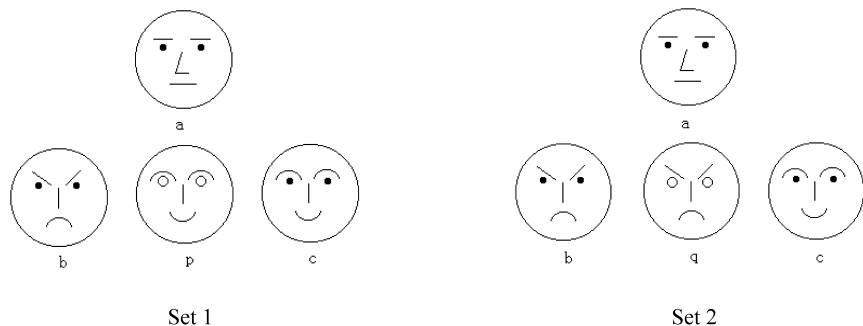


Figure 1. Two sets of schematic faces used by Tversky (1977) and present experiments.

hand, Nisbett et al. suggest that East Asians are relatively less likely to use categories or rules for judgments of similarity, and therefore might be expected to be less likely to follow the diagnosticity principle. On the other hand, if East Asians' are more dependent on context than Westerners, the context of the schematic faces test is such that it may lead them to follow the diagnosticity principle more strongly. In other words, since in this case the only context is in terms of the categorical structure of the items, it is not clear whether the most important determinant of performance for East Asian participants will be the reduced sensitivity to categorical structure or the greater sensitivity to context.

To explore these possibilities, we conducted a cross-cultural experiment using participants from Australia and China. The experiment is a replication of Tversky's original study (1977) using schematic faces (as shown in Figure 1).

## Method

### *Participants*

One hundred and forty Australians and 167 Chinese were recruited from the University of Western Australia and Beijing Normal University, respectively. All participants were divided into four groups to complete one of four different tasks.

### Materials

The two sets of four schematic faces in Figure 1 were used as stimuli in the similarity judgment task. In the categorization task, the four schematic faces of each set were displayed in a row and the positions of the four faces were balanced.

### Tasks

In the categorization task, participants were instructed to partition the four schematic faces into two pairs. Some participants grouped the four faces in Set 1, and some participants grouped the four faces in Set 2. In the similarity judgment task, participants were presented with Set 1 or Set 2 and asked to select one of the three faces below that was most similar to the above face. Some participants selected the face from Set 1, and some participants selected the face from Set 2.

### Results

Both of the categorization results of Chinese and Australian participants (Table 1) were consistent with those of Tversky's (1977) Israeli participants<sup>1</sup>. For Set 1, the most frequent partitions were *c* and *p* (smiling faces) versus *a* and *b* (non-smiling faces). For Set 2, the most frequent partitions were *b* and *q* (frowning faces) versus *a* and *c* (non-frowning faces). Smiling had a greater diagnostic value in Set 1 than in Set 2, whereas frowning had a greater diagnostic value in Set 2 than in Set 1.

Table 1

*Categorization results of Chinese and Australian participants (%)*

Participants	Set 1				Set 2			
	<i>N</i>	<i>b</i>	<i>p</i>	<i>c</i>	<i>N</i>	<i>b</i>	<i>q</i>	<i>c</i>
Chinese	33	57.58	24.24	18.18	30	6.67	6.67	86.66
Australian	56	96.43	0	3.57	46	2.17	2.17	95.65

<sup>1</sup>However, the neutral face in Set 1 was paired more often with a happy face by Chinese participants than by Australian participants,  $\chi^2(2, N = 89) = 43.85, p < .001$ .

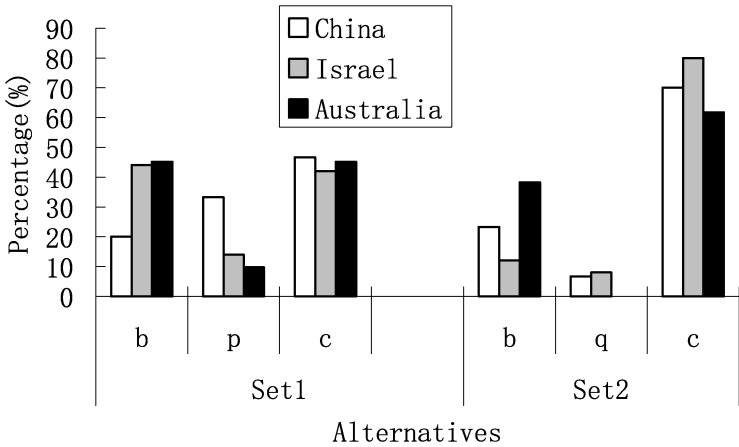


Figure 2. Results of similarity selection from three nations. In Set1, Chinese participants selected *c* as most similar to target *a*. Israel participants select *b*. Australia selected both *b* and *c*.

In addition, both the similarity results of Chinese and Australian participants in Set 2 were compatible with those of Tversky's (1977) participants. That is, *c* was selected as most similar to *a*.

However, the similarity judgments of the Chinese participants in Set 1 were somewhat different from those of the Australians in this study, and from the participants studied by Tversky (1977). As shown in Figure 2, very few Chinese participants chose the unhappy face as being most similar to the neutral face; most selected one of the two happy faces. The difference between Chinese and Australian participants in Set 1 was significant,  $\chi^2(2, N = 61) = 22.72, p < .01$ , as was the difference between Chinese and Israelis (Tversky, 1977) in Set 1,  $\chi^2(2, N = 80) = 17.12, p < .01$ . In addition, Australian participants' results were consistent with those of the Israelis,  $\chi^2(2, N = 84) = 0.92, p = .63$ .

## Discussion

The present experiment showed that the categorization results from Australian, Chinese, and Israel participants were consistent. However, the similarity judgments of the Chinese were different from those of Australians or Israelis. Therefore, Chinese participants seemed not to follow Tversky's (1977) diagnosticity principle. In addition, there is evidence from both

tasks that participants also differed in the emotional valence with which they viewed the neutral face; specifically, Chinese participants appeared to assign positive affect to the neutral face. Both of these results will be discussed below.

#### *Cultural differences in use of category rules vs. context*

In this experiment, we found that the performance of Chinese participants in similarity judgments for emotional schematic faces was different from that of Australians or Israelis. Although the Chinese participants defined the neutral face as belonging to the same category as the unhappy face (as members of the implicit category “non-smiling”), they did not judge that the neutral face was similar to the unhappy face. Rather, they judged the neutral face as being similar to two smiling faces (with a slightly higher preference for the happy face which shared the same eyes). The discrepancy in their judgments of category membership and similarity is a clear violation of Tversky’s (1977) diagnosticity principle. Whereas category judgments in Set 1 seem to have been based on the smiling/non-smiling distinction, similarity judgments were based on a different principle, *not frowning*. Exactly why this second principle was followed is not clear, though some consideration is given in the next section. At this stage it is simply important to note the difference in judgments between the two tasks, casting doubt on the culture-universality of the diagnosticity principle, and suggesting that similarity judgments of Chinese populations are less category-sensitive than those of Western populations. This finding in turn implies that the paradigm of the diagnosticity principle is more sensitive to categorical structure than to context.

#### *Cultural difference in emotion perception*

Why did the Chinese participants in the current study fail to judge the neutral face as most similar to the unhappy face in Set 1? As noted above, this result shows a difference in use of context with the categorization task, but not why that difference occurred. Also, even for the categorization task, the neutral face in Set 1 was paired more often with a happy face by Chinese participants than by Australian participants. In each task, therefore, it appears that Chinese participants viewed the neutral face as having a positive emotional valence.

This finding is consistent with the importance of emotional moderation in such traditions of Chinese culture as Taoism, Buddhism, Confucianism, and so on. For instance, Confucian teachings emphasize “the fundamental moral idea of moderation, balance, and subtleness” (deBary, Chan, & Watson, 1960). Indeed, the importance of emotional moderation is still held by modern Chinese. Compared with members of Western cultures, Chinese people believe that emotional moderation promotes individual health and interpersonal harmony (Chiu & Kosinski, 1994; Leung & Lind, 1986; Russell & Yik, 1996). Differing from participants from the United States (Bond & Lader, 1974), Chinese perceived scales describing feelings of contentment as related to relaxation and tranquility (Tsoi & Tam, 1983), and were more emotionally reserved, introverted, fond of tranquility, and habituated to self-restraint (Song, 1985).

Drawing on these findings, we predict that there might be cultural differences in perception of neutral emotional stimuli. However, this assumption still needs further cross-cultural research to be validated.

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