Language Structure and Categorization: A Study of Classifiers in Consumer Cognition, Judgment, and Choice

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Using classifiers—lexical items that depict perceptual and conceptual properties of objects—six cross-cultural experiments were conducted in the People's Republic of China, Hong Kong, Japan, and the United States to investigate how structural features of languages affect mental structures and, in turn, consumer behavior. Experiments 1–4 show how classifiers affect the perceived similarity between objects, attribute accessibility, and concept organization. Experiment 5 shows how classifier-based schemata result in inferences about product features. Experiment 6 provides evidence for the effect of classifiers on judgment and choice via assimilation and contrast processes and affect transfer. We discuss our findings in light of the Whorfian hypothesis and argue for the incorporation of structural components of languages into models of consumer behavior.

Categorization is a fundamental aspect of human information processing (Barsalou 1992b; Rosch 1975, 1978). In consumer research, categorization has been shown to influence information search, memory, inference, and choice (Alba and Hutchison 1987; Cohen and Basu 1987; Huber and McCann 1982; Loken and Ward 1990; Sujan and Deklava 1987; Yates, Jagacinski, and Faber 1978).

How do people form categories? According to the mainstream similarity-based approaches (e.g., probabilistic, exemplar, and prototype models), individuals form categories by observing and comparing features of objects (Barsalou 1992a; Rosch and Mervis 1975). Individuals also show surprising flexibility when they form categories and are sensitive to context (Barsalou 1983, 1992b). Most important, the construction and retrieval processes in categorization are constrained by internal structures in people's minds that result in top-down information processing (Murphy and Medin 1985).

One important internal constraining factor seems to be language structure (Hunt and Agnoli 1991). Some languages contain classification elements, called "classifiers," which have both syntactic and semantic functions and provide specific schemes for classifying objects in the world. Speakers of a language with a classifier system may thus use these classification schemes inherent in their language to organize perceptions of external stimuli such as physical objects and consumer products (Zhang and Schmitt 1998). As a result, speakers of a language with a given classifier system (e.g., Mandarin Chinese speakers) should perceive and categorize external stimuli differently than speakers of a language that has a different classifier system (e.g., Cantonese or Japanese) or none at all (e.g., English). Moreover, these language-influenced categorizations and schemas should result in differential product-attribute inferences, judgments, and choice.

THE LINGUISTIC CONCEPT OF CLASSIFIER

Classifiers are linguistic labels for classifying the world into categories. Rather than referring to categories having to do solely with language-internal relations, classifiers refer to the shared features of physical objects and create concept-classes (Lucy 1992). They depict perceptual

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properties of objects such as shape, size, thickness, and length, and conceptual properties such as bendable, elastic, graspable, and so forth.

The use of classifiers is a widespread lexical and syntactic phenomenon in the Chinese language as well as in the Japanese, Korean, and Thai languages (Norman 1988) and other languages such as Navajo and Yucatan-Mayan (Lucy 1992). They are practically nonexistent in such Indo-European languages as English, French, German, and Spanish. Classifiers are special types of measures that are used in conjunction with numerals (one, two, three, etc.) or determiners (a, the, that, this) to form noun phrases. For example, the counterparts in Chinese for the English noun phrases "a table" and "that umbrella" are illustrated in (1) and (2):

yi	zhang	zhuo-zi	
NUMERAL	CLASSIFIER	table	(1)
"a table"			
nei	ba	yusan	
DETERMINER	CLASSIFIER	umbrella	(2)
"that umbrella"			

In (1), "zhang (1)" is a classifier used for flat, extended objects such as tables, desks, photos, and paper; in (2), "ba (3)" is a classifier for graspable objects that can be handled with a hand and so forth.[1] A numeral/determiner and a classifier together form a syntactic unit that precedes a noun, and omitting the classifier in (1) and (2) is ungrammatical. Note that classifiers in Chinese are not obligatory in all syntactic constructions: nouns can appear without numerals/determiners, for example, in plural noun constructions similar to the English "cars are red" or "I like fast cars." Typically, one classifier is used for a given object; however, in a number of cases, particularly for new consumer products, two different classifiers can be used.

It has been argued that the syntactic patterns such as the ones that we described for classifiers in (1) and (2) are part of an innate Universal Grammar (Chomsky 1986). Although English and Chinese share many structural similarities in terms of linguistic principles, they differ in important ways with regard to lexical and syntactic representations (Huang 1982; Zhang 1990a, 1990b). In the Chinese language, the noun phrase includes a numeral/determiner, a classifier and a noun. In English the classifier component is lacking. In other words, for Chinese native speakers the parameter of the Universal Grammar has been set for classifiers but not for English native speakers. The system of classifiers should thus be mentally represented in the minds of Chinese native speakers but not in those of English native speakers.

Consequently, the process of forming categories and relating an instance to a category is likely to be different for native speakers of languages with and without classifiers. Whereas native speakers of languages without classifiers need to construct categories by observing properties and regularities in the world, native speakers of classifier languages may engage, in part, in a top-down process in which they access the conceptual knowledge (e.g., the perceptual and conceptual features) represented in the classifier.

MENTAL REPRESENTATIONS AND THE PROCESSING OF CLASSIFIERS

Following semantic network models of memory, we assume that memory is organized around category concepts and that objects are represented in memory by conceptual nodes (Anderson and Bower 1973). For example, an object (e.g., "table") will activate a corresponding concept in memory in which information about the attributes of the object are stored (e.g., "tables are flat; they are pieces of furniture; they typically have four legs," etc.). Furthermore, one object (e.g., "table") can be related to another object (e.g., "paper") via a common feature linked to both objects (such as "flatness").

In classifier languages, some fundamental features (such as flatness) are encoded by the classifiers. Therefore, when individuals perform similarity judgments, compared to speakers of a nonclassifier language, speakers of a classifier language should see objects that share a classifier as relatively more similar than objects that do not share a classifier. Therefore, we predict the following interaction effect:

> **H1:** In a similarity-ratings task, two objects sharing the same classifier should be viewed as relatively more similar than two objects that do not share the same classifier by speakers of classifier languages than by speakers of nonclassifier languages.

According to the spreading activation model, when individuals perform comparison tasks, activation spreads from one concept node to another via pathways that represent the strength of association between concepts (Anderson 1984). In classifier languages, it is more likely that activation spreads to classifier-related features than to features that are not related to classifiers because classifier-related features are directly associated with the object through language grammar. That is, classifier-related features should be easily accessible from long-term memory (Higgins and Chaires 1980). Therefore, when we ask individuals to list common features between two objects, speakers of a classifier language should list classifier-related features earlier in their recall protocol than speakers of a nonclassifier language.

> **H2:** Common features between objects that are related to classifiers should be more easily acces-

[1]Chinese is a tonal language. Because different tones signify different meanings, numbers in parentheses are used for the four tones in Mandarin Chinese: high (1), rising (2), falling-rising (3), falling (4).

sible for speakers of classifier languages than for speakers of nonclassifier languages.

Thus far, we have considered the effect of classifiers on the categorization and perceived similarity between two objects and the process of activation of common features related to classifiers when comparing two objects. Since most classifiers have more than two objects associated with them, the question arises whether objects associated with a common classifier form a mental representation schema. Schemata are clusters of associations that organize and guide perceptions (Anderson 1980; Bartlett 1932; Minsky 1975). They are anticipatory structures that assimilate and structure incoming information in schema-relevant terms.

In cognitive psychology and consumer research, the sequence in which individuals recall information has been suggested as a measure of schematic organization (Friendly 1979; Lynch and Srull 1982). If people spontaneously organize information on the basis of a schema, then thinking about one item belonging to a schema should enhance the thinking of another item belonging to the same schema.

H3: Classifier-related clustering in recall should be more likely to occur for speakers of classifier languages than for speakers of nonclassifier languages.

A related issue in the mental representation of classifiers concerns the scope of classifiers. In linguistics, "semantic scope" refers to the conceptual coverage of a lexical unit. In terms of a semantic network model, we assume that a classifier of broad scope is associated with more concepts than a classifier of narrow scope. That is, a classifier of broad scope has the potential of forming a broader schema than a classifier of narrow scope.

Some classifier languages (e.g., Japanese) have classifiers that are generally of broader scope than classifiers in other languages (e.g., Chinese). For instance, in Chinese, the classifier "zhi (1)" is associated with pen, chopstick, and pencil, and the classifier "ke (1)" is associated with tree, sunflower plant, and wheat; in Japanese only one classifier ("hon") is used for all six objects (see Fig. 1).

Classifier scopes allow us to make predictions about the mental representations of the same objects in different classifier languages. For example, in a pairwise similarity task, Chinese speakers should judge object pairs associated with the "zhi (1)" classifier and those associated with the "ke (1)" classifier as more similar, respectively, than object pairs in which one object is associated with "zhi (1)" and the other object with "ke (1)." However, this difference in perceived similarity should be much less pronounced for Japanese speakers because all the objects share the same classifier ("hon"). Thus, we predict the following interaction effect:

H4: Given two classifier systems, one system in which all products/objects are linked to one broad classifier and another system in which half of the products/objects are linked to one narrow classifier and the other half to another narrow classifier, the difference in similarity ratings between the objects associated with two classifiers is greater in the cognitive system that has the narrow classifier (e.g., Chinese) than in the cognitive system that has the broad classifier (e.g., Japanese).

OVERVIEW OF EXPERIMENTS 1–4

In the first three studies, we test how the presence of classifiers (in Mandarin Chinese) and their absence (in English) affect mental structures and processes. Mandarin Chinese is spoken in the northern part of China. As the standard language, it is used all over the People's Republic of China, Taiwan, and Singapore and is spoken by more than 1.5 billion people worldwide. In experiment 4, we test the differential effect of two classifier systems (Mandarin Chinese and Japanese) in a similarity task.

The experiments were conducted with different groups of students at major universities in the People's Republic of China, in Japan, and in the United States. Subjects were screened such that only native speakers of English, Mandarin Chinese, and Japanese participated.

Approximately 50 classifiers are identifiable in contemporary Mandarin Chinese (Chao 1968), and 28 are easily identifiable by Japanese speakers (Sanches 1977). However, not all of them would be appropriate for the purpose of our studies. For example, some of the classifiers are rarely used or highly domain specific, that is, associated with very few objects, or low frequency words. For example, the Chinese classifier "zhong (1)" is used exclusively for "metal wine glass," and the Japanese classifier "ji" is used only for "temples." The inclusion of these classifiers or classifier-objects might have made subjects aware of our hypotheses. As a result, we asked a language expert to eliminate, out of the list of about 50 classifiers given in Chao (1968), those classifiers that are not commonly used in Chinese or are not highly domain specific. Out of the final list of 35 classifiers, 20 were randomly chosen for inclusion in the six studies. The same procedure was used for Japanese classifiers. Table 1 displays the Chinese classifiers whose objects were included in the experiments along with the classifier features and the objects used as stimuli. To safeguard against demand effects, stimuli were described as "objects/products" and presented as dictionary entries, that is, without a numeral/determiner and classifier. Materials were presented to subjects in their native language. Each study was administered by an experimenter who spoke with subjects in their respective native language.

STUDY 1: PERCEIVED SIMILARITY

Method

In study 1, 61 Mandarin native speakers and 59 English native speakers provided six pairwise comparisons for

TABLE 1

GLOSSARY OF THE CLASSIFIERS AND STIMULI PRODUCTS/OBJECTS USED IN THE STUDIES

Classifier				
Pinyin[a]	Character[b]	Study[c]	Semantic features[d]	Products and objects[e]
ba (3)	把	1, 2, 3, 4	Can be grasped with a hand	Broom, comb, cooking knife, fan, mop, pistol, scissors, umbrella, rifle
bu (4)	部	5	Complete mechanical or electronic unit	Fax machine
ben (3)	本	1, 2	Volume, bounded material	Dictionary, magazine
duo (3)	朵	1, 2	Amorphous	Cloud, flower
ke (1)	棵	1, 2, 4, 6	Treelike uprising items	Bonsai tree, sunflower plant, weed, wheat
kuai (4)	塊	1, 2	Piecelike, lumplike, rocklike	Cake, crackers, cutting board, soap
guanr (3)	管	5	Pipelike	Lipstick
guan (4)	罐	5	Tinlike, canlike	Soft drink
jian (4)	件	1, 2	Articles or items that are generally without a definite shape (usually for clothing)	Clothes, package
jia (4)	架	5	Wooden-frame-like	Piano
li (4)	粒	1, 2, 3	Tiny objects, grainlike	Peanut, pill, rice, sand
liang (4)	輛	6	Having wheels for transportation	Bicycle, stroller, motorcycle
ping (2)	瓶	5	Bottle	Hair spray
shuan (1)	雙	1	Pair	Gloves, shoes
tiao (2)	條	1, 2, 3	Strip, for long and slender things, often bendable	Belt, pants, road, rope, scarf, towel, wire, whip
tai (2)	台	5, 6	For machines, electronic or mechanical apparatus	Fax machine, piano, refrigerator, TV
tong (3)	筒	5	Bamboo-pipe-like	Hair spray
zhang (1)	張	1, 2, 3	For flat sheetlike items, or items with linear extension	Bed, cartoon, map, paper
zhi (1)	支	4, 5, 6	For long and narrow items, often made of wood	Chopstick, lipstick, pencil
zhi (1)	枝	4	Branchlike, for long and narrow items	Rifle
ge (4)	個	5	General classifier for any countable noun	Fax machine, hair spray, lipstick, piano, soft drink

[a]Standard transliteration used for Chinese characters.
[b]Chinese characters.
[c]Studies in which the classifier effect is tested.
[d]The perceptual and conceptual features that each classifier depict.
[e]Stimuli products and objects used in the studies.

seven sets of four stimuli each: (1) magazine, dictionary, paper, cartoon; (2) rice, peanut, cake, soap; (3) tree, weed, flower, cloud; (4) gloves, shoes, scarf, belt; (5) cutting board, crackers, pants, towel; (6) packages, clothes, rope, road; (7) map, bed, scissors, fan. The first two objects and the last two objects in each set share the same classifier in Chinese. Within each set, stimulus pairs were presented in the same random order to Chinese and U.S. respondents. Subjects provided their ratings on seven-point scales (1 = not at all similar, 7 = very similar).

Results

In Hypothesis 1 we had predicted an interaction effect: we expected that Chinese native speakers, compared to English speakers, would rate the object pairs sharing the same classifier as relatively more similar than the object pairs not sharing the same classifier. Table 2 shows the mean similarity ratings. Analysis included 2 (language) × 2 (classifier: same vs. different) ANOVAs on each of the seven sets and on an overall score. "Language" was a between-subjects factor; "classifier" was a within-subjects factor. A significant language main effect at $p < .05$ was obtained for three sets (set 2: $F(1, 118) = 23.73$; set 3: $F(1, 118) = 7.04$; set 5: $F(1, 118) = 6.13$). The classifier main effect was significant at $p < .05$ for six sets (set 1: $F(1, 118) = 5.64$; set 2: $F(1, 118) = 20.64$; set 3: $F(1, 118) = 92.61$; set 4: $F(1, 118) = 46.71$; set 6: $F(1, 118) = 161.87$; set 7: $F(1, 118) = 3.30$); the overall analysis was also significant ($F(1, 118) = 108.47$; $p < .001$). Most important, the predicted interaction was

TABLE 2

SIMILARITY MEANS FOR OBJECT PAIRS WITH THE SAME AND DIFFERENT CLASSIFIERS IN CHINESE FOR CHINESE AND ENGLISH SPEAKERS

		Classifier			ANOVA		
Set	Language group	Same	Different	Difference score	L	C	L × C
1	Chinese	4.02	3.60	.42			
	English	3.98	3.94	.04		*	*
2	Chinese	3.57	3.11	.45			
	English	4.40	3.69	.70	*	*	
3	Chinese	4.79	3.36	1.42			
	English	3.92	3.28	.64	*	*	*
4	Chinese	4.85	4.22	.63			
	English	4.40	4.75	−.35			*
5	Chinese	4.35	2.98	1.37			
	English	3.50	2.97	.53	*	*	*
6	Chinese	3.70	2.98	1.63			
	English	3.97	2.11	1.86		*	
7	Chinese	2.75	2.34	.41			
	English	2.54	2.53	.01			
All	Chinese	4.00	3.09	.91	*		*
	English	3.81	3.32	.49			

NOTE.—N = 61 Mandarin Chinese and 59 English native speakers. The ANOVAs were performed separately for each set (L = language main effect; C = classifier main effect; L × C = interaction). Significant effects at $p < .05$ or less are indicated by an asterisk.

obtained for four out of the seven sets at $p < .05$ (set 1: $F(1, 118) = 3.77$; set 3: $F(1, 118) = 13.33$; set 4: $F(1, 118) = 16.88$; set 5: $F(1, 118) = 9.31$) and was borderline significant at $p < .10$ for a fifth set (set 7: $F(1, 118) = 2.80$). The overall analysis revealed a significant interaction as well ($F(1, 118) = 9.60$; $p < .01$).

The main effects for language were due to the finding that Chinese speakers provided significantly lower similarity ratings for set 2 and significantly higher similarity ratings for sets 3 and 5. The classifier main effects occurred because both Chinese and English native speakers rated object pairs that shared classifiers in Chinese as more similar than pairs that did not share classifiers. This result is not surprising: it seems to indicate that different cultures are sensitive to similar object properties, which have become lexicalized and syntactically encoded in Chinese classifiers.

The predicted interaction of language and classifier was obtained because the difference in perceived similarity between pairs sharing the same and different classifiers was larger for Chinese than for English speakers. This difference in perceived similarity was captured by a difference score computed between the similarity judgments for the two types of objects, separately for Chinese and English speakers. Compared to English speakers, the difference score for Chinese speakers was almost twice as large and significantly different from zero ($p < .0001$) in the overall analysis (0.90 vs. 0.49) and was actually greater for the other four significant sets (0.42 vs. 0.04 for set 1; 1.42 vs. 0.64 for set 3; 0.63 vs. −0. 35 for set 4; and 1.37 vs. 0.53 for set 5). Moreover, classifiers seem to affect both common and distinctive features between objects: Chinese speakers tended to provide higher similarity ratings than English speakers for objects sharing classifiers ($\bar{X}$ = 4.00 vs. 3.81) as well as lower similarity ratings for objects not sharing classifiers ($\bar{X}$ = 3.09 vs. 3.32).

STUDY 2: FEATURE ACCESSIBILITY

Method

Twenty Mandarin native speakers and 15 English native speakers were asked to list five common features for 14 object pairs (the stimuli pairings with common classifiers in study 1). Great attention was paid to the appropriate coding of subjects' responses to determine whether a listed feature could be counted as classifier related. English native speakers' responses were first translated into Chinese by a professional translator who was blind to the hypotheses so that the features could then be coded in terms of their relatedness to Chinese classifiers by Chinese coders. The professional translator also recopied the original Chinese responses to make the protocols indistinguishable in handwriting style from those of the English translations. Next, responses were coded by two Mandarin native speakers. The coders did not know that the responses constituted original responses from Chinese subjects and translations of English responses into Chinese. To avoid further biases, the Chinese subjects' responses and the translations of English subjects' responses were mixed and presented in random order to the two coders.

Coders were provided with examples of classifier features similar to those listed in Table 1. Coders were asked to provide a binary check for each response in terms of whether or not it was related to the common classifier of each pair. On the basis of the coding, the position of the first mention of a classifier-related feature was identified. Interrater agreements on the position measure was 87 percent, and disagreements were resolved by discussion.

Results

Wilcoxon rank-sum tests (equivalent to Mann-Whitney U tests) were conducted on the ordinal position variable. As predicted, classifier-related features were more accessible for Chinese than for English speakers: the features appeared significantly earlier in the response protocols of Chinese than those of English speakers for 11 out of 14 comparisons (p's $< .05$): belt/scarf ($z = 2.49$), magazine/dictionary ($z = 2.57$), paper/cartoon ($z = 2.80$), rice/peanut ($z = 2.26$), cake/soap ($z = 3.14$), tree/weed ($z = 2.03$), flower/cloud ($z = 2.70$), package/clothes ($z = 2.26$), rope/road ($z = 2.13$), cutting board/cracker ($z = 3.02$), and scissors/fan ($z = 2.03$). Moreover, ordinal position was borderline significant in one additional comparison ($p < .09$): map/bed ($z = 1.66$). The result was also highly significant in the overall analysis ($z = 3.20$; $p < .001$), thus indicating higher feature accessibility for Chinese than for English speakers.

STUDY 3: SCHEMATIC ORGANIZATION

Method

Seventeen Mandarin and 20 English native speakers were asked to learn a list of stimuli and after a filler task to recall them. The list consisted of a total of 16 objects that were presented in random order; subjects were paced to look at each item for two seconds. Some of the items had been used in studies 1 and 2; others were new. The 16 items were based on four groups of objects, each group sharing a common classifier. They were peanut, pill, rice, sand (classifier: "li [4]"); road, scarf, whip, wire (classifier: "tiao [3]"); comb, fan, scissors, umbrella ("ba [3]"), bed, cartoon, map, paper ("zhang [1]"). Subjects were given one minute to recall as many items as possible.

Results

In Hypothesis 3 we had predicted that Chinese speakers would organize objects according to a classifier schema and should therefore exhibit more classifier-related clustering-in-recall than English speakers. A clustering index focusing on the immediate sequential co-occurrence of two items with the same classifier was created, omega minus expected omega (Pellegrino and Hubert 1982), to measure clustering-in-recall related to the classifiers. A strong language effect was observed on this measure; as predicted, Chinese speakers were more likely to cluster by classifier than were English speakers ($\bar{X} = 5.64$ vs. 2.04, $F(1, 35) = 22.82$, $p < .0001$). However, Chinese speakers also recalled significantly more items than English speakers, perhaps because of a facilitation of the classifier-related cognitive organization. Therefore, the data were also analyzed using a conservative index adjusting for the number of items recalled: omega minus expected omega divided by max (omega) minus expected omega (Pellegrino and Hubert 1982). In the adjusted score, the effect was still significant, although borderline ($\bar{X} = 0.375$ vs. 0.26, $F(1, 35) = 3.27$, $p < .07$).

STUDY 4: SCOPE OF CLASSIFIERS

This study was designed to examine scope of classifiers in similarity judgments. To make sure that results would be classifier driven rather than stimulus driven, the test was performed on the same objects between two classifier languages (i.e., Chinese vs. Japanese) rather than for classifiers with different scopes within one classifier language. As mentioned earlier, Chinese classifiers are typically conceptually narrower than Japanese classifiers. However, there is a small number of exceptions, that is, cases in which Japanese classifiers are narrower in scope than Chinese classifiers, which may be employed as a methodological control.

As shown in Figure 1, two stimulus sets were constructed: set 1 with the broad-scope Japanese classifier "hon (a)" and two narrow-scope Chinese classifiers, "zhi (1)" and "ke (1)"; and set 2 with the broad-scope Chinese classifier "ba (3)" and two narrow-scope Japanese classifiers "hon (b)" and "cho."[2] Using pairwise similarity ratings, we expected a three-way interaction effect; that is, for set 1, the difference in similarity ratings between objects pairs that share the same classifier and those that do not should be greater for the Chinese than for the Japanese subjects; the reverse effect should occur for set 2.

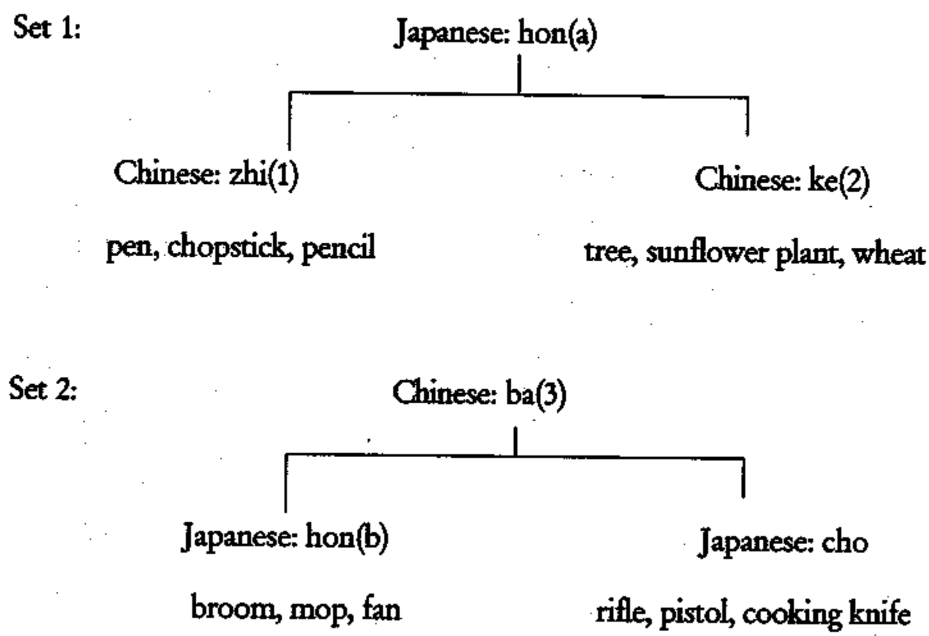
Method

Subjects (20 Chinese and 19 Japanese native speakers) were asked to provide pairwise similarity ratings on an 11-point scale (1 = not at all similar, 11 = very similar). Subjects provided all pairwise similarities for the two sets

[2]Historically, Japanese classifiers were influenced by the Chinese classifier system (Norman 1988). In this process, the classifier system was simplified in such a way that Japanese classifiers are, in general, conceptually broader than Chinese classifiers. The structure displayed in set 1 is quite common; the structure displayed in set 2 is rare. Therefore, it was necessary to use the Japanese classifier "hon" in both sets 1 and 2. This, however, causes no problems for testing our hypotheses for the following reasons: (1) as required for testing our hypothesis, in set 1 the objects tested are associated with two different classifiers in Chinese but only with "hon" in Japanese (the reverse is true for set 2 in which "hon" is one of two Japanese classifiers associated with the objects, which in Chinese take only one classifier); (2) "hon (a)" and "hon (b)" can be viewed as homophones (as the English word "bank") that have two separate meanings and dictionary entries; and (3) subjects gave similarity ratings only for comparisons within each set.

FIGURE 1

STRUCTURE OF CLASSIFIER SCOPE



of six objects each shown in Figure 1, that is, 15 pairwise similarities per set. Set 1 contained six objects that shared the same classifier ("hon [a]") in Japanese but had two different classifiers in Chinese. In contrast, set 2 contained six objects that shared the same classifier in Chinese ("ba [3]") but had two different classifiers in Japanese. For purposes of data analyses, two composite indices were created. For set 1, a composite index was created for the $2 \times 3 = 6$ pairwise comparisons of the two groups of three objects each that shared the same classifier in Chinese; another composite was created for the nine pairwise comparisons of the objects that did not share the same classifier in Chinese. For set 2, analogous composite indices were created.

Results

The mean similarity ratings are shown in Table 3 and displayed as difference scores (rating of same minus different classifiers) in Figure 2. A $2 \times 2 \times 2$ ANOVA was conducted to analyze the data. Language was a between-subjects variable; the latter two variables were within subjects. The ANOVA revealed a significant language main effect (Wilks's lambda = 0.608, $F(1, 37) = 23.81$, $p < .0001$), a significant type of stimuli main effect (lambda = 0.106, $F(1, 37) = 307.36$, $p < .0001$), a significant two-way interaction of language and type of stimuli (lambda = 0.801, $F(1, 37) = 9.18$, $p < .01$) and, most important, a three-way interaction of language, type of classification, and type of stimuli (lambda = 0. 823, $F(1, 37) = 7.98$, $p < .01$). The remaining effects were not significant (all p's > .34).

The language effect was obtained because Chinese speakers in general judged the object pairs as more similar than did Japanese speakers. The type of stimulus effect, once again, provides evidence for the influence of reality on language, that is, classifiers are reflective of actual features and relations in the world. The two-way interaction of language and type of stimuli was due to Chinese speakers' differential response to different objects/products compared to that of Japanese speakers.

These effects, however, must be interpreted in light of the significant three-way interaction. The interaction is displayed graphically in Figure 2 for the difference scores (mean similarity ratings for same minus different ratings) in set 1 and set 2 for Chinese and Japanese. As expected, in set 1 the difference score was higher for Chinese than

TABLE 3

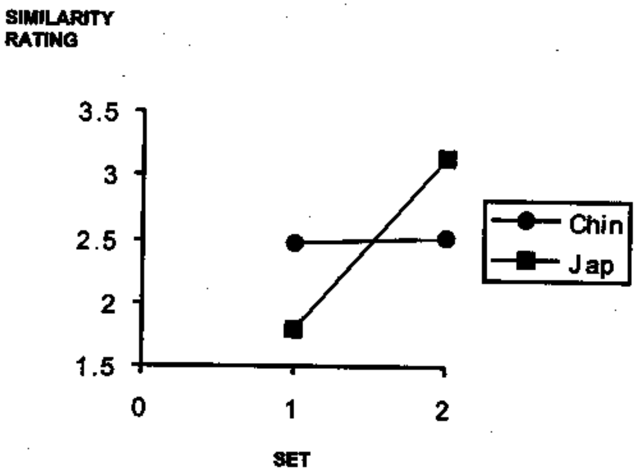
CLASSIFIER BREADTH AND SIMILARITY RATINGS

	Same classifier	Different classifier
Set 1:		
Chinese	5.63	3.17
Japanese	4.76	2.96
Set 2:		
Chinese	4.80	2.29
Japanese	4.79	1.65

NOTE.—N = 20 Chinese speakers; N = 19 Japanese speakers. Ratings are provided on an 11-point similarity scale (1 = not at all similar, 11 = very similar). Different classifier in set 1 refers to objects that have a different classifier in Chinese; in set 2, it refers to objects that have a different classifier in Japanese.

FIGURE 2

DIFFERENCE SCORES IN SET 1 AND SET 2 FOR CHINESE AND JAPANESE



that for Japanese speakers ($\bar{X}$ = 2.46 vs. 1.80, $t(37) = 1.78, p = .08$) whereas in set 2 it was higher for Japanese than Chinese speakers ($\bar{X}$ = 3.15 vs. 2.51, $t(37) = -1.78, p = .08$), indicating that classifier scope affects perceived similarities. This pattern of results produced a significant interaction on the difference scores in a 2 (set) × 2 (language) ANOVA ($F(1, 37) = 9.18, p < .01$).

SUMMARY OF STUDIES 1–4

In four studies, we have shown that people's mental structures and processes can be influenced by grammatical components such as classifiers. Compared to English native speakers, Chinese speakers perceive objects that share a classifier as more similar than objects that do not share a classifier. Features that are related to classifiers are easier to access for Chinese than for English native speakers. Furthermore, Chinese native speakers have schematic organizations based on classifiers. Finally, the results of study 4 suggest that the characteristics of classifier systems such as scope are represented differently in the cognitions of speakers of distinct classifier systems.

CLASSIFIER-RELATED COGNITIONS AND CONSUMER BEHAVIOR

How do classifiers affect consumer behavior? In the following section, we propose that classifier-related cognitions are likely to affect consumer inferences because classifiers contain expectations about product features. We further propose that they affect preference judgments and choice via associative and affect transfer.

The Effects of Classifiers on Consumer Inference

In the social cognition literature and in consumer research, schemata have been viewed as patterns of expectations (Bettman 1979; Fiske and Taylor 1984). That is, once individuals have categorized objects, people or events into categories based on perceived similarities, they expect certain attributes to be present and, as a result, draw schema-consistent inferences (Fiske and Taylor 1984; Folkes and Kiesler 1991).

As shown in study 3, speakers of a classifier language are likely to place objects with common classifiers into a classifier-related schematic cluster (e.g., into categories of flat objects, long objects, graspable objects, etc.). Thus, owing to the expectations inherent in schematic organizations, individuals should expect certain attributes to be present in consumer products and infer certain attributes whenever a product is associated with a certain classifier.

The inferential nature of classifier schemas can be tested by pairing the same product with two different classifiers. As mentioned earlier, in Chinese more than one classifier may be used for certain objects, and particularly for new consumer products. For example, either "zhi (1)," the classifier for long, thin objects such as pencil and pen, or "guanr (3)," the classifier for pipe-like, thick objects such as toothpaste, can be used for "lipstick." The two classifiers, however, should result in different expectations about the physical appearances of the lipstick and consequently should affect inferences about the product. If the classifier "zhi (1)" is assigned to lipstick, then consumers should infer, based on the perceptions of features associated with classifiers, that the product is long and thin and thus provides less quantity and will not last as long than if the classifier "guanr (3)" is used. In sum, inferences about product attributes should be systematically affected by the type of classifier assigned to that product. This prediction should hold, however, only for a classifier language in which the two classifiers are well differentiated (e.g., Mandarin Chinese) but not for a language or dialect in which these classifiers are not well differentiated (e.g., Cantonese). Thus, we predict the following interaction:

H5: In a classifier language in which classifiers are well differentiated (e.g., Mandarin Chinese), inferences about product features are systematically influenced by the type of classifier assigned to a product, compared to a language in which classifiers are not well differentiated (e.g., Cantonese).

The Effects of Classifier-Related Similarity on Judgment and Choice

As Medin and Ross have noted, "a key aspect of classification is that it allows one to make predictions concerning the future, predictions that can be used to select plans and actions" (1992, p. 364). As linguistic labels for classification, classifiers affect, as we have shown in studies 1–4, the perceived similarity of objects and accessibility of features. Linguistic labels thus exercise a top-down influence on categorization and related behavior (Gentner and Rattermann 1991). Because perceived similarity has been shown to influence consumer judgment and choice (Alba, Hutchinson, and Lynch, 1991), we hypothesize that classifiers affect judgment and choice.

We demonstrate the effects of classifiers on judgment and choice by examining a choice situation between two products in which one of the products shares a classifier with a third (referent) product. Specifically, we expect the referent product to exercise an influence on the target product via a two-stage process. First, consumers will notice the classifier-based similarity between the referent and the target and thus associate the referent with the target. Second, consumers will transfer either positive or negative affect from the referent object to the target (similar to the affect transfer that occurs in brand extensions from the core category to the extension category; Aaker and Keller 1990), thus affecting evaluative judgments and choice directionally. In studies 1–4 we have provided ample evidence for a similarity and resulting association process. In study 6, we present evidence for the similarity-based affect-transfer process that provides the ultimate link between language-based categorization and choice. To test the effect, we contrast the likelihood of choice in the presence of the referent product compared to a control situation without the referent product. We predict:

> **H6:** In a choice situation, the choice likelihood of a product will be increased if it shares a classifier with a positively valenced referent object and will be decreased when it shares a classifier with a negatively valenced referent object, relative to a baseline control group in which the products are presented without a referent object.

Since a classifier relates to product categories rather than to brands, it is necessary to test the effects of perceived similarity on choice in decisions involving noncomparable (i.e., product) rather than comparable (i.e., brand) alternatives. As argued by Johnson (1984, 1989), noncomparables are compared in terms of higher order, abstract features; noncomparables may thus be compared along the general featural dimensions depicted by classifiers.

STUDY 5: INFERENCES ABOUT PRODUCT FEATURES

Method

Sixty mainland Chinese (Mandarin native speakers) students and 60 Hong Kong (Cantonese native speakers) students participated in study 5. The study took the form of a 2 (Mandarin/Cantonese) × 2 (type of classifier) between-subjects experimental design.

Cantonese was selected as a comparison language to Mandarin Chinese for the following reasons. As a Chinese dialect spoken in Hong Kong and in the Guangdong province of the People's Republic of China, Cantonese has the same writing system as Mandarin and a similar grammar. However, Cantonese differs from Mandarin in the classifier system in terms of classifier scope. The Cantonese classifier system has classifiers of broader scope than does the Mandarin system. For example, the Cantonese classifier "dzek" is used for a variety of different objects that all have different classifiers in Mandarin, namely comb (classifier in Mandarin: "ba [3]"), egg ("ge [4]"), pan ("kou [3]"), record ("zhang [1]"), and warship ("sou [1]"). Similarly, "zhang (1)" is used for knife (classifier in Mandarin: "ba [3]"), blanket ("tiao [2]"), quilt ("chuang [2]"), and mattress ("piang [4]"); and "dzi" is used for flag ("mian [4]"), stick ("gen [1]"), wine ("ping [2]"), ointment ("guanr [3]"), and battery ("jie [2]"). Therefore, if we present Cantonese subjects with the characters and thereby the concepts of differentiated Mandarin classifiers (which they can read and fully understand), they should have less developed classifier schemata and less differentiated expectations and inferences. Thus, we predict an interaction between language (Mandarin vs. Cantonese) and type of classifier in study 5 such that Mandarin speakers are more likely to draw inferences based on certain classifier features than are Cantonese speakers.

Subjects were asked to rate, on seven-point scales, the inferences of the likely characteristics of five different consumer products. The product categories with the corresponding classifiers were hair spray ("tong [3]" vs. "ping [2]"), soft drink ("tong [3]" vs. "guanr [4]"), lipstick ("zhi [1]" vs. "guanr [3]"), piano ("jia [1]" vs. "tai [2]"), and fax machine ("tai [2]" vs. "bu [4]"). The two characteristics judged by consumers for each product were perceived size and degree of content/volume (for hair spray); difficulty to open and easiness to hold (for soft drink); volume and durability/long lastingness (for lipstick); compactness and appropriateness for amateurs (for piano); and ease of use and complexity of electronics (for fax machine). An equal number of subjects was randomly assigned to one of two classifier conditions. The ratings of the two inferences per stimulus were summed up to form a composite score.

Results

Were Mandarin speakers' inferential judgments of product attributes more strongly influenced by the classifiers than those of Cantonese speakers? Analysis included 2 × 2 ANOVAs for each product category. A main effect for type of classifier was obtained for hair spray ($F(1, 73) = 8.57, p < .01$). No other main effects were significant. As predicted, a significant interaction of type of classifier and language was obtained for three product categories: hair spray ($F(1, 73) = 4.30, p < .05$), soft drink ($F(1, 73) = 6.33, p = .05$), and lipstick ($F(1, 73) = 3.99, p < .05$).

Table 4 shows the mean ratings per category for Mandarin and Cantonese native speakers. In Table 4, the results are displayed in such a way that classifier 1 should receive higher ratings than classifier 2 on each measure

TABLE 4

INFERENCES ABOUT PRODUCT FEATURES

Language	Classifier 1	Classifier 2
Hair spray:		
Mandarin	9.15[a]	6.60[b]
Cantonese	7.20	6.76
Soft drink:		
Mandarin	7.1[a]	4.8[b]
Cantonese	4.7	5.8
Lipstick:		
Mandarin	8.2[a]	5.9[b]
Cantonese	8.3	8.35
Piano:		
Mandarin	7.9	7.55
Cantonese	8.7	8.15
Fax machine:		
Mandarin	9.1[a]	7.9[b]
Cantonese	8.0	8.2

NOTE.—Means were tested rowwise, that is, separately for Mandarin and Cantonese native speakers. For Mandarin speakers, means with different subscripts are significantly different at $p < .05$. For Cantonese speakers, none of the means are significantly different (all p's > .3).

in each category. As predicted, Cantonese speakers were not affected by the linguistic framing of the products: none of the means were significantly different. In contrast, the means of Mandarin speakers were significantly different in the predicted direction for hair spray, soft drink, and lipstick, resulting in the significant interactions reported above. Although the interaction effect was not significant for fax machine ($p < .16$), the simple test comparing the two classifiers for Mandarin speakers reached significance at $p < .05$.

STUDY 6: CLASSIFIERS AND CHOICE

Method

Subjects were 90 Chinese native speakers in the People's Republic of China and 90 English native speakers in the United States. Participants were shown choice scenarios between two products and asked to indicate their likelihood of selecting each product as a birthday present for a friend. In the experimental conditions, each scenario consisted of two alleged equally liked choice products and a third referent product that shared a classifier with one of the two choice products (the target). In the control group the target choice products were presented without the referent product.

A pretest was conducted to select the choice products. To avoid floor and ceiling effects, the ideal choice products would be pairs of products that use different classifiers but are about equally preferred in a purchase situation. Thirty Chinese students participating in the pretest were asked to indicate their preferences for a birthday present on a nine-point scale. Six pairs of products were given to the subjects. Based on the means, two pairs of target choice products were selected as appropriate. They were pen and bonsai tree ($\bar{X} = 5.20$ and $\bar{X} = 5.10$, $t < 1$), and fax machine and motorcycle ($\bar{X} = 4.40$ and $\bar{X} = 4.60$, $t < 1$). The other four sets all had extreme ratings and differed from each other significantly (all p's < .0001); they were therefore not included in the experiment: brush and pants ($\bar{X} = 2.30$ and $= 7.00$), "book" and "coke" ($\bar{X} = 7.60$ and $\bar{X} = 2.10$), "toothpaste" and "shampoo" ($\bar{X} = 3.00$ and $\bar{X} = 6.20$), and "electronic keyboard" and "desk" ($\bar{X} = 6.70$ and $\bar{X} = 3.40$).[3]

In the experiment, participants were given booklets describing birthday-present purchasing scenarios. Several random orders of the scenarios were presented. Participants were asked to indicate the likelihood of purchase for each of the target choice products on nine-point scales (1 = I would definitely not choose, 9 = I would definitely choose). As a between-subjects manipulation, half of the subjects in the Chinese and English experimental groups were presented with a positively valenced referent product, a product that the recipient would like better than the two choice products. The other half of the participants were presented with a negatively valenced referent product, a product that the recipient would like less than the two choice products. Below is an example of the scenario for the case of a positively valenced referent product. (Note that the names used in Chinese and English are gender neutral.)

> Little Liu's (Kim's) birthday party is coming. You are thinking of buying a present for Little Liu (Kim). So, you ask Little Liu's (Kim's) parents, and they tell you that Little Liu (Kim) wants either (product A) or (product B) and has equal preference for both of them. You want to make Little Liu (Kim) really happy by buying something that Little Liu (Kim) likes. Therefore, you insist on getting more information from the parents regarding what products Little Liu (Kim) likes and *you are told that Little Liu (Kim) likes (product C) better* although Little Liu (Kim) equally prefers the other two. You go to the department store and find that (product C) is sold out. There is not much time left before the party so you must decide between (product A) and (product B). Note that the prices are the same.

In the experimental conditions in which negatively valenced referent products were provided, participants were told that product C was not liked as much as the choice products, and the sentence about "out of stock" was excluded. In the control conditions, participants read scenarios that included only the two base choice products (A and B) but none of the referents.

Two of the scenarios used pen and bonsai tree as the target choice set, and the other four scenarios used fax machine and motorcycle. In each scenario, the referent

[3]The pretest was conducted in China and stimuli for the study were selected based on the China pretest results. As the results for the control condition in the experiment proper will show, the choice pair pen/bonsai tree was less ideal for English speakers: there was a significant preference for bonsai tree over pen ($\bar{X} = 6.23$ vs. 4.16), though the preference was not as extreme as in the case of the other stimuli that we excluded based on the Chinese pretests.

TABLE 5

CLASSIFIER-INDUCED CHOICE

		Classifier-sharing		Non-classifier-sharing	
Choice products	Referent	B1	E1	B2	E2
Positive valence:					
Pen*/bonsai tree	Chopstick	5.33 (4.16)	6.70 (4.93)	5.03 (6.23)	4.50 (6.93)
Pen/bonsai tree*	Sunflower	5.03 (6.23)	7.20 (7.33)	5.33 (4.16)	3.70 (4.20)
Fax*/motorcycle	TV	4.37 (5.00)	6.57 (5.36)	4.67 (5.42)	3.30 (4.67)
Fax*/motorcycle	Refrigerator	4.37 (5.00)	5.70 (5.46)	4.67 (5.42)	4.30 (5.13)
Fax/motorcycle*	Bicycle	4.67 (5.42)	7.03 (6.00)	4.37 (5.00)	3.13 (4.06)
Fax/motorcycle*	Stroller	4.67 (5.42)	6.59 (4.43)	4.37 (5.00)	4.04 (5.53)
Overall		4.73 (5.20)	6.59 (5.58)	4.73 (5.20)	4.04 (5.08)
Negative valence:					
Pen*/bonsai tree	Chopstick	5.33 (4.16)	3.47 (5.13)	5.03 (6.23)	6.63 (5.57)
Pen/bonsai tree*	Sunflower	5.03 (6.23)	3.13 (5.90)	5.33 (4.16)	7.06 (5.13)
Fax*/motorcycle	TV	4.37 (5.00)	3.00 (5.00)	4.67 (5.44)	6.73 (5.53)
Fax*/motorcycle	Refrigerator	4.37 (5.00)	3.33 (5.10)	4.67 (5.42)	5.80 (5.33)
Fax/motorcycle*	Bicycle	4.67 (5.42)	3.56 (4.16)	4.37 (5.00)	5.60 (6.53)
Fax/motorcycle*	Stroller	4.67 (5.42)	3.56 (4.63)	4.37 (5.00)	5.73 (5.96)
Overall		4.73 (5.20)	3.34 (4.98)	4.73 (5.20)	6.26 (5.67)

NOTE.—Means without parentheses are for Chinese speakers; means in parentheses are for English speakers. Asterisks indicate the choice product that shares a classifier with the referent in each row in Chinese. B1 is the baseline rating of the classifier-sharing choice product in the absence of the referent; E1 is the rating of the classifier-sharing choice product in the presence of the referent. Analogously, B2 is the baseline rating of the non-classifier-sharing choice product in the absence of the referent; E2 is the rating of the non-classifier-sharing choice product in the presence of the referent.

product shared a classifier with one and only one of the target choice products. The target and referent stimuli products are given in the first two columns of Table 5.[4] For example, in the first choice situation listed, pen/bonsai tree, the referent product chopstick shares a classifier with pen but not with bonsai tree, as indicated by an asterisk next to pen. In the next choice scenario, the referent product is sunflower plant, which shares a classifier with bonsai tree.

Results

We hypothesized that Chinese native speakers would be more likely to choose the classifier-sharing target product in the positive valence condition in which the classifier-sharing referent was present than in the control groups, in which the two choice products were presented without a referent product. In contrast, Chinese participants should be less likely to choose the classifier-sharing target product in the negative valence experimental groups, compared to the control groups. However, we expected that the choice of English participants would not be affected systematically by the classifier-sharing referent product.

Table 5 shows the purchase likelihood means in each scenario for choice products sharing the classifier with the referent (E1) relative to the control group (B1); the means are shown both for scenarios with a positively and negatively valenced referent product. For example, the relevant means for the choice set pen/bonsai tree with the referent chopstick for Chinese speakers are 6.70 for E1 versus 5.33 for B1 in the positive valence condition and 3.47 for E1 versus 5.33 in the negative valence condition.

As predicted, and as shown in Table 5, for Chinese respondents, all of the means in the positive valence condition are higher by more than one scale point for the experimental group (E1) than for the baseline control group (B1). Also as expected, all the means in the negative valence condition are lower by more than one scale point for the experimental group (E1) than for the control group (B1). In contrast, means in the corresponding English experimental conditions are higher for some stimuli but lower for others in both the positive and negative valence conditions. Furthermore, compared to the control group, the English means vary by less than a scale point (except for two stimuli: pen/bonsai tree with sunflower in the positive valence condition; and fax/motorcycle with bicycle in the negative valence condition).

To test for statistical significance, contrasts were performed between the experimental and control conditions. In the Chinese conditions, the six contrasts in the positive valence experimental condition between the ratings of the classifier-sharing choice product and the baselines (E1 vs. B1) indicated that participants were significantly more likely to select a target choice product compared to the control for each scenario (all t's > 2.00, p's $< .05$, except for scenario 4 [$t = 1.90$, $p < .06$]). In the negative

[4]In contrast to study 4, for pen and bonsai tree, two scenarios instead of four were used because the potential referent product pencil in stimuli set 1 of study 4 was perceptually too close to the target pencil and thus would have provided a nonsensical choice situation. Accordingly, we also excluded wheat to balance the stimuli set.

valence conditions of the Chinese sample, we observed opposite effects. Subjects were generally less likely to select the classifier-sharing target objects, compared to the control groups (E1 vs. B1: all t's > 1.90, p's $< .05$, except scenario 4 [$t = 1.8$, $p = .10$]).

Interestingly, as shown in Table 5, some of the non-classifier-sharing choice products also seemed to be affected in the experimental conditions compared to their baselines (E2 vs. B2). In each scenario, the participants gave a lower rating of purchase likelihood to the non-classifier-sharing choice product in comparison to the baseline in the positive valence condition and a higher rating of purchase likelihood in the negative valence condition, suggesting an inverse referent-effect. Of the 12 t-tests, six t's were greater than 2.00 and significant at $p < .05$; three were borderline significant at $p < .10$; three were not significant. That is, the tendency to choose one target product may have simultaneously reduced the likelihood to choose the other.

Significant effects were also obtained for the aggregate analyses across all stimuli. Results for the positive valence condition were as follows: E1 versus B1, $\bar{X} = 6.59$ versus $\bar{X} = 4.73$, $t(58) = 6.80$, $p < .001$; and E2 versus B2, $\bar{X} = 4.04$ versus $\bar{X} = 4.73$, $t(58) = 2.32$, $p < .05$. Results for the negative valence condition were as follows: E1 versus B1, $\bar{X} = 3.34$ versus $\bar{X} = 4.73$, $t(58) = 5.20$, $p < .0001$; and E2 versus B2 $\bar{X} = 6.26$ versus $\bar{X} = 4.73$, $t(58) = 5.37$, $p < .0001$. In sum, in the Chinese sample, the aggregate tests were all significant, and, on an item-by-item basis, out of 24 comparisons 21 comparisons were either significant at $p < .05$ or borderline significant at $p < .10$

In contrast, in the English conditions, out of a total of 24 comparisons (six for positive valence and six for negative valence for both classifier-sharing and non-classifier-sharing choice products) only one test was significant at $p < .05$: in a E2 versus B2 comparison, fax machine was more likely to be chosen in a choice pair with motorcycle when the birthday person did not like a bicycle ($\bar{X} = 6.53$ versus $\bar{X} = 5.00$, $t(59) = 2.07$, $p < .05$). Moreover, only one other test was borderline significant: in a E1 versus B1 comparison, bonsai tree was more likely to be selected against pen when sunflower tree was out of stock ($\bar{X} = 7.33$ versus $\bar{X} = 6.23$, $t(59) = 1.93$, $p < .06$). None of the four aggregate analyses was significant.

Discussion

The pattern of results obtained in study 6 suggests that Chinese respondents were affected by the presence of the classifier-sharing referent product whereas the English speakers were not affected. For Chinese native speakers, the positive and negative valence associated with the referent (operationalized as "liking better" or "not liking as much as the choice products") seems to have resulted in an increased or decreased preference due to the transfer of positive or negative affect from the referent to the target. Yet, when the referent product shared a classifier with the target, it influenced not only the target but also the other, non-classifier-sharing choice product. This finding suggests that process may have occurred in addition to the proposed affect transfer. Specifically, since the choice products were presented together as a pair it seems that the positive (or negative) affect transfer from the referent to the target may have resulted at the same time in a contrast to the non-classifier-sharing choice product. Assimilation and contrast effects have been reported in the context of social categorization processes and may occur for language-based categorizations as well. The key finding in the social categorization is that assimilation effects occur when a target stimulus and a referent belong to the same category; contrast effects may emerge when they are considered to belong to different categories (Herr, Sherman and Fazio 1983; Schwarz and Bless 1992; Tajfel 1981; Turner 1987). This pattern of results in the social cognition literature is consistent with the results reported in the present experiment: in the positive valence condition, the target product belonging to the same classifier category seems to assimilate the positive affect associated with the referent whereas the nontarget product belonging to a different classifier category seems to be subject to a contrast effect. Conversely, in the negative valence condition, the target assimilates the negative affect whereas the nontarget is, again, subject to a contrast effect, in this case a "positive" contrast. Note that in the English-speaking conditions, no such systematic patterns of assimilation and contrast were observed in either the positive or negative valence conditions. This provides further evidence that classifier-based categorization affects Chinese but not English speakers.

GENERAL DISCUSSION

We have shown that classifiers and their structures affect the perceived similarity of objects and the accessibility of classifier-related features. In addition, classifiers seem to be organized schematically and consumers use the conceptual knowledge associated with classifiers when they draw inferences. Finally, consumers also use the conceptual knowledge represented in classifiers in judgments and choices.

As we have shown, classifiers affect a variety of cognitive tasks due to associative relations. That is, the association of an object with a classifier increases the likelihood of association with another object sharing the same classifier, and thus increases the perceived similarity between these objects. Moreover, in a judgment and choice situation, positive or negative affect may be transferred from a referent choice object sharing a classifier with a target, resulting in increased (or decreased) preference for the target choice product relative to situations in which no classifier-sharing referent product is presented.

The notion that language structure influences cognition, particularly in a cross-cultural context, may be construed as the core of the well-known Whorfian hypothesis of linguistic relativity (Sapir 1929; Whorf 1956). In the past, hypothesis formulation concerning the Whorfian hypotheses has been vague (Koslow, Shamdasani, and Touchstone 1994) and empirical results have been equivocal (Au 1983; Bloom 1981; Brown 1976; Brown and Lenneberg 1954; Carroll and Casagrande 1958; Heider 1972; Pinker 1994). Recently, the Whorfian hypothesis has been reconceptualized in terms of how linguistic forms are represented, how they operate in the mind, and how they affect the concepts and categories that denote objects and relations in the world (Hunt and Agnoli 1991). The present research is in line with this reformulation of the Whorfian hypothesis by offering specific hypotheses about how representations of grammatical structures operate in the mind. We also provide empirical support for linguistic relativity by demonstrating the influence of grammar-related differences on the fundamental process of categorization. We extend prior research on the Whorfian hypothesis by showing how linguistic structures of different languages affect judgment and choice.

Future research on language, consumer cognition, and behavior should be expanded beyond classifiers to consider the cognitive and behavioral ramifications of different types of grammatical structures, either within a given language or across languages. For example, product characteristics may be lexically and syntactically encoded in the form of a classifier or an adjective that depicts the function of the product. Despite similarities in the linear occurrence of classifiers and adjectives in a noun phrase (both classifiers and adjectives appear before nouns), it is clear that there are distinct semantic and representational differences between classifiers and adjectives. Classifiers describe classes of objects; they are "type" concepts (Jackendoff 1985, 1987). In contrast, adjectives describe specific instances within a class; they are "token" concepts. Adjectives answer the question, "What kind of object is it?" Classifiers answer the question, "What kind of objects is this object a member of?" For example, unlike an adjective, the classifier "zhang (1)" is used for any table, no matter whether a specific table is genuinely flat or not. Thus, it may be instructive to study the representational form of classifiers as well as adjectives in long-term memory and their impact on consumer behavior. For example, how do consumers process and respond to an inconsistency between a classifier attribute and a product attribute (e.g., a curved table)? Such an inconsistency may occur in real life as a result of gradual changes in the structural appearance of products to the point where specific features depicted by adjectives become inconsistent with classifier attributes. Such cases already occur in Chinese where the classifier "jia (4)" (used for objects standing on a frame) as used in "yi jia dianhua" (a telephone) seems to be inappropriate to modify a pocket-size portable or cellular phone. In this case, the classifiers "bu (4)" or "ge (4)" are used. Therefore, these questions not only raise important theoretical issues in terms of how grammatical structures such as classifiers and adjectives are cognitively represented, but also raise practical issues concerning the selection of classifiers to communicate critical features and attribute information about new products.

Additional research should further broaden the topic of language-based consumer judgment and choice from classifiers to other linguistic categories. For example, various other aspects of a language such as word formation, sentence constructions and language use should be examined in different languages in terms of their relation to cognitive structures and processes. One interesting research area is how structural differences in sentence construction influence message processing in advertisements. For example, languages such as Chinese and Japanese that employ topic structures may make it relatively easy for consumers to encode and remember the topic and theme (e.g., the brand's function) whereas languages that explicitly repeat or use anaphoric expressions to refer to the topic (such as English in the form of pronouns) may make it relatively easy for consumers to encode and recall the brand name.

The present research also has important implications for the generality and cross-cultural stability of models of consumer information processing. In terms of language influence, comprehensive models of information processing have incorporated linguistic features to predict message comprehension (e.g., Sternthal and Craig 1982). But these models have not incorporated the fundamental structural issues explored in this article, namely, that mental representations of grammar-based structures provide a conceptual frame for perceiving and interpreting incoming information. Based on the present research and other related research (Schmitt, Pan, and Tavassoli 1994; Zhang and Schmitt 1998), we suggest that structural aspects of languages be incorporated into models of consumer cognition to enhance the explanatory and predictive power of these models in a cross-cultural context.

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