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Linking syntax and inductive reasoning:

Categorical labeling and generic noun phrases

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Abstract

When a person is characterized categorically with a noun label (e.g., Linda is a *feminist*), people tend to think that the attributes associated with that person are central and long-lasting (i.e., labeling effect). This bias, which is related to category-based induction and social misattributions such as stereotyping, has been known to occur because we associate the person with prototypical attributes represented in the category. One experiment described in this article indicates that the labeling effect can occur separately from the attributes represented in the category. The experiment suggests that labeling bolsters not only the perception of prototypical attributes but also the awareness of unrelated or even irrelevant attributes. The results from the experiments suggest that some generic information inherent in noun labels play a crucial role in category-based reasoning.

Linda is a feminist. – (1)

Linda believes in and supports feminism. – (2)

These two sentences literally mean the same thing. However, the implications of the two sentences are drastically different. Sentence (1) provides rich images of Linda, such as her penchant for political activities or her uncompromising attitude toward injustice, while sentence (2) does not. How does it happen? The effect of categorical labeling is evident in many aspects of cognitive biases such as stereotypes and false generalizations (Fiske, 1998) and is likely to contribute to psychological disorders such as anxiety disorder (e.g., Williams, Mathews & MacLeod, 1996). On the basis of the labeling effect is our propensity to use categories to make inferences. For example, by seeing some exotic plant on a shopping cart together with a label "fruit," we infer spontaneously that the plant is edible and probably sweet (see Yamauchi & Markman, 1998; Yamauchi, Love, & Markman, 2002).

Major theories of category-based induction explain how knowledge about a particular category influences inductive reasoning (Heit, 1999; Heit & Rubinstein, 1994; Osherson, Smith, Wilkie, Lopez & Shafir, 1990; Medin, Coley, Storms, & Hayes, 2003; Sloman, 1993, 1998), but pay little attention to the role of language. In this approach, the aforementioned "labeling effect" occurs because categorical statements activate the mental representation of the category. That is, given "Linda is a feminist," prototypical features of "feminist" are activated. As a result, typical attributes associated with that category are intensified (e.g., Kunda & Thagard, 1996).

Observe an argument below:

Argument 1

<u>(Premise) Gazelles have disease X.</u>

(Conclusion) Lions have disease X

Standard theories explain that the strength of the argument depends on (1) how many attributes “gazzeles” and “lions” share, (2) how inclusive the premise is with respect to the conclusion (Heit, 2000; Osherson et al., 1990; Rips, 1975; Sloman, 1993), and (3) how relevant the premise is in relation to the conclusion (e.g., lions eat gazzelles; therefore, lions and gazelles have the same disease; Heit & Rubinstein, 1993; Medin, et al., 2003; Sloman, 2004). In these explanations, the link between language and categorical reasoning is primarily semantic. That is, language influences reasoning because language generates meaning.

Implicit in these explanations is that syntax plays little role in inductive reasoning, and inductive reasoning takes place in an autonomous system of symbol manipulation (Newell & Simon, 1976; Simon, 1990). This assumption reflects a long standing view that syntax operates independently from the rest of cognitive processes (Hauser, Chomsky, & Fintch, 2002; Pinker, 1994; Pinker & Jackendoff, 2002). Recent studies in cognitive linguistics and cognitive neuroscience, however, reveal a close connection between language and concepts (Damasio & Damasio, 1992; Demomet, Thierry, & Cardebat, 2005; Gernsbacher & Kaschak, 2003; Hagoort, 2005; Langacker, 1998; Pulvermuller, 1999, 2004, 2005; Talmy, 2003). For example, research in cognitive linguistics indicates that grammar is a schematic extension of concepts, rather than a collection of abstract rules operating in an independent module (Langacker, 1986, 1987, 1998). Recent brain imaging studies also suggest that the internal representation of lexicons and concepts overlap significantly. For example, reference to action verbs, such as “lick,” “pick,” or “kick,” simultaneously activates the sensori-motor areas that support actual actions of licking, picking or kicking, while these areas at the same time provide the basis for concept representation (Barsalou, 1999; Damasio, 1989; Demonet, et al., 2005; Martin, Wiggs, Ungerleider, & Haxby, 1996; Pulvermuller, 2004).

In this article, I investigate how *genericity* – a grammatical property that specifies objects as an abstract whole – influences inductive reasoning. In so doing, I aim to highlight the link between syntax and reasoning.

Labeling effect, generic noun phrases and psychological essentialism

Compare sentences 1a-3a with 1b-3b.

(1a) *Dogs* bark.

(1b) *Dogs* were barking.

(2a) *A bird* can fly.

(2b) *A bird* is flying.

(3a) *The French* love wine.

(3b) *The French* bought wine.

These sentences use the same noun labels, *dogs, a bird,* and *the French,* but the implications of these noun labels are drastically different. Sentences (1a)-(3a) refer to *dogs, a bird,* and *the French* with a category as an abstract whole, while (1b)-(3b) treat the same nouns, *dogs, a bird* and *the French* as specific instances of the categories. For example, while (1a) describes the general characteristic of *dogs* as a kind, (1b) tells us an episode about particular *dogs*. Sentences like (1a)-(3a) are called generic sentences and convey information about a category as a whole, rather than properties associated with particular instances in the category (Carlson & Pelletier, 1995; Prasada, 2000).

Generic noun phrases can influence reasoning processes by promoting causal justifications. Consider the following examples.

(4) Dogs bark.

(5) The Spanish love soccer.

(6) Chairs are for sitting.

As these examples show, the characteristics expressed in generic noun phrases are central to the categories, and re-asserting category membership can create a sense of causal justification (Prasada, 2000).

(7) Why do Spanish people like soccer so much? Because they are *Spanish*.

(8) Why did he lie? Because he is a *lawyer*.

Sentence (7) implies that the reason for Spanish people's penchant for soccer originates from the essence of "Spanishness." Sentence (8) forces us to think that lawyers are in essence liars. In this manner, categorical labeling, when stated in a generic noun phrase, encourage causal reasoning and helps integrate diverse features. In the next experiment, I show that this influence of categorical labeling occurs separately from the specific meaning of a sentence.

The following examples help illustrate the design of the experiment (see Gelman & Heyman, 1999; Walton & Banaji, 2004; Yamauchi, 2005; for a similar procedure).

(9) "KINATE" is a diet food.

(10) Many people who are dieting eat "KINATE" to reduce their weight.

(11) "KINATE" is the diet food that Susan eats every morning.

The three sentences characterize an unknown item, "KINATE," in different manners. (9) is a typical generic sentence. This sentence links "KINATE" to a category as an abstract whole. (10) refers to "KINATE" in terms of a general episode associated with the item. The idea of "KINATE is a diet food" can be inferred directly from (10), but no explicit reference to a category is made in this sentence. Sentence (11) employs a category inclusion statement in a similar manner described in (9), but this is not a generic sentence. "KINATE" is modified with a definite article "the" along with an adjective clause. "KINATE" in (11) refers to a specific item, not a category of "KINATE" as a whole (Carlson & Pelletier, 1995).

Now consider the estimation of an unlikely feature – "KINATE sells well in mid-size cities" – with respect to these three types of premises (9) – (11) (Table 1). Previous studies showed that categorical labeling such as in (9) bolsters the estimation of highly likely attributes (e.g., "KINATE contains no fat." see Gelman & Heyman, 1999; Walton & Banaji, 2004; Yamauchi, 2005). The main explanation suggested for this "labeling effect" is that categorical statements activate the underlying "content" of the category. That is, given "KINATE is a diet food," the representation of "diet food" is activated (e.g., a list of features and see Kunda & Thagard, 1996), and the dominant attribute attached to that representation is enhanced.

However, this explanation is inapplicable to the estimation of attributes that have nothing to do with the category (e.g., "KINATE sells well in mid-size cities"). This target attribute has no obvious connection with the category – diet food. Thus, if the estimation for the unrelated attribute is systematically enhanced in (9) as compared to (10) and (11), it could be argued that some generic properties underlying categorical labels influence a reasoning process (e.g., causal justification) separately from the nominal representation of the category such as prototypes, exemplars, or a list of features contained in the category. The current experiment tested this idea.

Experiment

Method

Participants

Participants were 317 undergraduate students recruited from a large mid-western university in the United States. They participated in this experiment for course credit. They were randomly assigned to one of three conditions – a categorical condition (*N*=104), a descriptive condition (*N*=110), and a non-generic condition (*N*=103).

Materials

The materials were 15 descriptions of arbitrary items, which were specified by a combination of three consonant-vowel pairs (e.g., “KINATE”). Each item is associated with one of 15 categories that represented objects, activities, and locations (see Appendix and Table 2). Typical categorical induction studies employ biological categories such as the names of animals. I selected these diverse categories (e.g., ad hoc and script categories and see Barsalou, 1983; Ross & Murphy, 1999) in order to maintain the ecological validity and generality of this experiment.

From these 15 categories, three types of descriptions were created. In the categorical condition, an unknown item (e.g., “KINATE”) was characterized generically with categorical statements. In the descriptive condition, the same item was characterized descriptively without category labels. In the non-generic condition, an unknown item was characterized with a category inclusion statement, but it was also modified by a definite article “the” and an adjective clause (Table 1).

Each item statement accompanied two attribute questions and one probe question, which was shown last (Table 1). The two attribute questions were not directly related to the category. For example, given a description about a diet food, the two attribute questions, “People who like KINATE love baseball” and “KINATE sells well in mid-size cities” can hardly be part of the content of “diet food.” The probe questions were designed to measure the compatibility of the categorical statements and the descriptive statements. For example, the probe questions in the categorical condition were the descriptive statements used in the descriptive condition. The probe questions used in the descriptive condition were the categorical statements employed in the categorical condition. The probe questions given in the non-generic condition were the descriptive statements used in the descriptive condition (Table 1). In this manner, these probe questions measured the extent to which participants endorse categorical statements given descriptive statements, and vice versa. The estimation scores obtained from each probe question were used to balance the inferential value of the categorical statements and the descriptive statements (see the Results section for details).

Procedure

The task of the participants was to estimate the likelihood of attributes given stimulus statements with a 0-100 scale.[1] Each stimulus was shown on a computer screen and the order of presenting the stimuli was determined randomly for each participant.

Design

The experiment had one factor with three between-subjects levels (labeling condition – categorical, descriptive, and non-generic). The scores obtained from two attribute questions were combined and analyzed together.

Results

To eliminate outliers, all estimation scores that deviated 2 standard deviation units from the mean of each experimental condition were removed from the data analysis. This procedure resulted in 4650 data points (97.8% of the original data points), which were taken from 310 participants.

To ensure that the categorical statements and the descriptive statements were equivalent in their truth values, the data were analyzed for the participants who made a score of 100 to each probe question. This procedure assures that all of the descriptive statements were endorsed with a score of 100 in the categorical and non-generic conditions, and all of the categorical statements were endorsed with a score of 100 in the descriptive condition (categorical condition, N=89; descriptive condition, N=98, and non-generic condition, N=81).[2] Thus, this data analysis compared participants' attribute estimations when categorical statements and descriptive statements were perceived to be literally compatible. To test the generality of the results, a minimum value of quasi *F-ratio* (*min-F')* was also calculated from a subject-based *F*-value and an item-based *F*-value after following the suggestion by Clark (1973). This measure examines whether or not the effect obtained from the three conditions can be generalized to different items and different participants simultaneously.

Overall, estimation scores obtained in the three conditions differed significantly; $F(2, 267)=7.44$, $MSE=260.3$, $p<.01$; *min-F'*(2, 235)=6.36, $MSE=51.1$, $p<.01$ (Table 2). Planned *t*-tests revealed that the average estimation score in the categorical condition was higher than that in the non-generic condition; $t(177)=3.81$, $p<.001$, $d=0.59$; *min-F'*(1, 163)=12.1, $MSE=86.8$, $p<.01$. The estimation score observed in the categorical condition was also higher than that in the descriptive condition; $t(185)=2.79$, $p<.05$, $d=0.41$; *min-F'*(1, 162)=6.3, $MSE=40.3$, $p<.05$. The performance in the descriptive condition were not statistically different from that in the non-generic condition; $t(168)=0.98$, $p=.33$, $d=0.14$; *min-F'*(1, 177)<1.0. This result suggests that participants in the categorical condition were far more likely to endorse unlikely attributes as compared to participants in the descriptive condition and in the non-generic condition even though they fully endorse corresponding descriptive statements and categorical statements perfectly.

There were different numbers of words in the item statements used in the three conditions (categorical condition, M=16.47; descriptive condition, M=19.47; non-generic condition, *M*=22.07). This surface disparity might have contributed to the observed differences between the three conditions. To rule out this explanation, item-based ANCOVAs (analysis of covariance) were performed by treating the number of words in individual stimuli as covariate. This analysis shows that the mean estimation score from the category condition was higher than those from the other two conditions; $F(2, 41)=4.48$, $MSE=58.70$, $p<.01$; categorical condition vs. descriptive condition; $F(1, 27)=4.40$, $MSE=66.04$, $p<.05$; categorical condition vs. non-generic condition; $F(1, 27)=6.64$, $MSE=58.94$, $p<.05$. The difference between the descriptive condition and the non-generic condition was not significant; $F(1, 27)=1.31$, $MSE=52.60$, $p=.26$. Clearly, categorical statements, when stated in generic sentences, elevate the estimation of unlikely features.

Syntax or meaning? One possible interpretation of these results is that the three types of statements (i.e., categorical, descriptive, and non-generic statements) were fundamentally different in their *meanings*. Thus, the results can be explained by semantic information associated with individual sentences, rather than syntactic properties attached to generic noun phrases per se. This assertion, however, merely begs another important question – how do these sentences convey different meanings to begin with? In the present experiment, categorical statements and descriptive statements were inferentially compatible in the sense that one type of statements can be readily inferred from the other. This means that the different *meanings* conveyed in the three types of sentences did not come from the nominal representation of a category (e.g., a list of features and/or exemplars). Furthermore, the target attributes that participants estimated had no obvious connections with corresponding categories.[3] Thus, on top of specific meaning conveyed in each sentence, some intrinsic property pertinent to category labels should have influenced the reasoning process.

Discussion

Previous research has shown that labeling unknown objects with concrete nouns intensifies the interpretation of the attributes associated with the category (Gelman & Heyman, 1999; Walton & Banaji, 2004). The results from this experiment suggest that part of this phenomenon arises from syntactic properties attached to generic noun labels. Generic sentences describe characteristics of a group as a whole (e.g., "The French loves wing"). In so doing, they lead us to think that the attribute described in a sentence is essential to the category (Gelman, 2003; Medin & Ortony, 1989). This *intuitive belief* attached to generic sentences could help interpret other attributes. For example, when an unknown object is stated in a generic sentence ("'KINATE' is a diet food"), a notion of essential properties is evoked (e.g.,"'KINATE' can help reduce body weight), which in turn leads us to interpret other unrelated attributes ("'KINATE' sells well in mid-size cities) in relation to the essential property (e.g., there should be many overweight people in mid-size cities; therefore, "KINATE" should sell well in mid-size cities). I argue that the results observed in the present study reflect the fundamental link between generic noun phrases, category labels, and *intuitive theories.*

The present findings extend the developmental studies that demonstrated a structural relationship between children's induction and grammatical properties (Brown, 1957; Gelman, Hollander, Star, & Heyman, 2000; Markman & Hutchinson, 1985; Waxman & Booth, 2001). The present results indicate that the labeling effect reported in children (e.g., Gelman & Heyman, 1999) is not transient, and observable well beyond the developmental process specific to language acquisition.

How are generic noun phrases, category labels, and *intuitive theories* integrated? I speculate that this complex relationship was established in the course of the development of language. Although anthropologists, linguists, and evolutionary psychologists disagree how language evolved, there is a general consensus that the ability to use symbols for communication preceded the development of human language (Christiansen & Kirby, 2003; Deacon, 1997). Pinker (2003) suggests that language developed partly due to the need to capture causal relationships in an environment. English syntax, for example, transmits causal information by means of word order (e.g., a dog bites a man vs. a man bites a dog) (Pinker, 1994, 2003). Analogously, generic noun phrases and category labels help transmit causal information by incorporating *intuitive theories* (see Ahn, 1998; for the relationship between categories and causal information). For example, a generic expression such as “lions are predators” not only extends our knowledge about a particular lion to lions in general, but also helps understand how other animals are causally related (e.g., Lions prey on gazelles; therefore gazelles are weak but run fast, and that is the reason why gazelles live together to protect themselves from lions). In this manner, generic sentences help extract causal relationships in an environment. Because of this causal value, *intuitive beliefs* such as psychological essentialism might have been integrated into generic noun phrases and category labels.

Implications: Categorical labeling and inductive reasoning. A main assumption in cognitive science has been that an autonomous system of symbol manipulation mediates inductive reasoning (Newell & Simon, 1976; Simon, 1990). Following this assumption, research on categorical reasoning has focused on uncovering computational algorithms of reasoning (e.g., Heit, 2000; Sloman, 1993), while paying little attention to the role of language. In this regard, standard theories of inductive reasoning explain an inductive process by means of similarity, representativeness, availability, or background knowledge associated with premises and conclusions (see Murphy, 2003 for review). These explanations can be summarized under the same umbrella of associative networks, in which external knowledge and contexts provide additional associative strength to an existing network (Kunda & Thagard, 1996; Redher & Murphy, 2003; Rogers & McClelland, 2004; Rumelhart, 1990; Rumelhart & Todd, 1993; Sloman, 1993). Given the fact that grammatical information affects inductive behavio;r of adults, it is unlikely that these associative networks can account for labeling biases fully unless the network employs some mechanism of representing grammatical information such as genericity. Future studies have to evaluate this assertion.

In conclusion, by demonstrating a connection between the labeling effect and generic sentences, this study suggests that there is a significant link between a cognitive system that creates a concept and a linguistic system that organizes language. This study further suggests that the study of cognitive systems can be aided vastly by the study of language and vice versa.

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Appendix

The stimulus statements used in the categorical condition

1. "KOMITA" is a birthday gift. It is particularly popular among young couples.

2. "KINATE" is a diet food. It is rich in protein but has no fat.

3. "TASIRO" is winter clothing. It makes people stay warm and cozy. Without it, people can barely survive in winter.

4. "HITASI" is a popular holiday activity. On Easter or Labor day, many people get together and enjoy HITASHI.

5. "MIYAGI" is a popular vacation site. It provides many fun things for young children.

6. "NUMATA" is a health food. It regulates blood pressure. Many doctors recommend NUMATA to stay healthy.

7. "KINUMI" is an ethnic restaurant. With about $20, one person can have a superb exotic dinner at KINUMI.

8. "YUMITE" is a suburban car. Almost all families living in the suburb own YUMITE as their first car.

9. "KOMETA" is a children's game. It gives young children lots of actions and interactions.

10. "TOMERO" is a honeymoon site. Last year, more than 800,000 couples visited TOMERO for their honeymoons. "TOMERO" is warm year round and has many romantic beaches.

11. "SUNOKI" is a summer food. It is popular especially during a hot summer and helps people to reduce body temperature.

12. "TOMOKO" is a popular winter sport. People think TOMOKO should

be included in the Winter Olympics.

13. “TENBO” is an Asian food. It has exotic flavor and texture.

14. “MENIKO” is a tabloid journal. It is filled with gossip about movie and TV stars.

15. “MINAMI” is a healthy exercise. It helps people to correct their posture and reduce blood pressure.

The stimulus statements used in the descriptive condition and in the non-generic condition (In the two conditions, only the first sentences of the categorical statements were replaced with the following sentences)

1. Many people give “KOMITA” to their friends and relatives for their birthdays.
2. Many people who are dieting eat “KINATE” to reduce their weight.
3. Many people wear “TASIRO” in the winter.
4. During holidays, people love to do “HITASHI.”
5. Many people love to visit “MIYAGI” on their vacation.
6. Eating “NUMATA” regularly helps people stay healthy.
7. People go to “KINUMI” to eat ethnic food.
8. Many people living in the suburb drive “YUMITE” for many different purposes.
9. Many children play “KOMETA” for fun. It gives young children lots of actions and interactions.
10. Many newly weds choose “TOMERO” for their honeymoons.
11. In the summer, many people eat “SUNOKI.”
12. Many people love to play “TOMOKO” in the winter.
13. Many Asian people eat and love “TENBO.”

14. MENIKO is published weekly.

15. People exercise “MINAMI” to enhance their health.

the non-generic condition

1 “KOMITA” is the birthday gift that John bought for his wife this year.

2. “KINATE” is the diet food that Susan eats every morning.

3. “TASIRO” is winter clothing that Jane loves to wear.

4. “HITASI” is the popular holiday activity that the Smiths enjoy every year.

5. “MIYAGI” is the vacation site that the Markmans visit every summer.

6. “NUMATA” is the health food that Craig bought last week.

7. “KINUMI” is the ethnic restaurant that Jin opened two years ago.

8. “YUMITE” is the suburban car that John drives.

9. “KOMETA” is the children’s game that Paul's daughter invented.

10. “TOMERO” is the honeymoon site that that almost all young Japanese couples choose.

11. “SUNOKI” is the summer food that Amy loves a lot.

12. “TOMOKO” is the popular winter sport that originated from Sweden.

13. “TENBO” is the Asian food that Ann eats for dieting.

14. “MENIKO” is the tabloid journal that Bob loves to read on the beach.

15. “MINAMI” is the healthy exercise that Kathy's doctor recommended her.

The attribute questions used in the three conditions

1. A. KOMITA sells well during the summer.

   B. Many lawyers own KOMITA.

2. A. People who like KINATE love baseball.

   B. KINATE sells well in mid-size cities.

3. A. People who like to wear TASIRO also like to play basketball.

   B. TASIRO is sold at Wal-Mart but not at K-Mart.

4. A. Liberal people are particularly fond of HITASI.

   B. People who like HITASI eat lots of chocolate.

5. A. People who visit MIYAGI tend to support Al Gore.

   B. Many accountants live in MIYAGI.

6. A. NUMATA is popular in Texas but not in Louisiana.

   B. Many high school teachers like NUMATA.

7. A. KINUMI has more waitresses than waiters.

   B. KINUMI’s customers drink red wine more often than white wine.

8. A. YUMITE’s dealers are exceptionally generous.

   B. YUMITE makes a model change every two years.

9. A. Some schools restrict children from playing KOMETA during school hours.

   B. KOMETA is more popular in eastern states than in western states.

10. A. The unemployment rate of TOMERO is higher than that in Los Angels.

    B. TOMERO’s mayor loves baseball.

11. A. SUNOKI smells like pasta.

    B. People who buy SUNOKI tend to buy Diet Coke as well.

12. A. TOMOKO makes people polite.

    B. People who play TOMOKO are generally smart.

13. A. There are many restaurants that serve TENBO in Texas, but not in Florida.

    B. TENBO tastes like a bagel.

14. A. MENIKO readers prefer cats over dogs for pets.

B. MENIKO’s editor has at least two children.

15. A. MINAMI requires expensive equipment.

    B. People who exercise MINAMI also like traveling abroad.

Footnotes

1. In a standard “category-based induction” task, participants evaluate the strength of a conclusion (e.g., Lions have disease X) given a premise (e.g., Cats have disease X), where the two items (lions and cats) have the same attribute (e.g., disease X). This experiment employed another induction task, in which the same item (e.g., Premise: Linda has attribute X) has different attributes (e.g., Conclusion: Linda has attribute Y). This type of tasks are often employed in inductive reasoning and impression formation studies (e.g., Tversky & Kahneman, 1983; Kashima et al., 2000). The two types of tasks are analogous in the sense that both investigate the relationship between categorical information and inductive inferences. The former involves the estimation of the same attribute being projected to different items, while the later involves the estimation of different attributes being projected to the same item.

2. The reported results were based on individual participants who had a probe score of 100 in at least 1 trial. An additional analysis was conducted with the participants whose probe scores were 100 in at least 5 trials. The results from this additional analysis were nearly identical to those reported in the Result section. I also conducted extra analyses with three different selection criteria – (1) without any data selection restriction, (2) with the selection criterion of a probe score of 90 or above; (3) with the selection criterion of a probe score of 80 or above. In all cases, the overall results of these additional analyses were nearly identical to those described in the Result section.

3. Yamauchi (2005) compared estimations made to these unlikely features with likely features. For example, given a categorical statement, “’KINATE’ is a diet food,” the estimations for unlikely features, such as “’KINATE’ sells well in mid-size cities,” were compared to those

made to likely features, such as "'KINATE' helps lower one's cholesterol level." This study showed that the estimation scores obtained in these unlikely attributes were indeed far below as compared to likely attributes. See Experiment 2 in Yamauchi (2005) for details.

Table 1

Sample stimuli used in the three conditions

	Categorical	Descriptive	Non-generic
Item statements	"KINATE" is a diet food. It is rich in protein but has no fat.	Many people who are dieting eat "KINATE" to reduce their weight. It is rich in protein but has no fat.	"KINATE" is the diet food that Susan eats every morning. It is rich in protein but has no fat.
Attribute Questions	A. People who like KINATE love baseball. B. KINATE sells well in mid-size cities.	A. People who like KINATE love baseball. B. KINATE sells well in mid-size cities.	A. People who like KINATE love baseball. B. KINATE sells well in mid-size cities.
Probe Questoins	C. Many people who are dieting eat "KINATE" to reduce their weight.	C. "KINATE" is a diet food.	C. Many people who are dieting eat "KINATE" to reduce their weight.

Note.

This table shows sample stimuli given in the three conditions, categorical, descriptive, and non-generic conditions. Participants read item statements, and evaluated the likelihood of attributes given in the attribute questions with a 1-100 scale.

Note that the probe questions used in the categorical condition and in the non-generic condition were the first sentence of the item statements in the descriptive condition.

The probe questions used in the descriptive condition were the first sentence of the stimulus statements in the categorical condition.

Table 2

Mean estimation scores

	Categorical	Descriptive	No-generic
birthday gift	**35.93**	35.75	30.33
diet food	**38.66**	32.16	25.76
winter clothing	**23.66**	20.70	20.20
holiday activity	**41.79**	32.72	32.47
vacation site	**26.04**	20.12	18.21
suburban car	**44.24**	42.57	34.55
children's game	**36.10**	34.06	29.80
honeymoon site	**28.30**	21.61	19.03
health food	**38.09**	30.68	26.03
summer food	**34.23**	23.70	24.07
winter sport	**21.36**	17.32	20.33
Asian food	**17.46**	17.19	13.98
tabloid journal	**25.79**	20.77	15.59
healthy exercise	**39.81**	26.75	24.73
ethnic restaurant	**42.33**	33.48	32.71
Average	32.92	27.30	24.52
SD	8.46	7.74	6.51

Note.

The numbers represent means of estimation scores collected from the data set, in which the corresponding scores for probe questions were 100.