Anggoro, F., & Gentner, D. (2003). Sex and seniority: The effects of linguistic categories on conceptual judgments and memory. *Proceedings of the Twenty-Fifth Annual Conference of the Cognitive Science Society*. Boston, MA.

Sex and Seniority: The Effects of Linguistic Categories on Conceptual Judgments and Memory

Florencia Anggoro (f-anggoro@northwestern.edu)
Department of Psychology, Northwestern University
2029 Sheridan Rd., Evanston, IL 60208 USA

Dedre Gentner (gentner@northwestern.edu)
Department of Psychology, Northwestern University
2029 Sheridan Rd., Evanston, IL 60208 USA

Abstract

The current study explored the effects of different semantic categories in kinship terms on similarity judgments, word extensions, and recognition memory. We compared Indonesian – in which sibling terms are based on *relative age* – with English – in which sibling terms are based on *gender*. In Experiment 1, participants saw triads of pictures of scenes involving kinship relations and were asked to make similarity judgments and to extend novel labels from the standards to the variants. The variants each resembled the standard along one dimension and differed along the other. In Experiment 2, other participants were asked to remember the standard pictures and were later tested on their recognition memory using the variants. Results from both experiments converged to suggest that participants' judgments, word extensions, and memory were influenced by their semantic categories.

Introduction

The Whorfian Question

The question of whether language influences nonlinguistic cognition has enjoyed a recent resurgence of interest. This idea was widely accepted in the 1950's and 1960's. Then it fell into disregard, due in part to Rosch's failure to find differences in performance on cognitive tasks between the Dani people and English speakers, despite striking differences in the linguistic categories of color terms ([Rosch] Heider, 1972). In recent years, however, interest in the question of language and thought has been revived (Gentner & Goldin-Meadow, in press; Gumperz & Levinson, 1996). This renewed interest was marked by a shift from the domain of color to relationally richer domains such as space, fueled in part by linguistic findings of major semantic differences in domains such as space and motion (e.g., Talmy, 1975; Bowerman, 1980), tense (Boroditsky, Ham, & Ramscar, 2002), and social categories (Romney & D'Andrade, 1964). For example, Choi and Bowerman (1991) found that in contrast to English, which divides spatial configurations into support vs. containment relations, Korean divides this arena into tight-fitting vs. loose-fitting arrangements (Choi & Bowerman, 1991).

There is recent evidence that such linguistic distinctions may influence non-linguistic similarity and memory for scenes (Bowerman & Choi, in press; Sera et al., 2002; Choi, McDonough, Bowerman, & Mandler, 1999; Levinson, 1998), as well as counterevidence (Munnich, Landau, & Anne Dosher, 2001; Li & Gleitman, 2002).

So far the bulk of the new wave of cross-linguistic investigations on language and thought has centered on space and motion (e.g., Levinson, 1998). However, it is clear from the classic studies in anthropological linguistics that there are also substantial differences in semantic categories in social arenas such as kinship (Romney & D'Andrade, 1964; Danziger, 2001; Foley, 1997).

One kind of linguistic category that touches on the social arena is linguistic gender. Although gender has often been seen as purely formal, some recent research suggests that it may retain some semantic content (e.g., Sera, et al., 2002). For example, Boroditsky and Schmidt (2000) conducted a study where they taught bilingual Spanish-English and German-English speakers gender-specific proper names for objects in English (e.g., *Betty* for a table). For both groups of participants, half the names were consistent with the grammatical gender of the objects' labels in their first language; the other half were inconsistent. The objects were chosen to have opposite genders in Spanish and German. Boroditsky and Schmidt found that participants remembered gender-consistent pairings better than gender-inconsistent pairings. In addition, because the objects had been chosen to have opposite genders in both languages, the results showed opposite memory patterns: for objects where Spanish speakers remembered more female names, German speakers remembered more male names, and vice versa (Boroditsky & Schmidt, 2000).

Our research investigates another arena of social categories, namely kinship terms. Some common distinctions occur across languages, such as the gender of the person named, the age and/or generation relative to ego, and the gender of the linking relative, leading some theorists to emphasize universal aspects of kinship systems (e.g., Malinowski, 1930). Nevertheless, kinship systems vary considerably in how these distinctions play out. We focus here on one pair of contrasting languages – English and Indonesian – which vary in the way they name sibling relations.

Before describing the current study, we describe the relevant semantic patterns for Indonesian and English.

Indonesian makes more distinctions than English in many aspects of social and kinship terms. The most relevant to our study is that Indonesian makes a lexical distinction for whether a sibling is *older or younger*. The word *kakak* refers to older sibling while the word *adik* refers to younger sibling. For example,

(1)

Saya	mempunyai	seorang	kakak.
1st pers. sing.	have	one (person)	older sib

'I have an older sibling'

Crucially, the words *kakak* and *adik* are gender-neutral. When English speakers need to be specific, they could ask "Is your brother older or younger?" Similarly, if Indonesian speakers need to be specific, the following is one way they could go about it:

(2)

Adikmu	laki-laki	atau	perempuan?
younger sib.-your	male	or	female

'Is your younger sibling a boy or a girl?'

In other words, when an Indonesian child refers to her siblings, she speaks not in terms of sister and brother but rather of older and younger. That is, the Indonesian semantic system focuses on the relational seniority of siblings, in contrast to the English focus on gender. Does this linguistic difference matter to the way people think about family relations? Might it even affect the way people construe scenes involving families? Our study investigates this possibility.

The Current Study

In this research, we explored the effects of language on how people encode and remember scenes. Specifically, we compared Indonesian and English to ask whether differences in habitual kinship language can influence similarity judgments and recognition memory. Indonesian and English are interesting to compare, because in some arenas – e.g., spatial prepositions – the Indonesian language makes fewer distinctions than English, while in other arenas – e.g., many social domains – the reverse is true. In the present case – terms for siblings – each language makes a distinction that the other does not. Our interest is in exploring whether relative age of siblings matters *more* for Indonesian speakers than for English speakers.

Experiment 1

In this study, we contrasted the two languages using a similarity task and a word extension task. In both tasks, Indonesian and English speakers were shown triads of pictures depicting family interactions, containing a standard and two variants. In the similarity judgment task, participants were simply asked "which of these two pictures *(showing the variants)* is more like this one (*pointing to the standard*)?" (In Indonesian: "Dari dua ini menurut kamu mana yang lebih seperti yang ini?"). In both cases, one variant (the Gender Variant) preserved the gender relation but altered the seniority relation; the other (the Seniority Variant) preserved the seniority relation but altered the gender relation. We chose the word extension task in addition to the standard similarity task to provide a more natural, implicit measure of similarity than a direct judgment. We know from studies with American subjects that the term *similarity* in English is ambiguous (Gentner, Rattermann and Forbus, 1993; Goldstone, 1995). It can be taken to mean 'purely perceptual similarity' or 'deep relational similarity' or a combination. Because extending a new word to further situations is natural across both languages, this task should be less susceptible to misinterpretation across languages than instructions to 'judge similarity' (Gentner & Brem, 1999).

In the word-extension task, the event depicted in the standard picture was labeled, and participants were asked which of the two variants could also be described as the label. In designing the novel word task, we avoided naming the sibling relation itself, for this might have invited a kind of internal translation – participants might have translated the novel word into their languages' normal kinship system. Instead, the novel word always described an event in which the siblings were participating. We reasoned that kinship relations might be particularly salient for ritual or ceremonial events (in both languages). Therefore, in designing the family triads, we included two sets depicting ceremonies as well as one rather mundane kitchen scene.

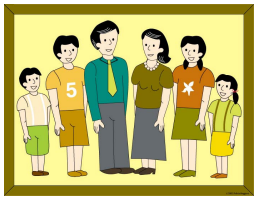
If the language's patterns of kinship naming become integrated into their habitual conceptualization of kinship relations, then (1) they should influence the perceived similarity to other parallel events involving kin pairs, and (2) they should influence people's sense of how the new word should be extended. For example, if an English speaker sees a new event between a brother and sister who differ in age, s/he might be more likely to generalize that event to a future brother-and-sister pair than to a future older-and-younger pair. In contrast, an Indonesian speaker would be more likely to weigh the relative age of the two participants more than the gender difference.

The question is whether these habitual patterns will influence people's extension of a new word, and perhaps even their sense of similarity. If so, then the English participants in both the word-extension and the similarity tasks should choose the alternative where gender relations are preserved. The predicted Indonesian pattern is to choose the alternative where seniority relations are preserved.

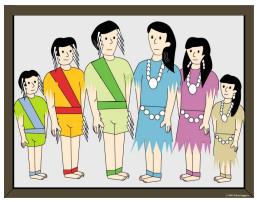
Method

Participants The participants include 15 Indonesian monolinguals and 19 English monolinguals, ranging in age from approximately 17 to 19 years old. Participants were either given credit or a small monetary compensation. Data from Indonesian speakers were collected in Jakarta, Indonesia. Data from English speakers were collected at Northwestern University and other areas near Chicago.

Materials The stimuli were three sets of pictures. One set (the Kitchen set) involved scenes of siblings performing a simple activity in the kitchen. The other two sets (the Ritual sets) involved ceremonies. The Kitchen set was used in the similarity task and the Ritual sets were used in the word extension task. In all cases, family pictures were used to introduce the 'characters' and make clear the sibling relations.



Family Picture for Kitchen Set

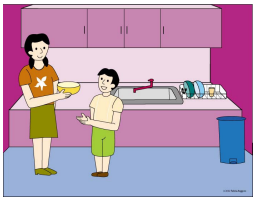


Family Picture for Ritual 1 Set

Figure 1: Family pictures used in the Kitchen and Ritual 1 sets. These were shown before the standards and remained in view throughout the task.

The triad pictures consisted of one standard picture and two variants: the Seniority Variant, which preserved the seniority relation but altered the gender relation, and the Gender Variant, which preserved the gender relation but altered the seniority relation.

Standard
older sister gives bowl to younger sister



Seniority Variant
older sister gives bowl to younger brother

Gender Variant
younger sister gives bowl to older sister

Figure 2: The Kitchen set. In the Seniority Variant, the bowl still goes from the older to the younger sibling, but the gender of the younger sibling is altered. In the Gender Variant, the gender of both actors is the same as in the standard, but the bowl now goes from the younger to the older sibling.

Standard
younger brother gives crown to older sister

Gender Variant
older sister gives crown to younger brother

Seniority Variant
younger brother gives crown to older brother

Figure 3: Ritual 1 set. In the Gender Variant, the genders of both actors are the same as in the standard, but the crown now goes from the older to the younger sibling. In the Seniority Variant, the bowl still goes from the younger to the older sibling, but the gender of the older sibling is altered.

Procedure Participants were run individually in a quiet room. Instructions were given in Indonesian for the Indonesian speakers and English for the English speakers. For each set of stimuli, participants were first shown a family picture to insure that they understood that the triad that followed only involved the children. For the word-extension task (Ritual sets), the experimenter explained that the family lives on some island and they held a ritual each year. Then the experimenter labeled the ritual (with a novel word) and asked participants to choose which of the two variants is also called that name.

Specifically, for the similarity judgment task (Kitchen set), the experimenter said, "This is a picture of a family *(showing Kitchen set family picture)*. Two parents, four children. Now I am going to show you pictures of just the children." Then the experimenter said, "Pay attention to this one *(showing standard)*. Which of these two *(showing variants)* do you think is more like the standard?" For the word-extension task (Ritual sets, e.g., Ritual 1), the experimenter said: "On the island of *Kokapu*, there lives this family *(showing Ritual 1 family picture)*. Two parents, four children. Once a year they always attend a ritual that is being held at night, when there is a full-moon. Now I am going to show you pictures of just the children." Then the experimenter said "Now this *(showing standard)* is called *saluming*. Which one of these two *(showing variants)* do you think is also *saluming*?" After participants had made a choice, the experimenter asked them to explain their choice.

Predictions

We predicted that Indonesian monolinguals would be relatively more sensitive to changes in relative age, as opposed to changes in gender, than would English monolinguals. Specifically, if the similarity judgments and word extensions reflect the semantic categories in the two languages, then Indonesian speakers should be likely to choose or extend the novel labels to the variant that preserved the seniority relation (Seniority Variant). English speakers should be less likely to attend to relative age and more likely to attend to the variant that preserves the gender relation (Gender Variant).

Results

The results from the similarity judgment task (Kitchen set) are depicted in Figure 4. As predicted, Indonesian speakers were much more likely to choose the Seniority Variant (M = .93, SD = .26) than the English speakers (M = .63, SD = .5), $t(32) = 2.14$, p =.04.

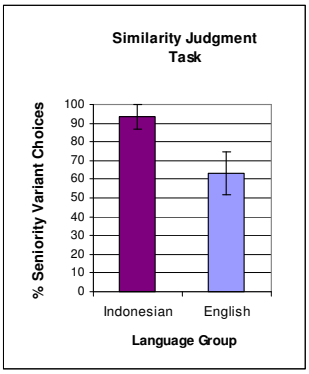


Figure 4: Results from the similarity judgment task.

The results from the word-extension task (Ritual sets) are depicted in Figure 5. Again, as predicted, Indonesian speakers (M = .97, SD = .13) were more likely to extend the new word to the Seniority Variant than were English speakers (M = .55, SD = .37), $t(32) = 4.14$, $p < .001$.

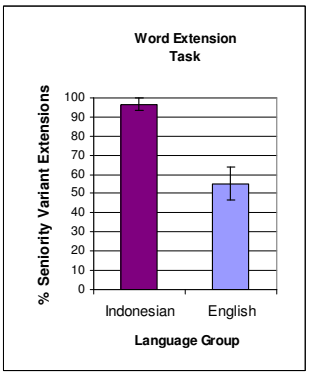


Figure 5: Results from the word extension task.

Although the two measures are somewhat different, we then combined them to permit an items analysis. A paired-samples t-test over the three sets of items showed a significant difference between the two language groups, $t(2) = 5.74$, p = .03.

Discussion

The results from Experiment 1 showed that, as predicted, Indonesian speakers were highly attentive to seniority in judging the similarity of events and in extending a new word meaning. In this study, we did not find a correspondingly strong weighting for gender relations among English speakers; rather, English speakers seemed to attend to both kinds of relations. (However, the next study shows a somewhat different pattern.) In any case, the important thing is the difference between the two language groups. Indonesian speakers attend more to seniority than do English speakers. This pattern fits with our prediction of greater relative sensitivity to the dimension required in naming siblings.

Experiment 2

In this study we used a recognition task as a more subtle way to discover whether the two languages induce different encodings. Indonesian and English speakers were shown a series of pictures: the three kinship standards and their three corresponding family pictures from Experiment 1, along with 21 other pictures. Participants were asked to remember the scenes for a later memory task. Recognition memory for the scenes was later tested using the Gender and Seniority Variants that were used in Experiment 1.

Method

Participants Participants were 15 Indonesian monolinguals and 15 English monolinguals, ranging in age from approximately 17 to 19 years old. They were either given credit or a small monetary compensation. Data from Indonesian speakers were collected in Jakarta, Indonesia. Data from English speakers were collected at Northwestern University and other areas near Chicago.

Materials There were 27 study pictures (the three standard pictures from Experiment 1, their three corresponding family pictures, and 21 filler pictures). There were 50 test pictures. The recognition test included the three standards and all six of their variants, plus 41 fillers, as described below.

Procedure As in Experiment 1, before each standard picture, participants were shown a family picture to ensure that they understood that the picture that followed involved only the children. (For the Ritual sets, the experimenter explained that the family lives on some island and they held a ritual each year. Then the standard was shown without further description.) After participants had seen all of the standards, they were given a short break (approximately 10 minutes) during which they were asked to solve a few

simple puzzles. Then they were given a yes-no recognition task. The two variants for each standard were intermixed in semi-random order among the fillers. The three standards were given at the end of the test.

Results

The key dependent measure is the mean proportion of times a participant responded 'yes' to each variant; i.e., the false alarm rates on the Gender Variants vs. the Seniority Variants. Qualitatively, Indonesian speakers were more likely to false alarm on the Seniority Variants (M = .49, SD = .25) than on the Gender Variants (M = .38, SD = .25), while English speakers were more likely to false alarm on the Gender Variants (M = .56, SD = .30) than on the Seniority Variants (M = .44, SD = .30). An ANOVA over language and variant type showed a marginally significant interaction between the two factors (p = .06).

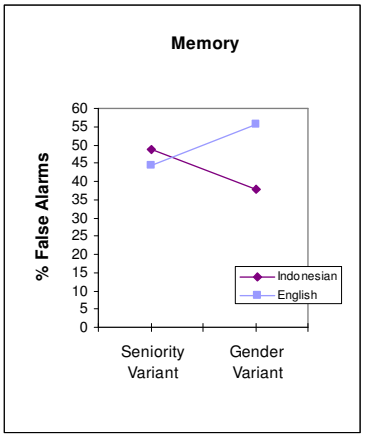


Figure 7: Results from Experiment 2. The Seniority Variant preserved the seniority but altered the gender, and the Gender Variant did the reverse.

Discussion

The results from Experiment 2 suggest an influence of language on encoding and recognition. Indonesian speakers showed greater relative sensitivity to changes in seniority than to changes in gender in recognition memory, whereas English speakers showed the reverse pattern, as evidenced by the marginally significant interaction between language and variant type. As in Experiment 1, this pattern suggests greater sensitivity to the dimension that is required in naming siblings in each language.

General Discussion

Our major prediction was that Indonesian speakers would focus on seniority and English speakers on gender. This prediction was borne out in all three tasks. Our results suggest that the difference in the semantic patterns of the two languages may lead to differences in the way speakers encode situations – even nonlinguistic perceptual scenes. Habitually speaking a different language appears to have led participants to have different 'takes' on the same pictures.

Our three measures converge quite well. Across our studies we found that Indonesian speakers attended more to seniority than did English speakers in judging similarity and in extending a new word meaning. However, because these two tasks might have a somewhat deliberative component, we added a memory task as a more subtle test of whether semantic patterns influence encoding. Indeed, the results of the recognition task showed the predicted interaction: Indonesian speakers show greater sensitivity to seniority and English speakers to gender. Interestingly, in the memory task the language effects appeared greatest on the gender dimension, in contrast to the first two tasks in which the effects were most prominent for seniority.

In our studies, we did not ask participants to describe the pictures verbally. It is possible that the differences would have been even stronger had we done so. As Slobin (1987) suggested in his *thinking for speaking* hypothesis, "[when] constructing utterances in discourse, one fits one's thoughts into available linguistic forms." To test whether giving verbal descriptions will heighten the language effects, we are currently running another version of the memory study in which participants are initially asked to describe the pictures.

The two tasks used in Experiment 1 – similarity judgment and word-extension – are somewhat related. In a sense, the word-extension task could be viewed as a highly selective form of similarity judgment. When one variant is judged to have the same label as the standard, it is presumably seen as sharing the commonalities relevant to the inferred word meaning. However, given the abundant evidence that naming patterns differ from general similarity judgments (Gentner & Brem, 1999; Imai, Gentner & Uchida, 1994; Markman, 1989), the fact that the predicted pattern emerges in both tasks is evidence for the role of the language of kinship in the conceptualization of kinship.

A question we raised in Experiment 1 was whether there would be stronger language effects on the Ritual sets than on the Kitchen set; that is, would family relations become especially salient in ceremonial settings? The results are indeterminate at this point. The Indonesian speakers were essentially at ceiling on the seniority choices (i.e., they almost never showed gender-based responses), so this prediction could not be tested. English speakers showed a hint of such a tendency in that they showed their strongest gender-based responding (57.9% gender-based) on the Ritual 1 set (shown in Figure 3). However, their performance on the Ritual 2 set (31.58% gender-based) was not markedly different from their performance on the Kitchen set (36.84% gender-based).

We have interpreted our findings in terms of effects of semantic patterns on habitual encoding patterns. However, another possible explanation for our findings is cultural differences in the salience of status differences in seniority. It is indeed possible that seniority is more salient in Indonesia than in the U.S. On the other hand, it is difficult to argue that gender is less salient in the Indonesian culture than in American culture (if anything, Indonesia employs more traditional gender roles than does the U.S. in everyday life). Although further research should be done to sort out the roles of culture and language, our overall results are

most consistent with effects of semantic patterns on habitual encoding patterns.

In conclusion, our results suggest that linguistic differences in kinship terms (specifically, sibling terms) influence the way people encode and remember scenes and perceive similarities among them. This finding is important because it suggests that language can influence encoding not only in spatial domains but also in the social arena. Further research may reveal that social categories are a rich source of information on the effects of language on habitual thought.

Acknowledgements

This research was supported by NSF-ROLE award 21002/REC-0087516 and the Culture, Language, and Cognition group at Northwestern University. We would like to thank Jeanne Arijanti, SMU PSKD in Jakarta, Kathleen Braun, and Ronnie Rios for their assistance with data collection and other stages of this project. Special thanks to Felicia Anggoro for creating the materials.

References

Boroditsky, L., Ham, W., & Ramscar, M. (2002). What is universal in event perception? Comparing English and Indonesian speakers. *Proceedings of the 24th Annual Meeting of the Cognitive Science Society.*

Boroditsky, L. & Schmidt, L. (2000). Sex, Syntax, and Semantics. *Proceedings of the 22nd Annual Meeting of the Cognitive Science Society*, Philadelphia, PA.

Bowerman, M. (1980). The structure and origin of semantic categories in the language-learning child. In M. L. Foster & S. Brande (Eds.), *Symbol as sense.* New York: Academic Press.

Bowerman, M. & Choi, S. (in press). Space under construction: Language specific spatial categorization in first language acquisition. To appear in D. Gentner & S. Goldin-Meadow, Eds. *Language in mind: Advances in the study of language and thought*. Cambridge, MA: MIT Press.

Choi, S., & Bowerman, M. (1991). Learning to express motion events in English and Korean: The influence of language-specific lexicalization patterns. *Cognition*, 41, 83-121.

Choi, S., McDonough, L., Bowerman, M., and Mandler, J.M (1999). Early sensitivity to language-specific spatial categories in English and Korean. *Cognitive Development, 14*, 241-268.

Danziger, E. (2001). Relatively speaking: Language, thought and kinship in Mopan Maya. *Oxford Studies in Anthropological Linguistics.* Oxford University Press.

Foley, W. (1997). *Anthropological Linguistics: An Introduction.* Blackwell Publishers.

Gentner, D., & Brem, S. (1999, August). Is snow really like a shovel? Distinguishing similarity from thematic relatedness. Paper presented at the Twenty-first Annual Meeting of the Cognitive Science Society, Vancouver, B.C.

Gentner, D., & Goldin-Meadow, S. (Eds.). (in press). *Language in mind: Advances in the study of language and thought*. Cambridge, MA: MIT Press.

Gentner, D., Rattermann, M. J., & Forbus, K. D. (1993). The roles of similarity in transfer: Separating retrievability from inferential soundness. *Cognitive Psychology, 25*, 524-575.

Goldstone, R. L. (1995). Mainstream and avant-garde similarity. *Psychologica Belgica, 35*, 145-165.

Gumperz, J. J., & Levinson, S. C. (Eds.). (1996). *Rethinking linguistic relativity*. Cambridge, NY: Cambridge University Press.

Heider, E. R. (1972). Universals in color naming and memory. *Journal of Experimental Psychology*, *93*, 10-20.

Imai, M., Gentner, D., & Uchida, N. (1994). Children's theories of word meaning: The role of shape similarity in early acquisition. *Cognitive Development, 9*, 45-75.

Levinson, S. C. (1998). Studying spatial conceptualization across cultures: Anthropology and cognitive science. *Ethos, 26*, 7-24.

Li, P., & Gleitman, L. (2002). Turning the tables: Language and spatial reasoning. *Cognition, 83*, 265-294.

Malinowski, B. (1930). Kinship. *Man, 30*, 19-29.

Markman, E. M. (1990). Constraints children place on word meanings. *Cognitive Science, 14,* 57-77.

Munnich, E., Landau, B., & Anne Dosher, B. (2001). *Cognition, 81, 171-207.*

Romney, A. K., & D'Andrade, R. G. (1964). Cognitive aspects of English kinship terms. *American Anthropologist, 66*, 146-270.

Sera, M. D., Elieff, C., Burch, M. C., Forbes, J., & Rodríguez, W. (2002). When language affects cognition and when it does not: An analysis of grammatical gender and classification. *Journal of Experimental Psychology: General, 131*, 377-397.

Slobin, D. I. (1987). Thinking for speaking. *Proceedings of the Berkeley Linguistic Society, 13*, 435-444.

Talmy, L. (1975). Semantics and syntax of motion. In J. Kimball (Ed.), *Syntax and semantics*. New York: Academic Press.