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A cross-linguistic comparison of generic noun phrases in English and Mandarin

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Abstract

Generic noun phrases (e.g. '*bats* live in caves') provide a window onto human concepts. They refer to categories as 'kinds' rather than as sets of individuals. Although kind concepts are often assumed to be universal, generic expression varies considerably across languages. For example, marking of generics is less obligatory and overt in Mandarin than in English. How do universal conceptual biases interact with language-specific differences in how generics are conveyed? In three studies, we examined adults' generics in English and Mandarin Chinese. The data include child-directed speech from caregivers interacting with their 19–23-month-old children. Examples of generics include: 'baby birds eat worms' (English) and da4 lao3shu3 yao3 bu4 yao3 ren2 ('do big rats bite people or not?') (Mandarin). Generic noun phrases were reliably identified in both languages, although they occurred more than twice as frequently in English as in Mandarin. In both languages, generic usage was domain-specific, with generic noun phrases used most frequently to refer to animals. This domain effect was specific to generics, as non-generic noun phrases were used most frequently for artifacts in both languages. In sum, we argue for universal properties of 'kind' concepts that are expressed with linguistically different constructions. However, the frequency of expression may be influenced by the manner in which generics are expressed in the language. © 1998 Elsevier Science B.V. All rights reserved

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1. Introduction

Generic noun phrases (e.g. '*dogs* chew bones', '*a tiger* is a wild animal') provide a window onto human concepts. They refer to a category as an abstract whole (e.g. *dogs* as an entirety), not to any individual or group of individuals (e.g. Fido; the dogs we saw yesterday at the park). Indeed properties predicated of whole categories (such as 'extinct') require generic subjects. We can say that dinosaurs are extinct, but not that any particular dinosaur is extinct. Furthermore, generics refer to qualities that are relatively essential, enduring, and timeless – not accidental, transient, or tied to context (Lyons, 1977). Thus, generics imply that a category is a coherent, stable entity. We can refer to these coherent, stable categories as 'kinds' (cf. Gopnik and Meltzoff, 1997).

Kinds play an important role in human cognition because they are used to organize knowledge and guide inferences. Recent psychological studies demonstrate that thinking about kinds leads people to make rich inferences about the world (e.g. Gelman and Markman, 1986; Shipley, 1993; Gopnik and Meltzoff, 1997). Once one learns that something is a member of a kind (for example, that a chihuahua is a dog), one tends to infer that the entity shares properties with others of the same kind (Gelman and Markman, 1986; Gelman and Markman, 1987).

Although kind concepts are often assumed to be universal, generic expression varies considerably across languages (Krifka et al., 1995). The present studies examine generics in two languages that express them quite differently: English, which conveys generics by means of obligatory morphosyntactic cues, and Mandarin Chinese, which does not. Our question is whether and in what ways these language differences affect how generics are used. In other words, how do universal conceptual biases interact with language-specific differences in how a concept is expressed?

In English, generics can be expressed with definite singulars, bare plurals, or indefinite singulars (cf. Lyons, 1977):

a. *The bird* is a warm-blooded animal.
b. *A cat* has nine lives.
c. *Dinosaurs* are extinct.

They can be contrasted with non-generic expressions such as the following:

d. *The bird* is flying.
e. *A cat* caught two mice.
f. There are *some dinosaurs* in the museum.

As can be seen in the examples above, generics in English are not uniquely identified with a particular form of the noun phrase, but instead are cued by a variety of morphosyntactic, semantic, and pragmatic cues, including the form of the noun phrase and of the verb. Specifically, there are at least four morphosyntactic cues that help a speaker identify an utterance as generic or non-generic: determiners, number (i.e. singular vs. plural), tense, and aspect. We treat *determiners and number* together, since they jointly operate to indicate genericity. In English, a plural NP preceded by the definite determiner (*the*) cannot be generic. For example, 'bears are brown' is generic, but 'the bears are brown' is not. Neither determiners nor number alone indicate whether or not an NP is generic. However, it is the interaction of the two (i.e. definiteness plus plurality) that provides information regarding genericity. *Tense* is also an indication of genericity. With the exception of historic past (e.g. '*woolly mammoths* roamed the earth many years ago'), past-tense utterances are not generic. For example, we distinguish between 'a cow says 'moo' (generic) and 'a cow said 'moo' (non-generic). Likewise, 'the lion is ferocious' can have either a generic or a non-generic reading, whereas 'the lion was ferocious' has only a non-generic reading. Finally, *aspect* is an important cue in English for distinguishing generic from non-generic interpretations. For example, a statement in the simple present, such as 'cats meow', is generic, whereas a statement in present the progressive, such as 'cats are meowing', is non-generic. Thus, in English, some of the cues relevant to whether an NP is generic include articles, plurality, tense, and aspect.

In contrast, Mandarin does not have three of these grammatical distinctions (articles, plurality, or tense). The fourth grammatical distinction (aspect) does not always appear in Mandarin, and is even ungrammatical with some verb types (Li and Bowerman, 1998)[1]. As a consequence, there are sentences in Mandarin that could be translated as either generic or non-generic in English (Krifka, 1995). For example, the following sentence:

g.: xiao3 ya1zi yao2yao2bai3bai3 de zou3 lu4
little duck waddlingly DE walk road

could be translated in any of three different ways:

h. The duck is waddling,
i. The ducks are waddling, or
j. Ducks waddle.

Only the third is generic. This does not mean that Mandarin fails to express generics. There are subtle semantic and pragmatic cues that may help clarify the status of an utterance (Krifka, 1995). For example, the *absence* of specific number, time, or place markers can imply a generic interpretation. Nonetheless, the lack of such morphosyntactic cues as articles, plurality, tense, and (sometimes) aspect, means that the expression of generics is less overt in Mandarin than English.

English generics are also detected in part on the basis of contextual cues, such as the absence of specific time and place markers. Thus, the marking of English generics is not wholly unambiguous, and the difference between English and Mandarin is a difference of degree rather than a qualitative difference. To summarize that difference: in English, there are some constructions for which it is possible to decide

[1]As Li and Bowerman (1998) note, 'Chinese resembles English in that it does not permit the combination of the progressive marker with stative verbs, but it contrasts with English in that it also does not allow the progressive with achievement verbs (e.g. 'da-po' 'hit-break') or with posture verbs (e.g. 'zuo' 'sit' and 'zhan' 'stand')' (Li and Bowerman (1998), p. 11).

on the basis of morphosyntactic cues whether or not a generic interpretation is intended, whereas there are other constructions for which one must rely on pragmatic and contextual uses to determine whether or not a generic interpretation is intended. In contrast, in Mandarin all constructions are of the latter sort.

What are the implications (if any) of these linguistic differences for how generics are interpreted and expressed? It may be that there are no such implications. In other words, one possibility is that semantics are universal, and the form through which meanings are expressed is wholly incidental to language use or interpretation. However, there are both empirical and theoretical justifications for examining a link between generic use and means of generic expression. A variety of recent empirical studies have found that cross-linguistic differences in language form affect semantics: for words referring to motion events (Choi and Bowerman, 1991), spatial prepositions (Bowerman, 1996), object and substance terms (Imai and Gentner, 1997), number-marking patterns (Lucy, 1992a), and adjectives (Waxman et al., 1997).

For example, Bowerman (1996) finds that children express spatial prepositions in language-specific ways from very early in language learning. Whereas children learning English use notions of containment and support to guide their use of spatial prepositions, children learning Korean use notions of tight fit versus loose fit, which cross-cut the dimensions used by English speakers. Bowerman concludes, on the basis of her evidence, that: ‘children’s semantic categories for spatial terms may already be profoundly language-specific even before the age of two’ (p. 146).

With regard to generics, Chierchia (unpublished data) likewise suggests that there can be cross-linguistic variation in semantics. Based on linguistic analyses of different languages, he argues that the syntactic category N (noun) may map onto different semantic types across languages (including English vs. Chinese), and that this finding requires ‘giving up a widely shared idea, viz., that the syntax–semantics map is completely universal’ (Chierchia, unpublished data).

Moreover, Lucy (1992a) argues that when a language signals a semantic distinction more obligatorily (e.g. plural in English vs. Yucatec), then speakers of that language should ‘habitually attend’ (p. 87) more to that semantic distinction. In English, generics themselves are not obligatorily marked; however, both number and determiners are obligatory and, as noted earlier, contribute to presentation of a NP as either generic or non-generic. Thus, speakers of English should habitually attend to the status of an utterance as generic or not. In contrast, in Mandarin there is no obligatory marking of either number or determiners, thus contributing to the presentation of many NPs in a neutral way (neither generic nor non-generic).

For example, in a discussion of noun phrases in ancient Chinese, Dobson (1959); pp. 21–22) says the following:

> An important observation must be made here about nominal usage in LAC [Late Archaic Chinese]. A word used nominally denominates indifferently both species and specimen or specimens of the species. Thus, *jen* in a nominal usage is indifferently ‘homo sapiens,’ ‘man’ as a species, or ‘a man, the man, men’ as a specimen or specimens of the species. It is not merely that number

> (the difference between one, two, or more than two instances of) is not differentiated, but that both class and member are comprised in one term. Certain of these distinctions are imposed in determination, and the noun is then said to be 'committed'; otherwise, it remains neutral in its indications as to these distinctions.

Although Dobson's analysis was of Late Archaic Chinese, the same can be said of modern Chinese as well, when additional markers or phrases (e.g. time adverbs, deictic pronouns, etc.) are not added to specify the meaning.

This analysis of generics contrasts with the case of simple ambiguity. Our claim is *not* that Mandarin speakers always have either a generic or a non-generic interpretation in mind, and simply express both with forms that are similar on the surface (as is the case of homonyms, such as *bank*). Rather, we suggest that consideration of a NP as generic or not can at times be bypassed in Mandarin. This is roughly analogous to the distinction between formal and informal presentations of 'you' in languages such as French. The French language forces speakers to select either a formal or an informal interpretation, with every use of *vous* or *tu*. In contrast, although English certainly has devices for signaling level of formality (e.g. 'sir' or 'ma'am' as second-person address forms), they are not obligatory, morphosyntactic devices. Correspondingly, uses of you (in English) are typically neither formal nor informal, but rather neutral with respect to this dimension.

To summarize, then, we assume that the generic–non-generic distinction is a universal conceptual distinction that is expressed in languages with widely varying morphosyntactic systems. Nonetheless, we hypothesize that, for speakers of English, the use of obligatory markings to express generics heightens the salience of generic concepts, and thus leads them to be expressed more frequently in English than in Mandarin.

1.1. Prior comparative studies of Mandarin and English: a brief review

There is in fact a long-standing claim that linguistic differences between Mandarin and English may lead to conceptual differences. Typically, this claim is expressed in terms of broad differences along a concrete/abstract dimension (Lin, 1935; Granet, 1934; Wright, 1953; Hu, 1963; Bloom, 1981; Hansen, 1983; Bodde, 1991; see Moser (1996) for discussion). For example, Wright (1953) suggests: 'the Chinese [language] was relatively poor in resources for expressing abstractions and general classes or qualities. Such a notion as 'Truth' tended to devolve into 'something that is true'. 'Man' tended to be understood as 'the people' – general but not abstract. 'Hope' was difficult to abstract from a series of expectations directed toward specific objects' (p. 287). Relatedly, others have suggested that there may be cultural differences in how Chinese versus American people reason about categories, with greater accessibility of categories among Americans (Choi et al., 1997). For example, in their literature review, Choi et al. (1997) state, 'Some ethnographers, philosophers, and historians of science have proposed that there are differences in reasoning style between Westerners and East Asians of a very broad nature that include a different emphasis on the role of categories in thought.'

Generics are but one example of this broader set of claims. The literature that specifically focuses on generics in Chinese versus English includes the claim that linguistic differences in expression of generics lead to corresponding conceptual differences in how speakers of Mandarin versus English think about abstract kinds (Bloom, 1981; Moser, 1996). However, as we review briefly below, there are no clear data available that are relevant to the issue.

1.1.1. Bloom

Bloom (1981) states the linguistic relativity hypothesis most starkly: '... the Chinese language does not have any mechanism... with which to signal the generic concept...' (p. 38).

> Perhaps the fact that English has a distinct way of marking the generic concept plays an important role in leading English speakers, by contrast to their Chinese counterparts, to develop schemas specifically designed for creating extracted theoretical entities, such as the theoretical buffalo, and hence for coming to view and use such entities as supplementary elements of their cognitive worlds (p. 36).
>
> Thus, Bloom's suggestion has two parts: (1) that generics have no means of expression in Chinese, and (2) that this linguistic difference leads to corresponding conceptual differences.

Yet Bloom's evidence for this position was insufficient, on his own admission (p. 36). Specifically, to provide preliminary support, he presented a single sentence to 110 Taiwanese subjects: 'dai4shu3 shi4 chi1 luo2bo de dong4wu4'[2] ((The) kangaroo(s) is/are (a) turnip-eating animal(s)). Subjects were asked whether the sentence, 'in addition to referring to an actual kangaroo, to some actual kangaroos or even to all actual kangaroos, might have an additional interpretation, for example, as a conceptual kangaroo' (guan1nian4 shang4 de dai4shu3). A positive response to this question was deemed evidence of a generic interpretation. Thirty-seven percent of the subjects said yes, which Bloom interpreted as a low number, and most of the 'yes' responders already knew English, suggesting that their interpretation could have been influenced by their knowledge of English, rather than a functional knowledge of generics in Mandarin. Bloom inferred from these results that Chinese speakers have difficulty grasping generic concepts, although he cautioned that further research is needed.

This initial study, though intriguing, raises a variety of questions (see also Lucy (1992b) pp. 230–232, for a related critique). First, judgment of the test sentence posed a difficult metalinguistic task. The question itself is ambiguous and open to alternative interpretations (i.e. what is meant by a 'conceptual kangaroo'?), and thus is likely to lead to confusion. In other words, the task may not have been a sensitive index of subjects' generic concepts. Moreover, the experiment included only Man-

[2]To maintain consistency, we present this and all Mandarin examples in Hanyu pinyin form (with tone markings designated by numerals at the end of each syllable), although it should be noted that Bloom (1981) used a different system of transcription.

darin speakers tested in Mandarin, and did not test the same speakers in English, nor did it include a separate group of monolingual English speakers. Because there was no comparison group of English speakers, it is (a) difficult to know whether 37% agreement is relatively high or low, and (b) impossible to draw cross-linguistic conclusions. Thus, we cannot assume that English speakers would perform any differently.

Another limitation is that, in his analysis of English, Bloom focused on the definite singular form of the generic (‘the X’), and did not discuss either the indefinite singular form (‘an X’) or the bare plural construction (‘Xs’). One can form generics in English using any of these three forms (e.g. ‘the kangaroo is a turnip-eating animal’; ‘kangaroos are turnip-eating animals’; ‘a kangaroo is a turnip-eating animal’). We suggest that the notion of ‘a conceptual kangaroo’ is sensible only when one focuses on the definite singular form of the generic (which, incidentally, is the least commonly found form in ordinary speech (Pappas and Gelman, 1998)). When considering plural generics (e.g. ‘kangaroos are turnip-eating animals’), it no longer seems apt to regard the generic noun phrase as referring to a conceptual individual. In other words, plural generics may call to mind the category as a whole (e.g. the category that includes most or all kangaroos), rather than a single abstract entity (e.g. a ‘conceptual’ kangaroo).

Finally, in an anecdotal example provided by Bloom to illustrate lack of generic understanding, one speaker provided evidence that we interpret as potential sensitivity to generic concepts. Specifically, an adult speaker with ‘a very modest command of English’ claimed not to understand the question about a conceptual kangaroo. However, ‘from the generality of the content of the statement and the lack of any kangaroos in the vicinity or previous mention of any, she inferred that the sentence must be referring to plural kangaroos; in fact, to all kangaroos’ (suo3you3 de dai4shu3). We believe that this capacity to differentiate between particular kangaroos in specific contexts and the set of all kangaroos nicely captures the distinction between non-generic and generic interpretations. However, it is not clear how frequently people reached this interpretation, as Bloom did not report (and appears not to have asked) how many of the 110 speakers interpreted the sentence as referring to the set of all kangaroos.

In sum, Bloom’s argument is that generic concepts are less available to speakers of Mandarin. The evidence used to support this hypothesis was a comprehension task, with findings that could be interpreted as showing that speakers of Mandarin reach non-generic readings of utterances that could be considered generic when translated into English. However, support for this hypothesis was weak. Moreover, if generic meanings are less available to speakers of Mandarin, then we should also expect to find that speakers express them less frequently in productive speech. Until now, no evidence was available on this issue from production data.

1.1.2. Moser

Moser (1996) put forth a different set of claims, focusing on both ancient and modern Chinese. In contrast to Bloom, he suggested that generics *can* be produced in Mandarin, but that generic concepts are less accessible to metacognitive awareness. (Another way of phrasing this is to say that overt marking of generics in languages such as English increases their availability to conscious awareness.) He suggested: '... there is evidence for at least count, mass, and generic nouns [sic] distinctions in classical Chinese. But since these distinctions were dealt with as cryptotypes in the language, and because their application was less obligatory, there seems to have been no meta-linguistic awareness of the distinctions on their part' (p. 167). This aspect of Moser's argument, although intriguing, remains untested.

Instead, Moser presented some preliminary evidence that speakers of Mandarin are not *random* in their interpretation of unmarked Ns. When asked to substitute either singular or plural third-person pronouns for nouns that English-speakers would consider generic, Mandarin speakers were often consistent across speakers for a given sentence (although variable across sentences). For example, for the word 'kangaroo' in the sentence 'kangaroo is/are turnip-eating animal', participants selected the third-person singular pronoun (ta1) 66% of the time, whereas for the word 'panda' in the sentence 'panda is/are on the verge of extinction' they selected the third-person plural pronoun (ta1-men) 63% of the time. However, these data are difficult to interpret, without either baseline comparisons of some sort (e.g. from speakers of a language that marks generics overtly), or predictions regarding which interpretations will be reached under various conditions. Most problematic for our purposes, either singular or plural pronouns could be consistent with a generic reading, and either could be consistent with a non-generic reading.

Thus, we are left with some powerful claims in the literature regarding the semantic and/or conceptual implications of how generic expression varies cross-linguistically – but little in the way of compelling or relevant data.

1.2. Present Studies

In the present set of studies, the primary question is whether different formal/linguistic means of expression across languages influence the frequency and use of generics in natural speech. Although we pose this as a general question, it is also of particular interest from a developmental perspective. Children's category knowledge is not just directly perceived or innately pre-wired (Wellman and Gelman, 1997). How, then, do children come to acquire this knowledge of kinds? Perhaps a major influence on the development and expansion of children's knowledge about a category is caregiver *talk* about the category, and that occurs most obviously with generic noun phrases (Gelman et al., 1998). In particular, generics have the potential to enrich children's categories in two ways. (1) They convey specific information concerning properties that members of a kind have in common, thus contributing to an elaborated knowledge base. For example, 'bats fly at night' conveys a specific fact about bats that might never be observed directly by the child, thereby enriching the child's knowledge of a particular property typically shared by bats. (2) Generics imply that members of a category are alike in important ways, even when little or no specific information is conveyed. For example, the statement 'bats are brown' may not tell the child anything new that he or she hasn't already observed, but nonetheless implies that the category (bats) is a kind about which one can make a broad generalization. Indeed, we suspect that even generic questions (e.g. 'are bats brown?'), which themselves provide no information concerning the category in question, may convey to children that the category in question (bats) is richly structured, because they make reference to the category as a kind.

Thus, even if children have a propensity to construct kind concepts on their own (Gopnik and Meltzoff, 1997), generics in caregiver speech may play an important role in helping children to determine which categories are kinds, and in helping children to amass specific knowledge concerning kinds. In English, this may be facilitated by specific grammatical structures. In Mandarin, this acquisition issue is potentially problematic given that there is little explicit formal marking of generic forms in adult speech.

To examine the frequency and use of generics in the natural speech of caregivers, we first ask whether generic NPs can be reliably identified in Mandarin, and if so, how frequently they appear, relative to English. One position, the Conceptual Universals position, suggests that generic usage should be influenced by universal conceptual underpinnings and independent of how generics are expressed in the language. Thus, frequency and distribution of generic concepts should be substantially similar across English and Mandarin. In contrast, a second position, the Linguistic Relativity position, would argue that means of linguistic expression would influence speakers' tendency to produce generics (and perhaps even their tendency to think generically, although this is not assessed in the present paper). On this view, generics should be less frequent in Mandarin versus English.

The second major question we ask concerns how generics map onto semantic domains. Recent psychological work suggests that concepts are organized differently in different domains (e.g. Gelman, 1988; Keil, 1989; Wellman and Gelman, 1997). Specifically, animal concepts (such as 'dog' or 'skunk') appear to be more richly structured than artifact concepts (such as 'chair' or 'hat'). Animal concepts have more shared features, support more inferences about novel properties, and retain identity across striking transformations. Given these conceptual differences between animals and artifacts, we predicted that generics would show the same domain differences. In particular, we expected generics to be favored in the animal domain.

Past linguistic analyses of generics have tended to ignore semantic domain, perhaps because there are no formal restrictions on which domains *can* be used. It is certainly possible to form generics concerning a broad array of concepts (including animals, artifacts, plants, inanimate natural kinds, food, etc.). Therefore, if subjects differentiate among domains in generic usage, this would presumably reflect something about the mapping between semantics and conceptual structure. There is preliminary support for the idea that English-speaking mothers preferentially use generics for the domain of animals (Gelman et al., 1998). The comparison between English and Mandarin is especially useful here, as it tells us indirectly how generics *function* across languages. If we find clear domain differences in the frequency of generics, and if these differences are consistent across the two languages, this would imply that there is a common conceptual basis for generic use in English and Mandarin.

Studies 1 and 2 examine productive use of generics among adult caregivers using child-directed speech. Study 1 uses naturally-occurring speech samples of children interacting with their caregivers in or around the home. Study 2 uses natural speech gathered within a laboratory setting, thus providing more control over context, available props, and length of interaction. Study 3 examines generic comprehension in a sample of adults, and serves as a comparison to Study 2. All three studies provide evidence regarding Bloom's hypothesis that generic concepts are less available to speakers of Mandarin, with a focus on either language comprehension (Study 3) or production (Studies 1 and 2).

2. Study 1

2.1. Method

2.1.1. Subjects

2.1.1.1. Mandarin. Ten children, eight boys and two girls, and their families participated. All resided in Beijing, China. Children ranged in age from 21 to 23 months; mean age 21.7 months; child mean lengths of utterance (MLUs, see Brown (1973)) ranged from 1.12 to 2.82, mean MLU 1.82. Of the ten children, five had parents who were classified as 'intellectuals' (*zhishifenzi*: college-educated or above, professional and semi-professional occupations), and five had parents who were classified as 'workers' (*gongren*: no more than a high-school education, manual or semi-skilled laborers). Children and caregivers were recorded for 1 h at each visit while engaging in normal activities. Because caregiving was shared widely among adults and older children (see Tardif (1993), Tardif (1996) for additional details of this sample and recording procedures), the adult-to-child speech in the Mandarin transcripts was pooled over all the caregivers who spoke during the recording session.

2.1.1.2. English. The English data involve 20 mother–child pairs from a larger sample of 63 mother–child dyads from Wisconsin (Hoff-Ginsberg, 1991). They were divided into two groups: one group (n = 10) matched to the Chinese sample in age (21–23 months; mean age 21.7 months, MLUs ranging from 1.12 to 1.54, mean MLU 1.30); and a second group (n = 10) matched to the Chinese sample in MLU (20–30 months, mean age 24.2 months; MLUs ranging from 1.21 to 2.26, mean MLU 1.63). Within each group, half of the children had parents who were characterized as 'upper middle class' and half had parents who were characterized as 'working class' (see Hoff-Ginsberg, 1991). The sample of chil-dren had originally been selected on the basis of the fact that they were not yet producing auxiliary verbs. The contexts of interaction were specified by the observer and included toy play, mealtime, and dressing contexts for each mother–child dyad.

Table 1
Sample generic and non-generic utterances produced by mothers (Studies 1 and 2)

Generic								
English	Baby birds eat worms							
Mandarin	da4	lao3shu3	yao3	bu4	yao3	ren2		
	big	rat	bite	Neg	bite	person		
	‘Do big rats bite people or not?’							
Non-generic								
English	These little wheels go round and round							
Mandarin	ma1ma	gei3	ni3	da1	-ge4	gao1gao1	de	ji1mu4
	mommy	give	2PS	build	-CL	tall-tall	DE	block
	‘Mommy will build a very tall (stack of) blocks for you’							

2.2. Procedure

Subjects were audiotaped interacting naturally at home. The English-speaking subjects were recorded as part of a larger longitudinal study of early language development (Hoff-Ginsberg, 1991). The English-speaking subjects were observed in three contexts each: eating, toy play, and book-reading. The contexts in which the Mandarin-speaking subjects were observed were less systematically varied, but also included both indoor and outdoor toy play, mealtimes, dressing, social interchanges, and occasional book-reading episodes. Sessions were approximately 45 min in length in English and approximately 60 min in length in Mandarin. Following data collection, audiotapes were transcribed and caregiver speech was coded, as indicated below.

2.2.1. Coding

Coding of the adult-to-child speech involved two separate steps. First, coders identified all generic noun phrases, excluding those stated as pronouns[3]. Second, coders coded each generic noun phrase for domain (animate, artifact, food, other).

2.2.1.1. Generic coding. We coded for generics using a combination of morphological, semantic, and pragmatic cues. In English, in order for a NP to be coded as generic, it had to meet all of the following criteria: appropriate form of the noun (either bare plurals, or singular NPs preceded by an indefinite article), appropriate form of the verb (present non-progressive tense), and the absence of cues specifying a particular individual. Any one of these cues taken individually would be insufficient. For example, ‘those birds like to fly’ uses present non-progressive tense, but would not be coded as generic because the NP does not have the appropriate form. In both English and Mandarin, we also used absence

[3]Pronouns were excluded because Mandarin is a pro-drop language, and we wished to keep coding as comparable as possible across languages.

of information that the utterance referred to a specific time point or a specific instance. Additionally, in Mandarin we coded the utterance as generic if the parent referred to properties that weren't immediately present or apparent in the toys provided (for example, pointing to a picture of a duck and saying: 'what does duck say?' (xiao3 ya1zi zen3me jiao4 – 'how duck(s) say(s)?')). The coders made use of all available context cues, both from the discourse and from their knowledge of the available objects and pictures. Some examples are provided in Table 1.

Two coders, one a native speaker of English and one a native speaker of Mandarin, identified all generic noun phrases produced by mothers in the transcripts. A third coder (native speaker of English and fluent in Mandarin) coded four transcripts (two in English, two in Mandarin) for reliability. Agreement was calculated as the number of utterances on which coders agreed (i.e. both coded as generic, or both coded as non-generic), divided by the total number of maternal utterances. Overall agreement between coders was over 99% in each language.

2.2.1.2. Domain coding. Every generic noun phrase was coded for domain. Domains included: animals (people, animals or animal parts), artifacts, food, and other (including non-object human creations, plants, plant products, inanimate natural entities such as clouds, unknown, and other). Agreement on the transcripts coded for reliability (two per language) was 100% in each language.

2.3. Results

Each mother received a score for each domain, indicating the number of utterances containing a generic NP, divided by the total number of utterances produced by that mother. Five out of ten Mandarin-speaking mothers and 17 out of 20 English-speaking mothers produced at least one generic noun phrase during the audiotaped sessions. These scores were entered into a 3 (group: Mandarin, English – MLU match, English – age match) $\times 4$ (domain: animals (including people), artifacts, food, and other) ANOVA. Results are provided in Table 2. There was a main effect of group, $F(2,27) = 5.76$, $P < 0.01$, indicating that generics overall were less frequent in Mandarin (0.17% of utterances) than in English, controlling for either MLU (0.46% of utterances) or age (0.79% of utterances). As we did not predict differences between the two groups of English-speaking mothers, we conducted a planned

Table 2
Study 1, mean percent of maternal utterances including a generic NP, by language group and domain

Domain	Language group		
	Mandarin	English MLU match	English Age match
Animals	0.09	0.25	0.26
Artifacts	0.05	0.06	0.18
Food	0.00	0.13	0.30
Other	0.03	0.02	0.05

contrast to examine the group effect further. Specifically, we conducted a contrast examining the hypothesis that Mandarin would be lower than each of the groups of English speakers, which would not differ from one another (i.e. Mandarin: –2, English (MLU match): +1, English (age match): +1). On this analysis, the results differed significantly from chance, $F(1,27) = 8.16$, $P < 0.01$.

There was also a main effect of domain, $F(3,81) = 4.33$, $P < 0.01$. Tukey's tests revealed that generics were more frequent for animals (0.20% of utterances) than for the category of 'other' domains (0.04% of utterances), $P < 0.05$. Artifacts and food were in-between (0.10% and 0.15%, respectively), and not significantly different from either animals or 'other'.

The language x domain interaction was non-significant.

2.4. Discussion

Study 1 revealed three main findings. First, generics were reliably identified in Mandarin, despite the lack of a formal means of expressing them, and despite Bloom's (1981) proposal that speakers of Mandarin do not readily form generic concepts. That we found generics even in child-directed speech, language typically devoted to what is 'here and now' rather than abstractions (Phillips, 1973), suggests that this form of expression is salient and pervasive in natural language.

The second major finding was that, despite the presence of generics in both languages, generics were consistently more frequent in English than Mandarin (controlling for amount of talk produced by each speaker). The language difference was upheld when one controls across languages for child's MLU and when one controls across languages for child's age. Moreover, this difference cannot be explained by positing that generic expression is more difficult in Mandarin. In Mandarin, generics are either equivalent in complexity to non-generic forms (e.g. 'dog bark' for both generic and non-generic form), or are simpler due to the lack of specific time and place markers (e.g. 'dog bark' vs. 'yesterday dog bark'). Overall, the comparative finding suggests that cross-linguistic differences in overtness and obligatoriness of generic expression may indeed influence the *frequency* of generic expression. Of course we cannot draw inferences concerning differences in generic thought on the basis of differences in linguistic expression. Nonetheless, this result does imply that children hearing the two different languages are being exposed to substantially different linguistic environments: in English, generic concepts are emphasized to a greater extent than in Mandarin.

Finally, there were consistent domain differences in both English and Mandarin. Specifically, generics were most frequent in the domain of animals. This finding is consistent with recent research with English-speaking mothers (Gelman et al., 1998). One plausible interpretation of the finding is that caregivers' animal concepts are structured differently from their concepts in other domains, specifically, that animal categories are conceptualized as 'deeper' (more similarities in common, and promoting of richer inferences). This conceptual difference is then reflected in adults' propensity to form category-broad, generic statements and questions.

These findings must be viewed as preliminary without certain additional controls, to be included in Study 2. Specifically, there are two primary limitations of Study 1. First, in order to compare English and Mandarin directly, it is crucial to control the conversational context. Frequency of generics may vary with context (e.g. book-reading vs. eating vs. toy play). Thus, because contexts were not strictly controlled across the two languages, language differences in generic use may be due to context rather than language. In Study 2, we keep context controlled across languages, to determine if language differences are upheld. We also vary context within each language, to determine the influence of context on generic use.

The second limitation of Study 1 is that we do not have a baseline measure of how frequently mothers talked about each of the domains. Thus, domain differences in generic use may be due to domain differences in the salience of each domain, rather than being specific to generics. Perhaps there were more opportunities to talk about animals than artifacts, for example, thus resulting in more generics pertaining to animals than to artifacts. In order to address this issue, in Study 2 we examined *non*-generic noun phrases, to examine how often adult caregivers talked about each of the domains. If domain differences in generic use are a by-product of the salience of each domain, then the same domain differences should be found with non-generics as with generics. If, however, the domain differences reflect differences in conceptual structure across domains, then the patterns for generics and non-generics should differ. Although it would have been possible to examine non-generics in Study 1, it was more feasible and revealing to do so in Study 2, which systematically varied domain context.

3. Study 2

3.1. Method

3.1.1. Subjects

Twenty-four English-speaking children (12 first-born or only children, 12 later-born) and their mothers were recruited from the subject pool in a midwestern university town in the United States. Half of the children were male and half were female. Their mean age was 20 months, 20 days (SD = 1 month, 1 day). The mean level of educational attainment for their mothers and fathers was 16.8 years (SD mothers = 1.6, SD fathers = 2.3), or almost 5 years of post-secondary schooling. One additional child was tested in this procedure but the data were not included because of technical problems with the audiotape.

Twenty-four Mandarin-speaking children (all only-borns) were recruited from hospital immunization records and word-of-mouth in the university area of Beijing, China. Half of the children were male and half were female, with a mean age of 20 months, 5 days (SD = 1 month, 5 days), which did not differ from the English-speaking children. The mean level of educational attainment of the Beijing mothers was 15.3 years (SD = 2.3) and of the fathers was 15.4 years (SD = 2.6), or roughly 3.5 years of post-secondary schooling. Although both the Beijing mothers' and fathers' educational levels were significantly lower than the US mothers' and fathers' levels, it is important to note that both groups represent a population that is well above average in education for their respective societies (see Population Census Office of P.R.C., 1993; US Bureau of the Census, 1994). Two additional Beijing children were tested, but because of difficulties in completing the play sessions, were eliminated from the sample.

3.1.2. Materials

Three sets of toys were used: (a) a wordless picturebook that depicted a variety of familiar items, (b) a set of ordinary toys (including blocks, vehicles, and stuffed animals), and (c) a set of mechanical toys (various battery-operated, wind-up, and push-button toys). All items are listed in Appendix A.

3.1.3. Procedure

Subjects were videotaped interacting in each of the three contexts (picturebook, ordinary toys, and mechanical toys), 10 min per context, with contexts in counter-balanced order. Subjects were instructed to play as they normally would at home. They were told that we were interested in studying mother–child interaction and how mothers play together with their toddlers with different types of toys. Subjects also filled out a MacArthur Communicative Development Inventory (Fenson et al., 1994) on their child's vocabulary knowledge.

3.1.4. Coding

Coding involved three separate steps. First, coders identified all target noun phrases. These included common nouns and excluded proper nouns, pronouns, vocatives, and nouns used as non-possessive modifiers in noun + noun constructions (e.g. for 'motorcycle man', 'man' was included but 'motorcycle' was excluded). Next, coders coded each target noun phrase as either generic or non-generic. Finally, coders coded each target noun phrase for domain (animate (including people, animals, and people/animal parts), artifact, other).[4]

The English data were coded by native speakers of English; the Mandarin data were coded by native speakers of Mandarin. A third coder (a native speaker of English and fluent in Mandarin) coded four transcripts for reliability (two English, two Mandarin). Overall agreement between coders in identification of NPs as generic versus non-generic was over 99% in each language.

For domain coding, a second coder in each language coded two complete transcripts (including all three contexts for each), identifying target noun phrases and coding each for domain. Agreement between coders on noun phrase identification was 92%; agreement on domain coding was 98% in each language.

3.1.5. Modified English transcripts

In order to determine how much the morphological cues of English may have provided additional information beyond the contextual cues available in Mandarin,

[4]In contrast to Study 1, very few generic noun phrases referred to food, so in Study 2 the food domain was collapsed into the coding category of 'other'. The greater use of food generics in Study 1 was probably due to the fact that Study 1 included meal contexts whereas Study 2 did not.

we conducted a control coding, using the English transcripts but modifying them to remove all pronouns, articles, and morphological cues regarding number. Thus, for example, the utterance 'you like buttons?' (previously coded as generic) was modified to be 'like button?', and 'what's the lion say?' (previously coded as non-generic) was modified to be 'what lion say?' The reliability coder then went through and identified the generics in these transcripts, using the criteria she had used while coding Mandarin. In this way, we hoped to get a measure of how close the two kinds of coding are, and whether one overestimates or underestimates the proportion of generics. For example, if the procedure we used to identify generics was more conservative in Mandarin than English, this could result in finding more generics in English.

On this crude measure, at least, coders identified *more* generics when the markers were removed than when they were present. Seventy-five percent of generics identified originally in English (with markers present) were still identified when markers were absent, plus an additional set. If we exclude those utterances for which there was agreement across languages, we find that twice as many generics were identified when markers were absent as when markers were present. These results suggest that the coding of Mandarin did not reduce the estimate of the number of generics (and may even have inflated it).

3.2. Results

We conducted two sets of analyses, one examining the generics and the second examining the non-generics.

3.2.1. Generics

For the analysis of generic noun phrases, each mother received a score for each domain and context, indicating the number of generic noun phrases, divided by the total number of utterances produced by that mother in that context. Thus, each subject received nine scores, indicating the number of generic noun phrases per 100 utterances for each of three domains (animals, artifacts, and other), within

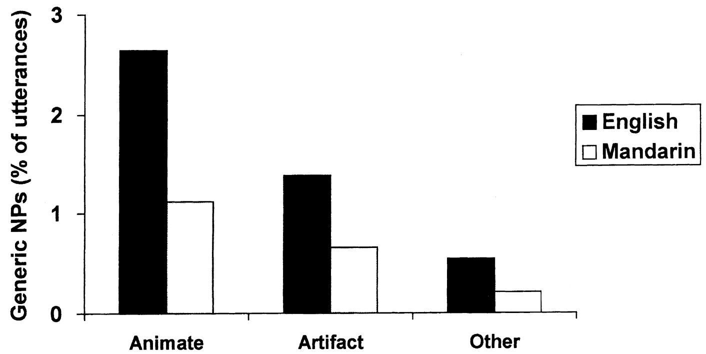

Fig. 1. Mean percentage of utterances containing generic noun phrases, as a function of language and domain.

each of the three play contexts. Twenty-one of 24 Mandarin-speaking mothers and 24 out of 24 English-speaking mothers produced at least one generic noun phrase during the videotaped sessions. These scores were entered into a 2 (language: English, Mandarin) ×3 (context: picturebook, regular toy, mechanical toy) ×3 (domain: animals, artifacts, other) ANOVA. See Fig. 1 for the data.

As predicted, generics were more frequent in English (3.58% of utterances) than in Mandarin (1.40% of utterances), $F(1,46) = 12.99$, $P < 0.001$. Also as predicted, domain exerted a significant effect, $F(2,92) = 26.60$, $P < 0.0001$. Tukey's HSD tests revealed that generics were most frequent for animals, less frequent for artifacts, and least frequent for other domains (1.45%, 0.80%, and 0.24% of utterances, respectively), in all cases $P < 0.01$. Further, there was a language × domain interaction, $F(2,92) = 5.00$, $P < 0.01$. However, the domain effect was significant for each language considered separately, by simple-effects tests: Mandarin ($F(2,92) = 4.28$, $P < 0.02$) and English ($F(2,92) = 27.32$, $P < 0.001$). The language × domain interaction indicated significant language effects for animals and artifacts, $P < 0.01$ by simple effects, but no significant language effect for generics in other domains, $P > 0.40$.

Finally, there was a main effect of context, $F(2,92) = 26.85$, $P < 0.0001$, and a context × domain interaction, $F(4,184) = 6.42$, $P < 0.001$. As we had suspected, generics were more frequent in the book-reading context (4.67% of utterances) than in either the mechanical toy (0.96%) or regular toy (1.83%) contexts, $P < 0.01$, Tukey's HSD. The latter two contexts did not differ significantly from one another. The interaction indicated that domain effects were most pronounced in the book-reading context (see Fig. 1). Nonetheless, simple-effects analyses revealed significant domain effects within each play context (book: $P < 0.001$, mechanical toy: $P < 0.05$, regular toy: $P < 0.001$).

3.2.1.1. Individual differences. We conducted correlations between (a) the number of generics produced by the mother per 100 coded utterances (book-reading context only, since so few generics were provided in the other contexts) and both (b) total number of words the child 'can say and understand', as measured by the MacArthur inventory, and (c) nouns as a proportion of nouns + main verbs on the MacArthur. These correlations were conducted within each language separately, and across the whole sample. None of the correlations were significant (see Table 3). However,

Table 3
Correlations, Study 2

	Mandarin ($n = 22$[a])	English ($n = 22$[a])	Overall ($n = 44$)
Maternal generics (book context) × child's total vocabulary	–0.01	–0.02	–0.26
Maternal generics (book context) × child nouns/(nouns + verbs)	–0.25	+0.31	+0.33

[a]Two subjects in each sample could not be used because of incomplete data on the MacArthur inventory.

there was a non-significant tendency for generic use in mothers to be more frequent in speech to 'nouny' child-speakers of English, but to 'verby' child-speakers of Mandarin.

3.2.2. Non-generics

It is possible that the domain differences in generic use simply reflect how interesting these different topics are. Specifically, there may be more generics about animals and people simply because parents were talking most of the time about animals and people. To examine this possibility, we needed to find out how often parents talked about each of these content areas overall (not just with generics). We did this by examining the use of *non*-generic noun phrases in each domain.

For the analysis of non-generic noun phrases, each mother received a score for each domain and context, indicating the number of non-generic noun phrases, divided by the total number of utterances produced by that mother in that context. Thus, parallel to the scoring of generics, each subject again received nine scores, indicating the number of non-generic noun phrases per 100 utterances for each of three domains (animals, artifacts, and other), within each of the three play contexts. These scores were entered into a 2 (language: English, Mandarin) $\times 3$ (context: picturebook, regular toy, mechanical toy) $\times 3$ (domain: animals, artifacts, other) ANOVA. Results can be found in Fig. 2.

On this analysis, there was no main effect of language, $P > 0.20$. That is, there was no significant difference between English and Mandarin in how often parents produced non-generic noun phrases. The language difference presented earlier was specific to generics.

However, there was a main effect of domain, $F(2,92) = 181.11$, $P < 0.0001$, indicating that most non-generic noun phrases were produced for artifacts ($M = 18.04$ per 100 utterances), then animals ($M = 11.99$ per 100 utterances), and finally for other domains ($M = 5.34$ per 100 utterances), in all cases $P < 0.01$, Tukey's HSD. Note that the distribution of non-generic NPs across domains is clearly different from what we found with generics. Instead of animals being the most frequent, here the artifacts were most frequent. This means that domain differences in generic

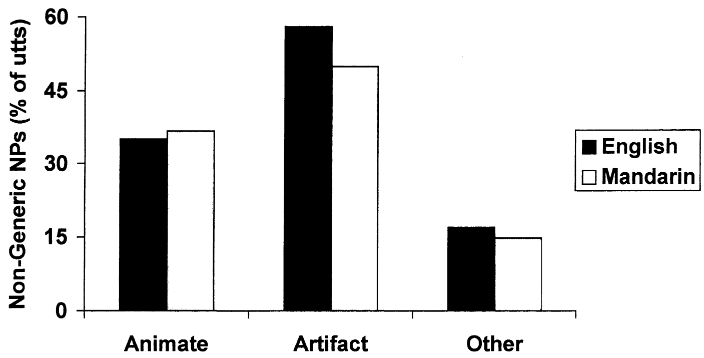

Fig. 2. Mean percentage of utterances containing non-generic noun phrases, as a function of language and domain.

use cannot be attributed to differences in how interesting speakers found each domain.

Finally, there were several significant effects due to context. First, there was a main effect of context, $F(2,92) = 118.39$, $P < 0.0001$. The context effect mirrored that for generics, with more non-generic noun phrases for the book-reading context than for regular toys or mechanical toys, *M*s per 100 utterances = 49.67, 33.03, and 23.40, respectively, in all cases $P < 0.01$, Tukey's HSD. There was also a context $\times$ domain interaction, $F(4,184) = 18.80$, $P < 0.0001$, indicating that the domain pattern for non-generics reported earlier (artifacts > animals > other domains) held up for each of the book and regular toy contexts individually, $P < 0.01$, Tukey's. For the mechanical toy context, artifacts and animals were equally frequent, and greater than other domains, $P < 0.01$, Tukey's.

There was a context $\times$ language interaction, $F(2,92) = 3.90$, $P < 0.05$, indicating that, for the book-reading context only, non-generic noun phrases were more frequent in English than Mandarin (*M*s = 17.92 and 15.19, respectively), $P < 0.01$ by simple-effects tests. However, as indicated by a three-way interaction (context $\times$ language $\times$ domain, $F(4,184) = 3.50$, $P < 0.01$), this domain difference was apparent only among artifacts (28.21 for English, 20.85 for Mandarin), not for animals (17.48 vs. 17.44) or other domains (8.08 vs. 7.29). Although with generics, too, there were more noun phrases for English than Mandarin in the book-reading context, that difference held up across domains, and not just for artifacts.

3.2.2.2. Pronouns. As noted earlier, we did not include pronouns among the target noun phrases, in order to allow for more uniform coding across languages. As Mandarin is a pro-drop language, we reasoned that including pronouns would bias the results toward showing more generics in English. However, it remains a possibility that Mandarin speakers would express generic statements more with pronominals than with full NPs. To test this possibility, we conducted a supplementary analysis of pronoun use, in both English and Mandarin. For each mother, we coded all third-person singular and third-person plural pronouns (English: he, she, it, him, her (non-possessive), they, them; Mandarin: ta1, ta1-men) as either generic or non-generic. Then, each mother received a score indicating the number of generic pronouns per 100 utterances.

On this analysis, English-speaking mothers produced more generic pronouns per utterance than Mandarin-speaking mothers (0.13% and 0.01%, respectively), $t(46) = 2.00$, $P = 0.052$. Thus, although overall frequency of generics was much lower for pronouns than for full NPs, the language difference in generic usage held up for pronouns as with full NPs. This finding is complicated by the fact that pronouns are expressed more frequently in English than in Mandarin (Li and Thompson, 1982). However, even when we control for the amount of pronouns by giving each mother a proportion score (number of generic pronouns divided by number of total pronouns), we find a trend toward greater frequency of generics in English versus Mandarin (means = 0.7% vs. 0.2%, respectively). Altogether, these results rule out the possibility that the language difference found earlier was merely an artifact of limiting our analysis to full NPs.

3.3. Discussion

As in Study 1, generic NPs could be reliably identified in both English and Mandarin (with agreement between coders of well over 90% in each language). This is a simple point, but it is important to emphasize. Although the morphological information is very different in the two languages, there were enough other cues (morphological, syntactic, semantic, and pragmatic) to allow for high agreement in Mandarin as well as English.

A second point is that generics were frequent in child-directed speech. In fact, these rates of production are surprisingly high: nearly every parent (83% of Mandarin speakers and 100% of English speakers) produced at least one generic in half an hour of speech. This is interesting when we consider that the parents were talking to children who were less than 2 years old. Children at this age tend to talk about the 'here and now' (Phillips, 1973). Despite this, parents are using nouns to refer not just to what is right in front of them, but also to abstract kinds. This finding implies that generics are rather fundamental in natural language.

As predicted, context exerted a powerful effect on frequency of generic use. This validates the design of the present study, in which we control for context in examining generic use across language. Here we again obtained a significant language effect, even when controlling for context across languages.

At the same time, there are consistent, statistically significant differences between Mandarin and English. Generics are much more common in English. As with Study 1, this difference cannot be explained by positing that generic expression is difficult in Mandarin, since non-generic expressions are at least as syntactically complex (and at times, more so). We instead argue that generics are more common in English because there exists a set of overt, obligatory constructions for expressing them.

Despite the frequency differences, English and Mandarin looked remarkably similar in how generics were distributed across domains. In both languages, generics were more frequent for animals than for any other domain. In fact, there were more generics for animals than for all the other coding categories combined, in both English and Mandarin.

Non-generics allow us to rule out the possibility that generic effects were simply due to the salience of each domain, or due to a greater number of noun phrases (excluding pronominal and proper name NPs) in English versus Mandarin. The patterns of results differed substantially for generics versus non-generics. Whereas generic noun phrases were overall more common in English than in Mandarin, non-generic noun phrases were equally common in the two languages. Whereas generics were more common for animals than for artifacts, non-generic noun phrases were more common for artifacts than for animals. Whereas for generics, the book-reading task revealed the greatest domain effect, for non-generics, the book-reading and regular toy tasks revealed the greatest domain effects – in the opposite direction (artifacts greater than animals). Finally, although for both generics and non-generics, English speakers provided relatively more noun phrases than Mandarin speakers in the book-reading context, this language difference held up across domains for generics, but only within the artifact domain for non-generics. Thus, none of the important findings with generics involving domain or language were found in the non-generic noun phrases, thereby ruling out artifactual sources of domain or language differences.

4. Study 3

To this point, the data examine *production* of generic noun phrases, but we have no evidence regarding generic *comprehension*. Yet comprehension data are crucial if we wish to make claims regarding the psychological reality of the generic coding in Studies 1 and 2. In other words, comprehension data are needed to help establish that the utterances our coders considered generic are interpreted as generic by ordinary speakers. To some extent we have implicitly addressed this issue by finding that coders can reliably identify generic utterances, and that speakers employ them in non-random ways. Speakers are therefore making systematic distinctions that are marked by identifiable external cues. However, interpretation of the utterances has not been directly addressed, and remains especially a concern for Mandarin, where the morphosyntactic indicators of genericity are less clear. After all, the coders in Studies 1 and 2 were bilingual and trained in linguistics, and perhaps were drawing from their knowledge of English to impose a generic interpretation on certain utterances.

Study 3 provides a check on this issue by assessing how English- and Mandarin-speaking adults interpret a subset of utterances that had been previously coded (in Study 2) as generic or non-generic. If the present coding system reflects stable semantic interpretations, then utterances that our coders have identified as generic should be interpreted as generic by linguistically uninformed speakers of both English and Mandarin.

4.1. Method

4.1.1. Subjects

Participants included 27 Mandarin-speaking adults, living in Beijing, China, who ranged in age from 21–43 years (mean age 28 years), had completed 15–20 years of schooling, and were primarily monolingual. There were also 23 English-speaking adults, undergraduates enrolled in the University of Michigan in Ann Arbor, MI, USA.

4.1.2. Materials

Subjects received a questionnaire asking for their interpretation of 16 sentences, sampled from the actual English-speaking database and presented in the subject's native language (English or Mandarin). We used English sentences rather than Mandarin so as to have available the morphological cues that English-speaking subjects would ordinarily use. The sentences were selected so that there would be one example each of all 16 cells resulting from the perfect crossing of four independent factors: sentence type (generic vs. non-generic), number of noun phrase (singular vs. plural; for English only), syntactic position (subject vs. non-subject), and animacy (animate vs. inanimate).

The same utterances were presented in English to the US participants and in Mandarin to the Chinese participants. To present the sentences in Mandarin, three bilingual English/Mandarin speakers worked together to translate the English sentences into Mandarin. The sentences were then back-translated from Mandarin into English, by a native speaker of Mandarin. There were a few slight modifications based on cultural differences (e.g. ‘horse says neigh’ in English became ‘dog says woof’ in Mandarin). See Appendix B for the full set of sentences.

4.1.3. Procedure

Each subject was given a copy of the questionnaire to fill out individually. He or she was asked to read the sentences and judge each as referring to ‘one individual member of the category, a few members of the category, or most/any members of the category’. Following each sentence were the phrases ‘one’, ‘a few’ and ‘most or any’, and subjects were asked to circle the appropriate word or phrase. Some practice sentences with answers provided were included before the test sentence (e.g. ‘this frog is green’ – one; ‘Jane’s frogs are green’ – a few; ‘any frog is green’ – most/any). All practice sentences had the target noun phrase in the subject position, so as not to bias subjects regarding syntactic position, and none of the practice sentences included the same formal devices as the test sentences (i.e. indefinite singular, definite plural, bare singular, or bare plural).

4.2. Results

Results are shown in Table 4. We interpret ‘one’ and ‘a few’ as non-generic, and ‘most or any’ as generic. As can be seen, speakers of both languages agreed highly

Table 4
Mean number of response choices (out of 4.0), as a function of language and response choice. Predicted responses are shown in bold

Language	Response choice		
	‘One’	‘A few’	‘Most/any’
English			
Generic singular	1.83	0.04**	**2.13***
Generic plural	0.00**	0.17**	**3.83****
Non-generic singular	**3.91****	0.00**	0.09**
Non-generic plural	0.00**	**3.70****	0.30**
Mandarin			
Generic singular	1.15	0.89*	**1.96****
Generic plural	0.52**	0.44**	**2.96****
Non-generic singular	**2.52****	0.30**	1.15
Non-generic plural	1.52	**2.11****	0.37**

*$P < 0.05$.
**$P < 0.01$.

with our coding, typically choosing ‘one’ or ‘a few’ for non-generic sentences, and ‘most or any’ for generic sentences.

We conducted two sets of analyses: one on the ‘most/any’ responses and one including both ‘one’ and ‘a few’ responses. The three sets of responses were not considered together in a single analysis because they are not independent of one another. Both sets of analyses examine effects of language, sentence type, and noun phrase number. Although it would have been interesting to examine effects of animacy and position in sentence (i.e. subject vs. other), we did not have sufficient data to do so (having only a single data point per cell, when all factors were included). Therefore, we omitted animacy and position in sentence from all analyses. Generic versus non-generic sentences were equated with respect to these factors in each language, and it was thus ensured that these factors were not confounded with either language or presumed generic status.

4.2.1. ‘Most/any’

We conducted a 2 (language: English, Mandarin) ×2 (sentence type: generic, non-generic), ×2 (noun phrase number: singular, plural)[5] ANOVA. As predicted, there was a main effect of sentence type, with more ‘most/any’ responses for generic versus non-generic sentences, $F(1,48) = 295.96$, $P < 0.0001$. There was also a main effect of number: ‘most/any’ responses were more frequently used for plural than singular noun phrases, $F(1,48) = 19.63$, $P < 0.0001$. These main effects must be interpreted in light of a sentence type × number interaction, $F(1,48) = 60.54$, $P < 0.0001$. This indicates that the distinction between generics and non-generics was greater for plural noun phrases than singular noun phrases (*M* differences = 3.05 and 1.43, respectively). However, the sentence-type effect was significant for both types of noun phrase considered separately, by simple effects tests, $P < 0.0001$.

In addition to the effects described above, there were two significant interactions involving language. First, there was a language × sentence type interaction, $F(1,48) = 17.12$, $P < 0.0001$. English speakers made more of a distinction between generic and non-generic sentences than did Mandarin speakers. This result is important, suggesting that availability of articles, plural markings, and tense in English but not Mandarin does convey important information regarding generic status. Importantly, however, the sentence type effect was highly significant within each language considered separately, $P < 0.0001$ by simple-effects tests. Thus, in both English and Mandarin, speakers readily distinguished generics from non-generics in their semantic interpretation.

Finally, there was a significant language × number interaction, $F(1,48) = 12.31$, $P < 0.01$, indicating that the number effect described earlier (i.e. more ‘most/any’ responses for plural than for singular NPs) was found only for English. Indeed, subsequent simple effects tests revealed a significant number difference for English, $P < 0.001$, but not Mandarin, $P > 0.6$. The lack of a number effect in Mandarin is

[5]Note that noun phrase number was not marked with articles or noun morphology in Mandarin.

[6]Note, however, that Mandarin can mark number through the use of numeral-classifier compounds (which were not included in these translations).

to be expected, given that Mandarin does not distinguish singular versus plural through overt inflections on the nouns.[6]

An examination of individual items confirms the greater consistency of interpretations in English versus Mandarin. There were ten items (out of 16) on which English speakers showed 90% or more agreement, but only three items on which Mandarin speakers showed 90% or more agreement. We also computed a consistency score for each item, by calculating the absolute difference between the mean ‘any/most’ score for that item and 50% (i.e. higher scores indicate higher consistency). English speakers had higher consistency scores than Mandarin speakers on 14 out of 16 items. On four of the items, deviations between English and Mandarin were quite large (the following numbers are the percentages of ‘most/any’ responses): ‘buttons’ (91% English, 59% Mandarin), ‘bunny rabbits’ (100% English, 70% Mandarin), ‘the tractor’ (9% English, 78% Mandarin), and ‘the frog’ (0% English, 30% Mandarin).

4.2.2. ‘One’/‘ A few’

‘One’ and ‘a few’ are, combined, the inverse of ‘most/any’, as the three kinds of response add up to 100%. Accordingly, analyses of ‘one’/‘a few’ that simply mirror those of ‘most/any’ are not of interest. For example, given that ‘most/any’ responses were more frequent for generics than non-generics, it must be the case that ‘one’/‘a few’ responses are more frequent for non-generics than generics. However, the analyses of ‘most/any’ do not tell us how ‘one’ versus ‘a few’ compare to each other.

Therefore, our interest in examining ‘one’/‘a few’ responses is to examine differences in how the two different non-generic responses pattern. Specifically, we predicted that English speakers would differentially use ‘one’ with non-generic singular noun phrases and ‘a few’ with non-generic plural noun phrases, whereas Mandarin speakers would treat these noun phrases (which are clearly marked as singular vs. plural in English, but are unmarked and therefore ambiguous in Mandarin) alike. We also predicted that the singular/plural distinction would be more relevant for non-generic than generic sentences (Quirk et al. (1972) p. 265).

We conducted a 2 (language: English, Mandarin) $\times 2$ (sentence type: generic, non-generic) $\times 2$ (noun phrase number (in English): singular, plural) $\times 2$ (response type: ‘one’ vs. ‘a few’) ANOVA. In order to focus on how ‘one’ versus ‘a few’ differ from one another (for the reasons stated above), we report only those effects involving response type as a factor. Overall, subjects were more likely to respond with ‘one’ than with ‘a few’, $F(1,48) = 31.89$, $P < 0.0001$. As expected, however, which response subjects used varied by noun phrase number, with ‘one’ used more for noun phrases that were singular in English, and ‘a few’ used more for noun phrases that were plural in English (response type $\times$ noun phrase number (in English) interaction, $F(1,48) = 266.87$, $P < 0.0001$). Furthermore, also as expected, this effect was more pronounced in English than Mandarin (language $\times$ response type $\times$ noun phrase number, $F(1,48) = 74.12$, $P < 0.0001$), and was more pronounced for non-generic sentences than generic sentences (sentence type × response type × noun phrase number, $F(1,48) = 222.74$, $P < 0.0001$).

Finally, there was a three-way interaction involving language, response type, and sentence type ($F(1,48) = 24.12$, $P < 0.0001$), and a four-way interaction involving language, response type, sentence type, and noun phrase number (in English) ($F(1,48) = 28.69$, $P < 0.0001$). This indicated that the patterns for English and Mandarin differed from one another in the following way: for English non-generic sentences, 'one' was used exclusively for singular noun phrases and 'a few' was used exclusively for plural noun phrases. In contrast, for Mandarin non-generic sentences, noun phrases that were marked as plural in English were judged as referring to 'one' versus 'a few' fairly equally. (Mandarin non-generic noun phrases that were marked as singular in English were typically judged as referring to 'one', as in English.) Thus, as expected, speakers of Mandarin were more variable in their use of number – which was not surprising, given the absence of pronouns and plural morphology. Their success in distinguishing singular from plural undoubtedly came from other sources of information (e.g. 'these').

4.3. Discussion

The English speakers agreed with our coding significantly more than the Mandarin speakers, but both groups were above chance. Given that subjects were presented with the sentences out of context, and that contextual cues are presumably especially important for Mandarin speakers (due to the relative scarcity of formal syntactic and morphological markers), it is striking that Mandarin speakers performed as well as they did. It may be that language differences in performance would be reduced if full contextual cues were provided. Moreover, the utterances selected were drawn from the English transcripts and translated into Mandarin. It is possible that Mandarin speakers would be more consistent/accurate than English speakers, had our sentences been drawn from the Mandarin transcripts then coded into English. Thus, we cannot conclude that Mandarin is overall underspecified relative to English in how generics are conveyed, when non-formal cues (including semantic and pragmatic information) are taken into account. Rather, the main point is that accuracy is high in both languages.

Moreover, Mandarin speakers were no less likely to interpret utterances as generic *overall* than English speakers. This finding provides at least preliminary evidence against the notion that speakers of Mandarin find it more difficult than speakers of English to grasp generic readings. However, a more intensive study would be needed to examine the more general question of how Mandarin versus English speakers conceptualize generic categories.

In sum, the main point of Study 3 is that the coding of utterances as generic versus non-generic has psychological reality for ordinary speakers of both English and Mandarin. The coders in Studies 1 and 2 did not arbitrarily impose generic interpretations on certain utterances. Rather, they coded in ways that untrained native speakers tended to agree with. Importantly, ordinary speakers' intuitions could not have been due to other salient factors, including animacy or position in sentence, as generics and non-generics were equated with respect to these factors. Instead, speakers were presumably making use of a combination of morphological, semantic, and pragmatic cues.

5. General discussion

The results of the present three studies suggest an interaction between cognitive universals and language-specific effects. On the one hand, we argue for universal properties of ‘kind’ concepts that are expressed with linguistically different constructions. On the other hand, the frequency of expression may be modified by the manner in which generics are expressed in the language.

5.1. Conceptual Universals

There were three primary similarities across English and Mandarin with respect to production of generic noun phrases: First, generics were relatively frequent in both languages, appearing in most of the mothers in a brief sampling of speech to their young children. In Study 2, for example, 83% of the Mandarin-speaking mothers and all of the English-speaking mothers produced at least one generic noun phrase in half an hour of speech. Second, the contexts in which generics were most frequent were similar across languages, appearing more often in book-reading contexts than toy play contexts. Frequency of generic usage in the book-reading context is particularly striking: in just 10 min of speech, 71% of the Mandarin-speaking mothers and 92% of the English-speaking mothers produced at least one generic noun phrase. There are several possible reasons for the context effects. They may be due at least in part to the fact that book-reading contexts are also more biased toward nouns than toy-play contexts, across both Mandarin and English, as could be seen in the analyses of non-generic noun phrases (see also Tardif, Gelman and Xu, unpublished data). The more nouns a mother produces, the more opportunities she has to produce generic noun phrases. Furthermore, book-reading contexts are likely to be more didactic, and generics may often serve a didactic function, in the sense of introducing an item as a kind and expanding on its properties (see Section 1). It also may be that books promote talk beyond the ‘here-and-now’, in part because they are representations and so readily elicit conversations about entities not directly present. Because generics are abstractions away from current context, they would therefore be more frequent during book reading. In any case, the point to stress here is that the same contextual influences are at work, whether one is analyzing Mandarin or English.

A third cross-linguistic similarity is that in both languages generics were especially frequent for categories of animals and people versus categories of artifacts. This result was found both in naturally occurring speech around the home as well as in a more controlled laboratory setting. This domain difference could reflect either a biological-non-biological distinction or an animate-inanimate distinction. Evidence from non-biological animate categories, such as those based on occupation, moral status, or social standing (e.g. clowns, carpenters, bad guys), is needed to distinguish these two possibilities.

Why were domain differences found? The results cannot be due to domain differences in the amount of talk about each domain, as *non*-generic noun phrases (excluding pronouns or proper nouns) were more frequent for artifacts than animals, again in both Mandarin and English. We suggest instead that these domain differences in generic usage reflect domain differences in category structure. As noted in the introduction, animal categories are more richly structured than artifact categories: they promote more inferences (Gelman, 1988) and retain identity over transformations (Keil, 1989). In spontaneous language, mothers likewise are more apt to discuss animal categories using ‘kind-referring expressions’ (Carlson and Pelletier, 1995). This result suggests that generic NPs may provide a means of enriching children’s category knowledge in domains that are particularly central for adults.

Attributing the differences to ‘category structure’ still leaves open the nature and source of domain differences in category structure. As our subjects were adults, with a wealth of linguistic and conceptual knowledge and experience, there are many possible explanations for the patterns of language usage they displayed. Specifically, we cannot determine whether the animate bias evident in adults reflects (1) something about the world (more highly correlated category structures for animals vs. artifacts), which speakers are sensitive to and express in their speech, (2) something about the human mind (a bias to expect animal kinds to be more richly structured), or (3) a convergence between mind and world, so that animal categories are indeed more richly structured *and* speakers are biased to expect such. It will be important to gather developmental evidence from children to begin to address these issues.

Taken together, the similarities summarized above pose a challenge for theories that suggest that speakers of Mandarin do not form generic concepts (Bloom, 1981), and place boundaries on the claim that categories are chronically less accessible in East Asian cultures (Choi et al., 1997). One major difference between the present work and Bloom’s claims is that we did not require subjects to hold in mind a single entity to represent the entire category (‘the panda’ as an abstraction). However, when generics are conceptualized as referring to ‘most’ or ‘any’ members of the category (‘pandas’ or ‘a panda’), then adult speakers of Mandarin as well as English readily call to mind the category as a whole (Study 3).

Indeed, the similarities across the two languages provide initial evidence in support of the possibility that generic concepts are universal. Some of the most powerful arguments *against* the universality of generics have come from linguistic analyses of Mandarin (cf. Bloom, 1981), and were based on formal linguistic differences between Mandarin and English, including the lack of articles and plural markers in Mandarin. That Mandarin speakers readily produce generics, and that they do so in ways that apparently function much as do those of English speakers (in book-reading contexts and to refer preferentially to animals) suggests striking cross-linguistic similarities. At the same time, English and Mandarin are not identical in generic usage. We turn next to language differences in the results.

5.2. Language-Specific Effects

In both Studies 1 and 2, the major language difference was that generic noun phrases were more frequent in English than Mandarin. This difference cannot be due to the fact that English speakers more commonly use pronouns than Mandarin speakers (although they do; see Tardif et al., 1997), because we excluded pronouns from consideration in the main analyses. The language difference also cannot be due to differences in the relative frequency of nouns in the two languages, as we obtained a language difference for generic noun phrases only. There was no significant language difference in production of non-generic noun phrases. It is also the case that the language difference cannot be due to contextual differences in the two languages. Although contexts were allowed to vary freely in Study 1, the contexts of Study 2 were identical across languages (including set-up of room, props available, and amount of time available to interact with each set of props). Finally, the language difference appears not to be due to more stringent coding criteria in Mandarin: if anything, there is a slight bias for coders to interpret more utterances as generic when English morphology is absent than when it is present. Thus, faced with an identical context, mothers of English- versus Mandarin-speaking toddlers produce generic utterances at different rates.

There are at least two possible accounts of these language differences, both of which may be operating. The explanation we favor is that formal properties of the language prompt speakers to notice and use generics relatively more (as with English) or less (as with Mandarin). Although the generic/non-generic distinction itself is not obligatorily marked in either language, in English it is conveyed by means of obligatory cues (including number and determiners). The use of obligatory markers for conveying generics in English may make generic expressions more salient and so more frequently used. In other words, the morphosyntactic system may have a subtle, almost Whorfian effect on the frequency with which speakers express generic noun phrases, and possibly even on the frequency with which speakers consider abstract kinds. If this is so, then we would predict that frequency effects should also appear in other languages that are structurally similar to Mandarin, in their nominal and verbal systems. Of course the present research takes only an initial step toward examining linguistic relativity, in that we measure frequency of language use rather than non-linguistic cognitive effects. Nonetheless, the semantic issue itself has important implications. Semantic interpretations reflect how readily speakers call to mind generic interpretations when comprehending language, and patterns of use tell us how readily speakers provide generic information for language- and concept-learning children.

It is also possible that the different rates of generic expression are cultural in origin. Cultures may differ in the extent to which they broadly generalize to a category as an abstract whole, as opposed to either noticing individual category members or focusing on relations between category members (Hansen, 1983; Choi et al., 1997). Relatedly, there may be cultural differences in what our two groups of participants feel is appropriate to express with young children. For example, a culture that places greater value on teaching during parent-child interactions, or a culture that has more familiarity with book-reading, may show greater use of generics in child-directed speech, even if there are no corresponding differences in adult-directed speech. Although this issue awaits more systematic research, we believe these possibilities cannot account for the language differences in our data. Informal observation suggests that the Chinese mothers were at least as focused on didactic teaching contexts as were the American mothers.

5.3. Conclusions

Altogether, the pattern of universals and specificity found in the present set of studies is consistent with what other researchers have been finding when examining other properties of language (Greenberg, 1966; Slobin, 1973, 1985; Au, 1983; Croft, 1990; Sera et al., 1991; Gentner and Boroditsky, 1998). Namely, languages throughout the world appear to be guided by conceptual constraints that are relatively invariant over formal differences in linguistic structure. At the same time, there are language-specific variations in the frequency, age of acquisition, and conceptual implications of particular forms. The current findings are important both as a case study of how relativity and universals interact in language use, and for understanding the impact and significance of generics as a particular construction. Finally, although our data were obtained entirely from adults, they raise a host of questions regarding the acquisition of generic noun phrases in children. It will be interesting to examine how children in English versus Mandarin acquire knowledge of kinds, particularly in the domain of animals, when the linguistic support that is offered to children differs by language.

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Appendix A. Coding of Generic Noun Phrases (English)

(1) A generic refers to a category *in general* rather than any specific or particular individual(s) or instance(s). The form is typically either a bare plural (‘zebras have stripes’) or *a/an* plus a singular noun (‘how does a kitty cat go?’). Generally, noun

phrases beginning with the word ‘the’ followed by a plural noun are not generic (‘I can make a hole for the birdies’). Similarly, noun phrases beginning with any of the following modifiers are not generic:

(a) a number (‘2 birdies’)
(b) a pronoun (‘I use all my balloons’), including the words ‘these’, ‘which’, ‘his’, etc., unless the pronoun is the generic ‘your’ (meaning ‘one’s’)
(c) quantifiers such as ‘some’, ‘more’, ‘most’, etc. (‘I want some more balloons’), unless the quantifier is a universal quantifier (‘all’, ‘every’). Utterances with universal quantifiers may be generic but are not necessarily; context must be consulted to determine whether speaker is referring to category as a whole or to some contextually-specified subset.

(2) A generic is not tied to a particular situation/point in time. Thus, it must be non-progressive present tense (e.g. ‘Dogs bark’ is generic; ‘Dogs are barking’ or ‘Dogs barked’ is not). Commands or past tense utterances are not generic, unless they are historic past (e.g. ‘Dinosaurs roamed the earth’). Similarly, future utterances cannot be generic (‘I will eat jelly beans’), unless they are historic future (‘Martians will rule’).

(3) Indefinite noun phrases are not generic. Indefinites, unlike generics, refer to a particular subset and are very similar in form. If the word ‘some’ can be inserted before the noun without changing the meaning of the utterance, then the noun phrase is an indefinite, not a generic. For example, ‘I like cows’ is a generic; however, ‘I’m going to buy cows’ is an indefinite and not a generic.

(4) Predicates of equivalence statements are not counted (e.g. with ‘X is Y’, Y cannot be generic).

(5) Rule of possession: if a predicate is part of or belongs to the subject noun, then the predicate is not considered generic. For example, in the question ‘do butterflies have bones?’ *butterflies* is generic, *bones* is not.

(6) Modal verbs: *can* used as permission cannot be generic; *can* used as possibility or capability may be generic (but not necessarily).

Appendix B. Items used in Study 2

Pictures in Picture Book (listed in order)

Lion; soccer ball; saucepan; butterfly; dinosaur; girl with cat; turtle; boy listening to his wristwatch; boy standing astride; bulldozer; duck; shoes; carrots; bear; telephone, saw, clown hat, and wheelbarrow; violin and bow; mouse; dandelions; comb; boy shoveling in sandbox; car; umbrella; apple with slice removed; kite; robin; hammer; dog; coat; tree; teapot; doll; chair; mushrooms in grass; airplane; gorilla; motorcycle; pencil; cow; sailboat; beetles; frog; hat and mitten; tractor.

Regular toys

Set of multi-colored wooden blocks of different shapes; two small stuffed animals (rabbit and duck); toy car; and toy motorcycle with kickstand and removable rider.

Mechanical toys

Two frogs (one that wound up, walked sideways, and moved in a dancing manner; one that was battery-operated, and bounced and shook when a switch was pulled); two dinosaurs (one that rolled forward when its head was depressed; one that walked forward, raised its head and roared when a switch under its belly was slid across to the 'on' position); two telephones (one resembling a cordless phone with an antenna that could be pulled and buttons that could be pushed; one with wheels and a rotary dial with eyes that moved up and down when pulled along by an attached string); two radio-like toys (one with a toy cassette tape that emitted a squeak when it was pushed in and control buttons on top that made clicking noises when slid from one end to the other; one with a spinning dial and a push-down antenna that resulted in the playing of some music).

Appendix C.

Sentences from Study 3

	Generic	Number	Syntax	Animacy
A horse says neigh. (a dog says woof.)[a] *Gou3 wang4-wang4 jiao4.*[b]	G	1	S	A
A kite goes flying in the sky. *Feng1zheng1 zai4 kong1 zhong1 fei1wu3.*	G	1	S	I
You roar like a lion? *Ni3 xiang4 shi1zi nei4yang4 hou2 ma?*	G	1	N	A
What do you do with a teapot? *Cha2hu2 zuo4 shen2me?*	G	1	N	I
Bunny rabbits don't make noises, do they? *Xiao3bai2tu4 bu4 jiao4huan4, shi4 bu2 shi4?*	G	P	S	A
Hammers are for pounding (nails). *Chui2zi shi4 za2 ding1zi yong4 de.*	G	P	S	I
Bud (Bao3bao) likes dinosaurs. *Bao3Bao xi3huan1 kong3long2.*	G	P	N	A
Do you like buttons? *Ni3 xi3- bu4 xi3huan1 kou4zi?*	G	P	N	I
The frog is not dancing anymore. *Xiao3 qing1wa1 bu4 zai4 tiao4wu3 le.*	N	1		A
The tractor doesn't have a nose. *Tuo1la1ji1 mei2 you3 bi2zi.*	N	1	S	I
Hey silly frog! *Wei4! Sha3 qing1wa1!*	N	1	N	A
Come and sit in your chair. *Guo4-lai2 zuo4 zai4 ni3 de yi3zi shang4.*	N	1	N	I
The little billy goats lived on the side of the valley. *Xiao3 gong1 shan1yang2 zhu4 zai4 shan1 gu3 de yi2-ce4.*	N	P	S	A

Appendix C. continued

Sentences from Study 3	Generic	Number	Syntax	Animacy
These little wheels go round and round. *Zhe4-xie1 xiao3 lun2zi ke3yi3 zhuan4-zhuan4.*	N	P	S	I
Did you see the bugs? *Ni3 kan4-jian4 xiao3 chong2zi ma*?	N	P	N	A
Can you hand me the purple blocks? *Di4-gei3 wo3 zi3se4 de ji1mu4, xing2 bu4 xing2*?	N	P	N	I

[a]Modifications when translating into Mandarin are noted in brackets.
[b]Mandarin translations are provided in italics.

References

Au, T.K., 1983. Chinese and English counterfactuals: the Sapir–Whorf hypothesis revisited. Cognition 15, 155–187.

Bloom, A.H., 1981. The linguistic shaping of thought. Erlbaum, Hillsdale, NJ.

Bodde, D., 1991. Chinese thought, society, and science. University of Hawaii Press, Honolulu.

Bowerman, M., 1996. The origins of children's spatial semantic categories: cognitive versus linguistic determinants. In: Gumperz, J.J., Levinson, S.C. (Eds.), Rethinking Linguistic Relativity, Cambridge University Press, Cambridge, pp. 145–176.

Brown, R., 1973. A First Language. Harvard University Press, Cambridge, MA.

Carlson, G.N., Pelletier, F.J. (Eds.), 1995. The Generic Book. Chicago University Press, Chicago.

Choi, I., Nisbett, R.E., Smith, E.G., 1997. Culture, category salience, and inductive reasoning. Cognition 65, 15–32.

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.

Croft, W., 1990. Typology and universals. Cambridge University Press, New York.

Dobson, W.A.C.H., 1959. Late Archaic Chinese. University of Toronto Press, Toronto.

Fenson, L., Dale, P.S., Reznick, J.S., Bates, E., Thal, D.J., Pethick, S.J., 1994. Variability in early communicative development. Monographs of the Society for Research in Child Development Vol. 59, No. 5, Serial No. 242.

Gelman, S.A., 1988. The development of induction within natural kind and artifact categories. Cognitive Psychology 20, 65–95.

Gelman, S.A., Coley, J.D., Rosengren, K.S., Hartman, E., Pappas, A., 1998. Beyond labeling: the role of maternal input in the acquisition of richly-structured categories. Monographs of the Society for Research in Child Development, in press.

Gelman, S.A., Markman, E.M., 1986. Categories and induction in young children. Cognition 23, 183–209.

Gelman, S.A., Markman, E.M., 1987. Young children's inductions from natural kinds: the role of categories and appearances. Child Development 58, 1532–1541.

Gentner, D., Boroditsky, L., 1998. Individuation, relativity, and early word learning. In: Bowerman, M., Levinson, S. (Eds.), Language Acquisition and Conceptual Development. Cambridge University Press, Cambridge, in press.

Gopnik, A., Meltzoff, A.N., 1997. Words, Thoughts, and Theories. MIT Press, Cambridge, MA.

Granet, M., 1934. La Pensée Chinoise. Éditions Albin Michel, Paris.

Greenberg, J.H., 1966. Language Universals. Mouton, New York.

Hansen, C., 1983. Language and Logic in Ancient China. University of Michigan Press, Ann Arbor.
Hoff-Ginsberg, E., 1991. Mother–child conversation in different social classes and communicative settings. Child Development 62, 782–796.
Hu, S., 1963. The Development of the Logical Method in Ancient China. Paragon Books, New York.
Imai, M., Gentner, D., 1997. A cross-linguistic study of early word meaning: universal ontology and linguistic influence. Cognition 62, 169–200.
Keil, F.C., 1989. Concepts, Kinds, and Cognitive Development. MIT Press, Cambridge, MA.
Krifka, M., 1995. Common nouns: a contrastive analysis of Chinese and English. In: Carlson, G.N., Pelletier, F.J. (Eds.), The Generic Book. Chicago University Press, Chicago, IL, pp. 398–411.
Krifka, M., Pelletier, F.J., Carlson, G.N., ter Meulen, A., Link, G., Chierchia, G., 1995. Genericity: an introduction. In: Carlson, G.N., Pelletier, F.J. (Eds.), The Generic Book. Chicago University Press, Chicago, IL, pp. 1–124.
Li, P., Bowerman, M., 1998. The acquisition of lexical and grammatical aspect in Chinese. First Language, in press.
Li, S., Thompson, C., 1982. The gulf between spoken and written language: a case study in Chinese. In: Tannen, D. (Ed.), Spoken and Written Language: Exploring Orality and Literacy. Advances in Discourse Processes, Vol. 9. Ablex, Norwood, NJ.
Lin, Y., 1935. My Country and My People. John Day, New York.
Lucy, J.A., 1992a. Grammatical Categories and Cognition: a Case Study of the Linguistic Relativity Hypothesis. Cambridge University Press, New York.
Lucy, J.A., 1992b. Language Diversity and Thought: a Reformulation of the Linguistic Relativity Hypothesis. Cambridge University Press, New York.
Lyons, J., 1977. Semantics: I. Cambridge University Press, Cambridge.
Moser, D.J., 1996. Abstract Thinking and Thought in Ancient Chinese and Early Greek. PhD Dissertation, Department of Asian Languages and Cultures, University of Michigan, Ann Arbor, MI.
Pappas, A., Gelman, S.A., 1998. Generic noun phrases in mother–child conversations. Journal of Child Language, in press.
Phillips, J.R., 1973. Syntax and vocabulary of mothers' speech to young children: age and sex comparisons. Child Development 44, 182–185.
Population Census Office, State Council and Department of Population Statistics, 1993. Tabulation on the 1990 population census of the People's Republic of China. State Statistical Bureau of the People's Republic of China, Beijing.
Quirk, R., Greenbaum, S., Leech, G., Svartvik, J., 1972. A Comprehensive Grammar of English. Longman, London, UK.
Sera, M., Rettinger, E., Castillo-Pintado, J., 1991. Developing definitions of objects and events in English and Spanish speakers. Cognitive Development 6, 119–143.
Shipley, E.F., 1993. Categories, hierarchies, and induction. In: Medin, D. (Ed.), The Psychology of Learning and Motivation, Vol. 30. Academic Press, NY, pp. 265–301.
Slobin, D.I., 1973. Cognitive prerequisites for the development of grammar. In: Ferguson, C.A., Slobin, D.I. (Eds.), Studies of Child Language Development. Holt, Rinehart and Winston, New York, pp. 175–208.
Slobin, D.I. (Ed.), 1985. The crosslinguistic study of language acquisition. Erlbaum, Hillsdale, NJ.
Tardif, T., 1993. Adult-to-child speech and language acquisition in Mandarin Chinese. Doctoral dissertation, Yale University.
Tardif, T., 1996. Nouns are not always learned before verbs: evidence from Mandarin speakers' early vocabularies. Developmental Psychology 32, 492–504.
Tardif, T., Shatz, M., Naigles, L.A., 1997. Caregiver speech and children's use of nouns versus verbs: a comparison of English, Italian, and Mandarin. Journal of Child Language 24, 535–565.
US Bureau of the Census, 1994. Statistical abstract of the United States, 114th Edition. U.S. Bureau of the Census, Washington, DC.
Waxman, S.R., Senghas, A., Benveniste, S., 1997. A cross-linguistic examination of the noun-category bias: its existence and specificity in French- and Spanish-speaking preschool-aged children. Cognitive Psychology 32, 183–218.

Wellman, H.M., Gelman, S.A., 1997. Knowledge acquisition in foundational domains. In: Kuhn, D., Siegler, R. (Eds.), Cognition, Perception, and Language. Vol. 2 of the Handbook of Child Psychology (5th edn.). Wiley, New York, pp. 523–573.

Wright, A., 1953. The Chinese language and foreign ideas. In: Wright, A.F. (Ed.), Studies in Chinese thought. University of Chicago Press, Chicago.