

## 17 Revisiting the Noun-Verb Debate: A Cross-Linguistic Comparison of Novel Noun and Verb Learning in English-, Japanese-, and Chinese- Speaking Children

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Q1 To understand the nature of lexical development, it is crucial to investigate how children learn a wide range of word classes, including nouns, verbs, and adjectives, along with closed class words such as prepositions and classifiers. An important question is whether a particular type of concept, over others, universally invites children to name it at early stages of word learning to serve as the entry point into language, that is, whether there is, in Gentner's words, "an initial set of fixed hooks with which children can bootstrap themselves into a position to learn the less transparent aspects of language" (Gentner, 1982). A number of researchers have proposed that basic-level object nouns serve such a function and argue that the basic-level object categories reflect the natural clustering of the world and are hence conceptually privileged (e.g., Gentner, 1982; Gentner & Boroditsky, 2001; Rosch, 1978). On the other hand, some researchers disagree with this view, arguing that the relative dominance of a particular type of words in the early lexicon is determined by distributional and structural properties of children's native language, and hence that the class of words that children learn earliest should differ across different languages (e.g., Choi & Gopnik, 1995; Tardif, 1996).

In this chapter we address this issue, reporting results from a series of cross-linguistic studies that examined how English-, Japanese-, and Chinese-speaking children generalize newly learned nouns and verbs. Based on the results, we evaluate the two competing positions in the noun-verb debate. We then explore

universal and language-specific factors that affect the ease or difficulty of early noun and verb learning.

#### Current Debate Concerning the Universal Advantage in Noun Learning

In her natural partition hypothesis, Gentner (Gentner, 1982; Gentner & Boroditsky, 2001) has proposed that nouns will predominate over verbs in children's initial vocabularies because the meanings of concrete nouns are easier for children to discover than those of verbs and other relational terms, because the concepts which nouns typically denote (e.g., balls, cups, dogs) are individuated from the environment in the world and hence are already prepackaged to be named when children start learning language. In contrast, relational concepts, which are typically denoted by verbs, are not as obviously accessible as basic-level object categories, as verbs are cross-linguistically variable in their semantic structure and their meanings cannot be learned independently of the semantic system of the language. Gentner thus predicted that noun learning is universally easier than verb learning, independent of the structural and distributional properties of the language that children are learning.

Some researchers have challenged this view, however, arguing that verbs can be learned faster and easier than nouns if verbs predominate in the input (Choi & Gopnik, 1995; Tardif, 1996). For example, in some languages, including Chinese, Korean, and Japanese, arguments (both subjects and objects) are often dropped from a sentence. As a result, verbs tend to appear more frequently than nouns in the maternal input (e.g., Choi & Gopnik, 1995; Kim, McGregor, & Thompson, 2000; Ogura, 2001; Tardif, 1996). Based on this observation, some researchers predicted that children who are learning these languages should learn verbs earlier, hence more easily, than nouns (e.g., Choi & Gopnik, 1995; Tardif, 1996).

Mixed results have been reported with respect to whether Chinese-, Korean-, or Japanese-speaking children learn verbs earlier than nouns, however. Some studies reported the predominance of verbs in Mandarin-speaking (Tardif, 1996) and Korean-speaking (Choi, 2000) children's early productive vocabularies. However, other studies reported approximately equal proportions of nouns and verbs (Choi & Gopnik, 1995). Yet some other studies reported that the proportion of nouns was higher than verbs in Korean (Au, Dapretto, & Song, 1994; Kim et al., 2000) and in Japanese (Ogura, 2001; Yamashita, 1997) children.

#### Limitations of Checklist or Production Data as an Index for Relative Noun-Verb Advantage

Why are there such discrepancies in the literature concerning the noun-verb debate? It seems that the discrepancies have in large part arisen from the fact that

the studies reviewed above relied on either maternal reports using checklist inventories or production data. While these methodologies no doubt are very useful and provide us with invaluable data for understanding how children build up their vocabulary, there are some limitations inherent in these methodologies when we rely on them as a sole index for relative ease or difficulty of noun and verb learning.

#### *Relative Use of Nouns and Verbs Differ Across Different Contexts*

In the studies using either checklist or production data, the relative proportion of nouns and verbs in children's early vocabulary is taken to be an index of the relative ease or difficulty of noun learning and verb learning. However, the relative proportion of nouns and verbs may vary depending on the context in which the production data are collected even within a single language (Choi, 2000; Ogura, 2001; Tardif, Gelman, & Xu, 1999). Thus, samples collected in different contexts may yield different results. Given this, it is difficult to draw a definitive conclusion about whether nouns are learned more easily than verbs (or vice versa) in a particular language based on production data alone.

#### *Using a Word Does Not Guarantee the Full Mastery of the Meaning of the Word*

A further limitation in using the proportion of nouns and verbs in children's vocabulary as the index of relative ease of noun versus verb learning is that the fact that a word learner "knows" a word does not necessarily mean that she has acquired the full meaning of the word. In other words, children may use a particular word in a particular situation appropriately, but the total number of situations in which they could use the word appropriately may be much more limited than situations in which the word is used by adults (Bowerman, 1980; Dromi, 1987). For example, a child may use the verb *throw* when she sees someone throwing a ball, but she may not fully understand that when one throws something, one can throw not only balls but any object that can be held with one's hand. She may also not realize that one can throw things in many different ways (e.g., with two hands or one hand, underhand or overhand, etc.), but one cannot throw things using legs (Forbes & Poulin-Dubois, 1997; see also Huttenlocher, Smiley, & Charney, 1983). This problem applies to verbs more severely than nouns because verb meanings are often made up of a combination of abstract semantic features.

Here, we report an interesting anecdote that clearly shows that using a verb in certain context does not mean that the child understand the full, adult-like meaning of it. In Japanese, there are two verbs, *ageru* and *kureru*, corresponding to the English verb *give*. However, the two must be clearly distinguished and cannot be used interchangeably. *Ageru* is used when the giver gives something to someone other than the speaker, while *kureru* is used when the giver gives something to the speaker. Thus, if a mother gives a candy to a child, the child must say, "Okaasan

(Mother) ga (nominal particle) ame (candy) wo (accusative particle) kureta (give me),” but when the mother gives a candy to the child’s sister, the child must say, “Okaasan ga ame wo ageta (give someone other than myself).” Mika, a 4-year-old girl, had been using *ageru* since she was 2-1/2 years old, and the adults around her had assumed that she knew the meaning of this verb. However, at 42 months old, she said “Ojii-chan (grandfather) ga (nominal particle) ame (candy) wo (accusative particle) age-ta (*ageru*-past, “give to other than self”)” when noting that her grandfather gave her a candy, where she should have said “ojii-chan ga kureta,” because the receiver of the candy was herself, the speaker. Her aunt (the first author) asked her to repeat what she had just said to confirm if it was just a slip of the tongue. She used *ageru* again with confidence. This shows that even though she used *ageru* correctly in many situations, her representation of the meaning was not quite adult-like in the sense that it did not include the crucial semantic component of whether or not the recipient of giving is the speaker. Nonetheless, if her mother had been asked to fill out a vocabulary inventory when Mika was only 2 years old, she would have definitely checked off *ageru*, thinking that Mika had already learned the word.

#### Our Approach: Learning New Nouns and New Verbs Introduced During a Dynamic Action Event

Given the limitations in using the relative dominance of nouns and verbs in children’s earliest vocabulary as the index of the relative ease or difficulty of noun and verb learning in young children, we decided to approach the question by asking how easily (and correctly in the adult sense) children learning different languages extend newly learned nouns and verbs to new instances in experimental settings. A merit of this paradigm is that it allows us to assess the general knowledge children possess about the given word class rather than the knowledge of the meanings of specific words, which must vary across different individuals depending on their specific experiences with the words.

The principles governing the extension of nouns and verbs are very different. An object can appear in many different actions. For example, a ball can be rolled, thrown, kicked, and so on. Thus, when a noun is introduced in a scene in which the referent object is used in a particular action, in extending it, children must know that the noun should be extended on the basis of the sameness of the object per se but not on the basis of the sameness of the action with which the object is used. Likewise, an action can be done with many different objects. For example, we can throw a ball, a Frisbee, a stone, a disk, or almost anything we can lift up with our hands. Thus, in extending a verb that has been mapped onto an action involving an object, the object must be separated from the action and be treated as a variable that can be changed.<sup>1</sup>

In this chapter, we report the results of a cross-linguistic study that investigated how young children learning English, Japanese, or Chinese map novel nouns

and verbs onto ongoing action event scenes and how they extend the novel words. Specifically, we asked whether children understand two basic principles for noun extension and verb extension: (a) a noun gets extended on the basis of the sameness of the referred object, and the particular action in which the object is used is not relevant for noun extension; (b) a verb gets extended on the basis of the sameness of the action, and the objects (both the agent and theme object) that appear in a particular action event are variables that can be replaced across different instances of the event referred to by the verb. Before describing the studies, however, we briefly discuss some linguistic properties of the three languages and discuss predicted patterns based on the linguistic comparisons.

#### Distributional and Structural Properties of English, Japanese, and Mandarin Chinese

Comparing children learning English, Japanese, and Chinese is extremely interesting because the three languages are different from one another along the dimensions that have been assumed to affect the relative ease or difficulty of verb learning by children. Argument dropping is allowed in Japanese and Chinese but not in English. This means that in Japanese and Chinese, when the arguments can be inferred from the context, it is possible that a verb is the only word in the sentence. As a consequence of this linguistic property, children learning Japanese or Chinese tend to hear verbs more frequently than children learning English do. As mentioned earlier, because of this distributional property, some researchers predict that children learning Japanese or Chinese will learn verbs earlier (and hence more easily) than nouns (Choi & Gopnik, 1995; Tardif, 1996). However, at the same time, this property may lead to the opposite prediction. It has been proposed that inferring the meaning of a verb is very difficult even for adults without cues from the argument structure (Gillette, Gleitman, Gleitman, & Lederer, 1999), and that children do utilize the structural cues in inferring verb meanings (e.g., Fisher, 1996). Thus, one could make the prediction that verb learning should be more difficult for children who are learning a language that occasionally allows argument dropping. (In fact, in Japanese, argument dropping occurs more than occasionally—it is usually dropped when the speaker believes that the arguments can be inferred from the context.)

The second dimension is the presence of morphological inflection in verbs. On this dimension, Chinese contrasts not only to English but also to Japanese. While verbs are inflected in both English and Japanese, they are not in Chinese. In other words, nouns and verbs are not morphologically distinguished in Chinese (Erbaugh, 1992). Remember that in Chinese and Japanese, verb arguments are often dropped, and the verb alone can constitute a sentence in the language. In the case of Japanese, even when this occurs, verbs can be identified by inflectional morphology. That is, when a verb is produced without the arguments, as in “Mite (Look), *X*-teiru (*X*-ing),” one can tell that the word *X* is a verb. However, in Chinese, when a word is produced on its own (and this can happen in a conversational discourse), it

is difficult to tell whether it is a noun or a verb. In other words, one can identify a novel word as a verb only when it is embedded in an argument structure (see Li, Bates, & MacWhinney, 1993, for a discussion of how Chinese-speaking adults determine grammatical classes of words and their thematic roles in sentence processing). It is of great theoretical interest to see whether the morphological simplicity of Chinese makes verb learning even easier when compared to Japanese (Tardif, 1996).

Given these distributional and structural properties of English, Japanese, and Chinese, comparing children of these three language groups should provide us with invaluable insights onto the question of what linguistic factors might influence early verb learning.

#### How Japanese-, Chinese-, and English-Speaking Children Map Novel Nouns and Verbs Onto Dynamic Action Events: Cross-Linguistic Comparisons

##### *The Task and Procedure*

In this study, 3- and 5-year-old children from three language groups—Japanese, Mandarin Chinese, and English—were tested (Imai, Haryu, & Okada, in press; Mayer et al., 2003; Haryu et al., 2004). The children were all from monolingual families living in Japan (a suburban Tokyo metropolitan area), China (Beijing), and the United States (Philadelphia), respectively.

Six sets of video action events served as stimulus materials. Each set consisted of a standard event and two test events. In each standard event, a young woman was doing a novel repetitive action with a novel object. The two test events were variants of the standard event. In one, the same person was doing the same action with a different object (action-same-object-change, henceforth AS) from the standard event. In the other, the person was doing a different action with the same object (action-change-object-same, henceforth OS; see figure 17.1 for a sample set; also see table 1 in Imai et al., in press, for a complete description of the actions and the objects used in the stimuli).

The standard event was presented on a computer monitor for about 30 seconds. While watching the standard event, a child heard either a novel noun or a novel verb, depending on the condition. The child was then shown the two test videos and was asked to which event the target word should be extended.

##### *Conditions and Instructions*

Our major interest was to examine whether Japanese-, Chinese-, and English-speaking children understand the basic principles governing noun generalization and verb generalization, so in all three language groups, children learned either six novel nouns or six novel verbs. In addition, we wished to see whether dropping of the verb arguments affects children's performance in learning novel verbs. Thus, in

Q2-3

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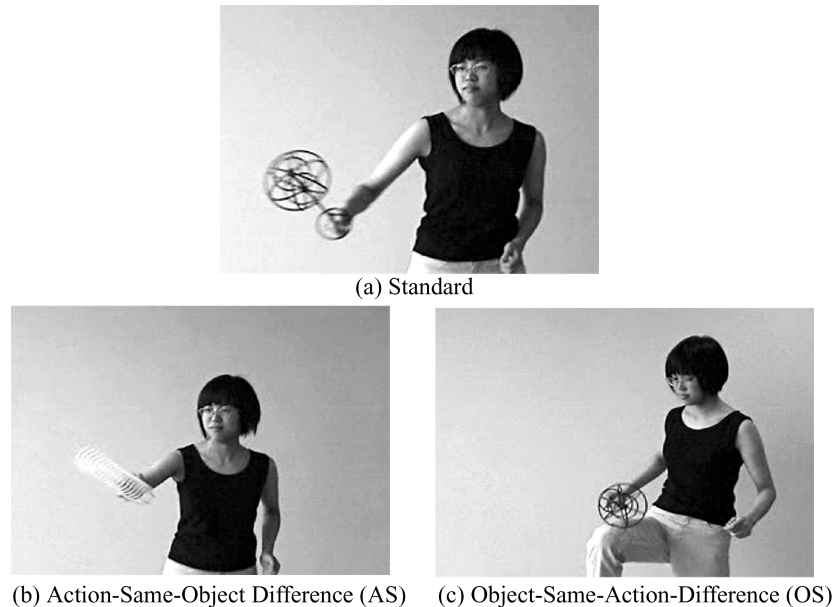


Figure 17.1. Sample stimulus set used in the novel noun/verb learning study.

English and Japanese, we presented the verbs in two different forms: one with full arguments (full argument verb condition) and the other with no arguments (bare verb condition). In providing the arguments, in English, the pronoun *she* served as the subject, and *it* as the object of the sentence (e.g., “Look, she is X-ing it”). In Japanese, the word *oneesan* (girl) is used for the subject, and *nanika* (something) was used in referring to the novel object.

As we noted earlier, in Chinese, when both arguments are dropped, one cannot tell whether the word is a verb or a noun. We thus conducted only the noun and the full argument verb conditions. In the noun and the full argument verb conditions, special care was taken so that there was absolutely no ambiguity over whether the target word was a noun or a verb, respectively. In presenting the verb in the full argument verb condition, an aspect marker *zai*, which marks the imperfective aspect and is usually used in expressing an ongoing action, accompanied the verb along with the subject *ayi* (the girl) and the theme object “yi-(one) ge (generic classifier) dongxi (thing)” (i.e., something).<sup>2</sup> The conditions carried out in each language and the corresponding instructions are given in table 17.1.

#### *Predicted Patterns*

What patterns are predicted? If children understand that a noun refers to an object and that the particular action in which it is used is irrelevant to the meaning

of the noun, we would expect them to select the OS event when asked to extend a novel noun. If they understand that a verb maps to an action, and that the agent and the object of the action event are variables that can be changed across different instances of the event referred by the verb, they would select the AS event in extending a novel verb.

The question of most importance is whether children would perform equally well in learning novel nouns and verbs. If there is any asymmetry between noun learning and verb learning, it is extremely interesting to see whether there are any cross-linguistic differences in the pattern of novel noun and verb learning. If the universal noun advantage view is correct, we may expect that children in all three languages perform better in learning new nouns than new verbs. On the other hand, if the relative ease of noun and verb learning is determined by distributional properties of the input language, we may expect that Japanese- and Chinese-speaking children do better in extending new verbs than English-speaking children. If structural properties of language such as morphological simplicity affect the ease of word learning (Tardif, 1996), we might expect that Chinese children perform even better than Japanese children, as Chinese verbs are morphologically simpler than Japanese verbs.

#### *Children's Performance in Novel Noun Learning*

Children in all three languages in both age groups succeeded in the novel noun extension task. They extended a novel noun to the same object/different action event, and there was no cross-linguistic or developmental difference. Thus, 3-year-olds, regardless of the language they are learning, have a clear understanding that nouns refer to objects and that the actions in which the referent object is used are irrelevant to the noun meaning.

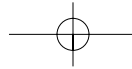
#### *Children's Performance in Novel Verb Learning*

In contrast to the success in the novel noun learning task, in none of the language groups were 3-year-olds able to successfully extended novel verbs (see table 17.2). It is not until they are 5 years old that children reliably can extend a novel verb to an event involving the same action but a different object. In this sense, the results suggest that learning a new verb is more difficult than learning a new noun. With this overall pattern in mind, however, we should also note that the performance of Japanese-, Chinese-, and English-speaking children was not totally uniform. In fact, we found intriguing cross-linguistic differences in the pattern of novel verb learning. Specifically, the condition in which 5-year-olds successfully extended newly learned verbs varied across the three languages, which in turn suggests that children speaking different languages rely on different cues in learning verbs. Below, we describe how children of the three language groups generalized novel verbs in our task, starting with Japanese children.



Table 17.1 Conditions carried out in the three languages and the corresponding instruction.

Language	Condition	Instruction during verb presentation	Instruction for test
English	Noun	"Look! This is an X!"	"Where is the X? Can you point to the X?"
	Bare verb	"Look! X-ing"	"Where is X-ing?"
	Full argument verb	"Look! She is X-ing it"	"Where is she X-ing it?"
Japanese	Noun	"Mite (Look)! X-ga (nominal particle) aru (exist)" (Look! There is (an) X)	"X-ga aru (exist)-no (nominal particle)-wa (topic particle) docchi (which movie)?" (In which (movie) is there (an) X?)
	Bare verb	"Mite (Look)! X-teiru (X-progressive)" (Look, X-ing)	X-teiru-no (genitive particle)-wa (topic particle) docchi (which movie)?" (In which (movie) is (she) X-ing?)
	Full argument verb	"Mite (Look)! Oneesan (girl) ga (nominal particle) nanika (something)-wo (accusative particle) X-teiru (X-progressive)" (Look, she is X-ing something)	"Oneesan (girl) ga (nominal particle) nanika (something)-wo (accusative particle) X-teiru (X-progressive) no (genitive particle)-wa (topic particle) docchi (which movie)?" (In which (movie) is she X-ing something?)
Chinese	Noun	"Ni (you) kan (look)! Nali (there) you (exist) ge (classifier) X" (Look! There is (an) X)	"Na (which) zhang (quantifier) tu (picture) li (within) you (exist) ge (classifier) X?" (In which picture is there (an) X?)



Full argument verb zai only

“Ni (you ) kan (look)! Ayi (girl) zai (progressive) X yi (one) ge (classifier) dongxi (thing) ne (mode marking particle)” (Look, (a) girl is X-ing something)

“Na (which) zhang (classifier) tu (picture) li (within) ayi (aunt) zai (progressive) X yi-(one) ge (classifier) dongxi (thing)?” (In which picture is she X-ing something?)

Full argument verb 3 sentences with different auxiliaries

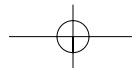
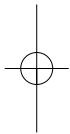
“Ni (you) kan (look)! Ayi (girl) zai (progressive) X yi (one) ge (classifier) dongxi (thing) ne (mode marking particle)” (Look, (a) girl is X-ing something)

“Na (which) zhang (classifier) tu (picture) li (within) ayi (aunt) zai (progressive) X yi-(one) ge (classifier) dongxi (thing)?”

“Ni (you) kan (look)! Ayi (girl) zhengzai (progressive) X yi (one) ge (classifier) dongxi (thing) ne (mode marking particle)” (Look, (a) girl is X-ing something)

“Ayi (aunt) zai (progressive) X yi-(one) ge (classifier) dongxi (thing) de (progressive) tu (picture) shi (is) na (which) yi-(one) ge(classifier)” (In which picture is she X-ing something?)

“Ni (you) kan (look)! Ayi (girl) yizhizai (progressive) X yi (one) ge (classifier) dongxi (thing) ne (mode marking particle)” (Look, (a) girl is always X-ing something)



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Table 17.2 Proportion of action-same-object-change responses in each of the noun, bare verb, full argument verb conditions in Japanese- and English-speaking 3- and 5-year-olds.

Language	Age	Noun	Bare verb	Full argument verb
Japanese	3-year-olds	0.27 <sup>b</sup>	0.64	0.41
	5-year-olds	0.08 <sup>b</sup>	0.85 <sup>a</sup>	0.69
English	3-year-olds	0.14 <sup>b</sup>	0.49	0.42
	5-year-olds	0.09 <sup>b</sup>	0.56	0.70 <sup>a</sup>
Chinese	3-year-olds	0.25 <sup>b</sup>	—	0.06 <sup>b</sup>
	5-year-olds	0.06 <sup>b</sup>	—	0.24 <sup>b</sup>
	7-year-olds	—	—	0.52
	9-year-olds	—	—	0.72 <sup>b</sup>

<sup>a</sup>Significantly above chance,  $p < 0.05$ . <sup>b</sup>Significantly below chance,  $p < 0.05$ . The children selected the object-same choice significant above chance.

*Japanese-Speaking Children*

Five-year-olds, but not 3-year-olds, showed understanding of the principle that verbs get extended on the basis of the sameness of actions, and that the objects that appear in a particular action event are variables that can be replaced across different instances. While the 5-year-olds extended a novel verb to the action-same-object-change test at reliably above chance level, the 3-year-olds showed only chance-level performance (Imai et al., in press). To our surprise, Japanese children performed better when the verb was presented without the arguments than when it was presented with an explicit mention of the arguments (Haryu et al., 2004).

A series of follow-up studies were conducted to specify the nature of the Japanese 3-year-olds' chance level performance in novel verb generalization (Imai et al., in press, Study 2). Chance-level performance in a forced-choice task must be interpreted with special caution because there are multiple possibilities to account for this phenomenon. One possibility is that some children may have mapped the verb to the object rather than the action ignoring the verb morphology (i.e., *-teiru*). A second possibility is that they might have thought that a novel verb could refer not only to the action but also to the object used in the action. If the 3-year-olds in this study had indeed made this assumption, they should have found both test events plausible. A third possibility, in contrast to the second, is that 3-year-olds may have thought that the verb referred to the action only with that particular object. In other words, the 3-year-olds were labeling the action-object interaction. If this was the case, they should have found neither test event plausible. Finally, the task may have involved a greater information-processing load than 3-year-olds could handle. To make a choice in this paradigm, children had to mentally process three ongoing action events simultaneously, holding the standard event in their working memory while watching the two test events.

Given that all three stimuli were ongoing video events, this may have overloaded the 3-year-olds' information processing capacity.

To circumvent the processing load problem, we replicated the original study using a yes-no paradigm. That is, instead of selecting one of the two scenes, children saw one test event at a time while watching the standard next to it. Thus, the demand of information processing should have been greatly decreased in this task. To examine the three possibilities introduced above, we included a scene of the object lying still on a table (still object, henceforth SO) in addition to the AS and OS events in the test. If the 3-year-olds thought that the new verb would refer to the object, they would extend the word to the SO scene but not to the action with a different object (AS). If they thought that a novel verb could refer to either an action or an object involved in the action, they should accept all of the test items, including the SO test. On the other hand, if they thought that a novel verb refers to an action with a particular object, they should reject any of the test stimuli as a referent of the verb in this study.

It turned out that the Japanese 3-year-olds clearly rejected the still object, which means that they did not think that a verb could refer to an object. The rate of "yes" responses was not different across the AS test and OS test, both of which fell at the chance level. These results suggest that Japanese 3-year-olds assume that verbs refer to the action-object interaction. In their verb meaning representation, the core meaning (i.e., the action) is not separated from the theme object, and as a result, their generalization of novel verbs is overly conservative: they do not extend a novel verb to the same action if the object involved in the action is replaced with a different object.

Given these results, in another follow-up study we examined whether Japanese 3-year-olds would extend a verb to the same action when the agent was changed but the same object was retained. This question is worth examining, since Maguire et al. (2002) recently reported that the 18-month-olds did not extend the verb to the exact same action done by a new person even after hearing the verb with the identical action acted by four different people. We thus tested whether 3-year-olds would extend a verb to a scene in which a different actor was doing the same action as the original event with the same object, again using the yes-no procedure (Imai et al., in press, Study 3). In this case, the children had no problem extending the verbs to the same action.

In summary, the pattern of the results from Japanese children suggest that 3-year-olds do tolerate a change in the actor but are unwilling to extend a newly learned verb to a new instance when the theme object is changed. This indicates that they do not fully understand the basic principle for verb extension, that verbs are extended on the basis of the action independent of the object. Five-year-olds did seem to understand this principle well and were able to apply it immediately in a novel verb learning situation. Interestingly, however, they were able to do so when the arguments of the verb were omitted but not when they were explicitly mentioned. (We will discuss the possible reason later in the chapter.)

Q7

*English-Speaking Children*

Q8 In spite of the linguistic differences between English and Japanese, English-speaking children's performance in the novel verb extension task was overall very similar to that of Japanese children: 3-year-olds showed chance-level performance, while 5-year-olds were able to extend a novel verb to the AS test (Mayer et al., 2003).

There was one important difference between Japanese-speaking and English-speaking groups, however. Unlike Japanese children, who performed above chance in the bare verb condition but not in the full argument verb condition, English-speaking 5-year-olds were able to extend the verb to the AS test reliably above chance only when the verb arguments were specified ("Look, she is X-ing it"). They selected the AS tests only 55.6% of the time when the verb arguments were omitted. This difference suggests that the structural characteristics of children's native language might influence the structural form in which children expect to hear a verb.

*Chinese-Speaking Children and Adults*

Q9 The results from Chinese-speaking children were utterly surprising. Unlike Japanese- and English-speaking children, both 3- and 5-year-olds selected the OS test at highly above chance level in the full argument verb condition. This means that they mapped the novel verb to the object instead of the action. As shown in table 17.2, the Chinese-speaking 3- and 5-year-olds consistently selected the OS test regardless of whether the word was presented as a noun or a verb.

Given these surprising results from Chinese-speaking children, we tested monolingual Mandarin-speaking adults living in Beijing, China, to see how they performed in the task. The Chinese-speaking adults who were assigned to the verb (with full arguments) condition selected the AS test 100% of the time. These results suggest (1) that it was perfectly clear to Chinese-speaking adults that the target novel word presented in the full argument verb condition was indeed a verb and (2) that there was a large developmental shift from an object-naming bias to an action-naming bias in Chinese speakers.

To identify the age at which this shift takes place, we further tested 7- and 9-year-old Mandarin Chinese-speaking children in the full argument verb condition and bare verb condition. In the full argument verb case, the 7-year-olds selected the AS test at chance (52.2%). At 9 years of age, Chinese-speaking children finally extended a novel verb to the AS test significantly above chance level (72%).

*Did Extralinguistic Cues Help?*

Given the surprising results from the Chinese speakers, we conducted a few different versions of the full argument verb condition, trying to find a condition under which Chinese children (at least 5-year-olds) could reliably extend the verb to the action even when the object is changed.

Table 17.3 Proportion of the AS response in Chinese-speaking children in the noun, bare verb, and full argument verb conditions tested with the original stimulus set and the revised stimulus set in which the object-holding segment was removed.

Stimuli	Age	Noun	Full Argument Verb	Full Argument Verb	Full Argument Verb
			2-syllable word, <i>zai</i> only	1 syllable word, <i>zai</i> only	1-syllable word, 3-sentence frames
Original	3-year-olds	0.25 <sup>b</sup>	0.06 <sup>b</sup>	0.25 <sup>b</sup>	0.34
	5-year-olds	0.06 <sup>b</sup>	0.24 <sup>b</sup>	0.34	0.39
	7-year-olds	—	0.52	—	—
	9-year-olds	—	0.72 <sup>a</sup>	—	—
Object-holding part removed	3-year-olds	0.32 <sup>b</sup>	—	—	0.41
	5-year-olds	0.27 <sup>b</sup>	—	—	0.88 <sup>a</sup>

<sup>a</sup>Significantly above chance,  $p < 0.05$ . <sup>b</sup>Significantly below chance  $p < 0.05$ . The children selected the object-same choice significant above chance.

First, the number of syllables in the word was changed. In the original study, we prepared novel words (both nouns and verbs) with two syllables. This was because two-syllable words were most common for both nouns and verbs. However, verbs referring to simple actions, such as *jump*, *kick*, and *run*, tend to be monosyllabic words. Thus, we constructed monosyllabic nonsense words and replicated the full argument verb condition with them. Although this manipulation lifted the AS response a little, no statistically reliable difference was obtained.

We then provided additional linguistic cues to indicate that the novel word was a verb. In the original instruction in the full argument verb condition, the experimenter said “Ayi (girl) zai (progressive) X (novel word) yi (one) ge (classifier) dongxi (thing) ne (mode marking particle)” (She is X-ing something). In this instruction, the novel word X could be unambiguously identified as a verb by the structure of the sentence, in particular, by the word order and the presence of the aspect marker *zai*. However, *zai* is also used as a verb, meaning roughly “to exist” or “to be present (at a place).” In this case, the word that comes after *zai* is usually a noun. Young children thus could have been confused because of this homonymous use of *zai* and mistakenly assumed that the word was a noun. We thus presented the verb in three different sentences using three different auxiliaries, namely, *zai*, *zhengzai*, and *yizhizai*, all of which mark the progressive aspect, to provide even clearer and stronger clues that the novel word was a verb. However, again, this manipulation did not bring a statistically reliable increase in the Chinese-speaking children’s performance.

#### *Chinese-Speaking Children Are Sensitive to Subtle Extralinguistic Cues*

So far, the results suggested that Chinese children as old as 5 years of age could not extend newly learned verbs to the same action in the face of a change in the object even when a novel word was presented in such a way as to make it clear that it was a verb. It is possible that the lack of morphological distinction between nouns and verbs makes it difficult for Chinese children to extract the extension principle for verbs, in contrast to the general assumption in the literature that Chinese is a verb-friendly language. At the same time, there must be conditions under which Chinese preschoolers, especially 5-year-olds, can extend to novel verbs to the action in the face of a change in the object. What cue do they need in addition to linguistic cues? We suspected that that the difficulty in identifying a word’s grammatical form class solely from structural cues such as morphological marking or word order leads Chinese children to rely heavily on extralinguistic cues.

Upon reflection, in this light, there is one property of our stimuli that may have given Chinese children a subtle cue that the object is the one that should be attended to in the event. We created the standard video clips in such a way that the actor holds the object for a moment (for about half a second) before starting the action. We did so to make sure that children see the object clearly; the details of the object may not be clearly observable when it is in motion. Of course, the

novel word was presented after the action started whether it was presented as a noun or a verb. It should be stressed that the object was not unnaturally highlighted in the original stimuli, and it did not affect Japanese- or English-speaking children. However, if Chinese children were very sensitive to extralinguistic, situational cues, this first segment of the video might have lead Chinese children to think that the object was in a way “topicalized.”

To test this possibility, we removed the segment of the video clip in which the actor was holding the object. In the new video, thus, the object is already in motion at the very start of the event presentation. We replicated the full argument verb condition with Chinese-speaking 3- and 5-year-olds with this version of the stimuli. We again presented the monosyllabic nonsense words in three sentences with three different aspect marking auxiliaries to highlight that the word was a verb to give the children as much linguistic support as possible.

Consistent with our expectation, this manipulation—removing the half-second segment of the video clip in which the object was held still—indeed brought a drastic change in Chinese-speaking children’s performance in the verb learning task and their performance was now equivalent to the level of performance by Japanese- or English-speaking children. The Chinese-speaking 3-year-olds were now at the chance level, just like Japanese- and English-speaking 3-year-olds, and the Chinese-speaking 5-year-olds now selected the AS test above chance level, just like their Japanese- and English-speaking counterparts. We then conducted the noun condition with Chinese-speaking 3- and 5-year-olds using this revised stimuli to see whether they could still select the OS test and confirmed that they had no problem in doing so. Thus, it was not the case that Chinese-speaking children mapped the novel word simply to the most salient component of the event, whether it was a noun or a verb. They were able to extend a novel verb to the same action only when the action was maximally salient, but even under this condition, they had no problem in mapping a novel noun to the object. Taken together, this shows that Chinese-speaking 5-year-olds can extend novel verbs to the same action with a different object, but they need support from contextual or perceptual cues in order to do so. When contextual cues are in conflict with linguistic cues, it appears that Chinese-speaking preschoolers rely more heavily on extralinguistic cues than linguistic cues, unlike Japanese- or English-speaking children. It may be that the lack of obvious morphological distinction between nouns and verbs leads Chinese-speaking children to be more attentive to extralinguistic cues than Japanese or English-speaking children are.

#### Implications for Theories of Lexical Development and Verb Learning

In this chapter, we have approached the question of whether learning of nouns (object names) is universally privileged over learning of verbs by asking how well



children from three different language groups—Japanese, Chinese, and English—learn novel nouns and verbs introduced during ongoing action events. Two findings from the cross-linguistic studies were particularly important for the question: (1) children in all three language groups succeeded in extending a novel noun to the same object appearing in a different action at 3 years of age but did not succeed in generalizing a novel verb to the same action involving a different object until 5 years of age or later; (2) 5-year-olds succeeded in the verb learning task, but the condition under which they showed the best performance differed across languages. We now discuss the implications we might draw from our results for theories of verb learning as well as theories of lexical development in general.

*Comparison of Novel Noun Learning and Novel Verb Learning  
in Experimental Settings*

In the studies reported in this chapter, 3-year-olds learning three different languages could extend a newly introduced noun to the same object used in a different action, while in no language group could 3-year-olds extend a newly introduced verb to the same action carried out with a different object. A very similar pattern of results was reported by Kersten and Smith (2002) with English-speaking children. As reviewed earlier, in their study, English-speaking 3-year-olds were unwilling to extend a novel verb to the same motion when the agent object was changed. Yet, parallel to the results from our own studies, the 3-year-olds in their study were willing to apply the same noun to the same object even though it appeared in a different motion.

Our cross-linguistic novel noun/verb learning study and Kersten and Smith's (2002) study with English-speaking children both showed that young children learn novel nouns more easily than novel verbs when the ease or difficulty was measured by how well and how willingly young children extend newly learned words to new instances (see also Golinkoff, Jacquet, Hirsh-Pasek, & Nandakumar, 1996). The advantage of novel noun learning over novel verb learning is also observed when we compare the ease with which young children form object-label associations and action-label associations. Werker, Cohen, Lloyd, Casasola, and Stager (1998) demonstrated that 14-month-old infants were able to form associations between novel labels and novel objects. Using the same experimental paradigm as in Werker et al. (1998), Casasola and Cohen (2000) tested whether 14- and 18-month-old infants were able to form associations with novel labels and novel actions and found that it was not until 18 months that infants could associate a novel action with a novel label.

With slightly older children, Childers and Tomasello (2002) also showed that children learn the noun-object link easier than the verb-action link. In one condition, they showed 2-1/2-year-old English-speaking children three different novel objects and taught them their noun labels. In another condition, they showed the children three novel actions performed with three novel objects and taught them three novel verbs corresponding to the three actions. In the third condition, they

simply taught three novel actions with three novel objects. The 2-year-olds remembered both objects and actions very well, yet their memory of the object-noun link was twice as good as their memory of the action-verb link.

The contrast between novel noun learning and novel verb learning in young children becomes even more prominent when we compare the conservatism children repeatedly show in extending novel verbs to the liberal, yet principled, fashion in which same-age or even younger children generalize newly learned nouns (e.g., Golinkoff, Hirsh-Pasek, Bailey, & Wenger, 1992; Haryu & Imai, 2002; Imai & Gentner, 1997; Imai, Gentner, & Uchida, 1994; Imai & Haryu, 2001; Landau, Smith, & Jones, 1988; Markman, 1989). In particular, in different studies we have demonstrated that Japanese-speaking 2-year-old children are able to flexibly map a novel noun not only to a basic-level object category but also to a subordinate category, a substance, or to a unique individual, depending on the perceptual or conceptual nature of the named entity and its familiarity. This flexible pattern of noun extension should be noted all the more because ontologically distinct subclasses of nouns—nouns denoting object kinds, nouns denoting substance kinds, and nouns denoting unique individuals—are not grammatically distinguished in Japanese (Haryu & Imai, 2002; Imai & Gentner, 1997; Imai & Haryu, 2001; see also Imai & Haryu, 2004).<sup>3</sup>

In summary, previous research has shown that children map a novel noun to its referent more easily than they map a novel verb to its referent (Cassasola & Cohen, 2000; Childers & Tomasello, 2002; Werker et al., 1998). Furthermore, it appears that young children find it easier to extend novel nouns than to extend novel verbs, as they extend a newly learned noun to instances other than the originally named object in principled ways, while they are reluctant to extend a newly learned verb to other instances with only a change in the object involved in the action (Imai et al., in press; Kersten & Smith, 2002; Maguire et al., 2002). Thus, the pattern of results from novel noun and verb learning seems to converge on the conclusion that novel noun learning is easier than novel verb learning.

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#### *Influence of Language-Specific Properties on Verb Learning*

So far, we have argued for the universal advantage of noun learning over verb learning. Furthermore, there was a striking cross-linguistic similarity in the developmental pattern in novel verb learning. The 3-year-olds in any of the three language groups were not successfully able to extend a novel verb to the same action when the patient object was changed, but in all three languages in the optimal condition, 5-year-olds succeeded in extending novel verbs. At the same time, however, the condition in which 5-year-olds succeeded as well as the ease with which children learn novel verbs appears to be different across the three languages.

Following the common assumption in the literature that learning an argument-dropping language gives an advantage to verb learning (Choi & Gopnik, 1995; Tardif, 1996), we had expected that Chinese- and Japanese-speaking children might perform

better than English-speaking children in the novel verb learning task. Furthermore, we had suspected that Chinese-speaking children might show even higher performance than Japanese-speaking children because of the morphological simplicity of Chinese verbs (Tardiff, 1996). Contrary to these predictions, Chinese-speaking children did not perform any better than Japanese- or English-speaking children. In fact, in conditions in which the action was not made particularly salient over the object, Chinese-speaking children showed greater difficulty in learning novel verbs than English- or Japanese-speaking children. Chinese-speaking children were extremely sensitive to contextual cues when learning novel verbs for action events, and unless the action was made very salient, Chinese-speaking 5-year-olds were not able to map a novel verb to the action. It should be noted that Chinese-speaking children did not determine the novel word form class solely based on contextual (or perceptual) saliency of the event, as they were able to map novel nouns to the objects under the action-salient situation. Given this, it seems reasonable to conclude that nouns are easier to learn than verbs for Chinese-speaking children, just as for Japanese- or English-speaking children. Furthermore, verb learning may be even more difficult for Chinese-speaking children than Japanese- or English-speaking children in conditions in which children must infer the meaning of a verb under circumstances in which strong contextual cues are not provided.

At present, we can only speculate on the reason Chinese-speaking children were so sensitive to contextual cues, even to the extent that linguistic cues that are apparent to Chinese-speaking adults were bluntly overridden. As discussed earlier, one important linguistic property that sets Chinese against Japanese and English is the lack of morphological distinction between nouns and verbs. Thus, unlike the case with Japanese or English, Chinese speakers cannot determine the grammatical form class of a word by morphological markings. Furthermore, even though word order provides a cue for determining the form class of each word in the sentence, it is only probabilistic: Although the basic word order is SVO, there other word orders: OSV, SOV, and VOS are also found in the spoken language (Li et al., 1993). Thus, to identify the grammatical class of each word in the sentence and assign its thematic roles to it, Chinese speakers have to coordinate semantic, syntactic, semi-morphological grammatical cues such as aspect markers, object markers, and passive markers in "a complex system of mutual constraints" (Li et al., 1993, p. 193). This linguistic property may lead Chinese-speaking children to rely more on extralinguistic, contextual cues than on linguistic cues in novel word learning.

It is also noteworthy that the condition in which children performed best in our novel verb extension task was different for English- and Japanese-speaking children. The action events used in our research involve only three elements, an actor, an action, and an object. Thus, even when children heard a verb without the explicit mention of the subject and the object of the sentence, it should have been easy to infer what the dropped arguments would have been. In Japanese, it is natural to drop the arguments when the speaker thinks that the hearer can infer them from the observational or pragmatic cues. From the Japanese point of view,

it was obvious that the subject was the actor and the theme object was the novel object, and hence it was more natural that the arguments be dropped in this case. Japanese children in fact could have been distracted by hearing this unnecessary information. In sharp contrast, English-speaking 5-year-olds extended the verb to the AS test only when the verb was accompanied by the pronouns *she* and *it*. It appears that the English-speaking children would not extend a novel verb when the verb was presented in an unusual structural form, even though the arguments of the verb could have been easily inferred from observation of the event.

Taken together, universally shared cognitive factors and language-specific linguistic factors both matter for early word learning, but it appears that the former is more prominent than the latter, given the striking similarity in the developmental pattern in the novel noun/verb learning task across the three languages of very different linguistic properties.

#### *Progressive Development of Verb Meanings*

The results of our cross-linguistic novel noun/verb learning study support the view that object naming is advantaged over verb learning, as discussed above. At the same time, it needs to be explained why children as old as 3 years had so much difficulty in our verb extension task even though they comprehend and produce many verbs (e.g., Choi & Bowerman, 1991; Golinkoff, Hirsh-Pasek, & Schweisguth, 2001; Gopnik & Choi, 1995; Tardif, 1996). We have no intension of claiming that children cannot learn verbs until 5 years of age. The point we would like to make instead is that young children's verb meanings develop progressively and that it takes a substantial amount of time before they finally obtain fully adult-like representations of verb meanings. Remember the example of the Japanese verb *ageru* we described earlier. The child started using the verb when she was 26 months old, but at 4-1/2, she still had not acquired the fully adult-like meaning of it.

The pattern of success and failure in young children's verb learning in experimental settings also supports this idea. First, as demonstrated by Casasola and Cohen (2000), children seem to become able to associate a novel causal action to a novel label at around 18 months of age. However, it is highly unlikely that 18-month-olds would be willing to extend a newly learned verb to the same action when one of the two objects (either the agent or the patient) or both objects are changed, given the results by Maguire et al. (2002). As reviewed earlier, these researchers demonstrated that English-speaking 18-month-olds were not willing to extend a newly learned verb to the same intransitive action when the actor was changed from the original scene even after they had been trained on the verb-action association with four different agents. Golinkoff et al. (1996) demonstrated that 3-year-old English-speaking children could extend a novel verb to the same intransitive action by a different actor, but the 3-year-olds in Kersten and Smith's (2002) study failed to do so.<sup>4</sup> In our studies (Haryu et al., 2004; Imai et al., in press; Mayer et al., 2003), in none of the three languages were 3- year-olds willing

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to extend a verb to the same action when an object (the agent in their case and the theme object in our case) was changed.

In summary, previous results from novel verb learning studies suggest that children do learn verbs as early as 18 months, but their representation of verb meanings at initial stages is incomplete and fragile. It seems to take some time for children to acquire the full, adult-like meaning for many verbs. It also seems to take quite some time for the basic principle for verb meaning extension—that verbs get extended on the basis of the same action or relation while the objects are variables that can be changed from situation to situation—to become solidified enough to be applicable under very stringent circumstances when external aids such as social and perceptual support are not provided, and a new verb is associated only with a single instance.

#### *Fast-Mapping May Not Be Beneficial for Verb Learning*

What does it take for a word learner to infer the meaning of a verb? What do they need to know to extend a verb to other instances correctly? The principle of verb extension we dealt with in this chapter—that verbs get extended to a new situation with a different agent or a different object, as long as the action is the “same”—is a very basic extension principle that holds for almost all verbs, and it is an important first step toward adult-like representation of verb meanings. However, word learners also need to know that different types of verbs employ different criteria for extension. Some verbs should be extended on the basis of sameness of manner, while others should be extended solely on the sameness of results, yet others should be extended on the basis of the sameness of direction or trajectory of motion. Furthermore, here, the notion of “being the same” does not mean “being identical,” as, for example, there are many ways of walking, turning, throwing, hopping, climbing, ascending, and so on. Children thus first need to know which semantic aspect (such as manner, path/direction/trajectory, and result) they should attend to in extending the particular verb they are learning, and they then need to extract what constitutes the “sameness” for the given semantic aspect in the verb in question (see Maguire et al., 2002, for a similar point). This process of extracting sameness—or discovering the “invariant component” in other words—and using it as the basis for extension is exactly like analogical mapping based on abstract higher-order relations.

Seen this way, the way children learn nouns and verbs may be very different, and for a good reason. Children as young as 2 years of age are willing to fast-map the meaning of a noun after only observing it to get associated with a single referent (e.g., Golinkoff et al., 1992; Haryu & Imai, 2002; Imai & Gentner, 1997; Imai et al., 1994; Imai & Haryu, 2001; Landau et al., 1988; Markman, 1989). This may be in large part because the structure of the noun lexicon is hierarchical and coherent, and also because the meaning of a noun is largely predictable from the perceptual nature of the named entity due to a high correlation between conceptual and perceptual properties in concrete entities. For example, the (concrete) noun lexicon

is divided into two distinct ontological classes, the class of objects and the class of substances, and determination of the class membership of a given entity (i.e., whether this thing is an object or a substance) is largely, if not completely, supported by the entity's perceptual nature, such as its solidity, boundedness, and shape complexity (Imai & Gentner, 1997; Imai & Mazuka, 2003; Smith, Columga, & Yoshida, 2003). Once the named entity's ontological class membership is determined, the extension principles are rather simple (or at least much simpler than those for verbs). When the word is determined to be an object name, it should be extended by shape; when it is determined to be a substance name, it should be extended by material (Soja, Carey, & Spelke, 1991). Given this coherent and cleanly structured noun lexicon, it is relatively easy for children to come up with assumptions about the noun lexicon (e.g., what kinds of nouns are there in the noun lexicon, what kinds of noun correspond to what kind of conceptual classes, how different kinds of nouns are syntactically marked, what perceptual and conceptual factors are most useful in inferring word meanings, etc.), and with these assumptions, it is likely that children can successfully fast-map a new noun to its meaning with only a single instance (Imai & Haryu, 2004).

The verb lexicon is not as cleanly structured as the noun lexicon, and the cross-linguistic variability is much greater than the noun lexicon (Gentner, 1982). Even though there seems to be only a small set of semantic components that are universally lexicalized in motion/action events (e.g., such as figure, ground, manner, and path), the component that is most likely to be packaged into verb meanings varies across different languages (Talmy, 1985). Furthermore, within each language, the lexicalization pattern is only probabilistic. For example, even though English is a manner-dominant language, there are quite a few verbs that lexicalize path of the motion (e.g., *enter*, *ascend*, *descend*). Syntactic argument structures provide clues for the inference of verb meanings at a global level (e.g., whether the action involves change of state of the patient object, whether it is spontaneous and self-moved, or whether it only happens by some external force, etc.). However, as there are so many different classes of verbs that take different argument alternation patterns in different semantic domains (Levin, 1993), inferring the specific meaning of a verb from a single instance with one syntactic argument structure would be difficult and could even be harmful (Naigles, 1996).

Seen in this light, the different strategies children take in learning nouns and verbs may be quite reasonable and optimal. In learning nouns, they generate assumptions about noun extension at very early stages of lexical development, and by applying these assumptions, they fast-map a newly encountered noun to its meaning with a single instance. In learning verbs, in contrast, they do not seem to easily generate such assumptions about verb extension. Children extract abstract, widely applicable rules for verb meaning extension quite slowly, only after learning different verbs in an "island-like" fashion for a substantial period of time (compare Tomasello, 2000). Considering the structure of the verb lexicon, this is probably a more beneficial strategy than fast-mapping.

### Concluding Remarks: Interaction Between Universal and Language-Specific Factors in Early Word Learning

One of the important questions in the literature of lexical development is whether a particular word class is easier for children to learn over others, and what factors determine the relative ease or difficulty of word learning. The results from the cross-linguistic novel noun/verb learning study reported in this chapter support the view that noun learning is universally advantaged over than verb learning, as children of three very different languages performed better in learning novel nouns than in learning novel verbs. At the same time, the cross-linguistic pattern of novel verb learning points to the influence of linguistic properties on the ease of novel verb learning as well as on cues children utilize in inferring verb meanings. Interestingly, however, it was not the distributional property of nouns vs. verbs, but the structural properties of the language that had a greater influence here. Contrary to the general assumption in the literature (Gentner, 1982; Tardif, 1996), morphological simplicity in the Chinese language may magnify the difficulty children experience in learning a new verb (see Erbaugh, 1983). Note, however, that the lack of the form class information within the subclasses of nouns does not seem to make novel noun learning difficult for Japanese-speaking children (see note 3; see also Imai & Gentner, 1997; Imai & Haryu, 2001, 2004). This suggests that availability of cues from syntax for the inference of word meanings interacts with the nature of the concepts for a given word class.

Early word learning takes place within a dynamic interaction among children's universal cognitive disposition, distributional and structural properties of the language they are learning, and nature of concepts (e.g., the degree of abstractness, complexity of meaning, perceptual accessibility, etc.) denoted by words. In this interaction, the relative dominance among these factors seems to be hierarchically ordered. Based on the pattern of results in the word learning literature, it is probable that conceptual factors take precedence over linguistic factors in the hierarchy. As we reviewed throughout the chapter, it has been repeatedly observed that, across different languages, children learn labels of objects more readily and easily than labels of actions, and that they generalize nouns more willingly than verbs. Linguistic factors, either structural or distributional, do affect word learning but not to the degree that they can override conceptual constraints.<sup>5</sup>

Taken together, what is important for future research is not so much the question of which of the two factors—universal conceptual constraints and language specific properties—is more important, but the question of how the two factors interact with one another.

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## Notes

1. Of course, verbs put some constraints on the types of arguments they can be used with. A piece of fabric cannot be smashed, so the verb *smash* cannot take *fabric* as an argument. However, within the range of the semantic constraints, different objects can occur as the argument of the verb.

2. However, we did not set up the “*zai* + verb” alone (without the arguments) pattern, since native speakers of Chinese judged this pattern unnatural.

3. For example, when a novel individuated object (either animate or inanimate) was labeled with a novel noun, Japanese-speaking 2-year-old children spontaneously generalized the noun to other objects that were similar to the original in shape (but not in other perceptual dimensions) assuming it to be a basic-level object category name. At the same time, they could relax this default assumption quite readily. When a novel noun was associated with a substance, they generalized it on the basis of material identity, ignoring the sameness in shape (Imai & Gentner, 1997). When a familiar animal was named, they interpreted it to be a proper name of the named animal (Imai & Haryu, 2001). When a named object was inanimate and was a typical member of the familiar category, they mapped the new noun to a category subordinate to a old, familiar one, but when the inanimate object was an atypical member of the familiar category, they mapped the new label to a new basic-level category, restructuring the boundary of the old, familiar category by excluding the named object from it (Haryu & Imai, 2002).

4. This difference in the results could be attributed to the difference in the stimuli. While Golinkoff et al. (1996) used still pictures, Kersten and Smith (2002) used animated events.

5. Interestingly, an analogous pattern has been witnessed in the learning of object names and substance names. Imai and Gentner (1997; see also Imai & Mazuka, 2003) examined how Japanese- and English-speaking children project word meanings when a novel noun was presented in association with a range of entities with different levels of individuation (i.e., highly individuated complex-shaped objects, simple-shaped solid substances that can be construed either as individuated objects or unindividuated solid substance, and clearly unindividuated substances). Imai and Gentner showed that the ontological distinction between objects and substances is universally available at the beginning stage of word learning, and this conceptual understanding constrains noun learning whether or not this ontological distinction is marked by the grammar of the language children are learning. At the same time, the way in which language divides the individuation continuum affected the pattern of word meaning projection for simple shaped solid substances, whose status of individuation was perceptually ambiguous.

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## Chapter 17: Author Queries

- [Q1] Add page no. of quote.
- [Q2] au: update?
- [Q3] au: please check spelling; reference has Meyer.
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- [Q10] au: update.
- [Q11] au: please add reference or delete citation.
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