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Part VII
Extensions
Acquisition of meaning

Soonja Choi

1 Introduction

Acquiring the meaning of a word requires integration of a number of skills, linguistic, cognitive, and socio-pragmatic. Consider a situation of an 18-month-old child learning a novel noun (“novel” for the child), such as “rabbit.” The child hears his/her mother say, “There’s a rabbit!” in a park where there are trees, benches, dogs, squirrels, and rabbits. First, the child needs linguistic ability to segment the speech stream and identify word boundaries and extract the word “rabbit.” Second, he needs to identify the referent of the word “rabbit” among many possible ones in the environment. This may require some socio-pragmatic skills, e.g., use of the mother’s eye-gaze or pointing as cue for identification. Third, even when the child has identified the referent, he needs to figure out which aspects/properties of the rabbit the word expresses (e.g., the whole entity, its tail, its furri ness). This requires some cognitive ability to narrow down the possibilities: For example, the child may have an a priori assumption that the word “rabbit” refers to the whole entity and thus he may not need to entertain a large number of other possibilities.

Acquiring meanings of non-nominal words, such as verbs, may be even more challenging than nouns: a verb refers to an action/event or a state that may occur only briefly with no clear boundaries about when it begins and ends. Furthermore, verbs are relational in that their meanings inherently include some information about participants of the event/state. For example, a transitive verb “push” requires two participants (an agent who pushes and a patient who is pushed) as in “The man pushes the cart.” As such information is encoded in the syntactic frame (i.e. clause), attention to the linguistic structure would be necessary to get the full meaning of the verb.

During the first few months of language production (until they acquire about 50 words), children typically produce one-word utterances, for example saying *mommy* when they need Mommy’s help or *allgone* when they finish a meal. From this single-word period, children learn various types of word: Nouns, verbs and other relational words (e.g., particles), attributes, and social words. Intriguingly, children are remarkably good at honing in on the correct word meaning from the beginning. (Although at the beginning, children may overextend word meaning, they are in the right track to acquire the full meaning.) From 2 to 6 years children acquire at a fast pace, about nine or ten words a day (Clark 2009: 75). This ability is often labeled “fast mapping.”

Given the challenges facing semantic acquisition as illustrated above, children’s fast-mapping ability suggests that they have a sophisticated and efficient system for learning
word meaning. Such a system should include not only children’s cognitive ability (as acquisition of meaning must be based on some understanding about how entities/events can be categorized) but also their socio-pragmatic skills and their sensitivity to language-specific input as children acquire meaning through interaction with caregivers.

### 1.1 Issues in earlier periods

Over the past four decades, different theories and research programmes have explored the nature of semantic acquisition.

From the 70s through the mid-80s, predominant theories took a universalist approach, in line with the general trend of linguistic theories of that period (i.e. dominance of Chomskyan theory of universal grammar). In particular, in the 70s, in the semantic domain (as well as other domains such as phonology), a feature theory was widely explored. According to the Semantic Feature theory, a word meaning in our mental lexicon is made up of a set of conceptually primitive features that together represent the essence of word meaning (H. Clark 1973; E. Clark 1973). Note that a word (e.g. *dog*, *run*) labels a concept/category that denotes a class of individuals. Thus, the set of features would represent those that all members of the category share (e.g., [+four-legged, +domestic, +barks, etc.] for *dog*). In this framework, children learn word meaning by building up the relevant features for the category over time. That is, children would start with an incomplete list of features (e.g. only [+ four legs] for *dog* or only [+ round] for *ball*) and complete it as they learn more about the category. The Semantic Feature theory could explain overextension errors that young children sometimes make (e.g. referring to all four-legged animals as *dog* or all round things as *ball*).

In large part, early theories of semantic acquisition also followed the Piagetian tradition, namely the view that language acquisition follows and stems from general cognitive development. This view was also concerned about discovering universal and general cognitive underpinnings of semantic acquisition (e.g., Bates (1976); E. Clark (1973)). According to this view, universal cognitive concepts are the major driving force for early semantic acquisition. In particular, during the first 18 months of life, infants develop concepts that are foundational for understanding how the world operates and is organized. For example, during the first year of life, infants develop concepts related to object permanence, causality, and space. These concepts are prerequisites for early semantic acquisition as children can map them directly onto words at an early stage. For example, in the spatial domain, infants develop conceptual categories of “containment” and “support” (Piaget and Inhelder 1967). Thus, when 18-month-olds acquire a word, say, *in* (in English) they can get its meaning directly from the already established concept of “containment.” In this theory, then, the direction between cognition and language is unidirectional, from cognition to language development.

This theoretical framework was adopted by a number of important studies in the 70s, such as studies on acquisition of early words (Bates 1976), grammatical morphemes (Slobin 1973), and spatial terms (Johnston and Slobin 1979; Clark 1973). As semantic development should progress based on conceptual development, the general order in which words/morphemes appear in children’s speech (within and across languages) in these studies was explained by the order in which relevant cognitive concepts developed. For example, infants develop spatial concepts (e.g. containment) before temporal concepts (e.g. past) (Piaget and Inhelder 1967). Reflecting this order, children produce or comprehend spatial words/morphemes (e.g. *in/on*) earlier than temporal words/morphemes (e.g. *today*, *Verb-ed*) (Brown 1973).
Johnston and Slobin’s work (1979) is important in this regard: they examined the development of “locative” terms in four languages, English, Turkish, Serbo-Croatian, and Italian. The locative terms express various types of spatial relationship between two entities (Figure and Ground objects), e.g. containment (in in English), support (on), front (in front of), and back (in back of). Johnson and Slobin (1979) found that the order of acquisition was remarkably similar across languages: regardless of target language, children acquire terms for containment/support before those for front/back. Interestingly, however, the pace of acquisition depended on the language. For example, children acquiring Serbo-Croatian took more time to acquire their locative terms than Turkish children did. Johnston and Slobin explain that while the order of acquisition followed universal cognitive development, the timing of acquisition depends on the degree of formal complexity in a specific language. For example, the locative terms in Turkish are suffixed to the Ground noun with a clear morpheme boundary and carry only spatial meaning. But in Serbo-Croatian, locative terms not only express spatial meaning, but they also inflect in case (e.g. instrumental, genitive). Thus, children learning Serbo-Croatian need to acquire case inflections to produce correct locative terms. Johnston and Slobin (1979) conclude that while cognitive concepts are established around the same time for all children, linguistic complexity could delay acquisition of words.

In summary, early studies (early 1970s through mid-1980s) were concerned with finding universal cognitive bases for semantic acquisition. In this approach, findings of a particular language (e.g. English) were assumed to be the same in other languages. In crosslinguistic studies, similarities across languages were highlighted more than differences, as the goal was to find common cognitive prerequisites for semantic acquisition.

1.2 Current issues

In the last two decades or so (from the late 1980s to the present), a new set of questions emerged, as researchers recognized that semantic acquisition involved more than matching preverbal cognitive concepts with word forms and that it requires integration of a number of factors (cognitive, linguistic, and social) and learning mechanisms. Recent research addresses the two major issues discussed in the next sections.

1.2.1 Language-specific semantics and its interaction with cognitive development

Recent studies examining typologically very different languages discovered that words that appear similar in meaning are actually quite different, particularly in the domain of non-nominal words (Bowerman et al. 1995; Choi and Bowerman 1991). For example, Choi and Bowerman (1991) showed that languages divide up spatial relations (e.g. containment, support) significantly differently (see section 2.2 below). Moreover, children acquire language-specific meanings from very early on. These findings implicated that semantic learning involved more than a direct matching of preverbal cognitive concept onto word.

Search for the basis for early acquisition of language-specific semantics motivated developmental psycholinguists to examine preverbal concepts in infancy that may be relevant to early semantics. In fact, with new experimental methods (e.g. preferential looking paradigm, habituation paradigm, see section 2.2), research in recent years on preverbal infant cognition has given new insight into understanding language-specific semantic development in early years. For example, in the domain of spatial development recent findings suggest that preverbal infants are sensitive to a large number of spatial features, larger than what the target
language requires. As they attend to language-specific input, they pick out (or combine) relevant ones from the large repertoire to learn the semantic system of the target language.

Recent studies suggest that to acquire word meaning, early cognitive development interacts with language-specific input. These findings lead to a number of questions: How early does language-specific input begin to shape semantic categories? Does language-specific semantics influence conceptual categories? If yes, then to what extent? Do the degrees to which language influences cognition differ across different semantic domains?

1.2.2 Word-learning mechanisms and constraints

Another major issue in semantic acquisition is discovering cognitive mechanisms and environmental factors that come into play during the acquisition process: exactly what cognitive assumptions and operating mechanisms do young children use to acquire word meaning? Given that there are many possible candidates for referent and meaning, how does the child know which ones are the right ones, and know them fast when there is a potentially infinite number of possible candidates (e.g. part of object, shape, material, event)? In terms of environmental factors: how much and how early do children use socio-pragmatic aspects in caregiver-child interactions (e.g. joint attention, intentionality)? Also, how much and how early do they attend to structural aspects of language (e.g. morphological cues for nouns and verbs)?

Semantics is a complex system that denotes many different types of concept (e.g. object, action/event, space, time). So far, in the field of developmental psycholinguistics, no single mechanism has been proposed to account for the acquisition of all types of meaning. Rather, researchers assume that semantic acquisition involves multiple resources from which children draw appropriate ones to acquire a given meaning. Depending on the type of meaning, the degrees to which those mechanisms and factors are used may differ. Thus, it is also important to discover how much the child relies on each factor and mechanism in a given task. For example, for referent identification, socio-pragmatic skills are important. Such skills include ability to follow the speaker’s eye-gaze to understand the speaker’s intention. Conversely, once the referent is identified, some cognitive mechanisms must be at play for children to hypothesize about which aspects/properties of the referent the word encodes.

While earlier studies focused on learning mechanisms for object names, more recent studies have explored mechanisms for verb learning. Action verbs are more abstract than object nouns. As mentioned earlier, actions do not have clear boundaries. In fact, a series of actions (each being labeled with a unique verb) may flow without pause. Consider, for example, a situation where a child watches her mother wash a dish and dry it without any pause in between. To acquire the verb “wash” in this context, the child needs to segment the “washing” part from the “drying” part. In addition, as verb meaning includes its argument structure (e.g. X (agent) washes Y (patient)), the child needs to attend to the syntactic frame when learning verb meaning.

In this chapter, I review recent findings on these issues in three semantic areas: In section 2.1, I review acquisition of object nouns and action verbs particularly focusing on recent proposals on word-learning mechanisms. Then, in section 2.2, I focus on acquisition of spatial words (verbs and spatial prepositions), reviewing the relationship between spatial cognition and language-specific spatial semantics. Finally, in section 2.3, I review acquisition of modality, particularly epistemic modality, a grammatical category that expresses abstract concepts.
2 Current contributions and research

2.1 Acquisition of object nouns and action verbs: learning mechanisms

Among the various types of words that children acquire during the single-word period (e.g. nouns, adjectives, particles, verbs and social words), nouns occupy a significant proportion: studies on lexical composition of the first 50 words in language acquisition show that in English, nouns occupy about 60% of the first 50 words (Choi and Gopnik 1995). Even in verb-prominent languages like Korean, nouns still occupy 44% (Choi and Gopnik 1995). Nouns that children learn early, for the most part, label concrete objects and entities, such as dog, ball, water, and milk, as well as some proper names, e.g. mommy, daddy.

Children also learn relational words and verbs from early on. However, growth of verbs varies across languages, i.e., it is slower and more protracted in some languages than others. As is well documented (Gopnik 1982), children learning English produce words such as no, up/down and gone from the one-word stage. With these words children express various types of relational notions: rejection/prohibition of propositions (no), spatial relations (up/down), success of intended action (there!) and presence or absence of object (gone). Interestingly, although smaller in number of types, in token frequency, children produce these words more frequently than nouns. Gopnik (1982; Gopnik and Choi 1990) interprets this to mean that children are cognitively interested in relational concepts from the one-word stage. She also suggests that early production of these words in turn enhances further development of those concepts, and thus cognitive and linguistic development interact in a dynamic way.

In Korean, many relational concepts are encoded by verbs. Based on spontaneous speech data of eight children, Choi and Gopnik (1995) report that a substantial proportion (31%) of the first 50 words in Korean acquisition are verbs. These data challenge the universal “Noun-bias” theory (Gentner 1982) that object names are cognitively easier to access than relational words are during the single-word period.

As mentioned earlier, children are excellent word learners: from the start they home in on the correct meanings. And even when they make overextension errors (e.g. saying dog to both cats and dogs, run to both running and jumping), they are in the right direction. Moreover, their “errors” may not mean that they misinterpret the meaning, but rather that they have difficulty in lexical retrieval or they may not know the right word (Bloom 2000). This remarkable ability leads us to assume that children possess a set of a priori assumptions and word-learning mechanisms that help them narrow down possibilities to just the right ones.

Over the last two and a half decades (since the mid-1980s), a number of proposals have been made. Below, I summarize a few major ones. (A full review of all the proposals would be beyond the scope of this chapter.) I should note, however, that we are far from understanding the full process of learning word meaning. Moreover, each of the proposed assumptions or mechanisms addresses different aspect of the process. At a given moment, several of these mechanisms must work together in the child’s mind to support the learning of word meaning.

(a) Sensitivity to speaker’s intention and non-verbal cues

There are two essential aspects about language that young children understand as they embark on semantic acquisition. First, language is a system of convention in which form-meaning relations have already been established by fluent speakers (Clark 1993; 2009). To learn meaning, then, children need to rely on caregivers’ use of word forms and extract necessary information about meaning, taking into account the context. Second, speakers convey
specific intentions when they use language. That is, speakers use language as a tool to communicate a particular message that they have in mind at the time of speech. Thus, a critical skill for children in learning a language is the ability to detect speakers’ intended meaning.

In conversational interaction, the speaker provides a number of non-verbal cues to indicate his/her intention, such as providing eye-gaze and pointing to the referential object/event. Caregivers provide these cues prominently to young children to facilitate communication. In return, children pay attention to these cues (understanding that the cues are highly relevant for detecting intended meaning) and they connect the new label to the entity or activity that the caregiver is focusing on during her speech. Children have this ability from early on. In addition, 16 to 19-month-olds know that the speaker’s eye-gaze is more important than their own to identify the reference of a novel word (Baldwin 1991).

Children are also sensitive to presence or absence of intentionality of the speaker. They can distinguish between intentional and accidental (i.e. erroneous) speech and learn a novel word only when they judge it to be intentional. Two-year-old children do not learn a label for what they think is an accidental action (e.g. when the speaker says “oh no,” or “uh-oh”, signalling an error) or what they think is a rejected object (Tomasello and Barton 1994).

Children can also detect caregivers’ intended meaning using other means. For example, temporal contiguity is an important cue for verb meaning. When a caregiver labels an action, children consider the label to refer to an immediately anticipated/impending action (rather than an action that was already completed) (Tomasello 1995). For example, when the caregiver requests an action from the child (e.g. drink milk), the child considers the label to refer to the anticipated action.

(b) Principle of contrast

Children assume that “different words express different meanings” (Clark 1990). This narrows down possible meanings of a novel word. For example, in a classic study, Carey and Bartlett (1978) introduced a novel word “chromium” to 4- and 5-year-olds, juxtaposing it with a color word they already knew e.g. “red.” Later, when the children were asked to pick out the object with “chromium” color, between a red object and one for which they did not have a name yet (e.g. an object with olive-like color), they chose the latter.

Note, however, that an entity can have several names. For example, a “dog” can also been called an “animal” or a “puppy” depending on which aspect of the entity the speaker wants to focus on. “Principle of contrast” still explains this phenomenon as it simply states that “different words express different meanings.” Thus, even when a novel word clearly refers to an entity for which children already have a label, children accept the novel word and consider it to encode a different aspect of the entity. For example, when the caregiver says “that’s an animal” pointing to a dog, children (who already possess the word “dog” in their mental lexicon) would consider it to refer to another aspect of the dog and make some corresponding hypothesis.

(c) Boundary detection for object and action: “whole object” constraint and segmentation of action sequences

In identifying the referent of a noun or a verb, children need to know the boundary of an entity or an action. For an object label, children consider the whole object to be the unit of reference. Saliency of the “whole object” is probably related to a principle of object perception in infancy. Five-month-olds consider an object to be a single entity when it moves as
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a unit (Spelke 1990). (Note that, at a later stage, children need to abandon this assumption since parts of an object/entity (e.g. tail) also have labels.)

As noted earlier, boundaries of events/actions are not obvious. Nevertheless, from 10 to 11 months of age, infants have the ability to segment a series of actions into discrete units that relate to the actor’s goals/intentions (Baldwin et al. 2001; Saylor et al. 2007). Baldwin et al. (2001) familiarized infants with a video sequence in which a person carried out a series of activities smoothly without pause. For example, a person moved toward an ice-cream container on the kitchen counter, took the container, turned toward the freezer, and opened the freezer door. Infants watched the video multiple times during the familiarization phase. In the test phase, they saw the same action sequence, but this time the flow of action was interrupted by still-frame pauses. In one test video, a pause was inserted at the completion/initiation of each intended act. In the second test video, a pause was inserted in the middle of an intentional act (e.g. in the middle of the opening action). Of the two test videos, infants looked longer at the second one in which action units were disrupted. The results revealed infants’ ability to parse continuous action into “intention-relevant” units (Baldwin et al. 2001: 710). Notice that in the above example, each intentional act is expressed by a unique verb (e.g. move, take, turn). With the ability to identify units of action, young children can associate a novel verb with the correct action boundaries.

(d) Non-perceptual essence of semantic category

One major limitation of the early Semantic Feature Theory is that it only addresses perceptual features for possible semantic content for a category (e.g. [+ four-legged] for dog, [+round] for ball). But many semantic categories are abstract, e.g. justice. Even what we call concrete words may form categories based on some abstract, non-visual properties (Murphy and Medin 1985). For example, a skunk is an animal that has a specific visual feature, i.e. white horizontal stripes. But if a skunk is merely painted like a raccoon, does the skunk then become a raccoon? Most adults would answer “no,” because people believe the essence of a natural category lies in non-perceptual biological features. Children gradually learn about abstract essences of categories through education and experience. However, the extent to which non-perceptual components determine the category membership may differ from one semantic domain (e.g. natural kinds) to another (e.g. artifacts) (cf. Medin et al. 2000).

(e) Morphological and syntactic bootstrapping for word meaning

Children pay attention to morphology and syntax, using them as bootstrapping tools for semantic acquisition. For example, morphology can play an important role in distinguishing across nouns, adjectives and verbs. In English, a noun is often preceded by a determiner (e.g. a, the, some) while a verb is not. Many adjectives have an -y, -ful or -ish ending. Children narrow down possible reference of a novel word based on these morphological cues (e.g. Soja et al. (1991); Waxman (1990)).

As mentioned in section 1.2.2, verb meaning is in part realized in syntax. Naigles (1990) showed that 22-month-olds attend to the syntactic frame of a novel verb (i.e. syntactic bootstrapping) to understand whether it has causative meaning. When they hear the verb in a transitive syntactic frame (i.e. SVO), children assign a causative meaning to it. But they do not do so when they hear the verb in an intransitive syntactic frame. Naigles’ study, together with other more recent studies on children’s sensitivity to syntax (e.g. Arunachalam and Waxman 2012), suggests that 2-year-olds consider syntax to be an important source for acquiring verb
meaning. In fact, Nappa et al. (2009) have recently reported that 3- to 5-year-olds pay attention to syntax (clauses introduced with full NPs) more so than speaker’s eye-gaze when it comes to learning verb meaning. This suggests that children understand the abstract nature of verbs and look for cues in the language itself more than non-linguistic context.

2.2 Acquisition of spatial semantics

From the single-word stage, children talk about going up and down, and putting something in a container or on a surface. While in English these spatial relations are expressed by spatial prepositions, in Korean they are expressed by verbs such as k kita (“fit tightly”), nehta (“put loosely in container”), and nohta (“put loosely on surface”).

Spatial words (regardless of the morphological form, e.g. particles, verbs) occupy a good portion of early relational words (Choi and Bowerman 1991; Choi and Gopnik 1995). English learners produce spatial prepositions, in and on, and Korean children produce spatial verbs k kita, nehta, and nohta. Thus, children are cognitively ready to learn spatial semantics from early on. There is good reason to assume so: space is a fundamental and universal aspect of human experience and infants begin to explore it virtually from the beginning of their life.

For example, 2.5-month-old infants can already recognize that a container must have an opening for an object to go in (i.e. one cannot put an object in a “container” that has no opening) and that the object contained moves with the container (Hespos and Baillargeon 2001). At 6 months, infants develop a conceptual category of containment, generalizing the relation to novel objects and novel containers (Casasola et al. 2003). As for the support relation (e.g. cup on table), 4-month-olds can also distinguish between situations in which an object will fall or be supported (Needham and Baillargeon 1993). And 8-month-olds can calculate how much support is needed for an object to be adequately supported by another (Baillargeon and Hanko-Summers 1990).

As mentioned in section 1.1, spatial notions were traditionally considered to be a domain where one could demonstrate pre-established cognitive concepts determining the order of acquisition of spatial words. In this framework, early-acquired semantic notions are universal across languages, and language-specific meanings are acquired gradually later on.

Spatial meanings are significantly different across languages, however. Choi and Bowerman (1991) demonstrated this comparing English and Korean. First, the two languages encode spatial relations in differential morphological classes (i.e. prepositions in English and verbs in Korean). Second, they also differ significantly in the way they semantically categorize spatial relations. The spatial preposition in English and the spatial verb kkita are cases in point, as the two categories cross-cut each other. While in in English refers to “containment” regardless of whether it involves tight fit (e.g. putting a jigsaw puzzle piece tightly in its slot) or loose fit (e.g. putting an apple in a bowl), kkita in Korean refers to “tight fit” regardless of whether it involves containment (e.g. kkita is used for “putting a jigsaw puzzle piece tightly in its slot”) or support (e.g. kkita is also used for “putting a ring tightly on the finger”). The two terms also differ in their syntactic function. In English, in is a particle that can be used for both spontaneous (intransitive) and caused (transitive) motions (e.g. go in(to) the room; put a piece in its slot), but in Korean kkita is used only for caused motion.

When and how do children acquire language-specific meanings of spatial words? The “cognitive prerequisite” view would predict that regardless of the target language, children would initially apply the same “pre-established” concepts to spatial words, and then later acquire the language-specific meaning. Contrary to this assumption, Choi and Bowerman (1991) found that English- and Korean-learning children used spatial terms in language-specific
ways from the beginning, 14–19 months of age. Their database was longitudinal recordings or diary notes of children’s spontaneous speech from 14 to 24 months. English learners used in to express a containment relation regardless of whether it involved tight or loose fit (e.g. apple in bowl, puzzle piece in slot) but did not use in for a support relation (e.g. cup on table; Lego piece on another). In contrast, Korean children used kkita to express tight fit regardless of containment or support but not for the loose-fit relation. And while English learners used in in both intransitive and transitive constructions (go in; put in), Korean children used kkita only in transitive constructions.

To confirm early acquisition of language-specific semantics, Choi et al. (1999) conducted an experiment testing comprehension of in in English learners and kkita in Korean learners (between 14 and 24 months) using a “Preferential Looking” method: As the child hears the target word (in or kkita), he/she sees two videos side by side on the screen. The child’s eye-gaze to each video is measured with the assumption that the child will look longer at the video that matches the target word meaning. The results showed that from at least 17 months, children comprehend spatial terms in a language-specific way.

To understand the possible mechanisms that would allow such early acquisition of language-specific semantics, McDonough et al. (2003) conducted non-verbal experiments with pre-verbal infants (aged 9–14 months) being exposed to English or to Korean. In one condition, infants first saw multiple pairs of tight containment events with a variety of objects (e.g. putting a book tightly into its matching cover, putting a puzzle piece tightly into its slot) one after another until they were familiarized with the relation. (In the other condition, infants were familiarized with a variety of events that depicted loose containment, e.g. putting an apple in a bowl, putting a pencil loosely in a cup. Each infant was assigned to one of the two conditions.) Then, during test trials infants saw both a tight containment event and a loose containment event side by side on the screen. If infants conceptually distinguish between tight and loose containment relations, their looking pattern to the two relations (one would be the familiar relation whereas the other would be a novel relation) would be significantly different. Note that in English the two types of containment are not distinguished in the spatial prepositional system. The result was interesting: preverbal infants distinguished the two relations by consistently looking longer at the familiar relation than the novel relation. That is, infants in both language groups distinguished tight containment from loose containment, and vice versa, demonstrating that they could attend to tightness or looseness of containment relation in a categorical manner.

More recent studies showed that detection of the tight- or loose-fit feature can start as early as five months. Hespos and her colleagues (Hespos and Piccin 2009; Hespos and Spelke 2004), using the “Habituation” paradigm,” showed that 5-month-olds can distinguish the two types of containment relation, as well as the tight covering and loose covering relation. (The “Habituation” paradigm is similar to the “Preferential Looking” paradigm except that in the “Habituation” paradigm, infants are shown the same relation repeatedly until they are no longer interested (i.e. look away out of boredom), before test trials begin.) Infants also consider different types of tight-fit relation as distinct categories: They consider tight attachment (e.g. putting a Lego piece tightly on another) to be distinct from tight encirclement (e.g. putting a ring tightly onto pole) (Choi and Casasola 2005).

These findings suggest that infants start with an ability to make fine distinctions, finer than their target language may require. During the preverbal period infants seem to develop sensitivity to a large repertoire of spatial features. Such sensitivity would essentially allow them to learn the spatial semantic categories of any language. As infants attend to language-specific input, they can pick out the relevant spatial features from their large repertoire. If
this is the case, then linguistic input guides semantic acquisition from its onset. In fact, recent studies have shown evidence that linguistic input is critical for the development of certain semantic categories. Casasola (2005; Casasola and Bhagwat 2007) demonstrated that it is language that unites different types of support into a single semantic category of on.

Eighteen-month-olds could form a category of support that includes loose horizontal support (e.g. put a cup on a table), attachment (e.g. put a Lego piece on another), and encirclement (e.g. put a ring on a pole) when they heard the word “on” during the habituation phase (i.e. training phase), but they could not form the category when they viewed them in silence (i.e. no word during the training phase). Similarly, 18-month-olds (learning English as a first language) could form an abstract category of tight-fit relation with linguistic training (i.e. hearing a novel word during the habituation of all types of “tight fit”) but could not do so just by viewing tight-fit events in silence. The study suggests that development of a tight-fit category needs linguistic guidance as well.

If language guides semantic categorization from an early age, does it in turn influence conceptual (i.e., non-linguistic) categories of space? There is evidence that over time, language-specific semantics does affect, at least partially, our conceptual categorization. Recall that preverbal infants (regardless of language environment) can distinguish between tight and loose containment (McDonough et al. 2003). A follow-up study by Choi (2006) with older children found that from 29 months of age, English learners, overall, significantly lost their ability to distinguish between tight and loose containment. (But Korean learners continued to distinguish between the two types.) Intriguingly, however, a detailed analysis of the data revealed an asymmetry of perceptual/conceptual sensitivity for tightness vs. looseness in English learners. English learners were actually still quite good at detecting the tight-fit feature in a tight containment event. The difficulty they had was detecting the loose-fit feature when they saw a loose containment event. The results suggest then that language-specific semantics influence non-verbal spatial categorization only partially and that certain features (e.g. tight-fit feature of containment) continue to be salient at a perceptual/conceptual level. Choi and Hattrup (2012) recently confirmed this partial influence of language-specific semantics on spatial cognition in adult speakers as well.

2.3 Acquisition of modal meanings

So far, I have discussed acquisition of meaning that relates to objects and spatial actions. In this section, I discuss how young children acquire an abstract domain of semantics, that of modality, particularly focusing on epistemic modality and evidentials. Modality can be divided into two types, deontic and epistemic (see Chapter 21). Deontic modality expresses some condition on the agent with regard to the main predicate. The “conditions” include ability, obligation, and permission (e.g. Mary can/must do her homework.). Deontic modality also includes the agent’s desire and intention toward an action (e.g. Mary wants to study linguistics). In contrast, epistemic modality expresses degree of certainty on the part of the speaker about the truth of proposition. The speaker may estimate that the event or state expressed in the main proposition is possible, probable, or certain (see example (1)). This category may include “evidentials,” expressions that mark the particular type of source of information. This is because, by specifying whether the information comes from hearsay or direct evidence, the speaker conveys varying degrees of certainty of the proposition.

(1) Mary may be home by now. (= It is possible that Mary is home at this time.)
Languages differ in selecting a morphological class that systematically expresses modality (e.g. auxiliary verb, verbal suffix). They also differ in the kinds of modal meaning expressed in the grammar. In English, both deontic and epistemic modality are grammaticized in modal auxiliary verbs (e.g. *can, will, must, should*).

Korean uses two types of morphological class to express modality: auxiliary verbs and sentence-ending (SE) suffixes/particles. While deontic modality is expressed by an auxiliary verb preceded by a specific connective (example (2) below), epistemic modality is grammaticized either in auxiliary verbs or in SE suffixes. SE suffixes constitute an obligatory class, i.e., a sentence must end with a SE suffix. As shown in example (3), SE suffixes can specify whether the information in the propositions is old, new to the speaker, shared between speaker and listener, or indirectly obtained (i.e. hearsay) (Choi 1991, 1995). These forms occur only in informal spoken interaction, indicating that they have rich discourse-pragmatic meaning. At the same time, these modal meanings are quite abstract, as they specify the differential status of information in the speaker’s mind.

(2) Mary-nun swukcey-lul hae-ya tway(-e).
Mary-TOP homework-OBJ do-CONN BECOME(-SE)
“Mary must do homework.”  
(Note: To express a given modal meaning, a specific auxiliary verb must be preceded by a specific connective. Thus, in (2), the connective –ya and the auxiliary verb –tway together express “obligation.”)

(3) Mary-ka cikum cip-ey iss-e/-ta/-ci/-tay.
Mary-SUBJ now home-LOC be.located-SE (old/new/shared (=certain)/hearsay)
“Mary is home now (old/new/shared (certain) knowledge/hearsay).”

A number of verb-final languages, e.g. Japanese and Turkish, also express epistemic modality and evidentials with SE suffixes, expressing interactionally rich meanings like those in Korean. Impressively, children start acquiring these from well before 2;0. Korean children acquire the SE epistemic modals, -ta, -e, -ci, and -tay, (see (3) above) in that order, between 1;8 and 2;6 (even before they start acquiring deontic modals). Children learning Japanese and Turkish also acquire SE forms during this age period, starting as early as 1;6 (Clancy (1985) for Japanese; Aksu-Koç and Slobin (1986) for Turkish). This is notably earlier compared to children learning languages such as English. English learners acquire epistemic modals after age 2;6 and after they have acquired some deontic modals (e.g. ability/inability) (Shatz and Wilcox 1991).

SE forms in Korean, Japanese, and Turkish have the following features in common: (1) SE forms are perceptually salient as they are mono-syllabic and occur in sentence-final position. The forms may also be highlighted in speech. In fact, Lee and Davis (2001) report that Korean mothers exaggerate high pitch for SE suffixes in their speech to 1-year-olds. (2) SE forms are highly frequent in the input, as they belong to an obligatory grammatical class. (3) SE forms have rich discourse-interactional functions. They indicate how much speaker vs. listener knows about an event or state of affairs. Using SE suffixes appropriately, the caregiver and child can co-construct coherent information and build up shared knowledge, creating an affective bond between them (Choi 1995). These factors undoubtedly enhance acquisition of SE forms and their meanings.

Within the commonality across the three languages, however, the meanings of SE forms are remarkably fine-tuned and language-specific. Acquisition data show that children acquire
language-specific meanings from the onset of their acquisition of these SE forms. Let’s compare Korean and Turkish. In Turkish, two types of verbal suffixes are acquired early, -dI and -mIş. These two forms carry tense information, namely past tense, as well as evidential meaning (Aksu-Koç and Slobin 1986): -dI expresses past events that the speaker has directly witnessed whereas -mIş expresses non-witnessed past events (inferred from the present) that are new to the speaker. Turkish children first acquire -dI to express information that they have assimilated through direct experience. They then acquire -mIş to refer to new information (that the child has not realized before) and use it in storytelling and pretend plays.

The -dI and -mIş distinction can be likened to the -ta and -e distinction in Korean. However, their functions also differ in significant ways: whereas in Korean the two forms express purely modal meanings, in Turkish modal markers are fused with tense/aspectual information. The two systems also differ in the kinds of epistemic/evidential meanings each form expresses. For example, while both -dI and -ta express direct experience, -dI refers to information that is assimilated into the speaker’s mind whereas -ta does not. -Ta actually expresses a newly perceived event/state.

Choi and Aksu-Koç (1999) compared acquisition of SE verbal suffixes in Korean- and Turkish-learning children between 1;6 and 3;0. What is similar between the two languages is the kinds of notions the two groups of children encode with modal markers and the general developmental trajectory of modal meanings. In both Korean and Turkish, direct experience is expressed early (-dI in Turkish and -ta in Korean). Both groups also distinguish between new and old information from early on. At around 2;6, both groups begin to express hearsay (-mIş in Turkish and -tay in Korean). Within this common developmental pattern, however, children in each language are remarkably sensitive to the language-specific meanings of the modal forms. In congruence with the adult grammar, Turkish children use -dI for past events but Korean children use -ta for both past and present events. Turkish children use -mIş in reference to past processes that were inferred from the present state (i.e. non-witnessed) and to signal novelty of information. In contrast, Korean children use -ta for novelty of information but not for inferential function.

Looking at Korean and Turkish (as well as Japanese) data, it is remarkable that children acquire language-specific modal meanings from the onset. How do we explain this? On the one hand, children must be cognitively sensitive, at some level, to notions that relate to new/old, shared/non-shared, directly/indirectly obtained knowledge. At the same time, children must also attend to caregivers’ speech and extract appropriate meaning components of a given modal form taking into account discourse-pragmatic aspects of the context. Such interaction between cognitive readiness and linguistic input seems similar to the one I suggested for acquisition of spatial terms. That is, during the preverbal stage, infants develop sensitivity to the differential information status of speaker and hearer and to different types of information source. (A recent study (Song and Baillargeon 2008) suggests that at 15 months of age, infants may understand that another person may not know what they know.) As children get linguistic input, they can then pick out (or combine) relevant features to acquire the modal meanings of the target language.

What is the precise relationship between language and cognition in the domain of modality? Studies have reported influence in both directions. On the one hand, there is evidence that cognitive abilities are foundational to particular linguistic abilities. Gonsalves and Falmagne (1999) conducted both linguistic and nonlinguistic tests relevant to deontic and epistemic modality to children aged between 2;6 and 5;0. Concerning epistemic modality, only those children who passed the nonlinguistic tests could also pass language comprehension tests. The result suggests that cognitive ability is foundational to understanding epistemic modality.
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(For deontic modality, however, there was no particular direction that was significant.) The order of acquisition of epistemic modal verbs in English and French also suggests that it is based on general cognitive development: children express “certainty” before they express probability/possibility (Bassano 1996; Moore et al. 1990). Other studies have reported children’s linguistic ability to be precursor to development of the knowledge structure called “theory of mind”; namely, the ability to differentiate between one’s own beliefs and others’. For example, the speaker (but not the hearer) may know that an object is actually a candle, although it looks like an apple. In Farrar and Maag (2002), general language development (development of vocabulary, syntax, verbal memory) predicted later performance on “theory of mind” tests. In de Villiers and Pyers (1997), acquisition of sentential complements (I think/know that . . .), which provide the representational structure, is a critical prerequisite for development of false belief reasoning. Clearly, more research is needed to understand the relationship between linguistic development of modality and cognition.

3 Conclusion and future directions

Acquisition of semantics in young children is a complex process involving cognitive, linguistic, and socio-pragmatic factors. During the last two decades, developmental psycholinguists have proposed a number of learning mechanisms to explain the “fast-mapping” ability in first language acquisition. These mechanisms have revealed sophistication in children’s detection of multiple types of cue at all levels of language that would enhance their semantic acquisition. However, they explain only the early stages of the acquisition process and do so only partially. More research is needed to identify the processes at later stages and to understand how those mechanisms interact with one another in a given semantic domain.

Recent studies have also demonstrated that children acquire language-specific semantics (particularly in the domain of relational words) from early on and that linguistic input and children’s cognitive ability interact in a dynamic way from the beginning of semantic acquisition. Studies in spatial development have further shown that during the preverbal period infants build up sensitivity to a large number of spatial features, which would essentially allow them to learn the spatial semantic categorizations of any language. Further research should explore whether such is also the case in other semantic domains.

Early interaction between linguistic input and cognitive development has raised questions about the extent to which one influences the other. While early theories focused predominately on the influence of cognition on language, recent studies have shown that semantic acquisition in early years can influence nonlinguistic cognitive categorization. Studies in different domains of semantics should pursue this area of research to identify the precise nature of the interaction between semantic and cognitive development.

Further reading


phonology, morphology, syntax, pragmatics, and discourse, focusing on how children use language as they learn them and integrating actual data with current relevant theories and debates on language acquisition.


Medin, D., B. Lynch and K. Solomon 2000. Are there kinds of concepts? Annual Review of Psychology 51: 121–147. This article proposes distinguishing object and non-object concepts based on three criteria – structure, process, and content – and reviews possible and plausible categories of events, objects, and properties in support of such criteria.

References


Acquisition of meaning


Soonja Choi


**Related topics**

Chapter 9, Linguistic relativity; Chapter 12, Lexical decomposition; Chapter 21, Modality.