Linguistics

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Introduction

The study of language development and the study of linguistics have long been intertwined. Ties between the two disciplines were given a deeper theoretical grounding in the 1950s–1960s through Noam Chomsky's paradigm-changing challenge to behaviorist accounts of language acquisition. Chomsky argued that the structure of language is far more complex than behaviorists had envisioned, and that the child's task is not simply to build up a stock of sentence patterns or responses, but to formulate a highly abstract underlying rule system. Learning mechanisms commonly invoked at the time, such as modeling, imitation, and reinforcement, were, Chomsky urged, inadequate to this task. He proposed that certain aspects of grammatical structure (viz., language universals, or constraints honored by all languages) are not in fact learned at all, but are known innately, as part of the child's inborn capacity for language acquisition.

Interest in the relationship between language universals and children's capacity for language acquisition remains strong, although linguistic frameworks have diverged and there is now a range of approaches to characterizing the linguistic structures a child must master. In the generative grammar tradition of Chomsky and his followers, grammatical structure is held to be autonomous (i.e., independent of meaning or other external factors and shaped by the domain-specific architecture of the mind). This architecture is seen as guiding the process of language acquisition: children rely on innately known abstract categories and principles in analyzing the structure of the language they are exposed to. This approach may be contrasted with that of cognitive-functionalist ('usage-based') approaches to linguistics, which view language structure as intimately related to the semantic and pragmatic properties of the messages being communicated, as well as to mechanisms of perception and production (Tomasello, 1998, 2000). Researchers working within this framework assume that most aspects of language are learned, not innate, although children are credited with a species-specific capacity for this kind of learning. The cognitive-functionalist perspective offers many points of contact with traditional concerns of developmentalists, and it will be the main focus of this entry. An introduction to the generative grammar approach to language acquisition can be found in Crain & Lillo-Martin (1999).

Discovering the mapping between form and function

According to the cognitive-functionalist perspective, the structure of human languages can be seen as a set of strategies that have evolved over time to solve communicative problems. Examples include how to direct someone's attention to a particular entity, how to express basic relations among entities (who did what to whom), how to elicit specific kinds of information (what, where, when, etc.), how to indicate what information is new and what is assumed to be shared by the listener, and how to describe an event from the perspective of one participant rather than another. Strategies differ across languages, and the 'choices' a language makes for how to solve one kind of problem often have repercussions for how it may solve another. For instance, English uses word order to distinguish agent and patient (cf. 'Bill kissed Ellen' versus 'Ellen kissed Bill'). Turkish, in contrast, marks the direct object with a suffix (accusative case ending): *Bill Ellen-i öptü* 'Bill Ellen-accusative kissed' ('Bill kissed Ellen'). The use of explicit markers to indicate basic relationships among sentence elements leaves word order free to express other meanings, such as emphasis or speaker perspective. For example, simply by switching the positions of agent and patient – *Ellen-i Bill öptü* 'Ellen-accusative Bill kissed' – a speaker of Turkish can convey that 'It was *Bill* who kissed Ellen.' To express this meaning in English requires the use of emphatic

stress or a special construction, or both (as shown here).

Form

Within this perspective on language structure, children's task is to work out the mapping between form and function (e.g., to discover the devices their language uses for communicating information of various kinds). Research since the 1970s has yielded substantial insights into how children approach the 'form' side of the mapping problem. For example, drawing on acquisition data from many different languages, Slobin (1985–1997, Vol. II) has explored which kinds of form-meaning mappings are easy for children and which are more difficult (i.e., learned later with more errors). Such data provide clues to learners' procedures for discovering and representing linguistic structure. For example, children do better with mappings that are 'iconic,' in the sense that the meaning to be communicated is in some way diagrammed or mirrored by the arrangement of the linguistic elements (e.g., when each element of meaning is expressed by one element of form, or the order in which two events take place is reflected in the order of clauses within a sentence). In further studies of the learning of forms, Tomasello (2003) and his colleagues have explored how children build up knowledge of grammatical structure over time, arguing that – contrary to generativist claims – learners' early grammars lack system-wide syntactic categories or parameters, and are instead item-based, reflecting, for example, knowledge of how to combine particular verbs with other elements.

Meaning

In much functionally oriented work on language acquisition, it has been assumed that while forms vary, the meanings to be expressed are more or less universal. Several factors have contributed to this view. Firstly, cross-linguistic work of the 1970s showed that, all over the world, children's first word combinations revolve around a restricted set of meanings to do with agency, action, location, possession, and the existence, recurrence, non-existence, and disappearance of objects. These were exactly the kinds of meanings that Piaget had stressed in his work on sensorimotor development, which suggested that children's early meanings originate through universal cognitive processes, and are later mapped onto language (Brown, 1973). Further inspiration came from early cross-linguistic studies of semantic categorization in adult languages (e.g., the domain of color terms), which suggested that semantic variation is more strongly constrained than had been supposed. Children's early meanings often show striking correspondences to candidate semantic universals,

which has suggested that the organization of meaning both in languages and in language learners is molded by fundamental propensities of human perception and cognition (E. V. Clark in Bowerman & Levinson, 2001).

Meanings of grammatical elements

A domain for which semantic correspondences between child and adult speech have been explored in particular detail is that of grammatical elements or 'closed class' forms (e.g., tense and agreement markers on verbs, plural markers and case endings on nouns, prepositions, conjunctions). In adult languages, these elements (as opposed to 'open class' items like nouns and verbs) convey restricted and schematic kinds of information (e.g., whether an entity is one or more than one – book versus books – but not that there are exactly five of them, or that their color is red). One explanation attributes these special meanings to biases inherent in the language learner. For instance, Slobin (1985–1997, Vol. II) proposed that children come to the language acquisition task with a pre-structured semantic space in which there is a "privileged set of grammaticizable notions" to which grammatical elements are initially mapped. Although the forms that get mapped vary across languages, of course, the meanings themselves are constant, and the result is a "universally specifiable 'Basic Child Grammar' that reflects an underlying ideal form of human language." A related hypothesis is Bickerton's (1981) proposal for an innate 'language bioprogram' – a universal cognitive/semantic sub-stratum for language that privileges certain meaning distinctions over others.

In a recent reconceptualization of the problem, Slobin has concluded that it is not, after all, necessary to explain the special meanings of grammatical elements by building them directly into the child (D. I. Slobin in Bowerman & Levinson, 2001). He argues that the schematic nature of these meanings can be adequately accounted for by reference to discourse factors that guide 'grammaticization', the diachronic process through which forms such as nouns or verbs may, over time, become restricted in their positioning, phonologically reduced, and semantically 'bleached,' until eventually they end up as new grammatical elements. This example shows that semantic universals can in principle be accounted for in different ways (e.g., by reference either to semantic predispositions inherent in the child, or to discourse processes at play in rapid speech among fluent speakers).

Semantic and syntactic bootstrapping

A second area in which a close relationship has been posited between language acquisition and semantic universals is that of 'argument linking' – the mapping

between the semantic roles associated with a verb, such as agent and patient, and the syntactic treatment of the noun phrases that play these roles. Both within and across languages, there are strong regularities in this mapping (e.g., in most languages an agent argument appears as the subject of a sentence, and a patient argument as the direct object of the verb).

According to generative linguistic approaches to language acquisition, these regularities suggest that linking rules are innate, which means that children can draw on them to solve important acquisition problems. According to the hypothesis of 'semantic bootstrapping' put forward by Pinker (1984), children use meaning to predict syntax. For example, they assume that if a word names the agent of an action (like "Daddy," in "Daddy threw the ball"), it is the subject of its sentence. From this starting point, they can work out further properties of the target language, such as the basic ordering of subject, verb, and object. A second proposal, 'syntactic bootstrapping' (Gleitman, 1990), runs the process the other way, from syntax to meaning: when faced with a new verb, the child uses the number and syntactic arrangement of its arguments to make a first-pass prediction about its meaning (e.g., in "Mary *blicks* the ball to John," *blick* is likely to be a verb of object transfer, such as 'give,' while in "Mary *blicks* that the ball is red," it is probably a verb of perception or cognition, such as 'see' or 'think').

Like the question of whether children are really pre-disposed to assign certain kinds of meanings to grammatical elements, semantic and syntactic boot-strapping have been hotly debated. Some critics focus on whether linking regularities are indeed universal enough to plausibly be considered innate, while others argue that children's knowledge of semantic-syntactic correspondences is built up over time in a process of schema abstraction (Goldberg, 1995; Tomasello, 2003).

Cross-linguistic variation in the structure of meaning

Since the early 1990s there has been a trend away from emphasis on universals of meaning and their role in language acquisition, and toward exploration of cross-linguistic differences in semantic structure. Languages may be constrained, but they are by no means identical: in every conceptual domain, there is significant varia-tion in the categories of meanings to which the forms of language are linked. Wherever there is variation, children's non-linguistic conceptualizations of the world cannot be counted on to supply directly the meanings to be encoded. Between non-linguistic cognition and the forms of language lies another level of linguistic

organization that has often been neglected in research on language development, namely, the semantic system of the target language. Current studies often stress that, just as learners must discover the syntax, morphology, and phonology of their language, so too must they work out its semantic system (Bowerman & Levinson, 2001, Part 4).

One kind of semantic difference among languages lies in what *must* be said – obligatory categories of meaning. For example, speakers of English must indicate in every sentence the time of the situation being talked about (a tensed verb is obligatory). Speakers of Turkish must also specify time, but, in addition, they must indicate (for past events) how they know about the situation (through direct perception versus hearsay or inference). Speakers of Mandarin, in contrast, need specify neither of these meanings. Children must, then, determine which meanings must be marked in their language, and which are optional, or left to inference.

A second and more fundamental kind of semantic difference across languages lies in the partitioning of basic conceptual domains such as space, time, and causality (e.g., how many categories are distinguished, and what these categories encompass). For example, the English prepositions *in* and *on* pick out concepts of 'containment' and 'support' that seem fundamental to native speakers of this language. But many languages lack close translation equivalents for these words, and classify spatial situations according to different criteria. Compare, for example, the classification of four spatial manipulations in English (Fig. 1A) and Korean (Fig. 1B): the English distinction between containment and support is crosscut in Korean by the category picked out by the verb *kkita*, which is used for fitting objects with complementary shapes snugly together regardless of whether the moved object goes 'into' or 'onto' the stationary object (M. Bowerman & S. Choi in Bowerman & Levinson, 2001).

Acquiring a language-specific semantic system

Recent research has shown that children tune in to language-specific classification principles remarkably early (Bowerman & Levinson, 2001.) For example, learners of English and Korean reveal sensitivity to the language-specific spatial categories shown in Figure 1 by as early as 18 to 24 months, both in their early production of spatial forms and in their comprehen-sion, even before production begins. By the one- and two-word stage, very young children learning Tzeltal, a Mayan language of Mexico, sub-divide 'eating' events more finely than children learning English, using different verbs, as is appropriate, for eating meat versus soft things versus crunchy things. These studies suggest that in addition to mapping already-available concepts
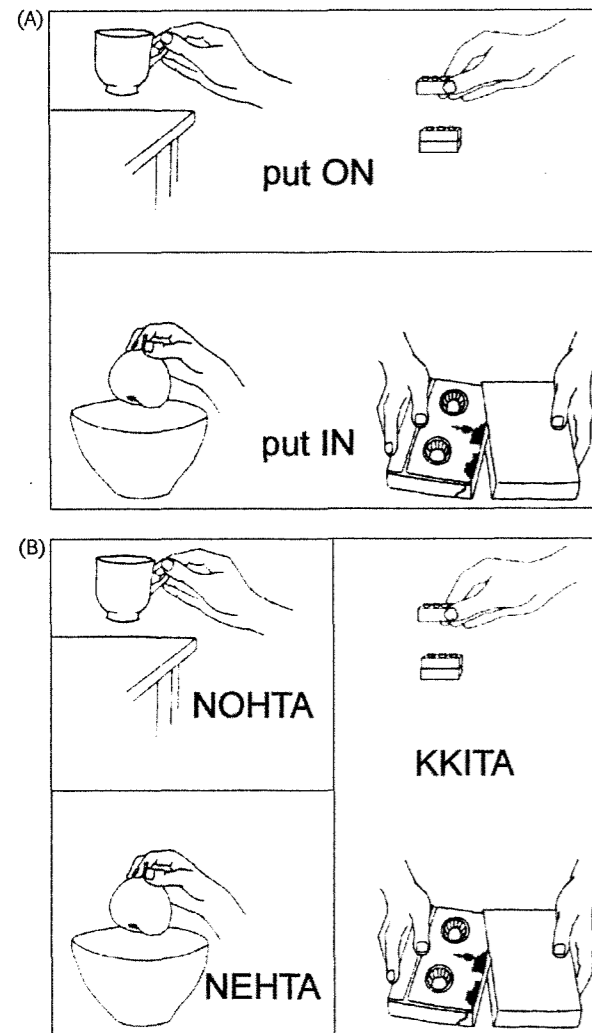
Figure 1. A – Semantic classification of four actions in English; B – Semantic classification of four actions in Korean.

directly to the forms of language, children may be capable, even from a very young age, of *constructing* categories of meaning through observing the distribution of forms across contexts in the speech of fluent speakers.

One factor that may contribute to rapid, language-specific acquisition is that cross-linguistic semantic variation is not unrestrained, but tends to pattern along a limited number of dimensions. As noted earlier, limitations on semantic variation might reflect either inborn cognitive-perceptual constraints or the shaping of meaning by the demands of fluent discourse; either way, the fewer the possibilities the child has to consider, the more tractable the learning task. Another factor that may facilitate early language-specific semantic development is that although there is diversity in the organization of meaning *across* languages, systems tend to be coherent *within* languages. For example, English characteristically encodes the path of motion with *particles* (e.g., 'go *in, out, down*'), while Spanish provides

verbs for this purpose (*entrar* 'go in'; *salir* 'go out' *bajar* 'go down'). These languages exemplify two of the major typological patterns according to which languages express motion (Talmy, 1985), where 'typology' refers to how languages cohere into distinct 'types' in their characteristic solutions to given communicative problems. The existence of intra-language systematicity means that whatever children have already learned about one part of their language can help them to make accurate predictions about other parts. This process has been termed 'typological bootstrapping' (D. I. Slobin in Bowerman & Levinson, 2001).

Influence of language on thought?

In the last few years, renewed attention to language-specificity in the organization of meaning has led to a resurgence of interest in an old question: does the language we learn affect the way we think about the world (the Whorfian hypothesis)? The possibility of linguistic influences on thought (perception, memory, similarity judgments, problem-solving, etc.) was for many years summarily rejected, but recently there have been several tantalizing lines of evidence. For example: (1) the presence of a distinction between two copulas in Spanish (*ser* 'to be' for inherent properties and *estar* 'to be' for transient properties) is associated with an earlier appreciation of the 'appearance-reality' distinction in learners of Spanish than in learners of English (Sera, 1997); (2) in early childhood, learners of both English and Yucatec Mayan strongly tend to classify objects by shape. This preference continues into adulthood for English speakers, but for Yucatec speakers it declines by 7–9 years of age and is replaced by a preference for material. These differences were predicted on the basis of systematic differences in the semantics of nouns in the two languages (J. Lucy & S. Gaskins in Bowerman & Levinson, 2001); and (3) adults who have learned a language that habitually presents spatial situations from the speaker's perspective (e.g., 'the cup is *to the left of / behind the bowl*') solve spatial problems differently from adults who have learned languages that habitually use a geocentric perspective ('the cup is *to the west of / uphill of the bowl*') (Levinson in Bowerman & Levinson, 2001). Of course, the proper interpretation of such findings is controversial, but the recent stress on language specificity has brought the relationship between language and thought back into the mainstream, and we can expect much future work on this issue.

Conclusions

Over the last several decades, there has been a close relationship between the study of linguistics and the

study of child language development. Following Chomsky, linguists have often explained hypothesized language universals by attributing them to properties of the child's inborn capacity for language acquisition. In their turn, acquisitionists have tried to explain how children draw on this innate knowledge to work out the structure of the language being acquired. The ensuing debates have typically revolved around what kind of innate knowledge of language structure, if any, it is plausible to attribute to the child.

Recent years have seen the rise of alternative 'usage-based' linguistic frameworks that emphasize cognitive and functional motivations for syntax and morphology, and describe the structure of any particular language as a complex set of interacting strategies, constantly in flux, for solving communicative problems. These approaches are attractive to child language researchers who favor 'learning' over 'innate knowledge,' because the child's task can be seen as one of discovering the mapping between forms (words, grammatical morphemes, construction patterns) and their meanings. Early attempts to understand the acquisition of form-meaning mapping concentrated primarily on the forms, with the assumption that the meanings are supplied by non-linguistic cognition and so are more or less universal. But researchers now emphasize that there are in fact striking differences in the way languages partition conceptual domains. To the extent that semantic categories differ across languages, the traditional assumption that children map the forms of language directly onto non-linguistic concepts becomes less plausible. Rather, the acquisition of semantic categories begins to look like an integral part of linguistic development, albeit a process that must

interact with children's non-linguistic conceptual understanding of the world.

In the coming years, cognitive-functional approaches to linguistics are likely to take on increasing importance for the study of language acquisition. On the one hand, scholars are attempting to characterize the mechanisms for pattern finding and schema abstraction that children use to discover patterns of form-meaning mapping in their language. On the other hand, they are trying to determine how the construction of language-specific semantic categories draws upon, interacts with, and possibly even influences children's general conceptual understanding of the world. Both developments will tend to pull the study of language acquisition back closer to traditional concerns of developmental psychologists than has been the case for child language research carried out within the framework of generative grammar.

See also:
Constructivist theories; Theories of the child's mind; Cross-cultural comparisons; Cognitive development beyond infancy; Language development; Williams syndrome; Ethology; Jean Piaget

Further reading

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The Cambridge Encyclopedia

of CHILD

DEVELOPMENT

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