using these forms, children express that the world that they are creating may be only potential.

Epistemic modality also relates to development of mental verbs, for example, think, know, and believe. Because these verbs can take sentential complements (e.g., I think that the apple is actually a candle), the speaker can explicitly differentiate between the event and his or her cognitive stance regarding the event.

Epistemic modality is also closely related to discourse pragmatics. A number of languages, for example, Japanese, Turkish, and Quechua, have particles to express the type of evidence and information status of an event or state that conveys different degrees of certainty. These particles can specify whether the information is new or well established, whether it is shared with the listener, or whether it is directly or indirectly obtained. These forms occur primarily in informal spoken interactions as conversation participants exchange their knowledge about a given topic. Children acquire these particles from as early as 1 year 8 months. The early acquisition is probably due in part to high frequency and perceptual salience of the markers (e.g., monosyllabic or postposition).

What is the precise nature of the relationship between cognition and language in the development of epistemic modality? There is evidence that cognitive abilities are foundational to the development. Observational studies (between 2 and 4 years) in different languages report a similar order of acquisition: Children acquire the notion of certainty earlier than various degrees of uncertainty, that is, probability and possibility. This may be explained by gradual cognitive development in the level of abstraction. For example, uncertainty is more abstract than certainty in that it involves a notion that an assertion could be open to question.

Experimental studies show essentially the same order of acquisition, although the ages of acquisition tend to be somewhat later (between 3 and 5 years) than those reported in observational studies. (The discrepancy is probably due to some demand for metalinguistic ability and certain degrees of unnaturalness inherent in experimental tasks.) Experimental studies also show that initially (around 3 years of age), children understand individual epistemic notions (e.g., certainty and possibility) independent of one another. From about age 4, they begin to relate one notion to another in terms of differences on an epistemic scale.

Other studies have reported that children’s linguistic ability plays a crucial role in the development of the ability to differentiate between one’s own beliefs and those of others—a body of knowledge known as theory of mind. For example, in a theory of mind task, the speaker (but not the hearer) might know that an object is actually a candle, although it looks like an apple; probe questions are design to test whether children can distinguish the beliefs of the speaker and hearer. In some studies, general language development (development of vocabulary, syntax, and verbal memory) was predictive of performance on theory of mind tests, whereas in other studies, acquisition of sentential complement (I think/know that X) was the critical factor.

In order to understand the exact nature of the interaction between modal expressions and cognition, there need to be more studies on typologically different languages that examine relationships between specific types of modality and specific cognitive capacities.

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See Also: Aspect; Auxiliary and Modal Verbs; Discourse-Pragmatics; Evidential Markers; Morphological Development; Theory of Mind and Language Development.

Further Readings

Event Perception and Language Development

Verbs and prepositions are the cornerstones of language, allowing people to talk about relations between objects in events. However, a wealth of research shows that learning verbs and other relational terms is difficult when compared to nouns. Imagine a parent trying to teach the verb sliding to their child while watching
children play at a park. The parent locates a boy about to go down a slide and points to him saying, “Look! He’s sliding!” To the parent, these actions may appear to provide a defined referent for sliding; however, the story is much more complex from the perspective of the child. For one, while objects have discrete perceptual boundaries, events are continuous. The child learning sliding must figure out that the action begins after the child climbs the ladder and ends prior to him landing on the ground and running to the jungle gym. Even with the event appropriately segmented, there are numerous components of this event to which the verb sliding could refer. While the parent intends to refer to the manner in which the boy descends the slide, the parent could be referring to the downward path of his motion or the fact that he is perched on the slide rather than underneath it. To make matters more complicated, languages differ in the components of events they represent in various parts of speech: Verbs typically depict manner information (e.g., how an action is performed—i.e., sliding versus running) and prepositions path information (e.g., trajectory of motion—i.e., through versus around) in English, but verbs in Spanish focus more on the path of motion (e.g., salir [go]), and manner is expressed as an optional gerund (e.g., corriendo [running]). How do children resolve such complicated issues of verb learning?

Over the last decade, research has sought to illuminate this intersection between event processing and language development to understand how children maneuver this complex problem space. This entry reviews the existing literature on how infants process and package events in a way that supports language learning. It begins by examining infants’ ability to attend to a wide range of components of events that underlie relational terms across languages. It then turns its attention to how children progress from this broad base to more language-specific representations, wrapping up with a discussion of what these processes tell us about the relation between language and thought.

Linguistic Origins

The study of verb learning began in cognitive linguistics, where researchers considered the conceptual underpinnings of relational language. According to L. Talmi, relational terms label a subset of many simultaneous occurring components of events, including path (trajectory of motion), manner (the way in which a figure moves), source (beginning point of an action), goal (end point of an action), figure (the primary agent in the event), ground (the reference point for that event’s path), containment (when something is fully or partially surrounded by a container), support (the contact of an object on top of a surface), and force dynamics (how entities interact with respect to force). While not intended to be an exhaustive list, these concepts provide a springboard for studying how children process the semantic categories in events that support relational terms across languages.

Bringing linguistics into psychology, researchers began to study semantic components in early childhood that have three features. First, these components of events that will be encoded in language are perceptually available in infancy. Second, these components are codified across the world’s languages. Third, languages differ in how they encode these components, as in the path and manner example above. The following sections review what has been discovered about children’s ability to discriminate and categorize these semantic components in preparation for mapping word to world.

Path–Manner

Manner of motion expresses how an action is performed. Path of motion describes the trajectory of an action. In the example The dog is running up the stairs, the verb (i.e., running) encodes the manner of the dog’s motion, while the preposition (i.e., up) expresses the dog’s path with respect to the ground (i.e., stairs). While both are present across languages, languages differ in how they encode such information. English is a manner-biased language, with manner expressed in the main verb (as in running) and path in a prepositional phrase (up the stairs). On the other hand, languages such as Turkish primarily encode path in the verb and manner outside the verb (e.g., sinifa kosarak girdi [go into the class runningly]).

Studies show that 7-month-old, English-reared infants attend to path and manner changes in non-linguistic dynamic events. Infants were shown an animated starfish performing both a path and manner (e.g., a starfish spinning under the ball) until their looking time dropped to or below 65 percent. At test, infants increased their attention to both a path (e.g., starfish spinning over the ball) and manner change (e.g., starfish making jumping jacks under the ball), suggesting that they discriminated changes in these two semantic components. However, discrimination is insufficient for acquiring motion verbs. Children must form categories of path and manner onto
which motion verbs can be mapped. Research shows that, after being familiarized to the same path (e.g., over) with varying manners (e.g., spinning, bending, twisting, and jumping jacks), 10- to 12-month-old infants can form categories of a figure’s path. In addition, studies suggest that 13- to 15-month-old infants abstract manner of motion (e.g., spinning) across changes in path (e.g., past, in front of, under, and over). Thus, even in the first year of life, children seem to be sensitive to manner and path changes in these nonlinguistic tasks.

**Containment—Support**

Containment refers to a relation in which an object is fully or partially surrounded by a container (e.g., apple in a bowl), whereas a support relation consists of an object resting upon a surface (e.g., apple on a table). Though encoded across languages, these categories vary. English utilizes the categories of in and on, while Korean labels containment and support based on the degree of fit between objects. These categories of tight fit (e.g., apple in cup or ring on finger) and loose fit (e.g., book on table, orange in bowl) collapse across the English categories of in and on.

English-reared infants notice Korean degree-of-fit relations by 5 months of age and differentiate between in and on by 6 months. The English categories of containment relations also appear around 6 months of age across a variety of exemplars, but support relations are not categorized until 14 months. Both English- and Korean-reared infants form categories of tight-fitting and loose-fitting relations by 9 months of age, showing that infants attend to conceptual divisions within events that are not encoded in their native language.

**Figure—Ground**

The figure of an event is a movable entity that can follow any path in reference to the ground or stationary setting. Terms across languages encode ground information, such as the English words cross or through. Yet, figure and ground are encoded differently in languages such as English and Japanese. Japanese ground-path (GP) verbs encode the nature of the ground along the trajectory of the motion. A verb like wataru implies that someone crosses a flat barrier between two points such as a bridge or a road. Wataru cannot be used to describe a ground that is not flat (e.g., a hill) or when the ground does not contain a barrier between two sides (e.g., a field). Other relations include koeru (i.e., go over) and mukeru (i.e., pass through). These ground distinctions in Japanese GP verbs are not marked in English.

English-reared infants distinguish figures in dynamic events by 10 months. Both English- and Japanese-reared infants differentiate between and form categories of Japanese ground distinctions (e.g., crossing a railroad versus a grassy field) by 14 months.

**Source—Goal**

The source of motion is a reference point from which a figure moves, while the goal of motion is a location or reference point toward which the figure moves. Source and goal are encoded in both source paths (e.g., from or flee) and goal paths (e.g., to or approach). Source and goal are exceptions to the pattern observed with previous constructs. While they are encoded in all languages studied to date, these components appear to be packaged in similar ways: languages encode goals more often than sources for both movements of intentional and inanimate figures. However, some languages such as Japanese differentiate source and goal with specific morphemes (e.g., ni and kara) attached to the noun.

Research shows that infants discriminate between goals in motion events by 12 months of age. Twelve-month-olds also identify source changes in events but only when sources are made extremely salient (e.g., decorated with sparkles). Fourteen-month-olds form categories of goals across different objects, spatial relations, and agents. Infants of the same age cannot form categories of sources across such variation.

**Spatiotemporal Causality—Force Dynamics**

Spatiotemporal causality refers to the action of one figure bringing about the action of a second. Such relations have traditionally been defined by the presence of spatial and temporal contiguity between the motions of the two figures. Spatiotemporal causality is encoded via transitive frames (e.g., The boy pushed the girl) and across languages, but with variation. Languages with fixed word orders, such as English, allow a wide range of agents in the subject position, including both intentional beings (e.g., The boy cut the bread) and tools (e.g., The knife cut the bread). On the other hand, languages of variable word order, such as Korean, restrict their category of causal agents to exclude tools, such as knives or keys.

Force dynamics refer to the interactions between forces in an event, moving beyond spatiotemporal causality to classify events into categories of cause,
prevent, enable, and despite. For instance, the statement *The boy helped the girl get to her house* implies a figure (the girl) with a path or intent for a given goal (the house), another figure (the boy) with a concomitant path or intent, the presence of spatiotemporal causality (the boy causes motion in the girl), and an achieved goal (the girl reaches her house). Force dynamics are universally encoded yet vary across languages. For example, in contrast to English, Russian puts emphasis on intentional agents, which focuses attention toward forces of internal energy at the expense of external forces such as friction. This yields a broader category of *enable*, as motion cues are not required to attribute goal-directed intention to an actor. Thus, a parent pushing a child in a sled in the direction the child is facing would be considered an act of *enabling*. This is because the direction the child faces is considered a sign of intent. English speakers, in contrast to Russian, would be more apt to classify the event as *causing to move* due to the lack of visible effort on the child’s part.

Infants discriminate causal from noncausal interactions on the basis of spatiotemporal properties by 6 months of age, but categorization has yet to be examined. Indeed, no research has confirmed the presence of categories of force dynamics in children, with the only evidence coming from studies of adults.

**Events and Grammatical Structure**

Research at the intersection of event processing and language development reveals that language does not transparently map concepts into semantics but rather encodes meaning through the syntax–semantics interface. Though infants attend to nonlinguistic event components that will carry semantic meaning, they must learn to package these semantic elements into the specific grammatical structures of their language. Tracking statistical regularities between language and events, children learn the lexicalization biases of their language, first discerning relations between parts of speech and information in events (e.g., verbs primarily encode manner in English and path in Spanish). Second, they must recognize how semantic meaning surfaces with respect to argument structure. For instance, complementary terms such as *give* and *receive* and *chase* and *flee* are only distinguished by noting which nouns appear as the agent and object of the sentence. Conversely, the case of force dynamics highlights the need to understand that certain grammatical structures require attention to specific components of events. For instance, the phrase *Mary blicked Greg go home* requires attending to the relation between the forces of the two agents in the event (e.g., *helped*) over simpler cause–effect relations (e.g., *pushed*). Understanding these relations between events and grammatical structure is fundamental to a full mastery of language.

**Role of Language in Packaging Event Components**

Given the vast differences between languages, how might children go from a universalist foundation to hone what are often very different ways of processing events for language? Research shows that the language children hear informs them as to the way their native language packages these components in events. When language is present, children show increased attention to semantic categories in events. For instance, when presented a novel verb (e.g., *javing*) accompanying videos of either a single path performed over varying manners or a single manner performed over varying paths, infants were successful in forming categories of path and manner three months earlier than in non-linguistic contexts. Moreover, as language highlights relations repeatedly over time, children track statistical regularities in how their native language encodes events, forming biases concerning how each new word will relate to the world. English-speaking 29-month-olds with larger vocabularies, or who knew the word *on*, were less likely to distinguish the degree-of-fit relations encoded in Korean than their counterparts with smaller vocabularies. Similarly, at 19 months of age, Japanese infants continue to attend to the Japanese distinction between *waturu* and *tooru*, whereas English infants pay less attention to it. Language appears to act as a spotlight, heightening attention to contrasts the child’s native language encodes while dampening attention to nonnative distinctions.

Additionally, language can help make sense of ambiguous events. Take the example of *chase* and *flee*. These two complementary concepts are both present within a single event: When a fox chases a rabbit, the rabbit also flees the fox. How might children learn these two tightly tied but distinct concepts? Four-year-olds use syntactic bootstrapping, tracking the syntactic structure of the novel verb and the accompanying noun phrases to disambiguate the meanings of verbs and gain a point of view on the event. Children who hear, “The fox is glorp[ing] the rabbit” think *glorp* means *chase*, but children who hear, “The rabbit[ is blicking] the fox” think *blick* means *flee*. This
important tool can provide clarity in events that can be packaged in a variety of ways. While not an exhaustive list, these varied influences of language on event perception demonstrate how prior language learning supports further learning as children move toward mastery of their native tongues.

The Language–Thought Debate
What does the study of verb learning disclose about the relation between language and thought? The presence of nonnative semantic categories in infancy strongly suggests that language is not the source of concepts, as would be dictated by the Whorfian view of linguistic relativity. What emerges is a weaker version of the Whorfian hypothesis that recognizes the presence of prelinguistic categories while still asserting a role for language in helping children learn what Dan Slobin called thinking for speaking. As is the case in phonemic development, the process is one of semantic reorganization. Over the first year and a half of life, infants notice a common set of foundational components of events regardless of the language they are learning. Then, influenced by distinctions encoded in the native language, infants appear to focus on a subset of these categories that are relevant to their native language. Language, in this case, has the function of orienting infants’ attention to some relations over others. Through this process, infants develop new perspectives in their interpretations of event categories in linguistic contexts, effectively trading spaces as they develop.

What remains is the issue of which system, the conceptual or the linguistic, drives the learning of relational terms. In their Typological Prevalence Hypothesis, Dedre Gentner and Melissa Bowerman suggest that those categories found in many of the world’s languages are likely more natural and therefore easier to form in childhood. Consequently, more natural concepts will appear earlier in language development because of the ease of mapping them onto language forms. For instance, the more widely encoded distinction between in and on is acquired sooner than the less frequent relations of solid support, tenuous support, and encirclement with contact seen in Dutch. Here, one sees both processes for language and concept learning at work. In the case of in and on, perceptually based concepts are driving the acquisition of relational terms. In the case of solid support, tenuous support, and encirclement with contact, however, language must direct attention to the categories that are not as natural to the infant. Thus, both concepts and language have influences on language learning, but their effects are weighted differentially across concepts.

Conclusion
The partitioning of events for language is a complicated process, requiring researchers to bridge the gap between perceptual, conceptual, and semantic development. Linguists have provided the foundation for answering this challenge, delineating the components of events that help to carve the world into the units underlying relational terms. By looking at those components of events that are perceptually available, prevalent in all languages, and encoded differently across cultures, the study of language development in psychology has made great strides in understanding how these two worlds intersect. Children are uniquely prepared for the challenges of verb learning, progressing from universalists who encode a wide array of event components present across languages to sophisticated specialists who use the ambient language to master the packaging of these components in their native tongue.

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See Also: Argument Structure; Aspect; Conceptual Foundations of Early Word Learning; Labeling Effects on Cognitive Development; Motion Expression; Relational Terms; Semantic Development; Spatial Cognition and Language Development; Syntactic Bootstrapping; Thinking for Speaking; Word-to-World Mapping.

Further Readings


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**Evidential Markers**

Every language has lexical means to indicate the source of information being communicated (e.g., I saw, reportedly, or the teacher said). In addition, about one-quarter of the languages of the world (e.g., Bulgarian, Korean, Quechua, Tibetan, and Turkish) also have grammatical means to do so. The only difference between the following two Turkish sentences is in the evidential marker used: –DI in (1) indicates that the reported information is directly acquired by the speaker, for example, through witnessing the event, and –MİŞ in (2) indicates that the reported information is indirectly acquired, for example, through hearsay or inference.

(1) John mektup yaz–DI. (John wrote a letter; I have direct evidence.)

(2) John mektup yaz–MİŞ. (John wrote a letter; I have indirect evidence.)

Evidentials are grammatical markers that identify the source of the information that is being communicated (in the case of a statement) or anticipated (in the case of a question). Developmental research on evidentiality is in its infancy, and the understanding of the acquisition process is rapidly changing. Notably, acquisition trajectories across languages, although somewhat idiosyncratic, share a number of similarities.

Several features of evidentials should be highlighted to contextualize the acquisition research. Evidentials are usually verbal affixes (as in the Turkish example above), clitics, or particles. Semantically, they represent source information abstractly and within a closed system of contrasts. They refer to a subset of the conceivable information sources, typically distinguishing one or more of the following six types: vision, nonvisual sense, inference, assumption, hearsay, and quotation. Evidential systems vary in the number and type of source distinctions they make. The simplest evidential systems consist of only two categories (e.g., firsthand versus nonfirsthand), while the richest ones distinguish five or more.

Distributionally, evidentials are much more common than source-of-knowledge expressions in west European languages. Source-of-knowledge information is rarely expressed in west European languages, even in adult discourse. In languages with evidential systems, not every sentence contains an evidential. Past-tense sentences are more likely to be marked than future-tense sentences. Still, as evidentials are obligatory within a range of sentences, source information is quite frequent in these languages.

Pragmatically, the use of evidentials is constrained by the power dynamics in the communicative situations and considerations about responsibility for and authority over the information that is communicated.

Finally, evidentials should be distinguished from other linguistic tools speakers can use to characterize knowledge, in particular lexical and grammatical expressions whose primary meaning is the expression of speaker certainty (such as the modal verbs must and might in English) or that the information is unexpected for the speaker (as in Wow, you have grown!). The grammatical systems corresponding to these notions are epistemic modality and mirativity. The connections between evidentiality, modality, and mirativity are complex. For example, both evidentiality and mirativity show connections with the perfect. (Analogously in English, the present-perfect construction used to express surprise in Wow, you have grown! is also used to express an inference, for example, John has arrived.) Such connections have to be taken into account in acquisition research and highlight the need for strong links between language development and linguistics research.

Acquisition data on evidentials currently exist for only about a dozen languages and are most extensive for Korean and Turkish. Despite notable differences across languages, several commonalities have emerged. First, evidentials first appear in children’s speech by