First Language Acquisition

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As anyone who has tried to learn a foreign language can attest, language learning is difficult. And yet, all (typically developing) children become fluent speakers of at least one language, learning the majority of the necessary sentence structures and grammatical rules during the first few years of life. How do they do it? This question has fascinated researchers for a long time who have come up with different, competing explanations. A very influential proposal has been the so-called nativist or generativist approach, which assumes that children are already born with knowledge of linguistic structure, and that linguistic knowledge is manifested in the form of rules (e.g. ‘add -ed to a verb to form the English past tense’). Knowing these rules allows the speaker to generate (hence the term ‘generative’) new utterances. In contrast to this, usage-based, constructivist approaches assume that children acquire linguistic knowledge from the language they hear. Linguistic knowledge is represented in the form of constructions, which can be thought of as form-function pairings, and rather than using rules to produce new utterances, children are assumed to operate by analogy (e.g. ‘kiss – kissed, miss – missed’).

Researchers working in this latter framework ask questions such as: What is the nature of the constructions in children’s developing grammar? What kind of information is available to children in the language they hear around them? How do children move on from their earliest simple utterances to complex syntax? To answer these questions, researchers employ a number of different methods. Since language input is seen as the driving force behind children’s acquisition, much work has been devoted to analyzing what children hear in everyday life using corpora of child-directed speech (CDS), to determine how this relates to what children produce themselves. But experimental methods are also widely used as they allow researchers greater control over the precise language children hear and are asked to produce.
In this chapter, we describe how constructivist approaches explain children’s acquisition of language. The focus is on grammatical constructions (syntax and morphology), so other areas of language, such as phonology and word learning, will not be covered here. The majority of examples are drawn from English, where the most work has been done, but we provide a few examples from other languages as well. Throughout, various methodologies will be covered to give readers a better understanding of the constructivist research tradition. The chapter is organized in four sections: First, we describe the notion of ‘construction’ and outline how children learn their first multiword utterances and gradually expand these to more abstract constructions. Next, we discuss the role of the input in acquisition and how children can use different kinds of frequencies to grasp the regularities of their language. The third section examines children’s creativity in language production and how their errors might indicate construction-based learning. The chapter concludes with a summary and discussion of remaining challenges, and suggestions for future directions.

4.1 Constructions in Child Language

Constructivist approaches to language acquisition assume that linguistic knowledge is learned and represented in the form of constructions. A construction is a pairing of a form with a particular meaning, used in a certain context to achieve a communicative goal. While traditional approaches assume a dichotomy between the lexicon containing words (‘mental dictionary’) and the grammar that combines these words into sentences (‘rules’), constructivist theories view grammar as a continuum: Constructions range in size from individual words such as ‘book’ to abstract and complex syntactic constructions such as the periphrastic causative construction (e.g. *The film made him cry*), or relative clauses (e.g. *The man who knew too much*).

Typically, children are thought to infer a form’s communicative function by observing how it is used in a specific context; repeated contexts are seen as particularly helpful for the formation of consistent form-meaning mappings. For instance, the child may hear someone say *Put your shoes on* in a situation where the speaker is looking at her, looking at the shoes, or preparing to go out. If she understands that the speaker is making a request, commenting on an action (putting shoes on), and/or that this action is relevant to the current context (preparing to go out), she may then associate the string with the event, learning specific utterances associated with specific contexts of use. Note that this account assumes that children make use of sociopragmatic skills to learn language. Sociopragmatic development – for instance, the ability to follow and direct another’s focus of
attention via pointing or eye gaze (Butterworth and Grover 1990), to infer
the intentions of others (Carpenter, Akhtar, and Tomasello 1998), and to
engage in collaborative acts (Bakeman and Adamson 1984) – is seen as
a prerequisite for language acquisition, and indeed many studies demon-
strate that prelinguistic children are sophisticated social thinkers.

Once children begin to talk, there is ample evidence that their early
word combinations appear to be lexically specific, item-based construc-
tions, known as ‘frozen phrases’ or ‘schemas.’ Frozen phrases are unana-
lyzed combinations of words that always appear together in that form,
with no evidence of flexibility in use, such as I dunno or What’s that? It is
assumed that as children learn more and more individual, item-based
constructions, like I wanna play, I wanna go, I wanna eat, or I’m eating cheese,
I’m eating cake, I’m eating breakfast, they realize that utterances can share
phonological elements (form) and/or meaning. In the simplest scenario,
this might result in slot-and-frame constructions where a part, the frame,
is always the same (i.e. I wanna), while one element, the slot (X), is variable
(e.g. I wanna X, where ‘X’ = play, go, eat). The category of words that can
occur in the slot is not (yet) a syntactic category like VERB. Rather, the
slots, loosely labelled with terms like OBJECT, and PROCESS, permit words
consistent with the range of meanings the child has heard used in that slot
in the input, so they could be relatively narrow (e.g. substances I can eat) or
relatively broad (e.g. actions I can do myself). At this stage children have
moved on from frozen phrases to lexically specific, but partially produc-
tive constructions (e.g. I wanna X, I’m eating X), also called schemas. Early
studies suggest that a large proportion of children’s early multiword utter-
ances can be accounted for by a relatively small number of these kinds of
frames in their speech (Lieven, Pine, and Baldwin 1997).

One potential problem with these early findings, however, is that chil-
dren’s utterances may appear lexically restricted because they choose to
talk about only a small range of things, people, and events. In attempts to
evaluate the degree of abstraction present in children’s early linguistic
representations in a more controlled manner, researchers have experi-
mentally investigated children’s abilities to manipulate grammatical con-
structions with newly acquired words (e.g. novel verbs in the transitive
construction). For example, in one study children were taught a novel verb
modeled in a non-English word order (Subject–Object–Verb, The cat the dog
meeked, to describe a scene where a cat acted on a dog). When descriptions
of comparable actions were elicited from the children, two-year-olds were
more likely than four-year-old children to reproduce the new verbs with
the word order and/or arguments with which they had heard them used,
rather than producing them correctly (The cat meeked the dog; Akhtar 1999).
These and other production studies suggest that young children do not
operate with a fully flexible, adult-like grammar.

On the other hand, experiments on early language comprehension show
that English-learning children below two years of age (twenty-one months)
have some understanding of the role of word order in causal transitive sentences containing novel verbs (The duck is gorping the bunny). When they see two scenes, one of which shows a duck acting on a bunny, and the other a bunny acting on a duck, they show a bias to look or point toward the matching scene (i.e. the duck acting on the bunny; Gertner, Fisher, and Eisengart 2006). Children appear to understand that the character named pre-verbally refers to the agent, demonstrating some knowledge of word order. One explanation for these conflicting findings is that children have already learned from their exposure to English that word order is an important cue to the comprehension of semantic roles, but that this sensitivity is not the same as having full productive control of word order needed for production. In fact, children’s performance on these kinds of forced choice tasks varies as a function of a number of cues such as the animacy of the participants, language (e.g. English versus a case-marking language such as German), and sentence type, suggesting that knowledge of sentence structure is not an all-or-nothing phenomenon. However, the precise cues children are sensitive to, and how this changes over development is still unclear (Dittmar et al. 2008, Noble et al. 2015).

An important question is how these constructions and cues link up to create the more abstract linguistic representations attributed to adult speakers. The constructivist approach assumes that from relatively early in development, children are building functionally or semantically motivated networks of words based on their distributional co-occurrences. The slot in a construction (e.g. AGENT, PROCESS) is seen as a generalization over all the items that appear in that position, and is a function of both the number of items appearing in that slot (type frequency) and their semantic heterogeneity. There is some evidence for this assumption. Matthews and Bannard (2010) tested two- and three-year-olds’ abilities to repeat unfamiliar four-word sequences (e.g. a piece of X) that were identical to familiar sequences with the exception of the last word, such as A piece of brick versus A piece of toast. They found that children were better at repeating the unfamiliar sequences if the item occurring in the X-slot was difficult to predict due to the variety of items appearing in that slot in the input. Thus, A piece of brick was easier to repeat than Let’s have a think, because children had encountered many different instances of A piece of X, whereas Let’s have a was followed only by a few words. Importantly, children’s performance was better if the slot was semantically dense, that is, if the items the child had heard in that slot previously formed a coherent category.

Thus, from around two years of age, children are assumed to operate with partially productive constructions with semantically constrained slots (e.g. I wanna X, I’m eating X). One method used to show how children’s language develops beyond the earliest utterances is the ‘traceback’ method (Lieven, Salomo, and Tomasello 2009). This approach compares the most recent multiword utterances produced by a child in a set time period (e.g. six weeks after the second birthday) to all previously produced
utterances in that time period to see how closely related they are. Target utterances might match a previous utterance exactly, show only minor differences such as simple lexical substitutions or juxtapositions, or be considered novel. For instance, the string *I sit on there* would be considered a close match to the target utterance *I sit on Mummy’s bike* using the frame *I sit + LOCATION*. Using this method on four two-year-old children’s data, Lieven et al. found that 78–92 percent of all multiword utterances could be simply derived from previous utterances, and that the slots of the identified frames constituted six broad semantic categories.

Constructivists posit that once children have acquired a number of partially productive constructions, they then start to perceive similarities across them like *I PROCESS the cat, We PROCESS the cake, You PROCESS a picture*. They are said to create analogies by identifying relational correspondences, a process called ‘structure mapping’ (Gentner 1983). This is suggested to lead them to extract more abstract constructions such as, broadly, AGENT PROCESS PATIENT, that no longer contain any fixed lexical items. These constructions consist of an ordered pattern of slots that have particular meanings (or features) associated with them, and the construction itself is also associated with a particular meaning. However, consistent with constructivist theories of adult language, these abstract constructions are assumed to co-exist alongside lexically specific constructions, as determined by their frequency of use (see Ambridge et al. 2015, for a review of frequency effects in language acquisition).

It is, however, not entirely clear how children arrive at this level of abstraction, and what information they use to generalize. Take for instance the verb in a transitive Noun–Verb–Noun construction. Although a prototypical transitive utterance has a causal agent acting intentionally on an inanimate entity which is directly affected by the action (e.g. *The man kicked the ball; Næss 2007*), children hear many sentences of the (syntactic) form Noun–Verb–Noun in which the Verb slot is not a prototypical action, but rather a state or psychological verb (e.g. *like, want, need*). Similarly, the noun occupying the Subject role is not always a prototypical agent, but could be an experiencer (*I saw the girl*) or force of nature (*The sun warmed the flowers*). A large body of work has examined the semantic scope of particular grammatical constructions, but for our purposes it is sufficient to note that constructions such as the transitive consist of a network of related senses (Goldberg 1995), and linking up these different senses may take considerable developmental time. For example, in one study five-year-olds and adults were first presented with a list of transitive sentences, none of which was prototypical (e.g. *Peter crashed the car, Sophie likes cake*) and had to later decide, when presented with a second list, if they had heard each sentence before. Critically, the second list contained some sentences heard previously, and some which were new, a subset of which mapped onto the transitive semantic prototype (e.g. *James opened the door, He sliced the bread*). The rationale behind this paradigm is that it is often difficult to
remember exactly what has been heard before from what has been con-
stucted on the basis of recalled meaning. If listeners have in their minds a semantic prototype for transitive actions that is activated on hearing any transitive sentence, then they may falsely assume that they have heard new but prototypical transitive sentences before, because the new sentence also activates this prototype. On the other hand, if children have not yet linked the different senses around a common prototype, they should be less likely to demonstrate a false recall effect. This is exactly what was found – adults were lured into false recognition of new but prototypical transitive sentences, whereas children failed to show this false recognition effect (Ibbotson et al. 2012). It appears that overlap in syntactic structure alone is an insufficient basis for the development of a fully abstract constructional network; children will need to recognise the abstract or metaphorical links between forms and functions which is likely to take developmental time, and require a broad conceptual understanding.

Whether the constructivist account of early language is the right one is a matter of considerable debate. For example, in a diary study of children’s first verb uses, Naigles et al. (2009) reported that children used their verbs rather flexibly: Before two years of age, they used verbs to both command (Pull!) and describe actions (Daddy pulling it), and to refer to different actions performed with a variety of actors and affected objects (Give mom hug, I give my cookie to A, Give that back). They interpreted their findings as showing that children generalize sentence structure at an early age, and thus do not appear to operate with lexically specific, partially productive constructions. However, constructivist researchers have pointed out that to assess children’s productivity in verb use, their productions must be compared to the input. It is, after all, possible that children’s apparent flexibility simply mirrors patterns of use in the language they hear. Following this rationale, Theakston et al. (2015) examined flexibility of early verb use in carefully matched samples of child speech and child-directed speech (CDS) from three children (between two to three years of age) and their caregivers. They found that children’s verb use was less flexible than that of their caregivers, and differences in the flexibility of use of individual verbs mirrored patterns in the input. Flexibility increased as the children got older, suggesting that children were gradually building more abstract linguistic representations. These two contrasting studies illustrate some of the methodological difficulties associated with investigating the nature of children’s grammatical representations, and highlight the significance of the input children hear within constructivist approaches. We now turn to this issue in more detail.

4.2 The Role of the Input

Under the constructivist view, children learn constructions from the language they hear. The frequency with which children come across
particular constructions in the input is predicted to influence when, how fast, and how well they learn them. The ability to detect patterns in the ambient language (i.e. statistical learning) is a prerequisite for this to happen, and there is ample evidence that this ability is present in very young children. Infants can also track distributional information across exemplars to learn non-adjacent dependencies, such as the relationship in Dutch between the definite article *het* and the diminutive *-je* (*het hondje*, ‘the doggy’; Van Heugten and Johnson 2010). Note, however, that to understand and use language additional steps are needed to link these patterns to meaning. Thus, statistical learning ability is a necessary but not a sufficient prerequisite for acquiring language.

To test predictions about frequency effects in language acquisition, researchers typically analyze the statistical properties of corpora of CDS, that is, transcriptions of recordings of interactions between caretakers and their children, and test whether children’s production patterns or comprehension abilities can be related to these properties. Within this framework, it is important to recognize that ‘frequency’ in language is not one single measure. Frequencies exist on different levels of language and there are different kinds of frequencies (Ambridge et al. 2015). Furthermore, different kinds of frequencies may play different roles at different stages of a child’s development. One differentiation is made between type and token frequency. The token frequency of a construction refers to how often a concrete lexical item, string, or variable construction occurs in the language children hear (e.g. in the intransitive construction the frequency of a particular verb such as *going*, a particular combination *He's going*, or a more abstract construction such as *He's V-ing* or *NP's V-ing*). Type frequency refers to the degree of variation present within a more abstract construction; for example, the number of different verbs occurring with a particular morphosyntactic ending (*V-ing*), or in a larger construction (*He's V-ing*), and is indicative of a construction’s productivity.

Token frequency effects have been observed in several linguistic domains, ranging from single words and inflected forms to multiword strings and questions. In the morphological domain, high-frequency forms such as the plural noun *feet* and past tense-verb *went* are less likely to be overregularized (*foot/*goed) than lower frequency forms (Maslen et al. 2004). In multiword utterances, two- and three-year-old children are more accurate in repeating high-than low-frequency four-word phrases even when the frequency of the individual components is closely matched (Bannard and Matthews 2008). Also, three- and four-year-olds make fewer errors (e.g. uninverson errors like *Why she is hitting?*) in wh-questions if the question begins with a high-frequency wh-word+auxiliary-verb combination (Rowland and Pine 2000).

Type frequency effects have been primarily observed in morphology acquisition. In Polish, for example, young children’s (between two and four years) performance in genitive, dative, and accusative inflection is
better for large declension classes (i.e. for constructions with a high-type frequency) than for smaller declension classes (Dąbrowska and Szczerbiński 2006). However, to what extent type frequency effects also appear in (syntactic) construction learning is less clear. On the one hand, studies of artificial language learning in infants suggest that variation in the X-slot of the pattern A–X–B facilitates learning (Gómez 2002) and syntactic priming of the passive construction in four-year-olds increases if children are presented with a number of different prime verbs, suggested to reflect greater implicit learning of the target construction (Savage et al. 2006). On the other hand, in novel construction learning studies, a skewed distribution of verb tokens across verb types may be more important than verb-type frequency alone; constructions appear to be learned better if a small number of verbs account for the majority of verb tokens with the majority of verb types appearing only a few times each (Casenhiser and Goldberg 2005).

Another distinction to be considered is that between the absolute and relative frequency of a form or construction. Although children make fewer errors with inflected forms that are highly frequent in absolute terms (Maslen et al. 2004), they also make fewer errors when a form is more frequent relative to a lower frequency competitor, irrespective of its absolute frequency. In a study designed to elicit plural nouns, five-year-old children inflected irregular nouns more often if their plural form was relatively more frequent (e.g. *feet*) than the corresponding singular (e.g. *foot*, Matthews and Theakston 2006). Another effect of relative frequency has been observed in argument structure. The frequencies with which children use bi-transitive verbs in the transitive versus intransitive constructions (e.g. *draw, eat*) mirror the relative occurrence of these constructions in their input (Theakston et al. 2001).

Although the examples we have considered so far pertain to the frequencies of individual lexical items in constructions, researchers point out that absolute and relative frequency effects also apply to abstract cues such as animacy. For example, children find transitive sentences with animate subjects and inanimate objects easier to understand than those with the reversed animacy mappings (Chan, Lieven, and Tomasello 2009), and sentences with object relative clauses (e.g. *Can you give me the cake that the uncle stole?*) easier to understand if the modified noun (cake) is inanimate (Brandt et al. 2009). Also, animacy cues influence children’s ability to comprehend conjoined intransitive sentences (e.g. *The duck and the ball are meeking;* Noble et al. 2015). All of these effects have been argued to reflect the most frequent (prototypical) distribution of arguments in particular constructions in English, and indicate that learning constructions necessitates the tracking of distributional statistics on a number of different levels simultaneously (from the word, to the construction, to relations between constructions).
From a constructivist perspective, the input plays a pivotal role in children’s acquisition of grammatical constructions. However, many questions remain as to which frequencies affect acquisition at different stages of a child’s development, how they interact together, and how children’s sensitivity to the distributional properties of the input interacts with other factors such as their sociopragmatic development.

### 4.3 Creativity and Errors as Evidence for Constructions

The preceding section set out the role of the input in constructivist approaches: children acquire grammatical forms earlier and more accurately if these forms occur often in the input. However, children’s patterns of errors and creativity can also reveal important information about the nature of their underlying linguistic representations and its relationship to the input.

Children can produce utterances that they have never encountered before, generalizing learnt patterns in creative ways. This can be seen most clearly in elicited production studies using novel words. Children’s creativity has been widely attested in the domain of morphology, first shown in Berko’s (1958) seminal study which showed that preschool children were able to form the plural of novel nouns like wug (i.e. wugs), or the past tense of novel verbs like rick (i.e. ricked), despite having never heard them before. Constructivists characterize the underlying mechanisms for the production of inflected forms in terms of retrieval from memory (for high token frequency forms) and the application of productive schemas (for lower frequency forms; Bybee 1995). For example, if a child knows that the way to express a past event of talk is talked, she may assume, based on phonological similarities, that by analogy the past tense of walk would be walked. Eventually, after having encountered many forms that express past events and share a common phonological ending, she establishes a schema such as VERB-ed, which is then available for use with many different verbs. The same mechanism can also be seen in the learning of irregular schemas for verbs like blow/blew, know/knew or sing/sang, ring/rang. Both types of schema can lead to error when applied inappropriately (e.g. go-goed, bring-brang) due to either a lack of knowledge of the correct form, or to competition between schemas and stored forms. These mechanisms lead to the observed phenomenon of apparently alternating use of correct and erroneous forms in the child’s speech at the same developmental time-point.

Similar mechanisms are posited to explain how children are able to use verbs in constructions in which they have not previously been heard, in, for instance, AGENT ACTION-ing PATIENT. Interestingly, children appear to find it easier to generalize verbs to new constructions if they can use existing ‘slot-and-frame’ patterns (see section 4.1), as in, for example,
a transitive frame based around pronoun subjects and objects such as *He’s X-ing her* (Childers and Tomasello 2001). There is evidence that for some children at least, similar frames might underpin the earliest full transitive utterances prior to the onset of more flexible verb use (Theakston et al. 2012). As for morphology, there is also evidence that children apply argument structure schemas inappropriately, leading to error, as, for example, when children produce utterances such as *“How do you unsqueeze it?*, *“Don’t giggle her!* or *“I spilled the rug with juice* (Bowerman 1982). In the first case, the un-prefix has been overgeneralized to an irreversible action. In the second, an intransitive verb has been used in a transitive causative construction. And in the third, a contents-locative verb (e.g. *I spilled juice onto the rug*) has been overgeneralized to the container-locative construction (e.g. *I filled the shaker with salt*).

Given that children make these kinds of errors, theoretical accounts must provide an explanation for how they cease. Constructivists initially put forward two possible mechanisms relating to the distributional properties of the input: entrenchment and pre-emption. The entrenchment hypothesis (Braine and Brooks 1995) posits that if a child hears a verb like *giggle* repeatedly in one construction (e.g. the intransitive inchoative, *she giggled*), she will infer that using this verb in another, unattested construction like the transitive causative (*don’t giggle her*) is ungrammatical. The pre-emption hypothesis (Clark and Clark 1979) is similar, except that it is assumed that incorrect uses are avoided because another near synonymous construction is already known. For instance, the periphrastic causative construction (*She made her giggle*) will pre-empt the causative transitive construction (*Don’t giggle her*).

There has been some empirical backing for these two hypotheses (see Ambridge et al. 2013 for an overview). In support of the entrenchment hypothesis, studies have shown that children produce more argument structure errors with lower frequency verbs with which they have relatively little experience, and that children (and adults) rate overgeneralizations of high-frequency verbs (*The funny clown laughed Lisa*) as less acceptable than overgeneralizations of lower-frequency verbs (*The funny clown giggled Lisa*). In support of the pre-emption hypothesis, for older children (nine to ten years), but not younger children (five to six years), the frequency of synonyms (e.g. *release + loosen* for *unsqueeze*) influences children’s acceptability ratings of ungrammatical un-prefixations.

However, constructivist theorists recognize that these two mechanisms cannot fully explain how children stop making errors, and have begun to develop more sophisticated accounts involving a clear role for verb meaning. This is because, on the one hand, sentences containing novel verbs (e.g. *blick*), for which no entrenchment can have occurred, show differential acceptability ratings which appear to reflect the verbs’ semantic similarity to already known verbs (Ambridge et al. 2013). On the other hand, not all incorrect forms have a suitable pre-empting alternative (Bowerman
Resultative constructions are a case in point. When a child utters "Feels like you're combing me baldheaded," it is unlikely that she will ever hear an alternative, equally expressive way to describe this event.

The proposal that overgeneralization involves a poor semantic fit between an item and a slot (see section 4.1) appears to be better suited to explain the learning that is taking place here. Under this account, argument structure errors arise when a lexical item is inserted into a slot in a construction with which it is not fully compatible in terms of its semantic or pragmatic properties. Indeed, relations between grammaticality judgments and independent ratings of the extent to which verbs exhibit the semantic properties associated with the construction in question (e.g. for dative constructions, a sense of ‘causing to go’ or ‘causing to possess’) provide some support for this proposal (see Ambridge et al. 2013). As the semantic properties of verbs and construction slots are learned from exposure to the input, over development children’s errors are expected to cease as they fine-tune their constructional representations.

In addition to overgeneralization errors, children also produce ungrammatical utterances that, at first glance, may not appear to have any corresponding pattern or source in the input. Well documented are English-speaking children’s use of non-nominative pronouns in subject position (*Me do that, *My going), optional infinitive errors (*Mummy go to work), auxiliary-doubling errors (*What does she doesn’t like?) and negation errors (*No soggy). However, in a constructivist framework, these errors could collectively be viewed as evidence that children are abstracting constructions – and the slots within these – across development. To take the example of me-for-I errors, these may arise if children extract chunks from more complex sentences in the input (Let me do that, He saw me cry), leading them to form a construction me+VERB (Kirjavainen, Theakston, and Lieven 2009). Similarly, tense omission errors may result from either a similar process of extraction of chunks (What is he doing?; Theakston and Lieven 2008) or by a learning mechanism biased to attend to the beginnings and ends of utterances but failing to register the middle (He [can] go; Freudenthal et al. 2007). Auxiliary-doubling errors may arise from a child mistakenly combining a previously learned question frame (What does...?) with an existing declarative frame (He doesn’t like...), Ambridge and Rowland 2009), while negation errors may reflect the use of creative but frequency-dependent schemas to serve particular communicative ends (Cameron-Faulkner, Lieven, and Theakston 2007). These errors are assumed to cease as children’s knowledge of a variety of (more complex) constructions increases, fine-tuning the semantic and formal properties associated with constructional slots.

Thus, establishing the properties of constructional slots by abstracting over specific exemplars allows children to generalize and to produce novel utterances that they have not heard before, paving the way to becoming a productive and flexible user of language. When these slot properties and
the properties of the larger constructions of which they are a part are not yet adult-like, children use items that are not licensed in a given construction or context, and make errors. Constructivist theory assumes that a process of fine-tuning, based on the probabilistic, formal, and semantic properties of these constructional slots allows children to become competent adult speakers.

4.4 Summary and Future Directions

Constructivist approaches assume that children learn language by mapping forms to specific functions. This mapping occurs in a situated context; that is, by experiencing how these forms are used in a specific communicative setting, to achieve a communicative goal. Importantly, no linguistic knowledge is deemed innate; rather, grammatical structure can be learnt from the input using the same learning mechanisms that can be applied to other cognitive domains. As such, it is viewed by many as being more psychologically plausible than accounts that posit complex grammatical structures to be present from birth. These form-function mappings develop into partially productive slot-and-frame constructions, in which the semantic properties of the constructions and the slots within them are determined in a probabilistic manner by abstracting across exemplars encountered in the input. This process of abstraction leads, along the way, to both creative language use and a variety of errors which disappear over time as a function of the building and strengthening of links across the network. At all stages, children operate with representations at a variety of levels, leading to competition between cues; for example, word order versus case marking, or syntactic structure versus prototypical mappings of animacy to thematic roles.

The constructivist framework has received increased empirical support over the past years, and its theoretical assumptions have been refined in line with advances in empirical work. For example, although early accounts suggested that children would operate with few links between their early sentences, it is now clear that children develop both lexically specific and more abstract representations from the beginning. It is also recognised that children’s performance is impacted by the prototypicality of the language they are required to comprehend or produce, and by the particular set of cues available to guide them in any given context. This requires more sophisticated models of the connections between different parts of the representational network, and also a better understanding of the routes to access that can explain children’s variable performance with particular syntactic structures and in different contexts, such as in comprehension versus production. Research has also demonstrated the importance of utilizing controlled comparisons of children’s speech with that of their caregivers to determine the nature of the underlying
representations. Finally, readers should be aware that there is now a greater focus on children’s non-linguistic abilities such as their processing speed and sociocognitive skills as researchers seek to understand the interactions between the child’s learning mechanism and the properties of the input to which they are exposed.

Constructivism in its modern form has established itself as one of the leading paradigms in child language acquisition in a short time, and is being applied to an increasing number of linguistic phenomena. However, it will come as no surprise that there is still some work to be done to arrive at a full and integrated account of language learning. We now briefly highlight some of the areas that constructivist researchers could and should turn their attention to in the future.

First, constructivist researchers traditionally focused on the early stages of language acquisition, with the aim of showing that children’s emerging language is lexically specific. Although the field has begun to investigate how children acquire more complex constructions, many linguistic phenomena have not yet been addressed extensively in the constructivist framework (e.g. long-distance dependencies, island constraints, pronoun co-reference).

Second, constructivists need to develop more specific descriptions of the mechanisms that enable children to acquire lexically specific and fully abstract constructions, how constructional networks develop, and the conditions under which different levels of representation are utilized. Such detailed descriptions would permit the development of theoretically motivated and testable hypotheses about which kinds of frequencies impact on which aspects of grammatical development, and when (Ambridge et al. 2015). This is not a simple task, because although frequency effects have traditionally been calculated at the level of lexical forms, it is clear that many different semantic and pragmatic factors influence the nature of, and routes of access to, linguistic representations, and thus frequency effects are multifaceted.

Third, as sociopragmatic skills are assumed to play a pivotal role in language acquisition, researchers should consider how some children with deficits in social abilities (e.g. verbal autistic children) are able to acquire language. There may be alternative routes to language, with learners making use of more general (and less impaired) cognitive skills like attention, statistical learning abilities, working memory and temporal order processing. Thus, it is clear that a full account of children’s learning of grammatical constructions will need to incorporate a role for multiple learning mechanisms.

Finally, bi- and multilingualism are fascinating cases of language learning, with language transfer and code-switching posing interesting challenges around how construction learning works. First steps in this direction have been taken (Mueller Gathercole 2007, Paradis et al. 2011), but there is huge potential to expand this line of work.
In this chapter, we have given a flavour of research within the constructivist approach as an account of how children learn language. But of course, this is necessarily a selective overview, and there are many complex issues we have only touched on briefly here. In conclusion, we believe that the constructivist approach provides a strong and exciting framework in which to situate the future investigation of children’s language acquisition, but it is clear that there is still a lot of work to be done before we can arrive at a full and integrated account of language learning.