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How Do Children Learn Language?

Theres Grüter

Introduction

As educators and parents, we like to take credit for the achievements of the children in our care. And often this is justified. A child's health, for example, is greatly impacted by the diet we provide. Yet at the same time, there are biological factors, such as a genetically conditioned inability to produce insulin, leading to childhood diabetes, that are clearly beyond our control. Much the same is true for language development. The goal of this chapter is to introduce you to the major social and cognitive factors that contribute to human language development. The chapter focuses on language acquisition in early childhood in a variety of learning situations, including monolingual and bilingual environments, as well as children with language learning difficulties.

As educators and parents, we can and must provide a child with a rich language environment through meaningful and age-appropriate interactions. Experiential and environmental factors are important contributors to the development of language: a child raised in an English-speaking environment learns English, a child raised in a Cantonese-speaking environment learns Cantonese and a child with sufficient meaningful interactions in both English and Cantonese naturally learns both. (See cultural transmission, Chapter 1.)

Recent research has shown that experiential factors influence language development even beyond which language(s) a child does or does not acquire. In a landmark study, Hart and Risley (1995) recorded interactions in the homes of English-speaking families from various socio-economic backgrounds in the USA over a period of three years. One of their most striking findings was the variability in the sheer amount of speech children experienced, with children from professional families hearing an estimated 30 million more words over their first three years of life than children living in poverty. Importantly, these differences in experience correlated with the number of words children knew at age 3: 3-year-olds from higher socio-economic backgrounds, who had experienced richer language environments, used over 1,000 different words, whereas their peers from less advantaged backgrounds produced only half as many. What is more, these differences in early language experience were predictive of academic achievement years later in elementary school. In other words, the children who experienced more language directed at them in early childhood had a larger vocabulary and tended to do better in school.

The fact that language experience matters is even more obvious in the case of children who grow up in bi- or multilingual environments. Barbara Pearson and her colleagues studied the language development of infants raised in a Spanish/English bilingual environment in Florida (Pearson et al., 1997). Through interviews with parents and caregivers, they estimated the proportion of time each child was exposed to Spanish versus English. They also looked at how many Spanish words and how many English words each child knew. Not surprisingly, they found that children with more exposure to Spanish knew more Spanish than English words, and children with more interactions in English knew more English than Spanish words. Thus at least with regard to vocabulary knowledge, experience clearly matters. Much less is known about the relation between environmental factors and other aspects of linguistic development, such as knowledge of grammar, an issue that is being investigated in current research. (For more on bilingual development, see Chapter 8.)

On the other hand, there are children who struggle with language despite rich language experience and caring environments. In some cases, this is due to a known medical condition, such as Down Syndrome, which affects cognitive development more broadly. For a child with Down Syndrome, language is one of many abilities impacted. Yet in many other cases, there is no obvious explanation for why a child is lagging behind her peers in language development. There are children who have no known medical condition and do well on non-verbal cognitive measures, but who fail to meet major milestones in language development. (We will discuss language milestones

in more detail below.) These children perform well below expectations for their age on standardized language tests. They are often diagnosed as having **Specific Language Impairment (SLI)**, a developmental disorder that is quite common. It has been estimated to affect about 5–7 per cent of preschool-aged children.

The causes of SLI are still poorly understood, but research has shown that a child is more likely to have SLI if someone else in the family also has it, suggesting that there is a genetic component to it. Children diagnosed with SLI are normally advised to see a speech-language therapist. This is important because although these children have normal cognitive abilities, persistent weaknesses in language development may affect their academic performance more broadly, since a delay in oral language development can lead to difficulties with reading, a critical ability for scholastic achievement. This is discussed further in Chapter 7. Fortunately, in many cases, children diagnosed with SLI eventually catch up with their peers in terms of language development, sometimes even by the time they start school. This often happens with the help of a speech-language therapist. In other cases, difficulties persist into the school years and possibly never fully resolve. Some researchers call the former 'specific language delay', and only the latter 'specific language impairment'. Yet when a young child looks like she is struggling with language, it is difficult to know whether this is just a temporary issue or whether it presents a more persistent problem. Researchers are currently trying to understand how the two could be distinguished early on so that they can know best how to help these children.

The existence of genetically conditioned language disorders is not the only indication that biological factors, in addition to experiential ones, play an important role in language acquisition. Let's consider the converse scenario: a child with intact cognitive and biological prerequisites for language learning, but an environment that, for one reason or another, provides only impoverished language experience. An example of such a case is a boy named Simon (pseudonym), whose development was followed by Singleton and Newport (2004) for a period of about seven years, starting around age 2. Simon was born deaf, and his parents communicated with him in American Sign Language (ASL). ASL, like other sign languages used by deaf communities around the world, has all the unique design features of a human language (see Chapter 1), but instead of using sounds it relies on combinations of hand motions and facial expression to convey meaning. Simon's parents, having learned ASL only later in life, were fluent but not fully proficient users of the language. For example, they only rarely, and sometimes incorrectly, produced more complex grammatical constructions in ASL. Simon had no interactions with native ASL signers, which could have provided the full-fledged linguistic experience

available to most children. Singleton and Newport observed that right around the age when children typically begin to use more complex sentences, Simon started combining the limited resources from the language he had learned from his parents to produce more complex sentences, structures that were not present in the input he had received. Simon thus went beyond what he had experienced to effectively invent parts of his grammar. His story illustrates the astonishing resilience on the part of the child not only to acquire language in a less than optimal linguistic environment, but also to approximate developmental milestones characteristic of typical development.

The story of Simon is only one case study, but it is by no means an exception. Similar observations have been made in areas where speakers from different language backgrounds came together, often as a result of trade, and initially developed a simplified language for basic communication, which linguists call a *pidgin*. Importantly, when these pidgin speakers had children, this next generation of speakers developed a language with far more complexity than the pidgin they were exposed to, a language linguists call a *creole*, which is comparable in function and complexity to any other human language. In a paper aptly entitled 'On the acquisition of native speakers by a language', Sankoff and LaBerge (1973) observed that this increase in complexity in creole languages is brought about predominantly by children. In other words, as the children are exposed to and use the pidgin, they create a more complex grammar. This leads to the development of a new language, a creole. Thus just like Simon, children of pidgin-speaking parents go beyond the input they receive to create a full-fledged human language.

Observations like these suggest that a predisposition to learn language is part of our genetic endowment as members of the human species. We cannot help but acquire language. The precise nature and evolution of this predisposition is a matter of intense debate among linguists and psychologists. Yet most people would agree that neither biology nor the environment alone are enough to explain how we come to learn language in its full glory. As Lila Gleitman, a leading researcher in the field, famously put it in a documentary about language acquisition almost two decades ago: 'I take it that this is the question of modern linguistics: how much of language does a child have to learn, and how much is built in?' (Searchinger, 1995). We are still humblingly far away from having good answers to this question.

Some major milestones: an overview

Around halfway into their first year of life, after several months of producing various gurgling and cooing noises, babies spontaneously start experimenting

with language-like sounds by repetitively stringing together consonants and vowels into something that sounds like *bababa* or *dadada*. This is called **babbling** and marks the first important milestone in children's productive use of language. Babbling is a phenomenon that babies from all cultures engage in, including those who are deaf or hard of hearing. Babies whose main interactions are with speakers of a sign language like ASL have been observed to start producing repetitive hand motions consisting of very basic aspects of adult signs around that same age. This phenomenon has been called 'manual babbling', and it suggests that babbling is a universal stage in child language development. Closer to the child's first birthday, these syllable strings typically start getting more varied and creative (*agagu*, *badaga*), and may show signs of sounding more like the language(s) the child is learning in terms of specific sounds and stress patterns.

All this sets the stage for the next great step in language development: the first word. Most people (and textbooks) expect babies to say their first word somewhere around their first birthday. This is true, on average. However, it is important to be aware that although children around the world follow a remarkably similar course in language development, there is also great variability as to when exactly they reach each milestone. Thus while it is true for many children that they will produce their first word around 12 months of age, some do so as early as 9 or 10 months and others wait until they are 17 or 18 months old. There is generally no need for concern if a child does not speak until after 18 months, although it is important to pay attention to whether an 18-month-old in this situation seems to understand speech addressed to her. If babies around that age show little evidence of engaging in interaction or understanding words, a thorough assessment of their hearing is typically recommended as a first evaluative step.

Similarly, there is a great deal of variation in when children reach the next major milestone in language development: putting two words together, as in *more milk* or *eat cookie*. For most children, this happens around 18 months of age, or when they have about 50 words in their productive vocabulary. Yet for some, it happens as early as 15 months, while others wait until their second birthday. Anything within this range is considered 'normal' (a notion we will consider a little more closely in the next section), just as it is normal for some children to walk or get their first teeth a little earlier or later than others. If by 26 months a child is still not putting two words together, further evaluation is typically advised.

After several months in what is called the two-word stage, children's utterances gradually become longer, but are still quite different from adult sentences. A child at this stage will say things like *I got horn* or *doggie go out*. This has been called **telegraphic speech** because it resembles

the language that was used for writing telegrams, in which each word cost money, and therefore words that were not immediately necessary to convey important content were omitted. Similarly, the telegraphic speech we typically see in children around 2 to 2.5 years of age is characterized by the omission of inflection (e.g. third person */-s/*) and function words (e.g. articles like *the*). Yet as we will see below, despite these omissions, children's early multiword utterances resemble adult sentences in important ways.

Once children start producing multiword utterances, they rapidly progress to acquire more complex grammatical structures (such as negation, question formation and inflection) throughout the preschool years. This does not happen without errors along the way. Certain types of errors are very much part of normal development, and we will look at some of them in more detail below. By the time they start kindergarten, children have acquired most of the grammar of their language(s). Yet their language development is far from complete. Some more complex and less frequent constructions, such as passives or relative clauses, are typically not fully mastered until well after the preschool years. Children continue to learn more words as they expand their experiences, and particularly as they learn to read and write. They also continue to learn how to structure and organize their talk, how to adapt their talk to different people and social situations and how to deal with common rhetorical devices such as irony and metaphor. There is no endpoint to language acquisition. Language is not a machine that is assembled and runs when complete. Just like the living organisms within which it resides, language continues to develop and evolve, shaped by constant dynamic interaction with the social environments in which it is situated.

How do we know what is 'normal'?

The age points and ranges for the major developmental milestones presented in the previous section are based on a cumulative body of research conducted over many decades. Much of the early research in the field was based on evidence from a small number of children, typically monolingual English-speakers from well-educated middle- to upper-class families, not seldom the children of the researchers themselves. One might rightfully wonder whether this kind of evidence is truly representative of child language development more generally. Fortunately, much progress has been made over the past two decades through the development of relatively simple standardized measures, which have allowed for the

collection and analysis of data from thousands of children from various social and economic backgrounds. The *MacArthur-Bates Communicative Development Inventories* (Fenson et al., 2006) is one such instrument, and we owe much of what we know about what is 'normal' in early language development to it. The *CDI*, as it is commonly known, consists of carefully constructed lists of several hundred words, and parents or caregivers are asked to check which words on this list a child says or understands. While an individual parent's estimate of what their child might say or understand at a given point in time may not be 100 per cent accurate, combined data from thousands of these questionnaires provide us with an excellent indication of the range of what we might consider 'normal'. *CDI* norms also provide useful benchmarks for assessing the development of an individual child, and are widely used in clinical practice. The *CDI* was originally developed for English, but has now been adapted, linguistically and culturally, to over 50 different languages and dialects.

Once children move beyond the one-word stage, quantifying their language development becomes more difficult. Brown (1973) introduced a widely used measure of grammatical development called **mean length of utterance**, or **MLU**. MLU is calculated by counting the number of morphemes, the smallest meaningful units of language, in a child's speech, and averaging that number over a total of 100 consecutive utterances. For example *two balls* consists of three morphemes (*two*+*ball*+*s*). (See also Chapter 2.) A child with an MLU of three produces, on average, utterances of this length and complexity. MLU has proven to be an excellent reflection of a child's stage in early grammatical development. Yet its calculation involves the recording of a representative speech sample, transcription as well as analysis. This process is both time consuming and difficult to standardize, which is why the use of MLU in educational and clinical assessment has been limited. Instead, language assessment for educational or clinical purposes in the (pre)school years typically involves the use of specially developed standardized tests designed to probe children's abilities in various subdomains of language use (sounds, words, sentences) in both production and comprehension.

Until very recently, the vast majority of the research that has informed our understanding of child language acquisition has come from children exposed to a single language. This reflects the predominantly Western, Anglo-Saxon culture from which much of this research has emerged. Yet it has been estimated that more than half of the world's population is bi- or multilingual. How do the milestones we have identified so far apply to children who grow up in multilingual environments? People who have grown up in monolingual environments themselves often intuitively believe that it

must take longer for a child to learn two languages at the same time. After all, there is twice as much language to be acquired. So should we expect bilingual children to be delayed in their language development? This is not an easy question to answer, and we must be very careful about what we mean by 'language'. We can look, for example, at the number of words a child knows in a given language. If we compare a monolingual (e.g. English) and a bilingual (e.g. English/Cantonese) child on this measure, it is likely (but not guaranteed) that the monolingual child will know more English words than her bilingual peer at the same age. Yet does this mean that the bilingual child is lagging behind in *language* development, or just in the size of her *English vocabulary*? Importantly, if we add the number of words bilingual children are reported to know in *both* of their languages, those totals tend to equal, on average, the number of words that monolingual children typically know in their one language at the same age. Moreover, when we look at the major milestones identified so far – the emergence of babbling, first words and first two-word combinations – it has been found that bilingual children generally reach them well within the (wide) range of what is considered normal in monolingual development. All this suggests that acquiring multiple languages at the same time is well within a child's capacity, and does not lead to delays in language development overall (see Chapter 8).

At the same time, it is important to remember that few bilingual children experience their two languages in comparable quantity and quality. For example, a child might hear one language from only a single person in her life and only for a limited number of hours per week, whereas she might have many more interactions in the other language. In this case, it will not be surprising to find one language develop more slowly, and perhaps to a more limited degree of proficiency, than the other. In cases such as these, estimating what is 'normal' development is very difficult because it is hard to know what should serve as a basis for comparison. In general, it is recommended that a bilingual child always be assessed in both languages, and that her abilities in the stronger language are taken as more indicative of her general language development. In practice, this is not always easy.

In the last two sections, we have identified major milestones in early language development, looked briefly at how language development may be assessed and quantified for research as well as educational and clinical purposes and considered how what we know based on monolingual language development extends to children growing up with two or more languages. In the following sections, we will delve a little deeper into looking at the many factors that contribute towards the amazing feat of acquiring a human language.

The journey into language: what happens before the first word

A child's first word is a major milestone in her development, and an exciting event for everyone in her life. Yet while it might seem that starting to speak marks the beginning of language development, this is far from the truth. A baby's journey into language starts much earlier, going back to even before she is born. Infants only a few days old not only prefer their mother's voice over other voices, but they also show a distinct preference for their maternal language versus other languages, even when the voice of the speaker is unfamiliar. This suggests that while they are still in the womb, infants already start to tune into the rhythm and sounds of their mother tongue.

Fine-tuning of this process continues over the course of the first year of life, which is when babies start to figure out what contrasts matter in the language(s) they are acquiring. In fact, it turns out that young infants are much better than older children and adults at discriminating between a wide variety of speech sounds. In a series of studies, Janet Werker and her colleagues presented infants from English-speaking homes with sounds that contrast in the language they are exposed to, such as [ba] versus [da] in English, as well as sounds that contrast in another language, but not in English (e.g. [ta] vs [ʈa], two different 't' sounds in Hindi). In these experiments, infants were initially taught to turn their head towards a loudspeaker whenever the sound changed. The researchers then played the *ba/da* sounds, as well as the *ta/ʈa* sounds, and noted whether the infants turned their heads when [ba] changed to [da] (and vice versa), and when [ta] changed to [ʈa]. They found that while everyone was able to discriminate between [ba] and [da], only Hindi-speaking adults and 6- to 8-month-old babies (exposed only to English) were able to perceive the contrast between [ta] and [ʈa]. Strikingly, infants at the age of 10 to 12 months performed just as poorly as their English-speaking parents on this unfamiliar contrast. This suggests that by the end of the first year of life, before most children have said a single word, they have homed in on the sound system of the language(s) they are acquiring. (Werker and colleagues have published several studies. For an example, see Werker and Tees, 1984.)

The ability to perceive relevant sound contrasts is a critical skill for tackling what is perhaps one of the hardest problems in language learning overall: how to find words in fluent speech. Words are easy to identify on a written page, where they are flagged conveniently by blank space on either side. Yet no such blank space exists between words in spoken language. (If you are not convinced, find a radio station with a language you do not know, and try

to identify words in the speech you are hearing.) So how do babies solve the task of what is called 'speech segmentation'? It seems that they use a variety of different cues. Language-specific stress patterns are one of them. For example, English nouns often consist of a stressed followed by an unstressed syllable (*DOggie, BAby*). Babies as young as 9 months of age seem to prefer stress patterns consistent with the language(s) they are learning, indicating that they are sensitive to the overall sound shape of words in their mother tongue(s).

Another dazzling skill that infants bring to the task of language learning is the ability to compute statistics over combinations of sounds. In other words, they seem to be able to keep track of which sounds occur together consistently, and are therefore likely to constitute a word. This was demonstrated in a set of experiments by Jenny Saffran and her colleagues, who had 8-month-old infants listen to two minutes of synthesized nonsense speech that sounded something like this: *bidakupadotigolabubida* . . . (Saffran et al., 1996). The sequence of sounds was carefully constructed such that some syllables always occurred next to each other (e.g. *bi* was always followed by *da*), whereas others did not (e.g. *ku* was followed by *pa* only a third of the time). Afterwards, infants were presented with 'words', that is, combinations of syllables that consistently occurred together, and 'non-words', which contained the same syllables, but in a different order from how they were encountered in the speech stream. Amazingly, babies listened longer to the unfamiliar combinations, suggesting that they were surprised by their novelty. This could only happen if they had somehow remembered what occurs next to what, that is, if they had kept track of co-occurrence statistics in the input they experienced.

If babies are naturally sophisticated speech perceivers and statistical analyzers, what role, if any, do parents and caregivers play in all this? Do babies just do it all on their own, or do they still need support from their environment? Some have argued that the special kind of baby talk, called 'motherese' or more neutrally **child-directed speech (CDS)**, that many of us adopt when we interact with an infant is critical for early language learning. CDS is characterized by exaggerated intonation, slower speech rate, short and often repetitive utterances and generally positive affect. Babies prefer to listen to child-directed compared to more adult-oriented speech. Yet while it seems that interactions involving CDS are enjoyable and of social and emotional relevance, it remains questionable whether CDS is in fact *necessary* for language acquisition to take place. One reason to be sceptical is that there is great variability across cultures regarding the extent to which speakers engage in CDS, and some have claimed that it does not exist at all in certain cultures. Nevertheless, children across the world acquire language

and reach major milestones on a remarkably similar timescale. Moreover, no study has been able to show that increased exposure to CDS enhances or accelerates language development in any way. Does this mean we should give it up? Certainly not. CDS clearly contributes, among many other things, towards a rich, nurturing and interactive environment, which is exactly what babies need to thrive – physically, emotionally and linguistically.

A striking example of the importance of social interaction for early language learning comes from a study by Patricia Kuhl and her colleagues (Kuhl et al., 2003; described also in her TED talk; see recommended reading and viewing). They conducted an experiment similar to the ta/ʈa study described earlier, except that they looked at a different contrast, present in Mandarin Chinese but not in English ([ɕ] vs [tɕʰ]). American 10- to 12-month-olds exposed only to English were not able to discriminate between the two, just as one might expect. The researchers then provided another group of American infants with one of three types of exposure to Mandarin over a four-week period preceding the same discrimination experiment. The 'audio-only' group just listened to Mandarin speech without any visual cues, the 'audio-visual' group watched and listened to people interact in Mandarin on a television screen, while the 'live-interaction' group interacted with native Mandarin speakers in active play sessions. On the discrimination experiment, the first two groups performed just like the American babies who were never exposed to Mandarin. In other words, they were not able to detect the contrast. The 'live-interaction' group, however, was able to discriminate the contrast as well as babies from Mandarin-speaking homes. If acoustic perception and statistical computation were all it takes to learn a language, all three groups should have done equally well. Instead, these findings confirm what parents and caregivers instinctively know: it takes real humans and meaningful social interaction for all the innate dispositions a baby brings to the task of language learning to come to full fruition.

In sum, during the first year of life, babies are keen listeners and observers of the world and sounds around them. Driven by an innate predisposition for the task at hand, they extract a dazzling amount of information about the language(s) they experience around them, and they do so particularly through meaningful social interactions with the people in their lives.

Taking off: words and beyond

In considering all the linguistic groundwork that infants engage in before they utter their first word, we have so far neglected one of the most important properties of words, namely that they connect strings of sounds with *meaning*

(see Chapter 1). What exactly 'meaning' means has been a matter of debate among linguists and philosophers for several thousand years. In very general terms, learning the meaning of a word can be characterized as establishing a relationship between a string of sounds and an object, action, routine or concept observed, directly or indirectly, in the world. This is perhaps most straightforward in the case of concrete objects: you can point to your shoe and say *shoe*, thus providing the child with a linguistic label for a real-world object. Not surprisingly, children's early productive vocabularies consist primarily of such concrete nouns, along with words and phrases associated with social routines they frequently encounter in their lives (*bye, hi*).

Yet even with concrete objects which can be labelled ostensively, the learning task is not as straightforward as it might look. When I point to my shoe and say *shoe*, how do you know that I mean the entire shoe and not just the heel? How do you know that I am using my shoe as an example of footwear of this type more generally, rather than telling you the name of this specific shoe? The questions could go on and on, but it seems that children do not generally get sidetracked by possibilities like these. They tend to assume that a new word refers to a whole object, and that it refers to a type of thing, rather than a particular individual. These word learning strategies, called the 'Whole Object Assumption' and the 'Type Assumption', seem to guide children's word learning universally, and it has been suggested that they are part of our innate predisposition for learning language.

At the same time, word learning has an essentially social component. This has been demonstrated in experiments like the following, where 2-year-olds were presented with two stuffed toys they had never seen before (Moore et al., 1999). The experimenter looked at one of them and said *Look, there's Dodo!* At the very same time, the child's attention was drawn to the other toy by having it light up and move. Children were then asked to find *Dodo* to see whether they connected the word *Dodo* with the toy that was most salient (the one that lit up) or the one that was the object of their joint attention as indicated by the adult's eye gaze. They consistently picked up the latter, indicating that social interactive cues like shared eye gaze play an important role in language learning.

The fact that children seem to come to the task of word learning with the right strategies and sensitivity to social cues does not mean that they always nail it right away. Children often use words with meanings that are too narrow or too broad in terms of their adult definitions. For example, a child might use *shoe* only to refer to her own, baby-sized footwear, and not to her mother's kitten heels (which, admittedly, look quite distinct). This is known as **underextension** of a word's meaning. The converse, **overextension**, is also quite common: a child might use *shoe* not only to refer to footwear, but also

to items used to cover hands (typically called *gloves* or *mittens* in English). This does not indicate that the child is confused or does not understand the difference between feet and hands, but simply that she has not yet learned that English has a different label for hand wear as opposed to footwear (incidentally, a distinction that is not universal: in German, gloves are called *Handschuhe*, which literally means 'hand-shoes').

These early 'errors' in word learning illustrate a fundamental characteristic of language learning more generally: children are creative and do not simply imitate what they hear from adults. The child might never have heard anyone label a glove, but she drew on her existing knowledge and generalized as best she could. The ability to generalize and to construct abstract rules becomes even more evident when we look at how children deal with linguistic material beyond nouns and verbs, namely functional items like the plural marker /*-s*/ in English. An English-speaking child might talk about her two *foots*, even though she almost certainly never heard her parents say this. If corrected, she might even be quite resistant to accepting that it should be *two feet*. Errors like these are called errors of **overgeneralization**, and are a sign of healthy development. They demonstrate that, contrary to popular belief, imitation only plays a limited role in language learning. In fact, studies have shown that it is quite rare to find a child immediately imitating or repeating an utterance addressed to her by an adult. Instead, children abstract over what they hear to build up the two critical components of linguistic competence: a 'mental lexicon' – a repository of word forms and meanings – and a 'grammar' – a system of abstract, unconscious rules and constraints that allows for the principled combination of words into a potentially infinite number of larger phrases and sentences. (Refer to Chapter 2 for more information.)

Evidence of 'grammar' in its simplest form is present from children's very first multiword utterances. If we look at the word order in these early utterances, we see that it overwhelmingly matches the word order of the language the child is exposed to: children learning English will say *eat cookie* (rather than *cookie eat*), reflecting that objects follow verbs in English. A child learning Japanese, by contrast, will almost certainly say *kukkii-(o) taberu* (literally: 'cookie eat'), consistent with the fact that objects come before verbs in Japanese. Beyond word order, an important part of learning the grammar of a language consists of learning small function words and inflection, such as the *-o* in *kukkii-o taberu* (a case marker, signalling that *kukkii* is the object of the verb). It is precisely this kind of material that tends to be missing during the telegraphic stage discussed earlier. Interestingly, some of these function words (like the English article *the*) are among the most frequent words in the language. Yet they tend to get omitted in children's speech for quite a long time, indicating that frequency of occurrence alone is also

not what determines the course of development. In a classic study, Brown (1973) looked at 14 grammatical morphemes in the speech of three children learning English. He observed that all three children started using these morphemes appropriately in almost exactly the same order. When he looked at the frequency of these morphemes in the speech of their parents, he found that frequency of occurrence was not related to the order in which children started producing them. Instead, a number of linguistic factors, including phonological salience and grammatical complexity, were found to be more indicative of the order in which children acquire grammatical function words and inflection.

How exactly children ultimately arrive at the highly complex knowledge that characterizes adult linguistic competence, and within a highly constrained timeframe no less, still remains a mystery in many ways. Some hold that it can only be explained if we assume that a large portion of this abstract knowledge is innate. This proposal is generally associated with the modern-day linguist Noam Chomsky, but it dates back at least to the Classical Greek philosopher Plato. Others argue that information from the environment, together with general learning mechanisms to extract this information, is sufficient, and that postulating innate linguistic knowledge is unnecessary. The debate is unlikely to be resolved any time soon, but in its function of spurring scientific inquiry, it continues to contribute towards the assembly of more and more pieces in the millennia-old puzzle of how human babies come to acquire language.

Learning a new language after childhood

Everything we have said about language learning so far was based on children who were exposed to the language(s) they were learning from birth or very early childhood. Yet we all know, and most of us have experienced it, that languages can also be learned later in life. How is later, or **second language acquisition** (SLA) similar to or different from what we have said so far about **first language acquisition**? Perhaps the most striking difference that comes to mind is that second language (L2) learners rarely reach the same proficiency as native speakers. At first sight, this seems paradoxical: why are little babies so much better at language learning than adults, who are generally far superior at learning other complex skills?

Some have argued that there is a biologically determined window of opportunity, a **critical period**, for language learning, similar to what has been observed in the animal world, where research has shown that songbirds must be exposed to the song of their species during a clearly specified time in their

early lives, or they will never learn it (Lenneberg, 1967). Yet while biological maturation and neural commitment in the brain is likely to play a role, the case of L2 acquisition is different from the songbird scenario it is often compared to in a number of ways. Most importantly, L2 learners already have *a* language, their first language (L1). This provides them with a rich resource to draw on when learning an additional language, and with an immense head start compared to infants: a teenage exchange student immersed in an unfamiliar language environment for 12 months is highly likely to be more fluent than a 12-month-old infant raised in that environment. L2 learners draw on their L1 at just about every possible level, ranging from their knowledge of how a conversation between two speakers is typically structured, down to the grammatical structure of sentences. In cases where the two languages differ in any of these points, we tend to see the effects of **transfer**, that is, learners apply the structure of their L1 to their L2. For example, a French-speaking learner of English might say *She drinks often milk*, a sentence that sounds jarring to the native English speaker, who would probably say *She often drinks milk*. The structure of French is such that adverbs like *often* must be placed after the verb. The learner's English sentence is reflective of this structure, indicating transfer at the level of syntactic structure.

If L2 learners begin by transferring everything they know about language from their L1, the starting point of L2 acquisition is a fundamentally different one from that in L1 acquisition. As a consequence, the learning trajectory – the path towards proficiency – must logically also be a different one. Nevertheless, research has shown remarkable similarities between L2 learners with very different mother tongues, suggesting that there are more general, L1-independent developmental patterns in L2 acquisition. For example, functional morphemes (like plural /*-s*/ or the article *the*) are often missing in the speech of L2 learners, even those whose L1s have similar functional elements. This, of course, is reminiscent of the telegraphic stage in L1 development, and suggests that despite the many differences between L1 and L2 learning, both abide by what might be universal principles in language development. An important commonality between the two lies in the fact that a learner's developing L2, also called **interlanguage**, just like the child's developing L1, is a system governed by abstract rules, rather than based on imitation and correction alone. Our earlier example *She drinks often milk* is a good example: the learner is unlikely to have heard this from a native speaker, and might even have been corrected by a teacher at some point. Yet it seems that the abstract rules and constraints of her current interlanguage have overridden information from the L2 environment in this case.

This is not to say, however, that information from the environment and from interactions with other speakers do not play a role in L2 acquisition. In fact,

differences in these domains might be an important contributor towards the differences we see in the outcomes of first versus later language acquisition. While infants are almost constantly immersed in the language around them, typically spoken by native speakers, many L2 learners experience their L2 only for limited periods of time in limited social settings (e.g. a classroom) and are often exposed to speech from other non-native speakers (e.g. their classmates). It is difficult to tease apart the effects of social factors like these from biological factors like brain maturation. It is highly likely that they contribute jointly to the development and outcomes we see in SLA. Like all human learning, language learning takes place at the crossroads of biology and social interaction. The many complex interactions that take place at this crossroads will remain a topic of research for many decades and centuries to come.

Relevance to educational settings

We have seen that meaningful social interactions among real people provide the best possible environment for language learning, for children learning their first language(s) as much as for adults learning additional languages later in life. Classrooms can be such environments, regardless of whether the focus of instruction is on chemistry, music or early childhood education. Educators can create rich linguistic environments in their classrooms by enabling verbal interaction with and among students while pursuing the goals of the curriculum they teach. This will be of particular benefit to students whose access to the language of instruction is otherwise limited, for example, because they speak a different language at home, as is the case for many immigrant children.

We have also seen that despite the universal properties of human language development, there is great variability among learners as to when they reach major developmental milestones. Parents and educators should not expect all children to follow exactly the same time course. Variation within the limits we have discussed here is normal and should not be reason for concern. Yet if significant delays outside the normal range are suspected, it is important to consult professionals (paediatricians, clinical psychologists, audiologists, speech-language pathologists) for proper evaluation of a child's strengths and weaknesses. In any such evaluation, a child's social and family background should be taken into consideration. This is particularly important in the case of children who experience more than one language on a regular basis. If a language delay is suspected in a bilingual child, it is critical to understand to what extent this might be reflective of the child's limited experience with the language, or whether it potentially indicates a clinical condition.

Discussion and reflection questions

- This chapter has shown that language learning involves both social and biological factors. In your opinion, what is the single most convincing piece of evidence that social factors are involved in language acquisition? What is the single most convincing piece of evidence that biological factors are involved in language acquisition?
- If you see that a bilingual child in your classroom is having more trouble with the language of instruction than other children, does this indicate that this child might have SLI? What kind of information about the child could help you – and a speech-language pathologist – figure this out?
- At the end of the chapter, it is suggested that teachers should create 'rich linguistic environments' in their classrooms, regardless of what subjects they teach. Can you think of some concrete things a teacher could do to create a 'rich linguistic environment' for the students in his or her classroom?

Recommended reading and viewing

For a very readable and engaging introduction to child language acquisition from a linguistic perspective, accessible to anyone with an interest in the topic, see:

O'Grady, W. (2005), *How Children Learn Language*. Cambridge: Cambridge University Press.

For a comprehensive overview of language development from a multidisciplinary perspective, see:

Berko Gleason, J. and Bernstein Ratner, N. (2012), *The Development of Language* (8th edn). London: Allyn & Bacon.

For a research-based guide to bilingual development in children with and without language disorders, specifically written for parents, educators and clinicians, see:

Paradis, J., Genesee, F. and Crago, M. (2011), *Dual Language Development and Disorders* (2nd edn). Baltimore, MD: Paul H. Brookes.

For a thought-provoking documentary on language acquisition with interviews of major researchers in the field, see:

> Searchinger, G. (1995), *The Human Language Series: Acquiring the Human Language* (part 2) [documentary]. New York: Equinox Films/Ways of Knowing Inc.

For an inspiring ten-minute talk about language learning in infancy, see Patricia Kuhl's TED talks on *The Linguistic Genius of Babies*:

> www.ted.com/talks/patricia_kuhl_the_linguistic_genius_of_babies.html