

Chapter 5

Language development

Learning outcomes

After reading this chapter, and with further recommended reading, you should be able to:

1. Explain what language is, and describe its four major component parts.
2. Discuss some of the ways in which infants' early communicative and social interactions pave the way for later language development.
3. Compare some different theoretical explanations for the development of language.
4. Explain how development occurs in the four major parts of language.



Talk to your baby

In 2008, Suzanne Zeedyk, a psychologist at the University of Dundee in the UK, published the findings of research carried out in collaboration with a UK organisation called the National Literacy Trust (NLT). The article is entitled, 'What's life in a baby buggy like? The impact of buggy orientation on parent–infant interaction and infant stress'. The research was carried out as part of the NLT's 'Talk to Your Baby' campaign (http://www.literacytrust.org.uk/talk_to_your_baby), which is aimed at encouraging parents and caregivers to talk more to children from birth to 3 years. 'Buggy orientation' is the way the buggy faces: towards the person pushing it, or away from them. You might wonder why the orientation of a buggy is important in considering language development. Well, the research showed that mothers spoke much more to their infants when using a toward-facing buggy. In fact, when infants were in away-facing buggies, the amount of speech that mothers directed towards them dropped by half. Consider the following questions:

- Do we talk less to our children than we used to and, if so, why might that be?
- Can talking to babies before they can talk themselves really facilitate language development?
- Could something as seemingly simple as a pusher-facing baby buggy really have a significant effect on a child's language development?

A full report of Suzanne Zeedyk's findings can be downloaded from http://www.literacytrust.org.uk/assets/0000/2531/Buggy_research.pdf

Introduction

Language is a system of symbols that we use to communicate with one another. It consists of sounds, which can be combined in various ways to make words, and those words each carry their own meanings. There are grammatical rules which govern how those words may be combined in order to construct sentences correctly, and social rules which govern how language is used appropriately in different situations. The foundations of this complex system of communication are laid well before a child even utters his first words. This chapter will explore the process of developing language, beginning in the pre-verbal stage and following children's progress through childhood to the point where they can use language very effectively to communicate and engage in social interactions. (For a consideration of speech and language disorder in childhood, see Chapter 16, Atypical Development.)

What is language?

Language is a system of communication, although not all communication occurs through language. We will see later in this chapter that, before they are able to understand or produce words, infants can communicate quite effectively with us. Language is a symbolic system. That is, each word (and sometimes even parts of words) means something, stands for something or refers to something else. So long as we all share a common understanding of what words refer to then we can communicate. The precise word that we choose to represent something is to a certain extent unimportant. Take, for example, the word 'bed'. This is the word which we use in the English language to refer to objects like the one in the photograph.

However, if we were speaking German, we would use the word 'Bett'. If we were speaking French we would say 'lit' and if we were using British Sign Language then we would make the sign pictured on the right. The relationship between the object and the word which we use to refer to it is, therefore, not a necessary one – there is no intrinsic reason why another word could not be used. From now on, we could all use the word 'kofu' to refer to objects like that in the photo. So long as everyone did it, and we all understood what we were referring to, kofu would serve as just as adequate a symbol for such objects as the word 'bed'.

The individual words themselves, though, are only the building blocks of language. There are rules which children must learn about how those words can be



British Sign Language for 'bed'.

Source: Bartlett

combined, and these serve as the cement which holds the words together. There are also rules about how words can be altered to make, for example, different tenses or to create plurals. Again, these rules differ between different languages. What is amazing about language is that, although there are only a finite number of words and rules available to us, there are a potentially infinite number of ways in which those words may be combined. Young infants use words to communicate only their basic needs but, by adulthood, we can talk about abstract ideas and concepts meaningfully. As children begin to develop language, they start by naming and describing objects. Eventually, though, they will be able to discuss how they feel and what they like, and will not rely upon the immediate environment for communication. Developing language enables us to talk about the past and the future. Language is therefore incredibly creative and productive.



An object which may be referred to using many different words.

Source: Pearson Education Ltd/Comstock Images

What communication is there before verbal communication?

We have referred to the fact that language is a system of communication, but that not all communication occurs through language. In this section, we will consider some

of the ways in which early communication occurs even before spoken language.

Infants are social and emotional beings, and are able to send emotional messages from the time that they are born. Using facial expressions and early vocalisations such as crying, screaming, smiling or laughing, we can interpret an infant's emotional state. In fact, some researchers suggest that there is a universal repertoire of facial expressions that infants are born with, so that regardless of culture they are able to communicate their basic emotions and their primary physiological needs (Izard, 1994). Crying has received particular attention from researchers as a key way in which infants communicate. However, there has been controversy in the research literature about the exact purpose and function of a baby's cry. The next 'Stop and think' box explores some of the arguments which have arisen from recent research exploring infants' crying – an interesting and controversial topic in understanding language development.

There are disagreements about whether crying should be viewed as an attempt to communicate some physiological need, a way to manipulate parents and caregivers or a way for an infant simply to signal that she is healthy and strong. In Chapter 9, Attachment and Early Social Experiences, we discuss the development of a healthy mother–infant bond. The work of John Bowlby (1969, 1982) in the field of attachment suggested that crying has an important function for infants since most mothers will return to an infant if she begins to cry, and thus crying can restore the infant's proximity to her mother. This is important since the infant is more likely to remain fed and warm, but also because proximity to the mother is important for the development of that infant's social and emotional wellbeing. Bowlby believed that crying may have developed as part of infants' behavioural repertoire through the process of human evolution. Remaining close to her mother will have made the early human infant less vulnerable to predators and thus will have served an important function in evolutionary terms in ensuring the continuation of the species.

Lummaa et al. (1998) suggest that excessive crying on the part of an infant is a manipulative signal and would have us believe that on some level there is an intent to 'send' a message. Research by Lorberbaum et al. (2002) suggests that when infants cry, their mothers are 'receiving' information. They used functional magnetic resonance imaging (fMRI) to examine the brain activity of first-time mothers whilst listening to infant crying, and compared this to their brain activity during

a control condition where they listened to white noise and to a third condition where they heard nothing. Some previous research by the neurologist Paul MacLean (see Recommended Websites) had suggested that a part of the brain called the **thalamocingulate division** would be important in mother–infant attachment behaviour (MacLean, 1990). If there are particular parts of the brain which are involved in maternal behaviour then clearly it is important to investigate which parts these are in order to better understand normal mothering and also potentially to understand what might underpin some instances of abnormal, neglectful or abusive mothering. The fMRI study showed that parts of the brain within the thalamocingulate division were indeed more active when mothers heard infants' crying than in the control conditions. Overall the results were consistent with other research which has identified areas of the brain involved in maternal behaviour with non-human mammals.

Interviews with the mothers in that research also asked them to report their emotional reactions to the different stimuli which they had heard, and the results of these interviews showed that hearing infants' crying resulted in the mothers experiencing significantly more sadness, and significantly more 'urges to help' than the control conditions. This evidence using fMRI techniques and interviews indicates that, merely by crying, infants elicit a consistent response in particular parts of mothers' brains and an accompanying desire on the part of the mothers to behave in a certain way (to help). It could therefore be argued that complex pre-verbal communication is occurring. This research shows how infants' crying can have a very real physiological effect on mothers, and supports the very early view of Bowlby that crying may have a survival function by ensuring that an infant remains in close proximity to its mother.

Should we really consider these early emotional expressions to be communication, though? Are infants and mothers really sending and receiving messages (see the next photo)? What is generally agreed is that in the very earliest days of life these kinds of emotional expression do

Definition

Thalamocingulate division: part of the human brain suggested within Paul MacLean's 'Triune Brain' theory (that we have three brains, each developed from the preceding ones through evolution) as important in family-related behaviour.

by showing that 5.6% of parents reported having smothered, slapped or shaken their baby at least once because of its crying (Reijneveld et al., 2004).

- Should we view crying as an important part of infants' early communication, or as a normal behavioural state like waking or sleeping?
- Is the communicative function of crying merely a side effect of evolutionary processes, or does it still have an important function in developing the mother–infant bond and ensuring healthy psychological development?
- Or does crying do more harm than good?

The four components of language

Language is made up of four main component parts. These four components are: **phonology**; **semantics**; **syntax**; and **pragmatics**. We will now consider each of these in turn in order to get a better understanding of this complex system, and how the different parts of it develop.

What is phonology?

When we talk about phonology, we are talking about the sound system of a language. Different languages contain different sounds, and if you have ever learned another language then you will know that just mastering the speech sounds that you need to be able to pronounce certain words can be a big challenge. In fact, there are significant phonological differences even between different dialects of the English language. The Scottish word 'loch' contains the **phoneme** /ch/ which does not feature in other English speakers' repertoire of sounds, and which they may therefore struggle to pronounce. In contrast, that same phoneme is a key part of the phonology of the German language, and Scottish students may find mastering the sounds necessary to pronounce German words easier than their traditional-English-speaking counterparts. Phonology also determines which sounds can precede or follow other sounds in a given language. For example, in English /s/ can be followed by /t/ as in the words 'star' or 'fast'. However, the sound /z/ cannot be followed by /x/, nor /p/ by /q/.

It is important to note that it is not just the ability to produce the speech sounds of a language which is important in understanding children's phonological development, but also the ability to recognise and to tell the difference, or **discriminate**, between different phonemes within a language. For example, in spoken English the /k/ sound in the word 'cat' actually sounds different to the /k/ sound when it appears in the spoken word 'ski'. However, if we get speakers of English to listen to different instances of the /k/ sound (say, by different speakers or taken from different words), they are unable to tell the difference between them. This means that these different instances of the speech sound /k/ all form one **category** of sound within spoken English. English speakers do not discriminate between different instances within the category of speech sound /k/. In contrast, speakers of Arabic can readily discriminate between different instances of the /k/ sound, because in Arabic these constitute different phonemes. Later in this chapter we will see how the ability to produce the sounds of a language develops, as well as the ability to perceive the sounds of language.

What are semantics?

Semantics refers to the part of language to do with the meanings of words, and also of sentences. As children learn language, they develop a vocabulary of words to

Definitions

Phonology: the sound system of a particular language.

Semantics: the part of language concerned with the meanings of words and parts of words.

Syntax: the part of language concerned with the rules which govern how words can be combined to make sentences.

Pragmatics: the part of language concerned with its use in social contexts.

Phoneme: the smallest units of sound in a language.

Discriminate: in speech-sound perception, to be able to tell the difference between speech sounds of a language.

Category: a set of sounds or words perceived as belonging to the same group (e.g. all instances of the sound /s/ or all words relating to female humans).

which they attach certain meanings (not always correctly at first, as we will see later on). As children's vocabularies grow, they are able to organise the words they know into groups of words which are **semantically related**. The words 'cat' and 'kitten' have a lot in common in terms of their meanings and the animal to which they refer. They are therefore semantically related, but have key semantic differences in terms of the age of the animal. Nevertheless, recognising that there are commonalities in their meanings is important in language development.

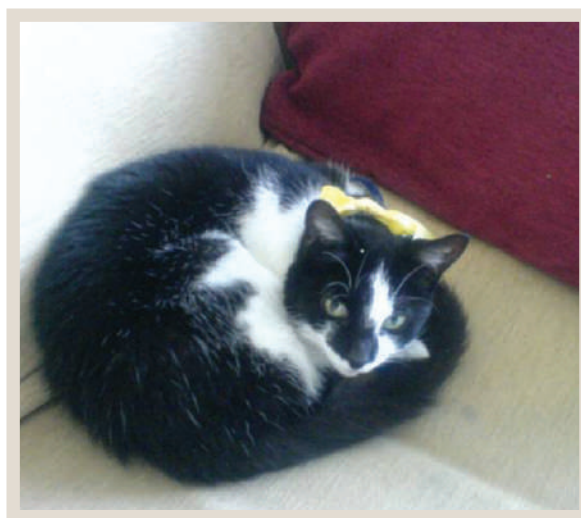
Even sentences which are grammatically correct may not be semantically accurate, if they do not make sense. For example, the sentence 'The carrot sang to the boy' is constructed correctly from a grammatical point of view, but it contradicts our semantic knowledge that the word 'carrot' denotes a vegetable which cannot sing.

What is syntax?

Syntax refers to the way in which words can be acceptably combined to create sentences or phrases in a given language. The sentence 'I am going to the shop' is syntactically correct in English, but combining the same words in a different way to say, 'I am to the shop going' is syntactically incorrect. Nevertheless, we may still be able to infer the meaning of what someone is trying to say from a sentence which is syntactically incorrect. The character Yoda in the *Star Wars* movies constructed sentences in this way and yet we are still able to follow what he is trying to say!

What are pragmatics?

Pragmatics refers to the social part of language and determines how language can be used appropriately in different contexts, and how meanings can be conveyed which go beyond the words themselves. For example, the convention of taking turns during conversations is part of the pragmatic system, and this begins to develop even before children have developed any spoken language, as we will see later in the chapter. Telling jokes,



A cat or a kitten?

Source: O'Donnell

or using language deliberately to make people laugh, is part of this system as well, as is the ability to modify the way we use language depending upon whom we are talking to.

STOP AND THINK

Reflection

- Have you ever heard anyone refer to things children say as 'refreshingly honest'?
- Young children often say things which we, as adults, may be thinking, but would not dream of saying out loud. Can you think of occasions where you have not said something, perhaps because of concern for causing embarrassment or insulting someone?
- How do you think a child learns the 'rules' concerning these aspects of language?

Consider the way that you might talk to a group of close friends when you are on a night out, and compare it to the way you might talk to your lecturer or to your grandparents. What are the differences between these different ways in which you use language? Knowledge and understanding of social contexts and of the effects of using language in different ways allows us to modify and adapt what we say and how we say it, to different situations.

Definition

Semantically related: words which have something in common in terms of their meaning.

How do infants' early social interactions prepare them for later language?

Turn taking in feeding

Earlier in the chapter, we mentioned the importance of turn taking for successful conversations to occur. This is a social aspect of language and researchers have found evidence that early social interactions which infants have with their caregivers may be important in preparing them for turn taking in formal conversations later on. When they are feeding, infants fall into a rhythmic pattern which includes bursts of sucking separated by pauses. It seems as though these pauses are unique to human babies, as they have not been found in other mammals' feeding patterns (Wolff, 1968a, 1968b). The purpose and function of the pauses is not clear, as there does not seem to be any logical reason for them to occur. Infants are perfectly able to suck continuously without needing to take a break in between. They can suck and breathe at the same time and, although their bouts of sucking may get shorter over the course of a feed, the pauses stay at roughly the same length (Kaye and Brazelton, 1971). This is curious and has led researchers to investigate what happens during these pauses in order to try to explain what purpose they might serve.

It seems as though the infant's mother matches her own cycles of activity and rest with the infant's burst-pause sequences, by remaining passive whilst the infant is sucking, and then inserting dialogue or 'jiggling' the baby during the pauses (Kaye, 1977; Kaye and Wells, 1980). This mirrors the conventional patterns of language that occur during conversational exchanges in later life, which require us to be attuned to the people around us. These cycles of resting and feeding may therefore play a part in the development of reciprocal turn taking as part of the development of the pragmatic system.

Interestingly, some research has compared these rhythmic exchanges between infants and their mothers in babies who were born prematurely and those who were born after a full-term pregnancy (Lester et al., 1985). This research showed that these mother-infant interactions are less well synchronised in premature babies than in babies born at full term. Other research has reported that children

born prematurely show some delays in language development (e.g. Friedman and Sigman, 1981). Lester et al. (1985) suggest that this lack of synchrony in the earliest interactions between infants and their mothers may be at least partly responsible for the delays in language development seen in children who were born prematurely. If this is the case then it shows how important these early social interactions can be for later language development. These cycles and rhythms of social interaction also occur in contexts other than feeding, as the next section shows.

Cycles of attention

In other interactions between infants and their caregivers, there is evidence of the same kinds of rhythm as discussed in the previous section. For example, studies of mother-infant gazing show that babies will engage in cycles of attention and looking away. In adult communication, meeting someone's gaze is interpreted as an invitation to engage socially, and this seems to be mirrored in these infant interactions, where babies are able to indicate their willingness to engage socially by attending visually to their mother or other caregiver. They can control the amount of interaction that takes place by then looking away. Interactions between babies and their caregivers are very stimulating for babies and too much attention can lead to over-stimulation and upset. Babies can therefore use these cycles of attention and looking away to regulate their level of excitement. Nonetheless, caregivers also need to be sensitive to the baby's state. Understanding the need to lower the level of stimulation when a baby looks away is an important part of the parent's role in an interaction, as persisting in trying to engage a baby who is not receptive to interaction can have adverse effects.

Where mothers are not attuned to their infants, the development of an attachment bond may be disrupted and so these early communicative interactions may be important for a child's social development, as well as for the development of language (Murray and Cooper, 1997). Chapter 9, Attachment and Early Social Experiences, explores the development of an infant's bond with her mother or primary caregiver. It is interesting to note that parental sensitivity to infants may play an important part in the development of a child's attachment style (for more information about attachment styles in general, see Recommended Reading), and this sensitivity to an infant's cycles of attention regulation in pre-verbal interactions may indicate a parent's sensitivity to the infant.

For both parties, engaging in this kind of social interaction provides a positive shared experience. We will see later in this chapter how learning theorists' accounts of language development would conceptualise the importance of this kind of positive reinforcement for language development. But equally, if the interaction produces negative effects for the infant, it may lower the likelihood of the infant engaging in this kind of interaction again. Thus, these early social interactions pave the way for later communicative exchanges and language.

Infant-directed speech

In the literature you may see this referred to as mother-child speech, parentese, baby talk, motherese or infant-directed speech. What we are talking about here is the kind of speech that is heard when adults talk to infants. This kind of speech has a number of distinct characteristics which make it quite different from normal adult-to-adult speech. It is generally of a higher pitch. It also tends to use a greater range of pitch, from high to low, which sounds exaggerated. This kind of speech is often slower, and words are articulated much more clearly. It is also simpler, using less complex words as well as less complex clauses and phrases. There is also more repetition than is usually heard in adult-to-adult speech.

Adults seem to make use of this kind of speech, almost without realising it, in their interactions with infants. There is evidence from research which shows that infant-directed speech exists in many different languages, even sign language (for more information on this, see Recommended Reading). Acquiring the speech sounds (phonology) of a language may be facilitated by the use of infant-directed speech, which exposes babies to their language in an exaggerated and simplified form, and this may therefore prepare them for its more complex forms later on. Having said this, it is important to note that exposure to infant-directed speech is not something which is necessary in order for language development to occur, as studies of different cultures have shown us that in some communities this special way of interacting with infants does not happen, and yet children in those communities develop in approximately the same ways and at the same rates as children who are exposed to infant-directed speech.

In one Mayan society, parents have been observed not to use infant-directed speech at all and yet children seem to acquire language quite normally (Pye, 1986). In Papua New Guinea, the Kaluli tribe treat children as though they do not have any understanding and so parents do not really address children verbally at all until later in life (Schiefflin and Ochs, 1983). Again, these children still go on to acquire language normally. So in spite of these examples of cultures where children's earliest exposures to the phonology, syntax and semantics of their language are not especially simplified, such children are nevertheless able to develop language normally, suggesting that whilst infant-directed speech may facilitate the development of language, it is not strictly necessary for development as a component of a child's early exposure to language.

Theories of development

Having established what language is, what its component parts are, and how some of the foundations of language may be laid in infants' earliest social interactions, we will now explore some of the theoretical perspectives which try to explain how language develops. Before reading on, stop and think about your own beliefs regarding language.

STOP AND THINK

Reflection

- How significant is language as a feature of what makes humans different from other animals?
- Is there something 'special' or 'different' about language, or is it just one of many abilities that we have? What makes you think so?
- What do you think would happen to a child's language development if they had no contact with other people? What makes you think so?

Learning theory accounts

Learning theorists argue that language is just another kind of behaviour which we learn, albeit a verbal behaviour. If we accept this account then it implies that there

are no in-born language abilities. This contrasts with Nativist accounts of language, which we will discuss in the next section, and which suggest that there are some abilities or aptitudes that infants are born with, which allow for the development of language.

STOP AND THINK

Reflection

Consider some of the research we have already discussed in this chapter about children's earliest communicative encounters. Would these fit with the view that children are not born with any specific language abilities?

Learning theorists point out that from the time they are born, children are surrounded with language. We talk to babies all the time, even though we know that they cannot respond or even understand us. For example, Rheingold and Adams (1980) collected samples of speech which was directed to new-born infants by staff in a hospital neonatal nursery over a period of two months. Ten two-hour samples of speech were collected and analysed in terms of their grammatical characteristics, topic and whether they expressed warm regard or instructions. The researchers found that the speech which was directed to these infants was extensive and grammatically well formed, and occurred from the day the infants were born. This suggests that infants have ample opportunities to learn language quickly after birth without us needing to believe in the existence of abilities that are present within the child from birth.

The discussion in the previous section about the use of motherese is another way in which exposure to language after birth could arguably provide opportunities for infants to be exposed to their native language and thus learn it from an early age. Perhaps infants imitate the sounds of language to which they have been exposed, and learn the words and the grammatical rules by copying what they have heard. Social learning theorists emphasise how important parental approval and positive regard are in the process of language development, by influencing which sounds, words and sentences are repeated in future and thus **shaping** a child's language development. Consider this example taken from an observation

of a mother as she holds her 7-month-old infant on her knee:

- Baby Ivor:** *Baba ba ba na na*
Mum: *(smiles) What are you saying baby?*
Ivor: *Ba ba ba na*
Mum: *Yes, I know (kisses baby on the nose)*
Ivor: *Ba ba ba da*
Mum: *(eyes wide, big smile) What did you say? What did you say?*
Ivor: *Ba ba ba da*
Mum: *Da! Did you say Da! Clever boy! What a clever boy! (touches nose to nose)*
Ivor: *Bababa da*
Mum: *Da! Yes baby! Yes! Dada! What a clever boy!*
Ivor: *Da da da da (jiggles)*
Mum: *Dada! (excited voice) That's a clever boy! You love your dada? Yes, you love your dada! Where's your dada? Where is he?*
Ivor: *Da da da da (big smile)*
Mum: *Dada! That's my clever boy! (three kisses) Dada! What a beautiful boy!*

It is likely that Ivor's vocalisation of the 'da' sound was produced as part of his expressive experimentation with speech sounds, along with 'ba' and 'na' sounds which were also produced in the early part of the exchange above. But clearly Mum picks up on the 'da' sound and repeats that particular sound to Ivor rather than the others. She also responds much more positively and enthusiastically to his production of the 'da' sound and by the end of this exchange we can see that Ivor is making that sound to the exclusion of others which were present at the beginning. Ivor therefore received a great deal of positive reinforcement from his mother for producing the 'da' sound, making it much more likely that this sound would be produced again. It is unlikely that Ivor actually

Definition

Shaping: a process by which children's utterances move closer to correct speech as the result of positive reinforcement, which leads to a series of successive approximations.

intended to say 'Dada' (meaning Dad), but the likelihood of Ivor now saying 'Dada' in the future is increased. In this way, social learning theorists suggest that language is learned through a process of gradually shaping sounds into word-like sounds, which will eventually become words associated with specific meanings. So do we really need to believe in any in-born language abilities to be able to explain how the process of language develops? Well, some people suggest that learning in infancy is not enough to account for all of the aspects of language development, as we will see in the next section.

The Nativist account

Noam Chomsky (see Recommended Websites) is a leading linguist who has suggested that humans are born with something called a **language acquisition device** (LAD). Chomsky does not believe that learning in infancy can account for all of the different aspects of language development. In particular, the suggestion that children can develop an understanding of the complex rules of grammar or syntax of a language through simple learning by imitation and reinforcement is unlikely. If you listen to adults talking, it is rare that they speak in fully formed, grammatically correct sentences, making it improbable that children would be able to learn the rules which govern language in this way.

Figure 5.1 gives an excerpt from a transcript of a conversation between two colleagues at work and illustrates the fact that adult language does not always involve grammatically correct sentences. Adult conversation is quite messy, with lots of hesitation and unnecessary or superfluous words. Exposed to this kind of language, it is difficult to imagine how infants could make sense of what they heard to such an extent that they could work out what was correct and incorrect syntax. Perhaps infant-directed speech helps with this, by exposing babies to exaggeratedly simplified speech which cuts out the unnecessary aspects of adult speech.

Definition

Language acquisition device: a hypothetical cognitive structure predisposed towards the acquisition of language and sensitive to rule-based regularities in everyday speech, therefore allowing for the development of grammar and syntax.

A: So it's just like (1) I don't know (.) you know the thing is (1) um (1) it's like there's no appreciation of what they have to
B: I know (.) I know how you feel (.) I feel the
A: I know (1) and so I think we have to (.) like
B: We do (.) say something about it
A: Yeh because otherwise it's just gonna keep on and (.) there's never gonna be
B: I know (.) it'll just be the same again
A: And it's not even just about him (.) it's a general
B: I know (.) like principle
A: Yeh the principle or something (.) I don't know
Key: (.) = short pause; (1) = 1-second pause

Figure 5.1 Excerpt from transcript of a conversation between colleagues.

Yet we have already considered evidence from other cultures which shows that even when the different kind of infant-directed speech does not feature in a society's interactions with infants, they develop language in approximately the same ways, so even the use of motherese cannot account for the learning of syntax.

Chomsky has also pointed out the predictability of the way in which language develops, and the fact that, regardless of country, culture or which specific language is to be learned, children reach certain developmental language milestones at roughly the same points in development. In fact, there are numerous websites that parents can visit which contain information on the speech and language abilities that typically developing children are expected to reach at different ages (see Recommended Websites). This lends further weight to the argument that learning from environmental influences and behaviour cannot be solely responsible for language development. If it were then we would expect to see far more variation in language development as a result of variations in the learning environment.

Studies of the kinds of mistakes which children make in their attempts to master language suggest that instead of learning syntax directly from speech, a LAD which they are born with enables children to pick up on the regularities that do exist in everyday speech. On the basis of these regularities, the LAD comes up with mini-theories about the rules which govern speech. For example, children may say 'mouses' instead of mice, and yet it is very unlikely that they would have learned to say 'mouses' as the result of hearing it said by

other adults. An adult would not make this error in the construction of this plural noun, and so learning theories of language cannot account for these kinds of mistakes in children's development. But if there is a LAD which has generated a mini-theory (based on lots of instances of pluralised nouns in the English language) that you make a plural by adding an /s/, then it is possible to understand how this error (of saying 'mouses') might have come about. It is only after more exposure to language that children's mini-theories will be modified, as they come across instances of plurals which contradict their existing theory. Eventually they will arrive at a more sophisticated understanding of the rules that govern the pluralisation of nouns, which incorporates some of the exceptions too. We will be looking at some other kinds of errors that children make in their developing language later in this chapter, because they can offer us useful insights into the way in which language is acquired, the mini-theories that children have about language at different stages of development and the way in which they come to appreciate the relationship between words and their referents.

A LAD, if there is such a thing, would have to have some sort of biological basis, but it is not entirely clear what this might be. It is possible that the LAD might represent a particular part of the brain, and there is certainly evidence that there are particular parts of the brain which are involved in language. It is widely understood that in adults the left hemisphere of the brain is important for language, and in 1987 a review of the literature about **lateralisation** of brain functioning confirmed that this is also the case for children from birth (Hahn, 1987). Evidence from patients who have suffered brain injuries has helped us to understand which parts of the left hemisphere may be implicated in language.

Pierre Paul Broca, a French neurosurgeon and pathologist, was the first to identify a specific part of the left hemisphere which is involved in language. In 1961 Broca conducted an examination of a patient with a specific language impairment following that patient's death, and

found lesions in a particular part of the posterior of his left hemisphere which has come to be known as 'Broca's area'. This part of the brain is important for the production of speech (and is sometimes referred to as the speech centre). Individuals whose speech and language is affected by damage to this area are often referred to as suffering from Broca's aphasia, which means that they have problems with expressive language, their sentences will be short and their speech very broken and sometimes distorted (for more information, including classic and contemporary papers about Broca's area, see Recommended Reading). Broca's area is connected by a pathway of nerves to another part of the brain implicated in language, called Wernicke's area. The location of these two areas of the brain is illustrated in Figure 5.2.

Wernicke's area is most important for the comprehension of language, and is named after the German psychiatrist and neurologist Carl Wernicke who first described the symptoms associated with damage to the area, in 1908. Individuals with damage to this area are able to produce speech that has the same kind of sound and rhythm as normal speech, but which does not have any real meaning, and they have difficulty in understanding language. Such symptoms are known as Wernicke's aphasia.

It is thought that Wernicke's area is important for language development. Damage to the area means that children will be unable to make sense of the language that they are exposed to, thus seriously impairing its development. Figure 5.2 illustrates the connection between

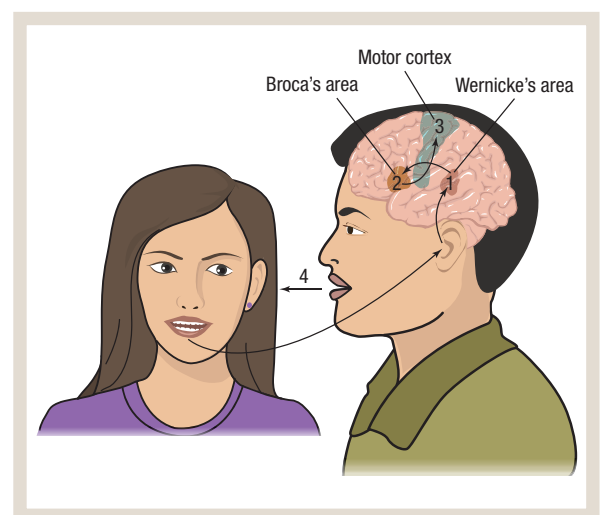


Figure 5.2 Broca's area and Wernicke's area are both important for language.

Definition

Lateralisation: the principle that some specific psychological functions are located in one or the other side of the brain's two cortical hemispheres.

Broca's and Wernicke's areas, and their involvement in language, from comprehension to production.

Contemporary research into these biological bases for language have lent support to the **critical period hypothesis**, through studies of children who have suffered traumatic brain injuries. Adults who develop language impairments following these kinds of injuries are likely to be permanently impaired, and some research with children suffering head injuries has also found long-lasting effects on language for at least some children. For example, Jordan and Murdoch (1993) studied 11 children over a period of 18 months following head injuries, assessing various different aspects of their language abilities, and found that few of them recovered to what would be considered 'normal' levels on all of the measures after 18 months. However, the youngest child in that study was 7 years old at the time of their injury. Another longitudinal study, this time of an infant who was 17 months and 10 days old when she suffered a head trauma, suggests that despite an initial decline in her language ability immediately following the injury, six months after her injury there were no longer any significant impairments on any of the measures of language that were used (Trudeau et al., 2000). This kind of evidence supports the idea that there may be a period in the early part of a child's life where parts of the brain develop specifically for language but that, if there is damage to those parts of the brain, there can be some compensation and other parts of the brain may be recruited for language. This ability of brains to recover their functioning is referred to as **plasticity**.

In the 1960s, Eric Lenneberg suggested that the critical period for children's language learning was between 18 months of age and the onset of puberty (Lenneberg,

1967). This original suggestion was based on the fact that language develops quickly during the early years of a child's life, and Lenneberg believed that there was a biological basis for this, in that language develops due to the development of the brain as children mature. The fact that more contemporary research has shown that brain damage in children over the age of 5 typically leads to at least some long-term effects on language, though, suggests that the critical period for language development has passed by this time, and that the opportunity for the brain to recover its functioning in this area is lost.

Overall, the ideas which Chomsky put forward about a possible LAD and the research from neuroscience regarding the importance of certain parts of the brain for language do suggest that external input and learning alone cannot account for how language is acquired and develops. Yet it is clear from the evidence regarding learning and the social world that environmental influences do affect how language develops too. Alternative accounts of language have evolved which emphasise the interaction between in-born abilities with a biological basis and input from the environment. These 'interactionist' accounts suggest that language can be understood best as an interaction between these two factors, and they are explored in the next section.

Interactionist accounts

Some interactionist accounts of language development make us think about the interaction between the development of language and the development of cognition and thinking abilities in general. For example, if we consider Piaget's theory of cognitive development (explored in Chapter 2, Theoretical Perspectives) then we recall that he believed in a progression through stages of development for children. Each stage means that a child is able to think and interact with the world in a particular way, which is fundamentally different to the way in which they thought about and interacted with the world in the previous stage. Early on in the present chapter, we discussed the fact that language is a symbolic system, where words represent things in the world. Language development can therefore be seen as part of a child's broader representational development, as they move into Piaget's later stages of development (see Chapter 2), where language and thinking are no longer dependent upon the immediate environment. Acquiring language allows us to think

Definitions

Critical period hypothesis: the suggestion that there is a specific period of time in the early part of a child's life (suggestions about when this begins and ends vary), during which language learning should occur in order to develop normally.

Plasticity: the ability of the brain to reorganise neural pathways either to recover lost functioning due to damage, or in response to learning from new experiences.

and talk about objects, people or events which are not present in our environment. Eventually, more sophisticated language allows us to talk and think about abstract concepts like justice or truth, which have no concrete referents in the external world. An 18-month-old infant has not yet reached the stage of cognitive development where thinking about such abstract concepts is possible. At this age, infants' thinking is focused on basic concepts like 'mummy' or 'food', 'hot' or 'sad' – these are things that they know about, and their language reflects the level of development of their knowledge and thinking. As children encounter new concepts, they will learn new words to associate with those concepts and then they will be able to talk about and think about the new concepts. Learning a new word which does not fit with any existing concepts will mean that a new concept is constructed (Kuczaj, 1982).

One of the Stop and Think boxes earlier in this chapter asked you to think about how important language really is, and whether you think it is much different from some of the other abilities we develop. In this particular theoretical framework, we can see that language is presented as part of the process of cognitive development, which means that we should not regard it as a special or significantly different aspect of development.

Other interactionist accounts emphasise the fact that children do not develop language in isolation, and allow us to consider how input from the external world works with innate abilities that a child brings into the world. Looking at some of the cases of children who have developed without input from the external world can help to illustrate this.

In 1992, an American journalist called Russ Rymer published a book called *Genie: A Scientific Tragedy*, one of many such books which tells the true and harrowing story of a young girl who was discovered aged 13 years of age, locked away in her parents' home in California, USA. She had spent her entire childhood strapped to a chair and was kept almost completely isolated during this time. Her father subjected her to physical beatings if she made any sounds, and when she was rescued, as well as having various physical problems, she could not speak. For many years after she was found, Genie was surrounded by therapists of many kinds, and although she did eventually learn some basic words and word combinations, she did not develop normal language

abilities and in particular she did not acquire an understanding of grammar or syntax. Sadly there have been other instances of children who for various reasons have lived the early parts of their lives without being exposed to language.

The study of an individual child like Genie represents a case study. The use of case studies as a research method in developmental psychology is discussed in more detail in Chapter 3 (Research Methods). Case studies do not necessarily allow us to generalise to an entire population. The fact that Genie's language was affected in certain ways by her deprivation does not mean that any child subject to the same circumstances would develop in the same way. However, case studies like this do allow us to carry out in-depth studies of naturally occurring phenomena which would simply not be possible to manipulate artificially for the purposes of an experiment. Obviously we could not remove infants from their families and keep them in conditions similar to those which Genie experienced, merely for the purposes of studying the effects on their development. But when cases like these occur, tragic though they are, they provide an opportunity for psychologists to learn something. What is crucial, though, is that the welfare of the child is always paramount, and that the researchers' interests are always secondary to the need to provide the best possible support and care for the child. Genie's case lends weight to the critical period hypothesis discussed previously, which suggests that language needs to develop within the first few years of life if a typical developmental pattern is to be established (see Recommended Websites for a link to a site devoted to cases of these kinds of children).

In these ways, then, interactionist approaches to understanding and explaining how and why language develops allow us to think about how abilities which are specific to language may interact with other cognitive abilities, and also how they may interact with input from the social world. Having explored these three major theoretical explanations for language development, the next part of this chapter will focus on the four component parts of language (phonology, semantics, syntax, pragmatics), and will describe what developments occur in those four domains across childhood, so that we can start to build up a picture of what language looks like (or, more accurately, *sounds* like), at different stages of development.

RESEARCH METHODS

The use of language in researching children's cognitive development

One of the major challenges facing researchers in developmental psychology is how to assess children's thinking in the pre-verbal stage. Once children have developed enough language to provide verbal responses or explanations, things seem a little more straightforward. Chapter 4 (Prenatal Development and Infancy) explores in more detail some of the methods that researchers have developed which allow them to assess psychological development in infancy, and Chapter 6 (Memory and Intelligence) explores some of these as well. Chapter 8 discusses the development of Theory of Mind, which is significant for understanding children's development. Developing a theory of mind is about developing the ability to recognise the mental states of others, and how these mental states relate to people's behaviour.

You will see in Chapter 8 that researchers have developed **false-belief** tasks to assess whether a child can correctly identify that someone else holds a belief about something, which the child themselves knows to be false. For example, the child might know that the chocolate is in the cupboard because they moved it there from the table. But do they understand that if their mother came into the room, she would look on the table for the chocolate? Understanding that someone else can hold a belief which is false, and that their false belief will influence their behaviour, is not easy for young children. Presenting children with scenarios like this one and asking them how someone else would behave allows us to judge children's theory of mind. These kinds of traditional false-belief tasks require verbal responses on the part of the child, and generally children cannot successfully complete such tasks until they are around 4 years of age

(Wellman et al., 2001). However, researchers have developed other tasks which do not require verbal responses, since they assess **implicit** theory of mind rather than **explicit** theory of mind. Using such tasks, researchers have been able to demonstrate implicit theory of mind in much younger infants (e.g. Baillargeon et al., 2010). We may underestimate children's cognitive abilities because the tasks children complete require verbal responses that they are not capable of. Recent research suggests that understanding verbs to do with knowledge (such as 'know' and 'think') may be part of the explanation for the shift from implicit theory of mind in infants to explicit theory of mind in older children (San Juan and Wilde Astington, 2012). This supports the interactionist approach to language development, and shows just how closely linked the development of language and cognition are.

These ideas, and the link between language development and theory of mind, are discussed more fully in Chapter 8. The study of language is important as an area of developmental psychology in itself, but understanding how language develops is also important for how we carry out research with children into other areas of their development, and how we interpret the results of research.

Definitions

False belief: the wrongly held belief that something is true.

Implicit: implicit knowledge comes from an understanding of what is meant or suggested even when it has not been directly stated.

Explicit: explicit knowledge is that which has been stated clearly and in detail, and where there is no room for misunderstanding, confusion or doubt.

Phonological development

The development of speech-sound perception

In order to use language, we need to be able to understand the spoken words that we hear, as well as to be able

to produce words ourselves. Hearing and understanding spoken words requires auditory perceptual abilities, and this section explores some of what we know about how the ability to perceive speech sounds develops in children. For adults to use language effectively, it is important to be able to discriminate (to hear the difference) between different categories of speech sound, and there is little point in us being able to discriminate between different

sounds *within* a category of speech sound. As discussed earlier, in Arabic, it is important to be able to discriminate between the different categories of /k/ sound, because these constitute different phonemes in Arabic. However, when speaking English there is little advantage in being able to discriminate within the single category of /k/ sound, since these are perceived by English speakers as belonging to the same category of phoneme.

In a piece of ground-breaking research published in the esteemed journal *Science* in 1971, four psychologists presented convincing evidence that children are able to make these kinds of discriminations between categories of speech sounds, yet not within categories of speech sound, at a surprisingly early age (Eimas et al., 1971). Using a habituation technique and a non-nutritive dummy, infants from English-speaking families aged just 1 and 4 months of age were exposed to the phonemes /p/ and /b/. By measuring changes in the infants' rates of sucking, these psychologists were able to establish that even at 1 month of age infants could tell the difference between /p/ and /b/ and would respond to them as different sounds, but that they did not discriminate within the categories of /p/ and /b/. For infants' speech-sound perception to so closely mirror that of adults was very surprising, given that at such a young age these infants will have had only a very limited exposure to spoken language. This evidence suggests that from early in the very first year of life, children can already make important distinctions between the sounds which, in their native language, constitute different phonemes. This evidence of infants' early abilities to discriminate between different phonemes has been shown to extend beyond the languages to which an infant has been exposed. Streeter (1976) found that Kenyan infants aged around 2 months were able to discriminate between phonemes which are not distinct in their own native language. This may indicate that the ability to perceive differences in speech sounds is in-born, rather than learned as a result of exposure to language. The Nature–Nurture box considers what the implications of these sorts of findings might be for the different theories of language development considered earlier, and how the conclusions which we draw might be affected by other research.

In terms of the continued development of speech-sound perception, it is interesting that despite the very good abilities which young infants have to discriminate between different phonemes as mentioned above, their abilities have actually been shown to diminish as they get older, as discussed in Chapter 4, Prenatal Development and Infancy. This is an interesting phenomenon as we tend to

as they get older. In the area of speech-sound perception, though, they get worse as they get older. Can you think of why this might be the case? Consider Chomsky's ideas about the existence of a language acquisition device. If all humans are born with one of these then it must be capable of facilitating the development of whichever language a child is exposed to, since we can assume that the LAD would not know in advance which language to prepare for. Yet it then needs to be able to respond specifically to whichever language the child needs to learn. Perhaps, then, the LAD comes equipped with generic capacities to respond to all possible languages, but as it begins to specialise in a particular language it develops an expertise in hearing and responding to the sounds of that language at the expense of others. In some ground-breaking research in the 1980s, an American child psychologist Janet Werker investigated exactly this possibility and was able to show that the decline in infants' abilities to perceive differences between different categories of speech sounds in languages other than their own occurs between 6 and 12 months of age (Werker, 1989). This seems to be one area of children's development, then, where their abilities are actually considerably better than those of adults, and reminds us that understanding children's development is more complicated than just following improvements in their abilities over time.

The development of speech-sound production

Having looked at some of what we know about children's developing abilities to perceive speech sounds, we will now explore the pattern of development which characterises children's speech-sound production. Following a Piagetian approach to development in this area, initial research identified a series of stages through which children's vocalisations progress, and which seem to be remarkably similar across children despite differences in language, culture and context (see, for example, Oller, 1980; Stark, 1980, 1981). Table 5.1 (page 131) presents an overview of the main stages. Physical maturation in the child's vocal system was thought to underpin the development of vocalisation through these stages, as infants then explore their developing abilities in interaction with others. We will see a little later that more recent research places greater significance on the influence of social interaction on the development of speech-sound production than previously.

Infants' earliest vocalisations include burping, crying, coughing and sneezing, all of which are produced in

NATURE–NURTURE

Is speech-sound perception innate?

Let's consider what the significance of this evidence from Eimas et al. (1971) might be to our understanding of how children develop language. Earlier on in this chapter we considered different theoretical approaches to the understanding of language development, and one of the key questions was about whether children are born with innate language abilities, or innate predispositions towards language acquisition, or whether learning is more responsible for language development. What do you think this key piece of research suggests in terms of language development? Could it be that infants of just 1 month old have already learned which speech sounds belong to one category and which represent different categories, as a result of their limited experience with spoken language? This seems unlikely to explain the results, and the original authors suggested that the evidence supported a view that some aspects of language development are 'part of the biological makeup of the organism' (p. 306) and that children are therefore born with innate language abilities. Some more recent research suggests that it is unlikely to be this straightforward either, though.

Patricia Kuhl, a professor of Speech and Hearing Sciences, did several pieces of research in the 1970s and 1980s which suggest that animals such as chimpanzees and macaques are able to make the same kinds of categorical discriminations between human speech sounds as infant children and adult humans can (see Recommended Reading). It is difficult to see why these kinds of animals would also have a built-in capacity for

perceiving human speech sounds. What seems more likely is that humans (and other animals) are born with some innate mechanism for making sense of sounds generally, but that this is not exclusively for the purposes of developing language. This mechanism is likely to be sensitive to auditory information generally, and for human infants would then provide the basis for the categorisation of speech sounds specifically.

The particular language to which an infant is exposed in infancy would then allow for the development of categorical discrimination between the sounds of that language, suggesting an interaction between children's in-born abilities and learning from the world around them. This suggestion is supported by the fact that infants' ability to discriminate between phonemes is one of the few areas of development where children get worse as they get older! Infants at 6 months of age are able to discriminate more phonemes than they can at 12 months. This seems to reflect the effects of environmental input on infants' initial auditory processing abilities, which leads to a gradual specialisation that enables the discrimination of phonemes from the child's native language, and a decrement in the ability to discriminate phonemes from other languages.

These pieces of research therefore lead us towards an understanding of the development of language which stems not from innate language abilities per se, but from innate mechanisms or abilities to process certain types of information. Development occurs as the result of the interaction between those mechanisms and the particular information which infants are then exposed to.

response to physiological or emotional states. An infant may be able to communicate some physiological need to us through crying, and in the first two months of life these vocalisations are referred to as 'reflexive' and are not viewed as language proper. Earlier in this chapter, we explored what kinds of communication can occur before verbal communication, and we discussed the significance of crying in particular. One study has found that new-born infants' crying seems to reflect the exposure which they have had in the womb to the sounds of their

native language (Mampe et al., 2009). The pitch and contours of two groups of new-borns (a French group and a German group) were compared. The researchers found that French new-borns produced cries which had rising melody contours, whereas the German new-borns cries had falling melody contours. This indicates that, even before birth, human babies must be able to perceive the sounds of their native language, and that the production of even their earliest vocalisations reflects those sounds.

The amount of crying which infants do seems to decrease after the second month of life, and it is then that more speech-like vocalisations occur. Cooing and laughing characterise a great deal of the vocalisations of infants between 2 and 4 months of age. The third stage is characterised by what is referred to as *babbling* or *vocal play* and features between 4 and 6 months. During this stage, infants begin to master some of the physical movements and manipulations which are required to make sounds (such as moving their lips and tongue and making their vocal chords vibrate) and they begin to play, explore and experiment. This is the vocal equivalent of exploring a new object which they have begun to be able to grasp – to see what it does, how it feels and what they can do with it. The next stage, *canonical babbling*, features sounds and combinations of sounds which actually sound like words (such as *mama* or *dada*, as seen in the example of Baby Ivor's exchange with his mother earlier in the chapter), though it is unlikely that infants are attaching any meaning to the word-like sounds that they produce during this stage. Next comes more complex babbling which is often referred to in the literature as *modulated babbling*, and which features between 10 and 15 months. During this stage, infants begin to play and explore the patterns of intonation, stress, pitch and tone which characterise more adult speech. This is the final stage before proper articulation and the use of **referential words** occurs at between 12 and 15 months. These stages are summarised in Table 5.1.

Definition

Referential words: common nouns used to denote real objects.

Semantic development

The growth of vocabulary in infancy

Once a child produces her first referential words, her vocabulary begins gradually to grow. This process is fairly slow for the first three or four months, adding just a few new words to her vocabulary each month. Once her vocabulary has reached between 50 and 100 words, however, the process of vocabulary growth accelerates rapidly. This is commonly referred to in the literature as the **vocabulary spurt**. Different authors disagree as to the exact rate at which a child's vocabulary grows during this spurt period, but some have reported cases where a child's vocabulary growth has increased from learning fewer than 10 new words one week, to learning as many as 40–70 new words the next week (e.g. Dromi, 1987; Mervis et al., 1992). The vocabulary spurt often occurs at around 18 months of age, but the exact point varies between children, and some children may not display a spurt at all (see, for example, Ganger and Brent, 2004).

There is a subtle but important distinction to be made between the size of a child's vocabulary and the rate of their vocabulary growth. Think about a Porsche Carrera driving down the M1 motorway. As it joins the motorway at junction 26 the Porsche is doing 57 miles per hour (mph), and by the time it reaches junction 27

Definition

Vocabulary spurt: a point in language development where the rate of acquisition of new words is thought to accelerate rapidly.

Table 5.1 Stages of infant vocalisation.

Stage	Main features	Approximate age range
I: Reflexive vocalisation	Crying, burping, coughing, sneezing	0–6/8 weeks
II: Interactive sound making	Cooing, laughing	6–19 weeks
III: Vocal play	Deliberate exploration of sounds	18–30/35 weeks
IV: Canonical babbling	Sounds and sound combinations which begin to sound like words	35 weeks–1 year
V: Complex/modulated babbling	Interactive use of babbling; exploration of stress, intonation, etc.	10–15 months
VI: Referential words	First words used to refer to things	12–15 months

Source: adapted from Stark (1981)

it is doing 70 mph. This tells us the absolute speed at which the Porsche was travelling at these two points, but it doesn't tell us about the Porsche's rate of acceleration between those two points. A Ford Fiesta could also join the M1 at junction 26 doing 57 mph, and could have reached 70 mph by junction 27, but we would imagine that the Porsche's rate of acceleration would have been greater than the Fiesta's, and that this would be due to differences in the engine capacity of the two cars. The spurt which is seen in children's vocabulary growth is evidence to many psychologists that there is suddenly a different 'engine' powering the process of word acquisition – that there has been some fundamental change in children's language abilities which allows for a much faster rate of vocabulary growth. In other words, it is suggested that some kind of underlying cognitive developments may be responsible for the spurt. This possibility is explored in the next section.

Cognitive development and semantic development

One suggestion as to what fundamental cognitive change might underlie the dramatic increase in vocabulary growth seen in the second year of a child's life is that they experience what is known as the **nam^{ing} insight**. The majority of infants' first words are nouns which refer to objects or people. The naming insight theory suggests that at first infants associate words with particular objects, activities, people or routines in their lives, but they do not yet realise that in fact every thing has a name, and conversely that every name refers to some thing (Reznick and Goldfield, 1992). Once they experience this realisation, their interest in naming things and their ability to learn new names for things increases. This may be why the vocabulary spurt often coincides with children beginning to ask the question 'What's that?' as they start to realise that everything that they encounter has a name.

Another feature of this period of development is the development of semantic relations – grouping words

Definition

Naming insight: the realisation that all things have names, leading to a fundamental change in the way children think about the world.

together according to their common membership of some kind of group or category. The development of early categorisation in infancy is discussed in Chapter 4, Prenatal Development and Infancy, and its role in mathematical thinking is explored in Chapter 7, The Development of Mathematical Thinking. Alison Gopnik and Andrew Meltzoff are both eminent developmental psychologists who have carried out some research into the role of categorisation in children's language development. In one study, infants between 15 and 21 months of age were observed playing with different sets of objects (Gopnik and Meltzoff, 1987). Each set of eight objects consisted of four objects of one type (e.g. four plastic boxes) and four objects of another type (e.g. four balls). The infants' behaviour as they played with and manipulated these objects was observed, with the researchers paying particular attention to whether the infants exhibited any of three different levels of grouping behaviour: (1) single category grouping – this is when a child systematically displaces four objects of one type and groups them together. The other type of object does not need to have been manipulated in order for single-category grouping to be said to have occurred; (2) serial touching of both object types – this is when a child touches the four objects of one type one after the other, and then touches the four objects of the other type one after the other; (3) two category grouping – this is when a child moves all eight objects from their original locations and systematically sorts them into two distinct groups. This was the highest level of categorisation to be observed. They observed each infant on these categorisation tasks at three-weekly intervals until he or she had passed all of the tasks. In addition to the infants' categorisation, the researchers were also interested in their vocabulary development, and noted when each infant's vocabulary spurt occurred.

They found quite a lot of variation in the ages at which individual infants each began to produce the three levels of categorisation behaviour, but the mean age at which level 3 categorisation was observed was 17.24 months. They also found a great deal of individual variation in the age at which the vocabulary spurt occurred, but the mean age at which it happened was 18.33 months. What was particularly interesting, though, was that these researchers found a strong correlation between the age of the vocabulary spurt and the age of the development of level 3 categorisation. None of the infants in this study had a vocabulary spurt before they were able to make

level 3 categorisations. This makes it seem as though the development of this understanding of semantic relations or category membership is a necessary prerequisite to the spurt in vocabulary which is seen in children at around this point in their development. None of the infants in this study had a vocabulary spurt before they reached level 3 categorisation, and the mean amount of time which elapsed between this kind of categorisation and the vocabulary spurt was 33 days, which again suggests that the two are closely linked developmentally. Think again about the different theories of language development which were considered earlier in this chapter. This kind of evidence seems to lend support to the interactionist accounts of language development, which emphasise the interrelationships between the development of language and the development of other more general cognitive abilities.

An interesting, and somewhat controversial topic in contemporary language development is that of baby signing. The underlying symbolic nature of language means that, for hearing-impaired children and adults, signing can be used as a form of communication, and this has been extended to pre-verbal infants on the assumption that whilst they may not yet be able to use words, symbols of a visual form can be learned (Doherty-Sneddon, 2008).

Learning the meanings of words

After the vocabulary spurt, children's vocabularies continue to grow, so that by the time they reach 6 years of age some estimates suggest that their vocabularies may be as large as 14 000 words. Initially, the words which infants produce are primarily common nouns and action verbs, but they also include sound effects such as animal noises (e.g. 'moo') and people words (e.g. 'Daddy'). Common nouns include animals, vehicles, toys and food, such as 'dog' or 'ball'. Action verbs include words such as 'go' and 'give'. One cross-cultural study of English-speaking infants, Mandarin-speaking infants and Cantonese-speaking infants found that there were a lot of cross-cultural commonalities in the first words which are produced, and that six of the top 20 first words produced by infants are shared across all three of these languages (Tardif et al., 2008). These were 'Daddy', 'Mommy', 'Bye', 'Hi', 'UhOh' and 'WoofWoof'. These are the kinds of words which reflect objects or people that are immediately present in infants' environments,

or which reflect infants' routines. This is consistent with theories of development such as Piaget's (explored in Chapter 2, Theoretical Perspectives) which suggest that at this stage infants' cognitive development reflects a reliance upon the immediate environment. Their language development here allows them to interact with their environment and is limited to that with which they have had direct experience.

Learning a new word is not as easy as you might think, though. Imagine you are walking down the street with a young child in a buggy, and the child points across the road and asks, 'What's that?' As you look across the street, you see a man walking a dog, and you reply, 'Doggy.' The first thing to consider here is whether your assumption about what the child was pointing to is correct. Perhaps the child was pointing at a bus stop or a tree! What effect is this exchange going to have on the child's word learning, do you think? In another situation, you might point to a dog and say to a child, 'There's a doggy!' The child may look in that direction, but do they really understand the communicative function of pointing? In other words, do they understand that by pointing at something you are trying to convey some information and not just direct their attention? Some researchers have tried to establish the age at which infants are really able to understand the communicative function of pointing, and the age at which they are able to produce communicative pointing themselves (e.g. Behne et al., 2012; Grafenhain et al., 2009). There is evidence that some, but not all children have developed these abilities at 12 months of age. Therefore it is important to bear in mind that when we use pointing with children, they may or may not be able to interpret what we are trying to communicate.

And how will we know whether the child has successfully learned a word or not? What would 'count' as successful word learning? When dealing with common nouns like 'dog', 'daddy', 'apple' or 'train', we want children eventually to arrive at an understanding of the appropriate object or category of objects, to which the referential word applies. In the example above, we want the child to use the word 'doggy' to refer to all dogs, but not to cats or cows. We would not want them to use the word 'doggy' to refer to bus stops or trees! But when children do use words incorrectly, it provides us with an insight into how their learning of that word has occurred. The next section explores what kinds of errors commonly occur in children's word learning, and what these can tell us about the process of learning words.

CUTTING EDGE

Immigrant children and second language acquisition

When they arrive in a new country one of the main barriers immigrant children must overcome is to learn a second language. A wealth of research exists exploring the process by which second languages are acquired (see Dixon et al., 2012, for a review), and it is clear that this is a challenging process in itself. Immigrant children may be at increased risk of social and family disadvantages (OECD, 2006) which may adversely affect their development in a variety of ways, but some recent research has suggested that for immigrant children with certain personalities, the acquisition of a second language may be even more of a challenge.

Chapter 10, Childhood Temperament and Behavioural Development, discusses the ways in which children's temperaments may differ, and how such differences manifest in tendencies to behave in certain ways. Previous research has shown that shy, inhibited children face particular social or emotional challenges (Letcher et al., 2009; Gazelle and Spangler, 2007) (see Chapter 16, Atypical Development, for a more detailed discussion of children and mental health). There are also various ways in which the development of shy

children's first languages may differ from other children's (Evans, 2010).

However, one recent study has specifically explored the impact of shyness on second language acquisition in a group of preschool-age immigrant children (Keller et al., 2013). Standardised tests of language and an assessment of shyness were applied to a group of 330 preschoolers in Switzerland. Then 130 of these children were followed up 16 months later, giving the researchers longitudinal as well as cross-sectional data (see Chapter 3, Research Methods). The results showed that shy immigrant children's second language skills were significantly lower than their non-shy counterparts. When the follow-up tests were carried out 16 months later, all of the children's second language abilities had improved, but the shy children had improved less than the non-shy children.

Chapter 13, Adolescence, discusses the issue of identity and immigration. But the research discussed here has revealed other challenges which may be faced by some immigrant children in development. In second language learning, as in first language development, social interactions play a crucial role. A child's temperament is important for social development, and here we see how it can affect other aspects of development too.

Using children's errors to understand referential word learning

There are four common types of error which children make in their learning of referential words. These are underextension, overextension, overlap and mismatch.

Underextension

Underextension is when a child uses a word to refer to only a sub-group of the category of objects to which that word applies. For example, in the case of the situation described above, underextension would occur if the child subsequently uses the word 'doggy' to refer to that

particular dog, each time he encounters it on the street, but does not apply it to any other dog that he comes across. This might seem odd, but let's think about what else could have happened in the example above. Imagine once again that you are walking this child in his buggy and he points across the road and says, 'What's that?' As you look across the road, you see your neighbour walking his dog, Buster. You respond, 'Buster.' In actual fact, Buster is just one exemplar of the broader category of dogs. Saying 'Buster' is correct, but saying 'Doggy' is also correct. How is the child supposed to understand the difference between these two possible responses, and recognise that the two words 'Buster' and 'Doggy' should be applied to a different range of objects? Clearly the process of learning a word and what it refers to is not as simple as it seems.

When children underextend their use of a word, then, we know that in the process of learning the word they have mistakenly associated it with only a sub-group of the category of objects to which it actually refers.

Overextension

Overextension is almost the opposite of underextension, and occurs when a child uses a word to refer to the whole category of objects to which it refers, but more besides! Again, let's think about the example above, and assume that you have responded, 'Doggy' when the child points across the road. Some time later, you pass another dog on the street, and the child shouts, 'Doggy!' But later still, you pass a cat and the child shouts, 'Doggy!' And when the child sees a goat on television the following day he shouts, 'Doggy!' These are examples of overextension.

Think back to when the child initially pointed across the road and said, 'What's that?' Your interpretation of the question was 'What's the name for that particular kind of animal?', and so you answered, 'Doggy.' It is possible, though, that to the child, the question 'What's that?' meant 'What's the name for hairy things with four legs?' and so your answer 'Doggy' is now the word that the child applies to refer to all instances of hairy things with four legs. The difficulty for us in interpreting the child's question 'What's that?' is that this simple two-word question could potentially mean many different things. This is something that we will explore more fully in the next section on the development of syntax. But when children overextend a word, we know that in the process of learning that word they have mistakenly associated it with more than just the category of objects to which it refers.

Overlap

Overlap can be thought of as a cross between underextension and overextension. Let's use a different example this time. Imagine you are with a young child at home and the child points to the mug of coffee you are holding and says, 'What's that?' You reply, 'Coffee.' The child then correctly says, 'Coffee' whenever she sees someone with a mug of coffee, but not when she sees someone with coffee in a cup or in a Styrofoam container. However, the child also says, 'Coffee' whenever she sees someone with a mug of tea. In this way the child is correctly using the word 'coffee' to refer to some appropriate referents,

but not all appropriate referents (this is underextension) whilst also using the word to refer to some inappropriate referents as well (this is overextension). This tells us that in learning the meaning of the word 'coffee' this child has correctly associated it, but with only a sub-set of the category to which it refers, whilst simultaneously incorrectly associating it with referents from other categories as well.

Mismatch

Mismatch occurs when there are no correct associations between a word and its category of referents. For example, in the example above when the child pointed and said, 'What's that?', you answered, 'Coffee.' Let's imagine, though, that the child was not pointing at your coffee mug at all, and was instead pointing at the window behind you. If the child subsequently used the word 'coffee' to refer to windows, then this would be an example of mismatch.

When we think of examples like these, it is surprisingly easy to see how these kinds of errors could occur in the process of children's learning of referential word meanings. It is clear that children may initially simply associate words with specific instances of categories of objects, like when the child used the word 'doggy' to refer only to one particular dog that he encountered regularly on the street. To arrive at a more sophisticated understanding that the single word 'doggy' should be used to refer to an entire category of a particular type of animal, children need to be able to group words together and to recognise that some words refer to whole sets of related objects. This means that upon encountering any new dog that they have never seen before, they will nevertheless be able to name it correctly, and this allows their language to move beyond the world which is immediately surrounding them. This is why the kinds of conceptual insights which children achieve with things like the naming insight or an understanding of semantic relations, as discussed above, mean that children's language development can move beyond their immediate environment, and this is reflected in a more sophisticated understanding of language and words. Learning that words can be related to one another in groups provides a framework within which children can organise their words.

We also need to bear in mind that children may infer the meaning of new words from the language which surrounds them in everyday life, and not just from

situations where they have directly asked for the meaning of an object. This leaves even more room for potential errors in word learning, but research has also shown that the more speech which surrounds a child, the better their vocabularies, so we should probably not worry too much about the possibilities which exist for errors, and view these as a normative part of the development of language.

For example, Huttenlocher et al. (1991) studied 22 children from the age of 14 months to 26 months. They observed the children in their daily activities with their mothers and took measures of the children's vocabularies as well as the amount of exposure to their parent's speech which each child had. The results of this study showed that the amount of exposure to their parent's speech was very important in explaining differences in vocabulary growth which were observed between different children. Think back to the example at the beginning of this chapter. If it is the case that children's vocabulary development is better if they have more exposure to speech then this might be an argument in favour of using buggies which face towards the person pushing them.

that a child is sitting in his high chair with his favourite toy, which then drops on to the floor. He points down at it on the ground and shouts, 'Teddy! Teddy!' Is this a simple case of his naming and labelling his toy, or is it possible that he is actually trying to convey something like 'I've dropped my teddy!' or 'I want my teddy back!?' The problem with these possible interpretations of a single-word utterance is where we draw the line. For example, could it be that the child is actually trying to convey, 'My favourite teddy has fallen on the floor and I can't reach it. Could someone pick it up and give it back to me?' Something this complex seems unlikely. However, if we are prepared to attribute some more complex meanings to holophrases then we need to beware of the dangers of over-estimating the complexity of what they are likely to mean. In other words, in doing so we are attributing children with an understanding of language (comprehension) which far exceeds their ability to themselves produce language (production). Having said this, it is generally accepted that production does lag behind comprehension, at least during the second year of life, and some psycholinguists suggest that children may comprehend between five and ten times as many words as they actually produce (Benedict, 1979).

Syntactic development

Single-word utterances

Once infants have produced their first words, we have seen that their vocabularies then continue to grow. However, there comes a point where language development moves beyond just the accumulation of single words to the production of phrases where words are combined, and also to the application of rules to individual words. In this section, we will explore the development of the rules of grammar, which govern how words can be changed within a language and how they may be combined.

The period before children start to combine words is known as the one-word period. However, there is evidence to suggest that, even in this period, children are condensing more complex meanings into their single words, which go beyond just naming objects or labelling things. When words condense more complex meanings in this way they are known as **holophrases**. This is a difficult issue because ultimately it is difficult to know whether children intend to convey more complex meanings with their single-word utterances. Imagine, though,

Combining two words

Children begin to put words together in combinations from about 18 months of age. Slobin (1972) reported that children are able to convey an immense amount of meaning with just two words, through the use of accompanying gestures and by their tone. For example, two words allow a child to indicate possession by saying 'My sweets', or to attribute features to something by saying, for example, 'Big car'. Children can convey information about location, by saying 'Book there' or can attribute someone with an action, like 'Mama walk'. The phrase 'Hit you' conveys a direct action of theirs to someone else, whilst saying 'Give papa' conveys an indirect action towards someone else. They can also ask simple questions, like 'Where ball?' and reveal an understanding of negation, through phrases such as 'Not wolf'.

Definition

Holophrase: a single word which expresses some more complex idea.

These sorts of two-word phrases were observed by Slobin (1972) in children from a variety of countries whose first languages included English, Samoan, Russian and Finnish, and the similarity of this process of development between children speaking a variety of languages lends support to those theories which argue that there is some sort of universal form underlying the development of language generally. Such two-word phrases carry a significant amount of meaning because the words which are combined tend to be nouns, verbs and adjectives. Words like 'in', 'on', 'the' and 'and' are not generally featured in these two-word combinations, but despite their omission children are able to communicate very effectively. For this reason, such speech is often called **telegraphic speech** because of its similarity to old-fashioned telegrams, where unnecessary words are omitted yet a great deal of meaning is retained.

Combining three and four words

After the end of the second year, children begin to put three and four words in combination. Their word combinations are still condensed and telegraphic in nature, and are not yet grammatically correct. However, it is interesting that despite this their speech contains evidence that they already understand some of the rules which govern their language. Earlier in this chapter we saw that some of the mistakes which children make in their use of referential words are useful in helping us to understand the process of acquiring new words. In terms of syntactical development, once again the errors which children make provide us with insights into the process of learning the rules of language. For example, in this stage of development we would not be surprised to hear a child say 'sheeps' or 'mouses' as the plural forms for these animals. To us this may seem like an amusing and insignificant mistake, but actually it tells us that the child has learned a rule – namely that adding /-s/ to the end of a noun makes it into a plural. The child has not yet learned that in English there are exceptions to this rule

which need to be learned separately, but her error tells us that she is already making progress in the learning of the rules which govern the English language. Jean Berko Gleason, a well-known psycholinguist, carried out a classic study in this area in 1958, where she developed a test commonly known as the Wug Test, which allows for an understanding of how children develop their rules of word formation.

In the Wug Test, children are shown a picture of a single creature with a fictional name. Next, they are shown more of these creatures and asked what they are. The child is therefore forced to produce a plural version of a noun which they could never have heard before since it is fictional, and their answers allow for an insight into how they understand the rules which govern, for example, the construction of plurals. Figure 5.3 shows an example of a stimulus used in Berko's (1958) original study. The results showed that the majority of children correctly produced the word 'wugs' as the plural form of the fictional word 'wug'.

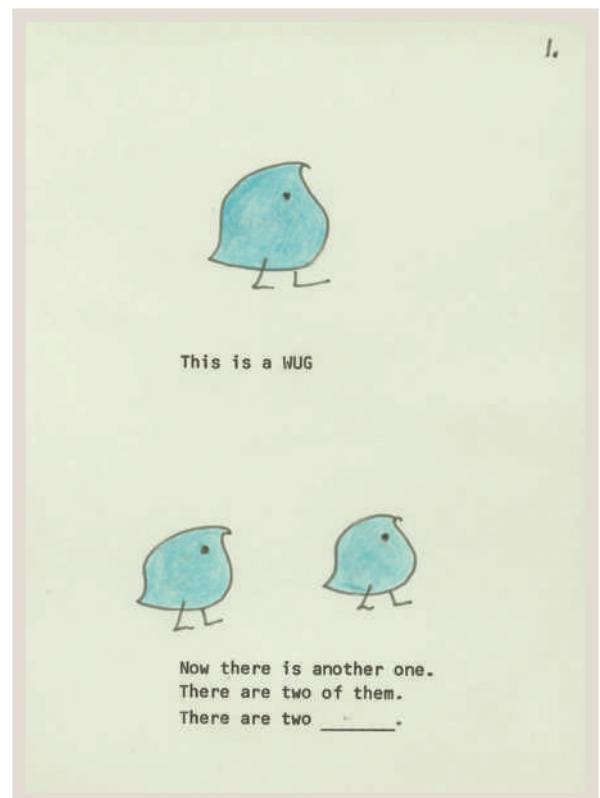


Figure 5.3 Example of stimulus from Berko's (1958) Wug Test.

Source: <http://chldes.psy.cmu.edu/topics/wugs/01wug.jpg>

Definition

Telegraphic speech: speech consisting of phrases of a small number of words (usually nouns, verbs and adjectives) combined to make sense, but without complex grammatical forms.

Similar errors are made in verb construction, and particularly in the creation of the past tense. For example, you might hear a child say 'I runned' or 'we swimmied'. Again, this reveals an understanding that adding /-ed/ to the end of a verb makes it into the past tense, although the child once more has not yet learned that there are exceptions to this rule where verbs are constructed differently.

STOP AND THINK

Going further

Think about how these kinds of errors relate to different theories of language development considered earlier.

- Could such errors be the result of simple learning or imitation?
- Does it seem likely that something like a LAD could account for these kinds of rule-based errors?
- What other cognitive developments do you think a child would need to have undergone before reaching this level of language ability?

It is interesting that, in many aspects of semantic and syntactic development discussed so far, there seems to be a difference between boys and girls. One recent study which examined data from more than 13 000 children under the age of 3 years, found that girls are ahead of boys in terms of their use of early communicative gestures, their productive vocabulary and their word combinations (Eriksson et al., 2012). The data came from children in ten different language communities (including French, Swedish, Croatian and Basque), and the difference between the genders was apparent across all of the languages. In addition, whilst the gender difference was only small for the youngest children, it seems to get bigger as children get older. You might want to think about what could be responsible for these differences between boys and girls.

A later development in syntax comes when children begin to re-order their sentences to construct questions. For example, a younger child may say, 'Mummy eat?' as a question, by raising his pitch at the end of the phrase. By 3 or 4 years this may have developed to something like 'What Mummy is eating?' which represents

a syntactical development with the inclusion of 'what' at the beginning of the phrase to denote a question. However, this child has still yet to learn that the auxiliary verb needs to be 'inverted' and exchanged with the subject of the sentence so that it is transformed from 'mummy is eating' to 'is mummy eating' when forming a question. By the time children move into their early school years, their use of irregular verbs and grammatical rules in general will have increased dramatically, so that they are now competent language users capable of constructing complex utterances which convey complex ideas and meanings.

The development of pragmatics

The pragmatic system is that part of language concerned with its appropriate use in social situations, our ability to extract and to convey meaning which goes beyond just syntax and semantics (for more information on pragmatics, see Recommended Reading). As this develops, children become more sensitive to the needs of other people in conversations, and show a greater awareness of, for example, what other people know and do not know. This may be linked to developments in other areas of cognition, such as theory of mind (see Chapter 8, Theory of Mind), and in Piagetian theory the development of non-egocentric thought. One clear example of this is when children begin to show an awareness of the difference between 'a' and 'the' in their conversations with others. Let's imagine you were having a conversation with your friend. They say, 'I was sitting at the bus stop last night, and the man just started laughing.' Your immediate response might be to ask, 'What man?' Since your friend had not introduced a man into the story previously, you could not have known that there was even a man there, and so it feels as though there is a step missing in the chronology of the tale. Yet this use of 'the man' or 'the dog' is common in younger children's speech, and seems to be the result of their assumption that other people know what they know. In Piaget's theory of development this may be due to egocentrism, and reflects a younger child's lack of awareness that other people have thoughts, ideas and perspectives which are different from their own. Once children develop this awareness,

LIFESPAN

Pragmatics and working memory

Some researchers have discussed the importance of working memory to understanding the pragmatic aspects of language, and have found that adults with damage to their brain's right hemisphere have problems with their pragmatic skills because of difficulties with their working memory capacities (e.g. Tomkins et al., 1994; Stemmer and Joanette, 1998). Pragmatics involve awareness and understanding of the particular context in which we find ourselves, in order to infer some of the meaning of conversations. Inferring that someone is joking or being sarcastic, for example, requires that we integrate several varied aspects of the context in which we find ourselves. It is thought that this places complex demands on working memory, and that this therefore affects the pragmatic aspects of language.

Previous research has shown that people with **dyslexia** also have a reduced working memory capacity (e.g. Baddeley, 1998), and several studies have found lower pragmatic competence in adults with dyslexia. For example, Griffiths (2007) compared groups of dyslexic and non-dyslexic adults' on four tests from the Right Hemisphere Language Battery (Bryan, 1995), which assess pragmatic competence, as well

as on a self-report pragmatic competence questionnaire and on the Dyslexia Adult Screening Test (DAST). Participants ranged in age from 18 to 45 years and had to show their understanding of metaphorical (as opposed to literal) information, inferential storylines (where they had to extract information from stories which had not been made explicit) and joke punch lines (where they had to choose the correct one from four possibilities). All of these are examples of pragmatic understanding.

Griffiths found that the dyslexic group consistently misunderstood aspects of pragmatics more often than the non-dyslexic group. She also found that there was a correlation between increasing pragmatic impairment and performance on the part of the DAST which tests working memory: the poorer the working memory, the greater the pragmatic impairment. The study of pragmatics therefore clearly demonstrates the ways in which language and cognition interact across the lifespan.

Definition

Dyslexia: a learning difficulty which affects a person's ability to read despite otherwise normal levels of intelligence.

they seem to recognise the need to introduce 'a man' into a story before then referring to 'the man' and this represents a significant improvement in the success of their conversations. Even so, some 5-year-olds still do not consistently use 'a' before 'the'. It is therefore an important part of the development of pragmatics, and another example of the ways in which language and cognition may interact.

The ability to repair faulty communications or to put right misunderstandings is a part of the pragmatic system which has been observed in children as young as 33 months. When there is a breakdown in communication, a sensitivity to the amount of information needed to put things right provides an important indicator of the maturity of the child's pragmatic system. For example,

imagine you approach a woman on the street to ask for directions. You say, 'Where is the nearest tube station?' If she replies, 'What?', how will you respond? It is likely that you would interpret her response as indicating that she has generally failed to understand you at all, and that you would therefore repeat the whole of your question. On the other hand, if she responded by saying, 'Where is the nearest what?', you would interpret this as indicating that she had simply failed to understand a part of what you had said, and that you would therefore repeat just that part, by saying, 'Tube station.' Your mature pragmatic system therefore enables you to appreciate the difference between general and more specific queries for information, and to modify your provision of additional information based on those differences. In one study of

how this sensitivity to conversational queries develops, researchers used a talking toy robot who responded to children's utterances with either general or specific queries (e.g. 'What?' or 'Baby's eating what?') (Ferrier et al., 2000). The researchers found that at 27 months of age, children were more likely to respond to both of these types of query with complete repetitions of their previous utterances, whilst at 33 months of age, children would respond to general queries with complete repetitions, and would give only the necessary partial information in response to specific queries. This illustrates an important development in children's pragmatics within the third year of life.

By the time they reach school age, children already have a well-developed pragmatic system, but there are still ways in which this continues to develop further. For example, some recent research showed that between the ages of 5 and 10 years, children's ability to recognise others' emotions from vocal cues improves considerably (Sauter et al., 2013). Non-verbal vocalisations (such as laughs, sighs and grunts) and speech (spoken three-digit numbers) inflected with a variety of emotions (such as amusement, relief, anger, surprise and fear) were presented to children as auditory stimuli. The children had to select an appropriate picture showing the corresponding facial cues to what they had heard. Performance was already good for 5-year-old children (average score of 78% correct for non-verbal vocalisations and 53% for speech), but continued to get better with age so that by 10 years the average scores were 84% correct for non-verbal vocalisations and 72% for speech. So the ability to understand the emotional content of words, irrespective of their meaning, continues to improve through the school years.

Another way in which the pragmatic system develops is in relation to the use of language and humour. Learning to tell jokes or funny stories, as well as the ability to understand when someone else is using humour, requires the ability to use language more creatively, and goes beyond just an understanding of word meaning and grammar. Telling jokes often requires a more subtle understanding of the ways in which words can have double meanings. Some types of joke (like knock-knock jokes, for example) have a very structured form whereby two individuals engage in a back-and-forth exchange with five stages. Learning these five stages of a knock-knock joke represents an important development in the child's learning of the 'rules' of conversation. The child is learning that words and sentences need to follow

certain patterns and sequences in order for successful social exchanges to take place. Some differences have been found in the use of verbal humour in children with and without hearing loss (Nwokah et al., 2013), and this is thought to be because children with hearing loss will have had fewer opportunities to be exposed to the subtleties of language. Another study (Hoicka and Gattis, 2012) suggests that the special infant-directed speech we use with young children might reflect humorous content. When mothers read stories or picture books to their infants, visual humour and sentences with humorous content were communicated using speech that was louder, of a higher pitch and slower, than with pictures or content that were sincere. Motherese may therefore help with the development of the pragmatic system, as well as just with word learning. And once again we can see how the earliest interactions between infants and caregivers pave the way for later, more complex developments in language ability.

Earlier in this chapter, we discussed the ways in which early social interactions assist with the later development of children's language, and in this context we explored how children may be prepared for turn taking in conversations through some of their earliest interactions with their caregivers. Turn taking is an important part of pragmatics, since conversations are generally quite well-organised interactions, and research has shown that normal adult conversation contains very few noticeable overlaps or interruptions (see, for example, Levinson, 1983). Understanding the rules which govern turn taking in conversation is important for successful conversations. For example, knowing when in a conversation it is possible and appropriate for there to be a change in speaker, how to go about taking your turn in a conversation and what to do to correct mistakes in the turn-taking sequence, all enable there to be fairly trouble-free transitions between speakers (Sacks et al., 1974). Infants' early interactions lay the groundwork for later social interactions, including conversations, and as such are an important part of the development of the social side of language.

Earlier in the chapter we discussed the lateralisation of brain function in relation to language. One interesting point to note here is that in fact not all language abilities are located in the left hemisphere. When it comes to pragmatics and the social side of language, the right hemisphere is involved. The fact that both 'sides' of the brain are involved in language emphasises just what a complex human function it is.

CASE STUDY

Early pragmatics in everyday life

Louise is 4½ years old and enjoying a day at home with her mum. Mum's friend, Alison, pops round and the three of them decide to take a walk to the park. Whilst pushing Louise on the swings, Mum and Alison carry on a conversation. After a few minutes, Louise asks to get off the swing and then says, 'Mummy, I want to talk to you.' She motions for Mum to bend down and then whispers in her ear, 'When you are talking to Alison, I think you have forgotten about me.'

- Why did Louise whisper instead of talking out loud?
- What does this tell us about her understanding and awareness of other people?
- What could we say about the development of Louise's pragmatic system on the basis of this example?
- How might this link to other aspects of Louise's cognitive development that you have read about elsewhere in the book?

SUMMARY

At the beginning of this chapter, we set out to discover what language is and what elements it comprises. We have seen that language is more than just speech and grammar. It is a logical yet creative symbolic system, and its development is a complicated business, dependent upon developments in four component parts: phonology, semantics, syntax and pragmatics.

The foundations of language are laid in infants' earliest social interactions in the pre-verbal stage, and these may pave the way for later developments. Early exposure to language assists with the specialisation of infants' phonological awareness so that they can discriminate between categories of sounds in their native language. The special kind of speech which adults direct towards infants may also help with developing language by exposing children to it in a simplified and more accessible form. Infants may get some preparation for the social side of language through patterns of turn taking which are established during feeding or activities which involve joint attention.

The abilities of infants in the first months of life force us to consider what language abilities or capacities children enter the world with, and how much of language is learned. Some of the mistakes which children make during the process of learning language may suggest the existence of an innate

mechanism which allows for the acquisition of language generally, but which depends upon input from the external world to fuel the acquisition process. The language which children are exposed to from infancy affects the development of language in various ways, but there is also evidence that developments in cognition and thinking more generally may underpin the development of language.

Before children can begin to learn words, they must be able to recognise and produce the speech sounds of their language. The learning of referential words is a complicated process, with lots of room for errors. It may be facilitated by more general cognitive developments which allow for a dramatic acceleration in vocabulary growth in the second year of life, and other cognitive developments may be necessary before children can learn and understand words which relate to abstract concepts. Even once children have learned lots of words, there is still work to be done in learning how to combine those words in grammatically correct ways. Children progress through combinations of two, three and four words, using condensed and telegraphic forms of speech, before eventually being able to produce fully formed grammatically correct sentences. The rules of grammar may be acquired through some innate language acquisition device which is sensitive to the regularities in

the adult language which children are exposed to, and some of the mistakes which children make as they move towards a full grasp of the rules of syntax can provide us with useful insights into the process that they go through. How to use language appropriately in different social contexts and how to interpret and communicate meanings which go

beyond the mere semantics of the words themselves is another important aspect of the development of language. Speech and grammar alone cannot ensure successful communication, but the development of pragmatics enables children to be confident and competent users of language in the social world.

REVIEW QUESTIONS

1. Discuss what the possible benefits to children's language development might be of backward-facing prams and buggies.
2. In what ways might infant-directed speech or 'motherese' facilitate children's language development?
3. Compare and contrast Nativist with learning theory explanations of language development. Which do you think is more convincing, and why?
4. Discuss some of the ways in which cognitive development and the development of language may interact.

RECOMMENDED READING

To read more about Patricia Kuhl's work on the perception of speech sounds by non-human animals, see:

Kuhl, P. K. (1988). Auditory perception and the evolution of speech. *Human Evolution*, 3, 19–43.

Kuhl, P. K., & Miller, J. D. (1975). Speech perception by the chinchilla: Voiced-voiceless distinction in alveolar plosive consonants. *Science*, 190, 69-72.

Kuhl, P. K., & Padden, D. M. (1982). Enhanced discriminability at the phonetic boundary for the voicing feature in macaques. *Perception and Psychophysics*, 32, 542-550.

Kuhl, P. K., & Padden, D. M. (1983). Enhanced discriminability at the phonetic boundaries for the place feature in macaques. *Journal of the Acoustical Society of America*, 73, 1003-1010.

For more information about infant-directed speech or 'motherese' in different languages and cultures, see:

Lieven, E. V. M. (1994). Crosslinguistic and cross-cultural aspects of language addressed to children. In C. Gallaway & Brian J. Richards (Eds.), *Input and Interaction in Language Acquisition* (56–73). Cambridge: Cambridge University Press.

For more information about Broca's area, see:

Grodzinsky, Y., & Amunts, K. (Eds.) (2006). *Broca's Region*. Oxford: Oxford University Press.

For more information about the development of pragmatics, see:

Ninio, A., & Snow, C. E. (1996). *Pragmatic Development*. Boulder, CO: Westview Press.

RECOMMENDED WEBSITES

To find out more about Paul MacLean's Triune Brain theory, see:

<http://www.kheper.net/topics/intelligence/MacLean.htm>

To find out more about the ideas of linguist Noam Chomsky, see:

<http://www.chomsky.info/>

To find out more about the developmental milestones which typically developing children are expected to reach at different ages, see:

http://childdevelopmentinfo.com/child-development/language_development

To find out more about cases of children who develop without the influence of human interaction, see:

<http://www.toptenz.net/top-10-feral-children.php>

On the importance of language development from birth to age 3:

http://www.literacytrust.org.uk/talk_to_your_baby