Psycholinguistics

Introduction

Language is everywhere in human society, across every culture. For most people, it is an effortless ability that we acquire before we learn how to dress ourselves. Some people feel that they even think using language, that an important part of their thoughts involves a kind of internal monologue. Yet, language is not a simple thing—it is actually quite complex and we need to be able to use it quickly. In fact, its timing is so crucial that even minor delays during the processing of language are thought to have profound consequences. So, by understanding how language works and how we are able to use it, we can understand a vital yet complex part of our daily lives, offer ideas for how to help people with language disorders, and perhaps even shed light on how we think.

A BRIEF HISTORY OF PSYCHOLINGUISTICS

Psycholinguistics is the field of study that addresses how people process and acquire a central aspect of what it means to be human language. The psycholinguistic research addresses this essential faculty of the human species from a number of perspectives, drawing predominantly from the disciplines of linguistics and psychology, from cognitive science, and from neuroscience. This field with vibrant research trends, combined, provide a rich picture of how language works in the human mind and how it is acquired.

Interest in the mind and language both date back for millennia, with a documented history of language study going back 2,500 years and spread across many cultures (including India, China, Mesopotamia, and Greece). Documented interest in the mind and knowledge—the foundations of what we consider to be psychology—also dates back, in one form or another, at least as early as language study, and perhaps earlier. However, modern versions of both linguistics and psychology are much more recent, with modern psychology tracing back to Wilhelm Wundt's lab in Leipzig in the late 1800s and modern linguistics tracing back to roughly the same time. Both fields have undergone some revolutions in even that relatively short time, with both fields experiencing some major shifts in the mid-1900s that are still felt today. From the beginning of psychology, there has been an interest in language. Wilhelm Wundt, for example, published a book on language (die Sprache) in 1900. This book, with 1,367 pages by its 1913 edition, covered a number of topics that are still very much relevant in current psycholinguistics, including child language acquisition, sign language, language perception, and grammatical structure. The interest between the domains of language and psychology was mutual and, as Blumenthal (1987) discussed, many linguists of the day were also interested in Wundt's work and attended his lectures at the University of Leipzig, including several influential language researchers such as Leonard Bloomfield, Ferdinand de Saussure, and Edward Boas. For example, Bloomfield's approach to analyzing the structure of language is important to almost all modern theories of grammar. De Saussure made a critical distinction that is still part of how language researchers think about language: langue, which is the knowledge of a language system that exists collectively among speakers of a language, and parole, which is the use of that system (see Seuren, 1998, for an excellent history of linguistics). While Wundt was an experimentalist (in fact, famously so—he is considered by many to be the father of modern experimental psychology), he also acknowledged the importance of internal mental states and viewed language as importantly reflecting mental representations. He viewed the sentence as a key unit of language, and sought to show how universal characteristics of human information processing, like attention and memory, would influence its production and comprehension. This is really not so different from what modern psycholinguistic researchers are doing, though the route from Wundt's experiments to the present day is not entirely direct. Wundt was not the only researcher at that time interested in language, of course, and in fact there was some conflict between Wundt's approach and others, including approaches that disagreed with the idea of

a unified mental representation and other types of "introspective" approaches. In fact, at the turn of the century there were quite a number of competing perspectives on psychology, which led one linguist of the day, Bernard Delburck, to suggest that linguists might do better to part ways with psychology. This is largely what happened, and for the next 30 to 40 years linguistics focused instead on the formal aspects of language—sound systems, grammatical structures, word formation rules—without much reference to the mental processing needed for their actual use. This approach still forms a core aspect of linguistic study today. Although Wundt's work clearly foreshadows modern views and topics on psycholinguistics, his influence declined following the first world war. Bloomfield, once a proponent of Wundt's approach, had turned to behaviorism instead by 1933 when he published one of his major contributions to linguistics, a book simply called Language. In psychology, behaviorism was a movement in which the study of mental states was more or less rejected, and the idea that one could account for human behavior in terms of mental states or representation was discounted. In linguistic terms, this meant a stronger focus on descriptive accounts of language rather than studying language as a window onto human mind. Perhaps the most famous attempt to account for language processing in a behaviorist tradition comes from B.F. Skinner's 1957 Verbal Behavior in which language is not a complex mental construct with rules and representations, but instead is reduced to, well, verbal behavior. As such, it can be explained, according to Skinner, in terms of the same conditioning theory that applied to other behaviors, such as classical and operant conditioning, in which links between stimuli and outcomes are formed and shaped by experience. For example, a child saying "I want milk" may result in the child receiving a glass of milk, and this reinforces (or conditions) the use of this verbal behavior. The trouble was that there are a number of aspects of language that cannot be explained by classical and operant conditioning. In a famous critique of Skinner's book, Noam Chomsky (1957) successfully argued against verbal behaviorism with several key points. Crucially, language is recursive and can produce an infinite number of sentences from a finite set of systematic rules and representations. The complexities of language that these rules create are difficult (if not impossible) to account for in simple stimulus–response terms. As part of his arguments, Chomsky reintroduced the idea of mental representations back to the study of language. He also drew an important distinction between the knowledge that one has about a language, called "competence" and the use of the language, "performance". **Chomsky's influence on modern linguistics and psycholinguistics is profound, and his focus on competence (as opposed to performance) drew linguistics heavily in this direction. On the other hand, psychology continued to be quite interested in the concept of language performance**. Nonetheless, several of Chomsky's proposals about the nature of syntactic structure, and in particular his work on transformation grammar, prompted experimentation by psychologists in the 1960s to see whether the linguistic processes proposed were psychological processes. For example, one could reasonably ask whether structures that were proposed to be more complex linguistically would cause longer processing times. The results were mixed—research showed that there was an important relationship between linguistic structure and psychological processing, but didn't support the particular relationship proposed by transformational grammar, despite initial successes (e.g., Miller & McKean, 1964; Slobin, 1966). Also, it became increasingly clear that this distinction between competence and performance was not trivial, and that the competence theories proposed by linguists could not simply be transferred to performance. Another difficulty was that linguistic theories were changing rapidly and that made it more difficult for psychologists to test them. As a result, there was relatively little interaction between the study of psychology and linguistics for the next couple of decades. Psychologists were still interested in language—very much so—but focused more on issues of performance, such as the processes by which syntactic structures are constructed in real time, how ambiguities in language are resolved, and how word knowledge is accessed upon encountering a word. Linguists were still interested in language as a mental phenomenon, but focused on issues of competence—what knowledge of a language entails, and formulating theories that could apply to all languages, regardless of the apparent differences among them.

Psycholinguistics is a relatively new field, with origins in a seminar in 1953 at Indiana University held in conjunction with the Linguistics Institute, resulting in a book edited by Charles Osgood and Thomas Sebeok titled Psycholinguistics: A Survey of Theory and Research Problems (Osgood & Sebeok, 1954). Their approach to the study of language focused on three disciplines: linguistics, learning theory, and information theory. It laid out foundational questions regarding the mechanisms and units that underpin hearing and speaking. A reviewer of Osgood and Sebeok's book made the prescient observation that "the joint exploration which it describes is something more than just another interdisciplinary venture" (Newman, 1955: 1097). Indeed, in the mid-twentieth century the then-new field of generative linguistics collided with behaviorist psychology, resulting in a scientific revolution with many of the characteristics observed by Thomas Kuhn in his book The Structure of Scientific Revolutions (2012). The history of psycholinguistics has been a story of the influence of linguistic theory on theoretical psychology, and the emergence of psycholinguistics as a dramatically altered but ultimately autonomous and prolific science. In the early days of psycholinguistics, linguistic theory was actually taken to be a theory of linguistic performance, but the falsification of the Derivational Theory of Complexity (Fodor, Bever, & Garrett, 1974) demonstrated the fallacy of that approach. However, the profound insight (Chomsky, 1959) that language is a mental construct—specifically, that knowledge of language is represented in the individual's mind/brain—changed psychology forever and replaced behaviorist models of language with a cognitive view that relies on mental representations and processes that underlie the linguistic life of humans.

Starting in the late 1980s and early 1990s, there was a renewed interest in psycholinguistics as a joint venture between linguists and psychologists, and these days many researchers have been trained in both disciplines (as well as other fields). Substantial advances in related disciplines, including neuroscience, computer science, and cognitive science have given researchers interested in language processing a huge new set of resources, both in terms of knowledge and tools. We now have researchers working on computational models of language processing, informed by current knowledge about how the brain works. We have researchers working at the intersection of language and other cognitive abilities, including not just working memory, but things like scene perception and reasoning. It is actually a very exciting time to be a psycholinguist—both because of this explosion of new interdisciplinary endeavor and because prior work has meant that we have started to build a solid foundation of understanding about how language processing works.

Language Acquisition
The acquisition of language has undergone extensive revision and expansion since the early days of psycholinguistics. A child's development progresses from an initial state sensitive to universal properties of languages to a state consisting of fully formed representations of the native language. This development takes place in a remarkably brief period of time: by the time a child begins school (typically around 5 or 6 years old), a marvelously sophisticated mental system is in place. That trajectory is informed and constrained by basic principles of linguistic organization, as well as by the child's developing perceptual system, lexical store, and additional cognitive abilities. Powerful internal capacities of pattern recognition, statistical monitoring, and memory contribute to the acquisition of a child's native language. An explosion of research on the acquisition of two or more languages and also of signed languages has enriched what we know about language development. We have always known that a child must be exposed to a language to acquire it, but recent advances in contemporary research have augmented how we understand and describe the characteristics of linguistic input, the feedback available to the child, and the quality of interactions with the child's linguistic environment.

LANGUAGE ACQUISITION: STAGES

All infants pass through the same stages in the acquisition of a first language; but they progress at different rates. So, while a child's age in years and months is often cited (as two figures separated by a semicolon), it is not a reliable indicator of development. Many accounts record development in terms of the phonological or linguistic content of the child's productions. The following stages are universal, the first two being prelinguistic:

Cooing (about 0;3). Gurgling moves on to vocalisation involving sounds which resemble vowels. The infant responds vocally to human speech.

Babbling (from 0;6). The infant produces consonant-vowel (CV) sequences which may resemble those of the target language. The child's later productions become imitative: there is often a phase of echolalia from about 0;8, when the child imitates adult intonation patterns with some degree of accuracy.

One-word stage (from 1;0). Sometimes termed holophrastic speech. The first words appear at about 1;0, and by 1;6 the child may have a vocabulary of around 50 words, usually nouns. The child recognises the referential function of words, using them to name objects.

Two-word stage (1;6 onwards). Sometimes described as telegraphic speech because of the absence of most function words. The two-word combinations exhibit a set of primitive semantic relationships (constituting a child grammar) of which the earliest are usually naming (this), recurrence (more) and non-existence (no). At about the same time, the vocabulary spurt begins, with an increase of about six to ten words a day in the child's repertoire.

Multi-word stage (2;6 onwards). The child uses strings of three or more words, often based upon established two-word patterns. Adult syntactic patterns gradually become more prevalent. Instead of age, a more precise way of calibrating the development of an infant is by mean length of utterance (MLU): a figure based on the average number of morphemes in the infant's productions. This is said to be a reliable marker of development until the age of about 4;0. Using MLU, early researchers proposed six stages of development

Those who take a Piagetian perspective have attempted to relate progress in language to the cognitive developments of the sensorimotor period (age 0–2) and the pre-operational period (2–7). These include object permanence, the formation of categories and an understanding of causality and displacement. The argument is that the child cannot understand linguistic forms representing such notions until the notions themselves have been acquired. Vygotsky's developmental stages also provide a loose framework for language development. Vygotsky identified a first stage when thought and language (a child's first words) are unrelated; a second stage of egocentric speech when the child expresses its thoughts aloud; and a third when egocentric speech becomes internalised. Yet another account of the stages of acquisition represents them in terms of the pragmatic functions which the child commands rather than surface features of syntax (see functionalism). In any of these accounts, some caution has to be exercised in accepting productions as evidence of development. Receptive recognition of form and understanding of meaning may occur well before an item appears in production. Conversely, the production of a form might predate 'acquisition': it might, for example, result from mimicry without understanding.

LANGUAGE ACQUISITION: THEORIES
A number of theoretical positions can be identified:
1. Language is a set of habits, with associations formed between words and the real-world states/objects which they refer to. See **behaviourism**.
2. Language is acquired through extended exposure to adult speech and a desire to make sense of the environment. See **empiricism**.
3. There is an innate language faculty, which is (a) fully developed at birth; or (b) programmed into the maturation process. See **nativism**.
4. A general cognitive predisposition equips infants to trace patterns in the miscellaneous language which they encounter. See **cognitivism**.
5. Language is acquired through the infant's desire to interact with its carers. See **social-interactionism**.

1. BEHAVIOURISM

A movement in psychology appeared in the first half of the twentieth century. It was based upon a view, prevalent from the 1920s to the 1950s, that we can only **speculate** about the operations of the human mind and that psychologists should therefore restrict themselves to studying **external manifestations of human behaviour.** Some of the proponents of behaviourism denied the existence of consciousness. It was suggested that thought was dependent upon language, and was a sub-vocal form of speech. Behaviourism is principally a theory of learning based upon the relationship between an **external stimulus** and the individual's **response** to it through acquired behaviour. One type of learning is classical conditioning, where an established response becomes attached to a new stimulus. Example: Pavlov trained dogs to associate food with the ringing of a bell and they finally began to salivate when they heard the bell alone. Another is operant conditioning, where a response becomes established because it is rewarded or **reinforced**. Asserting that language is simply 'verbal behaviour', Skinner (1957) put forward an account of first language acquisition based upon operant conditioning. His view was that a child acquires language through **imitating** adult utterances. Parents provide models of language. They also provide **reinforcement** through showing approval,through carrying out the child's wishes or through recognising, responding to and echoing the child's utterances. Utterances which approximate to adult language are rewarded; others are not. Grammar is said to develop in the form of sentence frames into which words or phrases can be inserted. A process of '**chaining**' accounts for the way in which words are organised in sequence, with the first word in the sentence providing a stimulus for the second, the second for the third and so on. This account considerably stretches what was originally understood by the terms 'stimulus' and 'reinforcement'. Skinner attempted to categorise child language in terms of the behavioural functions involved. He identified echoic utterances (¼ imitation); mands, where the child expresses a wish for something; tacts, where the child responds to non-verbal cues by, for example, naming something; and socially driven intraverbal responses which bear no syntactic relationship to the verbal stimulus that gave rise to them. Skinner's account of language acquisition received a scathing review from the young Noam Chomsky, who asserted that adult speech is 'impoverished' and therefore does not provide a good or adequate model for imitation. Nor can imitation explain why infants produce incorrect utterances such as I goed. Chomsky pointed out that parents reinforce and correct very few of their children's utterances. Most importantly, he drew attention to the generative nature of language: suggesting that a theory of language acquisition must account for the way in which the infant acquires the capacity to produce an infinite number of grammatical utterances, most of which it cannot have heard before. Until Chomsky's riposte, behaviourism exercised considerable influence on thinking in both pure and applied linguistics. Especially prevalent was the behaviourist view that language is a set of acquired habits. This shaped early theories of foreign language learning, which saw the process as involving the replacement of first-language habits with habits appropriate to the target language.

Further reading: Chomsky (1959); Greene (1975: 26–53); Owens (2001); Skinner (1957)

2.   EMPIRICISM

A view that all knowledge is acquired through **experience**. In a language-acquisition context, a view that an infant acquires language chiefly through exposure to the speech of those about it. Empiricist approaches to language acquisition maintain that the speech to which the child is exposed (child directed speech plus ambient adult speech) provides linguistic information of sufficient quality and quantity to support acquisition. An assumption of this kind underlies:

Behaviourism: a view of language as a set of habits acquired when the child imitates the carer and is rewarded;.

Connectionism: a view that the infant receives sufficient evidence to support a learning process in which connections are established between certain words and certain concepts and are strengthened by further exposure; .

Social-interactionism: the view that language is the outcome of the child's need to relate socially to those about it and/or the child's need to achieve certain pragmatic functions.

3.   NATIVISM

The view that language is **genetically transmitted**, and that children are **born** with an **innate** language faculty. Nativist arguments were eclipsed in the mid-twentieth-century heyday of behaviourism, when language was viewed as a habit acquired through a process of stimulus, reinforcement and reward. But they resurfaced powerfully with Chomsky's critique of behaviourist doctrine in his 1959 review of B.F. Skinner's Verbal Behavior. Chomsky concluded that language acquisition was only explicable if one postulated the existence of a faculty, present from birth, which supported it. The neurologist **Lenneberg** also argued in favour of nativism on the grounds that language shows features similar to other types of behaviour which are biologically triggered. This suggested to him that it was controlled by some innate mechanism. In the Chomskyan tradition, a number of standard arguments are invoked against the empiricist and the behaviorist view that language is acquired entirely through exposure to adult speech:

a. **Timescale**. In the space of only five years, the child acquires a vocabulary of about 5000 words and the ability to produce a range of well-formed utterances, some of which it may never have heard before.

b. **Lack of correlation between intelligence and language acquisition**. All children achieve mastery of their first language regardless of variations in intelligence and in their ability to perform other cognitive operations.

c.1 **Input: 'Poverty of stimulus'**. Chomsky (1965) described as degenerate' the adult speech from which the child supposedly acquires language. It contains all the features of natural connected speech (hesitations etc.) – including errors of grammar. It exemplifies only a limited range of the possible sentences of the language. The child is exposed to a range of speakers, with different voices, intonation patterns and accents. Finally, the input provides examples of language performance when the child's goal is to develop competence. How is the child to build the latter solely on random evidence of the former?

c.2 **Input: linearity**. An empiricist view assumes that the child induces the rules of grammar by generalising from specific utterances. But Gold's theorem (1967) calculated that this process cannot account for the way in which the child acquires the concept of structure dependency (the recognition that language is composed of sets of phrases which are organised into a hierarchy). It cannot account for anything more than a finite-state (word-by-word) grammar.

c.3 **Input: negative evidence.** Infants are said to require negative evidence (evidence of sentences which are not acceptable) to show them which syntactic patterns are not permissible; this is self-evidently not available in the input they receive. Example: An infant exposed to Italian has evidence that utterances occur 'with subject pronoun' and (more frequently) 'without subject pronoun'. An infant exposed to English encounters many examples of the 'with subject pronoun' condition, but never any of the negative rule that 'without subject pronoun' is not permissible in English.

c.4 **Input: carer correction**. Carers tend to correct facts rather than syntax (though they are more likely to repeat grammatically correct sentences). Any attempts to correct syntax and phonology produce little immediate effect.

d. **Order of acquisition**. Within a given language (and even across languages), there is evidence that children acquire certain syntactic features in a set order. The child also produces language for which there is no evidence in the input: for example, incorrect Past Simple forms such as goed or seed. This cannot come from adult examples; it indicates that the child is in the process of building up a system of language for itself. Nativist accounts of language acquisition vary widely: not least, in how they represent what it is that is genetically transmitted. Chomsky originally (1965) hypothesised that infants are born with a Language acquisition device (LAD), a mechanism which enabled them to trace patterns in the impoverished data with which they were presented. In his later work, the LAD is replaced with the concept of a Universal Grammar (UG), alerting the child to those features which are common to most or all of the world's languages and enabling it to recognise them in the speech it hears. UG consists of a set of principles which specify the essential nature of

language: they include structure-dependency and the presence of words. It also includes a set of parameters, linguistic features which can be set according to the language that the child is acquiring. Pinker (1994b) takes a more radical nativist view, asserting that we are innately endowed with mentalese, an internal language of thought. First language acquisition involves translating this language into strings of words specific to the language being acquired. Mentalese is abstract but closely parallels speech. The mapping between mentalese and speech is assisted by Universal Grammar which, in **Pinker's** account, includes specific linguistic information such as the existence of nouns and verbs and the categories of subject and object. There are differing accounts of the status of Universal Grammar at the time the child is born. Continuity theory asserts that UG is hardwired in the child, with all its features present from birth. They cannot all be applied at once, however, because the development of one piece of linguistic knowledge may be dependent upon another having been established and/or upon the child's cognitive development. Thus, the concept of Subject þ Verb þ Object cannot be achieved until after the child has recognised the word as an independent unit and developed the memory capacity to retain a three-word utterance. By contrast, maturational theory suggests that the acquisition of syntactic concepts is biologically programmed in the child, just as the growth of teeth or the development of vision is programmed. While the nativist view still commands widespread support, alternatives have increasingly come under consideration. This is partly because research into child directed speech has shown that it is not as degenerate as Chomsky assumed. It is partly because the Chomskyan view of language as infinitely productive has been questioned in the light of evidence that pre-assembled formulaic chunks play an important role in many utterances. It is also because connectionist computer models have demonstrated that learning can indeed take place by dint of tracing patterns across multiple examples of linguistic features and adjusting the system to take account of errors.

 A further problem for nativist accounts is the need to explain the concept of a genetically transmitted universal grammar in terms of phylogeny (the development of the language faculty in the species) as well as ontogeny (the development of the faculty in the individual). Chomsky has tended to favour the view that language appeared as the result of a mutation or accident. Other nativists have suggested that the brain gradually evolved to include a language component. However, brain evolution is very slow, whereas language change is rapid. This has suggested to non-nativists that perhaps it was language that evolved to fit the functions of the brain rather than vice versa.

Further reading: Pinker (1994b); Smith (1999: Chaps 1, 3)

4. SOCIAL-INTERACTIONISM

Approaches to first language acquisition which emphasise the parts played by the child's environment, its social instincts, its pragmatic needs and its relationship with the carer. Those who take this position do not necessarily deny the existence of an innately endowed capacity for language. But they maintain that genetic factors, if they exist, are insufficient on their own to ensure that language develops. Nor is simple exposure to language enough. What is important is the interaction, both linguistic and non-linguistic, which derives from the child's need to communicate. It is argued that child directed speech (CDS) is not as impoverished as Chomsky suggests. The modifications that are made to adult speech (slow rate, repetitions, set phrases, simple syntax and heightened intonation patterns) appear to assist the child in decoding what is said. In response to the nativist assertion that children do not receive feedback on ill-formed utterances, social-interactionists claim that correction is often indirect. Without specifically correcting a child, parents show puzzlement, recast utterances or give responses that exemplify the correct form. There is also evidence that carers grade their language sensitively, increasing sentence length and complexity as the child gets older in response to evidence of the child's linguistic development. A child's language does not develop faster in proportion to the level of input by the carer. But there appears to be a correlation between speed of acquisition and the pragmatic content of CDS – in particular, the extent to which, through questions, directives, acknowledgements and

references to the child's activities, the adult invites interaction by the child. Social-interactionist views stress the importance of the infant's relationship to its environment. One aspect is the familiarity of certain objects and events which ensures that there is a repetitive and even a ritualistic quality to much of the language that is used. Interaction with the principal carer (especially in the form of play) also follows predictable sequences; and it is through play that semantic relationships such as the agent/object distinction are said to become manifest. The carer plays an important role in interpreting new events as they arise.

- Vygotsky, the Russian psychologist, has greatly influenced social interactionist thinking. He stressed the connections between speech, thought and interaction. For him, the early stages of a child's language are characterised by egocentric speech, utterances which include what for an adult would be private thoughts. As the child becomes more aware of its social context, a distinction is made between ideas directed at others and ideas directed at oneself. Vygotsky saw the child's development as a progress from dependency to independence. The adult offers support (termed scaffolding in more recent accounts) which is gradually withdrawn as a task becomes more familiar and as the child becomes more practised.

- Jerome Bruner, in the Vygotskyan tradition, places great importance on carer–child interaction. For him, the linguistic relationship between carer and infant begins with the establishment of joint reference, the carer using various techniques to focus the child's attention on an object or event. Mother and infant then develop a set of standard interactional routines where the infant knows what to expect and references are to familiar surroundings. Bruner does not accept that the young child has to develop for itself a set of relationships with the world around it; he asserts that they mainly derive their awareness of reality through the mediation of others. He is critical of the notion that a child has to distinguish between the public world and the private, which he suggests owes too much to Western culture. Similarly, he challenges the established wisdom that the child lacks a theory of mind, the ability to identify with the point-of-view of others, and suggests that this capacity may be innate. He is willing to accept that some semantic aspects of language may be innate. But also innate is a set of responses to human behaviour which permit the infant to derive the rules of language from experiencing it in use.

- M.A.K. Halliday's functional account, based upon observation of his son Nigel, views language acquisition as fuelled by the child's need to express certain basic pragmatic concepts. Even at a pre-linguistic stage, the child may employ proto-language for this purpose, using certain sounds consistently to express simple needs and feelings. The child's first utterances, according to Halliday, fulfil four basic functions. There is then a gradual increase in the range of meanings which the child learns to express within these areas, even if the forms used are not those of adult language. The child also becomes aware of the nature of interpersonal discourse: it engages in exchanges which resemble dialogue, and thus finds its way towards the expression of attitudes and wishes and the use of syntactic features such as the interrogative. In a third phase, the child's functional repertoire gradually comes to resemble that of an adult.

Further reading: Bruner (1983, 1985: Chap. 4); Cattell (2000: Chaps 7–8); Halliday (1975); Owens (2001)

5. COGNITIVISM

Approaches to language acquisition which view the process as closely linked to general cognition and to cognitive development. Some accounts leave open the extent to which certain aspects of language are innate; but all take the view that acquisition is primarily driven by the way in which the infant's cognitive abilities are brought to bear upon the input to which it is exposed. These cognitive abilities may reflect developing awareness of objects, spatial relations, defining characteristics etc., or they may take the form of perceptual biases which incline the child to recognise patterns in linguistic material. Among views on acquisition which can be characterised as 'cognitive' are:

- An infant cannot express concepts in language unless it has previously developed them. Example: A child cannot use language to refer to objects that are not visible unless it has grasped the idea of object permanence. For Piaget, language was the product of cognitive and perceptual processes. His research with children led him to conclude that there were four stages of cognitive development. They represent a gradual progression and not a sudden shift in behaviour; and the age at which a particular child goes through each varies considerably. However, they are closely linked to linguistic development.
- Both language and cognition are part of a staged maturation programme, in which they operate in parallel, supporting each other. For Vygotsky, thought exists pre-verbally. There is initially a separation between thought and language: the infant's first words are devoid of thought. During three phases, the separate roles of thought and language become established.

- Innate cognitive tendencies may predispose us:

a. To find patterns in language data (as in data in general). A theory of syntactic bootstrapping postulates that infants reach conclusions about words on the basis of their inflections and other grammatical properties: thus the child learns that the difference between It's sib and It's a sib serves to distinguish real-world entities that are mass from those that are count.

b. To adopt certain strategies in response to language data. Slobin (1973) concludes that infants apply a set of universal strategies or operating principles in order to deconstruct the input to which they are exposed. (Pay attention to the ends of words. Pay attention to the order of words and morphemes.) More cognitively complex features are acquired later.

c. To apply individual learning styles to language data. Some infants appear to break the input into words, while others acquire chunks of language in a holistic manner.

-The infant's limited cognitive capacity renders it more sensitive to the features of language than it might be before or later. The 'less is more' argument holds that it may be the very limitations of the infant's early cognitive state which enable it to identify structure in language and to recognise that language constitutes a set of inter-related symbols.

Further reading: Bates et al. (1995); Deacon (1997: Chap. 4); Piattelli-Palmarini (198 0)

References

Field, J . (2004). Psycholinguistics : The Key Concepts. London: Routledge.

Clark, E, V. (2009). First Language Acquisition. Cambridge University Press.