Psycholinguistics

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علم النفس اللغوي

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for Derick & Elizabeth

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Purpose

What justification might there be for a series of introductions to language study? After all, linguistics is already well served with introductory texts: expositions and explanations which are comprehensive and authoritative and excellent in their way. Generally speaking, however, their way is the essentially academic one of providing a detailed initiation into the discipline of linguistics, and they tend to be lengthy and technical: appropriately so, given their purpose. But they can be quite daunting to the novice. There is also a need for a more general and gradual introduction to language: transitional texts which will ease people into an understanding of complex ideas. This series of introductions is designed to serve this need.

Their purpose, therefore, is not to supplant but to support the more academically oriented introductions to linguistics: to prepare the conceptual ground. They are based on the belief that it is an advantage to have a broad map of the terrain sketched out before one considers its more specific features on a smaller scale, a general context in reference to which the detail makes sense. It is sometimes the case that students are introduced to detail without it being made clear what it is a detail of. Clearly, a general understanding of ideas is not sufficient: there needs to be closer scrutiny. But equally, close scrutiny can be myopic and meaningless unless it is related to the larger view. Indeed it can be said that the precondition of more particular enquiry is an awareness of what, in general, the particulars are about. This series is designed to provide this large-scale view of different areas of language study. As such it can serve as preliminary to (and precondition

for) the more specific and specialized enquiry which students of linguistics are required to undertake.

But the series is not only intended to be helpful to such students. There are many people who take an interest in language without being academically engaged in linguistics *per se*. Such people may recognize the importance of understanding language for their own lives of enquiry, or for their own practical purposes, or quite simply for making them aware of something which figures so centrally in their everyday lives. If linguistics has reveal-ing and relevant things to say about language, then this should presumably not be a privileged revelation, but one accessible to people other than linguists. These books have been so designed as to accommodate these broader interests too; they are meant to be introductions to language more generally as well as to linguistics as a discipline.

Design

The books in the series are all cut to the same basic pattern. There are four parts: Survey, Readings, References, and Glossary.

Survey

This is a **summary** overview of the main features of the area of language study concerned: its scope and principles of enquiry, its basic concerns and key concepts. These are expressed and explained in ways which are intended to make them as accessible as possible to people who have no prior knowledge or expertise in the subject. The Survey is written to be readable and is unclut-tered by the customary scholarly references. In this sense, it is **simple**. But it is **not** simplistic. Lack of specialist expertise does not imply an inability to understand or evaluate ideas. Ignorance means lack of knowledge, not lack of intelligence. The Survey, therefore, is meant to be challenging. It draws a map of the sub-ject area in such a way as to stimulate thought, and to invite a critical participation in the exploration of ideas. This kind of con-ceptual cartography has its dangers of course: the selection of what is significant, and the manner of its representation, will not be to the liking of everybody, particularly not, perhaps, to some of those inside the discipline. But these surveys are written

in the belief that there must be an alternative to a technical account on the one hand and an idiot's guide on the other if lin-guistics is to be made relevant to people in the wider world.

Readings

Some people will be content to read, and perhaps re-read, the summary Survey. Others will want to pursue the subject and so will use the Survey as the preliminary for more detailed study. The Readings provide the necessary transition. For here the reader is presented with texts extracted from the specialist literature. The purpose of these Readings is quite different from the Survey. It is to get readers to focus on the specifics of what is said and how it is said in these source texts. Questions are provided to further this purpose: they are designed to direct attention to points in each text, how they compare across texts, and how they deal with the issues discussed in the Survey. The idea is to give readers an initial familiarity with the more specialist idiom of the linguistics literature, where the issues might not be so readily accessible, and to encourage them into close critical reading.

References

One way of moving into more detailed study is through the Readings. Another is through the annotated References in the third section of each book. Here there is a selection of works (books and articles) for further reading. Accompanying com-ments indicate how these deal in more detail with the issues dis-cussed in the different chapters of the Survey.

Glossary

Certain terms in the Survey appear in bold. These are terms used in a special or technical sense in the discipline. Their meanings are made clear in the discussion, but they are also explained in the Glossary at the end of each book. The Glossary is cross-referenced to the Survey, and therefore serves at the same time as an index. This enables readers to locate the term and what it signi-fies in the more general discussion, thereby, in effect, using the Survey as a summary work of reference.

...The series was designed so as to be usable in... common. The four sections of the format, can be drawn upon and combined in different ways, as required by the needs, or interests, of different readers. Some may be content with the Survey and the Glossary and may not want to follow up the suggested References. Some may not wish to venture into the preliminary reading for a course in applied linguistics or teacher education, and the Readings more appropriate for seminar discussion during the course. In short, the notion of an introduction will mean different things to different people, but in all cases the concern is to provide access to specialist knowledge and stimulate an awareness of its significance. This series as a whole has been designed to provide this access and promote this awareness in respect to different areas of language study.

H. G. WIDDOWSON

Author's Preface

One of the briefest and most memorable prayers in the Bible is found at the conclusion of Psalm 19:

Let the words of my mouth, and the meditation of my heart,
Be acceptable in thy sight,
O Lord, my strength, and my redeemer.

It may seem unusual to preface an introduction to a scientific discipline like psycholinguistics with this prayerful plea from the Book of Psalms, but words and thoughts (whether they are conceived in the heart, the mind, or even in the abdomen, as some cultures claim) are the central focus of this relatively new science. Further, their 'acceptability' depends very much on the norms and expectations of the language community in which they are conceived and shared. And because psycholinguistics is such a comprehensive discipline and embraces so many aspects of linguistic behavior, it then becomes obvious why I, as the author of this modest treatise on the topic, would begin with an invocation,

tions, I take no pride but do accept full responsibility, despite the help of many people who have deepened my understanding of the relationship between language and thought.

For several decades, I have enjoyed introducing psycholinguistics to students in many classes, both in the United States and in several countries around the globe, and in all of these courses, I have learned much from my students and from the authors of the many different texts we have used. I also have appreciated the insights shared by many professional friends, on my home campus, at academic conferences, and in the exchange of paper and electrons which makes modern communication so miraculously efficient. While trying to squeeze the writing of this book into a tight teaching schedule, I am, as always, grateful to my wife for tolerating my many sojourns into the study and for realizing that even an afternoon run into the nearby hills was not only good for the heart, but ultimately for the evolution of my scholarship as well.

Finally, I want to thank the good people at Oxford University Press for enlisting me as one of the authors for the Oxford Introductions to Language Study series. I was honored to be asked to participate, and I am grateful for their guidance, support, and most of all, for their patience, throughout the writing and production of this volume. My ultimate gratitude is reserved for the Series Editor, Henry Widdowson, who carefully helped shape my ideas, who painstakingly edited every page I produced, and who wisely and generously made my words and my thoughts more acceptable.

THOMAS SCOVEL
San Francisco, May 1997

SECTION I
Survey

brain versus mind

Psycholinguistics => hows for { speech/language production
         " / " comprehension
         " / " acquisition
         " / " attrition

Introduction

History is marked by the very human urge to explore and venture. From the earliest of recorded time, we have well-documented accounts of attempts to name and map the farthest reaches of the heavens, and, as time has progressed over the centuries, humans have ventured to study the more immediate world—the flora, fauna, and terra firma closer to them. But it has only been very recently, within the last century or so, that we have dared to explore the most proximal portion of our universe—the human mind. It is no accident, of course, that the oldest science is astronomy and the newest is psychology, for distance not only prompts curiosity, it also fosters observational objectivity. Given the inordinate attention devoted to psychology in magazines, books, and television, it seems as if humanity is trying desperately to make up for lost time in its zeal to discover more about the human mind.

Why is psychology one of the newest sciences and why has the study of mind provoked so much recent attention? The answer to both questions appears to lie in the fact that of all the objects of inquiry in our universe, the human mind itself, the seat of all queries and inquiries, is the least amenable to objective study. So desperate are we for concrete, physical evidence that we frequently lapse into mistaking the mind for the brain. Emily Dickinson commits this error, but she can be forgiven, for she was a poet, not a neuropsychologist, and she wrote before the science of psychology even existed. Most importantly, her words tellingly capture the essential frustration of trying to fathom the most fathomless of abstractions, the human intellect.

The Brain is Wider

The Brain—is wider than the Sky—
For—put them side by side—
The one the other will contain
With ease—and you—beside—

The brain is deeper than the sky,
For, hold them blue to blue,
The one the other will absorb
As sponges, buckets do.

The brain is just the weight of God,
For lift them, pound for pound,
And they will differ, if they do,
As syllable from sound.

Substituting 'mind' for 'brain', we can share the poet's perception that the mind seems to encompass everything within our natural universe. Indeed, because it can also conceive of the supernatural, perhaps Dickinson is right; the mind is made, or is part and parcel of, the very image of God. The task of the scientist, however, is the exact opposite of the poet's. Rather than to expand, enlarge, and enliven the universe through creativity, the scientist must describe, delimit, and delineate through objectivity, and thus we return to the essential conundrum—without simplistically **reducing** it to the less than two kilograms of soft tissue in the cranium, how do we study the human mind? In the last fifty years or so, scientists interested in this most proximal piece of nature have carved out a field of inquiry which has begun to yield answers about the structure of the mind, and they have arrived at these answers, in part, by using evidence from a uniquely human possession—speech and language. The use of language and speech as a window to the nature and structure of the human mind is called **psycholinguistics**.

The vast majority of data and evidence quoted here will deal with **language** and **speech**; however, it is instructive to remember that this book is not an introduction to the study of language, linguistics, but rather an introduction to the **psychology of language** (a term often used as a synonym for psycholinguistics). Although sounds, words, and sentences will serve as examples throughout this book, they themselves are not the center of our attention; they

will function instead as windows to the mind. And given the complexity of all languages and the collective complexity and individual complications of all human minds, it is understandable that linguistic data will only on occasion provide clear and transparent vistas of how the mind functions. More typically it will reveal only smudgy glimpses.

Like all disciplines, psycholinguistics has evolved into a conglomeration of sub-fields. However these divisions provide a means whereby a large body of information can be introduced in more digestible pieces. This book will examine research questions in four sub-fields: (1) how are language and speech *acquired*? (2) how are language and speech *produced*? (3) how are language and speech *comprehended*? and finally, (4) how are language and speech *lost*? One way to look at these questions is to view them as sets of pairs and picture them within the framework of a two-by-two matrix—a four-paned window, as it were, as set out in Figure 1.1.

FIGURE 1.1

		Diachronic	Synchronic
Synthesis		acquisition	production
Analysis		dissolution	comprehension

acquisition
production
comprehension
attrition

Viewed **diachronically**, over time, acquisition and dissolution are the beginning and the end of the story of speech in an individual human being. The former requires the skills of putting a new language together, while the latter reflects the unwanted and unintentional process of a language falling apart. Although these processes reflect the opposite ends of a continuum, they are not so disparate as they might initially appear. As the 'Seven ages of man' soliloquy from Shakespeare's *As You Like It* implies, the natural process of disintegration in old age may recapitulate the period of integration during infancy.

Last scene of all,
That ends this strange eventful history,
Is second childishness, and mere oblivion,
Sans teeth, sans eyes, sans taste, sans everything.
As You Like It 1. vii. 139

/sɒˈlɪləkwɪ/ = speaking your mind aloud

psycholinguistic tasks; the former involves the synthesis of language structures while the latter involves their analysis. The production of language demands the synthetic talents of an imaginary mental chef, who selects the appropriate ingredients, weighs them carefully, and then stirs them together into a creative new dish. The comprehension of language, on the other hand, requires the analytic skills of a cognitive chemist, who takes whatever is served up and meticulously breaks it down into its individual compounds and elements in order to understand it completely.

These four major sub-fields of psycholinguistics collectively comprise the issues which will concern us in this book.

[Handwritten annotations: "Psycholinguistics subfields / ① developmental", "① How can crying function as a precursor to language development?", "/dɪmiːnər/ = way of behavior"]

Acquisition: when I was a child, I spoke as a child

Children are a focus of attention and affection in all societies. The presence of an infant is a key to the hearts of strangers anywhere on the globe. 'What a cute smile', they murmur, immediately transfixed by the child's demeanor, 'What's her name?' they inquire. 'Does she speak yet?' Because of their universally unique status, small children evoke a certain sociolinguistic familiarity and directness not permissible with older children and adults. And if these encounters transpire in cross-cultural situations, for example when a couple are touring a foreign country with their young child, along with these typical expressions of affectionate attention come cries of amazement when the youngster is enticed or provoked into speaking its native tongue. There is a natural wonder when the strange and difficult sounds of a foreign language appear to pour effortlessly out of the mouths of mere babes.

It is no surprise, then, that the ability of children to pick up their mother tongue so quickly and seemingly so easily is the central concern of the first major sub-field of the psychology of language that we will review. Developmental psycholinguistics examines how speech emerges over time and how children go about constructing the complex structures of their mother tongue. The emergence of speech is not only an apt chronological stage to begin our reflections on the nature of the human mind, it is also the stage where we can glean the least complicated data. As Tennyson puts it, our first efforts at speech are not words but cries:

So runs my dream, but what am I?
An infant crying in the night;
An infant crying for the light,
And with no language but a cry.

So pervasive is the common perception that the crying of a baby conveys some significant linguistic communication, that the early Romans believed it was the gift of a specific spirit, Vigitanus, and even Plato observed that the very first communicative distinction is between comfort and discomfort. A common mistake of early students of developmental psycholinguistics was to assume that children had no language until they uttered their first word, usually about the time of their first birthday.

'... no language but a cry'

Over the past forty years, there has been an increasing amount of research into the linguistic capacity of infants, and it seems the more we study them the smarter they become. What we have learned about crying is that it is not only communicative, it is also a direct precursor to both *language* (human symbolic communication) and *speech* (spoken language). In a sense, crying, at least in the first few months, is a kind of language without speech, because the child communicates different types of discomfort without using normal speech sounds. As the infant matures, crying helps the child learn how to produce linguistic sounds, and so this earliest form of utterance is also a precursor to speech. During the first few weeks of a child's life, crying is largely an **autonomic response** to noxious stimuli, triggered by the autonomic nervous system as a primary reflex. In brief, this means that the crying response is hard-wired into the child, and crying is initially a spontaneous reaction, unaffected by intentional control from the voluntary nervous system, which eventually evolves as the mover and shaper of most human behavior. Even at this relatively primitive stage, however, crying is a direct preparation for a lifetime of vocal communication. As anyone can witness when observing a raucous infant in full voice, crying trains babies to time their breathing patterns so that eventually they learn how to play their lungs like bagpipes, with quick inhalations of air ①

followed by long, slow exhalations to fuel their vocal cords with prolonged wailing. This skill of timed breathing is crucial for successful speech communication for the rest of the child's life, and it is a direct result of a baby's ability to learn to control the cries of birth.

Crying initially is completely **iconic**; there is a direct and transparent link between the physical sound and its communicative intent. For example the hungrier a baby becomes, the louder and the longer the crying. It also increases in pitch. The degree of discomfort is directly proportional to the intensity of the acoustic signal. But in the first month or two of the child's development, crying becomes more differentiated and more **symbolic**. This means that it is not directly related to the child's sense of discomfort; rather, the cries are subtly, indirectly, and almost randomly associated with its needs. As most mothers realize intuitively, and as recent studies have suggested, the baby may not cry to express discomfort or pain, but rather to elicit attention. So even at this rudimentary stage of linguistic evolution, there is a significant transformation from using sound as an iconic or direct reflection of an internal state to using it as a symbolic, indirect manifestation of increasingly complex internal feelings. Later, we will learn that this transition also represents a major difference between the communication found in most animals and the way humans use language.

Even at this earliest and most primitive stage of psycholinguistic development, we cannot simply pretend that the baby exists alone and evolves independently. Humans are born at an early stage of development in comparison with most mammals. Even when we are born after our natural full term of nine months, we are physically so weak and underdeveloped that we are completely dependent on our caretakers for several years. This forces and forges an enormous degree of early bonding and socialization. After several weeks of extensive interaction with its caretaker, the child starts to coo, making soft gurgling sounds, seemingly to express satisfaction. Crying and cooing affect, and are affected by, caretaker behavior. It is difficult to surmise whether the coos and gurgles of a just-fed baby reinforce the mother's contentment in caring it, or whether the mother's sounds of comfort when nurturing her baby reinforce the child's

babbling { marginal / canonical

mothers and their babies made when together, Nobuo Masataka showed that there was a clear similarity between the sounds made by mother and child which had emerged by the time the infants were only five months old. Most likely then, a baby's early vocalizations, and the constant responses of the caretaker, mutually reinforce each other. Obviously then, even these earliest attempts at communication underscore the importance of social interaction in the acquisition of human language.

This cooing stage emerges at about two months of age but is succeeded, when the child is about six months old, by a babbling stage. Babbling refers to the natural tendency of children of this age to burst out in strings of consonant-vowel syllable clusters, almost as a kind of vocalic play. Some psycholinguists distinguish between marginal babbling, an early stage similar to cooing where infants produce a few, and somewhat random, consonants, and canonical babbling, which usually emerges at around eight months, when the child's vocalizations narrow down to syllables that begin to approximate the syllables of the caretaker's language.

Interestingly enough, when infants begin to babble consonants at the canonical stage, they do not necessarily produce only the consonants of their mother tongue. That is, their earliest acquisition is not of the segmental phonemes (the individual consonants and vowels) that go to make up their native tongue. In fact, children seem to play with all sorts of segments at this stage, and frequently produce consonants that are found in other languages, not just the language by which they are surrounded. Hence we find the first of several psycholinguistic ironies. A six-month-old infant, raised by English speakers, may very well babble a sound that is not in her mother tongue—say the unaspirated /p/ sound in Spanish *pico* ('beak'), which sounds more similar to the English /b/ in 'by' than the aspirated English /p/ in 'pie.' But this same child, when trying to learn Spanish words twenty years later, may have great difficulty producing this same unaspirated Spanish /p/ sound she had babbled with ease as a baby!

Since infants may babble vowels and consonants which are not part of their mother's native repertoire, babbling is not evidence that children are starting to acquiring the segmental sounds of

/ˈruːbɪkən/ "to cross the rubicon"

child-fabricated pseudo-words
"أقوال مبتكرة"

suprasegmental sounds of their mother tongue at this stage. The term suprasegmental refers to the musical pitch, rhythm, and stress which accompany the syllables we produce and which play such an important role in marking grammar, meaning, and intention. Eight-month-old babies reared in English-speaking families begin to babble with English-sounding melody; those of a similar age who are brought up in Chinese-speaking homes begin to babble with the tones and melodies of Chinese. Babbling is the first psycholinguistic stage where we have strong evidence that infants are influenced by all those many months of exposure to their mother tongue. Up to this stage, there is very little difference between the speech production of a normal child and that of a baby born profoundly deaf. Both infants will progress through the crying and cooing stages with little overt manifestation of the significant difference between them in hearing ability. However, as the babbling stage begins, a half a year into life, the lack of suprasegmental accuracy in the babbling of a deaf baby is often the first overt signal of the child's disability.

First words

First words = holophrastic stage

After crying, cooing, and babbling, we come to the culmination of a child's early language development—the first word. A child crosses this linguistic Rubicon at about one year old, although there is a wide range of latitude as to when the first word emerges and as to what constitutes a 'word'. For one thing, it seems that children often use idiomorphs, words they invent when they first catch on to the magical notion that certain sounds have a unique reference. For example, one psycholinguist recorded that when his daughter was about one year old, she came up with 'ka ka' as the word for 'milk'. But just as frequently, youngsters begin to learn the vocabulary of their mother tongue straight away. A survey of the words children first learn to say shows that they tend to be those which refer to prominent, everyday objects, and usually things that can be manipulated by the child. Thus, 'mama' and 'dada' (of course), and 'doggie', 'kitty', but also 'milk', 'cookie', and 'sock'. Even at this most rudimentary stage of vocabulary

development, we can see evidence for what Piaget calls **egocentric speech**. **Children**, quite naturally, want to talk about what surrounds them; **at life's beginnings**, they are the center of their universe. If the child cannot manipulate the object during this early period of physical development, it does not appear to be worth naming. Parents spend a lot of time putting diapers on and taking them off their one-year-olds, but because babies themselves (quite fortunately!) **don't** handle them, 'diapers' or 'nappies' do not become part of a child's early linguistic repertoire.

Parents fuss a great deal over their child's first word; this, and the first step, rank as singular benchmarks of maturation. The first cry, the first coo, or the first babble is often ignored or unrecognized, **but** the first substantive evidence of vocabulary acquisition, even if indistinguishable from a controlled burp to outsiders, is often duly recorded and dated by proud parents. Just as the first steps are symbolic of the evolution of man from ape-like animal to biped, the **first** few words, whether idiomorphs or words from the parent's native language, demonstrate to the mother and father that their child has successfully made the transition from an iconic creature to a symbolic human being.

The Miracle Worker, the compelling drama about the early life of Helen Keller, saves this marvelous moment for its powerful conclusion. Annie Sullivan, the teacher hired to transform the blind and deaf, asocial and non-communicative young Helen, has been laboring throughout the play to **get** Helen to communicate by finger spelling, but now, with Annie's contract almost up, all seems hopeless. Helen remains entrapped in an iconic world without speech **or** language. But as they stand in the well-house, next to the water pump, where Annie has led Helen for her daily chore of filling the pitcher for dinner, the water spills accidentally on Helen's hand and the miracle unfolds. Helen seizes Annie's hand and finger-spells what Annie has written so many times on Helen's hand, apparently without success. W-A-T-E-R. From this moment on, words cascade onto Helen's fingers like the water which is accidentally spilt at the well; and from this moment comes an explosion of linguistic learning, so that Helen is eventually able to write about the experience in her own words.

That living word awakened my soul, gave it light, hope, joy, set it free ... I left the well-house eager to learn. Everything had a name, and each name gave birth to a new thought.
(from Helen Keller, 1903. *The Story of My Life*. Doubleday, page 44)

More remarkable than the drama, and the actual biographical anecdote it depicts, is that most of us have experienced a similar moment when, at about the age of one, we too suddenly recognized 'the mystic harmony, linking sense to sound and sight', and entered the sentient and symbolic world of human communication. Once the first few words are acquired, there is an exponential growth in vocabulary development, which only begins to taper at about the age of six, when, by some estimates, the average child has a recognition vocabulary of about 14,000 words. It is no wonder then that parents are excited by their child's first word: it represents a step into symbolic communication, and it signifies the start of the rapid vocabulary growth with which thoughts, feelings, and perceptions, as well as other areas of linguistic development, are framed.

The birth of grammar ⇒ *Pivot grammar*

Even well over a century ago, parents noticed that their children seemed to use single words as sentences. In 1877 Charles Darwin, for example, recorded in the journal that he kept on his son's acquisition of language that the single word 'milk' could sometimes be a statement or a request, or, if his son had accidentally dropped his glass, an exclamation. This use of single words as skeletal sentences is referred to as the holophrastic stage, and though there is some debate about its verifiability, most psycholinguists believe that the intonational, gestural, and contextual clues which accompany holophrases make it clear that children are using single-word sentences, exactly as adults often do in conversation. 'Milk?' is often used as the truncated form of 'Do you have any milk?' but, given the appropriate context, 'Milk!' is just as obviously an abbreviated version of 'I'd like some milk'. Recall that from the very beginning, infants are reared and nurtured in a world where virtually all

manner used in the same highly contextualized holophrastic utterances which adults use when conversing with each other in familiar social settings. Holophrastic speech is the bridge which **transports** the child from the primitive land of cries, words, and names across into the brave new world of phrases, clauses, and sentences.

Of all the areas investigated by developmental psycholinguists, the acquisition of grammar has been studied the most intensively. Much of this can be related to the development of **Transformational-Generative (TG) grammar**, the most influential school of linguistics to affect the study of language over the past four decades. Although TG grammar has evolved and devolved into many different sub-schools, it has always been involved most centrally with the study of sentences. Another reason why people investigating child first language acquisition are inclined to focus on the attempts of children to acquire grammar is that the data is easy to obtain. Unlike **the** tape recordings of cooing, babbling, and burping babies, where the acoustic signals are fuzzy and the gathering of data a laborious and indeterminate task, the gleaning of information on how children create sentences is manageable, discrete, and can be done while caring for the child. No wonder that so many studies are done on the acquisition of grammar by toddlers as they converse with their parent/linguist parent at home. The transcripts **recorded** often reveal the amazing ability of youngsters to acquire their mother tongue fluently and, at the same time, create novel expressions.

Father/Linguist (Supervising daughter getting dressed): 'I think you've got your underpants on backwards.'
Daughter (Age 3 [yrs] 9 [months]): 'Yes, I think so.'
Father/Linguist: 'You'd better take them off and put them on frontwards.'
Daughter (Taking them off and turning them around): 'Is this the *rightwards*?'

(from Peter Reich, 1986. *Language Development*. Prentice-Hall, page 142)

Even at an earlier age, a child's acquisition of syntax displays a

elaborate chronology of how children acquire English grammar, published in 1973, demonstrated that children progress through different **stages** of grammatical development, measured largely by the average number of words occurring per utterance. Although individuals differ, especially at very young ages, in the speed with which they move from one stage to another, all children begin to create sentences after the holophrastic stage, first with two words, and subsequently with more. The many studies conducted of the early two-word stage reveal that, even within these limitations, children demonstrate a surprising amount of grammatical precocity. They do not randomly rotate words between first and second position, for example; certain words **(pivots)** tend to be used initially or finally, and other words then can be used to fill in the slot either after or before these so-called pivots. The order of the words in these two-word utterances tends to follow the normal word order of the expanded version used by adults in longer sentences, which indicates that children are already sensitive to the word order of their mother tongue. Finally, it is quite rare for youngsters to repeat the same word twice in forming their little sentences; children are parsimonious with their language and make each word count.

A telling indication of just how much children have acquired by the time they are approximately two years old, and have begun to use two-word sentences consistently, is to contrast examples of their grammar with the output collected from one of the most prominent experiments to teach a human language to a chimpanzee. The chimp examples below come from a project which attempted to improve upon previous attempts to teach a form of human sign language (**American Sign Language or ASL**) to young chimpanzees. ASL has become a popular human language to teach to these animals because, due to the anatomical differences between human and simian vocal tracts, chimps cannot make the sounds of a human language. In this project, the researchers' young pupil was 'Nim Chimsky', named, of course, after the father of TG grammar, Noam Chomsky. The examples below contrast utterances by a two-year old human child with Nim's longest attempts to sign in ASL. Even though this comparison is

already skewed in Nim's favour—two-word utterances by the child are contrasted with four-word phrases by the chimp—it is clear that in terms of conveying meaning, the child's language is far more developed.

Two-word utterances by a human child (from M.D.S. Braine. 1963. The ontogeny of English phrase structure: The first phrase. *Language* 39:1-13)

it ball	see ball	get ball	there ball	want baby
it doll	see doll	get doll	there doll	want car
it checker	see Steve	get Betty	there momma	want do
it daddy			there doggie	want get
it boy			there book	want up

Four-word phrases in ASL by a chimp (from H.S. Terrance. 1979. *Nim: A Chimpanzee Who Learned Sign Language.* Washington Square Press, page 319)

(1) eat drink eat drink   (6) grape eat Nim eat
(2) banana Nim banana Nim   (7) banana eat me Nim
(3) eat Nim eat Nim   (8) banana me eat banana
(4) Nim eat Nim eat   (9) play me Nim play
(5) banana me Nim me   (10) drink Nim drink Nim

Even in this sparse amount of data, there are obvious differences in performance. The child displays great lexical diversity (19 items); the chimp seems confined to a small stock of words (7 items). The child displays very little repetition. The chimp seems to find it impossible to sign a single sentence without referring to either 'Nim' or 'banana'. The child appears to have a sense of syntax: a two-word sequence is introduced by a pivot word like 'it' or 'want', which is followed by a slot filled by a wide variety of lexical items. The chimp, on the other hand, is a prolific producer of permutations: he can cleverly churn out random sequences of signs, but there are no fixed pivot words around which predictable slots can occur. In sum, the child's output can be symbolized by a simple set of phrase structure rules, grammatical rules which demonstrate that a series of words form a structured phrase or clause and are not simply a list of unconnected items. The child's sequences appear to be more like words in a sentence. The chimp's sequences, on the other hand, seem to be much less

Chimp and child differ in terms of rule-governedness.

like sentences and more like a grocery list. Thus they are much more difficult to describe by rules.

Notice that the child has a simple set of rules which are very powerful; they generate a large number of diverse utterances. Each rule is a logical linguistic extension of the previous rule. This capacity to generate new utterances has long been observed as an essential and universal characteristic of human language. In the eighteenth century, the German philosopher Leibnitz observed that 'human language uses finite resources to create infinite utterances', and two centuries later Chomsky founded the TG school of grammar on the same insight. Note too that the child's rules are elegant and simple, the two criteria most valued by grammarians, logicians, and theoretical mathematicians.

In contrast, the chimp's 'rule system', if we can be so generous as to call it such, is not nearly so tidy; indeed, these 'rules', like the actual data they attempt to reflect, are an ungainly sequence of random collocations. Nim's 'grammar', if it can be called a grammar, is unable to provide rules which can be used to describe many different sentences.

In comparing these two sets of data, we are led to the inescapable conclusion that even at a very young age, before they have any conscious awareness of the difference between parts of speech such as nouns and verbs, young humans very rapidly acquire the notion that words do not combine randomly but follow a systematic pattern of permissible sequences. Even at the stage when they are still producing two-word utterances, this system allows young children to generate a wide range of linguistic permutations. Chimps, on the other hand, do not appear to have even an inkling of any pattern or system, but randomly throw signs together in a haphazard fashion. At best, Nim's 'grammar' seems to tell him something like 'throw any four signs together from any category, and the nice man will give me a banana or a grape!'

Evidence for innateness

The example we have just reviewed is only one measure of the weight of evidence for innateness, which is the belief most psycholinguists now hold that the acquisition of human language is

...unua sau) response for language acquisition, we would not expect such a glaring discrepancy between the performance of these two primate species. In fact, we might even expect Nim to be the better of the two performers because he was constantly bombarded with signs and was continually rewarded and reinforced whenever he attempted to use them to communicate with his handlers. And although human children also receive an enormous amount of linguistic input on any given day, they are infrequently rewarded just for speaking up, indeed they are sometimes encouraged to be 'seen but not heard'. There are even cultures (for example some of the Native American tribes of Arizona and New Mexico) which discourage young children from engaging adults in prolonged conversation. This kind of argument led Chomsky and a whole generation of developmental psycholinguists to claim that a sizeable part of early linguistic learning comes from an innately specified language ability in human beings. In other words, learning your mother tongue is a very different enterprise from learning to swim or learning to play the piano.

No one would argue, not even the most radical rationalist, that humans have innate areas of their brain genetically programmed to help them swim the back stroke, or play a tune on the piano. Environmental conditioning is crucial for these and many other human activities, and among the plethora of arguments in support of this fact is the simple observation that huge numbers of people never learn to swim or to play the piano at all, yet it is exceedingly rare, as we shall discover in Chapter 5, to stumble across anyone who has never learned to speak. Chomsky has argued that just as humans have some kind of genetically determined ability to 'learn' to stand upright or to walk, so too do they possess an LAD, a 'Language Acquisition Device' (now replaced with the more linguistically accurate UG or 'Universal Grammar'). Chomsky's position is accepted by a great many contemporary psycholinguists and is most articulately and assiduously defended in Steven Pinker's popular book, The Language Instinct. In summary, to return to humans and chimps, most psycholinguists agree that an ape like Nim will never be able to ape his human

unique humanity.

Childish creativity

There is another way in which child language acquisition is relatively independent from environmental influences, despite the distinct control that the latter exercise on the course of our first language development. Obviously, a child's linguistic surroundings determine its mother tongue: children raised in Shandong, China, grow up speaking Mandarin; children raised in Bedfordshire, England, grow up as native speakers of English; and children, like your author, who grow up in Shandong but are reared by native speakers of English, usually acquire bilingual proficiency in both of these tongues. But despite the obvious impact the environment has on the choice and general direction of mother-tongue learning, children are prone to come up with all kinds of words and expressions which they have never heard in their mono- or bilingual environments. Children are creative wordsmiths, as evidenced in the following exchange between a friend and her two-year-old.

Daughter: Somebody's at the door.
Mother: There's nobody at the door.
Daughter: There's yesbody at the door.

(from P. Reich. 1986. Language Development. Prentice-Hall, pages 42)

From about two to four, children produce all kinds of expressions like this which they have never, or rarely, heard in their environment, but which they create on their own in their attempts to construct, or reconstruct, their mother tongue. Common at this age are regular plurals for irregular ones (mans, knifes, sheeps), regular past-tense endings for irregular verbs (goed, singed, eated), and even 'double tensing' when children seem to be caught in transition between recognizing an irregular verb and yet reluctant to jettison the regular past-tense ending that they have acquired. This kind of tuning, to use a term to describe that one type of cognitive processing, usually shows that the child has

creative construction = overgeneralisation →

progressed to a slightly more advanced linguistic stage of language development ('Yesterday, we *wented* to Grandma's.'). Overgeneralizations like these are very common in the mother tongue learning of young children and are, perhaps mistakenly, referred to as 'false' analogies. One could make a convincing case that it is not the child who is in error but the language, since it fails to adhere to the symmetry of its own grammatical patterning. This process of creative construction is yet another example of the relative autonomy of the child's developing linguistic system in relation to the adult version of the language. Children are not chimps, and are definitely not parrots or tape recorders. They are a bit more like well-programmed computers, who make creative, but often inaccurate guesses about the rules and patterns of the language they are acquiring.

Even at this early age, children can sometimes display a profound understanding of the syntactic machinery of their mother tongue. There is some irony in the fact that, through their creative syntax, they reveal linguistic rules or patterns which might well have escaped the grammatical ken of their highly educated parents. One three-year-old child, upon spying a family friend approaching for dinner, exclaimed: '*There Carlos is!*' It took considerable effort on the father's part to figure out why this sentence was ungrammatical, but why it also sounded almost acceptable. The child was probably overgeneralizing from Patterns A and B to form the close-but-not-perfect C (marked with an asterisk * to indicate its ungrammaticality).

Pattern A: There's Carlos!   [There's/Here's + Noun]
Pattern B: There he is!   [There/Here Pronoun + is]
Pattern C: *There Carlos is!   [There/Here + Noun + is]

Readers afflicted with a pathological addiction to grammar might want to consider how complex this particular paradigm really is, as well as how clever a linguistic puzzle solver this observant child had become.

Sometimes, children's creative constructions reflect their apparently inborn sensitivity to the syntactic structures of the language they are acquiring. Consider the following two examples of the creation of two-word verbs using *up* by two different five-year-olds.

A.K.:   Ben's hicking up. He's hicking up.
Adult: What?
A.K.:   He's got the hiccups.

(from S. A. Kuczaj II. 1978. Why do children fail to overgeneralize the progressive inflection? *Journal of Child Language* 5: 167:710)

Father: Don't interrupt.
Child: Daddy, you're interring up!

(from C. Hockett. 1968. *The State of the Art.* Mouton, page 115)

There is nothing wrong with the hearing of these two children. In the first example, *hiccup* and 'hick up' are phonologically indistinguishable. In the second, given the fact that final consonant clusters in English (as in the cluster /pt/ of 'interrupt'), especially when they are voiceless, are usually not fully pronounced, the difference between the final syllable of 'inter up' vs. 'interrupt' would be consistently difficult to perceive in normal conversation, even for an adult. So the children's 'errors', if we wish to label them such, are not mistakes of the ear, and since, of course, these children have not yet learned to read, neither are they slips of the eye. Rather, they are another example of how children creatively construct their grammars based on what they have learned and on what they can plausibly assume. Indeed, their assumption about the structure of English in these examples appears to reveal an uncanny awareness of a growing grammatical trend. Compared to most other languages in the world, including its cousins from Europe to South Asia, contemporary English has become very much a 'prepositional' language, and one indication of this tendency is the growing profusion of 'two-word' verbs—verbs plus prepositions such as *turn on* or *look over*. The point is that children are not only active and creative participants in the acquisition of their mother tongue; even their 'errors' often indicate that they are remarkably sensitive to the subtle but inherent grammatical characteristics of the language they are learning.

autonomous and growing discipline with its own texts, journals, and national and international conferences. It is difficult to present a concise summary of such a massive amount of research, even limiting our curiosity to just the acquisition of English as a mother tongue. Another large and equally burgeoning subdiscipline of developmental psycholinguistics is the area of bilingualism and its ancillary—and often politically controversial—branch devoted to bilingual education. Adding to the scope of this body of knowledge is the extension of first language acquisition research to older ages of childhood in order to investigate what kinds of complex linguistic structure are acquired by elementary school-aged children and, equally important, what possible age constraints on mother-tongue learning might reveal themselves when children turn into teenagers. For example, the emergence of 'foreign accents' in the speech of bilingual children at about the age of twelve suggests to some psycholinguists that there exists a **critical period** for first language learning which is biologically determined. To conclude this brief summary of an ever-expanding field, let us take a look at one universal and pervasive phenomenon that has been discovered at all ages of child language learning, with virtually every type of linguistic structure, and in all of the scores of world languages where child development has been intensively investigated. What most typifies first language acquisition is the fact that it invariably occurs in stages.

We must preface this brief description of the stages of language acquisition with the admission that there is and always will be individual differentiation. In all biological populations, there are always exceptions which fall on either side of the normal structure or behavior that defines a particular species, and this individuality is very conspicuous among *Homo Sapiens*. In one of the earliest pieces of research on the acquisition of a mother tongue by several child subjects, Roger Brown discovered that there was a glaring difference in the **rate** of language learning among the three children that he and his co-workers researched over a period of several years. Indeed, at about three years of age, one of the three children studied was linguistically already a year ahead of

and early environmental backgrounds that are found in even the most seemingly homogenous human populations. This differentiation can be seen in the supernormal performances of those rare children who burst forth from their peers with a genius for language, music, art, or sport. Consequently, these prodigies are becoming increasingly studied by psychologists because of their very individuality. But in spite of these individual differences, perhaps the most consistent finding in all of developmental psycholinguistics has been that there are universal stages of language learning. All children, no matter how rapid or how pedestrian their rate of acquisition, proceed systematically through the same learning stages for any particular linguistic structure.

An early example of this is found in the work of Brown's colleagues, Edward Klima and Ursula Bellugi, who proved that children learning English produce two different types of WH questions before they eventually come up with the correct adult version. They identified three distinct stages.

Stage 1
(use of WH word but no auxiliary verb employed)
What Daddy doing?
Why you laughing?
Where Mommy go?

Stage 2
(use of WH word and auxiliary verb after subject)
Where she will go?
Why Doggy can't see?
Why you don't know?

Stage 3
(use of WH word and auxiliary verb before subject)
Where will she go?
Why can't Doggy see?
Why don't you know?

(E.S. Klima and U. Bellugi. 1966 'Syntactic regularities in the speech of children' in J. Lyons and R.J. Wales (eds.): *Psycholinguistic Papers*. University of Edinburgh Press. Pages 183–208)

All children begin with Stage 1 utterances before proceeding to Stage 2 examples several months later. Eventually they end up with the linguistically appropriate target examples at Stage 3. No matter how precocious the children are, that is, no matter how fast their rate of progress through these stages, they do not skip over any of them; no child goes from Stage 1 immediately to Stage 3 without at least some examples of Stage 2 structures. Rates vary; stages don't.

Another example of developmental stages is seen in the acquisition of English negatives, again originally described by Brown and his colleagues in their study of the language learning of three young children. Brown divided their grammatical development into periods of '**Mean Length of Utterances**' (**MLUs**), showing that as the children progressed in the acquisition of their mother tongue, their MLUs grew from a minimum of about two words to about four. Recall that even when children are not yet two years old and are just beginning to string two words together, they seem to notice that words are not simply piled on top of one another like bricks. Certain words act as mortar and seem to hold words together in a certain order. It is this sensitivity to word choice and structure that allows children to create grammatical sentences, and it is the lack of this syntactic sense that appears to prevent chimps from creating sequences resembling human language. One example of young children's acquisition sensitivity to syntax is in the way they learn negation in English. Note how the primitive negatives found in Stage 1 (with an MLU of 1.75 words) eventually evolve into the adult-like forms of Stage 3 (where the MLUs are from 3.5 to 4 words).

Stage 1
(use of NO at the start of the sentence)
No the sun shining.
No Mary do it.

Stage 2
(use of NO inside the sentence but no auxiliary or BE verb)
There no rabbits.
I no taste it.

rate may differ in individuals; route does not.

Stage 3
(use of NOT with appropriate abbreviation of auxiliary or BE)
Penny didn't laugh.
It's not raining.

(E.S. Klima and U. Bellugi, 1966 'Syntactic regularities in the speech of children' in J. Lyons and R.J. Wales (eds.): *Psycholinguistic Papers*. University of Edinburgh Press. Pages 183–208).

There may be some argument over the exact number of stages for a given structure; some researchers have suggested that there are four, not three, stages represented in the two grammatical examples illustrated here. However, starting with these examples taken from Brown's early fieldwork, there has been continual confirmation of the existence of sequential staging for many of the grammatical patterns acquired by children learning their first language, and of the finding that all children proceed immutably from one stage to the next. One especially insightful development in this research on acquisition stages has been the discovery that similar stages and staging is found in adult second language learning. Research pursued by applied linguists for several decades demonstrates that, like little children, adolescent and adult foreign language learners also differ a great deal in their *rate of* language acquisition but not in the *stages* through which they progress. This finding has several implications, but one of the most obvious is the possibility that the process of language acquisition is a common psychological challenge for both the young, maturing child, and the older, experienced adult. When it comes to the human mind, age differences tend to evaporate, and we witness one common cognitive process when the minds of either youngsters or their older counterparts are confronted with a similar task, for example the tremendous challenge of picking up a completely new system of symbolic communication—in other words, learning a language.

The inquiring and acquiring mind is the common denominator for all areas of psycholinguistics and is, perhaps, an apt topic with which to conclude this discussion of first language acquisition and to begin to contemplate language production.