

***Introduction:***

* ***Themes of Psycholinguistics***

***Introduction***



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**4** *Part One General Issues*

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|  |  |  |  |  | ***MAIN*** | • | Psycholinguistics is the study of how individuals comprehend, produce, and ac- |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  | ***POINTS*** |  | quire language. |  |
|  |  |  |  |  | • | The study of psycholinguistics is part of the field of cognitive science. Cognitive |  |
|  |  |  |  |  |  |  | science reflects the insights of psychology, linguistics, and, to a lesser extent, fields |  |
|  |  |  |  |  |  |  | such as artificial intelligence, neuroscience, and philosophy. |  |
|  |  |  |  |  |  | • Psycholinguistics stresses the knowledge of language and the cognitive processes |  |
|  |  |  |  |  |  |  | involved in ordinary language use. |  |
|  |  |  |  |  |  | • | Psycholinguists are also interested in the social rules involved in language use |  |
|  |  |  |  |  |  |  | and the brain mechanisms associated with language. |  |
|  |  |  |  |  |  | • Contemporary interest in psycholinguistics began in the 1950s, although impor- |  |
|  |  |  |  |  |  |  | tant precursors existed earlier in the century. |  |
|  |  |  |  |  | ***Introduction*** |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | This book is about how people use language. Few things play as central a role in |  |
|  |  |  |  |  |  | our everyday lives as language. It is our most important tool in communicating our |  |
|  |  |  |  |  |  | thoughts and feelings to each other. Infants cry and laugh, and their facial expres- |  |
|  |  |  |  |  |  | sions surely give their parents some notion of the kinds of emotions they are experi- |  |
|  |  |  |  |  |  | encing, but it is not until children are able to articulate speech that we gain much |  |
|  |  |  |  |  |  | understanding of their private thoughts. |  |
|  |  |  |  |  |  |  | As we grow, language comes to serve other functions as well. Most young |  |
|  |  |  |  |  |  | people develop jargon that is more meaningful to those of the same age than to |  |
|  |  |  |  |  |  | older or younger individuals. Such specialized language serves to bind us more |  |
|  |  |  |  |  |  | closely with our peers while at the same time excluding those who are not our peers. |  |
|  |  |  |  |  |  | Language becomes a badge of sorts, a means of identifying whether a person is |  |
|  |  |  |  |  |  | within a social group. Similar processes are at work in gender and social class |  |
|  |  |  |  |  |  | differences in language use. |  |
|  |  |  |  |  |  |  | Over time, for many of us language becomes not merely a means to an end |  |
|  |  |  |  |  |  | but an end in itself. We come to love words and word play. So we turn to writing |  |
|  |  |  |  |  |  | poetry or short stories. Or to playing word games, such as anagrams and crossword |  |
|  |  |  |  |  |  | puzzles. Or to reading novels on a lazy summer afternoon. A tool that is vital for |  |
|  |  |  |  |  |  | communicating our basic needs and wants has also become a source of leisurely |  |
|  |  |  |  |  |  | pleasure. |  |
|  |  |  |  |  |  |  | The diversity of how we use language is daunting for psychologists who wish |  |
|  |  |  |  |  |  | to study language. How can something so widespread and far-reaching as language |  |
|  |  |  |  |  |  | be examined psychologically? An important consideration is that although language |  |
|  |  |  |  |  |  | is intrinsically a social phenomenon, psychology is principally the study of individ- |  |
|  |  |  |  |  |  | uals. The psychology of language deals with the mental processes that are involved |  |
|  |  |  |  |  |  | in language use. Three sets of processes are of primary interest: language compre- |  |
|  |  |  |  |  |  | hension (how we perceive and understand speech and written language), language |  |
|  |  |  |  |  |  | production (how we construct an utterance, from idea to completed sentence), and |  |
|  |  |  |  |  |  | language acquisition (how children acquire language). |  |
| S |  |  |  |  |  | The psychological study of language is called **psycholinguistics.** This book |  |
| N |  |  |  | explores the principles of this field along with selected applications. This introduc- |  |
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| *Chapter 1 Introduction: Themes of Psycholinguistics* | **5** |



tory chapter deals with two questions: What is psycholinguistics? and How has this field evolved over the last century?

***The Scope of Psycholinguistics***

Psycholinguistics is part of the emerging field of study called **cognitive science.** Cognitive science is an interdisciplinary venture that draws upon the insights of psychologists, linguists, computer scientists, neuroscientists, and philosophers to study the mind and mental processes (Johnson-Laird, 1988a; Stillings et al., 1995). Some of the topics that have been studied by cognitive scientists include problem solving, memory, imagery, and language. Anyone who is seriously interested in any of these topics must be prepared to cross disciplinary lines, for the topics do not belong to any one field of study but rather are treated in distinctive and yet comple-mentary ways by various disciplines.

|  |  |
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| As the name implies, psycholinguistics is principally an integration of the |  |
| fields of psychology and linguistics. **Linguistics** is the branch of science that studies |  |
| the origin, structure, and use of language. Like most interdisciplinary fields, how- |  |
| ever, psycholinguistics has a rich heritage that includes contributions from diverse |  |
| intellectual traditions. These contrasting approaches have often led to controversies |  |
| in how to best think of or study language processes. We will consider many of these |  |
| issues in the pages to come. For now, let us begin our survey of psycholinguistics by |  |
| examining some of its central themes. |  |
| ***Language Processes and Linguistic Knowledge*** |  |
| At its heart, psycholinguistic work consists of two questions. One is, What knowledge |  |
| of language is needed for us to use language? In a sense, we must know a language |  |
| to use it, but we are not always fully aware of this knowledge. A distinction may be |  |
| drawn between **tacit knowledge** and **explicit knowledge.** Tacit knowledge refers to |  |
| the knowledge of how to perform various acts, whereas explicit knowledge refers to |  |
| the knowledge of the processes or mechanisms used in these acts. We sometimes |  |
| know how to do something without knowing how we do it. For instance, a baseball |  |
| pitcher might know how to throw a baseball 90 miles an hour but might have little |  |
| or no explicit knowledge of the muscle groups that are involved in this act. Similarly, |  |
| we may distinguish between knowing how to speak and knowing what processes are |  |
| involved in producing speech. Generally speaking, much of our linguistic knowl- |  |
| edge is tacit rather than explicit. Reading this book will make you more aware of |  |
| various things you know about language, thereby transforming some of your tacit |  |
| knowledge into explicit knowledge. |  |
| Four broad areas of language knowledge may be distinguished. **Semantics** |  |
| deals with the meanings of sentences and words. **Syntax** involves the grammatical |  |
| arrangement of words within the sentence. **Phonology** concerns the system of | S |
| sounds in a language. **Pragmatics** entails the social rules involved in language use. | N |
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| **6** | *Part One General Issues* |  |
|  |  |  |  |  | It is not ordinarily productive to ask people explicitly what they know about these |  |
|  |  |  |  |  | aspects of language. We infer linguistic knowledge from observable behavior. |  |
|  |  |  |  |  | The other primary psycholinguistic question is, What cognitive processes are |  |
|  |  |  |  |  | involved in the ordinary use of language? By ‘‘ordinary use of language,’’ I mean |  |
|  |  |  |  |  | such things as understanding a lecture, reading a book, writing a letter, and holding |  |
|  |  |  |  |  | a conversation. By cognitive processes, I mean processes such as perception, mem- |  |
|  |  |  |  |  | ory, and thinking. Although we do few things as often or as easily as speaking and |  |
|  |  |  |  |  | listening, we will find that considerable cognitive processing is going on during |  |
|  |  |  |  |  | those activities. |  |
|  |  |  |  |  | ***Four Language Examples*** |  |
|  |  |  |  |  | The interplay of linguistic knowledge and language processes is a continuing theme |  |
|  |  |  |  |  | through this book. Because these concepts play a central role in psycholinguistic |  |
|  |  |  |  |  | work, the following two chapters explore the knowledge and process questions in |  |
|  |  |  |  |  | greater depth. Chapter 2 discusses linguistic insights into our tacit knowledge, and |  |
|  |  |  |  |  | Chapter 3 considers psychological mechanisms of information processing and how |  |
|  |  |  |  |  | these processes may be used in language processing. For now, it will be helpful to |  |
|  |  |  |  |  | consider various examples of language and language processes. The following ex- |  |
|  |  |  |  |  | amples are intended to illustrate how the aforementioned themes apply to specific |  |
|  |  |  |  |  | situations as well as to convey some of the scope of psycholinguistic research. |  |
|  |  |  |  |  | *Garden path sentences* What happens when we comprehend a sentence? We get |  |
|  |  |  |  |  | a hint of what is involved when the process breaks down. For example, consider |  |
|  |  |  |  |  | sentence (1): |  |
|  |  |  |  |  | **(1)** The novice accepted the deal before he had a chance to check his |  |
|  |  |  |  |  | finances, which put him in a state of conflict when he realized he had a |  |
|  |  |  |  |  | straight flush. (Adapted from Foss & Jenkins, 1973) |  |
|  |  |  |  |  | Sentences such as this are sometimes called **garden path sentences** since the sub- |  |
|  |  |  |  |  | jective impression is one of following a garden path to a predictable destination until |  |
|  |  |  |  |  | it is obvious that you were mistaken in your original interpretation and thus are |  |
|  |  |  |  |  | forced to ‘‘backtrack’’ and reinterpret the sentence. That is, in terms of knowledge, |  |
|  |  |  |  |  | we have stored in our memory at least two different meanings of the word *deal.* One |  |
|  |  |  |  |  | is related to a business transaction, and the other, relevant in this case, pertains to |  |
|  |  |  |  |  | card games. This knowledge of the two meanings of *deal* is part of our semantic |  |
|  |  |  |  |  | knowledge of the language. Another part of our semantic knowledge is knowledge |  |
|  |  |  |  |  | of the relationships among words, such as *deal* and *finances.* From a process stand- |  |
|  |  |  |  |  | point, we appear to select the one that is most appropriate, and we have little or no |  |
|  |  |  |  |  | conscious awareness of the alternative (or how else would we have the garden path |  |
|  |  |  |  |  | experience?). That is, we are able, by some process, to focus our attention on what |  |
| S |  |  |  | we believe is the relevant meaning of *deal.* Studies of ambiguity are examined in |  |
|  |  |  |
| N |  |  | Chapters 5 and 6; we will find that there is more to garden path sentences than what |  |
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| *Chapter 1* | *Introduction: Themes of Psycholinguistics* | **7** |  |  |  |  |  |
| we are immediately aware of. The point for now is that in the course of compre- |  |  |  |  |  |
| hending language we are making decisions—we are doing mental work. |  |  |  |  |  |  |
| *Indirect requests* Consider now a sentence such as (2): |  |  |  |  |  |  |
| **(2)** Can you open the door? |  |  |  |  |  |  |
| Literally, this sentence asks if we have the ability to open the door, but everybody |  |  |  |  |  |
| assumes that the speaker is asking us to open the door in an indirect manner. Why |  |  |  |  |  |
| is the request phrased indirectly? Part of the reason is that we have learned certain |  |  |  |  |  |
| rules about the use of language in social settings, including rules of politeness. A |  |  |  |  |  |
| request is, by definition, an attempt to change another person’s behavior. This can |  |  |  |  |  |
| be perceived as intrusive or threatening at times, so we soften it with indirect speech. |  |  |  |  |  |
| An indirect request is more polite than a direct command such as sentence (3): |  |  |  |  |  |  |
| **(3)** | Open the door! |  |  |  |  |  |  |
| We know this, as it is part of our pragmatic knowledge of our language. Some of us |  |  |  |  |  |
| know it better than others, to be sure (studies discussed in Chapter 9 indicate that |  |  |  |  |  |
| women and girls are more likely to use indirect speech than are men and boys). |  |  |  |  |  |  |
| From a processing standpoint, a speaker takes this pragmatic knowledge into |  |  |  |  |  |
| account when producing a statement such as sentence (2) in a social situation. That |  |  |  |  |  |
| is, the speaker utters the sentence with the understanding that it will be taken as a |  |  |  |  |  |
| request. The listener presumably shares this aspect of pragmatic knowledge and |  |  |  |  |  |
| interprets the sentence as a request rather than in a literal manner, although the |  |  |  |  |  |
| exact processes by which the listener arrives at the nonliteral meaning are not fully |  |  |  |  |  |
| clear (see Chapter 6). |  |  |  |  |  |  |
| Indirect requests are an aspect of language that forces us to consider language |  |  |  |  |  |
| in a social context. The study of the relationships between language and social |  |  |  |  |  |
| behavior is called **sociolinguistics.** Sociolinguists remind us that language activities |  |  |  |  |  |
| always take place in a social world. Sociologists and anthropologists study how lan- |  |  |  |  |  |
| guage varies with social groupings, how it influences social interaction, and how it |  |  |  |  |  |
| is used as an instrument of culture (as in the transmission of cultural traditions). All |  |  |  |  |  |
| of these aspects are well beyond those of the psychologist, who is principally inter- |  |  |  |  |  |
| ested in the behavior of individuals. Yet even when studying individuals, it is neces- |  |  |  |  |  |
| sary to recognize the social dimension of language. |  |  |  |  |  |  |
| *Language in aphasia* Although our primary focus is on language processes in |  |  |  |  |  |
| normal individuals, we can learn a great deal about language by studying individuals |  |  |  |  |  |
| with impaired language functioning. An **aphasia** is a language disorder due to brain |  |  |  |  |  |
| damage. One type of aphasia, called **Wernicke’s aphasia,** involves a breakdown in |  |  |  |  |  |
| semantics. For example, consider excerpt (4): |  |  |  |  |  |  |
| **(4)** | Before I was in the one here, I was over in the other one. My sister had |  |  | S |  |
|  |  |  |
|  | the department in the other one. (Geschwind, 1972, p. 78) |  |  | N |  |
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| **8** | *Part One General Issues* |  |
|  |  |  |  |  | The semantic relationships between words in this excerpt are seriously disrupted, |  |
|  |  |  |  |  | suggesting that the patient’s semantic knowledge has been impaired by the brain |  |
|  |  |  |  |  | damage. In contrast, phonological knowledge was spared; the speech, although |  |
|  |  |  |  |  | devoid of meaning, was articulated smoothly and with appropriate pausing and |  |
|  |  |  |  |  | intonation. It also displays appropriate syntactic structure, which is typical in Wer- |  |
|  |  |  |  |  | nicke’s aphasia. |  |
|  |  |  |  |  | The study of the relationship between the brain and language is called **neuro-** |  |
|  |  |  |  |  | **linguistics,** which is discussed more fully in Chapter 13. Although the details of the |  |
|  |  |  |  |  | links between brain structures and language elude us, what is presently known is |  |
|  |  |  |  |  | both fascinating and instructive. Depending on the exact location of the injury, its |  |
|  |  |  |  |  | severity, and many other factors, an individual who has sustained a brain injury may |  |
|  |  |  |  |  | display a wide variety of reactions. One person may have normal comprehension |  |
|  |  |  |  |  | but be deficient in language production. Another may have no loss of ability with |  |
|  |  |  |  |  | sentence structure but have greater than normal problems finding words. Still other |  |
|  |  |  |  |  | individuals may be unimpaired in comprehension and production but be unable to |  |
|  |  |  |  |  | repeat exactly what they have heard and understood. In normal individuals with |  |
|  |  |  |  |  | intact brains, various facets of language—sentence structure, meaning, sounds— |  |
|  |  |  |  |  | appear to form a smoothly coordinated system of communication; however, in brain- |  |
|  |  |  |  |  | damaged individuals, this system is revealed to be a combination of separate parts, |  |
|  |  |  |  |  | for the deficits in such persons are often selective rather than total. Thus, brain |  |
|  |  |  |  |  | injuries enable us to analyze an apparently unified program of language abilities |  |
|  |  |  |  |  | into its separate components and raise questions about how such abilities become |  |
|  |  |  |  |  | integrated in the normal adult in the first place. |  |
|  |  |  |  |  | *Language in children* An area of considerable concern to psycholinguists is lan- |  |
|  |  |  |  |  | guage acquisition. As difficult as it is to infer linguistic knowledge in adults, the |  |
|  |  |  |  |  | problem is even more intractable with children. An example may help here. Imag- |  |
|  |  |  |  |  | ine a young child, about 1 year old, interacting with her mother. Typically, children |  |
|  |  |  |  |  | around this age produce one word at a time. When the mother leaves the room and |  |
|  |  |  |  |  | then returns with the child’s favorite doll, the child says *doll,* not *mother.* Later, when |  |
|  |  |  |  |  | the mother is helping her with lunch, the child points at the milk and says *more.* Still |  |
|  |  |  |  |  | later, when the child is struggling with her shoes and the mother asks her what she is |  |
|  |  |  |  |  | doing, the simple response is *off.* What can we conclude from these observations? |  |
|  |  |  |  |  | For starters, the child might know, at least in a tacit manner, some of the rules |  |
|  |  |  |  |  | of language to use words appropriately. We could infer that she uses *more* not as an |  |
|  |  |  |  |  | isolated word or imitation but as a request that the mother bring the milk closer. |  |
|  |  |  |  |  | *Doll* is less clear; the child might be making a comment on her environment by |  |
|  |  |  |  |  | labeling a thing she finds interesting, or she may be requesting the doll. How do we |  |
|  |  |  |  |  | determine what she is trying to say? One way is to see what happens if the mother |  |
|  |  |  |  |  | does nothing. If the word were meant as a request, the child will probably become |  |
|  |  |  |  |  | more insistent, perhaps by repeatedly pointing at the doll and saying *doll;* whereas if |  |
|  |  |  |  |  | it were meant as a comment, the child’s behavior should end with mother’s mere |  |
|  |  |  |  |  | acknowledgment of the object. Thus, the child may have learned certain pragmatic |  |
|  |  |  |  |  | rules to guide her choice of words. |  |
| S |  |  |  | You may complain that this is reading a good deal, perhaps too much, into a |  |
|  |  |  |
| N |  |  | single word. Granted, the inferences made about this stage of development are |  |
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| *Chapter 1 Introduction: Themes of Psycholinguistics* | **9** |



terribly difficult. Yet, although there is disagreement over exactly how much knowl-edge to attribute to young children, it appears that children know more than they say. Children somewhat older than the one in the example commonly express them-selves with two words at a time, as in *baby gone,* by eliminating the **closed-class** or **function words** (prepositions, conjunctions, and so on) in favor of **open-class** or **content words** (nouns, verbs, adjectives). This pattern suggests that children havean intuitive understanding of these two grammatical classes, which is part of their syntactic knowledge.

An analysis of children’s comprehension and production abilities cannot be divorced from the social context in which the child masters language. Parents may set up situations in which one word is sufficient for communication. With the adult’s query *What are you doing with your shoe?* as the base, the child’s simple, economical *off* is instantly comprehensible. Parents do other things as well, such as simplifyingtheir speech to children and teaching specific words. Is the orderly pattern of devel-opment observed in child language the result of an orderly biological program or of an orderly social environment? This issue is addressed in Chapter 12.

***Summary***

Psycholinguistics is part of an interdisciplinary field known as cognitive science. Two primary psycholinguistic questions are What mental processes are involved in language use? and What linguistic knowledge is involved in language use? These questions reemerge in different forms in studies of adult language comprehension, the social use of language, language use in aphasia, and language in children.



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| ***The Historical Context*** |  |  |  |  |
|  |  |  |  |  |  |
| In this section we consider some historical developments in the study of psycholin- |  |  |  |  |
| guistics. I have not attempted to be comprehensive here. The history of psycholin- |  |  |  |  |
| guistics has been treated in detail elsewhere (see, for example, Blumenthal, 1970, |  |  |  |  |
| 1987; Kess, 1991; McCauley, 1987; Reber, 1987); if you are interested, you are |  |  |  |  |
| advised to consult these sources. My discussion here is simply meant to put succeed- |  |  |  |  |
| ing chapters in a little bit of historical perspective. |  |  |  |  |
| Blumenthal (1987) has observed that the interdisciplinary field of psycholin- |  |  |  |  |
| guistics flourished twice: once around the turn of the century, principally in Europe, |  |  |  |  |
| and once in the middle of this century, principally in the United States. In both |  |  |  |  |
| instances, it was a somewhat asymmetrical marriage of disciplines. In the early |  |  |  |  |
| decades of this century, linguists turned to psychologists for insights into how human |  |  |  |  |
| beings use language. In the later period, psychologists turned to linguists for insights |  |  |  |  |
| into the nature of language. In between these two periods, behaviorism dominated |  |  |  |  |
| both fields, each of which practiced a form of benign neglect toward one another. |  |  |  |  |
| We will look at the events of each of these periods, and I will add some observations |  |  | S |
| on the current directions in the field. |  | N |
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**10** *Part One General Issues*

***Early Psycholinguistics***

From the development of the first psychological laboratory, at the University of Leipzig in Germany in 1879, until the early 1900s, psychology was defined as the science of mental life. A major figure in early scientific psychology was Wilhelm Wundt (1832–1920), a man trained in physiology who believed that it was possible to investigate mental events such as sensations, feelings, and images by using pro-cedures as rigorous as those used in the natural sciences. Moreover, Wundt believed that the study of language could provide important insights into the nature of the mind. Blumenthal (1970) refers to Wundt as the master psycholinguist because Wundt wrote extensively about many different aspects of language. His concerns included grammar, phonology, language comprehension, child language acquisi-tion, sign language, reading, and other topics of contemporary concern.

One of Wundt’s contributions to the psychology of language was developing a theory of language production. He regarded the sentence, not the word, as the primary unit of language and saw the production of speech as the transformation of a complete thought process into sequentially organized speech segments (compre-hension was thought to be basically the same process in reverse). Wundt described speech production in the following terms:

When I construct a sentence, an isolated concept does not first enter consciousness causing me to utter a sound to represent it. That it cannot be this way is shown by the phenomenon of phonetic induction which occurs when a vocal element on the verge of being expressed is already affecting the form of a sound being spoken at the moment. And similarly, an articulation that has just occurred influences the succeed-ing sound. . . . The sentence . . . is not an image running with precision through consciousness where each single word or single sound appears only momentarily while the preceding and following elements are lost from consciousness. Rather, it stands as a whole at the cognitive level while it is being spoken. If this should ever not be the case, we would irrevocably lose the thread of speech. (Wundt, 1912, cited in Blumen-thal, 1970, p. 21)



These two notions—the view that speech production is a word-by-word process and that it begins with a whole sentence—continue to be of interest to language research-ers. As we shall see in Chapter 3, this distinction is a precursor of a contemporary distinction between bottom-up and top-down processing.

Some significant developments were also being made in measuring various language processes. An example comes from the 1908 work of Edmund Huey (1968), who examined reading from the perspective of human perceptual abilities. Huey, who regarded the achievement of reading as ‘‘the most remarkable specific performance that civilization has learned in all its history’’ (p. 6), employed the **eye-voice span** (the lag between eye position and voice when reading aloud, about sixor seven words) and the **tachistoscope** (a machine that presents visual stimuli for very brief periods of time) in his studies. Interest in eye movement and tachisto-

S scopic data remains very strong to this day.

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| *Chapter 1 Introduction: Themes of Psycholinguistics* | **11** |



***Behaviorism and Verbal Behavior***

In the first few decades of this century in the United States, there was mounting opposition to the focus on mental life as a goal for psychology. By the 1920s, **behav-iorism** took over the mainstream of experimental psychology. Behaviorists favoredthe study of objective behavior, often in laboratory animals, as opposed to the study of mental processes. Moreover, behaviorists had a strong commitment to the role of experience in shaping behavior. Emphasis was placed on the role of environmental contingencies (such as reinforcement and punishment) and on models present in the immediate environment.

From the 1920s to the 1950s, psychologists expressed relatively little interest in language. Behaviorists preferred instead to speak of ‘‘verbal behavior.’’ The behav-ior of speaking correctly was, it was assumed, the consequence of being raised in an environment in which correct language models were present and in which chil-dren’s speech errors were corrected. The manner in which parents shape their children’s utterances was described by the behaviorist B. F. Skinner (1957) in his book *Verbal Behavior:*

In teaching the young child to talk, the formal specifications upon which reinforce-ment is contingent are at first greatly relaxed. Any response which vaguely resembles the standard behavior of the community is reinforced. When these begin to appear more frequently, a closer approximation is insisted upon. In this manner, very complex verbal forms may be reached. (pp. 29–30)



Although this analysis seems straightforward or even obvious, we will find in Chap-ter 12 that the role of adult speech in child language acquisition is both more controversial and more complex than is suggested in this excerpt.

About the time Skinner’s book appeared, behavioristic research was providing evidence for its most basic premise: that verbal behavior could be conditioned by reinforcement. Verplanck (1955) found that the opinionated statements of college students in free conversation increased in frequency when they were followed by verbal reinforcers such as *mmm* or *good.* Related studies showed that the frequency of a grammatical class, such as plural words, could be increased by reinforcing only words from that class (Greenspoon, 1955). In a similar way, subtle signs of approval (such as nods) probably influence our choice of words in conversations.

Another major topic of research was meaning. A number of behavioristic accounts of meaning were developed, most of which emphasized associations among words. Noble and McNeely (1957) constructed an index of the ‘‘meaning-fulness’’ of individual words by measuring the number of associations a person could produce in a designated period of time. Later studies showed that high-meaningful-ness words such as *kitchen* were more easily learned in a variety of tasks than low-meaningfulness words such as *icon* (Underwood, 1966). It was also about this time that Osgood and his associates developed the **semantic differential,** a tool for meas-uring the associative meanings of words by asking people to rate words on dimen-

sions such as good/bad and strong/weak (Osgood, Suci, & Tanenbaum, 1957). S

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| **12** | *Part One General Issues* |
|  |  |  |  |  | Similar developments were occurring within linguistics. Linguists of this pe- |
|  |  |  |  |  | riod tended to emphasize behavioristic treatments of language, in which reference |
|  |  |  |  |  | to mental states or processes was meticulously avoided. However, despite the simi- |
|  |  |  |  |  | larities between the two fields, little interdisciplinary interest or activity took place. |
|  |  |  |  |  | One striking example of this is the work of linguist Leonard Bloomfield. Bloomfield |
|  |  |  |  |  | was once a student of Wundt’s and published a book in 1914 that emphasized many |
|  |  |  |  |  | Wundtian themes. However, his more widely known 1933 text took a more behav- |
|  |  |  |  |  | iorist view. In his preface to the later book, Bloomfield tried to distance himself not |
|  |  |  |  |  | only from Wundt but from psychology as a whole: |
|  |  |  |  |  | In 1914 I based this phase of the exposition on the psychologic system of Wilhelm |
|  |  |  |  |  | Wundt, which was then widely accepted. Since that time there has been much up- |
|  |  |  |  |  | heaval in psychology; we have learned, at any rate, what one of our masters suspected |
|  |  |  |  |  | thirty years ago, namely that we can pursue the study of language without reference to |
|  |  |  |  |  | any one psychological doctrine, and that to do so safeguards our results and makes |
|  |  |  |  |  | them more significant to workers in related fields. (Bloomfield, 1933, p. vii) |
|  |  |  |  |  | Thus, despite the inherent interconnections between the fields, psychology and |
|  |  |  |  |  | linguistics ‘‘divorced’’ for a period of several decades. |
|  |  |  |  |  | ***Later Psycholinguistics*** |
|  |  |  |  |  | By the early 1950s, psychologists and linguists became interested in talking to one |
|  |  |  |  |  | another. Tanenhaus (1988) describes the events in the following way: |
|  |  |  |  |  | In 1951 the Social Science Research Council sponsored a conference that brought |
|  |  |  |  |  | together several leading psychologists and linguists. . . . The proceedings of the confer- |
|  |  |  |  |  | ence outlined a psycholinguistic research agenda that reflected a consensus among |
|  |  |  |  |  | participants that the methodological and theoretical tools developed by psychologists |
|  |  |  |  |  | could be used to explore and explain the linguistic structures that were being uncov- |
|  |  |  |  |  | ered by linguists. (p. 4) |
|  |  |  |  |  | A second, larger conference occurred 2 years later and included anthropologists and |
|  |  |  |  |  | communications engineers as well as psychologists and linguists. It was out of these |
|  |  |  |  |  | exchanges that the term *psycholinguistics* first came into use (Osgood & Sebeok, |
|  |  |  |  |  | 1965). Not everyone was fond of the term. One of the participants at the first |
|  |  |  |  |  | conference, Roger Brown, complained that a ‘‘psycholinguist’’ sounded more like a |
|  |  |  |  |  | deranged polyglot than a psychologist interested in language (Brown, 1958), but the |
|  |  |  |  |  | name stuck. |
|  |  |  |  |  | The second period of interdisciplinary psycholinguistics really took hold in |
|  |  |  |  |  | the late 1950s, beginning with the emergence of the linguist Noam Chomsky. |
|  |  |  |  |  | Chomsky is generally regarded as the most influential figure in twentieth-century |
|  |  |  |  |  | linguistics, and Newmeyer (1986) has characterized the Chomskyan influence |
|  |  |  |  |  | within linguistics as a revolution. Chomsky has also played a powerful role in how |
| S |  |  |  | psychologists perceived language because he argued that the behaviorists’ accounts |
| N |  |  | of language were inadequate (Chomsky, 1957, 1959). |
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Let us look at some of his arguments. One theory advanced by behaviorists is called the **associative chain theory,** which states that a sentence consists of a chain of associations between individual words in a sentence. Put another way, each word in a sentence serves as a stimulus for the next word, and thus the entire sentence is produced left to right. Lashley (1951) had earlier argued against such a view, claim-ing that there is something more to the structure of a sentence than the associations between adjacent words.

Chomsky (1957) advanced this notion further. Consider the following sentences:

1. Colorless green ideas sleep furiously.
2. Furiously sleep ideas green colorless.
3. George picked up the baby.
4. George picked the baby up.

Chomsky suggested that associations between words could not possibly explain the existence of sentences such as (5). Even though the associations between these words are almost nonexistent, the sentence is syntactically acceptable. But, if the words are presented backward, as in sentence (6), it is not a sentence at all. Now consider sentences (7) and (8). It is part of our intuitive knowledge of the language that these sentences are synonymous, but this simple fact poses problems for the associative chain theory. Clearly, there is a relationship between *pick* and *up* in these sentences, but the relationship is more complex in (8) than in (7) because the words are separated. To comprehend the sentence, we must somehow know that these words are part of a linguistic unit, or **constituent.** Linguists call separate units, like those in sentence (8), **discontinuous constituents,** and their existence suggests that there are long-range dependencies among words in a sentence. Again, a theory that stresses a simple association between adjacent words is inadequate.



Chomsky has also argued that language acquisition cannot be explained in terms of children’s language experience. His primary argument is called the **poverty** **of stimulus argument** (Chomsky, 1980). This argument states that there is notenough information in the language samples given to children to fully account for the richness and complexity of children’s language. Sentences (9) through (12) (from Caplan & Chomsky, 1980) illustrate the point:

1. John believes he is incompetent.
2. John believes him to be incompetent.
3. John wants him to win.
4. John wants Bill to see him.

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| Our knowledge of the language tells us that the *he* in sentence (9) and the *him* in |  |  |  |  |  |
| sentence (12) could refer to John, though they need not. In contrast, the *him* in |  |  |  |  |  |
| sentences (10) and (11) cannot refer to John. It is doubtful that anyone’s parents |  |  |  |  |  |
| systematically distinguished between the *him* in sentences (10) and (11) versus the |  |  | S |  |
|  |  |  |
| *him* in sentence (12). In fact, most people would not know how to explain such a |  | N |  |
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|  |  |  |  |  | difference. Still, we recognize the difference and, moreover, can make a great num- |  |
|  |  |  |  |  | ber of other linguistic discriminations about much more complex aspects of lan- |  |
|  |  |  |  |  | guage that we are similarly unable to explain in an explicit manner. Chomsky’s |  |
|  |  |  |  |  | argument is this: the language children acquire is intricate and subtle, and the |  |
|  |  |  |  |  | sample of speech given to them during the course of language development is |  |
|  |  |  |  |  | anything but. Therefore, although parents may assist the child’s language develop- |  |
|  |  |  |  |  | ment in some ways and influence the rate of development somewhat, the pattern of |  |
|  |  |  |  |  | development is based not on parental speech but on innate language knowledge. |  |
|  |  |  |  |  | The Chomskyan revolution had a powerful effect on psychological thinking |  |
|  |  |  |  |  | about language. In the late 1960s, Chomsky (1968) noted that ‘‘the study of lan- |  |
|  |  |  |  |  | guage may very well, as was traditionally supposed, provide a remarkably favorable |  |
|  |  |  |  |  | perspective for the study of human mental processes’’ (p. 98) and that linguistics |  |
|  |  |  |  |  | could be profitably viewed as a branch of cognitive psychology. That is, linguists |  |
|  |  |  |  |  | were examining the kinds of linguistic knowledge needed for ordinary language use |  |
|  |  |  |  |  | and realized that this knowledge must be used, in some way, by those who use the |  |
|  |  |  |  |  | language. As Slobin (1971) puts it, a person who has learned a language has formed |  |
|  |  |  |  |  | something that is ‘‘psychologically equivalent’’ (p. 3) to a grammar. Thus, psychol- |  |
|  |  |  |  |  | ogists became very interested in linguistics in general and in Chomsky’s transfor- |  |
|  |  |  |  |  | mational grammar in particular (see Chapter 2). |  |
|  |  |  |  |  | The psychologist George Miller played an important bridge between psychol- |  |
|  |  |  |  |  | ogy and linguistics by introducing psychologists to Chomsky’s ideas and their psy- |  |
|  |  |  |  |  | chological implications. Miller collaborated with Chomsky on several articles and |  |
|  |  |  |  |  | papers in the early 1960s (for example, Miller & Chomsky, 1963) and was at the |  |
|  |  |  |  |  | forefront of research during this period to determine the psychological reality of |  |
|  |  |  |  |  | linguistic rules (see, for instance, Miller & Isard, 1963). |  |
|  |  |  |  |  | Language development became an especially popular topic for investigators |  |
|  |  |  |  |  | during this period. Several **longitudinal investigations** of child language, in which |  |
|  |  |  |  |  | a sample of a child’s speech is collected at several points over a period of years, |  |
|  |  |  |  |  | emerged in the early 1960s (Braine, 1963; Miller & Ervin, 1964), and various |  |
|  |  |  |  |  | ‘‘grammars’’ for child language were written, modeled after adult grammars but |  |
|  |  |  |  |  | differing in the specific rules (Bloom, 1970; Brown, 1973). The major questions for |  |
|  |  |  |  |  | language acquisition researchers were posed in the following way: What set of rules |  |
|  |  |  |  |  | governs the child’s developing grammar and when does this set develop? |  |
|  |  |  |  |  | Theoretical analyses of language development emphasized the role of innate |  |
|  |  |  |  |  | factors. Together with Chomsky, the most influential person in this regard was Eric |  |
|  |  |  |  |  | Lenneberg, whose 1967 book *Biological Foundations of Language* pulled together |  |
|  |  |  |  |  | evidence from aphasia, studies of delayed language development (for example, men- |  |
|  |  |  |  |  | tal retardation), and the available neurophysiological information into an elegant |  |
|  |  |  |  |  | argument for the role of innate factors in language development. Another strong |  |
|  |  |  |  |  | advocate of innate factors was David McNeill (1966, 1970), who proposed a theory |  |
|  |  |  |  |  | of development based on the concept of language universals. |  |
|  |  |  |  |  | The revolution of the 1960s and early 1970s emphasized the role of linguistic |  |
|  |  |  |  |  | theory in psycholinguistic research and the role of innate mechanisms in language |  |
|  |  |  |  |  | acquisition. These themes continue to be influential, but there are indications that |  |
| S |  |  |  | psychological interest in linguistic theory has waned. Reber (1987) examined the |  |
|  |  |  |
| N |  |  | number of references to Chomsky in psycholinguistic studies and found that they |  |
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rose sharply in the late 1960s, peaked in the mid-1970s, and then fell off by the early 1980s. Although it might be interesting to look at citations of other linguists, these data nonetheless appear to reflect the trend among psychologists to shy away from directly incorporating linguistic concepts into psychological research. Reber cites several reasons for these changes. One was that throughout the 1960s and 1970s linguistic theories underwent rapid and (to psychologists, at least) confusing changes (see Newmeyer, 1986). These changes made it difficult for psychologists to base their studies on any particular linguistic view, and some psychologists became wary of linguistics, preferring instead to develop a psychological view of language that was not tied to any specific linguistic theory. As Blumenthal (1987) has observed, there is a historical symmetry in these reactions—60 years ago, linguists such as Bloom-field pulled away from psychology for much the same reasons.

Reber (1987) also points out the growing realization that the two fields were quite distinct in their methodologies. A distinction may be drawn between two intellectual traditions, **rationalism** and **empiricism.** To some extent, this distinction is reminiscent of the familiar one between heredity and environment, or nature and nurture: rationalists emphasize the role of innate factors in human behavior, whereas empiricists stress the role of experience in behavior. But there is another difference between the two traditions that deals with the mode of inquiry. Rational-ists emphasize the use of argument, whereas empiricists favor the collection of data as a means for evaluating hypotheses. For the most part, linguists approach language in a rationalistic manner; psychologists, even those who are sympathetic with the notion of innate factors, favor the empirical method. As a consequence of these differences, ideas tend to be evaluated somewhat differently in the two fields (Pyly-shyn, 1972, 1973; Watt, 1970). In retrospect, it may have been too unrealistic to expect that two disciplines with their own histories and methodologies would mesh very easily.



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| ***Current Directions*** |  |
| Where do things stand now? It is always more precarious to describe events that are |  |
| currently in progress than those well in the past, but it is possible to discern several |  |
| themes of psycholinguistic work over the last 15 to 20 years. One is that the field has |  |
| become more interdisciplinary. In particular, as noted earlier in the chapter, psycho- |  |
| linguistics has increasingly been viewed as a portion of the interdisciplinary field of |  |
| cognitive science, which includes contributions from computer science, philoso- |  |
| phy, neuroscience, and related fields. |  |
| Second, the wave of interest in syntax that occupied psychological interest |  |
| after the Chomskyan revolution has spurred interest in other aspects of language. |  |
| One currently lively area of research deals with how people understand, remember, |  |
| and produce **discourse,** units of language larger than the sentence, such as para- |  |
| graphs and stories. Another is the **lexicon,** or mental dictionary—studies of individ- |  |
| ual words have become much more prominent in the last decade. And both areas, |  |
| while of considerable theoretical importance, have also had practical applica- | S |
| tions. Studies of discourse have provided insights into conversational processes in | N |
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psychotherapy (see Chapter 9), and studies of the lexicon have already been useful in increasing our understanding of how children learn to read (see Chapter 11).

One final theme concerns the ways psycholinguists look at child language acquisition. Interest in innate language mechanisms has been complemented by a resurgence of research of the child’s linguistic environment. Adults speak to children in ways that are phonologically, semantically, syntactically, and pragmatically dis-tinct from their speech to adults, and much research has examined the role of these language lessons in children’s language acquisition.

On balance, psycholinguistics is a more diverse field than the one that existed a few decades ago. Neither psychology nor linguistics is dominated by a single theoretical viewpoint, and the input from other fields within cognitive science has added new perspectives and insights that have been incorporated into this growing field. At the same time, tangible progress has been made in applying psycholin-guistic research to topics such as reading (Just & Carpenter, 1987), bilingualism (Hakuta, 1986), and language disorders (Caplan, 1987). These advances have been made possible by integrating the insights from different disciplines within cognitive science. For instance, Just and Carpenter’s book on reading comprehension in-tegrates linguistic theories of sentence structure, computer simulations of read-ing, and psychological experimentation on eye movements. These results give us reason to believe that interdisciplinary work on language, although it can produce tensions between different approaches, can ultimately be fruitful (see, especially, Miller, 1990).



***Summary***

The history of psycholinguistics can be divided into two periods of interdisciplinary activity separated by several decades of behaviorism. The first period was dominated by Wundt, who presented a cognitive view of language. The behaviorist position then held that verbal behavior can be explained in terms of environmental contin-gencies of reinforcement and punishment. This view was criticized by Chomsky, leading to a second wave of psycholinguistic activity. This period was characterized by an effort to incorporate linguistic theory in psychological research as well as by the view that innate linguistic mechanisms are necessary to explain child language acquisition. Psycholinguistics is presently a more diverse field of study that draws insights and methodologies not only from psychology and linguistics but also from adjacent fields of study.

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|  |  |  |  |  | ***Review Questions*** |  |
|  |  |  |  |  |  |  |
|  |  |  |  | 1. | Identify the two major questions that psycholinguists are interested in. |
|  |  |  |  | 2. | Define semantics, syntax, phonology, and pragmatics. |
| S |  |  | 3. | Distinguish between tacit and explicit knowledge. |
| N |  | 4. | What is a garden path sentence? |
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1. What aspects of linguistic knowledge appear to be disrupted in Wernicke’s aphasia, and what aspects are intact?
2. Summarize Wundt’s theory of language production.
3. Why did behaviorists prefer to talk of verbal behavior instead of language?
4. When did the term *psycholinguistics* arise?
5. What arguments did Chomsky give against behaviorist views of language?
6. How does the field of psycholinguistics currently differ from the field of the 1960s?

***Thought Questions***

1. In sentence (1), our misreading of *deal* forces us to backtrack and do a good deal of extra mental work at the end of the sentence. Why don’t we simply entertain both meanings of an ambiguous word until we know which one is appropriate?
2. If you discovered a person who spoke a language that no one else could under-stand, how would you go about trying to understand what the person was trying to say?



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