

Fundamentals of Psycholinguistics

Eva M. Fernández and
Helen Smith Cairns

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Prologue

For almost 40 years we (first Helen, then Eva) have been teaching 'Introduction to Psycholinguistics' to undergraduate students at Queens College of the City University of New York (CUNY). This book is dedicated to those students and others who come after them.

In 1999 Helen Cairns wrote *Psycholinguistics: An Introduction* (1999, now out of print), which was informed by years of figuring out which pedagogical strategies work and which don't when introducing students to the study of language acquisition and use. Both of us experienced great success teaching with that book, so we have adopted its focus and organization for *Fundamentals of Psycholinguistics*. The present volume offers updated content, given the empirical developments in the field of psycholinguistics in the past decade. We have also incorporated a new orientation triggered in part by our experience of teaching this material to the diverse student body at Queens College: we have woven multilingualism into the basic narrative.

We begin our story by asking what it means to know a language, a question whose answer necessarily includes an exploration of the biological underpinnings of language and its representation in the brain. We then explore the acquisition of language in children and adults. The book then focuses on the production and comprehension of sentences, describing the steps that intervene from the time an idea is born in the mind of a speaker to the moment it is understood in the mind of a hearer. We conclude with an overview of how language is used in discourse.

We have many people to thank for their assistance in the writing of this book. Danielle Descoteaux of Wiley-Blackwell has given us both enthusiastic support and helpful suggestions from the beginning of this project, and we received invaluable assistance from the editorial

and production team. A number of anonymous reviewers provided invaluable suggestions for improvement of the original manuscript. Dianne Bradley, Chuck Cairns, Dana McDaniel, Lucia Pozzan, and Irina Sekerina have provided guidance in a number of areas. We have also benefited from being part of the psycholinguistics community in and around the CUNY Graduate Center and Queens College.

We are fortunate to have students and colleagues with expertise in some of the languages we have used in examples throughout the book. For their help with these, we thank Yukiko Koizumi, Ping Li, Shukhan Ng, Irina Sekerina, Amit Shaked, Iglika Stoynezhka, and F. Scott Walters.

Our primary goal is not to provide our readers with a great many facts about language acquisition and use. As in all healthy empirical fields, data change with ongoing investigations. Instead, we hope to convey to our readers the amazing story of the unconscious processes that take place as humans use language.

Eva Fernández
Helen Cairns

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1 Beginning Concepts

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Psycholinguistics is an interdisciplinary field of study in which the goals are to understand how people acquire language, how people use language to speak and understand one another, and how language is represented and processed in the brain. Psycholinguistics is primarily a sub-discipline of psychology and linguistics, but it is also related to developmental psychology, cognitive psychology, neurolinguistics, and speech science. The purpose of this book is to introduce the reader to some of the central ideas, problems, and discoveries in contemporary

psycholinguistics. In this chapter, we explore key concepts about language that serve to distinguish it from related aspects of human behavior and cognition, and we identify the basic characteristics of language as a system. We also provide a brief account of how psycholinguistics emerged as a field of inquiry.

■ The Creativity of Human Language

A good place to begin is by thinking about some of the unique features of human language. Language is a system that allows people immense **creativity**. This is not the same creativity of people who write essays, fiction, or poetry. Instead, this is the linguistic creativity that is commonplace to every person who knows a language. The creativity of human language is different from the communication system of any other animal in a number of respects. For one, speakers of a language can create and understand novel sentences for an entire lifetime. Consider the fact that almost every sentence that a person hears every day is a brand new event not previously experienced, but which can be understood with little difficulty. Similarly, when speaking, people constantly produce novel sentences with no conscious effort. This is true for every person who speaks or has ever spoken a language. We can extend this observation to every person who uses a signed language to produce and comprehend novel sentences.

This remarkable ability to deal with novelty in language is possible because every language consists of a set of principles by which arbitrary elements (the sounds of speech, the gestures of sign language) are combined into words, which in turn are combined into sentences. Everyone who knows a language knows a relatively small number of principles, a small number of sounds put together to create words, and a large but finite vocabulary. This finite knowledge provides the person who knows a language with infinite creativity. The set of possible sentences for a given language is infinite. Everyone who has ever lived and known a particular language has produced and heard a miniscule subset of that infinite set. Knowledge of language confers upon every person the creativity to produce an infinite number of novel sentences. When that knowledge is shared with others in a given language community, speakers and hearers are able to produce and understand an indefinitely large number of novel sentences.

A second important kind of creativity humans possess is that we can use language to communicate anything we can think of. No other animal communication system affords its users such an unlimited range

of topics. Many mammals have complex sets of calls and cries, but they can communicate only certain kinds of information, such as whether danger is coming from the ground or the air, who is ready to mate, where food is located, and so forth. The philosopher Bertrand Russell once said, "No matter how eloquently a dog may bark, he cannot tell you his parents were poor but honest" (Gleason and Ratner 1993: 9). Language is so flexible that it not only allows people to say anything they can think of; it also allows people to use language for a vast array of purposes. Language is used to communicate, to interact socially, to entertain, and to inform. All cultural institutions – schools, communities, governments – depend upon language to function. Written and audio-recorded language allows people to communicate and convey information – as well as interact and entertain – across vast spans of space and time. It is probably the case that human dominance of the planet has been possible because of the power of human language as a medium for transmitting knowledge (Dennett 2009).

■ Language as Distinct from Speech, Thought, and Communication

Language is the primary communication system for the human species. In ordinary circumstances it is used to convey thoughts through speech. It is a special system, however, that functions independently of speech, thought, and communication. Because one of the main themes of this book is to identify the unique aspects of the human linguistic system, it might be helpful to distinguish between language and the other systems with which it usually interacts: speech, thought, and communication.

Before we discuss those other systems, let us emphasize that here and throughout this book our discussion of human language includes the signed languages of the deaf, unless explicitly noted. Sign languages are just as structured as any spoken language and are just as capable of conveying an unlimited range of topics (as discussed in the previous section). Sign languages also operate under principles distinct from thought and communication. What differs between signed and spoken languages is the transmission mode: gestural for the former and articulatory-phonetic (speech) for the latter.

Speech ought not to be confused with language, though speech is indeed the most frequent mode for transmitting linguistic information. Other modes for transmission include the gestures used in sign language and the graphic representations used in writing. Later in this

chapter (and later in the book), we will address the differences between the signal (speech, signs, written symbols) and the abstract information carried by that signal, and we will demonstrate that producing or perceiving a speech signal is possible and efficient because of knowledge of language. For now, consider the “linguistic” abilities of parrots and computers. Both can produce speech that might sound very human-like (promising new technologies are also able to create gestural sequences, using computer-animated figures, in sign language). But animal or computer-generated speech (or signing) differs from true human language production in one crucial respect: it is not based on knowledge of language as a finite system that yields an infinite set of possible sentences. Notice in particular that parrot and computer speech will fail to be creative in the senses described above.

Another mode for transmitting linguistic information is **writing**, but writing is markedly different from both speaking and signing. Writing systems are invented by people who already use language, so the central difference is that writing is a cultural artifact, while speaking and signing are biological; we will examine this point in more detail in Chapter 3. Writing is always dependent on spoken language, though the connection differs from language to language. In some languages, like English, the written symbols – also called **graphemes** – are linked to the language’s sound system (consonants, vowels); in other languages, like Chinese, the symbols represent words. Writing has had a very different historical trajectory than speech: humans have been using spoken language to communicate for tens of thousands of years, while writing is a relatively new development, with the earliest examples dating back to only about 5,000 years ago. Children learn to speak spontaneously and without explicit instruction, yet require hours and hours of teaching and practice when they are learning to read and write. While all human communities have some form of spoken (or gestural) language, in the majority of the world’s languages a writing system has not been invented. It is important to remember that languages without a writing system are no less complex than their counterparts with standardized writing systems. The complexity and sophistication of all human languages is independent of whether speakers have developed a way to write the languages down.

It is tempting to confuse **thought** and language, because we verbalize our thoughts using language. The distinction between language and thought (or general intelligence) becomes clear when one considers the many kinds of individuals who can think but cannot communicate through language. Among these kinds of individuals are infants and people who suffer from neurological pathologies that have

impaired their language ability. Moreover, many animals can think but cannot communicate using language. In the language pathologies, we observe pronounced mismatches between level of intellectual development and linguistic ability. Specific language impairment (SLI) is not a rare disorder in children without any neurological or motor pathology. In children with SLI, language development lags far behind that of their peers. While there are numerous cognitive deficits associated with children with SLI, their non-verbal intelligence is within normal range and their cognitive deficits are not sufficient to account for their language disorder (Leonard 1998). The flip side of SLI is Williams Syndrome, a genetically based disorder causing severe retardation. Children with Williams Syndrome are deficient in many other aspects of cognition. While some aspects of their language are impaired (Jacobson and Cairns 2009), these children have surprisingly good language skills, in both vocabulary and in the ability to form grammatical sentences (Lenhoff et al. 1997). Pathologies such as SLI and Williams Syndrome, that demonstrate a dissociation of language and general intelligence, are of interest because they demonstrate the independence of language and thought.

The thoughts that people have are distinct from the language (or languages) in which they encode them. Bilinguals can use either of their languages to transmit the thoughts they want to convey. It may be that one of the languages of a given bilingual will have a richer vocabulary for conveying certain thoughts, as in the person who prefers to speak about art in English and about soccer in Portuguese. Perhaps it is more convenient to convey information in one of the two languages; for example, memorizing word lists in one language will facilitate recall in that same language (Cabeza and Lennartson 2005). But neither of these phenomena alters the basic point: when required to, bilinguals are able to convey any thought in either of their languages, or in both. This observation can be extended to all human languages, of which there are close to 7,000 (Ladefoged, Ladefoged, and Everett 1997; Gordon 2005): any thought can be conveyed in any human language. A corollary of this is that any sentence in any human language can be translated into any other, even by ordinary bilinguals, as opposed to experienced translators or trained interpreters. It may take more than one sentence to do the job, and the translation may not be as elegant as the original, but all languages possess an ability to formulate equivalent meanings with precision. Thus, one can think of general intelligence as the system responsible for generating the “language of thought” (Fodor 1975), and this in turn is translated into speech by our linguistic system, which we describe in the following section and, in more detail, in Chapter 2.

Language is the primary communication system for human beings, but it is not the only way to communicate, so language can be distinguished from **communication** in general. Many forms of communication are not linguistic; these include non-verbal, mathematical, and aesthetic communication through music or the visual arts. Frequently, language is not used to communicate or transfer information; language can be used aesthetically (consider poetry or song lyrics) or as a means to negotiate social interactions (consider how *Yo, whassup!* might be the preferred greeting in some contexts but quite inappropriate in others). One of the wonderful things about language is that it can be studied in many different ways. Its social, cultural, and aesthetic characteristics can be analyzed independently of one another. In psycholinguistics, however, researchers are primarily concerned with the underlying structure of language as a biologically based characteristic of humans, derived from the human neurological organization and function; we come back to this topic in greater detail in Chapter 3. Human language is unique to human beings and its general structure is universal to our species. All and only humans have human language. These facts have profound implications for the way language is acquired by infants (see Chapter 4) and for the way that language is produced (Chapter 5) and perceived (Chapters 6, 7, and 8).

■ Some Characteristics of the Linguistic System

Language is a formal system for pairing signals with meanings (see Figure 1.1). This pairing can go either way. When people produce a sentence, they use language to encode the meaning that they wish to convey into a sequence of speech sounds. When people understand a spoken sentence, language allows them to reverse the process and decode a speaker's speech to recover the intended meaning. Obviously, these activities depend upon the speaker and hearer sharing a common language: both must have the same linguistic system for pairing sound and meaning.

The linguistic system that enables sound and meaning to be paired contains a complex and highly organized set of principles and rules. These rules are ultimately the source for the infinite creativity of language because they describe (or generate) any one of an infinite set of sentences. The set of rules that creates sentences in a language is a language's **grammar**, and the words of a language are its **lexicon**. Notice that this way of defining language is very specific about what it means to know a language. Knowing a language involves knowing its