Language in Cognition

Uncovering Mental Structures and the Rules Behind Them

Cedric Boeckx
Praise for Language in Cognition

“Boeckx has a deep familiarity with all of the (very wide-ranging) material he presents, and has done original and important work in several of these areas. He is a lucid and engaging expositor, and is highly qualified in every respect to undertake an enterprise of this nature . . . [He] brings together the right topics, some right at the edge or even at the horizons of research. If I were teaching undergraduate or graduate courses in these areas, I cannot think of a competing text that I would prefer.”

Noam Chomsky, Massachusetts Institute of Technology,
Professor Emeritus of Linguistics

“Boeckx masterfully presents the material, showing why biology must form a core part of the mind sciences, and how the mind sciences, and especially language, can pose new challenges for biology. It is an argument that every serious student of the mind sciences should know, even if they don’t join the choir.”

Marc Hauser, Harvard University

“No one had integrated, yet, the key four notions ‘language’, ‘cognition’, ‘mental’, and ‘structures’ in such a masterly and original way. A wealth of discoveries awaits both the novice reader and the expert. Cedric’s art of revealing deep connections between fields, authors, and ideas has frequently prompted me, while reading this book, to wonder why I had not seen those connections before.”

Massimo Piattelli-Palmarini, University of Arizona

“If Linguistics is the queen of the cognitive sciences, then Cedric Boeckx is her official court biographer. In one short book, he clearly outlines how the developments in linguistics have upended earlier empiricist conceptions of mind and spurred exciting investigations of human evolution.”

Norbert Hornstein, University of Maryland

“Cedric Boeckx provides a wonderful, modern review of the necessity of mentalism, of innate structure for all of the mind, and the role of mathematics in articulating different principles of representation for different modules of mind: a summary of the Chomskyan revolution over the last half century. He brings perspective to the project by connecting the history of philosophy with modern experimentation showing that the ‘generative’ approach to both language and mind has received stunning support in acquisition, processing, and aphasia. It is a superb introduction to the fundamental role of generative thought in modern cognitive science, weaving together psychological, biological, and philosophical perspectives, while acknowledging that fundamental aspects of human nature remain mysterious.”

Tom Roeper, University of Massachusetts Amherst
For Youngmi,

The light at the end of all my tunnels
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The seeds of this book were sown when I joined the department of Linguistics at Harvard University in the Summer of 2003. At the time (much to my surprise) linguistics was not part of the massive Mind-Brain-Behavior initiative on campus and lacked a course fully dedicated to how the study of language bears on cognition. Thankfully, I was given the chance to introduce a new course “Language and Cognition” and was allowed to form ties with psychologists and other members of the Mind-Brain-Behavior community, which eventually resulted in the creation of a (long-overdue) Linguistics/Mind-Brain-Behavior study track. Both sets of interactions, with faculty and students, led me to think deeply about the role linguists could play in the bigger cognitive science community and ultimately helped me structure the material of the present book. First thanks therefore must go to all my students, especially those that took my pilot class on language and cognition in the fall of 2003, and to the members of the Mind-Brain-Behavior community for the warm welcome they offered me, particularly John Dowling, David Haig, Liz Spelke, and Marc Hauser. I am also grateful to Martin Nowak for making me an associate member of his center at the interface of mathematics and biology, through which I learned more about how biologists approach certain problems.

I was fortunate to be asked by Ada Brunstein to turn my thoughts on language and cognition into a book. Although she left the Blackwell team before I could finish a draft of the volume, her support from the very beginning was very inspirational, and I am grateful to her for keeping track of my progress even after she had moved on, and, more generally, for her confidence in the project. The team at Wiley-Blackwell (Danielle Descoteaux and Julia Kirk) worked with me closely to make this a better book, and I thank them, and the authors of the anonymous reviews they commissioned, for all their efforts on behalf of this project. Thanks also to Anna Oxbury for excellent copy-editing.

For several years now I have had the good fortune to be a frequent visitor and close collaborator of various members of the department of linguistics at the University
Acknowledgments

of Maryland. Since its conception (thanks to David Lightfoot) the department has retained its unique focus on the language faculty and its mentalist agenda, offering the sort of oasis that I needed at various points. Readers of this book will quickly realize how much I have been impressed by the works of my College Park friends and their students. Special thanks go to Juan Uriagereka, Norbert Hornstein, Paul Pietroski, Howard Lasnik, Colin Phillips, David Poeppel, Jeff Lidz, Bill Idsardi, David Lightfoot, Stephen Crain, and Rozz Thornton for being so inspirational and supportive.

Thanks must go to Randy Gallistel, Alec Marantz, Gary Marcus, Steven Pinker, and Ray Jackendoff for discussing various issues of cognitive science with me at various points. Ray’s work, in particular, has been a source of motivation, as it always seeks to bridge disciplinary boundaries. Although Ray and I disagree on many issues surrounding the architecture of the language faculty, his 1994 book Patterns in the Mind was the book I originally relied on in my language and cognition class.

My teacher in graduate school, Howard Lasnik, was the first to make me realize how important and relevant chapter 1 of Chomsky’s Aspects of the Theory of Syntax remains 40 years after it was written, and I am extremely grateful for this, as I am for the teaching example he set for me and many others.

Noam Chomsky has been my mentor since day one. Words cannot adequately characterize what this has meant to me. All I can say is that his works were the reason I joined this field, and his constant encouragement has been the main reason I believe I can contribute to it. As for all my projects, Noam kindly listened when I sketched what I wanted to put in this book, and offered valuable advice at every step. I hope the reader will realize how much poorer linguistics and cognitive science as a whole would be without his insights. Morris Halle also deserves my thanks for his unfailing support over the years.

A host of graduate students have provided much needed help. I am grateful to Bridget Samuels, Dennis Ott, Hiroki Narita, Beste Kamali, Suleyman Ulutas, and Terje Lohndal for comments on the penultimate draft. I am especially grateful to Bridget for her editorial help at various stages and to Hiroki for compiling the index.

Special thanks go to So-One Hwang, who was one of the students in my pilot class on language and cognition, and went on to study language and cognitive science in graduate school despite pressure from various sides to settle on medical school or other “safer” career options. Her brave decision was a key motivation for me to write this book, in the hope that making this material available will convince others to do just what she did.

Harvard College provided me with various funds to help me gather material and try out various ways of conveying it to students, which helped tremendously in the completion of this project. Thanks go especially to Georgene Herschbach, Associate Dean of Harvard College for Undergraduate Academic Programs, for her support.

Over the years my friends Adam Szczegielniak, Norbert Hornstein, and Massimo Piattelli-Palmarini have spent countless hours talking with me about linguistics and cognitive science, teaching me many things I did not know, and giving me better ways to convey some of the central aspects of our field. They had a major influence
Acknowledgments

(all too insufficiently and inadequately acknowledged in the text) on this book, for which I am indebted to them.

My final set of thanks goes to the most important force behind this project, and indeed behind everything I undertake in life. My wife Youngmi saw well before me that I could write this book, and made sure I brought the volume to completion. She has provided a perfect mixture of love and support to make the writing of this book as enjoyable as any author could hope for. For this and the countless other things she does for me, I dedicate this book to her, in loving gratitude.
Serious fields of inquiry resist simple characterizations and ready-made definitions. Cognitive science as a whole, including all its subfields, such as linguistics, is no exception. Academic terms can also be quite misleading: one should not assume that linguistics deals with language just because the two terms are etymologically related; after all, who still thinks that geometry deals with land-measurement (the literal translation of the Greek term \textit{geometria})?

At its most general level of description, the enterprise we call cognitive science is a massive effort to construct a scientific understanding of mental life,\textsuperscript{1} the product of the brain – arguably the most complex object in the known universe.\textsuperscript{2} Although some of the leading ideas reach back to the rise of modern science, the time of Galileo, Descartes and Newton (some ideas even go further back to the Ancient Greeks), the efforts to construct a genuine scientific theory of mental life began in earnest only 50 years ago under the impetus of people like Noam Chomsky, Morris Halle, George Miller, and Eric Lenneberg. Not surprisingly, after only a few decades of intensive research, our ignorance overall remains quite profound, but there are a few areas where significant progress has already been made. One such area concerns our capacity to develop a language, and this is the area I will focus on here, touching on other cognitive domains whenever the opportunity arises. The results achieved in the domain of language have been made possible by the adoption of what can be called the biological view of language, in which the problem of making sense of our human capacity to acquire and use a language is conceived of as being on a par with how scientists would study echo-location in bats, the waggle dance in bees, and the navigational skills of birds.

The biological approach to language will enable me to paint one of the most interesting, insightful, and coherent pictures in cognitive science we currently have, and place it right at the heart of one of the best-articulated theories of mind (and because language is unique to our species, of what it means to be human) ever produced.
I should state right away, to avoid bitter disappointments in my readers, that we will treat language (and other cognitive capacities of ours, like music, mathematics, vision, etc.) as a natural object, fit for scientific inquiry. We will not focus on all the ways in which we use language (and the rest of our minds) in daily interactions with others. Instead we will focus on our unconscious knowledge of language, that which gives us the ability to form an infinite range of expressions, and at the same time exclude countless other ways of expressing ourselves. This focus of investigation turns out to be the only way to make progress. If you know a little bit about the history of the more established sciences (physics, chemistry, biology), this should not surprise you. The way science progresses is by first acknowledging the complexity of the world, and immediately admitting the futility of attempts to provide a full description of it. Once humbled by this recognition of the vastness of the problem, the best way forward for the scientist is to extract a small corner of the problem, make a few simplifying assumptions, and attempt to gain some understanding of that small part of the world. Science – like everything else, I guess – works best when it deals with simple things. It’s no use to ask questions we will never answer, even if these are the first questions that come to our ever-curious minds. Becoming a scientist is a subtle development that requires shedding our childish stubbornness to only ask questions we want to know the answers to, while at the same time preserving the childlike attitude that lets us ask questions that most adults find uninteresting.

My main goal in this book is to awaken your curiosity by pointing out a few facts that I suspect you never thought about, by asking questions that will cultivate your sense of wonder, and by suggesting a few answers that will whet your intellectual appetite. For this reason I will put less emphasis on results achieved in cognitive science and focus on the questions that have proven fruitful in making these results within reach. This book should definitely not be seen as providing a sum of all we know about the mind; it is best characterized as offering a point of entry into fascinating territory, a set of perspectives from which to approach certain topics. If you are like me, you will find some of the questions cognitive scientists ask simply irresistible. By the end of the book, you will be able to turn to more advanced material that will explore these questions in greater detail. This, I find, is the most appropriate way to introduce students to a scientific discipline. Science, by its nature, involves a constantly changing and developing body of knowledge. Today, perhaps more than ever, that knowledge develops and changes very rapidly. Because of this fact, many recent educational initiatives have stressed the need for science teachers to develop ways to help students understand the practice of scientific inquiry, and not just its current results, which may well be outdated by the time an introductory text hits the bookstores’ shelves, especially in the case of young scientific disciplines like cognitive science. As educators, we want students to avoid falling into the trap of a passive dependence on “experts,” and we want them to develop a critical mind. To do this, it is imperative that they come to understand how scientific knowledge is acquired, and how to derive it themselves.
The skills that everyone deems important in the conduct of scientific inquiry (pattern recognition, what-if reasoning, hypothesis-testing, and so on) are largely independent of content, in the sense that they can be illustrated using examples from any scientific domain, but I agree with many that some domains appear to offer advantages as educational media. As a few cognitive scientists have pointed out,³ the study of human language as a biological object is in many respects a great instrument for the teaching of science.

Linguist Richard Larson⁴ has summarized the main arguments for why this is the case, and I want to reproduce them in his terms here:

1. There is the sheer accessibility of the subject matter, especially data; language is all around us, so data can be collected easily. At least the basic data does not require high-level mathematics or complex tools. As a result, students can move very quickly from data collection to scientific questions and analyses.
2. There is the intrinsic interest of the subject matter. Every popular book about linguistics starts off by pointing out that everyone is interested in language, and rightly so. As we will see later on in this book, there is good evidence that children are biologically built in such a way that they can’t avoid paying attention to language; our biology makes us, in some sense, natural linguists. People love to manipulate language, look at different ways of expressing various thoughts, coin new terms, etc. Once carefully monitored by the teacher, this natural interest can turn into real scientific investigation at no cost.
3. There are certain social factors that contribute to make linguistics an ideal point of entry into science. As Larson notes, the fact that its data can be easily gathered largely means that linguistics is fully accessible to students with physical limitations that might otherwise present a significant barrier to learning (blindness, gross motor impairment, etc.). Furthermore, I think Larson is right that linguistics is a “gender neutral” domain. Being a young discipline, linguistics lacks some of the stereotypes that define who is a canonical “language scientist.”
4. Linguistics is a natural “bridge” discipline between the sciences and the humanities. Because its subject matter – language – is at the very center of many areas in the humanities, linguistics offers an excellent way to appeal to students not otherwise considering science as an area of study, and to introduce them to the principles of scientific method and reasoning.

In addition, as linguist Ray Jackendoff has observed,⁵ the reasons why many schools virtually gave up on teaching grammar no longer apply when language is studied as part of cognition. As we will see in subsequent chapters, modern linguistics as a sub-branch of cognition moves away from prescriptive grammar and its arbitrary rules of “proper speech”; it provides much better descriptions than traditional non-starters like “nouns are names for persons, places, or things” (how about nothing or redness?), it recognizes socially disadvantaged students’ own ways of speaking as valid subjects for grammatical description (African American English is just as
Prologue

good a medium to probe cognition as any other English variety), it highlights the
importance of studying other languages, it makes short shrift of the claim that chil-
dren will get confused if they try to speak more than one language (look around
the world: multilingualism is the norm rather than the exception), and it provides
a good illustration of the well-foundedness of and the subtle questions raised by
evolutionary theory in biology.

For all these reasons (illustrated in detail throughout this book), I think cognitive
science, with linguistics at its center, ought to be recognized as an essential part of
the curriculum.

Although the book is primarily aimed at students with little or no background
in the subject matter, I have provided extensive references in the Notes section at
the end of this book, which I hope will make it possible for the book to function
as a useful guide for more advanced students who may want a “big picture” pre-
sentation, so easily obscured by technical aspects of the various subfields involved
(aspects that are, of course, necessary, but never sufficient). I certainly encourage
curious students to track down as many of the references I provide as they can.
I also encourage them, as well as the instructors who adopt this book for courses,
to use the study guide at the end of this book and assign readings listed there as
supplements, like fine wine is supposed to accompany a good meal. The users
of this book should find enough flexibility in the material presented here to suit
various needs, and cater to a variety of audiences.

To conclude this brief overview let me emphasize that in presenting the material
that follows I make absolutely no claim to originality. The exciting discoveries reported
on here, the guiding intuitions, the questions asked, etc., are not mine. All the credit
should go to the authors mentioned in the bibliography. My task was merely
organizational and journalistic: I have selected material from various disciplines that
seem to me to shed light on our linguistic capacity and the nature of cognition,
and to offer complementary methods to investigate a coherent set of questions.
It stands to reason that in selecting material I am offering a rather personal view
of what cognitive science is and what cognition may be. I am presenting what I
take to be our most promising hypothesis regarding mental life, but I have no
doubt that others would have made different choices. Throughout I have favored
intellectual coherence over exhaustive coverage, and often relegated alternatives to
endnotes. I encourage readers to track down these competing viewpoints, make sense
of them, and improve on the perspective presented here.

Because my task was merely one of selection, collection, and organization, I
have inurred many intellectual debts, and I am grateful to the authors of all the
works cited in the bibliography for giving me such an abundance of excellence.
I am especially indebted to Noam Chomsky for providing the guiding ideas and
some of the best results in this book. Yes, this book is unabashedly Chomskyan
in character, in the same way that introductions to evolutionary biology must
be unabashedly Darwinian. I have been impressed by how much can be gained
by asking the sort of questions Noam Chomsky asks, and I hope the reader will
be equally impressed and motivated to ask them. I find the Chomskyan line of
inquiry the best antidote against our denial of human nature and against our own arrogance. I am also indebted to Alec Marantz, Colin Phillips, David Poeppel, Marc Hauser, Tecumseh Fitch, Liz Spelke, Paul Pietroski, Juan Uriagereka, and Massimo Piattelli-Palmarini, whose works have provided much of the ideas presented in Parts III and IV of this book, the most interdisciplinary parts of the volume. The works of the late David Marr, Jerry Fodor, Randy Gallistel, Charles Yang, Ray Jackendoff, and Gary Marcus have also been extremely valuable in preparing various chapters of this book.

I should also point out that although the book ranges over a broad spectrum of ideas, I am ultimately a tradesman, not a polymath. What I know about neuroscience, biology, and cognition in general is what lies at their intersection with human language. If some readers of the book feel that I have failed to report on some discoveries that they deem essential, I apologize in advance.

Throughout the book, I focus mainly on issues involving syntax, the study of sentence structure. This should not be taken to imply that syntax is more important or more central than other areas of language like phonology (sound structure) or morphology (word structure). It merely reflects the fact that I am first and foremost a syntactician, and also the fact that syntax is one area of language where enough of the pieces are in place to allow us to seriously consider how they all fit together, and to identify what is still missing. No doubt, other subfields of linguistics would have served equally well for purposes of illustration at various points in the book, and instructors that are less enamored with syntax than I am should feel free to substitute their own favorite topics.

With all these warnings in place, I now ask the reader to turn the page and reflect on the problems and mysteries of our own human condition.
PART I

Ever Since Chomsky
1

Mind Matters: Chomsky’s Dangerous Idea

1 Introduction

If you have ever crossed Harvard Yard, as I have done repeatedly on my way to teach the class on which this book is based, you must have seen visitors gathered around the statue of John Harvard. The statue is known as “The statue of the three lies.” The inscription on the stone supporting the statue reads: “John Harvard, Founder, 1638.” In fact, the model for the statue used by the sculptor (Daniel Chester French) was a student, since there was no portrait of John Harvard available. Equally misleading is the title “founder.” Harvard College was not founded by John Harvard; it was named after him. And the College was founded in 1636, not 1638.

It must have been on one of those occasions when I passed by the statue that I toyed with the idea of calling this book “Chomsky’s Dangerous Idea.” As is the case with the Harvard statue (or, for that matter, with terms like the Holy Roman Empire, which, as Voltaire once shrewdly remarked, was neither holy, nor Roman, nor an empire), the phrase “Chomsky’s dangerous idea” wouldn’t be accurate, but would nonetheless capture the essence of what I am trying to do in this volume. Although the book will not deal with just one idea, and it won’t always be Chomsky’s, and – I assure you – none of the ideas discussed here are dangerous, it is nevertheless quite correct to say that the central argument developed in the following chapters, shorn of all the qualifications and additions that many researchers have brought forward, goes back to Noam Chomsky. Furthermore, Chomsky’s central claim regarding language remains, in the eyes of many, quite controversial.

What’s this central idea? It will take me a book to characterize it properly, but for now, let me try to state it in simple terms. We, as human beings, come equipped biologically with the ability to develop a language, to make linguistic sense of the noise around us. This ability is both extremely rich in its potential and severely constrained, in ways that cannot be understood by simply looking at properties of
the world around us in which we use language. It requires a *mentalist* stance: a readiness to posit principles of the mind that we, as humans, bring to the task of language acquisition and language use. Since the very beginning of his career, Chomsky has urged us to look at the mind in a way parallel to how biologists study the heart, the kidney, or the immune system: as a complex organ of the body, where nature and nurture interact to give rise to some of our most distinctive traits as a species. (For this reason, the approach to language Chomsky advocates is often, and quite appropriately, called *biolinguistics*.4)

“Chomsky’s dangerous idea” could also serve as an allusion to Dan Dennett’s popular book entitled *Darwin’s dangerous idea*.5 This, too, would be apt, as I happen to think that there are quite a few interesting parallelisms between Chomsky and Darwin. Few scientists have had such a lasting influence on their respective disciplines as these two. Both are extremely controversial figures: They are either reviled or revered (much to their dismay). Both reoriented their own respective fields by articulating a vision that promises to yield genuine scientific understanding and shed light on some of the most difficult questions ever raised. Both showed an impressive ability to revise old ideas, and to turn these ideas into testable scientific hypotheses. Both have advocated theories that, upon reflection, make eminent sense. Indeed, many a scientist would regard Chomsky’s view on language and Darwin’s view on life as virtually the only game in town – the very best we have in these domains of inquiry. And yet, in spite of, or perhaps because of the simplicity of their views, quite a few researchers resist them, and they still require lengthy defenses and expositions.6 Finally, like Darwin, the implications of Chomsky’s views for human nature, though implicit in the work that made him famous, only became clear in subsequent publications.7

In the end I decided against using “Chomsky’s Dangerous Idea” as the title for this book. I wanted something less personal, and more immediately transparent, something with key terms like “language,” “cognition,” “mental,” and “structures,” to serve as *leitmotivs*. These will be the real characters in my story. My overall aim is to convince you that the study of human language offers a unique vantage point from which to understand human nature (“languages are the best mirrors to the mind,” as Leibniz once asserted), from which to do cognitive science, from which to dig deep into what William James called “the science of mental life.”9 Linguistics, as practiced along Chomskyan lines, is an essential player in the elaboration of a genuine “Science of Man.”10

I would be happy if by the end of the book I have managed to convey to the reader some feeling for what is without a doubt one of the most important and exciting paths of discovery that our species has embarked upon: the search for the underlying principles that both govern and constrain what our brain does (i.e., what our mind is). It is an avenue of research that many have explored, but where progress has been very slow. Cognitive science as we know it today is a relatively young science. It is only in the past 50 years that substantial advances have been made, and much – so much! – remains to be discovered. To the novice, this can be both a source of frustration, and excitement. Frustration because even some
of the most basic questions are still up for grabs, leading to the impression that
the foundations are not firm, that too much is changing too rapidly, that in the
end very little is known, and that much has to be unlearned on a frequent basis.
(These are impressions that I have invariably encountered in my teaching, and that
I will try to dispel. I’m introducing them now to urge the reader to recognize them
and resist them.)

Excitement because even some of the most basic questions are still up for grabs,
leading to the impression that fundamental discovery could come from one’s own
research, that the missing link is within reach, and that this is history very much
in the making. (These are impressions that I have invariably encountered in my
teaching too, and that I will do my best to cultivate throughout our journey. May
the reader never abandon them in the face of difficulty!)

2 I-language

Using language to study the human mind is a very old practice. Since at least
Descartes in the modern era (but no doubt, the practice goes back much further),
it has been standard to treat language as providing privileged access to some of the
deepest secrets of the mind. Unfortunately, the view of language that is required to
probe cognition is quite different from our common-sense notion of language, and
the way we experience it on a daily basis. We tend to think of language as something
that is hard to acquire, that varies from place to place, that is inextricably linked
to social norms and culture, and so on. And yet I will argue, following Chomsky,
that if we are to make progress in the domain of cognition, language must be
understood as something that is acquired effortlessly, that is shared by the entire
human species and fundamentally the same across cultures, and that is radically
dissociated from social norms. This, I realize, will be hard to swallow at first, and part
of this chapter will be devoted to rendering this view somewhat plausible. In an
attempt to make this change of perspective conspicuous, Chomsky has suggested
we distinguish between language as seen from a social/cultural perspective (what
he calls “E(external)-language”), and language as seen from a cognitive perspective
(what he calls “I( internal)-language”). Unless otherwise indicated, whenever I use
language, I mean “I-language.” (This is what the word “in” in the title of the book,
Language in Cognition, is meant to emphasize.)

I ask the reader to keep the distinction between I-language and E-language
firmly in mind because invariably, when I find myself in a casual setting and I
mention the fact that I study linguistics, I am asked how many languages I speak.
To a linguist like myself, this question is distinctly odd, for many of us (myself
included) think there is only one human language on the planet. This is not to
deny that there exist many linguistic variants (languages, dialects, etc.), but these
are not the primary objects of inquiry to the linguist/cognitive scientist. Asking
a linguist how many languages she speaks/ knows is a bit like asking how many
numbers a mathematician knows, or how many species a biologist knows, or how many molecules a chemist knows.

A linguist, to the extent that she is interested in finding out how some aspects of the mind work, tries to elucidate the mental capacities in virtue of which humans are able to produce and understand utterances in any (human) language variant. Linguistics, in this sense, is like trying to discover the laws of (some aspects of) the mind. Like any other scientist, the linguist will have to learn to go beyond the multitude of languages to get at the fundamental principles that make linguistic experience possible. From this perspective, specific human languages (English, Navajo, Japanese, . . .) are used as tools, convenient entry points to study something more fundamental, the same way biologists study rats, fruitflies, and worms. Here the linguist has the distinct advantage that languages are literally all over. We are surrounded by language(s). For this reason, linguistic facts often appear to be “cheap.” There is no need to deal with dangerous equipment, flammable substances, etc., to get something to work on. But linguistics is not blind data collection. It is an empirical science. One must be as careful with linguistic data collection and interpretation as in a science lab. And herein lies the rub. Many of the data that linguists deal with pertain to aspects of language that we use instinctively, and that we therefore are unaware of. Grammar classes in high school don’t dwell on them, and they are not discussed in popular newspaper columns about language. And because our mastery of these facts is so effortless, we tend to think that the explanation for these facts must be straightforward and intuitive. But as George Gershwin put it, it ain’t necessarily so.

3 A Few Illustrations

Consider the fact that you can readily recognize ambiguous sentences like these (often, contextual information, or special intonation favors one reading, but given enough time all native speakers are able to detect the ambiguity):

(1) Flying planes can be dangerous.\(^{13}\) (either planes that fly are dangerous, or flying these planes is dangerous)

or

(2) Mary hit the man with the umbrella.\(^{14}\) (either the man had the umbrella, or Mary used the umbrella to hit the man)

or

(3) John can ride a bike. (either John is allowed to, or he has the ability to, ride a bike)
Data like these are so mundane that the richness they contain hardly gets noticed. For instance, did you ever pause to marvel at the fact that a sentence like (4) is only two-way ambiguous, and not four-way ambiguous?

(4) John can ride a bike, and Mary can ride a bike, too.

On the face of it, you might have expected that putting two two-way ambiguous sentences together (John can ride a bike; Mary can ride a bike) would give rise to a four-way ambiguity, but somehow, it doesn’t. Something forces you to understand Mary can ride a bike in the same way you understand John can ride a bike when the two sentences are combined into one. And no context, no matter how contrived, will make this fact go away. You must interpret members of a conjunction in parallel. Let’s call this the Parallelism Constraint.

If you are like my students, you may be tempted to say that the Parallelism Constraint is due to the presence of the words and and too. But how about (5)?

(5) John can ride a bike, but Mary cannot ride a bike.

Here too, you have to understand the meaning of the word can in the same way in both sentences. But it’s not clear what word to blame this constraint on this time. I’m sure you have never thought about this fact before (unless you met a linguist at a cocktail party, and he or she tried to impress!), and you were never told how to interpret ambiguous sentences. Facts like those just discussed constitute tacit (unconscious) knowledge: knowledge that the great linguist Morris Halle aptly called “unlearned and untaught.” It’s just part of what it means to be a native speaker of a language. (Here and so often elsewhere in the book, I will use English examples to illustrate the points I want to make, but this is just a matter of convenience. Similar examples could be found in any other language of the world.)

The extent of your tacit knowledge of language does not stop here. We have, in fact, barely scratched the surface. But, if you think that the ability to understand ambiguous sentences is a purely linguistic ability, think again. You can, for example, readily construe the cube to the left of Figure 1.1 from two perspectives: (a) and (b).
And here too, juxtaposing two ambiguous objects appears to demand a parallel interpretation. You must see the cube on the left in Figure 1.2 from the same perspective you see the cube on the right. In the same vein, you may have felt in cases like (4) and (5) that the sentences contained redundant material, and you may have felt to desire to shorten them like this: *John can ride a bike, and Mary can, too; John can ride a bike, but Mary cannot.*

![Figure 1.2 Viewing objects from the same perspective](image)

This ability to understand material that is not explicitly present is also part of your tacit linguistic knowledge, but it shows up elsewhere in cognition. For example, everyone I have met interprets the visual object in Figure 1.3a as a white strip covering a black strip. You would, I’m sure, be surprised, if there was nothing underneath the white strip; that is, if you found what is in Figure 1.3b. You would be equally surprised if there was something as weird as what is in Figure 1.3c.

![Figure 1.3 What’s underneath the white strip?](image)
underneath the white strip. This shows that your visual system imposes severe con-
straints on object construal. This is true of your linguistic system too. You would
be surprised if I told you that *John can ride a bike but Mary cannot* means some-
thing like “John can ride a bike, but Mary cannot drive a car.”

4 A Few More Notions

Linguists and other cognitive scientists are trying to figure out what these constraints
on interpretation are, how exactly they work, and why they should be part of our
mind. In so doing, linguists practice what is known as descriptive grammar, as opposed
to prescriptive grammar. Prescriptive grammar is what people tend to associate with
the term “grammar.” It refers to a normative practice that seeks to dictate proper
linguistic usage. I guess you can say that this is the sort of thing that everyone ignores,
unless they have to draft an official letter, make a public address, and so on. Prescriptive
grammarians will tell you never to end sentences with a preposition, and you’d be
right to wonder what those guys are talking about [sic]. Descriptive grammarians
do not impose artificial rules that no one follows; they instead focus on normal
usage, and try to figure out the underlying capacity that is responsible for what
is said, and how it is interpreted. In so doing, descriptive grammarians also focus
on what is sometimes called “negative” knowledge, or knowledge of negative facts:
things that speakers never do. We already saw a negative fact in the context of the
Parallelism Constraint (you cannot interpret sentences like *John can ride a bike and
Mary can too* as four-way ambiguous). Here is another. Whereas native speakers
of English commonly end their sentences with prepositions (*What did you say that
Mary was talking about?*), they never say things like *What did you say about that
Mary was talking?* For some reason, it is OK (cognitively/descriptively, but not
prescriptively) to leave a preposition dangling at the end of a sentence, but it is not
OK (cognitively/descriptively, and – irrelevantly – prescriptively) to leave a preposi-
tion dangling in the middle of a sentence. Prescriptive grammarians never worry
about such negative facts (since no one ever does it, there is nothing to prohibit),
but descriptive grammarians use them all the time to discover the limits of linguistic
knowledge, the boundaries of our language faculty.

In some cases the limits will not be strictly linguistic, they will be shared with
other cognitive abilities. This is arguably the case for the Parallelism Constraint.
In such situations, the constraint will be said to be part of our language faculty
broadly construed (*Faculty of Language Broad*, or FLB). But in some other cases,
the negative knowledge will be strictly linguistic (part of our language faculty
narrowly construed; *Faculty of Language Narrow*, or FLN). (Teasing apart the
contributions of FLN and FLB is one of the most exciting ways of figuring out
how the mind works. For this reason I will devote a whole chapter (Chapter 12)
to the distinction.)