

# 1

## What is I-language?

<b>1.1 Jumping in</b>	<b>5</b>	<b>1.5 I-language</b>	<b>13</b>
<b>1.2 Equivalence classes</b>	<b>8</b>	<b>1.6 Some implications of</b>	
<b>1.3 Partial reduplication in</b>		<b>mentalism</b>	<b>14</b>
<b>    Samoa</b>	<b>9</b>	<b>1.7 Summing up</b>	<b>15</b>
<b>1.4 Mentalism</b>	<b>12</b>	<b>1.8 Exercises</b>	<b>17</b>

In the summer of 1991 Charles lay in an Istanbul hotel room burning with fever, 15 percent lighter than his normal weight. In the other bed lay his friend Paul, who had just golfed his way to an MBA, also hot with fever, the inside of his mouth covered with blisters.<sup>1</sup> Paul had paid for the room on his credit card, so it was several steps above the dives they had been staying in. He had gotten the name of a doctor in Istanbul from his mother back in Kansas and was now on the phone with the hotel receptionist, who, given the price of the establishment, spoke excellent English. In vain, Paul was asking her to find the number of Dr. Ozel—“That’s right, it’s o-z-e-l, Ozel.” It wasn’t happening.

From the depths of his delirium and intestinal distress, Charles finally found the strength to call out in a hoarse voice, “Tell her to try o with two dots,” referring to the Turkish letter ö, so *Özel*. Much to Paul’s surprise, she found the number immediately. “Reiss, that’s amazing—how did you know that?” Paul asked, fully aware that Charles did not speak Turkish, and also

<sup>1</sup> Charles had recommended that he rinse his mouth in the alkaline waters of Lake Van, but that hadn’t helped at all.

annoyed with himself for having spoken to him civilly, since they were at one of the points in the trip when they wanted to strangle each other. “If you had listened to me on the bus ride from Bucharest to Istanbul, instead of obsessing about what pork products we would sample on the passage through Bulgaria, you would know,” Charles replied brightly, suddenly energized by his ability to gloat.

So, what had Charles tried to explain on that bus ride, in the thirty seconds before Paul’s eyes glazed over? How *did* he know? The answer lies in Charles’s understanding of vowel patterns in Turkish, an example of a most wonderful linguistic phenomenon called vowel harmony. Understanding of Turkish vowel harmony happened to have a practical value in this situation, something neither of us has ever again experienced, but its real beauty lies in the fact that it reflects some of the deepest workings of the human mind.

Our goal in this book is to get you to accept this rather grandiose claim about the vowel patterns in Turkish words. We will introduce many new ideas, some of which will initially strike you as ridiculous. However, we will try to convince you with logical arguments, data-based arguments from both familiar and less familiar languages, and also appeal to general scientific methodology.

Building on linguistic phenomena, our discussion will touch on some of the most longstanding and difficult issues in philosophy including the following:

### 1.1 Big philosophical issues we will address

- The Nature–Nurture debate: How much of what we are is innate and how much depends on our experience?
- What is knowledge? How is it acquired?
- What is reality?
- Whatever reality is, how can we get access to it?
- Is there a principled distinction between mind and body?
- How can our study of these issues bear on social questions and educational practice?

Given both the incomplete nature of all scientific inquiry and the limited space we have, we will not propose complete and final solutions to all these problems, but we do hope to offer a real intellectual challenge in a fascinating domain. This should lead you to experience frustration . . . confusion . . . annoyance . . . and ultimately (we hope) . . . understanding and insight and pleasure.

## 1.1 Jumping in

Not only the average person but also experts in fields like psychology, engineering, neuroscience, philosophy, and anthropology are willing to make proclamations, sometimes in the pages of respected scholarly publications, about language—its evolution, its acquisition by children and adults, its relationship to thought, and so on. But there is a question that is prior to all of these issues, namely *What is language?* We aim in this book to provide you with a deeper appreciation of the nature of language than that of the average academic in the fields listed above.

This book is not a catalogue of cool facts about language, nor is it a report on the exciting findings of modern linguistics over the past fifty years—there are several excellent books on the market for those purposes. Instead, our strategy is to get you to think about language the way linguists do. With this in mind, we'll jump right in with some data (not Turkish—we'll come back to that later), before we even explain the somewhat obscure title of the book. We won't even tell you what “I-language” means yet. By the end of the chapter, we hope you will have an appreciation of the term that is much deeper than you would have if we just handed you a definition.

Let's begin with a simple example, the relationship between singular and plural nouns in Warlpiri, an Australian Aboriginal language.

### 1.2

#### Warlpiri plurals

SINGULAR	PLURAL	
kurdu	kurdukurdu	child/children
kamina	kaminakamina	girl/girls

In English, we form the plural of most nouns (but not all—look at *children*) by adding a suffix to the singular, as in *girl-s*. As you can see, it looks like the plural of a noun in Warlpiri is formed by repeating the singular. This is a real plural—*kurdukurdu* does not just mean “two children,” it means “children” and is used to denote two or a hundred children—any number greater than one. You can probably guess the plural form of the word *mardukuja* “woman”—it is *mardukujamardukuja*.

Processes of word formation that involve repeating material from a basic form (all or just part of the basic form) to create a derived form are called processes of reduplication. Reduplication processes are very common in the languages of the world with a variety of meanings, but are not productive in English.

Even with this simple example, we can learn a lot about the nature of language:

- 1.3 Some lessons about language based on Warlpiri plurals
- a. Some aspects of language are simply memorized—it is necessary to remember certain arbitrary links between sound and meaning, for example, that *kurdu* means “child” in Warlpiri but *child* means “child” in English.
  - b. Some aspects of language involve rules or patterns. Your ability to correctly guess the Warlpiri form for “women” shows that the form can be generated by a rule.
  - c. If there are rules, they have to apply to some kind of input and produce some kind of output. The Warlpiri plural formation rule highlights an important aspect concerning the nature of rules of language—the units of language, the elements that rules affect, can be quite abstract. We cannot give a definite answer to the question “What sound corresponds to the plural in Warlpiri?” because the answer varies depending on context. We will illustrate this point by discussing the rule in more detail below.
  - d. The rules apply to elements that are only definable in linguistic terms—for example, the Warlpiri plural rule applies to nouns, not verbs, and the noun-verb distinction is a purely linguistic one.

The first item is fairly obvious, although the arbitrary nature of the sound-meaning links of human language was only really fully appreciated about one hundred years ago by the Swiss linguist Ferdinand de Saussure, the inventor of structuralism. The point is just that one of the requirements for language is memory. A system, device, organism without memory cannot generate Warlpiri or English plural forms from singulars, since it has no way to store the singulars.

The second item will be dealt with again and again in this book. A Warlpiri speaker has to memorize that *kurdu* means “child”, but not how to say “children,” since *kurdukurdu* is generated by a rule that repeats any noun in the singular form to make a plural. Of course the rule or pattern itself must be memorized, but this is an even more abstract kind of information than that required for memorizing words.

This discussion of reduplication illustrates a property of language central to our approach: languages are *computational* systems. This term scares some people, but all we mean by it is that language can be analyzed in terms of explicit rules that apply to symbols. Given an input symbol and a rule that applies to that symbol, we can say what the output form will be. The symbols and rules are different ones than those that are familiar in

math, but the goal of a computational approach is to make them as explicit as the formulas of math or the mathematical formulas used in sciences like physics or chemistry.

To illustrate the third item, let's compare Warlpiri to English, although we will simplify greatly. In English, we can say that the rule for pluralization is something like “If a noun is of the form  $x$ , then the plural of that noun is of the form  $x$ - $s$ ” as in *girl*- $s$ . In Warlpiri, the rule must be something like “If a noun has the form  $x$ , then the plural of the noun is of the form  $xx$ .” Both the English and the Warlpiri rules show that the rules of language must refer to VARIABLES. A variable is a kind of symbolic placeholder that can change in value each time a rule is applied. This is particularly clear for Warlpiri—the plural marker is not a constant “piece” of sound, as it apparently is in English regular forms, but rather a copy of the noun. Sometimes the variable has the value *kurdu*, sometimes *kamina*, etc.

Variables in this sense are just like the variables of math—in a function like  $y = 2x + 3$ , we can plug in different values for the variable  $x$  and derive values for the dependent variable  $y$ . If  $x$  is set equal to 4 then  $y = 2 \times 4 + 3$ , which is 11; if the variable  $x$  is set equal to 5, then  $y = 2 \times 5 + 3$ , which is 13; and so on.

In contrast to the Warlpiri rule that tells us to repeat the singular in order to generate the plural, the English rule for regular plurals takes the variable corresponding to a noun and adds a constant  $-s$  ending.<sup>2</sup>

If we really want to make the parallel to math explicit, we can think of pluralization as a function mapping members of the set of singulars (the domain of the function) to a set of plurals (the range of the function). In Warlpiri, the pluralization function is something like

$$1.4 \quad f(x) = x \wedge x$$

where the variable  $x$  is drawn from the set of singular nouns and the symbol  $\wedge$  denotes CONCATENATION— $a \wedge b$  means “ $a$  followed by  $b$ .”

In English, the function would require a variable drawn from the set of singulars and a constant corresponding to the suffix:

$$1.5 \quad f(x) = x \wedge s$$

<sup>2</sup> As we said above, we are oversimplifying, but probably only those readers who have taken a linguistics course know what details we are glossing over. If you do not, you are better off, since you can concentrate on our point about variables and constants.

Concatenation is not the same as mathematical addition or multiplication, but it may still be useful to draw a parallel in math. A function like  $f(x) = x + 3$ , where the output of the function, typically shown on the  $y$ -axis of a graph, depends on the value assigned to the variable  $x$  added to a constant, 3.

It is probably apparent that the notions of rules and variables are intimately related. By virtue of the fact that they refer to variables, rules apply to classes of entities. That is what makes the rules productive. The Warlpiri rule that says “Repeat the singular  $x$  to make the plural  $xx$ ” applies not just to *kurdu*, but to *kamina*, *mardukuja*, and in fact to all nouns.

With respect to item (1.3d.), note that nouns are just one of the categories that linguistic rules operate on, but all linguistic categories are just that—linguistic. They cannot be reduced to categories of physics, biology, psychology, or any other domain. The category noun cannot be defined as “a person, place, or thing”, despite what your English teacher told you. We’ll come back to this later.

## 1.2 Equivalence classes

Let’s elaborate on the notion of “variable” used above. The various nouns of Warlpiri have different pronunciations, and yet we are able to treat them all as members of a set or class of elements that are all subject to the same rule. In other words, any noun can stand in for the variable  $x$  in the Warlpiri rule to give the output  $x\hat{\ }x$ . One way of understanding this is that the rule ignores the differences among various nouns and treats them all as members of the abstract category or class “noun.”

However, there is another kind of abstraction that is necessary before we even can refer to the nouns in this class. If five Warlpiri speakers utter *kurdu*, the actual sound will be different coming from each speaker—there are differences in the shapes and masses of their vocal apparatus, so that an old man and a young child will produce tokens of *kurdu* with very different physical characteristics. And yet someone hearing all five speakers can perceive *kurdu* in each case.

Even more fundamentally, each pronunciation of *kurdu* by even a single speaker will be physically distinct with respect to the sound wave that reaches a listener, due to differences in ambient noise, the moisture in the speaker’s vocal tract, variability in muscle control of the speech organs, etc.

We will come back to these issues in several subsequent chapters, but what they illustrate is a point made about eighty years ago by the great linguist and anthropologist Edward Sapir: “No entity in human experience can be adequately defined as the mechanical sum or product of its physical properties.” In modern parlance, human perception and cognition depends upon equivalence classes—symbolic representations that may be derived from experience (tokens of a word heard) or somehow manifested in behavior (tokens of words uttered), but whose relationship with actual experience is quite complex. As Sapir noted “it is notorious how many of these physical properties are, or may be, overlooked as irrelevant” in a particular instance. In Chapter 2, we will illustrate these ideas with both linguistic examples and examples from other cognitive domains.

Scientists, when they conduct experiments and build theories, also make idealizations and consciously exclude certain observations from consideration. In describing equivalence classes, however, we are saying something different. We are claiming that the human mind and cognitive systems act as a filter on experience—they are built to collapse certain detectable differences when categorizing input.

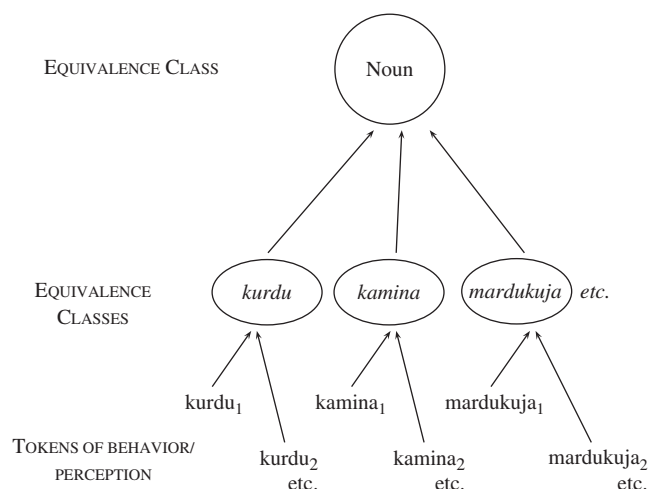
Returning to Warlpiri, then, we see that we need to recognize that words, themselves, are just equivalence classes. The word *kurdu* is one such class, as is the word *kamina*. But then the category noun is also an equivalence class, an abstraction over the set of abstractions that correspond to words.

In Fig. 1.1 we see that individual nouns represent an abstraction from various tokens of words that are spoken and perceived. The category noun is itself an abstraction over the set of individual nouns. The use of symbols that represent equivalence classes is one of the most important notions for understanding language.

There is much more philosophizing to be drawn out of the Warlpiri example, but just for fun we will broaden our empirical base with another example of reduplication before returning to big picture issues.

### 1.3 Partial reduplication in Samoan

In the case of Warlpiri, the input symbol corresponded to the singular form of a noun, call it  $x$ , and the output form could be denoted  $x\hat{x}$ . This pattern is called “total reduplication” because the whole base form is repeated. In



**Fig 1.1** The equivalence class of nouns is itself an abstraction from equivalence classes abstracted from sets of tokens of individual nouns.

the following discussion of Samoan, we will discover a pattern of partial reduplication, where only part of the base is repeated.

In Samoan, the singular of the verb “sit” is *nofo* “she sits” and the plural is *nonofo* “they sit” as shown in (1.6).

1.6	Samoan verbs: sg-pl
nofo	nonofo “sit”
moe	momoe “sleep”
alofa	alolofa “love”
savali	savavali “walk”
malieu	maliliu “die”

If you compare the singular with the plural, are you tempted to posit a rule that adds a prefix *no-* to the singular to get the plural? We can reject this by considering some more data: the singular and plural for the verb “sleep” is *moe/momoe*—clearly there is no prefix *no-* here. So, maybe the rule in Samoan involves reduplication, just as in Warlpiri, but in this case reduplication just repeats part of the base word, say the first syllable.<sup>3</sup> Well, this idea fails when we get to another pair, the forms for the verb meaning “love”: *alofa/alolofa*—the first syllable of the singular *alofa* is *a-*, and this is not repeated in the plural. Instead, the syllable *lo* is repeated in

<sup>3</sup> We will assume that you have an intuitive notion of what a syllable is—it is a technical term in linguistics.



*alolofa*. Perhaps these forms show us that the correct rule involves starting at the beginning of the word, looking for the first consonant and the vowel following that consonant, and then repeating the two of them. This would work for the three verbs considered so far, but there is more data to consider: the last two verbs in example (1.6) show the forms *savavali* and *maliliu*, which shows that the correct rule involves copying the second to last syllable of the singular to make the plural.

We thus see that the Samoan rule requires a variable that constitutes a part of a root word. We won't worry too much about how to represent this—it is an advanced topic, beyond the scope of this book, but here is one approach: suppose that we represent each verb as a sequence of numbered syllables starting from the end of the word. So a two-syllable verb would correspond to (1.7a.) and a three-syllable word to (1.7b.), where the symbol  $\sigma$  stands for a syllable.

#### 1.7 Representing syllable sequences

- a.  $\sigma_2\text{-}\sigma_1$
- b.  $\sigma_3\text{-}\sigma_2\text{-}\sigma_1$
- c.  $\sigma_n\text{-}\dots\text{-}\sigma_2\text{-}\sigma_1$

The representation in (1.7c.) corresponds to a word with an arbitrary number of syllables,  $n$ . The rules for plural formation can now be stated by referring to the variable  $\sigma_2$ :

#### 1.8 If $\sigma_n\text{-}\dots\text{-}\sigma_2\text{-}\sigma_1$ is a singular verb, then the plural is $\sigma_n\text{-}\dots\text{-}\sigma_2\text{-}\sigma_2\text{-}\sigma_1$

We will revise our view of Samoan later, but for now we have an idea of what is needed. The Samoan and Warlpiri both are instances of the same process of reduplication. What differs is the nature of the variable that gets repeated in each case: a full word in Warlpiri, a syllable in Samoan. It is exactly because we are able to abstract away from the different nature of the two variables that we can see that the two languages are in fact using the same computational process, reduplication.

Our discussion of Samoan has also illustrated a crucial aspect of linguistic analysis—we examined pieces of data and made hypotheses that we have then tested against more data, revising the hypotheses as necessary to match the full data set. This is a good example of how language data can be subjected to the scientific method. The same methodology is used in all sciences. However, as we will discuss later, there is a deeper level of analysis than just coming up with a rule that is consistent with the data.

## 1.4 Mentalism

We have posited some rules to account for patterns of nouns in Warlpiri and verbs in Samoan. Let's now ask what those rules are. Well, in some sense, they are our creation, hypotheses we made to account for data sets on the page. However, unless we have some kind of mystical view of our own creative powers, and assuming the data on the page is somehow related to what Warlpiri speakers and Samoans say, it seems reasonable to think that these rules reflect something that existed prior to our analysis—in other words, we have discovered them, not invented them.

Even if the data we analyzed had never been written down, it seems that the rules describe a property of Warlpiri and Samoan speakers. In fact, the memorized singular forms needed to generate the plurals also describe a property of the speakers. Actually spoken words have a sound associated with them, but the rules and the variables they refer to do not—and, as we have seen, even the constant parts do not, since each token is different physically. The rules, the variables, and also the memorized forms of the singulars constitute properties of Warlpiri and Samoan speakers. Similarly, the information that *cat* is pronounced as it is, that it is subject to the regular plural formation rule, and that this rule adds *-s* to the end of the singular is a property of you. We will assume that these properties are a kind of information somehow encoded in the brains of the speakers, and we will refer to that kind of information as a kind of knowledge in the mind of the speakers. Linguistic analysis aims to discover what speakers know—we have discovered, for example, that Samoan speakers *know* (that is, have as one of their properties) a rule that generates plural verbs by reduplicating the second to last syllable of the singular.

The preceding discussion falls under the *mentalist* approach to linguistics. It considers the information and rules and patterns that can be used to analyze linguistic behavior to reflect mental properties, properties of the minds of individuals—the mind consists of information and rules and patterns, some of which constitute knowledge of language. We will later argue that what is mental is part of the biological world, and thus our approach is also known as *biolinguistics*.

Neuroscientists who are trying to understand how cognition arises from the physical matter of the brain need linguists to tell them what kinds of powers inhere in the brains they are studying. If they cannot come up with a model of the brain that accounts for the ability to memorize words (like

Warlpiri singulars) and also store and apply rules that contain variables (the pluralization via reduplication rule of Warlpiri and Samoan, for instance) then their work is not done.

### 1.5 I-language

You now have all the pieces that are necessary to understand what I-language is. An I-language is a computational system that is encoded in, or a property of, an individual brain. It is a system of rules (a grammar) that computes over symbols that correspond to equivalence classes derived either from experience or other symbols. The mind contains (or perhaps is composed of) many such systems, for vision, language, etc., and an I-language is the name given to that one of these systems that generates the structures associated with speaking and understanding speech.

The I-language approach to linguistics thus studies *individual* mental grammars, entities that are *internal* to each person. In addition to these two words beginning with the letter *I*, there is a third relevant term implicit in the notion of a grammar as a system of rules or patterns. In mathematics a set can be defined *extensionally*, by listing its members, or *intensionally*, by providing a formula or description that characterizes all and only the members of the set. For example, {2, 4, 6, 8} extensionally defines the same set as the intensional description “even numbers less than 10.” Notice that an intensional definition is more practical for large sets, and required for infinitely large ones like the set of *all* even numbers. A Warlpiri speaker need not store the set of plurals as an extensionally defined list, since the reduplication rule defines this set intensionally as a function from the set of singulars.

1.9

Two characterizations of the set of Warlpiri plurals

**Extensional:** {kurdukurdu, kaminakamina, mardukujamar-  
dukuja, ... }

**Intensional:** { $x \cap x$  such that  $x$  is a singular noun}

The intensional characterization reflects the rule-governed nature of the relationship between singulars and plurals. I-language is meant to suggest all three of these notions—internal, individual, and intensional.

The study of the shared properties of all I-languages is thus the study of what is sometimes called the human language faculty. This study is

sometimes called Universal Grammar, the goal of which is to discover the core of properties common to all I-languages.<sup>4</sup> We will address implications of the I-language approach and also contrast it with other approaches throughout the book.

### 1.6 Some implications of mentalism

This mentalistic, I-language approach to language has several implications. First of all, we need to recognize the difference between our conscious knowledge of Warlpiri and Samoan reduplication that we developed as a scientific analysis, and the unconscious knowledge that the speakers have. Samoans, for example, may have no idea what a syllable is, and thus could not tell us how the singular and plural verb forms they produce are related. They acquired these rules as pre-literate children without any direct instruction from their parents—they were not given organized data sets as you were.

Furthermore, if all speakers of Warlpiri were to die tomorrow, then nobody in the world would have the kind of knowledge that they have, and the language would cease to exist. We might have some writings that describe our analysis of aspects of their language, but that is all. A language, for linguists, is a system of representations and rules in the mind of a person. If the person ceases to exist, that particular person's language ceases to exist. In other words, we have been talking about the Samoan language and the Warlpiri language, but we have been doing so informally. From a linguistic perspective, each Warlpiri speaker and each Samoan speaker has his or her own set of symbols and rules, what we call his or her own *mental grammar*, his or her own I-language.

If this is so, that each Warlpiri speaker actually has his or her own individual mental grammar, then how can Warlpiri speakers communicate with each other? Why do they seem to have the same grammar? The answer is simple—they have mental grammars that are quite similar because they are all humans and they were exposed to similar linguistic experiences when they were acquiring their language as children.

<sup>4</sup> Just as the terms *physics* and *history* refer both to objects of study (the physical world or the events of history) and the study itself (as in “He failed physics”), the term Universal Grammar is also used sometimes to refer to the common core of the human language faculty.

Everything we have just said about Warlpiri and Samoan holds as well for English. If we take the mentalistic approach seriously, then we have to admit that there is no entity in the world that we can characterize as “English.” There is just a (large) bunch of people with fairly similar mental grammars that they can use to communicate in a way that is typically more efficient than between what we call Japanese and English speakers, because the so-called English mental grammars are more similar to each other. We will continue to use terms like “the English language,” “Warlpiri plurals,” and “Samoan verbs,” but bear in mind that each name is a just practical label for a set of individual mental grammars that are identical with respect to a given phenomenon under analysis.

## 1.7 Summing up

So, at this point, we hope you have an idea of the I-language approach. The ultimate goal is an understanding of the human language faculty, which is instantiated in individual minds/brains, in the same way that we talk of a human visual faculty. Each individual person, based on their particular experience of language acquisition, ends up with a language faculty that is in a particular state.

We told you earlier that we would not review the major findings of modern linguistics, but we have changed our mind—here they are:

### 1.10 The fruits of linguistic research

- Every language is different AND
- Every language is the same.

Believe it or not, both of these claims have elicited virulent criticism. Obviously, we have stated the claims like this for rhetorical effect, but we have suggested that they can both, in fact, be true in some non-trivial way. The two claims are complementary rather than contradictory.

We have illustrated the sense in which linguists say that each language is different: each language corresponds to information in a particular mind. Since each person has at least slightly different experiences of language acquisition, it is not surprising that each ends up with different grammars, different bodies of information. When we say that two people speak the same language, it is rather like saying that they are “near” each other. This is a useful expression whose definition depends on numerous

factors—Montreal is near Kingston, only three hours away; we work near Mary, only three blocks away; we are sitting near Mary, only three feet away; Paul’s liver is near where his gall bladder used to be, only three inches away (N.B. We know nothing about anatomy). What does *near* mean? There is no formal definition of the everyday word *near*, and there is no formal definition for the everyday term “English.” Linguistically, there are no dependable criteria for defining a speaker of English—some dialects share properties with Hungarian that others dialects do not share, for example.

The situation becomes even clearer if we look at other languages (using the term in the everyday sense). Spanish and Italian are called different languages, but speakers of the standards feel like they can communicate with each other quite well. On the other hand, the various Italian dialects are often mutually incomprehensible—they are called dialects of the same language because they are spoken within the political boundaries of Italy, not for any linguistic reasons.

The second claim is just the hypothesis of Universal Grammar, an idea we have already hinted at. We will try to show in later chapters that Universal Grammar is more of a logical necessity than a hypothesis. However, in order to understand the claims, and to decide whether to accept or reject them, we propose to continue developing an understanding of what language is.

As promised, we have already argued for one apparently ridiculous notion, the non-existence of English! As with any scientific endeavor, it is to be expected that our results will surprise us from time to time, and that they will be at odds with our everyday intuitions and common sense. In the same way that modern science departs from our common sense, which tells us that light should behave as either a particle or a wave, not both, or that our bodies and our cars must be made of fundamentally different substances, we expect the scientific study of language to overturn some of our most dearly held intuitions. This commitment to science and its ability to surprise us is expressed well in the following quotation from Zenon Pylyshyn, a psychologist and computer scientist whose work inspired much of what you will find in the following pages:

[I]f you believe  $P$ , and you believe that  $P$  entails  $Q$ , then even if  $Q$  seems more than a little odd, you have some intellectual obligation to take seriously the possibility that  $Q$  may be true, nonetheless. [Zenon Pylyshyn (1984), *Computation and Cognition*: xxii]

Throughout the book, we intend to mind our *Ps* and *Qs* in accordance with Pylyshyn's dictum.

### 1.8 Exercises

**Exercise 1.8.1. Ethnologue:** Throughout the book we refer to languages in the everyday sense of English, Warlpiri, Spanish, and so on. Find information about where languages are spoken, how many speakers they have and what family they belong to by consulting the *Ethnologue* at <http://www.ethnologue.com>. Go to the website and write up a description of the language that immediately follows your family name alphabetically and the language that immediately follows your given name. (If your name is James Jameson, or something else that gives the same language twice, use the language that *precedes* your family name alphabetically.)

**Exercise 1.8.2.** How do you express the meaning *very* in Pocomchi? Fill in the blanks.

adjective		<i>very</i> + adjective	
saq	white	saqsaq	very white
raš	green	rašraš	very green
q'eq	black	q'eqq'eq	very black
q'an	ripe		very ripe, rotten
nim	big		very big
kaq	red		very red

**Exercise 1.8.3.** Can you see how to generate the set of definite nouns (like *the bird*) from the set of bare nouns (like *bird*) in Lyle? Note that vowels in Lyle can bear one of three tones: a = mid tone; á = high tone; à = low tone. These tonal differences are distinctive—they can differentiate meaning.

kúmí	bird	kúmíí	the bird
yálá	millet	yáláá	the millet
kùlí	dog		the dog

Things may be a bit more complex than you thought:

nà	foot	nàá	the foot
yiji	church	yijií	the church
ya	market	yaá	the market
cèlé	parrot	cèléé	the parrot

To make the definite form (*the* + N) repeat \_\_\_\_\_ but always use a \_\_\_\_\_ tone.

What equivalence classes are relevant to a discussion of these Lyele noun forms?

**Exercise 1.8.4. Is it English?** Here are some sentences rendered in Standard orthography that we have heard spoken in various places that are referred to as English-speaking places. Identify differences from your own variety of English, if you can figure out the intended translation into your own dialect. Are these sentences all English? How does the I-language approach bear on the issue?

1. We are allowed running here. (Montreal)
2. We are allowed to run here. (Brooklyn)
3. I did nothing today. (Brooklyn)
4. I didn't do nothing today. (Brooklyn)
5. The government has decided to raise taxes. (Montreal)
6. The government have decided to raise taxes. (London)
7. I'm going to the dep to get some cigarettes and beer. (Montreal)
8. That's all the faster I can run. (Michigan)
9. That's as fast as I can run. (Brooklyn)
10. I might could go. (Alabama)
11. I might be able to go. (Brooklyn)
12. He been try make me mad. (Cajun English, Louisiana)
13. I ate a egg. (Ypsilanti)
14. I ate an egg. (Brooklyn)

#### Further Readings

- Chapters 1 and 2 of *Patterns in the Mind* by Ray Jackendoff (1994). This is an excellent book that inspired much of this book—we actually recommend reading it all.



- Recapturing the Mohawk Language by Marianne Mithun and Wallace Chafe, in Timothy Shopen (1979) (ed.) *Languages and their Status*, (3–33). We have our students read this partly because Mohawk is spoken in the vicinity of Montreal where we teach, and partly because it gives interesting illustrations of productive grammar in a language that is very different from English. There are aspects of the article we disagree with, but this can lead to useful discussion.