

1.2 Linguistics is Biology

We have seen in the previous section how much speakers of a language actually know. What we have demonstrated is knowledge. It only exists in our minds.³ Grammaticality judgments, interpretations, calculations of c-command relations, ... Grammars are properties of our mind.⁴

So how does this stuff get into our minds? How do we know all of this? How come we know such subtle and complex facts about language without having been instructed in them?

Plainly, we have to learn language. Nobody is born speaking English or Polish or German or Japanese, but everybody will learn any of these languages if they grow up in an English or Polish or German or Japanese speaking environment. The biological parents do not matter.

Equally plainly, we couldn't possibly memorize all the sentences of a language, since there are infinitely many of them.⁵ This is, in fact, one of the most striking facts about language: it is compositional. This means that you can use the pieces you have (traditionally the pieces of syntax are thought to be words, but we will come to doubt that) to build up complex structures that you have never heard before and

- have intuitions about whether they are grammatical and
- have intuitions about what they mean.

There must be some process of *generalization* at work in language learning. You hear some sentences and you figure out the rest on the basis of the ones you heard. But there are endless possibilities of coming up with wrong generalizations. For example our earlier, linear, principles of reference assignment (13) and (14) work for a lot of the data—but not for all of it. How does a child learning English know these aren't correct generalizations? And they do know. How does the child know that the relevant rules refer to structural properties rather than linear properties of language?⁶

1.2.1 Case I: Binding Theory

(35) How does the child avoid the following generalizations?

³Although you might find some of the grammatical sentences we discussed above in a corpus or in some other form 'out there', you will probably not find the ungrammatical ones—and if you did, you might end up believing that they are grammatical! Even the grammatical ones are found in the corpus as uninterpreted strings. The fact that there is a difference between (6-c) and , etc. exists only in our minds and nowhere else.

⁴Language as a property of our minds/brains has been called I-language, where the 'I' stands for internal and individual. The opposite view of language looks at it as an external, social object and has been called E-language. Generative grammarians study I-languages only (see Chomsky (1986), Chomsky (2000), Chomsky et al. (2002)).

⁵Given any putative longest sentence you can always make it longer (for example by putting *he believes that* in front of it).

⁶For discussion of a famous argument along these lines see the papers in *The Linguistic Review* 2002 volume 19 issue 1-2.

- (36) a. John seems to Mary to like himself.
 b. John wants to wash himself.
- (37) Generalization: Objects in infinitives count as within the same clause.

However this would be false.⁷

- (38) a. *John seems to Mary to like herself.
 b. *John ordered Mary to like himself.
 c. *John wants Mary to like himself.

1.2.2 Case II: Resultatives

- (39) Why does this generalization not occur?
- (40) a. John pounded the flat metal.
 b. John pounded the metal flat.
- (41) Wrong Generalization: Adjective and noun are interchangeable in object position of a transitive verb.
- (42) a. John saw the flat metal.
 b. *John saw the metal flat.

1.2.3 Case III: Genitive of Negation and Negative Concord

- (43) Greatly simplified, the following facts hold in Russian: Accusative Case on the direct object of a transitive verb alternates with genitive Case when the clause is negated. This is known as the genitive of negation.
- (44) a. Ivan čitaet takuju knigu
 Ivan reads such.acc.sg book.acc.sg
 'Ivan is reading such a book/a book of this kind.
 b. *Ivan čitaet takoj knigi.
 Ivan reads such.gen.sg book.gen.sg
- (45) a. Ivan ne čitaet knigu
 Ivan NOT reads book.acc.sg
 'Ivan is not reading the book.
 b. *Ivan ne čitaet takoj knigi.
 Ivan NOT reads such.gen.sg book.gen.sg
 'Ivan isn't reading any book of this kind.'

⁷The preposition 'to' in (38-a) is not responsible for the fact that 'Mary' cannot bind 'herself' here. We know this because of examples like the following. The examples do raise a problem for our definition of c-command which appears to be too strict for these cases. We will not try to resolve the issue in this class.

- (i) John talked to Mary about herself.

- (46) There is another phenomenon in Russian that depends on negation: Negative Concord.^{8 9}
- (47) a. Ivan *(ne) čitaet ničego.
Ivan *(NOT) read nothing
'Ivan is *(not) reading anything.'
b. Nikto *(ne) čital èto.
Nobody *(NOT) read this
'Nobody (*didn't) read this.'
- (48) False Generalization: Negative pronouns (pronouns that start with *ni-*) are acceptable in all the environments where genitive of negation is licensed and then some. In particular, negative pronouns are acceptable whenever they occur together with a clausal negation in the same clause.

Both parts of this generalization are overwhelmingly true.

- (49) It was only in 1995 that Brown and Franks (1995) discovered that in some environments this pretty and simple theory fails. They give examples like the following.
- (50) a. Ne čitaet- li on takoj knigi?
NOT reads *Q_{PRT}* he such.Gen.sg book.gen.sg
'Isn't he reading such a book?'
b. *Ne čitaet- li on ničego?
NO reads *Q_{PRT}* he nothing

But how did generations of Russian speakers avoid the obvious generalization in (49)?¹⁰

1.2.4 Further considerations

The first problem is that a child who has made any of the wrong generalizations discussed above (or numerous others) will never find out just on the basis of what she hears. Her grammar generates a proper superset of the language she is surrounded by. But how do you find out that something which other speakers think is acceptable is unacceptable? For the linguist it is easy: just ask a native speaker, but what about the child?

It is known that parents do not usually react to the form of their children's utterances but their content. It is absurd to us even to imagine otherwise.

Even when parents try to give their children input concerning grammar¹¹

⁸The sentences are very similar to the English sentences 'I didn't see nobody', 'Nobody didn't do nothing.', etc. which are acceptable in many dialects of English – though not in the standard language.

⁹The notation **(...)* is to be read as follows. The sentence *with* the bracketed material is acceptable, but not without it.

¹⁰For an idea of what might be going on, see Abels (to appear).

¹¹In fact, typical mistakes children make are over-regularizations, though not of the types seen in the previous subsections.

they fail and dialogues like this one ensue (cited in Aitchison (1994) p. 122-3):

- (51) Child: Want other one spoon, Daddy.
 Father: You mean, you want the other spoon.
 Child: Yes, I want other one spoon, please Daddy.
 Father: Can you say "the other spoon" ?
 Child: Other...one...spoon.
 Father: Say "other."
 Child: Other.
 Father: Spoon.
 Child: Spoon.
 Father: "Other spoon."
 Child: Other...spoon. Now give the other one spoon?

In other words, explicit instruction on grammar is absent and when present does not help the child. Explicit correction and information about which sentences are ungrammatical has been called 'negative evidence' in the literature. Apparently children do not need it to acquire a language.

Children can acquire language without negative evidence.

Despite all of this children are extremely good at picking up language. For example, we have a knack for learning words. English speaking high-school graduates have a vocabulary of roughly 60 000 words, which means that we have to acquire roughly 3750 words per year or 10 per day. Many words are learned and remembered the first time they are heard. Moreover, children are fluent and have essentially mastered their native language to perfection by the time they start going to school.

Children have an easy time acquiring language; they do it fast.

People are not equally good at picking up all obvious generalizations in their environment.¹² It took Karl von Frisch, who got the nobel prize for his discovery in 1973, almost fifty years to figure out the waggle dance of the bees, although it's rules are much more simple than the rules governing natural languages. Finally, you would never be able to learn *fax* no matter how hard you tried—and despite the fact that fax is actually pretty simple.

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- (i) a. root – roots
 b. foot – *foots
- (ii) a. sing – sung
 b. bring – *brung
- (iii) a. The vase broke. – John broke the vase.
 b. The child giggled. – *John giggled the child.

Lila Gleitman has pointed out that people cherish these mistakes; they laugh, they repeat them, they remember them years later. This shows that even in simple cases such as these, children cannot count on their parents' explicit help or training to learn the correct forms.

¹²See the impressive evidence in Smith and Tsimpli (1995) and Smith et al. (1993) regarding made up languages with 'impossible' rules.

We are not universal pattern recognizers as some people claim. We have specialized mechanisms for recognizing and learning certain patterns but not others. Language is one such pattern.

There seem to be critical period effects in language learning, certain language disorders are clearly traceable to a hereditary trait,¹³ and language acquisition appears to follow a strict program.¹⁴ There is a double dissociation between general cognition and language skills.¹⁵

All of this points to a genetically determined, specialized faculty for language and language learning. At birth this faculty will be in a particular initial state and by the time we have acquired a language it has changed into a different fairly stable state. A complete theory of our mental grammar organ will describe the properties of the initial state (i.e. the answer to questions like: What are we born with? Which parts of language are invariant? How is linguistic experience mapped onto successive states of the language organ?), the possible final states (i.e., it will describe what the range possible language variation is, it will thereby also describe what languages are impossible), and it will include a theory of the learning process (how is language learned? By what mechanisms?).¹⁶

This argument is made in a very accessible way in Pinker (1994), which every beginning linguist should read.

Generative Grammar is thus also about explaining how come children are able to acquire language reliably and quickly.

In the early eighties the notion of language Principles and language Parameters was invented.

- The Principles are more or less abstract constraints or mechanism that are operative in all languages. We have already encountered a principle: language rules and constraints are structure dependent.
- The Parameters are constraints or mechanisms that leave a small number of simple choices open. We will discuss possible examples as we go along.
- A grammar is then fully determined by setting values for every parameter.

The most recent incarnation of generative grammar, *Minimalism*, adds yet another question to these: Why does language have the properties it does?

¹³See Gopnik and Crago (1991)

¹⁴See Aitchison (1994)

¹⁵See Smith and Tsimpli (1995).

¹⁶In Chomsky (1965) a theory that is descriptively adequate and also answers the questions from the previous paragraph is called *explanatorily adequate*. This is a misleading formulation that has given rise to a lot of confusion and unnecessary argument.