Syntax
Background

Modul 04-006-2002
Phonology – Morphology – Syntax

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The object of study

Question:
What is language? What does it mean to have language?

Wittgenstein (Philosophische Untersuchungen):
A language L is a system of conventions. Its rules are uniformly fixed by the society that uses L. Its primary function is communication. Language is a social phenomenon.

Criticism (cf. Chomsky 1969, cited after Grewendorf 2006):

- How does the uniformity of the conventions come about? It appears that this would presuppose the existence of language to begin with.
- One can perfectly master language and at the same time not be able to interact socially. Vice versa, one may possess the ability to interact socially and at the same time not be able to fully acquire language.

The object of study

Examples (see also Jackendoff 1994):

- Curtiss (1977, 1981): "Genie" was able to interact socially but had only rudimentary linguistic knowledge (deficits in agreement, word order, complex embeddings, etc.).
- Yamada (1990): "Laura" was mentally retarded and therefore could hardly engage in proper social interaction. Yet her linguistic knowledge was impeccable.
- Smith & Tsimpli (1995): Christopher shows large deficits in social interaction but possesses linguistic abilities that even surpass the norm.

The object of study

Skinner (1957):
Language develops as a response to linguistic stimuli. Thus, language is learned exclusively as a reaction to the linguistic input that is presented to the learner.

Criticism (Chomsky 1959):

- Linguistic knowledge is far too complex and abstract to be the result of a stimulus-response interaction. In particular, this knowledge goes beyond what can be observed in the linguistic input.
- Speakers are able to produce and judge linguistic expressions (e.g. sentences) that they have never heard before or been instructed about. (There are infinitely many of them.) They show knowledge of something for which no stimulus was given.
- Linguistic input is often defective, full of errors (wrong agreement, anacoluthons, etc.). How can the learner possibly distinguish proper stimuli from defective ones?

The object of study

Illustration (Grewendorf 2006):

- Speakers of English know intuitively that the pronoun *he* in (1-a) can refer to the same person as the proper name *John* while the pronoun *him* in (1-b) cannot, although they have never been told this.
- As we will (hopefully) see, formulating the correct rule governing possible vs. impossible coreference requires reference to abstract *hierarchical structure*, which is not part of the acoustic signal of the linguistic input.

(1) a. John believes he (= John, ≠ John) is intelligent.
b. John believes him (≠ John) to be intelligent.

The object of study

More illustration (Grewendorf 2006):

- Speakers of English know that the pronoun *he* can refer to the same person as the proper name *John* in (2-a-c) but not in (2-d).
- Crain & McKee (1985) argue that such knowledge is already part of the linguistic wisdom of three year old children. Again, the correct rule requires reference to abstract (i.e. hidden) structure.
- How does the learner know this? It is unlikely that they encountered evidence that could have served as a stimulus.

(2)
a. When John entered the room he wore a funny hat.
b. John wore a funny hat when he entered the room.
c. When he entered the room John wore a funny hat.
d. He wore a funny hat when John entered the room.

The logical problem of language acquisition

Poverty of the stimulus:

- Children acquire language quickly and without obvious efforts, and they do this although the linguistic input they get is deficient.
- How is this possible if linguistic knowledge involves abstract structure that is only very indirectly accessible (if at all) through the linguistic input?
- This problem is known under the name *Poverty of the Stimulus*, an instance of what Chomsky (1986) calls Plato's Problem. (How can we know so much given our limited experience?).

PotS and its consequences: Subject-auxiliary inversion

Consequences of Poverty of the Stimulus (PotS):
In what follows, the consequences of PotS are illustrated in some detail. The discussion involves subject-auxiliary inversion as it shows up in yes/no-questions in English (see, e.g., Adger 2003, Grewendorf 2006).

Point of departure:

- There is a close relation between the declarative clauses in (3) and the yes/no-interrogative clauses in (4). Assumption: The interrogative clause is "derived" from the declarative clause.
- Suppose the language learner must find the correct rule that defines this derivation.

(3) a. Jenny has eaten a cake.
b. Anson will come to the party.

(4) a. Has Jenny eaten a cake?
b. Will Anson come to the party?

PotS and its consequences: Subject-auxiliary inversion

Observation:
There are many different conceivable hypothetical rules that define the relation between (3-a,b) and (4-a,b). For instance:

(5) a. *Rule 1:*
Flip the first two words of the sentence.
b. *Rule 2:*
Displace the (linearly) first auxiliary to the front.
c. *Rule 3:*
Displace the structurally highest auxiliary to the front.

Conventions:

- Linguistic expressions that are ill-formed (ungrammatical) are prefixed by an asterisk *.
- The position that a "displaced" element occupied in the declarative clause is marked in the interrogative clause by _.

PotS and its consequences: Subject-auxiliary inversion

Rule 1:

(6) a. The man has eaten the cake.
b. *Man the _ has eaten the cake.
c. The woman who is singing is happy.
d. *Woman the _ who is singing is happy.

Problem:
Rule 1 only works for declarative clauses whose subject consists of one word. Is the subject of a clause made up from more than one word, then Rule 1 wrongly triggers displacement within the subject.

Note:
Rule 1 contradicts sentences that arguably show up sufficiently frequently in the input to the learner, see (7). Thus, Rule 1 can be eliminated by the learner as a wrong hypothesis.

(7) a. Has the man _ eaten the cake?
b. Will this guy _ come to the party?

PotS and its consequences: Subject-auxiliary inversion

Rule 2:

(8) a. The man *has* eaten the cake.
b. Has the man _ eaten the cake?
c. The woman who *is* singing *is* happy.
d. *Is the woman who _ singing is happy?

Problem:

- Rule 2 works fine as long as there is only one auxiliary. But (8-c) contains two instances of the auxliary *is*: The first one is part of the relative clause (*who is singing*) that modifies the noun *woman*; the second is part of the main clause.
- Rule 2 wrongly enforces fronting of the auxiliary that is part of the relative clause in (8-c) (because it linearly precedes the auxiliary of the main clause). Fronting of the second auxiliary (the one from the main clause) would have been correct.

PotS and its consequences: Subject-auxiliary inversion

Note:

- A hypothetical Rule 2′ that always fronts the second auxiliary fails in cases with three auxiliaries (9) (two relative clauses in the subject).
- A hypothetical Rule 2″ that always fronts the last auxiliary is not sufficient either (10) (one relative clauses modifying the subject, one modifying the object).

(9) a. The woman who *is* meeting a man who *is* rich *is* happy.
b. *Is the woman who is meeting a man who _ rich is happy?
c. Is the woman who is meeting a man who is rich _ happy?

(10) a. The woman who *is* singing *is* meeting a man who *is* rich.
b. *Is the woman who is singing is meeting a man who _ rich?
c. Is the woman who is singing _ meeting a man who is rich?

PotS and its consequences: Subject-auxiliary inversion

Rule 3:

(11)
a. The man *has* eaten the cake.
b. Has the man _ eaten the cake?
c. The woman who *is* singing *is* happy.
d. Is the woman who is singing _ happy?

Rule 3 is correct:

- The relevant difference between the auxiliary of the relative clause and the auxiliary in the main clause is not one in terms of linear order but one in terms of *hierarchical structure* (we will come back to this).
- The auxiliary in the main clause occupies a "higher" position (in a sense to be made precise) than the auxiliary in the relative clause (the relative clause is part of the subject of the main clause). This is already suggested by the notion "main clause".
- Rule 3 correctly covers all facts discussed so far: it is always the structurally highest auxiliary that is fronted.

PotS and its consequences: Subject-auxiliary inversion

Claims:

- The learner never adopts Rule 2, Rule 2′, or Rule 2″, although they have no evidence that would eliminate them as a hypothesis (as was the case for Rule 1, recall (7)). This means: the learner never utters sentences such as (12).
- Negative evidence, i.e. information that a particular sentence is ungrammatical, is not relevant for language acquisition because such evidence is not part of the input.
- Corrections of ungrammatical utterances of the learner, for instance by the parents, either does not take place at all or does not have any effect on learning.

(12) *Is the woman who singing is happy?

PotS and its consequences: Subject-auxiliary inversion

Upshot:

- Only positive evidence is available to the language learner.
- Such evidence does not distinguish between Rule 2 and 3 because the relevant grammatical examples that could eliminate Rule 2 are too rare to have any effect on the learner.
- If the learner happened to adopt Rule 2 as a hypothesis, they would have no reason to drop it afterwards. Hence, one would expect examples such as (8-d)/(12) to show up in the learner's output.
- Since the learner never utters examples such as (8-d)/(12), it follows that they never adopt Rule 2 as a hyopthesis in the first place.

PotS and its consequences: Subject-auxiliary inversion

Note:

- This argument can be even sharpened by assuming that Rule 4 is a possible hypothesis that could be adopted by the learner, too.

(13) *Rule 4:*
Displace any auxiliary to the front.

- If Rule 4 is adopted, then it becomes a mystery why the learner does not utter (14-a) even if one grants the assumption that grammatical examples such as (14-b) show up frequently in the input (because (14-b) does not eliminate Rule 4).

(14) a. *Is the woman who _ singing is happy?
b. Is the woman who is singing _ happy?

PotS and its consequences: Subject-auxiliary inversion

Consequence:

- There must be a structure sensitive constraint that prevents the learner from ever adopting Rule 2 ($2'$, $2''$) or Rule 4 as a hypothesis.
- This constraint cannot have been acquired by the learner from the input (no negative evidence, not enough positive evidence, i.e., PotS).

The solution: Universal Grammar

Assumption (Chomsky 1965):

- As the learner cannot infer all rules of grammar from the input (because of PotS), they must be equipped with genetically determined knowledge about what kind of hypotheses about rules of grammar can be adopted and which cannot (from the set of logically possible ones) .
- This knowledge is called Universal Grammar (UG). As UG is part of the genetic endowment of homo sapiens, all human languages must be alike (on an abstract level).
- The combination of genetic endowment and linguistic input leads to the growth of the grammar of a particular language (*I-language* in the mind of the learner, where "I" stands for both *internal* and *individual*, respectively).

Language as a biological phenomenon

I-language:

- According to this reasoning, to have language means to have "aquired" I-language. For Chomsky, language (in the sense of I-language) is a biological phenomenon.
- The I-language in the mind of a speaker characterizes the set of all grammatical sentences (strings of words) of the E-language (*external* language), and only these. Morevover, I-language determines the internal hierarchical representations underlying these sentences.

The grammarian's task

Theory of grammar:

- The task of the linguist is to reconstruct a theory of the I-language in the mind of the speakers.
- Such a theory will consist of a (hopefully small) set of general principles (possibly part of UG), the interaction of which can explain as many linguistic (in our case: syntactic) phenomena as possible.
- Simple and far reaching principles are necessarily formal and abstract. They require an elaborate set of technical notions.

Research strategy:
If one can choose between two theories that cover the same amount of phenomena, then one should go for the simpler theory (the one that requires fewer assumptions). This research strategy is known under the name *Ockham's razor* (Wilhelm von Ockham, 1288–1347).

Recursion

Recursion:

- As any human language allows for infinitely many grammatical sentences (sentences can embed sentences that, again, can embed sentences, etc., (15); nouns can embed nouns that, again, can embed nouns, etc., (16)), I-language must include a means to create *recursive* structures.
- (Sometimes, one also speaks of the creativity of language in this context.)

(15)
a. Mary is smart.
b. John believes that Mary is smart.
c. Harry doubts that John believes that Mary is smart.
d. . . .

(16)
a. a picture
b. a picture of a book
c. a picture of a book about Bobby Fisher
d. . . .

Types of adequacy for a theory of grammar

Three types of adequacy (Chomsky 1964):

1. *Observational adequacy*: The theory characterizes the set of all grammatical sentences (strings of words) of a language, and only these.
2. *Descriptional adequacy*: The theory is observationally adequate and assigns intuitively correct hierarchical representations to the sentences of a language.
3. *Explanatory adequacy*: The theory is decriptively adequate and is compatible with the facts of language acquisition.

Ways to characterize the set of grammatical sentences

Two types of characterization:

- Derivational/algorithmic characterization: There is set of operations that generates/enumerates all members of the set of grammatical sentences in a step-by-step fashion.
- Representational/declarative characterization: There is a set of constraints that filters out all ungrammatical sentences from the set of all possible sentences, leaving only the grammatical ones.

Instantiations:

- The theory often referred to as the "Minimalist Program" (Chomsky 1995), which will be discussed in this course, is, to a large extent, a derivational theory.
- HPSG (Pollard & Sag 1994) or LFG (Bresnan 1982) are purely representational theories.

Competence vs. Performance

Competence vs. Performance:

- The notion of *competence* refers to our implicit linguistic knowledge (I-language), which allows us to produce a potentially infinite set of grammatical sentences.
- In contrast, the term *performance* denotes the concrete daily application of this knowledge, where it interacts and is subject to many further factors (fatigue, drugs, social competence, world knowledge, etc.)

Important to note:

- Theory of grammar (theory of I-language) is not a theory of language processing. It abstracts away from our every-day use of language.
- For instance, the theory that we will discuss in this course (Chomsky 1995 et seq.) characterizes the "generation" of sentences in a way that diverges from the way that they are actually acoustically produced and processed ("from left to right").

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