

Transformational grammar

From Wikipedia, the free encyclopedia

In linguistics, a **transformational grammar**, or **transformational-generative grammar (TGG)**, is a generative grammar, especially of a natural language, that has been developed in a Chomskyan tradition. Additionally, transformational grammar is the Chomskyan tradition that gives rise to specific transformational grammars. Much current research in transformational grammar is inspired by Chomsky's Minimalist Program.^[1]

Contents

- 1 Deep structure and surface structure
- 2 Development of basic concepts
- 3 Innate linguistic knowledge
- 4 Grammatical theories
- 5 “I-Language” and “E-Language”
- 6 Grammaticality
- 7 Minimalism
- 8 Mathematical representation
- 9 Transformations
- 10 References
- 11 See also
- 12 External links

Deep structure and surface structure

In 1957, Noam Chomsky published *Syntactic Structures*, in which he developed the idea that each sentence in a language has two levels of representation — a deep structure and a surface structure.^[2] ^[3] The deep structure represented the core semantic relations of a sentence, and was mapped on to the surface structure (which followed the phonological form of the sentence very closely) via *transformations*. Chomsky believed that there would be considerable similarities between languages' deep structures, and that these structures would reveal properties, common to all languages, which were concealed by their surface structures. However, this was perhaps not the central motivation for introducing deep structure. Transformations had been proposed prior to the development of deep structure as a means of increasing the mathematical and descriptive power of Context-free grammars. Similarly, deep structure was devised largely for technical reasons relating to early semantic theory.

Linguistics

Theoretical linguistics
Generative linguistics
Phonology
Morphology
Syntax
Lexis
Semantics
Lexical semantics
Statistical semantics
Structural semantics
Prototype semantics
Pragmatics
Systemic functional linguistics

Chomsky emphasizes the importance of modern formal mathematical devices in the development of grammatical theory:

But the fundamental reason for [the] inadequacy of traditional grammars is a more technical one. Although it was well understood that linguistic processes are in some sense “creative”, the technical devices for expressing a system of recursive processes were simply not available until much more recently. In fact, a real understanding of how a language can (in Humboldt’s words) “make infinite use of finite means” has developed only within the last thirty years, in the course of studies in the foundations of mathematics.

(*Aspects of the Theory of Syntax*, p. 8 ^[2])

Development of basic concepts

Though transformations continue to be important in Chomsky’s current theories, he has now abandoned the original notion of Deep Structure and Surface Structure. Initially, two additional levels of representation were introduced (LF — Logical Form, and PF — Phonetic Form), and then in the 1990s Chomsky sketched out a new program of research known as *Minimalism*, in which Deep Structure and Surface Structure no longer featured and PF and LF remained as the only levels of representation.

To complicate the understanding of the development of Noam Chomsky’s theories, the precise meanings of Deep Structure and Surface Structure have changed over time — by the 1970s, the two were normally referred to simply as D-Structure and S-Structure by Chomskyan linguists. In particular, the idea that the meaning of a sentence was determined by its Deep Structure (taken to its logical conclusions by the generative semanticists during the same period) was dropped for good by Chomskyan linguists when LF took over this role (previously, Chomsky and Ray Jackendoff had begun to argue that meaning was determined by both Deep and Surface Structure).^{[4][5]}

Innate linguistic knowledge

Terms such as “transformation” can give the impression that theories of transformational generative grammar are intended as a model for the processes through which the human mind constructs and understands sentences. Chomsky is clear that this is not in fact the case: a generative grammar models only the knowledge that underlies the human ability to speak and understand. One of the most important of Chomsky’s ideas is that most of this knowledge is innate, with the result that a baby can have a large body of prior knowledge about the structure of language in general, and need only actually *learn* the idiosyncratic features of the language(s) it is exposed to. Chomsky was not the first person to suggest that all languages had certain fundamental things in common (he quotes philosophers writing several centuries ago who had the same basic idea), but he helped to make the innateness theory respectable after a period dominated by more behaviorist attitudes towards language. Perhaps more significantly, he made concrete and technically sophisticated proposals about the structure of language, and made important proposals regarding how the success of grammatical

Descriptive linguistics
Phonetics
Historical linguistics
Comparative linguistics
Etymology
Sociolinguistics
Corpus linguistics

Applied linguistics
Language acquisition
Language development
Language education
Psycholinguistics
Neurolinguistics
Linguistic anthropology
Cognitive linguistics
Computational linguistics
Stylistics
Prescription

History of linguistics
List of linguists
Unsolved problems

theories should be evaluated.

Chomsky goes so far as to suggest that a baby need not learn any actual *rules* specific to a particular language at all. Rather, all languages are presumed to follow the same set of rules, but the effects of these rules and the interactions between them can vary greatly depending on the values of certain universal linguistic *parameters*. This is a very strong assumption, and is one of the most subtle ways in which Chomsky's current theory of language differs from most others.

Grammatical theories

In the 1960s, Chomsky introduced two central ideas relevant to the construction and evaluation of grammatical theories. The first was the distinction between *competence* and *performance*. Chomsky noted the obvious fact that people, when speaking in the real world, often make linguistic errors (e.g. starting a sentence and then abandoning it midway through). He argued that these errors in linguistic performance were irrelevant to the study of linguistic competence (the knowledge that allows people to construct and understand grammatical sentences). Consequently, the linguist can study an idealised version of language, greatly simplifying linguistic analysis (see the "Grammaticalness" section below). The second idea related directly to the evaluation of theories of grammar. Chomsky made a distinction between grammars which achieved *descriptive adequacy* and those which went further and achieved *explanatory adequacy*. A descriptively adequate grammar for a particular language defines the (infinite) set of grammatical sentences in that language; that is, it describes the language in its entirety. A grammar which achieves explanatory adequacy has the additional property that it gives an insight into the underlying linguistic structures in the human mind; that is, it does not merely describe the grammar of a language, but makes predictions about how linguistic knowledge is mentally represented. For Chomsky, the nature of such mental representations is largely innate, so if a grammatical theory has explanatory adequacy it must be able to explain the various grammatical nuances of the languages of the world as relatively minor variations in the universal pattern of human language. Chomsky argued that, even though linguists were still a long way from constructing descriptively adequate grammars, progress in terms of descriptive adequacy would only come if linguists held explanatory adequacy as their goal. In other words, real insight into the structure of individual languages could only be gained through the comparative study of a wide range of languages, on the assumption that they are all cut from the same cloth.

“I-Language” and “E-Language”

In 1986, Chomsky proposed a distinction between *I-Language* and *E-Language*, similar but not identical to the competence/performance distinction.^[6] (I-language) refers to Internal language and is contrasted with External Language (or E-language). I-Language is taken to be the object of study in linguistic theory; it is the mentally represented linguistic knowledge that a native speaker of a language has, and is therefore a mental object — from this perspective, most of theoretical linguistics is a branch of psychology. E-Language encompasses all other notions of what a language is, for example that it is a body of knowledge or behavioural habits shared by a community. Thus, E-Language is not itself a coherent concept^[7], and Chomsky argues that such notions of language are not useful in the study of innate linguistic knowledge, i.e. competence, even though they may seem sensible and intuitive, and useful in other areas of study. Competence, he argues, can only be studied if languages are treated as mental objects.

Grammaticality

Further information: Grammaticality

Chomsky argued that the notions “grammatical” and “ungrammatical” could be defined in a meaningful and useful way. In contrast an extreme behaviorist linguist would argue that language can only be studied through recordings or transcriptions of actual speech, the role of the linguist being to look for patterns in such observed speech, but not to hypothesize about why such patterns might occur, nor to label particular utterances as either “grammatical” or “ungrammatical”. Although few linguists in the 1950s actually took such an extreme position, Chomsky was at an opposite extreme, defining grammaticality in an unusually (for the time) mentalistic way.^[8] He argued that the intuition of a native speaker is enough to define the grammaticality of a sentence; that is, if a particular string of English words elicits a double take, or feeling of wrongness in a native English speaker, it can be said that the string of words is ungrammatical (when various extraneous factors affecting intuitions are controlled for). This (according to Chomsky) is entirely distinct from the question of whether a sentence is meaningful, or can be understood. It is possible for a sentence to be both grammatical and meaningless, as in Chomsky’s famous example “colorless green ideas sleep furiously”. But such sentences manifest a linguistic problem distinct from that posed by meaningful but ungrammatical (non)-sentences such as “man the bit sandwich the”, the meaning of which is fairly clear, but which no native speaker would accept as being well formed.

The use of such intuitive judgments permitted generative syntacticians to base their research on a methodology in which studying language through a corpus of observed speech became downplayed, since the grammatical properties of constructed sentences were considered to be appropriate data on which to build a grammatical model. Without this change in philosophy, the construction of generative grammars, when conceived of as a some kind of representation of mental grammars, would have been almost impossible at the time, since gathering the necessary data to assess a speaker’s mental grammar would have been prohibitively difficult.

Minimalism

In the mid-1990s to mid-2000s, much research in transformational grammar was inspired by Chomsky’s *Minimalist Program*.^[9] The “Minimalist Program” aims at the further development of ideas involving *economy of derivation* and *economy of representation*, which had started to become significant in the early 1990s, but were still rather peripheral aspects of Transformational-generative grammar theory.

- Economy of derivation is a principle stating that movements (i.e. transformations) only occur in order to match *interpretable features* with *uninterpretable features*. An example of an interpretable feature is the plural inflection on regular English nouns, e.g. *dogs*. The word *dogs* can only be used to refer to several dogs, not a single dog, and so this inflection contributes to meaning, making it *interpretable*. English verbs are inflected according to the grammatical number of their subject (e.g. “Dogs bite” vs “A dog bites”), but in most sentences this inflection just duplicates the information about number that the subject noun already has, and it is therefore *uninterpretable*.
- Economy of representation is the principle that grammatical structures must exist for a purpose, i.e. the structure of a sentence should be no larger or more complex than required to satisfy constraints on grammaticality.

Both notions, as described here, are somewhat vague, and indeed the precise formulation of these principles is controversial.^{[10][11]} An additional aspect of minimalist thought is the idea that the

derivation of syntactic structures should be *uniform*; that is, rules should not be stipulated as applying at arbitrary points in a derivation, but instead apply throughout derivations. Minimalist approaches to phrase structure have resulted in “Bare Phrase Structure”, an attempt to eliminate X-bar theory. In 1998, Chomsky suggested that derivations proceed in “phases”. The distinction of Deep Structure vs. Surface Structure is not present in Minimalist theories of syntax, and the most recent phase-based theories also eliminate LF and PF as unitary levels of representation.

Mathematical representation

Returning to the more general mathematical notion of a grammar, an important feature of all transformational grammars is that they are more powerful than context free grammars.^[12] This idea was formalized by Chomsky in the Chomsky hierarchy. Chomsky argued that it is impossible to describe the structure of natural languages using context free grammars.^[13] His general position regarding the non-context-freeness of natural language has held up since then, although his specific examples regarding the inadequacy of CFGs in terms of their weak generative capacity were later disproven.^{[14] [15]}

Transformations

The usual usage of the term ‘transformation’ in linguistics refers to a rule that takes an input typically called the Deep Structure (in the Standard Theory) or D-structure (in the extended standard theory or government and binding theory) and changes it in some restricted way to result in a Surface Structure (or S-structure). In TGG, Deep structures were generated by a set of phrase structure rules.

For example a typical transformation in TG is the operation of subject-auxiliary inversion (SAI). This rule takes as its input a declarative sentence with an auxiliary: “John has eaten all the heirloom tomatoes.” and transforms it into “Has John eaten all the heirloom tomatoes?”. In their original formulation (Chomsky 1957), these rules were stated as rules that held over strings of either terminals or constituent symbols or both.

$$X \text{ NP AUX } Y \Rightarrow X \text{ AUX NP } Y$$

(where NP = Noun Phrase and AUX = Auxiliary)

In the 1970s, by the time of the Extended Standard Theory, following the work of Joseph Emonds on structure preservation, transformations came to be viewed as holding over trees. By the end of government and binding theory in the late 1980s, transformations are no longer structure changing operations at all, instead they add information to already existing trees by copying constituents.

The earliest conceptions of transformations were that they were construction-specific devices. For example, there was a transformation that turned active sentences into passive ones. A different transformation raised embedded subjects into main clause subject position in sentences such as “John seems to have gone”; and yet a third reordered arguments in the dative alternation. With the shift from rules to principles and constraints that was found in the 1970s, these construction specific transformations morphed into general rules (all the examples just mentioned being instances of NP movement), which eventually changed into the single general rule of move alpha or Move.

Transformations actually come of two types: (i) the post-Deep structure kind mentioned above, which are string or structure changing, and (ii) Generalized Transformations (GTs). Generalized

transformations were originally proposed in the earliest forms of generative grammar (e.g. Chomsky 1957). They take small structures which are either atomic or generated by other rules, and combine them. For example, the generalized transformation of embedding would take the kernel “Dave said X” and the kernel “Dan likes smoking” and combine them into “Dave said Dan likes smoking”. GTs are thus structure building rather than structure changing. In the Extended Standard Theory and government and binding theory, GTs were abandoned in favor of recursive phrase structure rules. However, they are still present in tree-adjoining grammar as the Substitution and Adjunction operations and they have recently re-emerged in mainstream generative grammar in Minimalism as the operations Merge and Move.

References

1. ^ Chomsky, Noam (1995). *The Minimalist Program*. MIT Press.
2. ^ ^{a b} Chomsky, Noam (1965). *Aspects of the Theory of Syntax*. MIT Press.
3. ^ The Port-Royal Grammar of 1660 identified similar principles; Chomsky, Noam (1972). *Language and Mind*. Harcourt Brace Jovanovich.
4. ^ Jackendoff, Ray (1974). *Semantic Interpretation in Generative Grammar*. MIT Press.
5. ^ May, Robert C. (1977). *The Grammar of Quantification*. MIT Phd Dissertation. (Supervised by Noam Chomsky, this dissertation introduced the idea of “logical form”.)
6. ^ Chomsky, Noam (1986). *Knowledge of Language*. New York: Praeger.
7. ^ Chomsky, Noam (2001). “Derivation by Phase”. In other words, in algebraic terms, *the I-Language is the actual function, whereas the E-Language is the extension of this function*. In Michael Kenstowicz (ed.) *Ken Hale: A Life in Language*. MIT Press. Pages 1-52. (See p. 49 fn. 2 for comment on E-Language.)
8. ^ Newmeyer, Frederick J. (1986). *Linguistic Theory in America (Second Edition)*. Academic Press.
9. ^ Chomsky, Noam (1995). *The Minimalist Program*. MIT Press.
10. ^ Lappin, Shalom; Robert Levine and David Johnson (2000). “Topic ... Comment”. *Natural Language & Linguistic Theory* **18**: 665–671. doi:10.1023/A:1006474128258.
11. ^ Lappin, Shalom; Robert Levine and David Johnson (2001). “The Revolution Maximally Confused”. *Natural Language & Linguistic Theory* **19**: 901–919. doi:10.1023/A:1013397516214.
12. ^ Peters, Stanley; R. Ritchie (1973). “On the generative power of transformational grammars”. *Information Sciences* **6**: 49–83. doi:10.1016/0020-0255(73)90027-3.
13. ^ Chomsky, Noam (1956). “Three models for the description of language”. *IRE Transactions on Information Theory* **2**: 113–124. doi:10.1109/TIT.1956.1056813. <http://www.chomsky.info/articles/195609--.pdf>.
14. ^ Shieber, Stuart (1985). “Evidence against the context-freeness of natural language”. *Linguistics and Philosophy* **8**: 333–343. doi:10.1007/BF00630917. <http://www.eecs.harvard.edu/~shieber/BibliøPapers/shieber85.pdf>.
15. ^ Pullum, Geoffrey K.; Gerald Gazdar (1982). “Natural languages and context-free languages”. *Linguistics and Philosophy* **4**: 471–504. doi:10.1007/BF00360802.

See also

- Antisymmetry
- Generalised phrase structure grammar
- Generative semantics

- Head-driven phrase structure grammar
- Heavy NP shift
- Lexical functional grammar
- Parasitic gap
- Phrase structure rules
- Syntax

External links

- What is I-language? (<http://linguistics.concordia.ca/i-language/>) - Chapter 1 of I-language: An Introduction to Linguistics as Cognitive Science.
- The Syntax of Natural Language (<http://www.ling.upenn.edu/~beatrice/syntax-textbook/index.html>) – an online textbook on transformational grammar.

Retrieved from “http://en.wikipedia.org/wiki/Transformational_grammar”

Categories: Generative linguistics | Grammar frameworks | Noam Chomsky | Syntactic transformation

Hidden categories: Wikipedia articles needing clarification | All articles with unsourced statements | Articles with unsourced statements since July 2008

- This page was last modified on 25 January 2009, at 22:43.
- All text is available under the terms of the GNU Free Documentation License. (See **Copyrights** for details.)
Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a U.S. registered 501(c)(3) tax-deductible nonprofit charity.