

Syntactic semantics, also known as **formal semantics**, is a branch of semantics that studies meaning by analyzing how linguistic expressions are composed from smaller parts. It focuses on the relationship between syntax (the structure of sentences) and semantics (the meaning of those sentences). The core idea is that the meaning of a sentence is determined by the meaning of its words and the way they are combined grammatically. This approach uses logical and mathematical tools to model meaning with precision.

Key Principles of Syntactic Semantics

1. **Principle of Compositionality:** This is the foundational principle of syntactic semantics. It states that the meaning of a complex expression is a function of the meanings of its parts and the way in which they are syntactically combined. In simpler terms, to find the meaning of a sentence, you calculate the meaning of the words and then apply the rules of syntax to combine them. For example, in the sentence "The cat chased the mouse," the meaning is derived from the meanings of "the," "cat," "chased," "the," and "mouse," and the syntactic rule that a verb ("chased") connects a subject ("the cat") to an object ("the mouse").
 2. **Truth Conditions:** Syntactic semantics often defines the meaning of a sentence by its **truth conditions**—the conditions under which the sentence would be true. For example, the meaning of the sentence "The dog is a mammal" can be understood as the set of conditions that must be met in the real world for the sentence to be true (i.e., that the entity identified as "the dog" is, in fact, an animal belonging to the class of mammals). This approach allows for a formal, objective way to analyze meaning, as it's not based on subjective interpretation.
 3. **Formal Systems:** This field uses logical frameworks, like predicate logic and set theory, to represent meaning. Nouns and verbs are translated into logical expressions, and sentences become logical formulas. This provides a precise and unambiguous way to analyze how grammatical structures contribute to meaning. For instance, the sentence "All cats meow" can be translated into the logical formula $\forall x(\text{Cat}(x) \rightarrow \text{Meow}(x))$.
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Contrasting with Lexical Semantics

While **syntactic semantics** focuses on the compositional nature of meaning at the sentence level, **lexical semantics** focuses on the meaning of individual words. The two fields are complementary: lexical semantics provides the meanings of the building blocks, and syntactic semantics provides the rules for combining them into larger structures.