

The CogNet Library : References Collection[☰](#) : [Table of Contents](#) : [Syntax-Semantics Interface](#)[«« Previous](#)[Next »»](#)

Syntax-Semantics Interface

A commonplace observation about language is that it consists of the systematic association of sound patterns with meaning. [SYNTAX](#) studies the structure of well-formed phrases (spelled out as sound sequences); [SEMANTICS](#) deals with the way syntactic structures are interpreted. However, how to exactly slice the pie between these two disciplines and how to map one into the other is the subject of controversy. In fact, understanding how syntax and semantics interact (i.e., their interface) constitutes one of the most interesting and central questions in linguistics.

Traditionally, phenomena like word order, case marking, agreement, and the like are viewed as part of syntax, whereas things like the meaningfulness of a well-formed string are seen as part of semantics. Thus, for example, "I loves Lee" is ungrammatical because of lack of agreement between the subject and the verb, a phenomenon that pertains to syntax, whereas Chomky's famous "colorless green ideas sleep furiously" is held to be syntactically well-formed but semantically deviant. In fact, there are two aspects of the picture just sketched that one ought to keep apart. The first pertains to data, the second to theoretical explanation. We may be able on pretheoretical grounds to classify some linguistic data (i.e., some native speakers' intuitions) as "syntactic" and others as "semantic." But we cannot determine a priori whether a certain phenomenon is best explained in syntactic or semantics terms. So, for example, syntactic accounts of semantic deviance (in terms of mismatches of features) are possible. As are conceivable semantic accounts even of phenomena like agreement. To illustrate the latter case, one could maintain that a VP like "loves Lee" denotes a predicate that cannot be true of, say, the speaker. Hence, "loves Lee" predicated of the speaker results in something undefined. This account of the ungrammaticality of "I loves Lee" would qualify as semantic as it crucially uses notions like *truth* and *denotation*, which are the building blocks of semantics. What is actually most likely is that agreement is ultimately a cluster of phenomena, whose optimal account will involve the interaction of both syntax and semantics (see Lapointe 1979). This is a simple illustration of how issues of interface arise and why they are so important. They concern both data and theory. It is not a matter of terminology but of which component is responsible for which phenomenon and how the modules of each component are set up, something that cannot be settled a priori once and for all (see [MODULARITY AND LANGUAGE](#)).

Perhaps the key issue at the interface of syntax and semantics concerns the nature of the mapping between the two, which has been at the center of much research within [GENERATIVE GRAMMAR](#). An important approach, pursued especially within [CATEGORIAL GRAMMAR](#) and related lexicalist frameworks, has been dubbed by E. Bach the "rule-by-rule" hypothesis. It assumes that for each syntactic rule determining how two or more constituents are put together, there is a corresponding semantic rule determining how the respective meanings are to be composed. On this view, the interface task is to figure out which syntactic rules are mapped onto which semantic composition modes. A somewhat different line is pursued within transformational approaches to syntax such as the Government and Binding framework or the more recent Minimalist Program (see [MINIMALISM](#)). Within such approaches, there are no rules in the traditional sense but only very general schemata and principles that interact in yielding pairing of phonetic representations and logical forms. Logical forms (LFs) are syntactic representations where phenomena like scope and anaphoric links are unambiguously represented. For example, one possible LF for a sentence like (1a) would look roughly as (1b).

- (1)
- a. An advisor was assigned to every student to help him out with his scheduling.
 - b. [Every student_i] [an advisor was assigned to *t_i* to help him_i out with his_i scheduling]
 - c. Every student *x* is such that an advisor was assigned to *x* in order to help *x* with *x*'s scheduling.

The way to understand a structure like (1b) is by interpreting the object "every student" (which has been moved from its surface position to the left periphery of the clause) as having wide scope over the subject "an advisor" and as binding the pronouns "him/his" in the adjunct (as per the informal paraphrase in (1c)). This interpretation is guaranteed by mapping structures such as (1b) into their meaning (i.e., their the truth-conditions or some other logically based representation of propositional content). The mapping usually employs three things: the lexical meaning of the words; a few universal semantic operations (like function application and abstraction); and a limited set of type-shifting or coercion mechanisms.

The lexical meaning of words is drawn from a restricted set of semantic types that correspond in systematic ways to syntactic categories. For example, the syntactic category "NP" encodes certain patterns of distribution (namely, the possibility of occurring in certain slots in the clause, like subject, object, prepositional object, etc.). The corresponding semantic type will be that of individuals (in the case of referential NPs like "Luciano Pavarotti") or generalized [QUANTIFIERS](#) (in case of quantificational NPs like "at most two tenors" or "every red cat"). Similarly for the other syntactic categories: VPs will denote functions from individuals into truth values, and so on. In interpreting complex structures, say, for example [S Pavarotti [VP sings well]], one first checks the semantic type of the meaning of the constituents. Generally, one finds a function and an argument that can be combined by functional application. If, however, types don't match, something will have to be done. One possibility is resorting to a limited set of mechanisms that make the types fit (type shifting or coercion). This procedure is known as "type-driven interpretation" (Klein and Sag 1985; see also Partee 1987).

To illustrate typeshifting further, consider an adverb like "for two hours," which normally combines felicitously only with atelic verb phrases (i.e. VPs that express an activity lacking an inherent end point or culmination; see Verkuyl 1993 or Moens 1987, among many others):

- (2) a. John pushed the cart for two hours. [atelic]
 b. ?? John reached the summit for two hours. [telic]

Now certain telic eventualities can combine with such adverbs in spite of their telicity. They must, however, be reinterpreted iteratively, thereby becoming atelic:

- (3) a. Yesterday John knocked at the door once. [telic]
 b. Yesterday John knocked at the door for two hours. [telic]

The idea here is that the type of adverbials "for two hours" and that of telic activities don't match. But, in certain cases, one can interpolate a functor ITERATE that turns a telic individuality into an atelic one:

- (4) A. FOR TWO HOURS (KNOCK) → undefined
 B. FOR TWO HOURS (ITERATE(KNOCK)) → defined

Pinango, Zurif, and Jackendoff (1997) argue that type shifting of this sort has consequences for real-time processing. Type shifting can also be implemented on the rule-by-rule approach. Both the rule-by-rule approach and the LF-based one are compositional (see [COMPOSITIONALITY](#)) and strive to understand the universal properties of the syntax-semantics mapping. The main differences between them are mostly traceable to the different conceptions of syntactic structure that they are tailored on.

Live issues at the syntax-semantic interface include the following: What are the universal rules of semantic composition? We mentioned above function application and abstraction; is this all there is? What kinds of type-shifting operations (besides aspect-related ones like ITERATE) are there? Is type shifting restricted to the [LEXICON](#) or is it also used in the compositional part of the semantics? What are the mappings from syntactic categories into semantic types? Is there any crosslinguistic variation in any of the above? What role does the syntax-semantics mapping play in acquisition? To illustrate the variation issue, consider for example the status of mass nouns in English versus Italian. The following paradigm is representative:

- (5) a. Gold is rare
 b. *Oro e' raro
 'gold is rare'
 b. L'oro e' raro
 'the gold is rare'

In English, mass nouns like *gold* have the same syntactic distribution as proper names and can occur without a determiner in the canonical argumental positions (subject, object, object of preposition, etc.). In Italian (or French), mass nouns behave instead just like singular-count common nouns in that they can never occur in subject or object position without a determiner (see (5b-c)). This difference might be syntactic in nature (*gold* and *oro* belong to two different syntactic categories). Or, it is also conceivable that they belong to the same syntactic category (say, the category N) but their semantic type is different. In Romance, mass nouns are mapped into predicates (true of any portion of the relevant substance). As such, they are suited to restrict a determiner but not to occur bare in argument position. On the other hand, in English mass nouns might be names of substances, which would explain their proper noun-like behavior. This second approach is based on the assumption that there is a certain degree of variability across languages in the way items belonging to the same syntactic category are mapped into the corresponding meanings (Chierchia forthcoming, 1998).

From the above considerations, it should be clear why questions that arise at the syntax-semantics interface are fundamental. The empirical domains where one can hope to find answers to such questions are very broad. They range from the study of quantification and [ANAPHORA](#), to [TENSE AND ASPECT](#), to the study of [THEMATIC ROLES](#), and much more.

See also

- [COGNITIVE LINGUISTICS](#)
- [LOGICAL FORM IN LINGUISTICS](#)
- [MEANING](#)
- [WORD MEANING, ACQUISITION OF](#)

-- Gennaro Chierchia

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[«« Previous](#)

[Next »»](#)

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