

# THE INTERACTION OF SYNTAX, SEMANTICS & PRAGMATICS IN GRAMMARS: THE DEVELOPMENT OF ANALYTIC TOOLS IN MODERN LINGUISTICS

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- *ABSTRACT: One of the primary tasks facing a grammatical theory is to capture the interaction of syntax, semantics and pragmatics in linguistic systems. This is essential if linguistic theory is to explain the communicative functions of grammatical structures in particular languages and across languages. The questions which must be answered include: what is the appropriate universally valid representation for syntactic structure?, what would be an adequate representation of crucial aspects of the semantics of propositions?, how can discourse-pragmatic information be represented in a grammatically relevant way, and, most important, how do these different representations interact with each other? In this paper answers to these questions will be given in terms of Role and Reference Grammar (Van Valin, 1993; Van Valin & La Polla, 1997).*
- *KEYWORDS: Grammatical theory; Role and Reference Grammar.*

## Introduction

Many linguists would agree that one of the primary, if not *the* primary function of language is communication, and accordingly one of the primary tasks facing grammatical theories is to capture the interaction of syntax, semantics and pragmatics in linguistic systems. This is essential if linguistic theory is to explain the interplay of meaning, morphosyntactic form and communicative functions in particular languages and across languages. This leads to a host of important questions

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which must be answered, including: what is the appropriate universally valid representation for syntactic structure?, what would be an adequate representation of crucial aspects of the semantics of propositions?, how can discourse-pragmatic information be represented in a grammatically relevant way, and, most important, how do these different representations interact with each other? These are questions that could not have been imagined, let alone formulated, at the beginning of this century. As Franz Boas in North America and Ferdinand de Saussure in Europe worked to formulate the fundamental principles of modern synchronic linguistics in the last decade of the previous century and the first decade of this one, they strove to answer the most basic questions about the nature of language and its analysis, answers which provide the foundation for all of the work that followed. It has taken literally the entire 20th Century to get to the point where we can begin to develop serious theories and thereby to offer serious solutions to the issues raised above.

Language is often described as a system which related sounds to meanings, and the link between the two is provided by grammar, as in Figure 1.

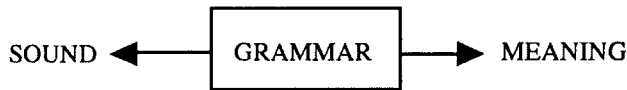


FIGURE 1 - Language as a system relating sound and meaning.

Interestingly but probably not surprisingly, the development of analytic tools for the study of language proceeded from sound via grammar to meaning. Up until around 1930, most work in the field in both North American and Europe concentrated on defining, refining and applying the concept of the "phoneme" in phonological analysis, and this continued on through the 30's as well. In that decade, work by Jakobson, Trubetzkoy, Bloomfield, Sapir and others began to shape the tools for morphological analysis as well, and this remained an important focus of research through the 1950's, with important contributions by Kurylowicz, Benveniste, Harris, Pike, Hockett and many others.

## The study of syntax

Serious investigation of syntax did not begin in earnest until the 1950's, and there is an important reason for this delay having to do with

the nature of syntax itself. The analytic methods employed by structural linguists were oriented toward uncovering the finite number of phonological and morphological units in a language and inventorying them and the variations in their forms. There is a finite number of phonological units, e.g. phonemes, in a language, and there is a finite number of grammatical morphemes (both derivational and inflectional) in a language. Hence it is possible to make a complete inventory of them, classify them, and describe their formal variation. It is not so obvious that this would be possible with respect to syntax. What exactly are the relevant units? Bloomfieldian tagmemes? Constructions? Sentence types? Sentences? There is a potentially infinite number of sentences in a language, and therefore a complete inventory analogous to that for phonological and morphological units is impossible. Hence syntax is fundamentally *productive* in a way that phonology and morphology are not. The serious study of syntax required the development of new techniques in linguistic analysis and there with new theoretical constructs, and these developments later fed back into phonology and morphology and led to analytic and theoretical changes.

Everyone is well aware of the major contributions that Chomsky and Melcuk have made to the study of syntax since the 1950's and 1960's, and I will not dwell on them here. I would, however, like to discuss briefly the contributions of two structural linguists, Zellig Harris and Charles Hockett, which are surprisingly relevant to the issues raised at the outset. A great deal of modern syntax derives from Harris' work. One aspect that is regularly acknowledged is the root of the ideas codified in X-bar syntax in Harris' analysis of morphosyntax in his 1946 paper "From morpheme to utterance". It is usually recognized as well that the original use of the term "transformation" was by Harris and that Chomsky, his stellar student, took the notion of transformation in a very different direction from that intended by Harris and in the end eclipsed his mentor and his ideas. It is worth looking at the notion of "transformation" proposed in Harris' paper "Cooccurrence and transformation in linguistic structure" a bit more closely. The fundamental notions for Harris were those of cooccurrence and substitution. In "From morpheme to utterance" he argued that the notion of form-class should be extended to include strings of morphemes in addition to single morphemes, and these substitution classes form the constituents of grammatical constructions, e.g. NV, AN, PN. If two (or more) constructions (1) have the

same substitution-classes and (2) the same morphemes can occur in the appropriate sub-classes in each, then the two constructions are *transforms* of each other (Harris, 1957, p.159-60). For example, simple clauses and gerunds are transforms of each other, since for any clause type NP V (NP), it is possible to form a gerund NP's *V-ing* (of NP). The relationship is bidirectional; the clause form can be predicted from the gerund, and vice versa. The statement describing the relationship between the transforms is a *transformation* (ibidem).

<u>a. Clause Pattern</u>	<u>Gerund</u>
Pat visits Chris	Pat's visiting (of) Chris
Dana sings	Dana's singing
Kim sends the package to Leslie	Kim's sending (of) the package to Leslie

b. The transformation:  $N_1 V (N_2) \leftrightarrow N_1 \text{'s } V\text{-ing ((of) } N_2)$

Thus a transformation for Harris is a statement of cooccurring forms in a language; to paraphrase (1b), "if there is a form ' $N_1 V (N_2)$ ', then there is also a form ' $N_1 \text{'s } V\text{-ing ((of) } N_2)$ '", and vice versa. There are also unidirectional implicational statements as well, the best example being passive. It is unidirectional, because there are sentences which fit the right hand side of the rule which are not related to an active voice form, as illustrated in (2c). ("*v*" = auxiliary verb)

- (2) a. The boy ate the sandwich → The sandwich was eaten by the boy  
 b.  $N_1 v V N_2 \rightarrow N_2 v \text{ be Ven by } N_1$   
 c. The ship was wrecked by [=near] the lighthouse ≠ The lighthouse wrecked the ship.

This notion of transformation was superseded by the Chomskyan derivational variety, but it has returned to be an important theoretical and analytic tool in syntactic theory in the last fifteen years or so, even though it has not usually been recognized as coming from Harris. Perhaps its most important use has been in the form of lexical rules in lexicalist theories. Consider the following lexical rule for passive taken from early Lexical-Functional Grammar (Bresnan, 1982).

- (3) a. (SUBJ) → ∅/OBL<sub>AG</sub>  
 (OBJ) → (SUBJ)  
 a'. < (↑SUBJ) (↑OBJ) > → < (↑OBL<sub>AG</sub>) (↑SUBJ) >  
 b. (↑PRED) = 'eat < (↑SUBJ) (↑OBJ) >'
- |       |       |
|-------|-------|
| Agent | Theme |
|-------|-------|
- (↑PRED) = 'eaten < (↑OBL<sub>AG</sub>) (↑SUBJ) >'

I have reformulated the rule in (3a) more in line with Harris' approach in (3a'); it can be interpreted as meaning, "if there is a verb with the argument structure ' $\langle (\uparrow\text{SUBJ}) (\uparrow\text{OBJ}) \rangle$ ', then there is also one with the argument structure ' $\langle (\uparrow\text{OBL}_{\text{AG}}) (\uparrow\text{SUBJ}) \rangle$ ". The result of the application of this rule to the lexical entry for the English verb *eat* is given in (3b). Thus lexical rules of this type are in essence Harris transformations stated over lexical entries for verbs, rather than over strings of syntactic substitution-classes.

The second realization of Harris' notion of transformation is in the metarules of Generalized Phrase Structure Grammar (Gazdar et al., 1985). Again, the passive construction in English provides a good example of how this type of cooccurrence statement works. In a phrase structure grammar, there are a variety of rules specifying types of VPs; the ones in (4) introduce active voice VPs, while those in (5) introduce passive voice VPs.

- |                               |                                       |
|-------------------------------|---------------------------------------|
| (4) a. $VP \rightarrow V, NP$ | (5) a. $VP[\text{PAS}] \rightarrow V$ |
| b. $VP \rightarrow V, NP, PP$ | b. $VP[\text{PAS}] \rightarrow V, PP$ |
| c. $VP \rightarrow V, NP, NP$ | c. $VP[\text{PAS}] \rightarrow V, NP$ |

There is obviously a systematic relationship between the VP rules in (5) and those in (4), and it can be captured by the cooccurrence statement in (6). (These are not meant to be the exact GPSG formulation, only illustrative; 'X' is a variable.)

- (6) ' $VP \rightarrow V, NP, X' \Rightarrow 'VP[\text{PAS}] \rightarrow V, X'$

We can give the same paraphrase as before: "if there is a VP-rule of the form ' $VP \rightarrow V, NP, X'$ ', then there is also one of the form ' $VP[\text{PAS}] \rightarrow V, X'$ ". Again we have a Harris-type unidirectional cooccurrence statement, this time over phrase-structure rules.

Thus, the Harris notion of transformation as a cooccurrence statement did not in fact disappear with the rise of Chomskyan transformational grammar, and with respect to the current situation in the field, it could be argued that it is in fact the more widely used notion at the present time, particularly in its use in the lexicon.

Two works by Hockett are of interest. The first is his 1954 paper "Two models of grammatical description", in which he contrasted item-and-process and item-and-arrangement approaches. Consonant with the Post-Bloomfieldian era in which he was writing, Hockett argued for the superiority of the item-and-arrangement model. With the advent of Chomskyan generative grammar a few years later, the item-and-process

approach came back into vogue; indeed, one could argue that the essential move Chomsky made analytically was to marry Harris' notion of transformation with Bloomfield's process model of morphology proposed in his book *Language*. A glance at the range of contemporary grammatical theories, however, reveals that the pendulum has swung back toward the dominance of item-and-arrangement models. This is true both in syntax, in which the majority of theories are non-transformational (in the Chomskyan sense) and are concerned with stating cooccurrence restrictions in the lexicon and elsewhere, and in computational linguistics, where great emphasis is placed on *declarative* rather than procedural formulations in many approaches.

The second work of Hockett's is his chapter entitled "Deep and Surface Grammar" in his 1958 book *A Course in Modern Linguistics*. There one finds what is perhaps the first attempt to integrate aspects of the syntactic, semantic and even pragmatic features of a construction. For syntax, he employs an immediate constituent representation, done in terms of boxes rather than trees. He augments the IC description with dependency notions, explicitly representing modifier-modified and "object-of" relationships. In what may be termed a "proto-" or "primitive pragmatic" representation, he also indicates *topic-comment* relations among the major constituents of the sentence. Finally, in order to talk about the relationship between the preposed NP *neĒi ge chei* "that car" and the verb *kaĒi* "drive" in the Mandarin sentence in (7),

- (7) Nèi ge che wo bú nèng kai.  
 that CL car I not can drive  
 'That car I can't drive.'

he introduced the notion of "valence" and talked about how at a deep level there is an important valence relations between this NP and the verb which is not overtly coded in the surface grammar. These "deep grammar" relationships are what we have come to talk about in terms of thematic relations and argument structure. Hockett never developed these insights any further, and similar ideas were independently discovered and developed by Gruber and Fillmore a decade later.

## The study of semantics & pragmatics

The work of Gruber and Fillmore on semantic roles represents one important strand in the study of semantics and grammar. We may provi-

sionally identify three such strands. The first concerns the semantics of predicate-argument relations and their relevance for grammar, as in the work of Fillmore, Gruber, Jackendoff and others. The second is focussed on combinatory semantics and derives primarily from the work of the philosopher Montague; Partee, Keenan, and others have shown how formal semantics of this type can be integrated into linguistic description and theory. The third concerns lexical representation, lexicography and related issues, and leading researchers in this strand include Apresjan and Wierzbicka. Taken together, the results of these distinct strands of research have made available a rich set of powerful tools for the analysis of meaning, and it would be fair to say that the traditional pairing of "syntax & semantics" now reflects an equal partnership in the study of language.

The modern investigation of the communicative functions of language begins with Czech linguistics such as Mathesius in the 1920's and his successors in the Prague School such as Danes-, Firbas, Sgall and others; their theory of communicative dynamism has profoundly influenced work in discourse and pragmatics throughout Europe and North America. A second major impetus to work in this area came from philosophers of language, in particular Grice, Austin and Searle. Each of these schools has contributed analytic and theoretical tools for the study of how language is used in various ways and in various contexts, and many linguists have been wielding them successfully in the search for the understanding of the complex relationships between linguistic forms and communicative functions.

### **Capturing the interplay of syntax, semantics and pragmatics**

There are at present a number of approaches to presenting an integrated description of syntax, semantics and pragmatics; for example, Dik's Functional Grammar represents and deals with all three aspects, as does Kamp's Discourse Representation Theory, which combines a combinatorial syntax, Montague semantics, and a theory of discourse. I would like to summarize the approach that I have been taking to this issue, namely Role and Reference Grammar [RRG], and to show how the way it represents this interaction reflects the influence of many of the ideas mentioned above.

At the beginning of the paper a number of questions were raised, the first one being "what is the appropriate universally valid representation for syntactic structure?". There are good reasons for rejecting both immediate constituent and grammatical-relations based representations, as argued in Van Valin & LaPolla (1997), and Van Valin (1993) argues that a semantically-based representation of clause structure called "the layered structure of the clause" is a universally-valid conception of clause structure. The central components of the clause are the NUCLEUS, containing the predicate, the CORE, containing the nucleus and the arguments of the predicate, and the PERIPHERY, containing adjunct modifiers of the core. In addition, some languages have a PRE-CORE SLOT [PCS], which is the special clause-initial position for question words and topicalized phrases. It is represented in the projection grammar formalism, proposed by Johnson (1987). It represents predicates and their arguments and modifiers in one projection, and what in RRG are called operators (grammatical categories such as aspect, tense, modality and mood) in a separate projection. Examples from English and Korean are given in Figures 2a and 2b.

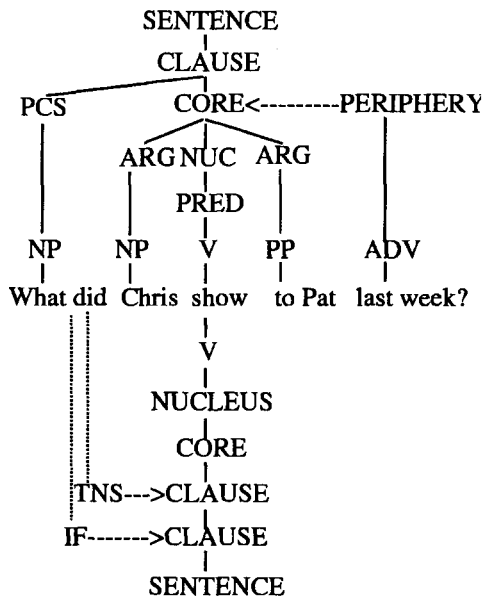


FIGURE 2a - The layered structure of the clause in English.



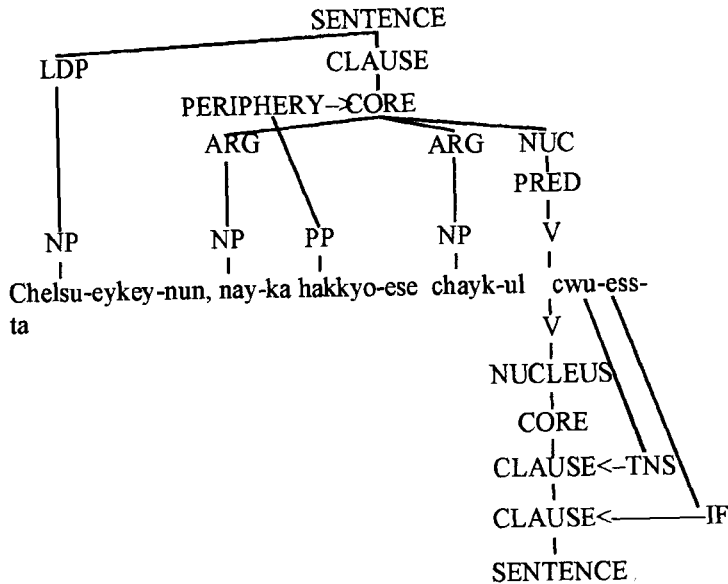


FIGURE 2b – The layered structure of the clause in Korean.

There are strong reasons for treating constituents and operators distinctly; see Van Valin (1993a), Van Valin & LaPolla (1997) for detailed discussion.

The representation in Figure 3 deals with only the morphosyntactic aspects of the sentence. The semantic representation of the clause in RRG is a decompositional representation, an approach proposed by Gruber, Wierzbicka, Jackendoff, Dowty and others. The particular decomposition employed is adapted from the *Aktionsart*-based decompositional system in Montague Grammar proposed in Dowty (1979) and elaborated and developed in Foley & Van Valin (1984), Van Valin (1993a, 1994), Van Valin & Wilkins (1993, 1996) and Van Valin & LaPolla (1997). Following Gruber and Jackendoff, semantic roles are defined in terms of argument positions in the representations, and there are cooccurrence statements of the Harris type in the lexicon. There is a direct mapping between the semantic representation and the syntactic representation. This is illustrated in Figure 3.

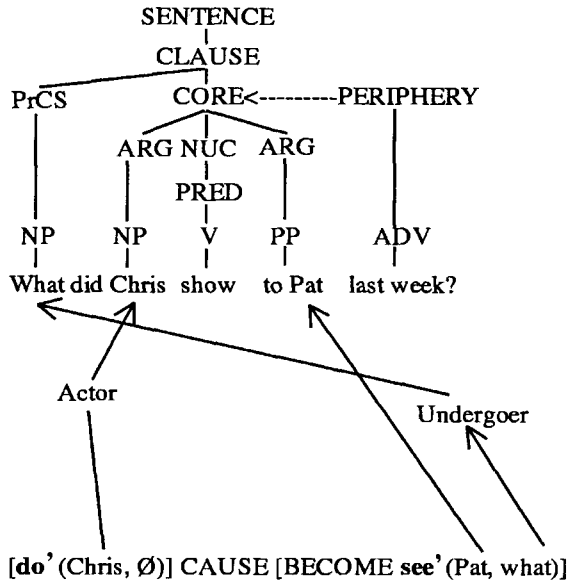


FIGURE 3 – Linking from semantics to syntax in RRG.

The final aspect of the analysis is pragmatic. Since this is a WH-question, there is narrow focus on the WH-word; how should this be captured and represented? In RRG, Lambrecht's theory (1994) of focus structure constructions, which owes a great debt to Prague School work in this area, is adopted, and two aspects of focus structure are represented for every sentence: first, the potential focus domain, which is the syntactic domain in which focus may occur, and second, the actual focus domain, what is in focus in the particular sentence in question. In English, the whole clause is the potential focus domain in simple sentences. Focus structure can be represented as in Figure 4. (The dark dashed lines indicate the potential focus domain, the triangle the actual focus domain.)

The illocutionary force [IF] anchors the Focus Structure projection, since it is tied to the speech act properties of the sentence.

All of these aspects of the structure of *What did Chris show to Pat last week?* can be portrayed in a single projection grammar representation, as in Figure 5.

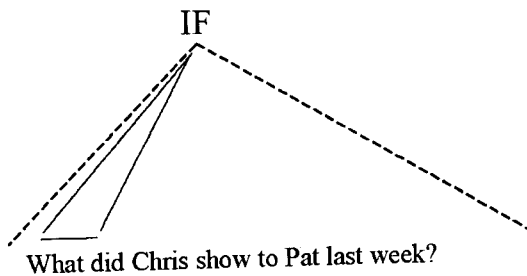


FIGURE 4 - Representation of information structure in RRG

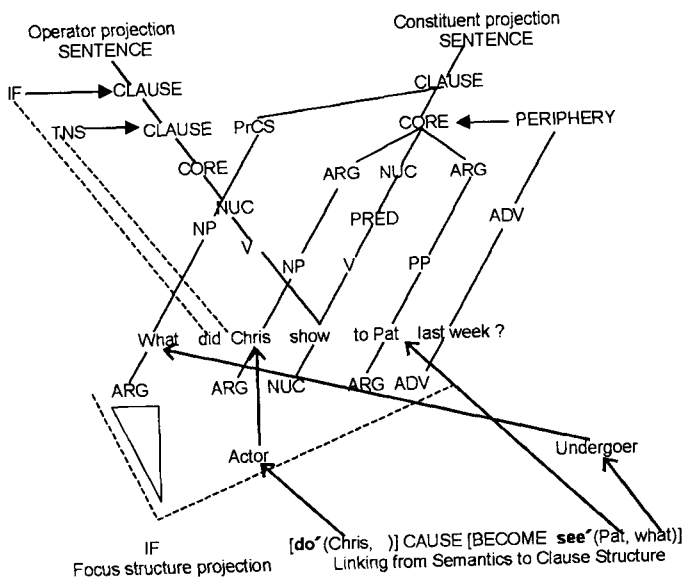


FIGURE 5 - Linking from semantics to syntax with full clause structure.

Representations like these can be seen as being in the spirit of Hockett's augmented IC representations, in that they attempt to depict different aspects of the structure of a sentence simultaneously. Given such representations, it is possible to analyze grammatical phenomena with respect to their morphosyntactic, semantic and pragmatic properties in an integrated way and to formulate principles and constraints which capture the interaction among these features.

## Conclusion

At the end of the first century of modern synchronic linguistics, we possess a rich and powerful array of descriptive and theoretical constructs for the analysis of syntax, semantics and pragmatics, and these tools, together with the explosion of information about languages from all over the world of the last thirty years, place us in the position to begin answering the great questions about language that have arisen during the 20th Century.

VAN VALIN JUNIOR, R. D. A interação entre sintaxe, semântica e pragmática nas gramáticas: o desenvolvimento de ferramentas analíticas na linguística moderna. *Alfa (São Paulo)*, v.43, p.171-183, 1999.

- *RESUMO: Entre as tarefas básicas a serem enfrentadas por uma teoria gramatical está a de entender e dominar a interação entre sintaxe, semântica e pragmática no sistema linguístico. Isto é fundamental se a teoria linguística tem que explicar as funções comunicativas das estruturas gramaticais não só em línguas específicas, mas também entre duas ou mais línguas. As questões que devem ser respondidas incluem: qual é a representação adequada universalmente válida para a estrutura sintática? Qual seria a representação adequada de aspectos semânticos cruciais da proposição? Como pode a informação discursiva-pragmática ser representada de um modo gramaticalmente relevante e, mais importante, como essas diferentes representações interagem umas com as outras? Neste artigo, respostas a essas questões serão dadas nos termos da Gramática de Papel e Referência (Van Valin, 1993; Van Valin & La Polla, 1997).*
- *PALAVRAS-CHAVE: Teoria gramatical; Gramática de Papel e Referência.*

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