Trends in Linguistics

Semantic Role Universals and Argument Linking

Theoretical, Typological, and Psycholinguistic Perspectives
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Theoretical, Typological, and Psycholinguistic Perspectives

edited by
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This volume is dedicated to the memory of Helma van den Berg (1965–2003). Helma participated in the conference that led to this volume and is co-author of one of the contributions, although her untimely death meant that she was unable to join in the final stages of production of the volume. An indefatigable investigator of the languages of the North Caucasus and a recent recipient of a prestigious research grant from the Netherlands Science Organization, Helma died prematurely of a heart attack while conducting fieldwork on the Dargi language in Derbent (Daghestan). We mourn the loss to her family, to science, and to ourselves.
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1. Semantic roles as a core linguistic concept

Semantic roles have long played a major role in all domains of linguistic explanation, including theory of grammar, language typology and psycho-/neurolinguistics. This strong degree of interest is grounded mainly in the need for suitable interface representations that can mediate between syntax and semantics. Because semantic (thematic) roles can characterise core relational meaning with a certain degree of abstraction, they have been implicated in the linking between the relevant semantic aspects of an underlying meaning and the abstract requirements of the corresponding surface form. However, despite the obvious appeal of such interface representations and the high degree of interest afforded to them during the last decades of linguistic research, there is still no fully satisfactory model of how the syntax-to-semantics linking is accomplished. One reason for this appears to lie in the problems regarding the definition and scope of semantic roles that have continually reappeared since the very beginnings of research in this domain (Fillmore 1968; Gruber 1965; Jackendoff 1972). For example, researchers have vastly differed with regard to how many semantic roles should be assumed, how these should be characterised both in semantic and in syntactic terms, how the different roles can be dissociated from one another, and which syntactic phenomena should be derivable from them.

Essentially, the literature suggests two possible ways of overcoming these difficulties. On the one hand, it has been proposed that the hierarchical relations between semantic roles are more important with regard to the form-to-meaning mapping than the content of individual roles (Bierwisch 1988; Bresnan and Kanerva 1989; Grimshaw 1990; Jackendoff 1972; Wunderlich 1997). While the further degree of abstraction provided by a hierarchy-based approach resulted in a major advance in the characterisation of linking properties, the formulation of hierarchies in
terms of individual role labels is inherently subject to similar problems as the individual roles themselves. Thus, a number of conflicting hierarchies have been proposed (e.g. with respect to the relative ranking of Theme/Patient and Recipient/Benefactive), all of which can account for certain syntactic phenomena, but at the same time fail to provide a comprehensive solution to the challenges of argument linking.

A second type of approach to the problems described above lies in the assumption of "generalised semantic roles" (GSRs), which have been referred to as macroroles (Foley and Van Valin 1984), proto-roles (Dowty 1991) and hyperroles (Kibrik 1997). GSRs differ from individual semantic roles in that they abstract over the content of several individual roles and therefore allow for a highly reduced role inventory (typically including only two generalised roles). By focusing on a small number of role oppositions, GSRs appear well suited to modelling argument linking. However, this obvious advantage comes at the cost of a reduced degree of semantic resolution such that fine-grained differences between, say, volitional Agents and inadvertent Causers must be expressed at a different level of representation.

The advantages of both hierarchy-based and GSR-based approaches to argument linking also become apparent when the concept of semantic roles is applied to typological and psycho-/neurolinguistic investigations of language.

The typological approach brings to bear information gleaned from studying both the constraints on cross-linguistic variation with regard to semantic role-based phenomena and the systematic aspects of such cross-linguistic variation. Where identity or similarity is found across languages, then models must be developed that pay due attention to such robust properties of human language. Where there is variation, models are encouraged that encompass the relevant variation while paying due heed to the ways in which different features in different languages modulate the interpretation of generalised semantic roles – for instance through the use of semantic maps to unite core and more peripheral instantiations of a particular semantic role – and to the ways in which hierarchies of generalised semantic roles may play a part, varying across languages, in determining other morphosyntactic properties such as argument linking.

From the perspective of language processing, a precise characterisation of the representations involved in the mapping from form to meaning (and vice versa) is of particular importance, because linguistic disciplines such as psycho- and neurolinguistics seek to explain how this mapping is performed in real time. Thus, efficient communication requires that a
maximal degree of interpretation be inferred at each point of the incoming speech stream in spite of the fact that the information relevant for the interpretive processes may still be incomplete. Consider, for example, the difference between the sentences *John broke a vase* and *John broke a leg*. The two sentences are identical until the direct object is encountered, at which point *John* may either be disambiguated towards an Agent (or at least a Causer) or towards a Patient of the breaking-event. Nonetheless, the processing system cannot wait until this point before making interpretive decisions and must therefore already assign at least certain relevant properties to the argument *John* before the disambiguating object position is reached. Under the assumption that these crucial properties are equivalent to individual thematic roles, however, the indeterminacy of individual role properties in the absence of verb-specific information would lead to some kind of role-reanalysis in the vast majority of sentences. In view of these considerations, it appears more appealing to assume an online assignment of hierarchical role relations or GSRs rather than of individual semantic roles, especially for languages in which the arguments typically precede the verb.

2. Semantic roles and argument linking

From the earliest approaches to semantic roles and their interface character between syntax and semantics, a central research focus has lain on defining the relation between these roles (both individual and generalised) and their corresponding syntactic categories. Thus, questions at the heart of the notion of “argument linking” concern both the precise semantic content of the assumed semantic role concepts and the nature of the syntactic notions to which they correspond (e.g. phrase structure positions or grammatical functions) as well as the way in which the correspondence between the two levels of representation is defined.

One of the strongest hypotheses with respect to the correspondence between semantic roles and syntactic structure was formulated in Perlmutter and Postal’s *Universal Alignment Hypothesis* (UAH; Perlmutter and Rosen 1984) and Baker’s *Universality of Theta Assignment Hypothesis* (UTAH; Baker 1988). Even though the two approaches are situated in different grammatical models (Relational Grammar vs. Chomsky’s Principles and Parameters framework), both assume that the semantic role borne by an argument crucially determines that argument’s position in the syntactic structure. The strictest interpretation of these approaches therefore
implies that a particular semantic role (e.g. Patient) is always realised in a particular syntactic position. However, as such a one-to-one correspondence appears too strong to be empirically adequate, slightly weaker versions of these mapping principles have been proposed. For example, in the extended UTAH, Baker (1988) proposes that a verb’s thematic grid determines only the relative hierarchical ranking of its arguments in the syntactic structure, rather than their exact structural positions (e.g. as a complement of the verbal head).

A second class of approaches drawing upon the notion of a semantic role hierarchy has found its primary advocates in Jackendoff (1972) and Grimshaw (1990). These researchers have focused particularly on the way in which the hierarchical ranking of semantic roles with respect to one another constrains (a) the mapping of their respective arguments onto grammatical functions, and (b) the applicability of syntactic operations such as passivisation. This approach was motivated, for example, by the non-standard linking requirements of psychological verbs such as to fear and to frighten, which appear to require mutually inverse associations of Experiencer and Stimulus to grammatical functions. Grimshaw proposes that this apparent linking paradox in fact results from the interaction of two role hierarchies, one of which is thematic and the other of which is aspectual in nature. It is the output of this interaction that determines the syntactic realisation of an argument (i.e. its realisation as subject or object).

Syntactic argument realisation in terms of grammatical functions has also been modelled in accounts assuming generalised semantic roles, specifically in the macrorole approach pursued in Role and Reference Grammar (Foley and Van Valin 1984; Van Valin and LaPolla 1997) and in Dowty’s protorole theory (Dowty 1991). However, these two approaches differ significantly with respect to the interpretive properties drawn upon in the linking process and as to the nature of the syntactic representation that is established. On the one hand, Van Valin and colleagues assume that the “privileged syntactic argument” is determined via the macrorole hierarchy, with precise correspondences subject to cross-linguistic variation (see Van Valin this volume). On the other, Dowty proposes that the argument with the higher number of proto-agent properties (e.g. volitionality) or the lower number of proto-patient properties (e.g. affectedness) is mapped onto the syntactic subject. The degree of role prototypicality therefore directly determines an argument’s syntactic realisation. In an extension of the protorole approach, Primus (1999) assumes a linking correspondence between GSRs and morphological case markers, which are in turn associated with grammatical functions.
The notion that hierarchically organised role concepts are linked to case markers as a prerequisite for the syntactic realisation of an argument has been advanced by a number of researchers (e.g. Bierwisch 1988; Kiparsky 1987; Wunderlich 1997). For example, Wunderlich (1997; see also Wunderlich this volume) assumes that case markers serve as linkers between syntactic arguments and their hierarchical positions in the decomposed lexical structure of a verb. The correspondence between the two levels is represented via the features ±lr (there exists a lower role, there exists no lower role) and ±hr (there exists a higher role, there exists no higher role). While this type of approach is based on the assumption of an isomorphism between the lexical argument hierarchy and a hierarchical syntactic representation, it does not require a one-to-one correspondence between a semantic role and a particular syntactic position/grammatical function.

In summary, the argument linking approaches described differ with respect to (a) the way in which they define semantic roles and/or the hierarchical relations between them, (b) the definition of syntactic properties onto which these roles are mapped, and (c) the nature of the correspondence between the two levels of representation. Nonetheless, all emphasise the importance of semantic role concepts as interface representations between form and meaning.

3. Integrating different perspectives on semantic roles and argument linking

The present volume is based on a conference on generalised semantic roles and argument linking that was hosted by the Max Planck Institutes for Human Cognitive and Brain Sciences and for Evolutionary Anthropology in December of 2002. This conference aimed to bring together insights on the subject of semantic roles from a variety of perspectives, with a particular focus on the integration of theoretical, language typological and psycho-/neurolinguistic views. As the contributions to this volume show, these different linguistic subdisciplines have been concerned with very similar sorts of questions with regard to the topic in question. Thus, while approaching the issue of semantic roles and argument linking from different perspectives, the contributions to this volume explore the following common set of questions:
a. How does semantic role information subserve argument linking (from semantics to syntax or vice versa) and how does it interact with other information types in this process?

b. What is the conceptual content of a semantic role? Which aspects of this content may be assumed to be universal and which are language specific?

c. Are semantic roles organised hierarchically? How should the role hierarchy be defined?

d. In what way do semantic roles relate to the concept of a lexical argument hierarchy, i.e. the hierarchy of argument variables specified in the logical structure of a verb’s lexical entry?

Despite these common questions and the partially overlapping approaches apparent in a number of the contributions, the volume adopts a “traditional” subdivision into the following three major sections: theoretical concepts, cross-linguistic considerations and psycho-/neurolinguistic evidence. In the first section, basic questions regarding the theoretical status of semantic roles are addressed, while the second and third sections apply some of these theoretical concepts to empirical issues in language typology and language processing in addition to drawing attention to some empirically warranted theoretical issues.

3.1. Theoretical concepts

Firstly, the contributions in the theoretical section all present arguments for more fine-grained distinctions in the definition and implementation of semantic roles. Moreover, they address the question of which aspects of semantic roles may potentially be universal and which can be expected to vary cross-linguistically, thereby providing a direct connection to the typological approaches discussed later.

Dieter Wunderlich identifies four different semantic factors that may influence argument realisation (in terms of case marking and/or structural position): the lexically determined argument hierarchy, the semantic roles assigned by the predicate, the sortal/referential salience of an argument (in terms of inherent features such as animacy) and the informational salience of an argument (e.g. in terms of topic/focus). Languages differ as to which of these influences is most important, thereby leading to a typological classification into (a) languages in which argument linking is determined
very strongly by a variety of semantic factors, (b) languages which have
developed a structural linking system based on the argument hierarchy and
which is at most modulated by semantic factors, and (c) languages that
employ a strictly position-based linking and which, as a consequence
cannot systematically encode semantic factors via linking properties.

By contrast, **Beatrice Primus** focuses on the internal content of
semantic roles and how different semantic features may differentially affect
aspects of argument linking. She thus addresses the problem of apparent
ranking paradoxes in semantic role hierarchies by proposing that the
singular hierarchies previously assumed should be differentiated in a multi-
dimensional manner. In this way, she assumes separate role hierarchies
based on the features “involvement” and “causal dependency”. She further
argues that different morpho-syntactic properties (case marking vs.
syntactic structure/position) are selectively sensitive to these different
dimensions. Semantic role-based constraints on case marking and structural
prominence are then modelled in an optimality theoretic account.

In the final chapter of the theoretical section, **Manfred Bierwisch** also
focuses on the content of semantic (thematic) roles and seeks to identify its
universal, language specific and idiosyncratic (i.e. lexically specified)
aspects. In this regard, he contrasts two conceptions about semantic roles,
the “extrinsic” and the “intrinsic” view. While the former assumes a
(presumably universal) set of semantic role relations ranked according to
their substantive content, the latter posits that the relations in question are
an inherent property of the ranking between the argument variables in a
lexical semantic form. He argues that the intrinsic view, in which semantic
roles are anchored in an independently motivated semantic representation,
is both empirically more adequate and more parsimonious than the extrinsic
view. Thus, in this chapter, the concept of an argument hierarchy – the
format of which is considered a universal property – also plays a crucial
role in the characterisation of semantic role information. Beyond these
universal conceptions, language-specific aspects determine the morpho-
syntactic features involved in the realisation of semantic roles, while
idiosyncratic properties include additional, lexically fixed options.

### 3.2. Cross-linguistic considerations

The cross-linguistic section of the volume provides a natural extension to
the theoretical concepts discussed in section 1. All of the four typological
chapters focus on possible factors affecting argument linking and the
neutralisation of semantic roles in syntactic operations. Whereas Comrie and van den Berg’s discussion of Daghestanian languages in Chapter 4 is very pertinent to the types of factors affecting argument realisation examined by Dieter Wunderlich in Chapter 1, Balthar Bickel’s typology of privileged syntactic argument selection (Chapter 5) picks up on the concept of an argument hierarchy and contrasts this with the influence of morphosyntactic factors. In Chapter 6, Walter Bisang examines a number of problems for traditional conceptions of argument linking from semantics to syntax, and, finally, Georg Bossong (Chapter 7) accounts for accusative vs. ergative linking patterns in terms of linguistic “forces” relating either to the text or the predicate level. In each chapter, consequences of the typological considerations for theories of semantic roles are discussed.

Bernard Comrie and Helma van den Berg examine the grammatical and semantic properties of experiencer verbs in Daghestanian languages (East Caucasian). While all Daghestanian languages have distinct experiencer constructions, they differ as to which verbs employ this construction and as to whether the case marking of the experiencer argument varies between different verbs. Moreover, in terms of argument linking, it is typically the experiencer argument that displays “subject properties” in these languages. However, this general tendency can be modified and, in some cases, even overridden by various syntactic, semantic and pragmatic factors. In this way, this chapter provides important insights on the fine-grained nature of typologically informed, feature-based accounts of generalised semantic roles.

Further new typological variables with respect to argument linking are introduced by Balthasar Bickel. His chapter argues for a differentiation between (a) constructional PSAs (privileged syntactic argument, a cover term for pivots and controllers adapted from Role & Reference Grammar) linking to arguments as represented in lexical predicates, where they are defined in terms of semantic roles or of positions in decompositional semantic structure, and (b) constructional PSAs linking to arguments as represented in clause structure, where they are defined in terms of case and agreement morphology, phrase-structural position, projection level (bare N, NP, DP, PP etc), and other morphosyntactic expression forms. He presents evidence from German and two Sino-Tibetan languages, Belhare and Lai, which suggests that both language-specific facts and cross-linguistic differences are adequately captured by the proposed variable. This contribution therefore makes apparent the explanatory power of GSRs in accounting for the cross-linguistic realisation of particular syntactic properties.
Walter Bisang further qualifies theoretical conceptions of argument selection (linking) from a typological perspective by examining (a) cases in which semantic role and semantic role hierarchy information does not suffice for assigning semantic participants to syntactic categories, (b) cases in which the syntactic categories of a language provide no independent evidence for semantic roles and/or syntactic operations are not based on the neutralisation of semantic roles, and (c) cases in which semantic roles and argumenthood are not the main factors in determining subject and object assignments. He argues that the additional semantic properties can be captured quite naturally in a prototypical approach to semantic roles, while the two other domains raise problems for both generative and functional theories. The absence of subject-object asymmetries in languages such as Chinese suggests that there is no universal linking hierarchy incorporating the subject-object distinction. Furthermore, the existence of languages with a syntactically privileged position not based on a thematic hierarchy (Liangshan Nuosu) is generally problematic for linking conceptions. Finally, the assignment of syntactic categories on the basis of referential status information favours functional rather than formal linking theories.

The conceptual content of GSRs and their role in argument linking is discussed in detail by Georg Bossong. He examines patterns of markedness in argument linking by focusing on the semantic polarity of the two basic case role prototypes A (+agentive, +controlling, +conscious, +animate and +topical arguments) and O (displaying the opposite polarity of these features). Depending of whether syntactic processes treat the sole argument of an intransitive verb, S, in the same way as A (accusative pivot) or as O (ergative pivot), unmarkedness (i.e. null morphological marking) is assumed to encode independence or integration. Independence is defined as autonomy with respect to another category, and specifically, as autonomy between an unmarked noun phrase and a predicate (a typical subject property). Integration, by contrast, means that an unmarked noun can potentially be incorporated into a verbal complex, while a marked noun cannot. On the level of function, then, unmarkedness is shown to have two opposite values: it marks independence in the accumulation pattern $S = A$, whereas it signals integration in the accumulation pattern $S = O$. Pivots of the accusative pattern are adapted to the needs of story telling, they are functional with respect to text constitution. Pivots of the ergative pattern are adequate for verb-object integration, they are functional with respect to predicate building. There are two forces of attraction, from linguistic ranks higher or lower than the kernel sentence. Attraction from above (text) leads to accusativity, attraction from below (predicate) to ergativity. Both are
equally functional, but for a majority of languages the force from above seems to be stronger.

3.3. Psycho-/neurolinguistic evidence

In the final section of the book, the theoretical and typological aspects previously discussed are enriched by a psycho-/neurolinguistic perspective on semantic roles and argument linking. The section is introduced by Robert Van Valin’s contribution on the relationship between syntactic theory and language processing (Chapter 8), thereby providing a foundation for the theoretical relevance of the empirical results discussed in the following chapters. In Chapter 9, Maria Piñango argues for an event-structure based characterisation of semantic roles on the basis of findings from language impairments (Broca’s aphasia). Finally, in Chapter 10, Ina Bornkessel and Matthias Schlesewsky propose a model of language comprehension incorporating the distinction between generalised semantic role-based argument linking and syntactic templates, thereby aiming to provide a first step towards a typologically adequate model of argument interpretation during real-time comprehension.

From the perspective of a theoretical grammarian, Robert Van Valin undertakes an important first step in integrating theoretical and psycho-/neurolinguistic concepts on argument linking. Adopting the position, following Kaplan and Bresnan (1982), that a syntactic theory should be relatable to a testable model of language processing, he goes on to explore the precise nature of this relationship. Using Role and Reference Grammar as a theoretical starting point, he examines the predictions of this theory’s claims for both language production and language comprehension. Whereas the correspondence between a theoretical model and a model of language production appears relatively straightforward, the link between grammatical theory and language understanding requires a number of further qualifying assumptions in order for real-time comprehension to be successfully captured. Finally, the chapter explores how processing facts might impact on grammatical theories, thereby providing an important foundation for the remaining psycho-/neurolinguistic chapters and the importance of the findings discussed there for theoretical conceptions of semantic roles.

One of the major empirical research traditions with regard to language has drawn upon data from language impairments – and here, especially from Broca’s aphasia – to explore the validity of concepts from linguistic
theory (cf. Zurif and Swinney 1994). From this perspective, Maria Piñango examines the correspondence between semantic roles and syntactic properties. Specifically, she argues that this mapping should be described in terms of a 3-tier model, in which the syntax-independent principles (e.g. affectedness and force-causality) that guide such a connection are derived from the event structure of the clause and are mediated by an interface level containing grammatical functions (GF) and discourse representations. This accounts for the apparent organization of semantic roles not in relation to their predicate but in relation to each other (e.g. Croft 1998; Jackendoff 1990; Krifka 1992). In this way, Piñango provides important evidence for the assumption that generalised representations are needed to mediate between a surface form and its interpretation.

In the final chapter of the volume, Ina Bornkessel and Matthias Schlesewsky describe a model of language comprehension making crucial reference to a representational level involving GSRs. Specifically, it is proposed that many existing neurophysiological and neuroanatomical results on on-line language comprehension are naturally accounted for with reference to a competence theory that assumes two levels of representation: syntactic templates and generalised semantic roles. Whereas the former underlie basic processes of constituent structuring during comprehension, the latter form the basis for a linking algorithm mediating between form (syntax) and meaning (semantics). Results on the processing of object experiencer verbs in German are taken as a starting point for a discussion of different theoretical concepts regarding GSRs. As such, this chapter shows how results from language processing might be drawn upon to provide converging support for theoretical approaches to these types of concepts.

3.4. A final remark

In summary, this volume unites approaches from a number of linguistic subdisciplines that have referred extensively to the concept of semantic (or 'thematic') roles. Of course, none of the approaches presented here can provide a comprehensive answer to all of the common questions formulated above. Nonetheless, the entire set of contributions and the obvious cross-fertilisation between them indicates how integrative, multi-disciplinary research in the field of semantic roles can advance our knowledge with respect to this crucial aspect of linguistic theorising.
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Primus, Beatrice

Van Valin, Robert D.

Van Valin, Robert D., Jr., and La Polla, Randy

Wunderlich, Dieter

Zurif, Edgar B., and David Swinney
Argument hierarchy and other factors determining argument realization

Dieter Wunderlich

1. Introduction

Most, if not all argument linking systems derive from generalizations based on agentive transitive verbs. Cross-linguistically, the creation of relational predicates (encoded in basic transitive verbs) is governed by a universal principle: the higher argument is more agent-like and more salient in terms of person, animacy and specificity than the lower one. Since also non-agentive types of verbs are possible, every language has to make certain generalizations covering these types of verbs, and since variation in the sortal or referential type of argument values is possible, every language has to make certain generalizations for non-canonical distributions of those values. Moreover, every language has to set off the set of transitive verbs from intransitive ones, for instance, to reflect conditions under which transitive verbs are reduced and, vice versa, intransitive verbs are enriched. Finally, every language has to make certain provisos of how to deal with 3-place predicates (to be encoded in ditransitive verbs or verb serialization), and to supply with further means of complex predicate formation.

The central function of agentive transitive verbs in a grammar is also reflected in the theories concerned with argument linking. Several theories, including classical generative grammar, only accept two true (‘structural’) arguments of a verb, designated by abstract case (‘accusative’ vs. ‘nominative’) or grammatical function (‘object’ vs. ‘subject’). Semantically oriented theories distinguish between proto-agent and proto-patient roles (Dowty 1991), while Role and Reference Grammar (RRG; Van Valin 1993) mediates between semantic and structural properties by the two macroroles ‘actor’ and ‘undergoer’. It is generally accepted that agents are more salient than patients, hence better candidates for topic, whereas patients are better candidates for focus.
Table 1. Prototypical transitive verbs

<table>
<thead>
<tr>
<th></th>
<th>λy</th>
<th>λx</th>
<th>VERB(x,y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>abstract case</td>
<td>accusative</td>
<td>nominative</td>
<td></td>
</tr>
<tr>
<td>grammatical function</td>
<td>object</td>
<td>subject</td>
<td></td>
</tr>
<tr>
<td>protoroles</td>
<td>proto-patient</td>
<td>proto-agent</td>
<td></td>
</tr>
<tr>
<td>macroroles</td>
<td>undergoer</td>
<td>actor</td>
<td></td>
</tr>
<tr>
<td>natural distribution</td>
<td>less salient</td>
<td>more salient</td>
<td></td>
</tr>
<tr>
<td>of salience</td>
<td>(person, animacy, specificity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>natural candidate for</td>
<td>focus</td>
<td>topic</td>
<td></td>
</tr>
</tbody>
</table>

Because of their design properties, all theories capture agentive transitive verbs sufficiently (in this respect they are compatible), but as soon as it comes to other types of verbs, they largely differ from each other. The crucial role of ditransitive verbs for a theory of grammar has been recognized only recently (Joppen-Hellwig 2001, Haspelmath 2005, Wunderlich 2005). One remarkable point is that ditransitive verbs in a language with positional linking (like English) behave differently from those in a language with morphological case (like German), as confirmed with data from passive.

(1)  
a. The woman gave him two books.  
   He was (sg.) given two books.  
b. Die Frau gab ihm zwei Bücher.  
   Ihm (DAT) wurden (pl.) zwei Bücher gegeben.

In a system with positional double-object, the recipient (being the 'primary object') becomes syntactic subject in the passive, whereas in a system with morphological case, the theme (being the 'direct object') is shifted to nominative in the passive, while the recipient (the 'indirect object') stays in the dative. In any case, the recipient should be considered a medial argument, as reflected by its place in the default word order, among others. This fact can be captured by the assumption of lexical decomposition, claiming that ditransitive verbs are constituted by at least two predicates.

(2) 'give' verbs: \( \lambda z \lambda y \lambda x \{ \text{ACT}(x) \& \text{BECOME POSS}(y,z) \} \)

Many theories of grammar have no adequate place for medial arguments. This can be seen if one tries to apply the criteria used in Table 1 to the recipient of ditransitive verbs.
Table 2. No place for medial arguments in various linguistic theories

<table>
<thead>
<tr>
<th></th>
<th>$\lambda x$</th>
<th>$\lambda y$</th>
<th>$\lambda z$</th>
<th>VERB(x,y,z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>abstract case</td>
<td>accusative</td>
<td>none</td>
<td>nominative</td>
<td></td>
</tr>
<tr>
<td>grammatical function</td>
<td>object</td>
<td>prim. obj/subject</td>
<td>indir. obj</td>
<td></td>
</tr>
<tr>
<td>protoroles</td>
<td>proto-agent</td>
<td>mixed</td>
<td>proto-agent</td>
<td></td>
</tr>
<tr>
<td>macroroles</td>
<td>undergoer</td>
<td>(recipient)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>natural distribution of salience (person, animacy, specificity)</td>
<td>less salient</td>
<td>more</td>
<td>more salient</td>
<td></td>
</tr>
</tbody>
</table>

natural candidate for

focus ?? topic

Not every language allows the expression of three arguments structurally, be it in the syntax or in the morphology. But this typological restriction does not mean that the existence of three structural arguments is forbidden in general, which many theories suggest. The concept of argument hierarchy seems to be more fruitful than the concept of abstract case because it gives the possibility to extend the number of structural arguments to more than just two.

A language with morphological case also allows dative marking in instances where the respective argument is either the lowest or the highest one; there is no similar option for positional languages.

(3) a. *Ich half dem Jungen (DAT).*
    I helped the boy.

b. *Mir (DAT) gefiel das Haus.*
   I liked the house.

The case patterns $<\text{nom},\text{acc}>$, $<\text{nom},\text{dat}>$ and $<\text{dat},\text{nom}>$ in German collapse to just a single transitive verb class SVO in English. Lexical marking is a device that can potentially characterize verb classes in a semantic perspective.

Another area in which semantic factors come into play is the basic asymmetry of transitive verbs. As pointed out already, the higher argument of a transitive verb is likely to be more salient than the lower one, in terms of person, animacy or specificity. These circumstances constitute the direct setting; they are reversed in an inverse setting.
Table 3. Direct and inverse settings of argument values

<table>
<thead>
<tr>
<th>direct settings</th>
<th>inverse settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda y \lambda x \ \text{VERB}(x,y) )</td>
<td>( \lambda y \lambda x \ \text{VERB}(x,y) )</td>
</tr>
<tr>
<td>3 1</td>
<td>1 3</td>
</tr>
<tr>
<td>I hit him.</td>
<td>He hit me.</td>
</tr>
<tr>
<td>( \lambda y \lambda x \ \text{VERB}(x,y) )</td>
<td>( \lambda y \lambda x \ \text{VERB}(x,y) )</td>
</tr>
<tr>
<td>-anim +anim</td>
<td>+anim -anim</td>
</tr>
<tr>
<td>The people surrounded the reed.</td>
<td>The reed surrounded the people.</td>
</tr>
<tr>
<td>( \lambda y \lambda x \ \text{VERB}(x,y) )</td>
<td>( \lambda y \lambda x \ \text{VERB}(x,y) )</td>
</tr>
<tr>
<td>-spec +spec</td>
<td>+spec -spec</td>
</tr>
<tr>
<td>The man hit someone.</td>
<td>Someone hit the man.</td>
</tr>
</tbody>
</table>

In order to avoid ambiguity, arguments must be distinguishable, preferably both in the morphology and in the syntax. Most fundamental is the following constraint.\(^6\)

(4) Avoid converse settings to be identically marked.

There are several ways to comply with this requirement: by different positions (as in a SVO language), by different sets of morphemes (such as me vs. I), by different morphological cases (accusative vs. nominative), by different agreement patterns, or other means. One, under cognitive aspects rather economic, device is that only particular kinds of inverse settings are marked (for instance, by ergative or accusative), while the corresponding direct settings are not. Such a split device (leading to a differential subject or object marking) then constitutes another way in which semantic factors enter argument linking (see below, section 4).

In summarizing, the factors that determine argument realization involve the following:

1. Argument hierarchy: The argument roles of a predicate are ordered in a unique way.
2. Semantic roles: The argument roles of a predicate can be distinguished by their participation in the 'event' denoted by the verb (such as agent, patient, or experiencer).
3. Sortal (or referential) salience: The arguments of a predicate can be distinguished by their inherent values (such as person, animacy, or specificity).
4. Informational salience: The arguments of a predicate can be distinguished by their informational status (such as topic and focus).
As a matter of fact, informational salience is nearly independent of semantic features of the verb (in principle, every argument can be focused upon), and thus cannot constitute an efficient argument linking device by itself, but it can be imposed on other systems. Regarding the observation that objects are more natural candidates for focus than subjects, it is interesting to note that the majority of Mayan languages developed an agent focus morpheme, which signals focus for the higher argument (Aissen 1999a, Stiebels 2003b), while some Bantu languages developed an antifocus morpheme, which blocks focus for the lower argument (Kimenyi 1980, Morimoto 2002). These facts are expected, while the reverse circumstances (a patient focus morpheme, or a morpheme that blocks agents from focus) are highly unexpected.

Sortal values often depend on the semantic content of a verb, thus, sortal salience can effectively distinguish the arguments for certain semantic classes of verbs. Sortal salience is a dominant factor in the Algonquian languages, where it is encoded both in the stems and in the morphology. The following examples are taken from Potowatomi (Hockett 1948).

(5) Sortal salience encoded in stems
   a. Inanimate objects: n-wapt-an 1-see-3  'I see it.'
   b. Animate objects: n-wapm-a 1-see-DIR  'I see him.'

(6) Sortal salience encoded in inverse morphology
   a. Direct marker: k-wapm-a-wa 2-see-DIR-pl  'You (pl) see him.'
   b. Inverse marker: k-wapm-:k-wa 2-see-INV-pl  'He sees you (pl)'

The direct and inverse markers take reference to both the argument hierarchy and the salience hierarchy imposed on the arguments (Wunderlich 1996); an argument linking device that is exclusively based on sortal salience would be rather unexpected.
In the following, I will concentrate on semantic roles in section 2, and argument hierarchy in section 3. I will argue that considering argument hierarchy is a much better device to indicate the role of arguments in a verb than considering their semantic participation. Finally, section 4 deals with the two already indicated ways in which semantic factors enter argument linking: by a lexical feature, or by a markedness condition for the argument values.

2. Semantic roles

Considering some recent stages of linguistic theorizing, one can observe that progresses in structural generalization are counter-balanced by attempts to give semantic factors more dominance. For instance, generative semantics was the answer to generative syntax, and later, Lexical Functional Grammar (LFG, Bresnan 1982) and Lexical Decomposition Grammar (LDG, Wunderlich 1997a,b), just to name these two, answered the purely syntactic accounts. Similarly, the increasing reference to semantic (thematic) roles reflects the need to overcome certain shortcomings in the theory of abstract case. It is astonishing that many researchers try to find generalized semantic roles (such as proto-agent and proto-patient) with the same vocabulary that describes simple semantic roles. A generalization that counts for the grammar must lead to a certain structural property; one possibility is that 'agent' is generalized to 'the higher argument', and 'patient' to 'the lower argument'. In the following I will argue that semantic roles, besides of their function of constituting a convenient façon de parler, do not play any theoretical function.

Semantic roles characterize the function of the participants in the event denoted by the verb, and thus depend on the semantic content of the verb. Consequently, there are at least so many semantic roles as they are verbs, or small semantic subclasses of verbs. Larger semantic classes could be characterized by more general semantic roles, but still the question remains: how many classes do exist, and how are they defined? More general semantic roles also compete with eventive (or aspectual) roles (such as CAUSE and RESULT), which characterize the semantic function of the possible subpredicates of a verb.

The following examples (cited from Maling 2001: 433) show a collection of ditransitive clauses of Korean in which the putative semantic role of the dative argument is annotated.
Datives in Korean ditransitive constructions, associated with a semantic role

adult-pl-NOM child-pl-DAT gift-ACC give-PAST-IND
‘Adults gave children gifts.’

‘The boy wrote (his) friend a letter.’

c. Chinkwu-ka na-eykey ku muncey-lui malha-yess-ta. Hearer
friend-NOM I-OAT the problem-ACC talk-PAST-IND
‘(My) friend talked to me about the problem.’

d. Na-nun Tom-eykey cenyek-ul sa-(a)ss-ta. Beneficiary
I-TOP Tom-DAT dinner-ACC buy-PAST-IND
‘I bought Tom dinner.’

e. Na-nun noin-eykey panci-lul sa-(a)ss-ta. Source
I-TOP old.man-DAT ring-ACC buy-PAST-IND
‘I bought a ring from an old man.’

I-TOP he-DAT ring-ACC rob-PAST-IND
‘I robbed him of a ring.’

Rather than speculating of whether Goal is a generalization that also captures Source, a much better way is considering the respective dative argument to be medial, either in a representation such as \{\text{ACT}(x) \& \text{BECOME POSS}(y,z)\} or in a representation such as \{\text{ACT}(x) \& \text{BECOME POSS}(y,z)\}. Hence, the generalization is that the dative argument is associated with similar positions in semantic decompositions.

Similarly, individual sentences with a dative argument can be ambiguous between several readings. These readings could be distinguished by using semantic roles, but it is likewise possible to state for each reading some predicate that contributes this reading. The following Albanian examples, adapted from Kallulli (1999: 269–270), illustrate readings induced by non-active morphology and correlated with a higher predicate: accidental causation in the aorist (8a–i), and a ‘feel like’ reading in the present (8b–i). Both sentences also allow readings with POSS, which are generally available for datives.
Datives and non-active morphology in Albanian

a.  
\[
\text{Ben-i-} \quad \text{thye} \quad \text{dritar-ja.}
\]
Ben-the.DAT he.DAT-NONACT.AOR break.3sg window-the.NOM

i. 'Ben accidentally broke the window.'  Causer
ii. 'Ben's window (suddenly) broke.'  Possessor
iii. 'The window broke to Ben.'  Maleficiary

b.  
\[
\text{Ben-i} \quad \text{lexo-het} \quad \text{një libër.}
\]
Ben-the.DAT he.DAT read-NONACT.PRES.3sg a book.NOM

i. 'Ben feels like reading a book.'  Affectee
ii. 'One can read Ben's book.'  Possessor
iii. 'One can read a book to Ben.'  Beneficiary

The notion of generalized semantic roles can be useful only if it exceeds the number of morphosyntactic distinctions of arguments. If transitive verbs can appear with several case patterns, some of them could be considered as lexically marked. The appearance of lexical marking may thus reflect certain (non-canonical) semantic roles, at least in some instances. However, in no way do semantic roles determine whether a verb is lexically marked or not. There are many minimal pairs of nearly synonymous verbs in which only one of these verbs is marked lexically. The following examples are from Icelandic (Maling 2002: 3).

Table 4. Nearly synonymous verbs governing dative (lexically marked) vs. accusative (by canonical realization)

<table>
<thead>
<tr>
<th>&lt;nom,dat&gt;</th>
<th>&lt;nom,acc&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>hjálpa 'help'</td>
<td>aðstoða 'help, support'</td>
</tr>
<tr>
<td>unna 'love'</td>
<td>elska 'love'</td>
</tr>
<tr>
<td>mæta 'meet'</td>
<td>hitta 'meet'</td>
</tr>
<tr>
<td>&lt;nom, dat, dat&gt;</td>
<td>&lt;nom, dat, acc&gt;</td>
</tr>
<tr>
<td>úthlata 'distribute, hand out'</td>
<td>skammta 'hand out, ration'</td>
</tr>
<tr>
<td>skila 'return, give back'</td>
<td>afhenda 'hand over, give back'</td>
</tr>
</tbody>
</table>

Knowing the semantic role of an argument does not help us much to predict how the argument is realized. One good example in question is the experiencer role, as it turns up in verbs describing mental effects or attitudes. It has been debated whether experiencers are entities in which certain effects
become manifest or rather entities that project their internal states onto an external target. Both alternatives are possible, as shown by transitive verbs from German, where the experiencer can be the higher or the lower argument.

(9) Experiencers in subject or object position

a. *Ich fürchtete den Sturm.* experiencer – target
   ‘I feared the storm.’ NOM ACC
b. *Der Sturm ängstigte mich.* stimulus – experiencer
   ‘The storm frightened me.’ NOM ACC

With an experiencer in the higher role it is also possible that this role is lexically marked for dative, so that exceptionally the nominative occurs with the lower role.

(10) Lexically marked experiencer role

a. *Der Junge mag den Hund.* experiencer – target
   the.NOM boy likes the.ACC dog NOM ACC
b. *Dem Jungen gefällt der Hund.* experiencer – target
   the.DAT boy likes the.NOM dog DAT NOM

Furthermore, experiencers of intransitive verbs can be structurally ‘down-graded’ by the occurrence of an expletive subject. However, these experiencer verbs can also be inherently reflexive.

(11) Experiencer verbs with an expletive subject (a) or with an inherent reflexive (b).

a. *Ihn ekelte es* (vor Spinnen).
   he.ACC disgusted it (at spiders)
   ‘He was disgusted (at spiders).’
b. *Er ekelte sich* (vor Spinnen).
   he.NOM disgusted himself (at spiders)
   ‘He was disgusted (at spiders).’

Obviously, a language such as German has no general solution of how to realize experiencers grammatically. German, as well as any other language, developed some structural generalizations for the realization of arguments, including certain types of impersonal constructions, and transferred these structural means historically, not taking reference to individual semantic types of verbs. Thus, if individual types are concerned, several options are
available. In the case of 2-place experiencer verbs of German, the best we can say is that experiencers are realized by nominative or dative as the higher argument, otherwise by accusative, depending on further factors; however, dative subjects overwhelmingly are experiencers.

The concept of semantic role becomes less interesting for stative verbs, which lack a dynamic identification of roles, and it breaks down with symmetric verbs, which, by definition, allow each argument in each position. There are always some classes of verbs for which semantic roles cannot predict argument linking

(12) Stative verbs
   a. The box contains apples.         container content
   b. Apples fill the box.             content container
   c. A wall surrounds the garden.     surrounder surrounded

(13) Symmetric verbs
   a. Peter and Erna met (each other). Both are targets
   b. Peter met Erna.
   c. Erna met Peter.

Another field in which the concept of semantic roles would have to prove useful is the formation of complex predicates. Causatives add a causer, affectives (in Basque) add an experiencer, and assistives (in Quechua) add an assistant in higher position (thereby downgrading the former agent to a causee or assistee), while applicatives add a beneficiary, an instrumental or a location in lower position (for some overview see Comrie 1985, Baker 1988, Stiebels 2003a). Similarly, resultatives add an object on which the result becomes manifest in lower position, and possessor 'raising' adds a possessor in either a higher or a lower position (Wunderlich 2000a). All these operations introduce a new semantic role in virtue of the fact that they add a predicate with a further argument. Therefore, the notion of semantic role is not necessary for capturing the resulting grammatical effects. More explanatory is the notion of argument hierarchy because for argument linking it is more important whether the additional argument is a higher or lower argument. Some of the involved operations may also be characterized by an eventive role: causatives add a causing event, and resultatives add a resulting state.

That semantic roles only have little grammatical function is also obvious in the formation of verb-verb compounds (and, similarly, in serial verb constructions and control structures). If two verbs are tightly combined, at
least one argument must be shared, but mostly not because of identity of semantic roles. Instead, the decision is made either on structural grounds or in a broader semantic perspective, trying to integrate two events into a single one.

In no way can semantic or eventive roles motivate the systematic gaps occurring in complex predicates, an issue that is addressed in the next section.

3. Argument hierarchy and structural arguments

For all the above mentioned operations forming complex predicates the concept of argument hierarchy is most promising: either a higher or a lower predicate is added and thus licenses a further argument connected with it. These operations often indicate a sequence of lexical compositional steps by overt morphology (Baker 1985, Stiebels 2002, 2003a). Other instances, lacking overt morphology, but with similar morphosyntactic effects, as well as similar semantic readings, can be framed similarly. There is good reason to assume lexical decomposition for basic ditransitive verbs, too, in the way suggested in (2) above. Given lexical decomposition of complex predicates, argument hierarchy can be predicted.

There is, however, one question in this context that must be answered: Why are certain arguments of a complex predicate blocked from realization? Neither semantic roles nor sortal factors can successfully explain why this does happen. Consider the resultatives in (14). Both the intransitive verb + adjective combination and the transitive verb + adjective combination project on a 2-place construction, in which the result object (not selected by the verb) is preferred over the object of the base predicate (if transitive). In the semantic representation, the result predicate must be lower than the cause predicate, as required from a universal COHERENCE postulate (Kaufmann and Wunderlich 1998).

(14) Strong resultatives
   a. The joggers run their shoes threadbare.
      \[ \lambda z \lambda x \{ \text{RUN}(x) \& \text{BECOME THREADBARE}(z) \} \]
   b. The guests drank the wine cellar empty.
      \[ \lambda z \lambda x \{ \text{DRINK}(x,y) \& \text{BECOME EMPTY}(z) \} \]

In (14b), the substance being drunk (y) cannot be realized structurally because y is in a ‘wrong’ structural position, as I will argue in the follo-
wing. There is no good semantic explanation why $y$ is blocked from realization, in particular if dative is available for a medial argument. In the locative alternation shown in (15) the locatum argument ($y$) can be human, but is at best realized obliquely (with the preposition *mit* ‘with’) rather than by structural case.

(15) Locative alternation

a. *Sie setzte ihre Verwandten in die erste Reihe.*

‘She placed her relatives in the first row.’

$\lambda P \lambda y \lambda x \{\text{SET}(x,y) \& P(y)\}$

b. *Sie besetzte die erste Reihe mit ihren Verwandten.*

‘She occupied the first row with her relatives.’

$\lambda z \lambda x \{\text{SET}(x,y) \& \text{BECOME LOCATED}(y, \text{AT } z)\}$

Likewise, if a prefix or particle is added, the object ($y$) selected by the verb must not be expressed, even if it is human (16). Note that the prefix *er-* and the particle *an* essentially add the same semantic contribution; here, the resulting argument structure is canonically ditransitive (Stiebels 1996, Wunderlich 1997b).

(16) Prefix and particle verbs

a. *Sie erküßte sich den Partypreis.*

‘She won the party prize through her kissing (people).’

$\lambda z \lambda u \lambda x \{\text{KISS}(x,y) \& \text{BECOME POSS}(u, z)\}$

b. *Sie küßte sich einen Schnupfen an.*

‘She got a cold through her kissing (people).’

$\lambda z \lambda u \lambda x \{\text{KISS}(x,y) \& \text{BECOME POSS}(u, z)\}$

An even more puzzling example is given in (17); here, both the object and the directional complement of *stellen* are suppressed.

(17) *Markus stellte den Keller (mit Möbeln) voll.*

Markus put the cellar (with furniture) full

‘Markus put (so many things into the cellar) that (as a result) the cellar got full.’
The directional complement obviously competes with another result predicate (volll in this case). The following constraint explains why only one of these result predicates can be expressed.

(18) **PREDICATIVE ARGUMENTS.** A predicate variable must occupy the lowest position in the semantic form. (Hence, there can be only one at the time.) (Wunderlich 2000a)

We have still to explain the occurrence of object gaps. If one shifts from semantic roles to eventive roles (such as CAUSE and RESULT), associated with the involved predicates rather than with their arguments, one could state that arguments of a result predicate take preference over those of a cause predicate. However, this explanation fails in examples with an ORIENTATION predicate added by the particle, illustrated in (19).9 Here, the object of the verb again can only be expressed obliquely.

(19) *Er sang die Freundin mit Arien an.*

he sang the girlfriend with arias at

‘He sang arias to his girlfriend’

\[\lambda z \lambda x \lambda s \text{SING}(x,y)(s) \& \text{DIRECTED.TOWARDS}(z)(s)\]

This suggests that the CAUSE-RESULT relationship as a possible semantic factor for suppressing arguments is generalized to other types of predicates. Hence, the crucial insight is that objects of a first predicate are never structural arguments.

Before formalizing this result, let us consider some interesting variation of verb-verb compounds in Japanese in which the first verb is transitive and the second intransitive. What is the resulting argument structure? First, resultative compounds show a similar behavior as the resultative constructions considered above: the object of the first verb can only be expressed obliquely.

(20) **Resultative verb-verb compounds in Japanese**

Yumiko ga \{'wain a/ wain de\} nomitture-ta.

Yumiko NOM \{'wine ACC/wine with\} drink-collapse-PAST

‘Yumiko drank herself unconscious \{'with wine\}.

\[\lambda x \{\text{DRINK}(x,y) \& \text{COLLAPSE}(x)\}\]

Rather unexpected is that in some resultative compounds the agent of the first verb must be suppressed.
(21) Unexpressed agents in Japanese verb-verb compounds

a. すうぷ が に-たまつ-た.
   soup NOM boil (tr.)-be.packed-PAST
   'The soup boiled down.'

b. *たろお が すうぷ に-たまつ-た.
   *Taro NOM soup acc boil (tr.)-be.packed-PAST
   'Taro boiled the soup down.'

As in (20), the surface ordering of the verbs corresponds to the semantic ordering of the predicates; both ICONICITY (cause precedes result in the morphosyntactic structure), and COHERENCE (CAUSE commands RESULT in the semantic form) are satisfied. Japanese is, however, subject to a further restriction because the morphological head is to the right.

(22) SUBJECT HEAD: The highest argument of a verb-verb compound must be identical with the highest argument of the morphological head (which is the second verb in Japanese V-V compounds).

(Gamerschlag 2000)

Accordingly, the agent of the first verb cannot be expressed (as in (21)), except it is identified with the result object (as is (20)). Thus, either the subject or the object of a transitive verb in nonhead position must remain unexpressed. But, surprisingly, in a manner compound both subject and object of the first verb (the nonhead predicate) can be expressed.

(23) わたし は てがみ お さがし-まわつ-た.
   1 TOP letter ACC search-go.around-PAST
   'I looked around for the letter'

Morphologically, manner precedes path. But since COHERENCE is irrelevant in the combination of these two predicates, the ordering in the semantic form follows the default requirement: the head predicate (PATH) commands the non-head predicate (MANNER). Given then the semantic form in the last line of (23), nothing prevents both x and y to be expressed structurally.

These three instances of Japanese transitive-intransitive compounds thus illustrate three different possibilities: one in which an object gap occurs, one in which a subject gap occurs, and a third one in which both subject
and object are expressed. The choice between these options is determined by two factors: (i) which argument of the first verb is identified with the argument of the second verb (which in turn depends on sortal possibilities); (ii) whether there is a specific condition for composing the semantic form (which in turn depends on the eventive roles involved): a cause predicate must command the result predicate, but no such condition holds if a manner predicate is involved. Under the theory advocated here, these two choices suffice to predict the resulting argument structure of the compound (Gamerschlag 2003).

In the remainder of this section I will briefly outline some general aspects of Lexical Decomposition Grammar (LDG), in particular those that relate to argument hierarchy, a central concept of this theory (Wunderlich 1997a,b, 2000a). LDG mainly implements some of the fundamental ideas raised by Bierwisch (1989), see also Bierwisch (this volume); however, differences grew out in the details.

(i) Semantic form (SF) is considered a minimal semantic representation that allows us to predict the grammatical behaviour of a verb. More precisely, SF is a structured tree whose nodes represent logical types rather than grammatical categories, as will be illustrated below. If two verbs are expected to form a complex predicate, both the complex SF and the morphosyntactic realization have to be determined.

(ii) Semantic notions play a role in order to determine which argument of a basic transitive predicate is the higher/the lower one (e.g. agents are higher than nonagents), as well as which predicate of a complex predicate is the higher/the lower one (e.g. causes are higher than results). These circumstances reflect the internal dynamics of an event: only agents can instigate and control an event, and a causing event can temporally precede but not follow the result. Apparently, only very few semantic notions are necessary to determine the relative rank of both the arguments and the predicates in SF. The ordering of arguments can also be tested by means of the Barss-Lasnik (1986) tests (including anaphoric binding, weak crossover, multiple questions).

(iii) Argument hierarchy is a purely structural notion based on SF. All argument-shifting operations (causative, applicative, possessor extension, locative alternation, prefixation, V-V compounding, etc), regardless of whether they are morphosyntactically overt or not, yield SF structures from which the particular argument hierarchy can be derived (iv), which in turn determines how the arguments have to be realized given a particular morphosyntactic profile of the language (v). Thus, the level of SF is a rather robust generalization of grammar, which allows the speakers to