

Manfred Bierwisch

Thematic Roles – Universal, Particular, and Idiosyncratic Aspects

0. General Orientation

Thematic Roles (or Theta-Roles) are theoretical constructs that account for a variety of well known empirical facts, which are more or less clearly delimited. In other words, Theta-Roles are not directly observable, but they do have empirical content that is open to empirical observation. The objective of the present paper is to sketch the nature and content of Theta-Roles, distinguishing their universal foundation as part of the language faculty, their language particular realization, which depends on the conditions of individual languages, and idiosyncratic properties, determined by specific information of individual lexical items.

According to general agreement, including traditions of various sorts, the properties Theta-Roles are to account for have to do with the morpho-syntactic realization of semantic relations between parts of complex linguistic expressions. A rather simple case in point is given in (1), where the relation between *Brecht*, *Villon* and *adaptation* in (a) is semantically parallel to that between the corresponding elements in the morpho-syntactically different verbal construction (b):

(1)(a) *Brecht's adaptation of Villon* (b) *Brecht adapted Villon*

Theta-Roles have to account for the parallel properties as well as the differences of these relations. For general reasons, the underlying theoretical framework must meet the usual conditions of parsimony and adequacy, where

- (A) Parsimony requires stipulations to be minimized, and
 (B) Adequacy requires all relevant empirical facts to be taken into account.

According (A), the theory of Theta-Roles must not set up principles or entities that follow from independently motivated theoretical assumptions, according to (B) it has to capture semantic, syntactic, morphological, and other phenomena that are related to Thematic Roles, a requirement that is clearly in need of clarification, as there is no simple and a priori delimitation of the phenomena to be included. Some preparatory observations might be helpful in this respect.

1. Five Basic Observations

(I) Interface Character: The correspondence between semantic relations and morpho-syntactic properties is not necessarily simple and uniform. Thus, the same semantic properties might be realized by different formal means, as shown in (1), and the same formal means might realize different semantic relations, as illustrated in (2), where the recipient of *anziehen* (dress) shows up as direct object *seinen Sohn* in (a) and as indirect object *seinem Sohn*, marked by the oblique Case in (c), while the direct object *den Mantel* realizes the object of the action in (b) as well as (c):

- (2)(a) Peter zieht seinen Sohn an (Peter dresses his son)
 (b) Peter zieht einen Mantel an (Peter puts a coat on)
 (c) Peter zieht seinem Sohn einen Mantel an (Peter helps his son to put a coat on)

Thus Theta-Roles must be able to reconcile identical semantic relations with different grammatical conditions and conversely the same morpho-syntactic properties with different semantic relations. To this effect, they must have access to semantic as well as syntactic and morphological information, participating in at least two levels of representation. In this sense, Theta-Roles are (part of) the interface mediating between formal, morpho-syntactic and semantic or conceptual aspects of linguistic expressions.

(II) Semantic and Categorical Selection: A specific effect of Theta-Roles is to select the co-constituents a lexical item can or must combine with in order to build up complex linguistic expressions. According to the interface character, this selection operates in two ways: Categorical or c-selection determines the syntactic and morphological requirements optional or obligatory complements of an expression must meet, while Semantic or s-selection specifies the corresponding semantic constraints. For example, both *fürchten* (fear) and *grauen* (shudder) semantically select a person and a content of the emotional attitude, but they differ with respect to their syntactic properties, as *fürchten* is either a standard transitive verb, or requires a reflexive pronoun, while *grauen* c-selects a something like an oblique subject, as shown in (3) and (4):¹

- | | |
|--|----------------------------------|
| (3) (a) Er fürchtet das Experiment | (He is fears of the experiment) |
| (b) Er fürchtet sich vor dem Experiment | (He is afraid of the experiment) |
| (c) *Ihm fürchtet vor dem Experiment | |
| (4) (a) *Er graut das Experiment | (*He shudders the experiment) |
| (b) ?*Er graut (sich) vor dem Experiment | |
| (c) Ihm graut vor dem Experiment | (He shudders at the experiment) |

(III) Cross-Categorical Status: Usually, Theta-Roles are studied with respect to verbs, but they are not restricted to one particular syntactic category, as already shown in (1a) vs. (1b). They rather show up with all major syntactic categories, as roughly indicated in (5) – (9):²

- | | |
|---|--|
| (5) (a) The kids _{Th} entered the room _{Goal} | (b) The kids _{Ag} run into the room _{Goal} |
| (6) (a) Peter _{Ag} criticized the proposal _{Th} | (b) Peter's _{Ag} critique of the proposal _{Th} |
| (7) (a) She _{Th} is similar to her brother _{Rel} | (b) She _{Th} resembles her brother _{Rel} |
| (8) (a) The boy _{Th} at the corner _{Loc} | (b) The boy _{Ag} was working at the corner _{Loc} |
| (9) (a) She _{Exp} expected [him _{Ag} to call] _{Th} | (b) Her _{Exp} expectation [of his _{Ag} call] _{Th} |

Thus, not only Nouns and Verbs can have similar Theta-Roles, but also Verbs and Adjectives or Prepositions.

Similarity across categories does not mean, however, that there are no crucial differences between syntactic categories. As shown by simple cases like (1) or (6), the c-selection induced by Nouns differs from that of Verbs. More intricate aspects

¹ Terminologically, the phenomena under discussion have been dealt with in various ways. The distinction between c-selection and s-selection has been proposed a.o. in Chomsky (1986). Earlier versions, such as Chomsky (1965), treated phenomena of c-selection as sub-categorization, while s-selection was to some extent treated as selectional restriction.

² The abbreviation Ag(ens), Th(eme), Exp(eriencer), Goal, Rel(atum) are provisional indications of similar semantic relations to be replaced later on.

will be discussed below. In general, though, systematic differences with respect to Theta-Roles is in fact an essential aspect of the content of syntactic categories.

(IV) Hierarchy of Argument Structure: The Theta-Roles of a linguistic expression E constitute the Argument Structure AS of E, sometimes called its Theta-Grid. This grid is not an unstructured collection, but a hierarchy of Theta-Roles, which are ordered on the basis of their semantic content and with respect to their grammatical realization as subject, direct, oblique, or prepositional object of E, etc. This is illustrated by the ranking of *er*, *sein Sohn*, und *ein Mantel* in (2c). That identical (or at least very similar) semantic relations do not necessarily lead to the same grammatical hierarchy, however, can be seen in cases like (10) and (11), where the Theme is higher than the Experiencer in (a), but vice versa in (b):

- (10) (a) The dog_{Th} didn't frighten Eve_{Exp} (b) Eve_{Exp} didn't fear the dog_{Th}
 (11) (a) Der Erfolg_{Th} freut Karl_{Exp} (The success pleases Karl)
 (b) Karl_{Exp} freut sich über den Erfolg_{Th} (Karl enjoys the success)

(V) Systematicity with Lexical Provisos: The organization of Argument Structures is based on systematic principles, but may be subject to idiosyncratic specifications of individual lexical entries. For example, the same semantic relation is realized by an idiosyncratic Genitive in (12)(a), but by the systematic Accusative of direct objects in German in (12)(b):

- (12)(a) Der Patient bedarf sorgfältiger Pflege (The patient requires careful tending)
 (b) Der Patient braucht sorgfältige Pflege (The patient needs careful tending)

An even more idiosyncratic deviation from the systematic pattern is involved in the AS of *fürchten* und *grauen* in (3) and (4), with *fürchten* allowing the regular transitive pattern of German, while *grauen* as an expression of emotional attitude behaves completely idiosyncratic.

A different type of idiosyncrasy is shown by in (14), which provides the German counterpart of the English so-called (un)ergative constructions in (13). Obviously, one of the two ways to realize the un-causative use of the German verbs must be marked idiosyncratically.³

- (13) (a) Paul broke the branch vs. The branch broke
 (b) Paul bent the branch vs. The branch bent
 (14) (a) Paul zerbrach den Ast vs. Der Ast zerbrach
 (b) Paul bog den Ast vs. Der Ast bog sich.

Yet another type of idiosyncrasy is involved in the different realization of Theme and Experiencer illustrated in (10) and (11).

The overall point to be noted in this respect is the fact, that (a) idiosyncrasy presupposes systematic principles to deviate from, and (b) these systematic principles are again of different sorts, belonging either to the general organization of

³ It is not obvious, whether the reflexive version *sich biegen* or the simple unergative *zerbrechen* is to be considered as the marked case. The reflexive is by far more frequent, while the simple unergative is morphologically simpler. The point at present is merely, that at least one of them needs idiosyncratic information, even though both options are based on systematic possibilities of German.

natural languages, i.e. to Universal Grammar UG characterizing the structure of the language faculty, or to the regularities of individual languages, i.e. the language particular systematicity, such as the inflectional system or the syntactic categories realized in the particular Grammar.

2. Necessary and Plausible Conditions on Formalization

Given these observations, a number of necessary, or at least plausible, conditions on any theoretical account of Theta-Roles follow.

(a) S-selection: A systematic account of s-selection requires a Theta-Role Θ_i of an expression E to be anchored in principle in the Semantic Form SF of E (where SF captures the invariant conditions which E contributes to the conceptual interpretation). The natural way to relate Θ_i to SF is to provide an empty slot to which it is bound, or more technically: a variable x_i that bears the relevant semantic relation in SF and is controlled by Θ_i . The actual realization of this requirement depends on the theory of SF one adopts. I will return to this point immediately.⁴

(b) C-selection: A natural treatment of c-selection should rely on the features that specify the syntactic and morphological properties a constituent to which the Theta Role can be assigned must meet. There are various ways to make this condition explicit in terms of unification, filtering, saturation, or checking of features the two expressions the Theta-Role ties together must exhibit.⁵ In any case, the features in question must be associated with the Theta-Role to be assigned to the constituent it selects. Thus the features requiring the Dative in *ihm graut* (he shudders) must be associated with the Experiencer.

(c) Association of s- and c-selection: The most direct way to meet the conditions formulated in (a) and (b) is to construe a Theta-Role Θ_i as a pair $\langle \lambda x_i, F_i \rangle$, where λx_i is an operator abstracting over the variable x_i in SF(E), and F_i is a set of morpho-syntactic features to be matched by (or unified with) the categorization of the pertinent Complement. In other words, each Theta-Role Θ_i is anchored in SF by its λx_i , and determines the saturation of x_i by the features F_i that c-select an appropriate constituent according to its categorization.

(d) Type Structure and Lambda Abstraction: Theta-Roles can be established by abstractors associated with morpho-syntactic features if and only if semantic representations provide the relevant variables. These variables must bear the relevant semantic relations the Theta-Roles rely on. To that effect, SF must be assumed to be a representational system made up from constants and variables as basic elements which constitute a functor-argument-structure based on the combinatorial types these elements belong to.⁶ In the end, these elements and their

⁴ It might be noted that early versions of Generative Grammar treated the facts ascribed to s-selection as strictly syntactic phenomena. The relevant information was therefore represented e.g. in Chomsky (1965) in terms of syntactic selectional features, which nevertheless had to refer to largely semantic properties of the constituent to be selected.

⁵ The initial treatment of c-selection in terms of so-called subcategorization features in Chomsky (1965) has been replaced in the Minimalist Program of Chomsky (1995) by the more general mechanism of feature checking.

⁶ The type-structure I will assume here has (at least) propositions and individuals as basic types, represented as t and e, respectively, according to the notational conventions introduced in Montague (1974), and functor types for one-place predicates, two place predicates, propositional connectors etc,

combination must be motivated by the conceptual interpretation assigned to SF. Under these conditions, Theta-Roles can be treated as operators applying to type-structures according to the formal principles of Lambda abstraction.

It might be noted that these are parsimonious assumptions, very much in line with condition (A) above, as conceptual representations need some sort of general organization anyway. Type structure is the minimal framework that provides the necessary generalizations⁷. On this background, three conjectures with fairly general consequences are to be made.

(e) First conjecture: Propositionality. The SF-representations of major syntactic categories (i.e. of expressions categorized as N, V, A, or P), are propositions, technically speaking configurations of type *t*. This assumption makes explicit, what most approaches to natural language semantics in fact assume in one way or the other⁸, namely that each major syntactic constituent expresses a more or less complex condition that specifies some situation.

This conjecture has certain immediate consequences. First, the operators in AS, i.e. the Theta-Roles of an Expression *E*, turn *E* semantically in an *n*-place propositional functor by means of lambda-abstraction, yielding one-place, two-place predicates, etc.⁹ Second, merging major category expressions amounts semantically to the systematic combination of propositional components. This combination is in crucial respects mediated by the Theta-Roles, which determine the way in which syntactic constituents contribute to the derived Semantic Form. Third, this requires among others items of so-called Functional Categories (Determiners, Complementizers, etc.) which make the SF of major constituents fit for the combination in question. Thus, in order to derive the SF of a PP like *in the room*, the propositional content of *room* must participate in the specification of an individual denoted by *the room*, which then can become the Relatum required by the Preposition *into*. In other words, the Determiner *the* turns the SF of *room* into the description of an individual.¹⁰

(f) Second conjecture: AS-Hierarchy. The hierarchy of Theta-Roles within AS is crucially related to the content of SF, over which the operators λx_i abstract. This is an important point, which concerns the interface character of Theta-Roles, as the hierarchy in AS determines the syntactic realization of Argument Positions in crucial respects. There are at least two conceptions about the way in which this aspect is realized. They will be discussed in section 3.

indicated by $\langle e, t \rangle$, $\langle e, \langle e, t \rangle \rangle$, $\langle t, \langle t, t \rangle \rangle$, etc., respectively. For details and further discussion see e.g. Bierwisch (1997, 2002).

⁷ See e.g. Cresswell (1973) for an explicit discussion of this point. In a somewhat different guise Jackendoff (1990, 1997) makes the same point.

⁸ This holds e.g. for Katz (1972), Jackendoff (1990), Montague (1974), Dowty (1979) or Kamp/Reyle (1993), to mention just a few. Here is not the place to analyze the different ways in which this assumption is realized.

⁹ Due to the type structure assumed in condition (d), the type of the variable of a given Theta-Role completely determines the type of the resulting operator. To illustrate the point, suppose that a Preposition like *at* has two Theta Roles, say a Theme and a Relatum or Place, both based on individual variables of type *e*, the type of the Preposition is $\langle e, \langle e, t \rangle \rangle$, i.e. a two-place predicate or binary relation. The same holds for transitive Verbs, due to their two Complements.

¹⁰ This is not even a rough sketch, merely indicating the role of Functional Categories. As a matter of fact, the appropriate account of Determiners, Quantifiers, and related elements is the topic of a large literature, including Montague (1974), Barwise/Cooper (1981), Hornstein (1984), Kamp/Reyle (1993).

(g) Third conjecture: Grammatical Regularity. It depends on general (universal or language particular) principles, how many Theta-Roles of which type and status an expression E may or must provide according to its syntactic category. Thus, for expressions categorized as [+ N], viz. Nouns and Adjectives, the Theta-Roles to be assigned to Complements are optional, while for [-N]-expressions, viz. Verbs and Prepositions, they are optional.¹¹ For illustration, consider Verbs like *encounter* or *support*, whose Complements are all obligatory, while the corresponding derived nouns, they are all optional may furthermore be realized only by oblique DPs or PPs. Similarly, Prepositions in German like *über*, *unter*, *hinter*, etc. (above, below, behind), with the feature [-N] and an obligatory Complement, as opposed to Adjectives like *angenehm* (convenient), *überdrüssig* (weary), whose Complements are optional.

As a particular aspect of Grammatical Regularity, the features F_i of the Theta-Role Θ_i in the AS of an expression E are determined by principles and rules of different degrees of generality, which depend on the syntactic category of E, the position of Θ_i in AS, and the morphological categories a given language provides. These principles and rules can be universal or language particular, and they admit for specific types of lexical idiosyncrasy. In other words, the formal features defining the c-selection of a given Theta-Role are determined by general, either universal or language particular conditions; these conditions can be overridden, however, by idiosyncratic, lexical information. Thus the regular pattern for di-transitive Verbs in German associates the features for Nominative, Dative, and Accusative with the highest, the intermediate, and the lowest Theta-Role, respectively, as indicated as indicated in (15)(a). In particular cases, however, the indirect object must be realized by a second Accusative, as shown in (15)(b)¹². Similarly, the regular Accusative for direct objects, shown in (16)(a), can idiosyncratically be replaced by Dative, as in (16)(b), or – even more marked – by Genitive, as in (12)(a) as opposed to (12)(b) above:

- | | |
|---|-----------------------------|
| (15)(a) Peter _{Nom} hat ihr _{Dat} etwas _{Akk} gesagt | (Peter said her something) |
| (b) Peter _{Nom} hat sie _{Akk} etwas _{Akk} gefragt | (Peter asked her something) |
| (16)(a) Sie _{Nom} drängte ihn _{Acc} , zu bleiben | (She forced him to stay) |
| (b) Sie _{Nom} half ihm _{Dat} , zu bleiben | (She helped him to stay) |

Regularities and their idiosyncratic supersession are, of course, not restricted to Theta-Roles of Verbs, but apply equally to Nouns, Prepositions, and Adjectives. German temporal Prepositions for instance regularly require the Dative, as in *vor / in / nach der Pause* (before / in / after the break), while *während des Treffens* (during the meeting) idiosyncratically requires the Genitive.

It might be noted that a great deal of work on Argument Structure and its grammatical aspects concerns precisely the principles envisaged by the Grammatical Regularity-conjecture.¹³ An important effect of the distinction between universal, regular, and idiosyncratic conditions on c-selection is the fact that predictable features need not be part of underspecified, redundancy free lexical representations (and need not be

¹¹ The characterization of syntactic categories by the binary features [+V, ±N] has been assumed e.g. in Chomsky (1981). A slightly different choice of features is discussed in Wunderlich (1996). Loosely speaking, the feature [+N] can be interpreted as "weak (or optional) government of complements".

¹² A more discussion of regular as opposed to idiosyncratic aspects of *fragen* and *sagen* is found in Bierwisch (1996).

¹³ See e.g. Grimshaw (1990), Kiparsky (1992, 2001) (Wunderlich (1997, 1997a), Bierwisch (1997), Stiebels (2002).

learned individually), to the effect that F_i might lexically be an empty set in many cases.¹⁴

A notational format that accounts for those aspects of the assumptions discussed so far, that have to show up in structural representations, is sketched in (17), where PF indicates the Phonetic Form of an expression, and Cat its morpho-syntactic categorization.

$$(17) \quad / \text{----} / \quad [\pm N, \dots] \quad \lambda x_n \lambda x_{n-1} \dots \lambda x_0 \quad [[P \dots [Q \dots x_n] \dots x_{n-1}] \dots x_0]_t$$
$$\quad [F_n] \quad [F_{n-1}] \quad [F_0]$$
$$\quad 1 \ 2 \ 3 \quad 1 \ 4 \ 2 \ 4 \ 3 \quad 1 \ 4 \ 4 \ 2 \ 4 \ 4 \ 3 \quad 1 \ 4 \ 4 \ 4 \ 4 \ 4 \ 2 \ 4 \ 4 \ 4 \ 4 \ 4 \ 3$$
$$\quad \text{PF} \quad \text{Cat} \quad \text{AS} \quad \text{SF}$$

A provisional instantiation of this schema, anticipating certain assumptions to be discussed below, would be the entry (18) for the German Preposition *auf* (on):

$$(18) \quad / \text{auf} / \quad [- N, -V, - \text{Dir}] \quad \lambda x \lambda y \quad [y \text{ LOCATED-AT SURFACE } x]$$
$$\quad [\text{Dat}] \quad | \quad | \quad | \quad |$$
$$\quad \quad \quad e \quad \langle e, \langle e, t \rangle \rangle \quad \langle e, e \rangle \quad e$$
$$\quad \quad \quad \quad \quad \quad \quad \quad e$$
$$\quad \quad \quad \quad \quad \quad \quad \quad \langle e, t \rangle$$
$$\quad \quad \quad \quad \quad \quad \quad \quad t$$

The Dative required for the object is the regular option that need not be specified lexically. The type-structure merely indicates the organization of SF – it needs no representation of its own.

3. Two Conceptions about Theta-Roles

Returning to the AS-Hierarchy-conjecture, essentially two traditions to look at the semantic aspect of Theta-Roles are to be noted, which might be called the intrinsic and extrinsic view, respectively. As a matter of fact, two The extrinsic view assumes a (presumably universal) set of relations, fixed independently of the items to which they are attached and ranked according to their substantive "content". The intrinsic view considers the relations in question as an inherent aspect of the items they rely on, with no independent status content or ranking outside these structures. Both views are compatible with the independent assumption that Theta-Roles are formally represented by abstractors over appropriate variables in SF. I will discuss the two approaches in turn and then compare their perspectives.

(A) The Intrinsic View: According to this conception, the variables which Theta-Roles rely are inextricably involved in the functor-argument-structure which specifies the semantic aspect of the linguistic expression in question. From the role and position of these variables derives the specific "content" of Theta-Roles as well as their ranking relative to each other. More specifically, the Intrinsic View is concerned with two aspects of Theta-Roles: their substantive content and their hierarchical ordering. Both

¹⁴ As a matter of fact, there might be no sharp boundary between regular and idiosyncratic features, but rather a difference in the degree Markedness or Irregularity. Stiebels (2002) is an instructive study showing that constraint ranking in the sense of Optimality Theory might be appropriate, to capture these degrees of Markedness. As I cannot go here into these matters here, I'll just leave it at that.

CAUSE, BECOME, SEE, ALIVE, LOCATION, SURFACE, etc., because this decomposition provides a more systematic representation of the grammatically relevant aspects of meaning.¹⁶ With this proviso, the relations and restrictions referred to in (21) can be reduced to those of the basic components, which eventually determine the conceptual (or truth-conditional) interpretation of SF. Thus the argument of ACT must be an individual involved in an action, the two arguments of CAUSE specify cause and effect of a causal connection, the argument of BECOME defines a resulting state, etc. On this basis, the Theta-Roles and their effects assigned to the direct and indirect object of the verb *show* for instance directly derive from those assigned to the object and subject of the verb *see* mentioned before, if the analysis in (19) is correct; the same holds for *give* and *have*, or German *tränken* (make drink) and *trinken* (drink), and lots of other less obvious cases.¹⁷

Turning to the second aspect – the ranking of Theta-Roles –, we notice first that the functor-argument-structure of SF induces a strictly hierarchical organization made explicit in (18) by a labeled tree and in (19) and (20) by labeled bracketings. Within this hierarchy, each element has a definite structural position relative to other elements. A straightforward way to characterize this position turns on the fact, that a functor forms a constituent with its argument¹⁸ by means of an asymmetrical relation to be called a-command (for argument-command) and defined as follows:

(22) If ϕ is a functor and ψ its argument, then every (improper) part of ϕ a-commands ψ and all its parts.

In other words, an argument and all constituents it is made up from are subordinate (in terms of a-command) to its functor and its constituent parts. A simple means to make the content of (22) visible is the so-called Polish notation, where functors are systematically written to the left of their arguments¹⁹. In this notation, each element would a-command everything to its right. Hence a straight a-command-ranking emerges if elements are simply numbered from left to right, such that higher numbers indicate dependence more complex functors. To illustrate the point, the SF of *show* in (19) is turned into (23a), using INST instead of the colon (see fn. 15) for the sake of clarity. The a-command relation between the relevant variables is indicated in (23b) with the ranking abbreviated in (23c):

¹⁶ The basic ideas of lexical decomposition have been pursued in a number of different, not always compatible ways e.g. by Katz (1972), McCawley (1971), Lakoff (1971), Dowty (1979), Jackendoff (1990), Bierwisch (1988), Wunderlich (1991), Hale/Keyser (1993) and many others. What is relevant here is not the assumption of a fixed and finite repertoire of basic elements, let alone a particular choice of it, but merely the fact that natural languages exhibit an internal organization of lexical items which is relevant for their grammatical behavior.

¹⁷ I would like to stress that the Intrinsic View is not bound to the lexical decomposition. Thus instead of (19) one might – in line with Davidson (1967) – assume (i) as the entry of *show* with the four-place predicate SHOW, which assigns the same properties to x , y , z , and e as the complex structure in (19).
(i) / show / [+V] $\lambda x \lambda y \lambda z \lambda s [[[[SHOW_{\langle e, \langle e, \langle e, t \rangle \rangle} \rangle x]_{\langle e, \langle e, \langle e, t \rangle \rangle} } y]_{\langle e, \langle e, t \rangle} } z]_{\langle e, t \rangle} } e]_t$
The crucial difference is merely the lower systematicity of representations like (i), which could not, for example rely explicitly on the relatedness between *show* and *see* just mentioned.

¹⁸ Notice that due to the type structure adopted here a the argument of a functor is uniquely determined, as a functor always applies to just one argument. Thus a two-place relation like SEE in (19) is of type $\langle e, \langle e, t \rangle \rangle$ and combines argument x to form a functor [SEE x] of type $\langle e, t \rangle$, which then combines with the argument y to form a constituent of type t .

¹⁹ Notice that this is a strictly equivalent notational option, since left-to-right ordering is not a structural property of SF at all. Thus e.g. [y [SEE x]], [y [x SEE]], and [[x SEE] y] are all equivalent notational variants for the same structure with the Polish notation [[SEE x] y].

- (23)(a) [[INST [[[CAUSE [BECOME [[SEE x] y]]]]] [ACT z]]] s]
 1 2 3 4 5 6 7 8 9
 (b) x a-commands y, z, s; y a-commands z, s; z a-commands s.
 (c) x < y < z < s

The ranking of variables just described provides a simple and obvious account of the second aspect of the Intrinsic View, according to which the ranking of variables in SF determines the hierarchy of Theta-Roles in AS. More formally:

- (24) Theta-Ranking:
 If x a-commands y in SF, then λx precedes λy in the AS prefixed to SF.

The effect of (24) has in fact been assumed for empirical reasons in the examples discussed so far²⁰. The interesting point to be noted is this: Although the lambda-calculus, on which the construal of Theta-Roles as abstractors rests, does by no means imply the ordering assumed in (24), it still need not be stipulated, if one adopts the more general principle (25):

- (25) Close structural correspondence is the default case for the relation between semantic and syntactic structure.

The notion of close structural correspondence can be made precise in various ways that need not concern us here. The basic idea is simply that the hierarchy of SF is projected into the underlying syntactic structure, such that Theta-Roles whose variables have a lower a-command-position, i.e. depend on less complex functors, are discharged to closer, i.e. lower syntactic constituents – given appropriate syntactic configurations. Hence the Intrinsic View need not stipulate the ranking of Theta-Roles, as it follows from the general assumption (25), which has, by the way, at least implicitly been followed in various syntactic approaches, from Lakoff (1971) and McCawley (1971) to Hale/Keyser (1993). It can in fact be observed fairly directly in the parallel ranking of Arguments in corresponding (not necessarily synonymous) cases like (26) or (27):

- (26)(a) John₃ showed us₂ the figures₁ (b) John₃ let us₂ see the figures₁
 (27)(a) John₃ persuaded us₂ of his plan₁ (b) John₃ made us₂ accept his plan₁

In conclusion, the Intrinsic View – in line with the conditions of Adequacy and Parsimony – accounts for content, s-selection, and ranking of Theta-Roles without stipulations beyond independently motivated assumptions.

Three apparently problematic issues are to be noted at this point. They might be called the visibility, the multiplicity, and the anomalous ranking problem. I will briefly comment on them in turn.

²⁰ It might be noted that the definition of a-command extends immediately to the lambda-operators in AS, which are formally functors taking their scope as argument. This assigns a hierarchy in terms of a-command to the operators in AS, as illustrated in (i), which adds heavy parentheses indicating the scope of Theta-Roles to the representation given in (19):

(i) /show / [+V] $\lambda x (\lambda y (\lambda z (\lambda s ([[INST [[[CAUSE [BECOME [[SEE x] y]]]]] [ACT z]]] s])))))$

This observation allows for an even more direct formulation of (24), given in (ii):

(ii) If x a-commands y in SF, then λx a-commands λy in AS.

(i) The visibility problem is due to the observation that in a wide variety of cases a variable occurring in SF is not turned into a Theta-Role by lambda abstraction. One type of in-visibility comes from optional Argument Positions, where a variable in SF is left unspecified, if optional Roles are not realized. In these cases, the value of the variables in question must be supplied according to contextual conditions. A variable in this case could be considered as a parameter (v), whose syntactic position is still identifiable, as indicated in (28):

(28) (a) He was not in (v) today. (b) She was reading (v) until he came.

Thus optional Theta-Roles of Prepositions like *in*, *above*, *behind*, pseudo-intransitive Verbs like *read*, *eat*, *think*, etc. and various other lexical categories can be dropped, but would still have access to regular syntactic realization, delivering also their content and s-selection. The situation is different for expressions with variables that do not appear in AS in the first place, as e.g. *speak*, which (in contrast to *say*) does not admit an object. A more intricate example are verbs for transfer of possession like *buy*, *sell*, or *rent*, whose AS clearly has a Position for an instigator and an object of exchange, while the exchange-partner and the monetary equivalent necessary for an act of buying or renting cannot be realized by a syntactic complement, but must be inferred from context or background. They can be made explicit, though, by prepositional Adjuncts, as indicated in (29):

(29)(a) They eventually bought the house (from an agent)
 (b) He rented a car (for 60 dollars (per day))

The partner and the monetary equivalent (indicated by *from an agent* and *for 60 dollars*) are linked to the Verb as Adjuncts by means of *from* and *for*, and they take up variables that appear in the SF, but not the AS of *buy* and *sell*. This brings up two non-trivial issues: discharging Theta-Roles of Adjuncts, and identification of variables coming from independent syntactic origin. Both problems cannot be pursued here any further²¹. Yet another type of invisible arguments is shown by resultative constructions like (30a), which rest on ordinary transitives like (30b): Although the inner argument of DRINK realized by *the wine* in (30b) is still present in (30a), it is removed from the AS of the verb *drink* and cannot surface as a regular complement:

(30)(a) Max drank the bar empty (b) Max drank the wine

A solution to this problem within the Intrinsic View is discussed in Wunderlich (1997a), who suggests that under specific structural conditions a variable of SF is systematically excluded from appearing as a Theta-Role in AS.²² I will bypass further types of syntactically invisible variables, turning instead to the next problem.

²¹ For a discussion of Theta-Roles of Adjuncts see Bierwisch (2003). The identification of co-referential variables with independent syntactic origin is well known from Agent-Phrases of passive constructions under a non-transformational analysis.

²² The details of this proposal must be left aside here. The basic assumption is that Resultative Adjuncts create something like a complex Verb *drink empty* with roughly the representation in (ii), if (i) abbreviates the entry of the verb *drink*:

(i) /drink/ [+V] $\lambda x \lambda y \lambda s$ [s : [y [DRINK x]]]

(ii) / drink empty / [+ V]

$\lambda z \lambda y \lambda s$ [s : [[y [DRINK x]] [CAUSE [BECOME [$\neg \exists v$ [v LOC [IN z]]]]]]]]]

The crucial point is that x loses its position in AS in favor of the Theta-Role for z coming from *empty*.

(ii) The multiplicity problem arises, if the same variable shows up more than once in a given SF with necessarily different rankings of the same variable. Which occurrence determines the rank of a possible Theta-Role under this condition?²³ The situation is illustrated in (31)(a) and (b). The first case, a so-called weak resultative construction, resembles (30)(a), except that the object of the transitive verb *paint* is identical with the individual introduced by the target state (*be*) *green* and hence occurs twice.

(31)(a) Max painted the wall green.

(b) Max stellte die Vase auf den Tisch (Max put the vase <upright> on the table)

Since in strong resultatives like (30)(a) the variable with the lower rank wins the race for a place in AS (see f. 22), one might expect a similar effect for weak resultatives like (31)(a), such that the argument of *green* rather than the object of *paint* decides the rank of the Theta-Role that binds both occurrences of the relevant variable of the complex verb *paint green*. The same consideration applies to cases like (31b). Here the causative verb *stellen* imposes two conditions on the target state – a position and a location of the object, the latter being realized by the PP, which not an Adjunct, but a proper Complement of the Verb.²⁴ The point to be noted is that again the occurrence of the variable with the lower a-command ranking is responsible for the place in AS. This effect follows, by the way, from condition (24) without any ado²⁵.

(iii) The anomalous ranking problem clearly differs from the previous cases, as it has to do with the content of Theta-Roles, and is presumably not a problem for the Intrinsic View. The issue is illustrated by minimal pairs like (32) – (33), where the (a)- and the (b)-cases appear to be close to synonymous, requiring however for roughly the same Theta-Roles not only different c-selection, but also different ranking in AS:

(32)(a) Mary liked the book

(b) The book pleased Mary

(33)(a) Mary owns the book

(b) The book belongs to Mary

(34)(a) Maria besitzt das Buch

(b) Das Buch gehört Maria

Within the Intrinsic View, two approaches seem to be possible: Either for one item of the pairs in question the AS-hierarchy is treated as an idiosyncratic, lexically marked violation of (24), or the pairs are analyzed as not really synonymous, differing in their SF with corresponding effects for their AS. It would be the stonger, more systematic account, if the latter approach could be justified as the general option. As a case in point, consider the contrast of *A besitzt/owns B* versus *B gehört/belongs to A*. While

²³ The question does not arise with respect to content and s-selection, as under the Intrinsic View a variable may well bear (possibly indirect) relations to several functors. If *x* belongs e.g. to the inner argument of LOC thereby qualified as a place, it will become a goal, if LOC is argument of BECOME.

²⁴ The entry in question should be something like (i), where VERT-POS abbreviates a more complex specification requiring the main axis of *x* to be vertical:

(i) /stell / [+V] $\lambda P \lambda x \lambda y \lambda s [s : [[ACT y] [CAUSE [BECOME [VERT-POS x] [\& [P x]]]]]]]$

Of the two conditions connected by &, the location to be specified by [*P x*] is the highest ranking proposition in terms of a-command, hence the Theta-Role λP to be assigned to the directional Complement of *stellen* has the highest position in its AS, and its argument *x* defines the rank of λx .

²⁵ Notice, by the way, that the effect is relevant only if the occurrences x^1 and x^2 of a variable *x* are separated by another variable *y* in terms of a-command, i.e. if $x^1 < y < x^2$ in SF. Although the examples under discussion are not of this type, those cases do in fact occur, confirming the assumptions made here. A case in point is the contrast between *he put the coat on* and *he put her the coat on*. I cannot go into the details here, however.

the former represents a (fairly abstract) right of A's disposition over B, the latter indicates a (more concrete) pertinence of B to A. Thus it seems e.g. that while in the (b)-cases of (33)/(34) a particular token, a concrete copy is at issue, in the (a)-cases an arbitrary exemplar of a given title would do. Suppose that the elements OWN (for right of disposal) and PERTAIN-TO (for pertinence) identify the relations in question, such that (35) and (36) indicate the items in question, with no violation of (24).

(35) / besitzen / [+V] $\lambda x \lambda y \lambda s$ [s : [y [OWN x]]
 (36) / gehören / [+V] $\lambda y \lambda x \lambda s$ [s : [x [PERTAIN-TO y]]
 [Dat]

This is certainly not the whole story about apparently anomalous rankings, but it indicates one option for the Intrinsic View to cope with the issue.

I want to emphasize, that the problems just discussed are all more or less well known and certainly in need of further clarification. It is to be noted, however, that they arise in much the same way and with respect to the Extrinsic View, creating by far more serious difficulties, as we will see shortly.

(B) Extrinsic View: According to this conception, Theta-Roles do not emerge from the semantic representation of lexical items, but are rather construed as a kind of organizing elements by means of which situations are made available for linguistic representation.²⁶ As in the Intrinsic View, two aspects – content and ranking of Theta-Roles – are dealt with, although in a rather different way, viz. by two independent stipulations, added to the theory of linguistic structure. As to the content, a fixed, presumably universal, albeit fairly controversial, set of Roles such as Agent, Place, Goal, Experiencer, Theme, etc. is stipulated. With respect to the hierarchy, an explicit ordering within this set is assumed. Usually, these two aspects are presented as just one ordered set of roles. Bresnan (2001) is a representative example, with Agent as the highest and Place the lowest position:

(37) Agent > Recipient > Experiencer/Goal > Instrument > Patient/Theme > Place

The basic idea is, of course, that Theta-Roles define relations by which participants are involved in an event or situation. A widespread version to implement this view, misleadingly called the Neo-Davidsonian view²⁷, has been proposed by Parsons (1990) and is adopted by Krifka (1992), Dölling (2003) and many others. It construes Theta-Roles as two-place predicates Agent (of), Experiencer (of), Theme (of), etc. which relate a variable x to a given situation or event s, with the properties of s being specified by a one-place predicate indicating the characteristic content of the lexical item in question. The entry (19) would now look like (38), other things being equal:

(38) / show / [+V] $\lambda x \lambda y \lambda z \lambda s$ [SHOW (s) & Agent (z, s) & Exp (y, s) & Th (x, s)]

²⁶ An early proposal along these lines is the Case-Theory proposed by Fillmore (1968), where clearly the conditions controlling the syntactic realization of Roles are in focus. – A rather different approach is Jackendoff's (1990) proposal to enrich semantic representations by a separate "Action-Team" which takes care of independent thematic information – a not very promising compromise between the Extrinsic and the Intrinsic View, which I will leave aside here.

²⁷ Reference to Davidson (1967) alludes to the event-variable, as noted in fn. 15 and 17, but it is heavily misleading with respect to the actual intention pursued by Davidson, who wanted to account for the logical status of adverbial adjuncts, rather than the proper complements. See also fn. 35.

Four comments are indicted at this point. First of all, the situation-predicate – SHOW in the case of (38) – must not be considered as an abbreviation for a more complex structure along the lines of (19), since any decomposition would make components like Agent(z, s), Exp(y, s) redundant and totally spoil the gist of the Extrinsic View. Thus SHOW does not have any linguistically relevant, formal relation to SEE, CAUSE, ACT or any other semantic primes.²⁸

Second, for an expression to carry Theta-Roles in this sense, it must provide a situation s to which the relations can refer, and, of course, a characterization of s. Hence either Nouns, Adjectives, Prepositions cannot be supplied with Theta-Roles, violating the principle of Adequacy, or they must all be provided not only with a situation variable, but also with a predicate specifying its characteristics.²⁹ In fact, a proper Neo-Davidsonian entry, that would look like (39), doesn't make any sense, as the Relatum x cannot be said to have a Place-relation to the bare UNDER-situation s.

(39) / under / [-V, -N] $\lambda x \lambda y [\text{UNDER}(s) \ \& \ \text{Th}(y, s) \ \& \ \text{Place}(x, s)]$

Similar difficulties would arise with adjectives like *tall*, *narrow*, or nouns like *brother*, *friend*, *president*, etc. In general, I don't see how the Neo-Davidsonian approach could meet the principle of Adequacy.

Third, the hierarchy in AS is assumed to be defined by the ranking among the semantic relations: Agent dominates Experiencer, which dominates Theme, etc. Beyond this stipulation, though, there is no hierarchy within SF (which turns out, by the way, to be compositional in a rather incomplete and arbitrary way, as it separates the Thematic Relations from the rest of a situation), since the conjunction & does not impose any ranking.³⁰

Fourth, according to a widely held additional assumption within the Extrinsic View, AS is constituted by a choice from the hierarchy (37), subject to certain constraints. One condition, which would impose interesting restrictions on possible ASs, is the following:

- (40)(a) A Thematic relation of (37) can be realized at most once by a given entry.
- (b) A semantic variable can participate in only one relation.

²⁸ One might, of course, set up meaning postulates to capture the relation among the primes of different lexical items. Such postulates, however, would not only come as additional stipulations, they would also be extremely complex, as they would have to cope with the arguments related to the event-arguments by Thematic Relations.

²⁹ Notice that a proliferation of situation-variables, is as sometimes proposed for independent reasons, turning e.g. (18) into (i) or simply (ii), would not do, as there are still no Thematic Relations of the "Neo-Davidsonian" type relating x and y to s.

(i) / auf / [-N, -V, -Dir] $\lambda x \lambda y \lambda s [s : [y \ \text{LOCATED-AT} [\text{SURFACE} \ x]]]$

(ii) / auf / [-N, -V, -Dir] $\lambda x \lambda y \lambda s [s : [y \ \text{ON} \ x]]$

³⁰ Notice, that if & is treated as an asymmetrical connective, as is assumed e.g. in the entry for *stellen* in fn. 24 (and in fact generally for the type structure of SF), one could impose a hierarchy of the following sort:

(i) / show / [+V] $\lambda x \lambda y \lambda z \lambda s [[[\text{SHOW}(s) \ \& \ \text{Th}(x, s)] \ \& \ \text{Exp}(y, s)] \ \& \ \text{Ag}(z, s)]$

This would connect the ranking in SF and AS according to the principle (24). But it does still not allow to dispense with the stipulation in (37). – In this connection, Dowty's (1991) proposal should be mentioned, which motivates the ranking primarily by syntactic conditions of their assignment, semantic aspects being accommodated by bundles of conditions called Thematic Proto-Roles. See. also fn.33.

Even if Theta-Roles are – contrary to fact – restricted to verbs, there are further problems with the choice from (37), constrained by (40). Thus (40a) would exclude repeated occurrence of a Role chosen from (37)³¹, and (40b) prevents assignment of more than Role to the same argument. This would be clearly at variance with many actual configurations, however. To give just one example: Verbs of motion like *walk*, *run*, *swim*, *crawl* etc. would require their subject to be Agent of an activity, but also Theme of motion in cases like *John walked to the bank and crawled across the river*. We will see immediately, that this issue is related to the multiplicity problem noted above.

As already noted, just like the Intrinsic View, the Extrinsic View has to deal with the visibility, the multiplicity, and the anomalous ranking problem, encountering greater difficulties in dealing with them, however.

(i) The visibility problem seems to disappear, at the first glance, for trivial reasons: As the major predicate of a verb is always a one-place functor that cannot introduce invisible variables, there are just as many variables as the entry provides Theta-Roles. Thus pseudo-intransitives like *read*, *eat*, etc. just don't introduce a Theme in cases like *he was reading all day*. However, why should a verb like *read* not have, besides $Ag(x,s)$, a component $Th(y,x)$ in its SF, bound by an optional operator in its AS? Notice that this would not even violate condition (40) in its more restrictive interpretation. But then, of course, the visibility problem arises in much the same way as in the Intrinsic View. Moreover, the standard way to account for optional Complements in the Extrinsic View by just omitting them from SF raises serious problems of a different type, as we will see.

(ii) The multiplicity problem, as already noted, would arise e.g. with many verbs of motion, but also with verbs of position like *sit* or *stand*, where the Theme needs to be related both to the type of position – the sitting or standing – and the location. In these cases, we get an empirically necessary blend of Roles with respect to their content, clearly violating (40) in its strong interpretation. But there is no difficulty in ranking, if the highest Role according to (37) determines the position in AS.

(iii) The anomalous ranking problem, however, causes serious problems to the Extrinsic View. Looking at cases like (32)/(33), there doesn't seem to be a possibility to come up with a different choice from (37) for *own* and *belong to*: They both have a Theme and a Recipient or Place (or whatever the appropriate choice for the role of the owner might be, an issue to which we have to return), with no chance to derive a different ranking in AS, – except by the assumption that one of them, say *belong to*, idiosyncratically violates the ranking of (37). Notice that an analysis along the lines suggested in (36)/(36) with different basic predicates for the two verbs would not be of any help, unless again by stipulation a difference in Theta-Roles is created. The reason is, among others, that the extrinsic hierarchy (37) provides a by far coarser classification than the elements of SF on which the Intrinsic View relies.

In conclusion, the Extrinsic View, and in particular the Neo-Davidsonian Approach,

³¹ Whether verbs like *feed* or *tränken* (make drink) violate (40a), as their Patient-Role does in fact participate as an Agent of the caused activity, might be a matter of debate. The object *feed* is in any case not a patient in the same way as the object of e.g. *hit*, *kill*, or *break*.

does have difficulties with the principle of Adequacy as well as the principle of Parsimony.

4. Comparative Assessment

The two views on Theta-Roles are concerned with largely the same phenomena and share a number of important features: In both views, Theta-Roles can be construed as lambda-abstractors annotated with formal features, thus providing an interface between semantic and morpho-syntactic aspects of linguistic expressions. The semantic background of the abstractors provides the s-selection, and the formal features, subject to universal, language particular, and idiosyncratic conditions, determine the c-selection associated with Theta-Roles. Finally, the semantic background of the lambda-abstractors provides the ranking of Theta-Roles, which – together with their formal features – determines the syntactic realization or saturation of the Argument Positions.

But the two views exhibit also important differences. Most importantly, the semantic background is construed in very different ways. As a consequence of this difference, only Verbs can naturally be assigned Thematic Roles under the Extrinsic View, while expressions of all major syntactic categories can exhibit Theta-Roles. As a matter of fact, the different characteristic of possible ASs emerges as a major factor defining the syntactic categories in question. The root of these differences is the separation of thematic information from the rest of SF, which is then to be treated as made up from un-analyzable one-place predicates. This separation must not only stipulate a set of universal thematic relations (in addition to, or rather instead of, those independently needed for semantic reasons), but also a ranking among these relations, which turns out to be controversial in crucial cases.

One might be inclined at this point to argue that the Intrinsic View simply shifts the stipulations to a different place, assuming a perhaps even more controversial, and in any case much larger system of semantic primes, from which SF-representations are made up. This argument misses a decisive point, however. Notice that the Extrinsic View does not get rid of the information expressed by the basic elements of a decompositional semantics, it rather needs a (presumably even larger) set of elements to represent for each verb the main predicate identifying its specific event or situation³². Hence the additional stipulation coming with the Extrinsic View must be assessed relative to the information needed independently under both views. In any case, the issue must not be misconstrued as simply a matter of counting primes. We will see shortly that important further problems are relevant to this point.

To summarize the relation between the two views, one might compare the schemata of verbal entries that correspond to each other in the following way:

- (41) $\lambda z \dots \lambda x \lambda s [s : [[[P z] \dots] x] <====>$
 $\lambda z \dots \lambda x \lambda s [P'(s) \ \& \ R^1(x, s) \ \& \ \dots R^n(z, s)]$
 where P is a possibly complex configuration of primes with no straight and simple correspondence to P'.

³² Yet another type of complexity would have to be taken into account, because the conceptual or truth-conditional relation between primes like SHOW, SEE, DO, CAUSE etc. needed under this view, must probably be made explicit by meaning postulates. See fn. 28.

With this provisional correspondence in mind, I will finally discuss four points where the Extrinsic View, and particularly its Neo-Davidsonian version, fails in empirical and theoretical respect

1. It has frequently been noted that the set of Thematic Roles raise various problems with respect to their number, their precise content, and their ranking. Looking at the set in (37), one might ask whether the distinctions it makes are necessary and sufficient. For verbs like *resemble*, *differ*, or *equal* it is difficult to see, which Role should be assigned to the subject. If the subject is the Theme, then a conflict arises with respect to the rank of the other argument, for the it can hardly be the Place, and there is no other role below Theme. If however Theme is taken to be the role of the object of *resemble* or *equal*, then difficulties arise with respect to the subject, as none of the higher roles can be taken as even remotely appropriate. To take another example: For verbs like *impress* or *frighten*, the (a)-constructions in (42)/(43) seem to exhibit the standard ranking of Agent (*the kids*), Experiencer (*us*), Instrument (*answer/noise*), then the (b)-cases would violate the ranking in (37), as now the Instrument is subject and thus higher than the Experiencer/object.³³

(42)(a) The kids impressed us with their answer (b) Their answer impressed us
(43)(a) The kids frightened us with terrible noise (b) The terrible noise frightened us

A different problem is connected to verbs like *drive*, where in (44)(a) the subject is Agent and the object is Theme (or Patient), while in (44)(b), contrary to condition (40)(b), the subject must be both Agent and Theme:

(44)(a) He drove the car to San Francisco (b) He drove to San Francisco
(45)(a) John met his friends in London (b) John and his friends met in London

Yet another type of difficulties, arising with verbs like *meet*, *marry*, *divorce*, is shown in (45), where the Roles assigned to subject and object in (a) are both realized by one plural-subject in (b).³⁴ What is more important than problems with specific cases, which could easily be multiplied, is however the fact, that similar difficulties would arise with all proposals trying to adjust (37) in one way or the other. For a revealing discussion of the whole matter see Levin (this issue).

For obvious reasons, the Intrinsic View cannot encounter the problems arising from (37) (or its variants). The less trivial observation is the fact already noted: The Intrinsic View does not need comparable stipulations somewhere else, but simply

³³ As a way out of these difficulties, Dowty (1991) proposed the notion of Thematic Proto-Roles, which are construed as bundles of conditions, defining the actual Roles and their ranking in accordance with their syntactic assignment by means of features like animacy, dominance, control, etc. It must be noted, however, that this is an important step away from the basic contention of the Extrinsic View, as now the actual Roles are the effect a kind of semantic components. See also fn.30 on Dowty's proposal.

³⁴ A more general problem already noted is the fact that the Extrinsic View deals only with verbs (and perhaps de-verbal or verb-related nouns and adjectives like *walk*, *ride*, *discovery*, *interesting*, *well-known*, etc.) but not with other nouns, prepositions, or adjectives. It is worth noticing, though, that extending (37) e.g. to prepositions would lead to further complications: Suppose, that locative prepositions like *under* would (somehow) assign *kids* and *roof* in (i) to Theme and Place, respectively. But then the directional *under* in (ii) would require a Theme and a Goal – with inverse ranking for practically the same arguments:

(i) The kids sat under the roof (ii) The kids ran under the roof

accounts for the properties the Extrinsic View has to capture just as well in a different way. Under this perspective, the Roles indicated in (37) just a convenient, but provisional way of referring to some descriptive generalizations about semantic aspects of Argument Positions.

2. A rather different problem for the Extrinsic View arises from fact that the number and content of Theta-Roles to be indicated for purely descriptive reasons is not just an arbitrary lexical property. That e.g the main predicates of *carry*, *kill*, *encounter*, or *resemble* all require two proper, lexical Argument Positions (in addition to the situation variable) in contrast to say *sleep*, *jump*, and *run* with only one such Position, while *meet*, *marry*, or *divorce* need two Arguments, unless they have a plural subject, all this are not an arbitrary facts. Similarly, that *carry* and *kill*, but not *resemble* or *own* would require an Agent and a Theme/Patient is not open to arbitrary alternations. It must furthermore be excluded that arbitrary Roles can be added, say Theme or Recipient to *sleep* or *jump*, or Instrument and/or to Goal to *resemble* or *marry*, etc. In short, anomalous combinations like (46) must be excluded on principled grounds:

- (46)(a) *Eve encountered into the garden (b) *John slept him a project
(c) *Harry expected

The only way I can see to accomplish these requirements is to set up a system of meaning postulates that specifies the necessary and admissible Theta-Roles for all (groups of) main verbal predicates. Notice that (37) and (40) cannot fulfill this task, but only constrain the postulates in certain respects.

There are two major objections to this way out. The first comes from the enormous, completely artificial, and in fact avoidable complexity such a system of postulates would have, if all actually inadmissible combinations that (37) would allow for are to be correctly excluded. Roughly speaking, for each main predicate P(s) there would be a postulate that determines the necessary, and one that excludes the impossible Roles from (37), schematically:

- (47)(a) $\forall(s) [P_i(s) \rightarrow \exists(x_1, \dots, x_m) [R^1(x_1, s) \& \dots \& R^m(x_m, s)]]$
(b) $\forall(s) [P_i(s) \rightarrow \neg\exists(x_{m+1}, \dots, x_n) [R^{m+1}(x_{m+1}, s) \& \dots \& R^n(x_n, s)]]$
where R^i is from the hierarchy (37) for $1 \leq i \leq n$.

Elements of (37) that do not show up in (47)(a) or (b) are optional Roles, such as e.g. Place for *work* or Goal for *swim*.

The second objection results from the consideration that, besides the general problems with meaning postulates for natural languages noted by Zimmermann (1999), they are obviously not the right way to state the conditions in question. Just as it would be inadequate to set up postulates by which ' \neg ', being a one-placed propositional functor, requires exactly one propositional argument, or ' \leq ' requires two and only two individual arguments, it is apparently inappropriate to stipulate that *kill* requires a killer and an object of killing, but excludes a Goal. The whole problem arises merely from the inappropriate separation of the conceptual conditions specified by predicates \rightarrow from the arguments to which they apply. It furthermore creates obscure logical problems, as we will see shortly.

For obvious reasons, these problems do not arise for the Extrinsic View.

3. A side issue of these problems is the fact that the Extrinsic View in its Neo-Davidsonian version does not provide a proper treatment of implicit or optional – as opposed to excluded – arguments. Consider the contrast between (a) and (b) in (48)/(49):

- | | |
|---|------------------------------|
| (48)(a) A: He was reading for two hours | B: And what did he read? |
| (b) A: He was sleeping for two hours. | B: *And what did he sleep? |
| (49)(a) A: I sold my old bike | B: To whom did you sell it? |
| (b) A: I found my old bike | B: *To whom did you find it? |

The A-sentences are not elliptical, hence they should not have a dangling Position in the AS of the verb, and therefore, according to the Extrinsic View, not in its SF either. The different acceptability of the B-sentences shows, however, that there must be a clear difference in the representation of *read* and *sell* in contrast to *sleep* and *find*: Although *read* and *sell*, like *sleep* and *find* don't need a Theme or Recipient, respectively, they must have the pertinent variable, though, taken up by a wh-pronoun in the B-cases, which is excluded for *sleep* and *find*.

The treatment of invisible variables in the Intrinsic View has already been discussed – it does not create any problems.

4. Finally, the Neo-Davidsonian realization of the Extrinsic View assumes a counterintuitive, in fact unacceptable logical structure, since treating the main predicate *p* and the thematic relations r_i as logical conjuncts $p \ \& \ r_1 \ \& \ \dots \ \& \ r_n$ is strongly misleading. While for instance (50)(a) would – ignoring tense and aspect – be represented as (50)(b), it does not express three conjoined propositions, each of which following in the same way from the truth of (50a).³⁵

- (50)(a) Fred helped Mary
 (b) $\exists(s) [\text{HELPING}(s) \ \& \ \text{Agent}(\text{Fred}, s) \ \& \ \text{Recipient}(\text{Mary}, s)]$

While the claim that there was some helping-situation might be considered as naturally following from (50a), there are hardly independent inferences to the effect that Fred acts as Agent Mary as Recipient of some situation.³⁶ This is even more obvious under standard negation, where (51)(a) with the representation (51)(b) would be equivalent to (51)(c):

- (51)(a) Fred didn't help Mary
 (b) $\neg \exists(s) [\text{HELPING}(s) \ \& \ \text{Agent}(\text{Fred}, s) \ \& \ \text{Recipient}(\text{Mary}, s)]$
 (c) $\forall(s) [\neg \text{HELPING}(s) \ \vee \ \neg \text{Agent}(\text{Fred}, s) \ \vee \ \neg \text{Recipient}(\text{Mary}, s)]$

³⁵ It should be noted that this is essentially different from the original Davidsonian analysis based on event-variables. Davidson (1967) proposed to account for locative and other adverbials like the one in (i) by predications on event-variables as indicated in (ii) according to which both Fred's buttering a toast and the localization of an event in the bathroom follow from (i) by standard conjunction reduction: (i) Fred buttered a toast in the bathroom (ii) $\exists s \exists x [\text{BUTTERING}(s, \text{Fred}, x) \ \& \ \text{TOAST}(x) \ \& \ \text{IN}(s, \text{bathroom})]$ A similar treatment would be indicated for locative or directional complements, as sketched e.g. for *stellen* in fn. 24.

³⁶ This must not be confused with claims concerning the identity of Fred or Mary. They might result from contrastive stress, as in *Fred helped MARY*, where the identity of Mary as opposed to some other potential recipient is focused, but not the proposition that Mary is recipient, rather than say Agent or Theme of the helping situation.

According to this analysis, (51a) would be true, if for any situation Fred would not be an Agent or Mary not a Recipient. But that is definitely not the interpretation of (51a).

One might try to avoid these deficiencies by means of a different status assigned to the thematic relations, treating them e.g. as some kind of presupposition, which are not asserted and cannot be negated, such that (50a) and (51a) are analyzed as (52)(a) and (b), respectively, the latter being equivalent to (c), with presuppositions included in curly brackets:

- (52)(a) $\exists(s) [\{ \text{Agent (Fred, s), Recipient (Mary, s) } \} \text{ HELPING (s) }]$
 (b) $\neg\exists(s) [\{ \text{Agent (Fred, s), Recipient (Mary, s) } \} \text{ HELPING (s) }]$
 (c) $\forall(s) [\{ \text{Agent (Fred, s), Recipient (Mary, s) } \} \neg\text{HELPING (s) }]$

Although (52) escapes some of the objections just noted, it is still not the appropriate analysis of (50a) and (51a): Fred's Agenthood and Mary's Recipienthood in s cannot be the presupposition for HELPING(s) to be true or false, if HELPING is nothing but a one-place predicate about s. There is, altogether, apparently no logically acceptable way to rescue the separation of the main predicate from its arguments, as required by the Extrinsic View.

For obvious reasons, the type of logical inappropriateness just discussed cannot arise with respect to the Intrinsic View, because there is no separation of the main predicates from their arguments. There are, nevertheless, nontrivial logical problems, e.g. with respect to the negation of complex predicates as required e.g. for verbs like *kill* indicated in (53):

- (53) / kill / [+V] $\lambda y \lambda z \lambda s [s : [[\text{ACT } z] [\text{CAUSE } [\text{BECOME } \neg [\text{ALIVE } y]]]]]]]$

Ignoring again tense and other detail irrelevant here, the SF of (54)(a) would come out as (54b), which should be equivalent to (54c):

- (54)(a) Max didn't kill Fred
 (b) $\neg [\exists s [s : [[\text{ACT Max }] [\text{CAUSE } [\text{BECOME } \neg [\text{ALIVE Fred }]]]]]]]]$
 (c) $\forall s [s : [\neg [[\text{ACT Max }] [\text{CAUSE } [\text{BECOME } \neg [\text{ALIVE Fred }]]]]]]]]]$

The task to be faced at this point is the distribution of the negation wrt. its scope. Intuitively, (54a) should come out as true if Fred didn't die or if he died, but not from an action of Max. The equivalences in (55) would be a first step to accomplish this effect:

- (55)(a) $\neg [\varphi [\text{CAUSE } \psi]] \equiv [[\varphi [\text{CAUSE } \psi]] \rightarrow \neg\varphi] \vee \neg\psi$
 (b) $\neg [\text{BECOME } \varphi] \equiv [\text{REMAIN } \neg\varphi]$

(55a) accounts for the two alternatives making (54) true. (55b), which relates BECOME to its dual operator REMAIN, would then turn $\neg [\text{BECOME } \neg [\text{ALIVE Fred }]]$, the instantiation of $\neg\psi$ in (54c) according to (55a), into $[\text{REMAIN } \neg\neg [\text{ALIVE Fred }]]$, that is $[\text{REMAIN } [\text{ALIVE Fred }]]$, representing Fred's staying alive, exactly as required by one of the conditions making (54a) true.

Even though this is but a rough approximation that only hints at a larger program, three important points are to be made. First of all, the general format, on which the Intrinsic View is based, does not create a conflict between standard logic and the proper intuitions that must be captured. In particular, the foundation of Theta-Roles is fully in line with standard logical requirements. Second, the program indicated by (55), determining the logical relations of basic functors, is necessary in any case for syntactically explicit constructions, such as resultatives like *he didn't wipe the table clean*, causative constructions like *they didn't make him go*, or the equivalence between *he closed the door* and *he didn't leave the door open*, all of which would be subject to equivalences like (55), which are therefore required by the condition of Adequacy. And third, no additional stipulation is necessary for this aspect of the Intrinsic View, thus meeting the condition of Parsimony.

To sum up, there are strong reasons to assume that Theta-Roles are anchored in an independently motivated semantic representation with no additional requirements due to the separation of Theta-Roles from other conceptual conditions.³⁷

5. Conclusion

Returning finally to the observation that Theta-Roles are subject to universal, language particular and idiosyncratic conditions, the following overall picture seems to emerge from the previous discussion.

(i) Three aspects of the structure determined by the language faculty characterized by Universal Grammar UG are essential for the organization of Theta-Roles as part of linguistic knowledge. First, UG determines the organization of the interface between the conceptual system CS (representing the internal, propositional representation of experience with the external and internal environment) and the computational structure of linguistic expressions. This interface has been called here Semantic Form SF³⁸. It is this interface that provides the basis for the "content" of Theta-Roles. Second, UG determines the representational format of possible linguistic expressions, in particular the hierarchical and sequential of their Phonetic Form PF and their morpho-syntactic structure, including the categorization of expressions and their constituents by sets of formal features. Third, UG determines the organization of lexical information, which basically associates structures of PF with morpho-syntactically categorized representations of SF, determining their combinatorial possibilities by their Argument Structure AS, which makes positions in SF according to presumably universal constraints available for syntactic realization, determining thereby the s-selection of the positions in question.

(ii) Two aspects of the organization of particular languages, based on the framework defined by UG, are characteristically involved in Theta-Roles. First, languages may

³⁷ Assumptions about Theta-Roles, are, like many other theoretical issues, usually varying clusters of partially independent ingredients. Thus the Extrinsic View is mostly, but not necessarily, combined with the assumption of an extrinsic thematic hierarchy, while the Intrinsic View is often, but not necessarily, combined with the assumption that decomposition is based on a universal set of primitives. There are, furthermore, approaches borrowing Neodavidsonian notation in contexts not committed to this view in other respects. Hence the above discussion rests on canonical versions of the two views compared, not denying the existence of less canonical variants.

³⁸ The main point distinguishing SF from the more widely used notion LF (for Logical Form) in Chomsky (1981, 1986, 1995, and elsewhere) is that SF systematically takes care of the grammatically relevant internal structure of lexical items. See Biewisch (1997) for some discussion.

distinguish different syntactic and morphological categories by means of formal features, where the computational content of syntactic features like $\pm N$ or $\pm V$ determines, among others, the organization of possible ASs, while morphological features for categories like Case, Number, etc. are crucially involved in c-selection associated with positions in AS. Second, according to their respective morphological categories, particular languages impose specific conditions on the c-selection, determining in particular systematic dependencies among c-selectional conditions associated with particular positions in AS. Thus Case features to be matched by (or assigned to) characteristic complements can largely be predicted by general conditions, which are, however, language particular to the extent to which they depend on language specific morphology. These conditions are likely to be subject to language particular markedness or preference ordering.

(iii) Among the properties listed in individual lexical items, which are the place of all idiosyncratic information in a given language, are specific deviances from the general conditions on positions in AS, such as the choice of Oblique Case for the direct object in particular items, like German *helfen* (help) with Dative instead of Accusative, or even more idiosyncratic *bedürfen* (deserve) with Genitive instead of Accusative, or conversely requiring Accusative instead of Dative for the indirect object of *fragen* (ask). Such idiosyncrasies are presumably restricted by borderline conditions, which reflect patterns of UG, preventing e.g. indirect objects from Nominative Case in English or German.

In somewhat more formal terms:

(I) Universal Conditions, determining the general organization of possible linguistic expressions, provide

(a) the format of SF, which would be some version of a typed functor-argument structure with lambda abstraction;

(b) the possibility to distinguish morpho-syntactic categories in terms of formal features as well as the principles of hierarchical and sequential organization of syntactic as well as PF-representations;

(c) the structure of lexical information, consisting of entries of the form $E = [PF, Cat [AS, SF]]$, where PF is the phonetic of E, Cat is a set of formal features, categorizing E, SF is its semantic information and AS a sequence of Argument positions or Theta-Roles $\Theta_i = \langle \lambda x_i, F_i \rangle$ with x_i a variable in SF, which determines the s-selection associated with λx_i , and F_i a set of formal features determining the corresponding c-selection. The ranking in AS is determined by the functor-argument hierarchy in SF, especially the a-command relation among the x_i .

(II) Language Particular Conditions, controlling the c-selectional conditions, determine

(a) the particular morphological and syntactic features available for c-selection;

(b) the features F_i , associated with the individual Roles Θ_i , as far as they are not fixed by universal principles or just idiosyncratic information. These conditions may be subject to language particular markedness hierarchies or preference-ordering.

(III) Idiosyncratic Conditions are particular, lexically fixed options essentially with respect to the content of F_i . Idiosyncratic conditions override language particular constraints belonging under (II)(b), but they are presumably constrained by the

conditions fixed by (I). Hence their range is not arbitrary, but the instances are unpredictable.

According to this general picture, universal aspects of Theta-Roles concern their general place and function in linguistic structure and their semantic underpinning, while language particular as well as idiosyncratic aspects fall in the domain of morphological categories and their regulation. Idiosyncratic peculiarities are moreover restricted to relatively rare instances of particular lexical items.

In Conclusion: It is not necessary (and hence excluded by the condition of Parsimony) to stipulate an autonomous, hierarchically ordered set of Theta-Roles. Universal, language particular, and idiosyncratic aspects of Theta-Roles, linking semantics arguments to their morpho-syntactic realization, can rather be derived from independently necessary conditions of UG, the respective grammar G, and specific lexical information.

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