

# Argument hierarchy and other factors determining argument realization

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## 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.

### (1) Prototypical transitive verbs<sup>1</sup>

	$\lambda y$	$\lambda x$	VERB(x,y)
abstract case	accusative	nominative	
grammatical function	object	subject	
protoroles	proto-patient	proto-agent	
macroroles	undergoer	actor	
natural distribution of salience (person, animacy, specificity)	less salient	more salient	
natural candidate for	focus	topic	

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

<sup>1</sup> The notation  $\lambda y \lambda x \text{ VERB}(x,y)$  (as well as its alternative  $\lambda y \lambda x \text{ VERB}(y)(x)$ ) indicates that x is the higher argument and y the lower argument (which 'more narrowly' belongs to the verb). The higher argument is also called '(logical) subject', and the lower argument is called '(logical) object'. These notions are invariant cross-linguistically, whereas all morphosyntactic notions such as 'grammatical subject', 'direct object' or 'nominative' are language-dependent. Throughout this paper, the event argument of a verb is neglected.

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.

- (2) 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.<sup>2</sup> 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.<sup>3 4</sup>

- (3) ‘give’ verbs:  $\lambda z \lambda y \lambda x \{ACT(x) \ \& \ BECOME \ POSS(y,z)\}$

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

- (4) No place for medial arguments in various linguistic theories

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

<sup>2</sup> The necessity of distinguishing between primary/secondary object versus direct/indirect object has been pointed out by Dryer (1986).

<sup>3</sup> ‘put’ verbs constitute another potential class of ditransitive verbs, characterized by a change of location rather than a change of possession:  $\lambda z \lambda y \lambda x \{ACT(x) \ \& \ BECOME \ LOC(z,y)\}$ . However, the location predicate is often realized by a prepositional phrase external to the verb, so that no three NP arguments occur with the verb. Pinker (1989), Krifka (2004), Wunderlich (2005) and others have argued that underlying to the ‘dative’ alternation of English is a shift in semantic representation (location vs. possession). In this paper, I disregard change of location verbs.

<sup>4</sup> In a representation such as (3), ‘&’ is an asymmetric coordination, which means that the predicate to the left commands the predicate to the right. In other words: {A & B} is bracketed as [A [& B]]; consequently, x in (3) is higher than both y and z (Wunderlich 1997a,b).

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.

- (5) a. Ich half dem Jungen (DAT).  
I helped the boy.  
b. Mir (DAT) gefiel das Haus.  
I liked the house.

The case patterns <nom,acc>, <nom,dat> and <dat,nom> in German<sup>5</sup> 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.

- (6) Direct and inverse settings of argument values

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

In order to avoid ambiguity, arguments must be distinguishable, preferably both in the morphology and in the syntax. Most fundamental is the following constraint.<sup>6</sup>

<sup>5</sup> Notations such as <nom, acc> characterize the default ordering of arguments in the syntax, which the higher argument to the left. This order is reverse to the ordering of the  $\lambda$ -abstractors (theta-roles) in semantic representations associated with morphological case (ACC NOM. vs. <nom, acc>).

<sup>6</sup> This constraint can be violated in certain contexts. Consider the following data from relativization in Welsh (Tallerman 1990:296, 302). Because the basic word order is VSO, the gap in (ia) renders the relative clause ambiguous: the gap can be related to either subject or object. This ambiguity, however, is resolved by pronominal doubling in (ib), and by consonant mutation in (ii).

- (i) a. y bachgen a welodd y ci  
the boy COMP saw.3sg the dog  
'the boy who saw the dog'  
'the boy who the dog saw'  
b. y bachgen y gwnaeth y ci ei weld  
the boy COMP did.3sg the dog he see  
'the boy that the dog saw'
- (ii) a. y bachgen a welodd gi  
the boy COMP saw.3sg dog (+MUT)  
'the boy who saw a dog'  
b. y bachgen a welodd ci



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 (LFG, 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 *fac on 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 there 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.

- (10) Datives in Korean ditransitive constructions, associated with a semantic role
- |    |   |              |                 |                |             |
|----|---|--------------|-----------------|----------------|-------------|
| a. | Elun-tul-i                                    | ai-tul-eykey | senmul-ul       | cwu-ess-ta.    | Recipient   |
|    | adult-pl-NOM                                  | child-pl-DAT | gift-ACC        | give-PAST-IND  |             |
|    | ‘Adults gave children gifts.’                 |              |                 |                |             |
| b. | Ku sonyen-un                                  | tongmu-eykey | phyenci-lul     | ssu-ess-ta     | Goal        |
|    | the boy-TOP                                   | friend-DAT   | letter-ACC      | write-PAST-IND |             |
|    | ‘The boy wrote (his) friend a letter.’        |              |                 |                |             |
| c. | Chinkwu-ka                                    | na-eykey     | ku muncey-lul   | malha-yess-ta  | Hearer      |
|    | friend-NOM                                    | I-DAT        | 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.’
- f. Na-nun ku-eykey panci-lul ppayas-ass-ta. Source  
 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 {ACT(x) & BECOME POSS(y,z)} or in a representation such as {ACT(x) & 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: 269f.), illustrate readings induced by non-active morphology and correlated with a higher predicate: accidental causation in the aorist (11a-i), and a ‘feel like’ reading in the present (11b-i). Both sentences also allow readings with POSS, which are generally available for datives.

(11) Datives and non-active morphology in Albanian

- a. Ben-it i-u thye 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. Ben-it i lexo-het 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).

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

<nom,dat>	<nom,acc>
hjálpá ‘help’	aðstoða ‘help, support’
unna ‘love’	elska ‘love’
mæta ‘meet’	hitta ‘meet’
<nom, dat, dat>	<nom, dat, acc>
úthlata ‘distribute, hand out’	skammta ‘hand out, ration’
skila ‘return, give back’	afhenda ‘hand over, give back’

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.

(13) Experiencers in subject or object position

- |                              |                               |
|------------------------------|-------------------------------|
| a. Ich fürchtete den Sturm.  | <i>experiencer – target</i>   |
| ‘I feared the storm.’        | NOM            ACC            |
| b. Der Sturm ängstigte mich. | <i>stimulus – experiencer</i> |
| ‘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.

(14) Lexically marked experiencer role

- |                                 |                             |
|---------------------------------|-----------------------------|
| a. Der Junge mag den Hund.      | <i>experiencer – target</i> |
| the.NOM boy likes the.ACC dog   | NOM            ACC          |
| b. Dem Jungen gefällt der Hund. |                             |
| the.DAT boy likes the.NOM dog   | DAT            NOM          |

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

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

- |  |
|--|
| a. Ihn        ekelte <i>es</i> (vor Spinnen).  |
| he.ACC    disgusted it    (at spiders)         |
| ‘He was disgusted (at spiders).’               |
| b. Er        ekelte <i>sich</i> (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 it that experiencers are realized by nominative or dative as the higher argument, otherwise by accusative, depending on further factors;<sup>7</sup> however, dative subjects overwhelmingly are experiencers.

The concept of semantic role becomes less interesting for stative verbs, which lack a dynamic identification of roles,<sup>8</sup> and it breaks down with symmetric verbs, which, by

<sup>7</sup> As Primus and her collaborators (Klein & Kutscher 2002) have shown, the choice between these structural options does not depend on a finer semantic classification of experiencers, but rather results from historical facts, namely whether a verb with a physical reading has been generalized so to opt also for mental readings.

<sup>8</sup> Likewise, semantic roles postulated for the arguments of relational nouns (such as *uncle*, *nephew*, *shoulder*) and prepositions (such as *in*, *on*) would have only little explanatory force.

definition, allow each argument in each position. There are always some classes of verbs for which semantic roles cannot predict argument linking

(16) Stative verbs

- |                                 |                   |                   |
|---------------------------------|-------------------|-------------------|
| a. The box contains apples.     | <i>container</i>  | <i>content</i>    |
| b. Apples fill the box.         | <i>content</i>    | <i>container</i>  |
| c. A wall surrounds the garden. | <i>surrounder</i> | <i>surrounded</i> |

(17) Symmetric verbs

- |                                     |                         |
|-------------------------------------|-------------------------|
| a. Peter and Erna met (each other). | <i>Both are targets</i> |
| 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 explanative 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 (3) 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 (18). 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 & Wunderlich 1998).

(18) 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 (18b), the substance being drunk (y) cannot be realized structurally because y is in a ‘wrong’ structural position, as I will argue in the following. 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 (19) the locatum argument (y) can be human, but is at best realized obliquely (with the preposition *mit* ‘with’) rather than by structural case.

(19) 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 (20). 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).

(20) Prefix and particle verbs

- a. Sie *erküßte* sich den Partypreis.  
 she er-kissed herself.DAT the.ACC party prize  
 ‘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 kissed herself.DAT a.ACC cold at  
 ‘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 (21); here, both the object and the directional complement of *stellen* are suppressed.

(21) 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 (*voll* in this case). The following constraint explains why only one of these result predicates can be expressed.

- (22) 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 (23).<sup>9</sup> Here, the object of the verb again can only be expressed obliquely.

- (23) 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.

- (24) Resultative verb-verb compounds in Japanese  
 Yumiko ga        {\*wain o/ wain de}        nomi-tubure-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.

- (25) Unexpressed agents in Japanese verb-verb compounds  
 a. suupu ga    ni-tamat-ta.  
    soup NOM  boil (tr.)-be.packed-PAST  
    ‘The soup boiled down.’  
 b. \*Taroo ga    suupu o   ni-tamat-ta.  
    \*Taroo NOM  soup acc  boil (tr.)-be.packed-PAST  
    ‘Taro boiled the soup down.’  
 $\lambda y \{\text{BOIL}(x,y) \ \& \ \text{BECOME BE.PACKED}(y)\}$

As in (24), 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.

<sup>9</sup> To express explicitly that the singing event is directed towards someone, I have added the situation argument.

- (26) 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 (25)), except it is identified with the result object (as is (24)). 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.

- (27) Watasi wa tegami o sagasi-mawat-ta.  
 I TOP letter ACC search-go.around-PAST  
 ‘I looked around for the letter’  
 $\lambda y \lambda x \{GO.AROUND(x) \& SEARCH(x,y)\}$

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 (27), 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.<sup>10</sup> 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 refrain from all particular semantic knowledge. (Have in mind that there are still possible places at which further semantic knowledge can enter.)

(iv) The question now is how argument hierarchy derives from SF. The answer consists of two parts: DEPTH OF EMBEDDING (Bierwisch 1989) yields a partial ordering of arguments, which is further restricted by STRUCTURAL ARGUMENT (Wunderlich 1997a,b), making use of the notion L(exical)-command (defined for the nodes in SF representing logical types). STRUCTURAL ARGUMENT picks out a unique path from the highest to the lowest argument of a complex predicate; it selects the highest argument of every predicate, and all arguments of the lowest predicate.

(28) Argument hierarchy

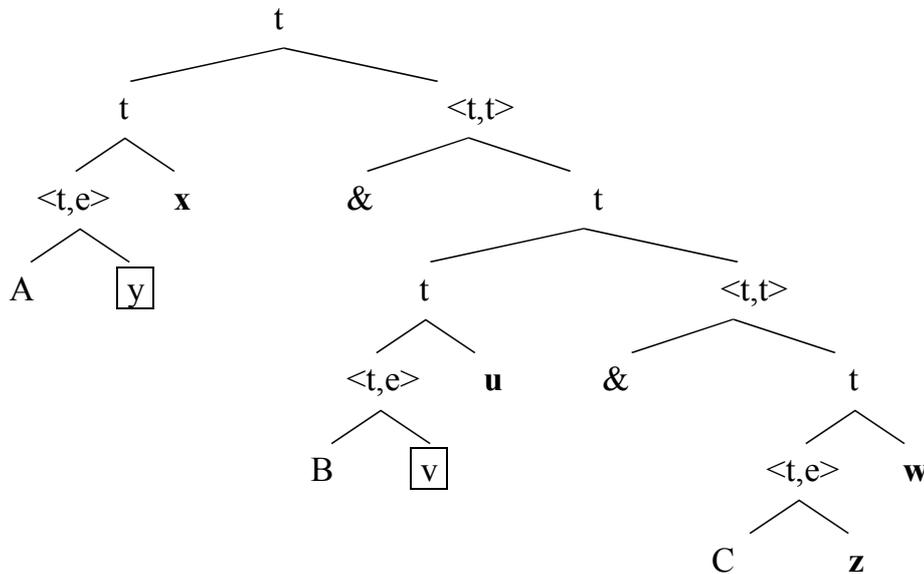
- a. DEPTH OF EMBEDDING. Argument roles are abstracted according to their relative ranking: the deeper an argument role is embedded in SF, the lower [i.e. more to the left] is its position in the list of abstractors.
- b. STRUCTURAL ARGUMENT. An argument is structural only if it is either the lowest argument or (each of its occurrences) L-commands the lowest argument. [Hence, every non-highest argument of a nonfinal predicate in SF is nonstructural.]
- c. L-command is defined as follows:  $\alpha$  L-commands  $\beta$  if the node  $\gamma$ , which either directly dominates  $\alpha$  or dominates  $\alpha$  via a chain of nodes type-identical with  $\gamma$ , also dominates  $\beta$ .

These notions are illustrated in the tree (29) with three arbitrary relational predicates A, B, and C. Only x, u and w L-command the lowest argument z; thus, only these four arguments are structural, and their ordering  $x > u > w > z$  is reflected in the list of  $\lambda$ -abstractors (the theta-roles). By contrast, the arguments y and v are nonstructural; they could be identified with other arguments, be gapped (left implicit), or be marked by explicit addressing their semantic role (i.e., obliquely realized).

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<sup>10</sup> It is interesting to note that static relational predicates often appear in converse pairs, such as *son-father*, *under-above*, whereas dynamic predicates mostly do not.

## (29) Illustration of STRUCTURAL ARGUMENT

$$\lambda z \lambda w \lambda u \lambda x \{A(x,y) \& B(u,v) \& C(w,z)\}$$


This mechanism is an optimal compromise between economy and expressivity. It is economical in reducing the number of possible structural arguments, and it is expressive in that every predicate is represented by an argument. Moreover, the special function of the lowest argument is respected: only this argument can be incorporated.

(v) Given the sequence  $\lambda z \lambda w \lambda u \lambda x$ , a simple feature system encodes each role by just two relative features: [+hr] for ‘there is a higher role’, and [+lr] for ‘there is a lower role’.<sup>11</sup> The same features are used to specify morphological case, see (31), so that the case assignments attributed to the argument roles in (30) turn out to be optimal, hence canonical.

## (30) Featural encoding of the argument hierarchy, and case assignment

<i>lowest</i>	$\lambda z$	$\lambda w$	$\lambda u$	$\lambda x$	<i>highest</i>	
	+hr	+hr	+hr	-hr		
	-lr	+lr	+lr	+lr		
	ACC	DAT	DAT	NOM		accusative system
	NOM	DAT	DAT	ERG		ergative system

## (31) Structural cases:

DAT	[+hr,+lr]
ACC	[+hr]
ERG	[+lr]
NOM	[ ]

ERG is optimal for the highest argument, and ACC for the lowest argument, while all medial arguments are best realized by DAT. The choice of NOM follows from the requirement that an unmarked case is preferred (DEFAULT). Furthermore, UNIQUENESS forbids a particular case to occur more than once, that is, double-dative in 4-place verbs as in (30) is highly dispreferred though not excluded (Wunderlich 1997a, Joppen-Hellwig 2001). The following

<sup>11</sup> Similar features were invented by Kiparsky (1992), but conflicted with markedness considerations. In Kiparsky’s system, the single argument of an intransitive verb is most marked (+F1,+F2), while the medial argument of a ditransitive verb is least marked (–F1,–F2), moreover, all morphological markers are defined in terms of minus-values, which in every respect is the opposite to what is desirable.

possessor-raising instance of Choctaw (Muskogean) illustrates the accusative pattern of (30) with double-dative; only the 3rd person theme remains unmarked on the verb (Davies 1986: 54,59).

- (32) Double-dative in Choctaw  
 Alla iskali chim-im-a:-li-tok.  
 child money 2.DAT-3.DAT-give-1.NOM-PAST  
 ‘I gave your money to the child.’

(vi) There is a general asymmetry involved: it is better to mark a lower argument than a higher one (Stiebels 2000, 2002).

- (33) [+hr] > [+lr]

The higher argument is more prominent for raising and control structures, as well as for topicalization, and therefore should be unmarked morphologically. This asymmetry gives rise to the fact that cross-linguistically, ergative systems are much rarer than accusative systems, and it explains why ergative morphology can be coexistent with accusative syntax.

(vii) The two features [+hr] and [+lr] encode a sequence of theta roles from its two endpoints, the lowest or the highest role. There is the logical alternative for encoding a sequence of roles by just one feature recursively (similar to counting).

- (34)    λz    λw    λu    λx  
          +hr   +hr   +hr   -hr  
          +hr   +hr   -hr  
          +hr   -hr

Since the morphological combination of [+hr] and [-hr] features is destructive, morphological cases that adapt to such an encoding system cannot exist. However, the ordering expressed in (34) can be mapped onto the linear order of syntactic arguments, which seems to be the default option for all languages. Positional linking systems with SVO, where only the highest argument precedes the verb (exemplified in the Bantu languages), mostly realize the next-to-highest argument (u) as the ‘primary object’. All the other objects (w, and z) have to follow the primary object. In positional linking systems the perspective of the lowest argument, characterized by the feature [-lr], does not play any role. Many languages also show morphological systems in which the recipient gets priority in object marking and passive; as predicted, these systems, which ignore the feature [lr], always lack dative.

#### 4. Structural case in the context of semantic factors

Categorial generalization could be *the* major feature of the human language capacity.<sup>12</sup> Once a category is introduced, it is better to follow the category than semantic classifications. For each category there are ‘prototypical’ instances, which are semantically defined and thus allow the language learner to acquire the category. In the course of generalization semantic

<sup>12</sup> Some researchers believe that recursivity is the major feature, possibly adapted from other systems (such as numbering, spatial navigation, or social relationships) (Hauser, Chomsky and Fitch 2002). Categorial generalization is necessary in order to deal with an increasing vocabulary in economic ways. Once the categories noun and verb and the possibility to convert verbs into nouns have been invented, at least one way of recursion is straightforward. Thus, categorial generalization may have prepared the possibility to invent recursion (Wunderlich 2002).

factors become increasingly downgraded: once you have a category apply it for all instances. However, semantic factors remain present both as content and context. For the sake of semantic expressivity, categories may be relativized for some semantic factor. Theoretically, this can be done in two different ways, by marking the lexical item itself ('this is an exception'), or by marking the context ('this is an instance of an unusual context'). Therefore, one expects two kinds of reaction if a grammar has adapted a structural concept such as 'argument hierarchy determines the realization by case'.

The question is: How can structural case patterns become sensitive for semantic factors? Typological inspection reveals that indeed two reactions appear again and again, in nonrelated languages: (i) Semantic roles that differ from prototypical agents or patients are signalled by an additional lexical specification, which leads to either a noncanonical case pattern (such as 'experiencer dative') or to a pseudo-role (to be realized by expletives or inherent reflexives). Of course, lexical marking of this kind can become historically opaque. (ii) The marked cases, bearing some processing load, are reserved for sortal values that are 'untypical' for an argument, while arguments with 'typical' values are realized by a less specified case (usually nominative). This phenomenon has been called 'differential object (or subject) marking'.

Lexical marking by a case feature leads to a noncanonical case pattern by which the respective class of verbs can be identified. This is exemplified by two examples from German. The feature [+lr] invites the inference that a proto-agent property is present ('an argument that exerts some control by itself'), and the feature [+hr] invites the inference that a proto-patient property is present ('an argument that is somehow affected'). Together with the respective default feature for a lower or a higher argument, in both instances a feature combination is achieved for which dative is optimal. Therefore, any attempt to capture an exceptional dative by just one semantic role must fail under this approach.<sup>13</sup>

- (35) a. Sie folgte ihm.  
 She.NOM followed he.DAT  
 b.  $\lambda y \quad \lambda x \quad \text{FOLLOW}(x,y)$   
 lexically +lr  
 default +hr  
 DAT

- (36) a. Ihr gefiel er.  
 She.DAT liked he.NOM  
 b.  $\lambda y \quad \lambda x \quad \text{LIKE}(x,y)$   
 lexically +hr  
 default +lr  
 DAT

Lexical marking by a pseudo-role preserves the canonical pattern. A pseudo-role in the highest position (an expletive argument) virtually lowers the true argument, and thus invites

<sup>13</sup> Bornkessel and Schlesewsky (this volume) report that the processing of a dative-nominative word order deviates from that of a nominative-dative word order by a characteristic N400 effect, regardless of whether the verb belongs to the type (35) or (36). They argue that this result is consistent with the assumption that the dative argument is considered a non-macrorole. The result is in fact consistent with much more hypotheses, including the assumption that the dative argument is lexically marked in both instances. However, I would be surprised if *dass ihm sie folgte* und *dass ihm sie gefiel* were processed identically in every respect.

the same inference as the feature [+hr] does ('is affected'). In contrast, a pseudo-role in a non-highest position (a reflexive argument) virtually raises the true argument, and thus invites the same inference as the feature [+lr] does ('exerts control'). Although the examples, repeated from (15) above, can refer to the same state of affairs, they slightly differ in just this respect. If an actor played the scene, only (38) would be adequate, but if one wants to describe how someone actually reacted in the presence of spiders, the construction in (37) is preferred.

- (37) a. Ihn ekelte es (vor Spinnen).  
 he.ACC disgusted it.NOM (at spiders)  
 'He was disgusted (at spiders).'
- b.  $\lambda z \lambda x \lambda y$  DISGUST(x,z)  
*vor*  
 ACC EXPL
- (38) a. Er ekelte sich (vor Spinnen).  
 he.NOM disgusted himself (at spiders)  
 'He was disgusted (at spiders).'
- b.  $\lambda z \lambda y \lambda x$  DISGUST(x,z)  
*vor*  
 REFL NOM

In turning to the second type of phenomena in which semantic issues interact with argument hierarchy, the reader is reminded at the observation in the beginning of this article: the higher argument tends to be more salient in terms of person, animacy and specificity than the lower argument.<sup>14</sup> All these notions refer to sortal or referential values of the arguments, which they have independent of their semantic role in principle. The argument linking system can be sensitive to these contextual values by a differential object or subject marking, i.e., by a split between marked and unmarked case.

The concept of harmonic alignment of scales (Prince and Smolensky 1993/2004) can deal with such a phenomenon. Let me first consider the proposal made by Aissen (1999b, 2003). According to her account, harmonic alignment of the argument hierarchy in (39a) and one of the semantic scales in (39b) yields the preference scales in (39c), to be read as 'local person subjects (i.e. 1st or 2nd person) are preferred over 3rd person subjects' etc., while the reverse readings hold for objects. The reversal of these preference scales then gives the markedness hierarchies in (39), to be read as 'Avoiding 3rd person subjects is better than avoiding local person subjects' etc.

- (39) Harmonic alignment of scales (Aissen 1999b)
- a. Argument hierarchy:  
 subject (sb) > object (ob)
- b. Contextual semantic scales:  
 person: loc > 3  
 animacy: +anim > -anim  
 specificity: +spec > -spec
- c. Harmonic alignments:

<sup>14</sup> Other possible factors are humanness and definiteness, the informativity of the nominal category (demonstrative, pronoun, full noun), and number.

sb/loc	>	sb/3	ob/3	>	ob/loc
sb/+anim	>	sb/-anim	ob/-anim	>	ob/+anim
sb/+spec	>	sb/-spec	ob/-spec	>	ob/+spec

## d. Contextualized markedness hierarchies:

*sb/3	»	*sb/loc	*ob/3	»	*ob/loc
*sb/-anim	»	*sb/+anim	*ob/+anim	»	*ob/-anim
*sb/-spec	»	*sb/+spec	*ob/+spec	»	*ob/-spec

These markedness hierarchies serve to describe of whether a given argument is preferably encoded as object (in an active clause) or as subject (in a passive clause), they do not imply anything about the choice between marked and unmarked case.<sup>15</sup> The crucial insight for understanding the relationship between harmonic alignment and morphological marking has been contributed by Comrie (1989) and Dixon (1994): Only arguments that deviate from what is expected should be encoded by a marked case. 3rd person subjects are less expected than local person subjects, and local person objects are less expected than 3rd person objects; therefore 3rd person subjects are preferably marked by ergative, and local person objects are preferably marked by accusative. (Similarly for the other types of salience.)

This insight leads to the alternative proposal in (40). The relevant scale from which one has to start is not the argument hierarchy itself but the ranking of morphological features in (40a), already introduced in (33). The markedness hierarchies in (40c) now give the desired results: ‘Avoiding ergative for local person is better than avoiding ergative for 3rd person’, etc.

(40) Harmonic alignment in the presence of morphological factors (Stiebels 2000, 2002)<sup>16</sup>

## a. Morphological features:

[+hr] > [+lr] (ACC > ERG)  
 (‘It is better to mark objects than subjects’)

## b. Contextual semantic scales:

person: loc > 3  
 animacy: +anim > -anim  
 specificity: +spec > -spec

## c. Contextualized markedness hierarchies:

*ERG/loc	»	*ERG/3	*ACC/3	»	*ACC/loc
*ERG/+anim	»	*ERG/-anim	*ACC/-anim	»	*ACC/+anim
*ERG/+spec	»	*ERG/-spec	*ACC/-spec	»	*ACC/+spec

On the basis of this result one expects possible effects in the lexical inventory of morphemes, as well as in the distribution of morphemes forming possible case patterns for a clause. The markedness constraints relate to economy; their effect is counterbalanced by faithfulness constraints relating to expressivity, such as Max(+hr) ‘Realize the feature [+hr] by an accusative’ and Max(+lr) ‘Realize the feature [+lr] by an ergative’. These constraints can differently interpolate with the markedness hierarchies in (40c), thereby giving the individual languages their profile.

<sup>15</sup> For this purpose, Aissen conjoins the markedness constraints with another type of markedness, namely whether the arguments are case-marked or not. This move is unnecessarily complex, and it does not pay regard to the distinction between ergative and accusative. As Stiebels (2002) shows, it also leads to wrong results.

<sup>16</sup> For convenience, I use the case names ERG and ACC rather than the respective features, which would be more adequate in the general framework.

One of the expectations resulting from (40c) concerns the existence of languages that lack an ERG morpheme for local person, and those that lack an ACC morpheme for 3rd person. A typical instance of a language that meets both of these expectations is Yidiñ (Australian), which has an ergative set for 3rd person, and an accusative set for 1st and 2nd person. There is also an overlapping region with human demonstratives, which show both an ergative and an accusative morpheme. Similar is Dyirbal, another Australian language, in this case without overlapping.

(41) Gaps in the linker inventory of Yidiñ (Dixon 1977)

		NOM	ACC	ERG
I	noun and adjective	∅	—	-ñgu/-du
	DEM: -def,-anim,+gen	wañi	—	wañi:ndu
	DEM: -def,-anim,+spez	wañi:ra	—	wañirañgu
II	DEM: +def,+hum	yिñu	yिññu:ñ	yिññu:ñ
	DEM: -def,+hum	waña	waññu:ñ	waññu
III	1sg	ñayu	ñañañ	—
	1du	ñali	ñali:ñ	—
	1pl	ñaññi	ñaññi:ñ	—
	2sg	ñundu	ñuniñ	—
	2pl	ñund:ba	ñundu:bañ	—

(42) Gaps in the linker inventory of Dyirbal (incomplete; Dixon 1994:10/14)

	NOM	ACC	ERG	
I	noun	∅	—	-ñgu
	DEM: fem.sg	balan	—	bañgun
	DEM: masc.sg	bayi	—	bañgul
III	1pl	ñana	ñana-na	—
	2pl	ñurra	ñurra-na	—

The two constraint hierarchies that account for these inventory gaps (leaving out the overlapping region in Yidiñ) are the following.

- (43) a. \*ERG/loc » Max(+lr) » \*ERG/3  
 b. \*ACC/3 » Max(+hr) » \*ACC/loc

Of course, other languages may have other rankings. In particular, there can be rankings concerning properties such as specificity that do not induce gaps in the inventory of morphemes but rather in the realization of nominal arguments, i.e. in the distribution of case patterns for nominal arguments. The rankings in (43) give rise to four types of case patterns which exhibit the involved ergative and accusative splits.

(44) Four possible case patterns

Direct setting (loc/3)		Inverse setting (3/loc)	
‘We see the man.’		‘The man sees us.’	
NOM	NOM	ERG	ACC

Symmetric setting (loc/loc) 'We see you.' NOM    ACC	Symmetric setting (3/3) 'The man sees him.' ERG        NOM
--	--

In summarizing, the interaction of argument hierarchy with semantic factors yields certain types of either noncanonical or underspecified case patterns. Semantic roles are accounted for by additional features (a relational device) that replace the default features as shown in the lower part of figure (45). 'Typical' sortal (or referential) values are accounted for by blocking the positive features (a purely local device), so that a less specific realization results.

- (45) Two ways in which semantic factors can interact with argument hierarchy
- |      |      |   |
|------|------|---|
| *+hr | *+lr | markedness constraints result in underspecified case patterns |
| ↓    | ↓    |   |
| λy   | λx   | VERB(x,y)   |
| +hr  | +lr  |   |
| ↑    | ↑    |   |
| +lr  | +hr  | lexical features result in noncanonical case patterns         |

In the remainder of this section I will illustrate the four-way split enabled by constraint hierarchies such as those in (43) with data from two unrelated languages: Udi, a Northeast Caucasian language, and Hindi. Only the conditions under which an ergative split appears differ in these languages. Moreover, the formal means are slightly different. The Udi accusative (traditionally called 'dative2') is derived by the suffix /-x/ from the dative (one of the rare cases in which the accusative is morphologically more marked than the dative), whereas in Hindi accusative and dative have been syncretized. Nevertheless, the general profile of splits is identical in these two languages.

- (46) Four types of split in Udi (NE Caucasian)

Ergative split in the inventory	There are no ergative 1st and 2nd person pronouns.	Markedness: * [+lr]/local person
Saliency split	In transitive verbs, accusative alternates with nominative. Accusative only occurs with definite, animate or pronominal objects.	Markedness: * [+hr]/low saliency
Intentionality split	Intransitive verbs encode intentional body actions ('those that are thought to be controlled') by ergative rather than nominative.	Lexical feature: [+lr] ( 'controller' )
Experiencer split	In transitive verbs, ergative alternates with dative. Dative occurs with perception verbs, but also with other kinds of verbs (exceptionally marked).	Lexical feature: [+hr] ( 'affected' )

The examples below illustrate these statements (Schulze 2001).<sup>17</sup> (47) shows both the lack of an ergative form of the 1st person and the definiteness effect with objects. (48) shows an intransitive verb that assigns ergative under specific conditions. (49a,b) show different choices of subject marking: *be*<sup>?</sup>g ‘see’ with agentive reading selects ergative, while *ak*<sup>?</sup> ‘see’ with experiencer reading selects dative; in addition, (49c) attests that the object variation between nominative/accusative is independent of the case of the subject. The examples also show that subject agreement on the verb is either nominative or dative.

(47) Ergative and accusative split in Udi

- a. *zu sum / sum-ax u<zu>k-sa.*  
 I.NOM bread.NOM / bread-ACC <1sgN>eat-PRES  
 ‘I eat bread/the bread.’
- b. *s□e-t’-in sum / sum-ax u<ne>k-sa.*  
 DIST-t’-ERG bread.NOM / bread-ACC <3sgN>eat-PRES  
 ‘(S)he eats bread/the bread.’

(48) Intentionality split in Udi

- a. *xinär axsum-ne-xa.*  
 girl laugh-3sgN-LV.PRES  
 ‘The girl is laughing.’
- b. *xinär-en gölö axsum-ne-xa.*  
 girl-ERG much laugh-3sgN-LV.PRES  
 ‘The girl is laughing very much.’

(49) Experiencer split in Udi

- a. *gädi-n-en sa adamar be<sup>?</sup><ne>g/-i.*  
 boy-n-ERG one man.NOM <3sgN>see-AOR  
 ‘The boy saw (observed) a man.’
- b. *gädi-n-a sa adamar a<t’u>k-i.*  
 boy-n-DAT one man.NOM <3sgD>see-AOR  
 ‘The boy saw (perceived) a man.’
- c. *gädi-n-a adamar-ax a<t’u>k-i*  
 boy-n-DAT man-ACC <3sgD>see-AOR  
 ‘The boy saw the man.’

As already mentioned, Hindi exhibits the same types of case split as Udi, with only slightly different conditions.

(50) Four types of split in Hindi

Ergative split is aspectually conditioned	Ergative is restricted to perfective forms.	Markedness: * [+lr]/-perf
Salience split	In transitive verbs, accusative only occurs with human, specific-animate or definite-inanimate objects.	Markedness: * [+hr]/low salience

<sup>17</sup> Both /t/ and /n/ which precede the case ending are stem augments. The subject marker on the verb is infix, which is characterized by ‘<infix>’ added to the stem. -xa is a present allomorph, formed from the light verb *pesun* ‘say’.

Intentionality split	Some intransitive verbs alternate between ergative and nominative depending on whether the action is deliberately done or not.	Lexical feature: [+lr] ('controller')
Experiencer split	Transitive experiencer verbs (e.g. perception verbs) encode their subject with accusative. (Note that Hindi exhibits accusative-dative syncretism.)	Lexical feature: [+hr] ('affected')

The following examples, taken from Mohanan (1994), illustrate these statements. Both (51) and (52) show that the subject is marked by ergative in the perfect, but unmarked (nominative) in the future. In addition, (51) shows that for human objects, always marked by accusative, it is undetermined whether they get a definite or an indefinite reading, whereas inanimate objects in the nominative only get an indefinite reading, as shown in (52). These examples also illustrate four types of agreement behaviour (F=feminine, M = masculine): no agreement in (51a), agreement with the subject in (51b), agreement with the object in (52a), and agreement with the subject in the presence of another nominative argument, in (52b).

(51) Ergative split in Hindi, human object

- a. niinaa-ne      baalika-kō ut<sup>h</sup>aa-y-aa.  
 Nina.F-ERG      girl-ACC      lift-PERF-M  
 'Nina lifted up a/the girl.'
- b. niinaa      baalika-kō ut<sup>h</sup>aa-eg-ii.  
 Nina.F.NOM      girl-ACC      lift-FUT-F  
 'Nina will lift up a/the girl.'

(52) Ergative split in Hindi, inanimate object

- a. niinaa-ne      roTii      khaa-y-ii.  
 Nina.F-ERG      bread.F.NOM      eat-PERF-F  
 'Nina ate bread.'
- b. niinaa      kelaa      khaa-eg-ii.  
 Nina.F.NOM      banana.M.NOM      eat-FUT-F  
 'Nina will eat a banana.'

Hindi has a couple of intransitive verbs (such as *cillaa* 'shout', *naac* 'dance'), which alternate between ergative and nominative subjects, depending on whether the action is deliberately done or not, whereas a few intransitive verbs (*nahaa* 'bathe', *c<sup>h</sup> i ik* 'sneeze') take ergative subjects only; they are lexically marked with the feature [+lr]. Lexical marking with the feature [+hr] is shown in (53).

(53) Experiencer split in Hindi

- tus<sup>h</sup>aaar-kō caand      dik<sup>h</sup>-aa.  
 Tushar-ACC moon.M.NOM      see-PERF-M  
 'Tushar saw the moon'

(Mohanan 1994:141)

Recall that Hindi does not have an overt dative, and thus shows ACC-DAT syncretism. In the tradition of Hindi grammar it is assumed that the postnominal clitic *-ko* is ambiguous between dative and accusative, a position that is defended by Mohanan (1994) and Butt (1995). One of their arguments is that in all constructions where dative is expected

(experiencer subject constructions such as those in (53), and ditransitive verbs with a medial argument), a salience split is lacking. As the examples in (54) show, the medial argument of ditransitive verbs is always realized by *-ko*, and their lowest argument by the unmarked nominative.

(54) Ditransitive verbs in Hindi

- a. Ravii-ne baalak-ko/\*baalak baccaa/\*bacce-ko diy-aa.  
 Ravi-ERG boy-ACC/boy.NOM child.NOM/\*child-ACC give.PERF-M  
 ‘Ravi gave a/the child to a/the boy.’
- b. Ravii-ne gaay-ko/\*gaay kelaa/\*kele-ko k<sup>h</sup>ilaay-aa  
 Ravi-ERG cow-ACC/cow.NOM banana.NOM/\*banana-ACC eat.CAUS.PERF-M  
 ‘Ravi fed a/the cow a/the banana.’

One can nevertheless assume that *-ko* simply is an accusative morpheme (avoiding the problem of ambiguity). The realization of *-ko* is independent of animacy or definiteness just in those contexts in which the underlying role specification is [+hr,+lr]. The highest argument of the experiencer verbs, which is [+lr] inherently, is lexically marked for [+hr], and the medial argument of ditransitive verbs is [+hr,+lr] inherently. It is the existence of the feature [+lr], which blocks the possibility of a salience split regarding [+hr]. The feature combination [+hr,+lr] must always be expressed by maximal means, which is dative if it is available, otherwise accusative. Neither can the lowest argument alternate between accusative and nominative, because UNIQUENESS (‘No marked case should appear more than once in a pattern’) forbids a second accusative. The constraints assumed in the analysis by Wunderlich (2000b) successfully explain why not every [+hr] argument underlies the accusative-nominative split.

As illustrated above, Udi and Hindi have a quite similar structural case system, with the same types of alternations reflecting semantic factors. In contrast, their agreement systems are relatively poor and exclusively structural; here, Udi and Hindi choose different options. The Udi verb always agrees with the highest argument, regardless of whether it is nominative or ergative; and there are special agreement markers with dative subjects, which are lexically marked. The latter fact shows that agreement still plays some role in the argument linking system of Udi. In contrast, the Hindi verb only agrees with a nominative argument, and in case of double nominative with the higher argument. If no nominative is present, the verb takes the default form masc.sg. The agreement features are reduced to gender and number. Evidently, agreement does not take any part in the argument linking system of Hindi, it has at best discriminative function.

(55) Agreement in Udi vs. Hindi

Udi: the verb agrees with the highest argument		Hindi: the verb agrees with the highest nominative argument	
agr.N - NOM		agr - NOM	
agr.N - ERG		ERG	
agr.N - ERG	NOM/ACC	ERG	agr - NOM
		ERG	ACC
agr.N - NOM	NOM/ACC	agr - NOM	NOM/ACC
agr.D - DAT	NOM/ACC	ACC	agr - NOM

Although the agreement systems of the languages considered here do not much contribute to argument linking, the impression that this would generally hold is certainly wrong. Many languages exhibit a rich system of head-marking, thereby indicating the argument structure of a verb by pronominal affixes attached to the verb. The structural properties of these head-marking systems are often very similar to those of dependent-marking systems, attributing morphological case to syntactic arguments. The different sets of pronominal affixes often can be described by the same notions as used for morphological case: dative, ergative, accusative, and nominative. The notion of *generalized case* can serve to subsume the common properties of morphological case and pronominal affixes. Both the claim that argument hierarchy is the crucial factor of argument linking and the claim that there are only two ways in which semantic factors can enter structural argument linking also hold for generalized case in general. That is, lexical marking for untypical argument roles, as well as differential object/subject marking in the context of salience factors, should be observed for pronominal affix systems as well, which indeed is true.

If head-marking loses its principal function for argument linking, it might be reduced to an agreement system which is relatively poor for argument linking, for instance, misses the pro-drop property. On the other hand, if free pronouns are clustered to clitics associated with the verb (or an auxiliary), this may be the first step to a head-marking system. One should not expect that in these transitional systems alternatives develop that also reflect the semantic factors considered here. Pure agreement morphemes seem to be too poor to preserve semantic sensitivity, and pure clitics seem to be too structural to react to semantic factors.

## 5. Conclusions

Among the languages of the world, generalized case, be it instantiated by morphological case or by pronominal affixation, is not only the most common but also the most effective type of argument linking. I argued that this is so because this type of argument linking widely abstracts from semantic factors and uses argument hierarchy as its central concept. Although in basic 2-place predicates argument hierarchy itself is determined semantically, in all complex or derived predicates it is uniquely determined by L-command, which reflects the structure in which basic predicates are combined. All arguments that do not L-command the lowest argument are blocked from structural realization.

I further argued that there is a small and closed set of structural cases defined by features of argument hierarchy, which guarantees a canonical case pattern for every intransitive, transitive or ditransitive verb. At the same time, this set of structural cases is flexible enough to form noncanonical case patterns under particular semantic conditions. Either an argument position of the hierarchy is specified lexically by an additional feature, or the realization of its feature is made context-dependent. In other words, the particular argument is realized by a case which is more or less specific than in the canonical pattern. The former option concerns the underlying features and therefore can have global effects, whereas the latter option is always locally restricted.

It would not be adequate to describe the global effects as dependencies in a semantic sense; they always follow from two simple global constraints, namely DEFAULT ('Each case pattern should include nominative') and UNIQUENESS ('No case should appear more than once in a pattern') (Stiebels 2000, 2002, Wunderlich 2003), and mostly result in a less specified case for another argument. For instance, the feature [+hr] for the higher argument turns the canonical pattern <nom, acc> into <dat, nom> rather than <dat, acc> because of

DEFAULT. The requirement of UNIQUENESS may also trigger semantic case on one of the arguments, as is exemplified in ditransitive verbs in languages that lack dative (Wunderlich and Lakämper 2001).

In this paper, I did not consider positional argument linking, which, however can be captured by similar means. The syntactic ordering of arguments mostly follows the argument hierarchy, regardless of the position of the verb, except that some V-initial languages prefer VOS. This ordering is affected by the informational status of the arguments as topic or focus, but never by semantic factors. A strict SVO positional system is unable to react to the semantic factors considered here.

From the point of typology, thus three linguistic types emerge: (i) languages that do not have acquired the property of generalized case (always languages with a considerable amount of morphology, such as the Algonquian languages with inverse morphology), (ii) languages that do inhere the property of generalized case (languages that must have at least some amount of morphology), (iii) languages that lack any morphology in argument linking (languages that only use SVO positional linking). Languages of the first type use semantic factors for determining argument linking in various ways. Languages of the second type have achieved a structural argument linking system and take semantic factors only additionally to the structural system in just two ways (or three ways, if one includes the possibility of semantic case). Languages of the third type have lost any systematic way to react to semantic factors, they can only react to pragmatic factors.

Elaborating this view, one might find that these three linguistic types also characterize certain evolutionary stages. For ‘early’ languages the semantic factors are dominant. In the process of generalization, structural factors may become more important, leaving for semantic factors only some clearly structured ways. Having undergone a process of further generalization, ‘late’ languages ignore these semantic factors altogether, leaving pragmatic factors as the sole source for alternative argument linking.

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