Division of Labour: The Role-Semantic Function of Basic Order and Case

1. Introduction

A common assumption in cross-linguistic research of both functionalist and generative provenience is that basic word order and case relations are functionally equivalent means of coding semantic roles. Formulated in syntactic terms, the assumption is that case and basic order (deep structure) are functionally equivalent manifestations of grammatical functions such as subject or object.

This paper will reveal the functional difference between the two systems of expressing semantic role information. The hypothesis of division of labour between case and structure makes the following claims. Case in the broader sense is sensitive to the degree of agentivity or patiency of a verbal argument. Prototype approaches such as Dowty (1991) are best suited for capturing such generalizations, but his approach makes false predictions for structurally expressed grammatical functions (basic order). The degree of agentivity or patiency is irrelevant for structural linking, which is sensitive to the semantic dependency between co-arguments. In terms of dependency, a patient is dependent on an agent. This dependency is expressed by placing the agent in a structural position that is superior to or precedes the position of the patient.

I have chosen three well-known, typologically major phenomena to illustrate the hypothesis of division of labour: i) ergativity, ii) split intransitivity and iii) the case and word order pattern of ditransitive verbs.

The main theoretical assumptions of this paper are inspired by Dowty's Proto-Role approach, Markedness Theory and Optimality Theory (OT). One of the main assumptions is that all principles and constraints are violable, even if this is not always stated explicitly. The semantic representations are informal (cf. Primus (1999) for formal representations).

The outline of the paper is the following. After an exposé of a modified version of the Proto-Role approach (Chap. 2), case coding and its role-semantic motivation will be discussed first (Chap. 3). This chapter also offers a formalization of the Proto-Role approach within OT. The next chapter deals with basic order and its role-semantic motivation (Chap. 4). The three phenomena - ergativity, split intransitivity and ditransitive predicates - will be discussed first with respect to case (sections 3.1-3.3) and then with respect to basic order (sections 4.2-4.4). The last section of this chapter deals with the relation between case and structure and compares languages with and languages without structural cases (e.g. English vs. German). The last chapter offers a summary and an outlook on still open questions.

2. Thematic Proto-Roles

Dowty (1991) views thematic roles such as agent and patient as prototype cluster concepts and calls them Proto-Roles. This means first that agentivity and patiency are a matter of degree: an argument may be more agentive or patientlike than another as it may accumulate a varying number of properties that define a Proto-Role. Second, thematic roles are not necessarily discrete (i.e. distinct) entities and accordingly, an argument may have thematic features that would fall under two thematic roles within traditional approaches. Third, he allows for predicates that assign the same thematic properties to two of their arguments. Under these assumptions, Dowty needs only two Proto-Roles to capture the mapping of
thematic roles to grammatical functions: Proto-Agent and Proto-Patient.

In general terms, a thematic role is viewed by Dowty as a set of entailments of a class of predicates with respect to one of its argument types. A thematic entailment is formally speaking a (second order) property of a predicate relative to one of its arguments. I will call it a basic thematic relation, since it will not be decomposed further. The properties (or basic thematic relations) that characterize the Agent Proto-Role are listed in (1):

(1) Contributing properties for the Agent Proto-Role:
   (a) volitional involvement in the event or state
   (b) sentience (and/or perception) with respect to the event or state denoted by the verb
   (c) causing an event or change of state in another participant
   (d) movement (relative to the position of another participant)
   (e) exists independently of the event named by the verb
   (f) possession of another entity

(1a)-(1e) are Dowty's proposal (1991:572). (1f) includes possession following, among others, Jackendoff (1991). Each of these characteristics is semantically independent. Nevertheless, some of them tend to co-occur (e.g. volition or causation and movement) and one property may unilaterally imply another (e.g. volition implies sentience, cf. Dowty (1991:606)).

Volitionality is used by Dowty in the sense of intentionality on the part of the participant in question, who intends this to be the kind of act named by the verb. Other approaches to action and agentivity consider more mental properties defining an agent. An agent is also able to start and stop the event at will, is responsible for the event, is able to do it, etc. Psychological research (cf. Libet 1985) suggests that the conscious part in initiating an action is not the impulse to act, but rather the control of that impulse. Therefore, Dik's term control seems to be more appropriate (Dik 1978, Primus 1999).

Sentience is used in a broader sense and includes emotion, perception and awareness.

Movement is attributed by Dowty to any form of activity of the participant in question (also for the first argument of look at). It is a Proto-Agent property only if it is an autonomous activity whose source of energy lies within the participant and that is not caused by another participant (cf. Dowty 1991:574). Cognitive linguistic research also demonstrates the relevance of the concept of self-propelled movement for the cognitive development of the notion of agentivity and causation (cf. Premack 1990, Leslie 1995, Premack / Premack 1995). If movement is caused by another participant, it will be considered a Proto-Patient property in the present approach. Thus for instance, in John threw the ball both entities move, but only the ball, the Proto-Patient, moves as a response to John's movement.

As to independent existence, it is logically entailed by all other Proto-Agent statements (Dowty 1991:573). Although there are some verbs that have this entailment but none of (1a)-(1d), there are apparently no verbs having any of (1a)-(1d) - including possession in (1f) - without entailing existence (for a given argument) as well. This property is crucial in the present approach for the distinction between Proto-Agent and Proto-Patient and for the role-semantic factor that determines the basic order of verbal arguments.

Let us now turn to Proto-Patient and the basic thematic relations defining it. Cf. (2):

(2) Contributing properties for the Patient Proto-Role:
   (a) is controlled (volitionally affected) by another participant
   (b) is causally affected by another participant
   (c) undergoes a change of state, e.g. is moved or physically manipulated by another participant

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1 Closely related proposals are the macrorole approach of Van Valin (cf. Foley / Van Valin 1984, Van Valin / LaPolla 1997) and the transitivity concept of Hopper and Thompson (1980).
(d) is the target of the sentience of another participant
(e) does not exist independently of the event, or not at all
(f) is the object of possession of another participant

Besides minor points, such as including possession in the list, two major departures from Dowty's concept of Proto-Patient have to be mentioned. The first is the treatment of aspectual concepts. For Dowty a change of state includes coming into existence, going out of existence, and both definite and indefinite changes of state. Some, but not all arguments of this type are incremental themes, a notion that is in Dowty's Proto-Patient list. Incremental themes are participants gradually affected in accomplishment events. Some of them undergo a perceptible and existential change of state, such as in build a house, write a poem, eat a cake, but others do not, cf. memorize a poem. Aspectual notions are treated here as a separate factor that may influence the syntactic realization of arguments (cf. section 4.3 below).

The second departure is the basic status given to the distinction between an independent and a dependent involvement. In the present approach, it is not considered an additional property (see the brackets in (1e) and (3e)), but rather the underlying criterion that distinguishes the properties of Proto-Agent and Proto-Patient from each other. The two Proto-Roles involve the same basic concepts: volition, causation, change (e.g. movement), sentience and possession. The difference between the two roles is that a Proto-Agent does not entail the presence of another participant, while a Proto-Patient does. Section 4.1 will deal with this dependency notion more extensively.

This view on Proto-Patient is facilitated by the prototype approach pursued here. The arguments of different intransitive verbs can only be distinguished by the number of agent properties they accumulate (cf. section 3.2 below) or by a different causal or aspectual structure they are embedded in (cf. section 4.3 below). The fact that an argument does not bear any relevant agentive property (e.g. John is tall) does not automatically qualify it for a patient or theme, as often proposed in the literature.

In conclusion, the basic concepts defining the agent and patient prototype are nothing new to the linguistic community: volition or control, causation, change (or movement), sentience and possession. For empirical reasons, the list can be amended in various ways without affecting the logic of the proposed constraints: one can substitute a basic concept with another (e.g. volition by control), split a concept into more basic ones (e.g. control into volition, responsability, etc.), or drop it altogether. Such steps are not crucial for the further argumentation of the present paper.

The present approach distinguishes two dimensions of role semantics. The degree of involvement is represented by the number of properties that an argument accumulates for a given Proto-Role. $\theta^{\text{max}}$ abbreviates an argument with a large number of consistent Proto-Role properties, $\theta^{\text{min}}$ an argument with a small number of consistent Proto-Role properties. The role hierarchy (3a) can be derived from this dimension:

\[(3) \begin{align*}
\text{(a) Thematic Involvement Scale: } & \theta^{\text{max}} > \theta^{\text{min}} \\
\text{(b) Corollary given the two Proto-Roles } & A, P: A^{\text{max}} > A^{\text{min}}, P^{\text{max}} > P^{\text{min}}
\end{align*}\]

Since there are exactly two Proto-Roles, Proto-Agent (A) and Proto-Patient (P), the two scales in (3b) will automatically follow. It means that A and P are equally apt to accumulate the maximal number of basic properties. A contrast between A and P arises in terms of role dependency. Cf. (4):

\[(4) \text{ Thematic Dependency Scale: } A \succ_{\text{dep}} P\]

With respect to this criterion, which will be discussed in greater detail in section 4.1 below,
agents outrank patients. This ranking is derived from the thematic structure of predicates, in which the logical variable for A c-commands and/or precedes the logical variable for P.

These two aspects of role semantics are at the basis of the hypothesis of division of labour. Thematic involvement is relevant for the case realization of arguments; thematic dependency explains their basic order. I will deal with case selection first.

3. Thematic Involvement and Case Selection

3.1 The Ergative Parameter in Optimality Theory

The basic principle that restricts case selection in terms of thematic role information is the following (cf. Primus 1999:61): The greater the number of Proto-Agent basic relations a participant accumulates, the more likely it is coded by A; the greater the number of Proto-Patient basic relations a participant accumulates, the more likely it is coded by B, A and B being the two highest ranking cases of a language. The Ergative Parameter specifies whether A or B is the first case. This principle presupposes a Case Hierarchy, such as that in (5):

(5) nominative/absolutive > accusative/ergative > dative > other oblique cases
    1C          2C          3C          4C

The two highest ranking cases are commonly called nominative / absolutive and accusative / ergative. Due to terminological tradition, the Case Hierarchy (5) holds for many languages, but it is not universally valid. One can avoid the problem of language specific hierarchies by using case variables in numerical order (1 > 2 > 3 etc.) as shown in (5).

Case is used here in a broader sense including adpositions and verb agreement markers. The latter qualify as equivalent for cases only if they are directly linked to thematic roles and are not predictable from another coding device such as case or structure. Such agreement markers are found in Guarani, for example (cf. section 3.2 below).

The formalization of the above-mentioned principle in OT makes its basic assumptions more explicit. The Involvement Scales $A^{\text{max}} > A^{\text{min}}$ and $P^{\text{max}} > P^{\text{min}}$ are aligned harmonically with the first two elements of a Case Hierarchy, A and B. In OT, a harmonic alignment generates an invariant ranking of constraints (cf. Prince / Smolensky 1993:129f.). Cf. (6):

(6) Constraint Schema for Thematic Case Selection

(a) $A^{\text{max}}/A >> A^{\text{max}}/\neg A$
   $\forall \neg$ $\forall$
   $A^{\text{min}}/A$ $A^{\text{min}}/\neg A$

(b) $P^{\text{max}}/B >> P^{\text{max}}/\neg B$
   $\forall \neg$ $\forall$
   $P^{\text{min}}/B$ $P^{\text{min}}/\neg B$

The Ergative Parameter specifies A and B as either 1C or 2C, so that the two ranking options in (7) and (8) obtain:

(7) Accusative Thematic Case Selection

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2 Cf. Dowty's closely related proposal (1991:576): "In predicates with grammatical subject and object, the argument for which the predicate entails the greatest number of Proto-Agent properties will be lexicalized as the subject of the predicate; the argument having the greatest number of Proto-Patient entailments will be lexicalized as the direct object." The main difference to Dowty and other approaches with similar principles is that in the present approach the variables A and B range only over cases in the broader sense and that the most prominent syntactic function, the subject, is not linked to the Proto-Agent.
(8) Ergative Thematic Case Selection

(a) $A^{\text{max}}/1C >> A^{\text{max}}/\neg 1C$

$\Uparrow$ $\Uparrow$

$A^{\text{min}}/1C$ $A^{\text{min}}/\neg 1C$

(b) $P^{\text{max}}/2C >> P^{\text{max}}/\neg 2C$

$\Uparrow$ $\Uparrow$

$P^{\text{min}}/2C$ $P^{\text{min}}/\neg 2C$

(7) and (8) are inverse rankings given $1C = \neg 2C$ and $2C = \neg 1C$. Reranking is the method of capturing typological variation in OT. Following typological tradition, a language is considered to be ergative if and only if it has case patterns that are selected according to the rankings in (8), at least in some of its clause types.

The horizontally aligned constraints compete with each other due to their identical semantic information. (7a) states that the constraint linking a maximal agent to the first case, the nominative, ranks above the constraint linking a maximal agent to another case. In (7b) the same ranking schema applies to maximal patients and the second case, the accusative. As to ergative constructions, (8a) states that the constraint linking a maximal agent to the second case, commonly called ergative, ranks above the constraint linking a maximal agent to another case. In (8b) the same ranking schema applies to maximal patients and the first case, commonly called absolutive or nominative. As to the horizontally aligned constraints involving $\theta_{\text{min}}$, they do not have a universally invariant ranking.

The vertical rankings order constraints with identical case information that vary along $\theta_{\text{max}} > \theta_{\text{min}}$. As to accusative patterns, (7a) states that the constraint linking a maximal agent to the nominative is stronger than the constraint linking a minimal agent to this case. As a corollary, the constraint linking a minimal agent to a non-nominative case dominates the constraint linking a maximal agent to a non-nominative case. As to ergative patterns, (8a) ranks the constraint linking a maximal agent to the ergative higher than the constraint linking a minimal agent to this case. This implies as a corollary that the constraint linking a minimal agent to a non-ergative case dominates the constraint linking a maximal agent to a non-ergative case.

Ergative constructions are illustrated in (9b) and (10b) with examples from Avar, a Caucasian language, and Dyirbal, an Australian language:

(9) Avar (Charachidzé 1981:144f.)
(a) yas y-or,c 'ana.
girl(ABS,CL2) CL2-woke-up
'A/the girl woke up.'

(b) di-cca y-osana yas.
I-ERG,CL1 CL2-took girl(ABS,CL2)
'I took a/the girl.'

(10) Dyirbal (Dixon 1972:59)
(a) bayi yaJa bani j.
DEM(ABS) man(ABS) come(NFUT)
'The man is coming/came.'

(b) bayi yaJa baniNgun |ugumbi|u balgan.
DEM(ABS) man(ABS) DEM(ERG) woman(ERG) hit(NFUT)
The woman is hitting/hit the man.'

In an ergative construction, the highest ranking, morphologically least marked case (the absolutive or nominative) is used for the patient of a transitive clause. The first rank of the absolutive is also manifest in intransitive clauses, where it is selected irrespective of the thematic role of the argument (cf. (9a)-(10a)). The second, morphologically more marked case (the ergative) is linked to the agent of a transitive clause. The accusative pattern can be seen in the English translations in (9) and (10).

Ergativity supports the hypothesis of division of labour in many respects. Let us start with the explanation for the existence and rather high frequency of languages with ergative constructions. As formalized in (6)-(8), case coding is sensitive to the mere distinctness of Proto-Agent and Proto-Patient and to the Involvement Scale $\theta^\text{max} > \theta^\text{min}$, i.e. the quantity of thematic information that an argument accumulates. Since agents and patients proper, $A^\text{max}$ and $P^\text{max}$, accumulate a high number of thematic properties each, they are equally suited to be coded by the highest ranking category (i.e. the nominative or absolutive). Alternative explanations for the existence of languages with ergative constructions, including Dowty (1991:581f.), reverse the thematic hierarchy agent > patient into patient > agent for ergative constructions. This is not only highly stipulative, but also empirically questionable since semantic roles are based on universal concepts.

Strong support for the hypothesis of labour is the fact ergativity in the strict typological sense is basically a morphological, i.e. case-based, phenomenon. There is no syntactic ergativity without morphological ergativity (cf. Comrie 1978, Dixon 1994:177, Croft 1991:30f.). In other words, the syntactic ergative languages are a subset of the morphological ergative languages. The distribution of the syntactic split in ergative languages corroborates this fact (cf. section 4.2 below): syntactic ergativity is more frequently attested in rules that are typically determined by cases, such as verb agreement and passive / antipassive. Syntactic accusativity (i.e. agent orientation) in ergative languages are more frequently attested in rules that are typically determined by thematic or deep syntactic structure, such as imperative, reflexive binding, relative clause formation, or 'infinitival' control. A structural linking theory (e.g. Marantz 1984, Baker 1997, Dowty 1982, 1991:582) cannot explain the relationship between syntactic and morphological ergativity, which is easily explained in the present approach: case-based phenomena can be agent- or patient-oriented, structurally determined phenomena are always agent-oriented. This results from the two types of thematic information, namely Involvement vs. Dependency (cf. (3)-(4) above) and the division of labour between case and structure.

Another empirical observation showing the impact of the Involvement Scale on case selection is that the Ergative Parameter is most clearly manifest in the constellation $A^\text{max} \& P^\text{max}$: there is no lexeme-bound case variation (e.g. morphological split ergativity) in this role constellation. If a language choses the linking option (7) for a verb $\alpha$, it cannot chose the linking option (8) for a verb $\beta$, if both verbs select maximal agents and patients. Let us demonstrate that this is a valid theoretical prediction from the universally fixed rankings of constraints in (7)-(8). If a language allows a verb $\alpha$ such as $\text{hit}(x, y)$ with the case pattern $x$-NOM $\text{hit}$ $y$-ACC, then the coordinated constraint $[A^\text{max}/1C \& P^\text{max}/2C]$ dominates the

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3 A counterexample seems to be Trumai (Christian Lehman, p.c.), an Equatorial Amerind language. In general, a verb belongs to exactly one lexical class, either ERG-NOM or NOM-ACC, according to the case categorization offered by Monod-Becquelin (1976). But her case analyses are too sketchy to allow a firm conclusion.

4 The constraints can be verified or falsified according to their logical form. The notation $A^\text{max}/1C$, for instance, is an abbreviation of the implication $[A^\text{max} \rightarrow 1C]$, which is logically equivalent to $[^\neg A^\text{max} \& \neg 1C]$. This means that this constraint excludes maximal agents that do not occur in the nominative. The following evaluations will take thematic information as input and cases as output, but the framework is also compatible with the other perspective. Note the logical equivalence between $[A^\text{max} \rightarrow 1C]$ and $[^\neg 1C \rightarrow ^\neg A^\text{max}]$, for example.
constraint \([A_{\text{max}}/2C & P_{\text{max}}/1C]\). Cf. Tab. 1:

<table>
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<tr>
<th>Tab. 1</th>
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<tbody>
<tr>
<td>Input: (A_{\text{max}} &amp; P_{\text{max}})</td>
<td>(A_{\text{max}}/1C &amp; P_{\text{max}}/2C)</td>
<td>(A_{\text{max}}/2C &amp; P_{\text{max}}/1C)</td>
</tr>
<tr>
<td>(\Phi) Verb (\alpha)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Verb (\beta)</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

The constraints are aligned in a tableau from left to right as stated in the ranking hypothesis of the respective language. Constraints of equal rank are not separated by vertical lines (cf. Tab. 3 below). If a candidate \(x\) violates a constraint and there is another candidate \(y\) that does not violate it, \(x\) has a fatal violation (cf. *!) and is eliminated from the competition. The winner is the candidate (cf. *\(\Phi\)) that has the smallest number of violations of the relevant highest constraint. If a competition is decided at a certain point of evaluation, further evaluations relative to weaker constraints are irrelevant (cf. the shaded columns).

In order to have a verb \(\beta\) such as write\((x, y)\) with the case pattern \(x\)-ACC write \(y\)-NOM or \(x\)-ERG write \(y\)-ABS, the ranking shown in Tab. 2 has to apply:

<table>
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<tr>
<th>Tab. 2</th>
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<tbody>
<tr>
<td>Input: (A_{\text{max}} &amp; P_{\text{max}})</td>
<td>(A_{\text{max}}/2C &amp; P_{\text{max}}/1C)</td>
<td>(A_{\text{max}}/1C &amp; P_{\text{max}}/2C)</td>
</tr>
<tr>
<td>Verb (\alpha)</td>
<td>*!</td>
<td>*</td>
</tr>
<tr>
<td>(\Phi) Verb (\beta)</td>
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</tbody>
</table>

A language allowing both verb lexemes \(\alpha\) and \(\beta\) would have the constraints tied in an equal rank. This would violate the fixed ranking hypothesis of (7) and (8).

The co-occurrence of ergative and accusative constructions (morphological split ergativity) does not violate the ranking (7)-(8). Ergative and accusative patterns can only co-occur if there are other constraints that rank above those linking cases to maximal agents and patients. These cannot be constraints having lexical thematic information as an input because there are no thematic constraints that are stronger than those for maximal agents and patients. Therefore, ergative and accusative patterns are not distributed along verb lexeme types. But (7) and (8) is compatible with a situation where constraints taking other categories as input (e.g. tense, person) dominate constraints with maximal agents and patients as input.

With minimal agents and patients, lexeme-bound case variation is tolerated. Psychic verbs, such as \(\text{see, know}\) and \(\text{like}\), select such roles. (11) offers German examples:

(11) (a) Der Junge (NOM) fürchtet dieses (ACC).
‘The boy is afraid of this.’
(b) Dieses (NOM) wundert den Jungen (ACC).
‘This intrigues the boy.’

In German (Klein / Kutscher 2002), the two types of verb have readings which cannot be distinguished from each other in terms of thematic information. Tab. 3 shows that both types of verb emerge as winners if the relevant constraints are tied on an equal rank:

<table>
<thead>
<tr>
<th>Tab. 3</th>
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</thead>
<tbody>
<tr>
<td>Input: (A_{\text{min}} &amp; P_{\text{min}})</td>
<td>(A_{\text{min}}/\sim1C &amp; P_{\text{min}}/\sim2C)</td>
<td>(A_{\text{min}}/2C &amp; P_{\text{min}}/1C)</td>
</tr>
<tr>
<td>(\Phi) Verb (\alpha)</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>(\Phi) Verb (\beta)</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

The candidates are evaluated with respect to both logically possible rankings. A tie between the $\theta_{\text{min}}$-constraints is possible as their ranking is not fixed in (7) and (8).

In conclusion, the basic assumptions that are needed in order to explain ergativity and its characteristic properties is that case in the broader sense is sensitive to the Involvement Scale $\theta_{\text{max}} > \theta_{\text{min}}$. The next section shows that this assumption is also needed in order to capture the second major typological linking parameter: morphological split intransitivity.

### 3.2 Morphological Split Intransitivity

The linking pattern in which the argument of one class of intransitive verbs is coded like the agent of transitive verbs and the argument of another class of intransitive verbs is coded like the patient of transitive verbs is called active (Klimov 1974), split-$S$ or fluid-$S$ (Dixon 1979, with $S$ for intransitive subject), or split intransitivity (Merlan 1985, Van Valin 1990). Split intransitivity is independent of and may co-occur with ergative (e.g. Bats, Lhasa Tibetan) or accusative patterns (e.g. Acehnese, Kannada, Malayalam). It is illustrated with examples from Guarani, which is considered to be a typical representative. Cf. (12):

(12) Guarani (Gregores / Suárez 1967:110, 131)
(a) a-ma.apo
   1SG,A-work   'I work.'
(b) še-manuʔa
   1SG,B-remember 'I remember.'
(c) ai-pete
   1SG,A-hit 'I hit him.'
(d) še-pete
   1SG,B-hit 'He hits me.'

Intransitivity is used in a syntactic sense in the literature. It is not restricted to semantically one-place verbs, as illustrated in (12b) with manuʔa 'remember'. The second argument of this verb is postpositional and cannot trigger agreement. The following observations are based on an analysis of all the ca. 370 intransitive verbs in the dictionary of Gregores / Suárez (1967). The results are summarized in Tab. 4:

<table>
<thead>
<tr>
<th>Tab. 4. Guarani: Agreement prefixes with intransitive verbs</th>
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<tbody>
<tr>
<td><strong>basic thematic relations</strong></td>
</tr>
<tr>
<td>i) $A_{\text{min}}$</td>
</tr>
<tr>
<td>ii) $A_{\text{min}}$: sentence</td>
</tr>
<tr>
<td>iii) $A_{\text{min/max}}$: motion, +/- sentence</td>
</tr>
<tr>
<td>iv) $A_{\text{max}}$: sentence, motion, causation, +/- volitional involvement</td>
</tr>
</tbody>
</table>

The first class of intransitive verbs does not determine particular Proto-Agent properties except for independence from another participant. The meaning of these verbs corresponds roughly to adjective meanings in standard European languages. Guarani, Acehnese and Tlingit, languages with a sizeable split intransitivity, do not have a well-defined class of

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6 Verbs such as (11b) in German have occasionally been called 'ergative' (cf. Wegener 1985, Fanselow 1992). This typologically misleading classification is rarely adopted by typologists. In German and other accusative languages, 2C is preferred for a minimal agent, in ergative constructions 2C is favoured for a maximal agent. These are inverse case selection options, as captured by (7)-(8) above.
adjective lexemes so that adjectival meanings are expressed by verbs. The second class
comprises sentence verbs. The lexical default for the first two classes of verbs that select an
$A^{\text{min}}$ is a B-prefix. Intransitive verbs belonging to a third class select motion (active participation)
and exclude volitional involvement. Sentience is added if the argument is also
subcategorized as animate (e.g. amu 'pant'). There is no default for this class. The fourth class
are action verbs with an active participant that causes (i.e. is the source of) and is aware of the
event named by the verb. In their most specific reading, the verbs denote a volitional
involvement. Here are some examples for the four classes of verbs:

B-prefix:  
1) porã 'be beautiful, right', marete 'be powerful, strong'
2) akâraku 'be enthusiastic, exalted', asi 'be sick, feel pain'
3) kerai 'talk in one's sleep', kurusu 'shrink'

A-Prefix  
ii) akâraku 'be enthusiastic, exalted', asi 'be sick, feel pain'
iii) ahoga 'drown', gwe 'disappear, go out'
iv) gwata 'walk', koroi 'scold'

The distribution shown in Guarani is typical for morphological split intransitivity and is also
attested in Tlingit, Bats (=Tsova-Tush) and Acehnese (cf. Primus 1999, Chap. 4).

These empirical observations are captured by the Involvement Scale and the general
ranking schema (6a) repeated here for convenience in (13):

\[
\begin{align*}
A^{\text{max}}/A & \quad >> \quad A^{\text{max}}/
eg A \\
\& & \quad \&
\end{align*}
\]

\[
\begin{align*}
A^{\text{min}}/A & \quad \& \quad A^{\text{min}}/
eg A
\end{align*}
\]

Morphological split intransitivity is also attested as a marginal phenomenon in many other
languages. A case in point are older varieties of German and Latin. The majority of
intransitive verbs selects a nominative, but some verbs with $A^{\text{min}}$ do not. Cf. (14):

\begin{itemize}
  \item German: Mich (ACC) friert. 'I am cold.'
  \item Latin: Me (ACC) pudet. 'I am ashamed.'
\end{itemize}

Alternative approaches to split intransitivity are based on a single semantic feature and cannot
capture the data appropriately. The traditional view, suggested by the term active coding, is
supported, among others, by Mithun (1991) who claims that in Guarani the split is motivated
by the aspect opposition stative vs. active. But Tab. 4 clearly shows that verbs of class iii) and
iv), which express dynamic situations, do not behave uniformly. Volitional involvement has
also been considered to be a relevant factor (cf. Van Valin 1990). But volitionality alone
cannot capture the attested difference between class iii) and class i) or ii) in Guarani.

Morphological split intransitivity is sensitive to the degree of agentivity of the verbal
argument, as captured by the Involvement Scale and the prototype approach to agentivity
pursued here.

Since split intransitivity is a semantically well-motivated linking system, the question
arises why not all languages have this type of linking. This typological variation emerges
from the competition between Thematic Case Selection and markedness constraints, as
captured in OT by the invariant ranking of constraints in (15):

\begin{itemize}
  \item (a) Case Dependency
    \[
    *[nC&mC] >> *[nC\&\neg mC] \quad \text{given } mC > nC
    \]
    \*
    \end{itemize}

\begin{itemize}
  \item (b) Case Markedness
\end{itemize}
*nC >> *n-1C  (alternative: n-1C! >> nC!)

The dependency constraints in (15a) prohibit, for instance, an oblique case without a nominative (or absolutive) as well as a dative without an accusative (or ergative). Case Dependency will play a role in section 4.1 below. (15b) is logically stronger than (15a). Thus, 1C! bans every pattern without a nominative.

Two language types exist due to the fact that there are two logical options of ranking the 1C-Requirement relative to the semantic constraints that require an oblique case for a Proto-Agent. Cf. (16):

(16) No split-intransitive case selection: 1C! >> A max/¬1C or A min/¬1C
E.g. English, French, Swedish (accusative languages); Dyirbal and Yidiny (cf. Blake 1987:28f., ergative languages)

Split-intransitive case selection: A max/¬1C or A min/¬1C >> 1C!
E.g. German, Latin, Icelandic (accusative languages); Bats, Lhasa Tibetan, Tupinamba (ergative languages); Guarani

The ranking options mention two semantic constraints, A max/¬1C or A min/¬1C. A max/¬1C, specifically A max/2C, is the strongest antagonist of 1C! in ergative languages; A min/¬1C is the strongest competitor in accusative languages.

The reason why German is not considered a typical split-intransitive language is the fact that the default ranking is 1C! >> A min/¬1C, as in English. This ranking holds for every verb lexeme that is not explicitly listed in a lexical constraint that ranks above 1C! Following Hammond (1995), lexical exceptions are captured by lexical constraints, as shown in (17).

(17) German: L EX-A min/¬1C(frieren, hungern, ...) >> 1C! >> A min/¬1C

Lexical constraints also appropriate for Icelandic, Russian, Latin, Quechua, Avar, Laz and Hindi, where a rather small number of intransitive verbs select an oblique case.

The last two sections have shown that the involvement distinctions are well suited to capture basic facts about the three major linking systems and their characteristic properties. This typological variation is based on paradigmatic involvement distinctions. The next section will deal with ditransitive verbs. With this class of verbs, θ max and θ min co-occur.

3.3 Case Selection in Ditransitive Clauses

There is general agreement that the following examples show a semantically typical ditransitive verb such as give and case patterns that are widely distributed for such verbs among the languages of the world:

(18) German: *Der Vater (1C) gab dem Sohn (3C=NP) ein Pferd (2C).
(19) English: *The father (1C) gave a horse (2C) to his son (3C=PP).
(20) English: *The father (1C) gave the son (2C) a horse (2C).
(21) Laz: *Babak cxeni meču skiris.
    Father(2C) horse(1C) gave son(3C)

The examples are translations of each other in order to facilitate cross-linguistic comparison. Tab. 7 shows the thematic analysis of give, a semantically typical ditransitive verb denoting a volitionally caused change of possession, and the optimal case options for this input:
Tab. 7. Thematic analysis of *give* and its optimal case selection options

<table>
<thead>
<tr>
<th>GIVE:     x = A_max</th>
<th>y = A_min/P_min</th>
<th>z = P_max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proto-Agent: volition, causation, sentence, physical activity, possession</td>
<td>Proto-Agent: sentence of z, possession of z</td>
<td>Proto-Agent: -</td>
</tr>
<tr>
<td>Proto-Patient: -</td>
<td>Proto-Patient: change of possession and sentence caused volitionally by x</td>
<td>Proto-Patient: object of sentience and possession, change of possessor caused volitionally by x</td>
</tr>
</tbody>
</table>

1C in accusative patterns
2C in ergative patterns

A similar analysis holds for verbs with benefactives as in *Peter is baking Mary a cake*. The relation between *Mary* and *cake* in these examples implies a possessor-possessed relation (cf. Jackendoff 1991, Shibatani 1996). Other typical ditransitive verbs such as *teach, tell* and *show* have the Proto-Agent implication of sentience for the argument y. If x teaches y z, then x intends that y gets to know z. If x shows y z, then x intends that y sees z. With all these types of predicate, argument x is a maximal agent, z a maximal patient and y has both minimal agenteive and patientlike properties. As a possessor or an experiencer, this argument is a Proto-Agent relative to the third participant z, as specified by the possesive or sentence meaning component of the verb. At the same time it is a Proto-Patient relative to the first argument x, which causes its change in possession and sentience, as specified by the causal meaning component of the verb. This combination is abbreviated as Proto-Recipient for convenience.

The bottom part of Tab. 7 shows the optimal case selection for this role constellation. In accusative constructions, A_max occurs in the nominative (=1C) and P_max in the accusative (=2C). In ergative constructions, A_max occurs in the ergative (=2C) and P_max in the absolutive or nominative (=1C), as in the example (21) from Laz. The semantically optimal case patterns for A_max and P_max are also optimal with respect to Case Markedness and Case Distinctness. Case Distinctness blocks identical cases within the case frame of a predicate. These constraints explain the fact that there is little cross-linguistic and language-internal variation in the coding of A_max and P_max, apart from the ergative-accusative distinction. By contrast, there is both cross-linguistic and language-internal variation in the coding of the Proto-Recipient. This can be explained by the fact that the semantic constraints for A_min and P_min are universally lower in rank and in competition with Case Markedness and Case Distinctness.

Let me summarize the findings about the role-semantic motivation of case selection. The distinction between θ_max and θ_min is needed in order to capture the existence of the three major types of case linking: ergative, accusative and split intransitive. In the active or split intransitive type, the distinction between θ_max and θ_min finds a direct expression: maximal and minimal agents of intransitive verbs are coded differently. An economy-driven markedness constraint that favours the selection of the least marked case (the absolutive or nominative) is responsible for the fact that not all languages have morphological split intransitivity.

Accusative and ergative patterns exist and are widely attested because, according to the criterion of quantitative involvement θ_max > θ_min, both Proto-Agent and Proto-Patient qualify for the highest ranking case of a language. This criterion also correctly predicts that the distinction between ergative and accusative constructions is most clear with maximal agents and patients, which fall under high ranking constraints. This is also the reason for the fact that...

---

7 Case frames that are nonoptimal with respect to the principles presented here require an additional lexical constraint. Cf. for example verbs selecting nominative A_min-recipients and oblique A_max-arguments, such as *receive* and *get* (cf. *Mary got a book from Peter*) and their equivalents in other languages. These verbs have A_max/¬1C & A_min/1C, a pattern that cannot win as a default in an accusative language due to the fixed ranking A_max/1C >> A_min/1C.
the co-occurrence of ergative and accusative constructions (morphological split ergativity) is never dependent on the choice of the verb lexeme. The hypothesis that cases, and not basic order, are sensitive to the Involvement Scale explains why morphological ergativity is the basic phenomenon and the prerequisite for syntactic ergativity.

The constraints for $\theta_{\text{min}}$-roles show a different ranking profile. This explains the great lexical and cross-linguistic variation in the case patterns of psychic verbs and of the Proto-Recipient of ditransitive verbs.

The next chapter shows that the distinction between $\theta_{\text{max}}$ and $\theta_{\text{min}}$ is irrelevant for the basic order of verbal arguments. Basic order is motivated by a role-semantic criterion that is called Thematic Dependency in the present approach.

4. Thematic Dependency, Thematic Structure and Basic Order

4.1 The basic notions

The criterion of Thematic Dependency (cf. (4) above) is repeated for convenience in (22):

(22) Thematic Dependency Scale: Proto-Agent $\geq_{\text{dep}}$ Proto-Patient

Let us examine this dependency notion. The standard definition of dependency is based on the logic of unilateral implication $q \rightarrow p$ and is usually formulated as follows: $q$ depends on $p$ if and only if $q$ cannot hold without $p$ (but $p$ may obtain without $q$). This standard definition is applicable in (22). All Proto-Patient properties in the present approach involve the same basic concepts that also characterize the Proto-Agent: volition, causation, change (e.g. movement), sentience and possession. The difference between the two roles is that a Proto-Agent does not entail the presence of another participant, while a Proto-Patient does. (22) generates the more elaborate and specific thematic hierarchies in (23):

(23) Thematic Dependency Hierarchies (corollary of (22))

<table>
<thead>
<tr>
<th>Role</th>
<th>Dependent Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proto-Agent</td>
<td>$&gt;$$<em>{\text{dep}}$ Proto-Recipient $&gt;$$</em>{\text{dep}}$ Proto-Patient</td>
</tr>
<tr>
<td>experiencer</td>
<td>stimulus</td>
</tr>
<tr>
<td>possessor</td>
<td>possessed</td>
</tr>
</tbody>
</table>

The dependencies experiencer $>$$_{\text{dep}}$ stimulus and possessor $>$$_{\text{dep}}$ possessed immediately follow from (22). That Proto-Recipients take an intermediate position also follows from (22) and from the fact that they have both A- and P-properties, as discussed in section 3.3 above.

As to a deeper explanation for the Thematic Dependency $A >_{\text{dep}} P$, cognitive approaches to the notion of causality contribute towards its clarification. Contrary to the assumption of Dowty and other linguists who treat causation as one component of agentivity, cognitive approaches suggest that causality is the relevant cluster concept and agentivity the derived manifestation of it (cf. Premack 1990, Leslie 1995, Premack / Premack 1995). If this turns out to be a viable hypothesis, the fact that a Proto-Patient depends on a Proto-Agent is an epiphenomenon of the dependency between cause and effect.

The dependency between cause and effect has been formulated explicitly in the tradition of philosophical logic: a cause is considered to be a necessary condition for the effect (cf. Lewis 1973, Stegmüller 1983). Two further factors, which have been shown to be relevant for causal cognition and the development of causal notions in infants (cf. Leslie 1995, Premack / Premack 1995), deserve special mention: the causing object must be contiguous in space with the causally affected object and the effected event must immediately succeed the causing event (cf. also Stegmüller 1983). A well-known example is one rolling ball causing the
movement of another ball.

The causal notion that is captured most appropriately and directly by this view is physical, mechanical causation. As pointed out by Premack (1990), among others, there must be a crucial asymmetry in the movement of the two objects in order to establish a causal relation. The movement of the causer has to be self-propelled; i.e., the source of the energy lies within this object. In fact, it suffices to postulate the weaker condition that the movement of the first object is independent from the movement of second. Additionally, physical causal relations have the above-mentioned properties of physical contact (spacial contiguity) and temporal immediate succession. This physical causal relation is captured in the present approach by the movement component in the notions of Proto-Agent and Proto-Patient.

The other causal notions are psychological. Agents pursue goals and act voluntarily upon entities which are not necessarily contiguous in space and whose change is not necessarily physical and temporarily immediate. Such situations are denoted by the verbs threat, console and promise. This goal-oriented notion is called teleological causality in both cognitive (cf. Leslie 1995) and philosophical approaches (cf. von Wright 1971). It characterizes the volitional or intentional involvement of a participant in the event named by the verb and is the most uncontroversial and widely accepted component of the notion of agentivity.

The other psychological causality notion is sentience. Sentience is an important condition for action. But even when it occurs in isolation, as with psychic verbs, sentience is a systematic causal factor: if the experiencer had not had the verb-specific sentience, the situation named by the verb would not have occurred. The existence of the stimulus is also a necessary condition, but the stimulus does not necessarily have the specific mental or sensory state denoted by the verb. All other things being equal, the experiencer, and not the stimulus is the verb-specific causal factor. This holds for stative psychic verbs like know, like, fear and see. But there are also psychic verbs such as frighten, surprise and please that have an inchoative reading in which the stimulus causes a change of state in the experiencer. With such verbs, the stimulus precedes the experiencer in the causal structure of the verb.

As to possession, the following observations of Premack / Premack (1995:193f.) about the cognitive difference between the notion of group and that of possession are revealing. Both notions imply that two or more objects are physically connected and capable of co-movement. But only possession requires that one object be more powerful than the other. Ultimatively, it is the ability to control movement that counts according to the authors. Control of movement implies that all above-mentioned causal factors are potentially (not actually) involved: volitionality, physical movement and sentience.

In sum, cognitive approaches to the notion of causality offer a promising way of explaining the Thematic Dependency A >dep P on the basis of the dependency between cause and effect.

Dependency is a major determinant of the basic order of verbal arguments as stated in the Principle of Structural Expression of Dependency (cf. Primus 1995; 1999, Chap. 5):

(24) Structural Expression of Dependency:\[\]
If a non-head constituent Y depends on a non-head constituent X, then X precedes and / or c-commands Y.
X c-commands Y if and only if X and Y do not dominate each other, and the first

\[8\] Some authors (cf. Croft 1993) claim that the stimulus, rather than the experiencer, is the systematic causal factor with all types of psychic verb. Cf. Primus (2002a) for a critique of this hypothesis.
\[9\] There are readers who have interpreted this principle in the sense of verb-bondedness. Under this interpretation, patients are closer to the verb than agents, due to the fact that patients form a closer semantic unit with verbs in general. Verb-bondedness is a plausible relevant factor, but it is not the factor intended in (34). Not only empirical evidence (cf. Primus 1998), but also psycholinguistic evidence (cf. Frisch / Schlesewsky 2001) suggests that dependency is computed immediately and incrementally from argument to co-argument even before the verb has been encountered.
branching node that dominates X dominates Y.

Standard semantic representations of the thematic structure of predicates (e.g. \textit{give}(x,y,z) decomposed roughly as \textit{CAUSE}(x, \textit{POSSESS}(y,z)) are in conformity with (22) and (24). When Proto-Agent and Proto-Patient are structurally represented on the semantic level, they are always aligned in accordance with (22) and (24): the variable for a Proto-Agent precedes and / or c-commands the variable for a Proto-Patient. The present paper does not represent thematic structures formally, but (22) is explicit enough for an empirical verification. The fact that thematic role asymmetries are responsible for the basic order or deep syntactic structural alignment of arguments is widely accepted in various types of approaches.

But the Principle of Structural Expression of Dependency (24) has a wider range of application. This is the main reason why it does not assign specific structural positions to the various types of constituents it applies to. A classical case of semantic dependency is that between an antecedent and its reflexive pronoun. (24) captures the fact that antecedents precede and / or c-command their reflexive anaphors (cf. Reinhart 1983). Another type of semantic dependency is established by scopal operators (e.g. quantifiers) or modifiers and their semantic domain. Quantified NPs and modifiers also tend to precede and / or c-command the elements within their scope (cf. Pafel 1993). Case Dependency effects on word order will be discussed below.

In the following, basic order will be the major focus of attention, since broader cross-linguistic studies in terms of c-command are not available. Within the present approach, as in many others, word order is viewed as a multi-factor phenomenon. There are several competing linearization constraints and each constraint determines a particular word order. Violable constraints determine preferences that are strictly local in the sense that they hold only relative to one determining factor or constraint as stated in (25):

\begin{equation}
\text{(25)} \quad \text{The order of two constituents } <X, Y> \text{ is preferred or unmarked relative to a linearization constraint } C \text{ if and only if } <X, Y> \text{ is ordered according to } C, \text{ and } <Y, X> \text{ is not } <X, Y> \text{ ordered according to } C.
\end{equation}

\textit{<Y, X>} does not invalidate \textit{C} unless \textit{<Y, X>} is statistically more frequent than \textit{<X, Y>} and this frequency cannot be explained by another dominant constraint \textit{C'} that requires \textit{<Y, X>}.

The notion of basic order is a special instance of (25) as it is restricted to those constraints that are most dominant. Since we are interested in thematically determined order, the following sections will deal with basic order in precisely this sense. Thematic roles and grammatical functions are considered to be universally dominant factors, but there are also languages in which discourse-functional constraints are more prominent (cf. Kiss 1995, Lambrecht 1994). Case Dependency (i.e. morphologically defined grammatical functions) may also determine the relative order of verbal arguments in some languages. Case Dependency is formalized as \textit{*[nC&~mC]} in (15a) above and is logically equivalent to \textit{[nC~mC]}. It states that the selection of a more marked case \textit{nC} unilaterally implies the selection of the less marked case \textit{mC}. Case Dependency seems to be relevant in Dyirbal, where OSV occurs as a statistically dominant order. This order challenges the Thematic Dependency Scale \textit{A >dep P}. Cf. (10b) above, repeated here for convenience:

\begin{equation}
\text{(26) bayi yâya bangun lugumbiju balgan.}
\text{DEM(ABS) man(ABS) DEM(ERG) woman(ERG) hit(NFUT)}
\end{equation}

'The woman is hitting/hit the man.'

Under the assumption that Case Dependency is at issue, Dyirbal does not have patient-agent, but rather nominative-oblique as a basic order. OS is an epiphenomenon of ergative case
linking, not only in Dyirbal, but also in other languages. Thus, for example, all OSV-languages and the majority of OS-languages in Nichols' sample (1992) are ergative. The rarity of this type of basic order even among ergative languages suggests that Thematic Dependency, which requires agent-patient as a basic order, is, in general, a more dominant constraint than Case Dependency.

The basic order of Dyirbal can be considered to be an ergative syntactic rule. The next section takes a closer look at the distinction between ergative and accusative syntactic rules.

4.2 Syntactic split ergativity

A syntactic ergative rule treats the only argument of an intransitive clause and the patient of a transitive clause alike as a primary grammatical relation (= syntactic pivot) and the agent of a transitive clause as a secondary grammatical function (cf. Sasse 1978, Dixon 1979). Besides basic order, Dyirbal also has an ergative coordination reduction rule. Where an intransitive and a transitive clause (cf. also (10a) and (10b) = (26) above) are conjoined and the two absolutive arguments are coreferent, (27) can be derived:

(27) bayi ya\j\a bani ju baNgun lungenbi\u balgan.

DEM (ABS) man\j\ (ABS) come(NFUT)  _ORIENTATION1/ABS)  DEM(ERG) woman(ERG)  hit(NFUT)
'The man came here and the woman hit him.'

By contrast, in an accusative language such as German, the only argument of an intransitive clause and the patient of a basic transitive clause do not form a pivot, as shown in (28):

(28) *Der Hund\j\ (NOM) kam her und \agner\j\ (ACC) schlug der Mann.

'The dog came here and the man hit him.'

Coordination reduction in Dyirbal cannot be expressed uniformly in terms of thematic structure or thematic roles. The rule links the maximal agent of the verb bani ju 'came' with the maximal patient of the verb balgan 'hit'. The conspicuous common property of these arguments is the fact that they are linked to the first case. This shows that syntactic ergativity, i.e. patient-orientation, as shown in the coordination reduction in (27) and the basic order in (26), is an epiphenomenon of ergative case linking. This explains the more general observation from above that syntactic ergativity unilaterally implies morphological ergativity. The rarity of the profound syntactic ergativity found in Dyirbal can be explained by the fact that the grammar of languages is rarely determined to such a great extent by cases (cf. Heath (1979), Dixon 1994, sec. 5.3, for some accusative traits in Dyirbal).

The fact that syntactic ergativity is an epiphenomenon of ergative morphology is also corroborated by the observation that syntactic ergative rules are more frequently attested in rules that are typically determined by cases, such as verb agreement and passive / antipassive. Syntactic accusative rules in ergative languages are more frequently attested in rules that are typically determined by thematic or deep syntactic structure, such as imperative, reflexive binding, relative clause formation, 'infinitival' control or coordination reduction (cf. Anderson 1976, Dixon 1994, sec. 5.3, Croft 1991:30f.). Strong support for this observation is offered in Tab. 8. It shows the implicational pattern between ergative and accusative phenomena found by Croft (1991:30f.):

| Tab. 8 | coordination | relativization | agreement | case marking |
The Avar examples in (9) above illustrate an ergative agreement rule. The verb agrees in nominal class with the absolutive argument only, irrespective of its semantic role and structural position. Example (27) from above shows the ergative coordination rule of Dyirbal.

Syntactic accusativity means that Proto-Agents of transitive clauses and the single arguments of intransitive clauses are treated alike as a syntactic pivot. Verb agreement in Warlpiri has an accusative syntactic pivot. Warlpiri has been more thoroughly analysed in terms of structural relations by Hale (1983). (29) offers some examples:

(29) Warlpiri (Hale 1983:18)

(a) ngaju  ka-rna  wangka-mi
    I(NOM)  PRS-1SG speak-NPAST
    'I am speaking.'

(b) ngaju  ka-rna-ngku parda-rni  nyuntu-ku
    I(NOM)  PRS-1SG-2SG wait-NPAST you-DAT
    'I am waiting for you.'

(c) ngajulu-rlu  ka-rna-ngku nyuntu  nya-nyi
    I-ERG   PRS-1SG-2SG you(NOM) see-NPAST
    'I see you.'

Consider first the agreement marker -rna- for a first person Proto-Agent. The case of this argument is irrelevant (nominative in (29a,b), ergative in (29c)). The agreement marker -nkgu is used for a second person Proto-Patient, no matter whether this argument is in the dative (cf. (29b)) or in the nominative (cf. (29c)). Hale formulates the agreement rule in terms of structural notions that are defined on the basis of the following lexical thematic structure (1983:23):

(30) [X agent [Y patient V]]

The thematic structure (30) expresses the Thematic Dependency Scale A >_dep P in terms of both precedence and c-command. For this structural thematic hierarchization, Hale adduces reflexivization facts so that the analysis of verb agreement in terms of lexical thematic structure is well supported. Hale’s proposal and the examples in (29) demonstrate that the Involvement Scale θ^{max} > θ^{min} is irrelevant: maximal agents and experiencers must have the same position in lexical structure as they trigger the same agreement marker (cf. -rna- in (29a,c)).

To the extent that a grammatical phenomenon is determined by thematic structure, directly or indirectly via deep syntactic structures that iconically map lexical thematic structures, the corresponding rule treats Proto-Agents as syntactic pivots. This situation characterizes accusative languages and accusative rules in ergative languages. As widely documented in the typological literature and as well-known since Anderson (1976), the situation in Warlpiri, where ergative case marking has a P-pivot and the greater part of the grammar has an A-pivot,

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10 Quiche has no overt case marking, so that ergative morphology is overtly expressed by verb agreement.
is more typical for ergative languages than the situation in Dyirbal, which has a lot more case-determined rules based on a P-pivot.

The hypothesis of division of labour clarifies these puzzling facts. Case marking and all case-determined phenomena can treat either Proto-Patient or Proto-Agent as a pivot; thematic structure and all phenomena based on thematic structure can only treat Proto-Agent as a pivot. In an ergative language, case marking has a P-pivot and thematic structure has an A-pivot. A syntactic split is expected to occur and to show the particular pattern mentioned above: phenomena that have a natural affiliation to cases, such as verb agreement and antipassive, are more often ergative, phenomena that have a natural affiliation to deep structure, such as basic order and coordination reduction, are rarely ergative. If they are ergative, they presuppose ergative morphology. In an accusative construction, both case marking and thematic structure are A-oriented. Therefore, there is no split behaviour. However, accusative languages have been claimed to have syntactic ergativity, as suggested by the Ergative or Unaccusative Hypothesis that will be discussed and refuted in the next section.

4.3 Structural split intransitivity

The Ergative or Unaccusative Hypothesis is illustrated with the following examples from German and Italian:

(31) (a) Also hat das Kind heute im Garten den Zaun zerbrochen.
    'Therefore the child broke the fence today.'
    (b) Also ist heute im Garten der Zaun zerbrochen.
    'Therefore the fence broke in the garden today.'

(32) (a) Ich bin weggegangen.
    (b) Sono partita.

(33) (a) Ich habe gelacht.
    (b) Ho riso.

(34) (a) der geschriebene Brief, der weggegangene Gast
    'the written letter', 'the guest who left'
    (b) *das gelachte Kind, *der gearbeitete Linguist
    'the child who laughed', 'the linguist who worked'

The examples show that there are two classes of intransitive verbs in these languages: the verbs in (31b) and (32) are called 'ergative' or 'unaccusative' (e-verbs in the following), and the verbs in (33) are analysed as accusative or unergative (a-verbs in the following). The main evidence for the Ergative Hypothesis (cf. Burzio 1986, Grewendorf 1989 for further criteria) is the following:
  i) The sole argument of an e-verb (Se in the following) and the object-patient of a transitive verb (O) share the same basic position. Note that Se in (31b) is closer to the clause final verb than the sole argument of an a-verb (Sa in the following).
  ii) The participial form of a verb can be used as a noun modifier in German and other languages. The function of the modified noun with respect to the verb is restricted to Se and O, as illustrated in (34).
  iii) E-verbs cannot be passivized even in languages such as German that allow passivization of intransitive verbs.
  iv) E-verbs do not serve as a basis for agentive nominalizations such as *Weggeher 'leaving person', *Verblüher 'fading flower', *Sterber 'dying person'.
v) E-verbs select the auxiliary be, e.g. in German, Italian, Dutch and French (cf. (32)), whereas a-verbs take the auxiliary have (cf. (33)).

These criteria do not coincide and yield slightly different classifications. Nevertheless, they are useful for a delimitation of the phenomenon and the following discussion. Within Relational Grammar (e.g. Perlmutter 1978) and generative grammar (e.g. Burzio 1986, Grewendorf 1989), these facts are treated syntactically by analysing surface Se as deep O.

Typologists have justly criticized the use of the term 'ergative' or 'unaccusative' for the phenomena under discussion (cf. Comrie 1978:391f., Dixon 1987:5f.; 1994:19f.). Let us look at morphological facts first. Se and O do not share the same case and therefore, this phenomenon cannot be ergative, no matter what definition of ergativity one choses. Other properties, specifically basic position and participial attribution, are justified by a broader definition of ergativity. By this broader criterion, a phenomenon is ergative if the subject of intransitive verbs (S) shares properties with the objects of transitive verbs (P or O), cf. Grewendorf (1989:1). But these properties do not match the stricter, more recent definition (cf. Sasse 1978, Dixon 1979, 1994): A rule or phenomenon is ergative if and only if it treats S and P (= O) as a syntactic pivot (i.e. primary grammatical relation) and differently from the agent of transitive clauses. The ergative phenomena in Dyirbal (cf. the basic order in (26) and the coordination reduction in (27) above) meet this stricter criterion, the alleged 'ergativity' discussed in this section, where Se and O share object properties, does not. The term 'unaccusative' is also misleading because an unaccusative type of construction that is different from the ergative or accusative type does not exist within the domain of relational typology.

But the facts mentioned in i)-v) fulfill the criteria of split intransitivity (cf. section 3.2 above): the subject of one class of intransitive predicates (S) behaves like the agent of transitive verbs (A) and the subject of another class of intransitive predicates behaves like the patient of transitive verbs (P or O). The close relationship between split intransitivity and the Ergative or Unaccusative Hypothesis has not gone unnoticed in past research. There are a number of studies which treat the 'unaccusativity' found in Italian or German on a par with the type of split intransitivity found in Guaraní or Lakhota, e.g. Rosen (1984), Van Valin (1990), Dowty (1991). The present approach claims that the two types of split intransitivity have to be distinguished from each other since they are expressed differently. The split intransitivity discussed in this section is of the structural type, the split intransitivity found in Guaraní or Lakhota is of the morphological type.

As expected from the hypothesis of division of labour, the morphological type is sensitive to the Involvement Scale $\theta_{\max} > \theta_{\min}$ (cf. section 3.2 above), the structural is not. This is obvious, for instance, in German and English, cf. (35a,b):

(a) A-verbs
German: frieren, blühen, schwitzen, arbeiten
English: feel cold, bloom, sweat, work

(b) E-verbs
German: zerbrechen 'break', schmelzen 'thaw, melt', verblühen 'fade', laufen 'run'
English: break, thaw, melt, spill

The a-verbs in (35a) are translations of each other: frieren / feel cold select an experiencer, blühen / bloom and schwitzen / sweat select an active participant that is also an experiencer if it is animate, arbeiten / work have a maximal agent. In a language with morphological split intransitivity such as Guaraní (cf. Tab. 4 above), Acehnese, Tlingit and Bats, these verbs would determine different morphological markers for their subject. As to the e-verbs in (35b), the English ones are thematically less heterogeneous, since maximal agents are absent (this is explained later by the specific causal structure of e-verbs in English). But the German e-verbs
in (35b) cover the whole range from \(A^\text{min}\) to \(A^\text{max}\). \textit{Laufen} 'go, run', \textit{gehen} 'go, walk' and \textit{klettern} 'climb', for instance, have a maximal agent. Such verbs are used in the imperative, can be modified with adverbs implying volitional involvement (e.g. \textit{deliberately, carefully}) and have agentive nominalizations: \textit{Läufer} 'runner', \textit{schneller Geher} 'fast walker', \textit{guter Kletterer} 'good climber'.

The most successful semantic explanations of the structural split under discussion point to aspectual and causal structure. The first factor seems to be crucial for German (cf. Helbig / Buscha 1989, Abraham 1994)\(^{[11]}\). E-verbs are telic, inchoative or perfective, a-verbs atelic or imperfective. In more appropriate and precise terms, e-verbs denote two subevents with a stative second subevent that the Se is predicated to be involved in. This treatment also captures the volitional stative e-verb \textit{bleiben} 'stay, remain'. According to von Wright (1971) and Dowty (1979), it denotes the fact that the two subevents are the same. This is expressed formally as \(pTp\). \(T\) is the operator that connects two subsequent subevents and that is interpreted as 'and then'. Only the ergative verb \textit{sein} 'be' cannot be straightforwardly accomodated by this analysis. All other German e-verbs have the aspectual structure \(\neg pTp\), which is abbreviated by Dowty (1979) as \textsc{become}(p).

This kind of approach can easily explain the particular behaviour of e-verbs listed in German. The basic object-like position of the argument of e-verbs is explained by their aspectual structure and the Principle of Structural Expression of Dependency. The basic assumption we need is that time and causation are both conceptualized as directional, i.e. asymmetrical (cf. Fales 1990). The dependency at issue is purely temporal and is congenially expressed by the temporal operator \(T\). If an argument is predicated to be involved in the second subevent, it is structurally expressed by the second, more embedded structural position (cf. for English Levin / Rappaport Hovav (1995) referred to below). This holds for the patients of transitive accomplishment or achievement verbs (e.g. \textit{write a letter, find the key}), but also for the only arguments of e-verbs.

The participial attribution illustrated in (34) has an even stronger aspectual restriction in German. The second subevent must be overtly expressed. Der \textit{weggegangene Gast} 'the guest that is gone away' is acceptable, *der gegangene Gast is not. Similarly die \textit{übrig gebliebene Soße} 'the sauce that is left over' or *\textit{eine nie da gewesene Situation} 'a situation that has never been / occured' vs. \textit{die gebliebene Soße} or \textit{eine nie gewesene Situation}.

As to passivization, most approaches claim that e-verbs cannot passivize because they are underlyingly passive verbs. More recent approaches (cf. Rapp 1997) have clarified the point in terms of aspectual structure. In German, both e-verbs (cf. (36a)) and a-verbs (cf. (36b)) passivize under the condition that they are interpreted as an atelic, durative and non-static event. With inherently telic or punctual verbs, this interpretation can be achieved by an iterative reading and an implicit plural subject, as shown in (36):

\begin{align*}
(36) & \\
(a) & \textit{Hier wird getosert.} 'People die here.' \\
(b) & \textit{Hier wird gehustet.} 'People cough here.'
\end{align*}

The agentive nominalization is a rather weak indicator of the distinction between e- and averbs. Recall that motion verbs that select \textit{sein} 'be' as an auxiliary, such as \textit{laufen, gehen} and \textit{klettern}, can have agentive nominalizations. But nevertheless, the pertinent aspectual restriction seems to be operative: *\textit{Wegläufer} and *\textit{Verblüher}, e-verbs with an overtly expressed and highlighted resultant state, do not have this type of nominalization.

The auxiliary selection matches the distinction between e- and a-verbs quite closely, but not perfectly. The verb \textit{sein} 'be' and motion verbs select \textit{sein}, even if they do not denote a second subevent, e.g. \textit{wir sind stundenlang herumgelaufen} 'we have been walking around for

\(^{[11]}\) Kaufmann (1995) takes a different view, which nevertheless corroborates our claim that the Involvement Scale is irrelevant for German.
hours’. This means that the use of *sein* as an auxiliary has been extended by analogy.

In sum, the structural split intransitivity of German is motivated by aspectual structure and is insensitive to the Involvement Scale $\theta^\text{max} > \theta^\text{min}$, which has been shown to be the basic semantic motivation for the morphological split intransitivity found in German and Guarani. The plausibility of the assumption that morphological and structural intransitivity have different semantic motivations is also confirmed by the fact that the two types of split intransitivity may co-occur in one language. German has both the structural type, as shown above, and the morphological type, as mentioned before in section 3.2. Cf. *ich* (NOM) *arbeite* ‘I am working’ vs. *mich* (ACC) *friert* ‘I am cold’.

The distinction between e- and a-verbs in English has a different, but related semantic motivation. Let us look at some promising explanations for this split. The crucial factor for Levin / Rappaport Hovav (1995) and McKoon / Macfarland (2000) is the causal structure of e- and a-verbs, reproduced in a simplified form in (37):

\begin{align*}
(37) \quad (a) \text{ causal structure of a-verbs: } & e[x] \\
& \text{e.g. the rose bloomed, the iron corroded} \\
(b) \text{ causal structure of e-verbs: } & e1[y] \text{ CAUSE } e2[x] \\
& \text{e.g. the ice melted, the water spilled, the pole broke}
\end{align*}

The illustrated verbs select an inanimate, non-volitional agent so that the relevant causal distinction appears in isolation. If such a-verbs denote a change (e.g. bloom, corrode, ferment), this change is caused internally; i.e., the means of bringing about the change is conceptualized as residing in the subject entity. This also holds for the animate or volitional agent of work, laugh, or sweat. The source of the event denoted by e-verbs (e.g. melt, spill, break) is external to the subject participant. There is a causing event involving another participant (e1), which is not overtly expressed. If this causing event is expressed, we get, for instance, *the warm wind melted the ice*.12 This explains why verbs that select an animate participant whose activity is self-propelled are not e-verbs in English (e.g. run, walk, climb). McKoon / Macfarland (2000) adduce psycholinguistic evidence for the difference in the causal structure of a- and e-verbs.

The relevant structural linking rule (Levin / Rappaport Hovav 1995:158f.) that captures the structural asymmetry between Se and Sa links the structural external argument-position to the argument of a verb that denotes the immediate cause of the eventuality described by the verb. Sa fulfill this criterion, Se do not. Se fall under the default rule assigning them an internal, deep structure object position or the rule for change-of-state verbs. It states that an NP that refers to the entity that undergoes the change of state in the eventuality described in the VP must be the (deep structure) direct object of the verb heading the VP (This second rule is also crucial for the e-verbs of German). This analysis is in conformity with the notion of causal or aspectual dependency between subevents and the Principle of Structural Expression of Dependency in the present approach.

In sum, the semantic motivation underlying the purely structural distinction between e- and a-verbs in English is causal dependency, a dependency factor that is more closely related to Thematic Dependency than the temporal-aspectual asymmetry found in German. In both languages, structural split intransitivity is insensitive to the Involvement Scale that distinguishes minimal and maximal agents. The division of labour between case and structure is particularly evident in languages such as German, in which morphological and structural split intransitivity co-occur.

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12 McKoon / Macfarland (2000) demonstrate that not all e-verbs participate in the intransitive-causative alternation. Levin / Rappaport Hovav (1995) also include verbs of existence and appearance (e.g. exist, appear, arise) and verbs of spatial configuration (stand, lean) in the list of e-verbs. For these subclasses the authors postulate a dyadic event structure, but no external causer.
4.4 The Basic Order of Proto-Recipient (R) and Proto-Patient (P)

The relative order of R and P is particularly revealing for the hypothesis of division of labour. As shown in section 3.3 above, the optimal case pattern has a lower ranking case for R (R/nC) and a higher ranking case for P (P/mC) due to the asymmetry between P^min for R and P^max for P. This means that R is the indirect object and P the direct object in terms of morphologically defined grammatical functions. In terms of structural grammatical functions, R is expected to be the direct object and P the indirect object, as R is expected to precede and / or c-command P due to the Thematic Dependency R > dep P.13

This structural hypothesis is most clearly confirmed in constructions in which R and P are morphologically not distinguished from each other. In such constructions, Case Dependency does not conflict with Thematic Dependency, yielding RP as a fairly rigid order. This situation is found in the Germanic languages that lack a morphological distinction between dative and accusative, e.g. English, Swedish, Norwegian, Danish, Dutch and Frisian. Examples are offered from English in (38) and Swedish in (39):

(38) She gave John a book. / *She gave a book John.
(39) Hon gav Johan en bok. / *Hon gav en bok Johan.

A fairly rigid RP-order is also found in languages that have distinct cases, but use the same case for R and P with some verbs, as in the examples (40) from Icelandic (cf. Ottósson 1991) and (41) from German:

(40) Jón skilaði Mariu (DAT) bókinni (DAT) / ??bókinni Mariu
    ‘John returned the book to Mary.’
(41) Der Lehrer lehrte die Schüler (ACC) die Vokabeln (ACC) / ??die Vokabeln die Schüler
    ‘The teacher taught the pupils the words.’

In a competition model of word order, a rigid order arises by virtue of the fact that there are no competing constraints that are strong enough to motivate a reverse order. In the languages illustrated so far, the Thematic Dependency R > dep P has no grammatical antagonist in the Case Dependency based on the markedness hierarchy mC > nC. But the RP-order may be reversed for pragmatic or weight reasons, in principle.14 In a study of 64 European languages (Primus 1998), all languages and constructions in which mC > nC and R > dep P are not in conflict have a fairly rigid RP-order.

The case pattern in which R > dep P and mC > nC do not match is the most widely attested, canonical ditransitive construction, as demonstrated in section 3.3 above. The word order pattern of R and P in the canonical constructions is more varied. In one type of canonical construction, R is expressed by a PP, and P by a NP. In this event, R > dep P has two systematic competitors, mC > nC and weight, because NPs are systematically shorter than PPs (cf. Hawkins 1994). The interaction of these competing constraints is demonstrated in (42)-(43):

(42) mC > nC and weight beat R > dep P: She gave a book to John.
(43) Weight and R > dep P beat mC > nC: She gave to John the expensive book I bought yesterday.

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13 The apparently contradictory ranking between Proto-Recipient and Proto-Patient is reflected by the fact that two options have been assumed in past research. P is the higher role e.g. in Dik (1978) and Dowty (1991), R is the higher role e.g. in Jackendoff (1972) and Wunderlich (1997).

14 This kind of competition between constraints is formalized most appropriately in a stochastic OT-framework, cf. Koontz-Garboden (2001).
In the second type of construction with canonical linking, there is no systematic weight difference between R and P because both R and P are nominal. $R >_{dep} P$ has only $mC > nC$ as a systematic competitor. In this event, RP-order is generally, but only weakly preferred. Cf. an Icelandic and a German example in (44):

(44) $R >_{dep} P$ is slightly stronger than $mC > nC$:
Icelandic: Jón gaf Maríu (DAT) bókina (ACC).
German: Hans gab Maria (DAT) das Buch (ACC).
'John gave Mary the book.'

The observations from above are also supported by evidence from outside Europe. In half of the 107 languages examined by Blansitt (1973), the recipients are not marked by an adposition or a particle (i.e., they are nominal). The other half of the languages have recipients expressed by an adposition or another particle. With nominal recipients, there is a clear skewing towards RP as a basic order irrespective of the basic position of the verb. Conversely, there is a skewing towards PR as a basic order with adpositional recipients.

In conclusion, RP is the optimal basic order option for Proto-Recipient and Proto-Patient. The basic order RP is always selected unless there are stronger competing word order constraints that require PR.

The structural direct object status of R shows up most clearly in languages such as English, where the structural position of verbal arguments is decisive for their syntactic behaviour. Anaphor binding is such a structurally determined phenomenon. Cf. (45):

(45) I showed Mary herself in the mirror.
*I showed herself Mary in the mirror.

A nominal recipient binds a nominal patient, but not vice versa. Other phenomena that indicate the structural superiority of nominal recipients over nominal patients in English are passive, cf. (46), and topicalization in wh-clefts, cf. (47):

(46) (a) We gave Mary the book.
(b) Mary was given the book.
(c) *The book was given Mary.\textsuperscript{15}

(47) (a) What Ann did for Beth was give her the car.
(b) *What Ann did with the car was give it Beth.

The fact that patients are less accessible to these rules cannot be explained by an independent constraint against patients. In the prepositional construction, nominal patients are more accessible than prepositional recipients, cf. (48)-(49):

(48) (a) We gave the book to Mary.
(b) *Mary was given the book to.
(c) The book was given to Mary.

(49) (a) *What Ann did for Beth was give the car to her.
(b) What Ann did with the car was give it to Beth.

\textsuperscript{15} There is language variation regarding the unacceptability of the question-marked clauses in (46)-(49). Thus for instance, sentences like (46c) are rejected by most American English speakers, but are accepted by some British speakers (cf. Baker 1996:18).
The relative basic order and the assignment of structural grammatical functions to R and P falsify Dowty's Argument Selection Principle, particularly the following corollary (1991: 576): "With a three-place predicate, the nonsubject argument having the greater number of entailed Proto-Patient properties will be lexicalized as the direct object and the nonsubject argument having fewer entailed Proto-Patient properties will be lexicalized as an oblique or prepositional object." This critique is further aggravated by the thematic meaning difference between the direct object and the prepositional object construction in English: the more agentive R is, the more likely it is coded as a structural direct object.

Leaving pragmatic and weight differences aside, R has to be interpreted as a possessor in order to surface as a structural direct object (cf. Pinker 1989, Jackendoff 1991, Shibatani 1996), as in the following examples:

(50)  I gave / brought / baked / told / showed Ann something.

Verbs like tell and show can be included in the possession schema by metaphorical extension ('possession' of information, cf. Shibatani 1996) or can be captured directly by the Proto-Agent property of sentience. If the argument in question cannot be interpreted as a possessor or an experiencer, it cannot surface as a structural direct object in more conservative varieties of English, cf. (51):

(51)  *I opened / closed / cleaned Ann the door.

The English varieties in which (51) is acceptable and other languages (e.g. German) license this construction due to the presupposition that Mary wanted (or intended) the change of state involving the door and the speaker acts on her behalf (cf. Jackendoff 1991, Shibatani 1996). It is more plausible to include this meaning component in the list of Proto-Agent properties than in the list of Proto-Patient features.

If R surfaces as a prepositional object with to, it refers to the goal of the movement of P, as in the following examples (cf. Pinker 1989, Jackendoff 1991, Krifka 2001):

(52)  I sent / brought / carried a package to London.

A locational goal is not a Proto-Agent property and a transfer of possession is not necessarily involved in this construction. The meaning of many verbs allows both constructions. The double object verbs in (50) license the prepositional construction because P undergoes a change of place (cf. I gave something to Ann). If this interpretation is not possible, the construction is blocked (cf. I denied him something / *I denied something to him). The examples (52) cannot be used in the double object construction because (or as long as) London does not qualify for a possessor or an experiencer.

In conclusion, if R is distinguished only structurally from P, R surfaces as the structurally superior object only if it is more agentive than P. This result confirms the criterion of Thematic Dependency, but invalidates Dowty's proposal. However, Dowty's prediction for the prepositional construction, which distinguishes R and P by case in the broader sense, is correct. As P accumulates the higher number of patientlike properties (i.e. change of location), it is a direct object in the objective case; R has the lower number of patientlike properties (i.e. goal of location) and surfaces as an oblique prepositional object.

4.5 Case determined by structure: challenge or confirmation?

There is strong evidence that the two nominal cases of English (nominative and accusative or
objective) are not directly linked to thematic information, but determined by the structural position of the verbal arguments (cf. Chomsky 1981 and subsequent work). Space limitation does not allow us to repeat the rather impressive body of grammatical evidence for this hypothesis. It suffices to show the consequences of this analysis for the hypothesis of division of labour between case and structure.

For structural cases and verbs selecting two arguments, the hypothesis of division of labour predicts that the nominative is always linked to the semantically independent argument and the objective to the dependent argument. Furthermore, the Involvement Scale $\theta_{\text{max}} > \theta_{\text{min}}$ is predicted to be irrelevant: maximal and minimal agents on the one hand and maximal and minimal patients on the other hand are not systematically distinguished by case because they have the same position in thematic structure.

Psychic verbs and the causal dependency between experiencer and stimulus demonstrate the viability of this hypothesis. Recall from section 4.1 above that the specific mental, sensory or emotional state of the experiencer is a necessary condition for the occurrence of the situation denoted by the verb. All other things being equal, the experiencer is the verb-specific causal factor that qualifies for the structural subject position. This holds for stative psychic verbs like know, like, fear and see. In English, the case asymmetry between experiencer and stimulus is an epiphenomenon of the structural asymmetry between these two roles. But there are also psychic verbs such as frighten, surprise and please that have an inchoative reading in which the stimulus causes a change of state in the experiencer. With such verbs, the stimulus precedes the experiencer in the causal structure of the verb and qualifies for the structural subject position. Dowty (1991:587) adduces the following evidence for the semantic difference between the two classes of psychic verbs in English:

\begin{enumerate}
\item[(53)] (a) The birthday party is pleasing Mary.
\item[(b)] *Mary is liking the birthday party.
\end{enumerate}

\begin{enumerate}
\item[(54)] (a) What happened to Mary was that the birthday party surprized her.
\item[(b)] *What happened to Mary was that she liked the birthday party.
\end{enumerate}

In conclusion, the difference in the aspectual and causal structure of the two classes of psychic verbs has a direct correspondence in the basic syntactic position of experiencer and stimulus in English, case being an epiphenomenal trait.

The situation in German and many other languages is different. The case linking mechanism of German is non-structural, a fact that is acknowledged in generative grammar (cf. Haider 1993). In sharp contrast to the English stative psychic verbs, in German, such verbs can have the experiencer in the nominative (e.g. wissen 'know', kennen 'know', sehen 'see', mögen 'like', bevorzugen 'prefer'), the dative (e.g. gefallen 'like', behagen 'be pleasant', schmecken 'be tasteful'), or accusative (e.g. wundern 'be intrigued', interessieren 'be interested'). This variation is expected with experiencers (i.e. minimal agents) under the assumption that cases are directly linked to thematic roles and that they are sensitive to the Involvement Scale $\theta_{\text{max}} > \theta_{\text{min}}$. As expected from the causal dependency experiencer $>_\text{dep}$ stimulus with stative verbs, the above-mentioned German verbs prefer the experiencer in structural subject position. If the experiencer is in the nominative, the word order is rather rigid because Thematic and Case Dependency co-incide. If the experiencer is in an oblique case, word order is more variable because Thematic and Case Dependency are in conflict (cf. Primus 1999:155f.; 2002a).

In conclusion, the difference between structural and thematic cases validates the hypothesis of division of labour. Structural cases are assigned according to the Principle of Structural Expression of Dependency. Thematic cases are assigned following Thematic Case Constraints. In both types of case system, formal case constraints (e.g. the 1C-Requirement)
are additional constraints.

There is neurolinguistic evidence for the difference between structural and thematic cases, which serves indirectly as evidence for the hypothesis of division of labour. Cf. the following double case ungrammaticalities in English and German:

(55) English:  they took we to the airport
(56) German:  Welchen Detektiv beobachtet den Kommissar?
  ‘Which detective (ACC) is watching the superintendent (ACC)?’

In neurolinguistic experiments with event-related brain potentials (ERP), sentences like (55) elicited an early left anterior negativity (LAN) at the point of the underlined NP in English, cf. Coulson et al. (1998). The LAN-pattern generated by (55) indicates that case and structural position do not match, since, in general, LAN is induced by syntactic-structural violations (cf. Friederici 1999:286ff.).

Sentences like (56) in German elicited a N400-pattern at the point of the underlined NP, cf. Frisch (2000), Frisch / Schlesewsky (2001). A LAN-pattern was absent. N400 is generally interpreted as an indicator of an increased parsing difficulty in the lexical-semantic component (cf. Friederici 1999:285ff.). The presence of a N400 and the absence of a LAN is interpreted by Frisch and Schlesewsky as evidence that the processing of case in German leads directly to the activation of the lexical-semantic component. The N400-pattern shows that the activation of an appropriate thematic role is impossible.

In sum, the division of labour between case and structure manifests itself in the difference between a case system with structural cases and a case system in which cases are directly linked to thematic information. Recent neurolinguistic studies indicate that this difference is psychologically real.

5. Summary and Outlook

The present paper has focussed on two aspects of role-semantic information. The first aspect is the degree of involvement of a participant in the event named by the verb and was captured by Dowty's prototype approach to thematic roles. The crucial property of this kind of approach is that it distinguishes only two cluster concepts, Proto-Agent (A) and Proto-Patient (P), while is makes finer distinctions within one Proto-Role depending on the number of consistent properties an argument accumulates. These finer distinctions were abbreviated within the present approach in the Involvement Scale $\theta_{\text{max}} > \theta_{\text{min}}$. Given exactly two Proto-Roles A and P, this scale has exactly two manifestations $A_{\text{max}} > A_{\text{min}}$ and $P_{\text{max}} > P_{\text{min}}$. Regarding this involvement criterion, agents and patients are equal.

The second aspect of role-semantic information is the causal or aspectual side. Causal and aspectual differences are binary and asymmetrical: one argument is involved either in the initial, causally independent subevent or in the succeeding, causally dependent subevent denoted by the verb. This binary asymmetry, particularly the causal one, has the property of the dependency relation and was therefore called Thematic Dependency. By this criterion, Proto-Agents outrank Proto-Patients, i.e. $A >_{\text{dep}} P$, no matter whether they are maximally or minimally involved. This scale was explained drawing upon cognitive linguistic and logical-philosophical research on the notion of causality.

It is important to note that in the present approach, the two thematic rankings are not postulated but derived from different underlying aspects (number of consistent Proto-Role properties and causal dependency). The thematic scales abbreviate, i.e. extract, the information that is represented in formal thematic structures (cf. Primus 1999).

The hypothesis of division of labour between case and structure or basic order claims that
case in the broader sense (i.e. morphologically defined grammatical relations) is sensitive to the aspect of involvement and structure (i.e. structurally defined grammatical relations) to that of dependency. The first aspect is captured in a general Thematic Case Constraint and was formalized in OT in the present paper. The second aspect is captured by a general constraint on Structural Expression of Dependency that does not only capture the preference to place Proto-Agents before Proto-Patients but also many other seemingly disparate phenomena. This aspect was partly formalized in OT in previous publications (Primus 1999) and was applied on an informal basis in the present approach.

A first typologically major consequence of the hypothesis of division of labour is that case may be patient-oriented, but structure not. Languages with ergative constructions, in which the first, least marked case is linked to P, exist and are widely attested because in terms of case, languages can treat either A or P as a primary grammatical function (pivot) and link it to their first case. This and the trivial hypothesis that syntactic rules may be determined by the case function of an argument immediately explain the second major property of ergative languages: all syntactically ergative languages are also morphologically ergative. The fact that syntactic ergative rules are case-based was illustrated with data mainly from Dyirbal. In contrast, agent-oriented rules in ergative languages (syntactic split ergativity) are phenomena determined by thematic or deep syntactic structure, as shown with data from Warlpiri. This is explained by the fact that agents outrank patients in thematic structure.

Further typological observations corroborate the hypothesis of division of labour for ergative languages. Ergative rules are of the type that show a natural affiliation to cases (e.g. verb agreement, antipassive); accusative rules are of the type that are sensitive to semantic dependencies and / or are structural in nature (e.g. basic order, reflexive binding, coordination reduction). No language has been found yet in which case marking and agreement are exclusively accusative and coordination reduction or reflexive binding is ergative. As a case-based parameter, ergativity is linked to the Involvement Scale $\theta_{\text{max}} > \theta_{\text{min}}$. This explains why it is most clear with $\theta_{\text{max}}$-roles - an insight that was made more precise by an OT-formalization. This hypothesis also explains the fact that the co-occurrence of ergative and accusative constructions in a language (morphological split ergativity) cannot be determined by $\theta_{\text{max}}$-constraints and as a consequence, it cannot be dependent on the choice of verb lexemes selecting $\theta_{\text{max}}$-roles.

A second typologically relevant consequence of the division of labour between case and structure is that morphological split intransitivity is sensitive to the Involvement Scale $\theta_{\text{max}} > \theta_{\text{min}}$ and structural split intransitivity to aspectual or causal structure (semantic dependency). A good representative of the morphological type is Guarani; good representatives of the structural type are German and English, as shown in the paper. The plausibility of the hypothesis of division of labour is enhanced by the fact that the two types of split intransitivity may co-occur in a language (e.g. German).

The third consequence of the division of labour that was discussed here is the syntactic realization of recipients. The cluster concept of Proto-Recipient was introduced for convenience, because it is a particular frequent combination of Proto-Agent and Proto-Patient. In terms of involvement, Proto-Recipients are less involved than maximal patients. As a consequence, they are predicted to be realized morphologically as oblique objects, i.e. by a case that is less prominent than that of maximal patients. This is indeed the most widely attested default, as shown in the paper. In terms of role-semantic dependency, Proto-Recipients outrank Proto-Patients, because they have agentive properties that patients lack. As a consequence of this ranking, they are predicted to be preferably placed before patients in basic order and to be realized structurally as superior objects, particularly in double object constructions. The preference to place recipients before patients is cross-linguistically well-attested. This preference is overridden only if the reverse order is motivated by strong competing constraints (e.g. pragmatics or weight).
Further evidence for the division of labour between case and structure are structurally determined cases. They are predicted to be selected according to the Principle of Structural Expression of Dependencies, and not according to Thematic Case Constraints, which are sensitive to the criterion of involvement. This prediction was confirmed by the distribution of case pattern with psychic verbs in English and German and by neurolinguistic experiments that indicate that structural determined cases (English) and thematically determined cases (German) are cognitively parsed differently.

The paper presented evidence in favour of the strongest version of the hypothesis of division of labour: case has a universally fixed (or at least strongly preferred) function that is distinct from that of structure. But why should cases be sensitive to involvement distinctions and structure to dependency distinctions and not the other way round? The present paper presented quite compelling evidence in favour of the stronger hypothesis that is based on well-documented typological data; but nevertheless, our present knowledge is not sufficient to allow a firm conclusion. Therefore, let us pursue the question whether the stronger assumption has a plausible general explanation.

Such a general explanation is readily available. Dependency distinctions are binary and binary syntactic relations such as precedence and c-command are sufficient to express them. Involvement distinctions are too varied for a binary syntactic system. In this article, only a rough six way distinction between $A_{\text{max}}$, $A_{\text{max/min}}$ (for Guarani), $A_{\text{min}}$, $P_{\text{max}}$, $P_{\text{min}}$ and $A_{\text{min}}/P_{\text{min}}$ (Proto-Recipients) was considered. This sufficed to clarify major typological case patterns. For more exact analyses of individual languages, finer distinctions are needed. Furthermore, only those basic thematic properties were investigated that are unquestionably relevant on a larger cross-linguistic basis: volitionality (or control), causation, movement, sentience and possession. The more distinctions we consider, the larger the number of individual roles. Such an intricate system cannot be expressed in a functional optimal way by word order and structural relations. One can invoke the fact that structural relations are able to differentiate a lot of distinct syntactic positions if one allows several syntactic phrasal projections above the verbal node $V$. But the crucial point for the present argumentation is that such finer structural distinctions are highly ambiguous in actual parsing. The expressive power of a case system is theoretically unbounded and is actually much greater than that of precedence and c-command, particularly if we do not only take nominal cases, but also adpositions into consideration. In conclusion, cases (in the broader sense) are better suited for the various differences that are presupposed by Thematic Case Constraints than precedence and c-command, which, in their turn, are well suited to express binary dependency distinctions.

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