ZERO MORPHOLOGY: A STUDY OF ASPECT, ARGUMENT STRUCTURE AND CASE

by

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ABSTRACT OF THE DISSERTATION

Zero Morphology: a Study of Aspect, Argument Structure, and Case

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This thesis examines the relation between aspect, argument structure, and case. The approach developed in this thesis assumes that Dowty-style aspectual operators are zero affixes of the type discussed in Pesetsky 1995, that can head syntactic projections, and enter into semantic composition in the manner determined by the compositional semantics.

The analysis of argument projection explored in this thesis follows Hoekstra and Mulder 1990 and Borer 1994 who proposed that arguments are not specified in the lexicon as being external or internal, and there are no linking conventions concerning projection of arguments. The present analysis develops this approach by using tools of compositional semantics to filter out impossible tree-verb combinations. This analysis is supported in this thesis by the relation between the syntactic position of the argument and semantic interpretation; the existence of verbs of variable behavior with respect to argument projection; the obligatoriness of internal arguments of telic verbs; and typology of the resultative constructions.

This thesis further develops an Optimality-Theoretic approach to case, which assumes that distribution of cases is governed by the violable principles that require verbal heads to check their nominal features. This approach, combined with the analysis of argument structure assumed in this work, explains the differences between stative and active languages (Comrie 1981), distinguishes six case/agreement systems, and accounts for different types of splits, which include case/agreement splits, specificity-based and modality-based splits. The present analysis of aspect

and case is further shown to account for perfectivity-based splits in languages like Finnish and Georgian, and agentivity-based splits in languages with fluid case-marking (Dixon 1979, 1994).

And, finally, the approach developed here is supported by the analysis of two classes of verbal roots in Russian, which check Accusative and Instrumental case and have different aspectual and morphosyntactic properties. It argues that Instrumental case on the direct object is not unpredictable in Russian, contra to the standard assumption that Instrumental case is lexical or idiosyncratic (Pesetsky 1982, Babby 1984, 1991, Neidle 1988).

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CHAPTER 1

TWO PROBLEMS OF THE SYNTAX-SEMANTICS INTERFACE

Decomposition of verbs by means of aspectual operators is the topic of many works in lexical semantics, starting with Generative Semantics (e.g. McCawley 1968, 1971). In Generative Semantics decomposition has been done in the syntax. Dowty 1979, on the other hand, argues that aspectual functors are part of the lexical representation of a verb. The approach undertaken in this thesis is intermediate between the syntactic decomposition of Generative Semantics and Dowty's lexicalist approach: specifically, I argue that aspectual operators are zero verbal affixes, which parallel to overt affixes can be adjoined to the verbs presyntactically, or they can head syntactic projections, and adjoin to the verbs as the result of syntactic incorporation (cf. Baker 1988, Borer 1991). Aspectual decomposition of verbs under this hypothesis, therefore, can either be part of their lexical representation, or can be reflected in the syntax.

The hypothesis that aspectual operators are present in the syntax has been argued for in Stechow 1995 based on scope ambiguities with adverbs. This thesis discusses consequences of this approach with respect to two problems of the syntax-semantics interface: (1) the relation between argument projection and aspect, and (2) the relation between aspect and Case.

1.1. Aspect and Argument Projection

The first problem of the syntax-semantics interface addressed in this thesis is *the relation between aspect and argument projection.*

The approach to argument projection argued for in this study assumes following Hoekstra and Mulder 1990 and Borer 1994 that arguments are not specified in the lexicon as being external or internal, and there are no linking conventions or mapping principles concerning projection of arguments. Verbs are free to project any structures, subject to general syntactic and semantic principles. The present analysis develops this approach by using tools of compositional semantics to filter out ill-formed projections.

Following the proposal of Marantz 1984 and Kratzer 1994a,b, we assume that external arguments are not the true arguments of the verb, but rather are introduced by independent functional heads. The heads that introduce external arguments under this analysis are zero aspectual affixes. This study discusses four null affixes: CAUSE, BECOME, BE and HAVE. The predicates CAUSE and BECOME are defined as in Dowty 1979, whereas BE is an imperfectivizing operator. The affix HAVE corresponds to the operator that introduces external arguments in the case of stative verbs in Kratzer 1994a,b (i.e. the predicate HOLDER), and is also involved in the derivation of double object constructions.

The following discussion introduces some of the phenomena that support the present analysis of argument projection. These phenomena include (1) the correlation between semantic properties of the arguments and their syntactic position, (2) verbs of variable behavior with respect to argument projection, (3) argument structure alternations, and (4) the relation between the obligatoriness of arguments and aspectual properties of the verbs.

1.1.1. UTAH

The first argument for the present approach to argument projection is based on the relation between semantic properties of arguments and their grammatical realization. Thus, agents are known to be mapped to subjects, patients or themes into objects. These considerations have led many researchers to postulate universal principles of mapping of semantic arguments into the syntax.

Perlmutter and Postal 1984 proposed so-called Universal Alignment Hypothesis (UAH) which claims that: “There exist principles of UG which predict the initial relation borne by each argument in a given clause from the meaning of the clause”. This principle states that there is some correlation between semantic properties of arguments and their syntactic positions, however, it does not indicate what these semantic properties are.

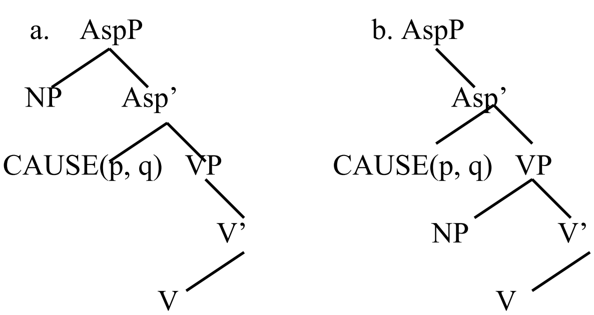
A stronger version of this hypothesis is proposed in Baker 1988 and is known as Universal Theta Assignment Hypothesis (UTAH): “Identical thematic relationships are represented by identical structural relationships between those items at the level of D-structure”. According to this hypothesis, argument projection is governed by the thematic properties of the verbs.

Tenny 1987, on the other hand, claims that the mapping between thematic structure and syntax is governed by aspectual properties. UAH and UTAH are replaced in her analysis by the “Aspectual Interface Hypothesis”, which claims that it is aspectual properties of the verbs which determine syntactic realization of their arguments.

Under the present approach, the correlation between semantic classes of arguments and their syntactic positions is accounted for by filtering out ill-formed projections rather than by mapping certain semantic classes into certain positions. Verbs, NPs, and aspectual affixes enter into semantic composition by the rules of compositional semantics. The interpretation of a NP, as we show below, depends on its position relative to aspectual affixes and verbs.

For example, consider the following structures, where the affix CAUSE heads the AspP projection:

(1)



Given the rules of compositional semantics, we show below that the two structures are predicted to have different semantic interpretation. When the NP is generated inside VP, it is combined by function application with the denotation of the verb, and thus is interpreted as the logical argument of the verb, i.e. the object which undergoes the action. The sentence is interpreted as “externally-caused” (Levin and Rappaport Hovav 1995). On the other hand, if the NP is generated in the Spec of AspP position, then it is interpreted as part of the causing proposition p, i.e. the causer of the event denoted by the verb. The sentence has an “internally-caused” or agentive reading.

Whether a verb has an agentive or nonagentive interpretation, therefore, depends on the syntactic position of the NP. This analysis thus follows the agenda of Hoekstra and Mulder 1990 who proposed that “the way arguments are projected contributes … to the meaning”.

Given four aspectual affixes CAUSE, BECOME, BE and HAVE, independently motivated in this thesis by various phenomena, we will also account for the correlation between telicity and other semantic properties of the verbs and argument projection discussed by Van Valin 1990, Dowty 1991, and Levin and Rappaport Hovav 1995. For example, verbs of directed change, i.e. verbs derived by affixation of the predicate BECOME, are predicted to project an unaccusative structure, i.e. the structure where the NP is generated in the Spec of VP position. On the other hand, we show that stative verbs, which can be derived either by BE or by HAVE, can project either unergative or unaccusative structures.

1.1.2. Verbs of Variable Behavior

The second argument in favor of the present approach to argument projection is based on verbs of variable behavior with respect to unaccusativity.

One of the most discussed classes of verbs that show variable behavior is the class of verbs of motion like ‘run’. As has been observed in Hoekstra 1984, Rosen 1984, Levin and Rappaport Hovav 1992, 1995 and others, these verbs pattern with unaccusatives if they co-occur with a prepositional phrase that specifies the terminal point of motion, and as unergatives in the absence of such a phrase.

(2) a. Gianni ha corso

Gianni has run

b. Gianni e corso a casa

Gianni is run to home

/ Hoekstra and Mulder 1990/

The existence of verbs of variable behavior motivated Hoekstra and Mulder 1990 and Borer 1994 to challenge traditional approaches to argument projection as driven by the lexical entry of a verb. Thus, if information about argument projection is encoded in the lexical representation of the verb, then verbs of variable behavior can only be analyzed as involving duplicate categorization.

On the other hand, if arguments are not specified in the lexicon as being internal or external, and verbs are free to project any syntactic structures, then the existence of verbs of variable behavior is not unexpected. However, the question which arises is how do we filter out the ungrammatical structures?

The intuitive idea is that verbs can occur in a certain construction, if this construction is "compatible" with its meaning. However, existing versions of such approaches do not really answer the questions of what exactly are the properties of the predicate which make it compatible with a certain construction, and how the notion of 'compatibility' can be defined.

Given the present analysis, which assumes that syntactic structures are projected by verbs, NPs and aspectual affixes, we will show below that 'compatibility' of a verb with a certain construction can be determined by the tools of compositional semantics and lexical semantics of aspectual affixes and verbs.

1.1.3. Argument Structure Alternations

The third argument in favor of the present 'compositional' approach to argument structure is based on argument structure alternations. Verbs are able to participate in a variety of different constructions, such as locative alternation, dative alternation, resultatives and others.

Dative sentences, for example, are illustrated in (3):

(3) a. Mary gave John a book

b. Mary threw John a ball

Although sentences of this type can be derived by different verbs, they all share a common meaning that can be described as in (4) (cf. Groepen et al 1989, Pinker 1989, Goldberg 1992, 1995, among others):

(4) X CAUSE Y to HAVE Z

Resultative constructions, illustrated in (5), also share a common meaning, which can be represented as in (6) (cf. Dowty 1979, Goldberg 1992, 1995):

(5) a. Mary sneezed the napkin off the table

b. Dan talked himself blue in the face

(6) X CAUSE y to BECOME Z

The notions of change of possession and causation involved in these constructions are not likely to be encoded in the lexical representation of a verb, and various proposals have been made concerning the source of these meanings.

Pinker 1989, for example, argues that these constructions result from semantic operations on lexical structure (see also Groepen et al 1989, among others). Verbs like 'throw' and 'give' under this approach do not have a change of possession meaning in their lexical representation, however, they can undergo a semantic rule which adds this notion to their meaning.

Goldberg 1992, 1995, on the other hand, argues that constructions should be analyzed as primitives in a language. The meaning of these constructions, as she notes, is not predictable from the meaning of lexical items, and therefore should have an independent status.

The hypothesis that aspectual operators like CAUSE, HAVE and BECOME are affixes that are involved in the derivation of syntactic constructions provides an alternative to both constructional approaches of the type discussed in Goldberg 1992, 1995, and approaches which assume the existence of lexical rules. For example, dative constructions under this hypothesis involve affixation of HAVE and BECOME, whereas the resultative construction is projected by the affixes CAUSE and BECOME. The interpretation of the structure depends on the lexical input, as well as the syntactic position where the affixes and NPs are generated. As opposed to constructional approaches, this view on argument structure alternations preserves the "bottom-up" approach to syntax (Chomsky 1981), according to which the projection of syntactic structures is governed by the lexicon.

An analysis of double object and locative alternations along these lines has been argued for in Pesetsky 1995. In this study we illustrate this approach to argument structure alternations by the analysis of resultative constructions.

Main evidence for the claim that resultative constructions involve affixation of zero affixes comes from the analysis of the two types of resultatives illustrated in (7)-(8):

(7) *Transitive resultatives*

a. The gardener watered the tulips flat

b. The grocer ground the coffee beans into a fine powder

c. They painted their house a hideous shade of green

(8) *Intransitive resultatives*

a. The joggers ran their Nikes threadbare

b. The kids laughed themselves into a frenzy

c. He sneezed his handkerchief completely soggy.

/Carrier and Randall 1992, p.173/

The two types of resultatives, as discussed especially in Carrier and Randall 1992, differ with respect to nominalization, formation of adjectival passive, selectional properties, and other phenomena.

The analysis of the two types of resultatives which we propose assumes along the lines of Baker 1988 and Borer 1991 that affixes can either be adjoined to the verbs presyntactically, or they can head a syntactic projection.

In the case of intransitive resultatives the affix CAUSE heads a separate PP projection, and incorporates into the verb as the result of head movement. In the structure of a transitive resultative, on the other hand, the affix is base-generated as a sister of V. The differences between the two types of resultatives discussed in Carrier and Randall 1992 are shown below to follow from this analysis.

Further evidence for this approach to resultative constructions discussed in this thesis is based on the semantic restrictions on the expressions that can form this construction (Simpson 1983, Hoekstra 1988, Bresnan and Zaenen 1990, Van Valin 1990, Levin and Rappaport Hovav 1995 and others). These restrictions under the present approach can be accounted for in terms of the selectional properties of the affixes CAUSE and BECOME.

1.1.4. Obligatoriness of Arguments

The fourth argument in favor of the present approach to argument projection relies on the analysis of the obligatoriness of arguments in certain constructions.

For example, as the Russian data below illustrate, the internal arguments of transitive verbs are obligatory if the verb is perfective[1].

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[1] All Russian and Georgian examples below are from my own fieldwork, unless noted otherwise.

(9) a. Ivan pisal b. Ivan pisal pis'mo

Ivan wrote-IMP Ivan wrote-IMP letter-ACC

'Ivan was writing' 'Ivan was writing a letter'

(10) a. *Ivan napisal b. Ivan napisal pis'mo

Ivan wrote-PERF Ivan na-wrote-PERF letter-ACC

'Ivan wrote' 'Ivan wrote a letter'

Similar generalizations are discussed for Dutch in Van Hout 1992 and for English in Mittwoch 1982 and Tenny 1987.

The leading assumption behind our analysis of this phenomenon is that the NP in the case of perfective verbs is not the logical argument of the verb, but rather is the argument of a perfectivizing prefix. Given compositional derivation of perfective verbs, we show that the presence of a NP in the Spec of VP position is obligatory in order for the structure to be interpreted.

In general, we show that a NP must be present in the syntactic structure, if it serves as the logical argument of a morphological non-head, such as a perfectivizing prefix. The relation between a prefix and a NP which fills its argument position is called logical predication in this study. Further consequences of logical predication discussed below concern the correlation between unaccusativity and telicity (e.g. Van Valin 1990, Dowty 1991); the "Direct Object Restriction" on resultative construction (Simpson 1983, Levin and Rappaport Hovav 1995); and perfectivity-based case splits in Georgian and Finnish.

1.2. Aspect and Case

The second problem of the syntax-semantics interface concerns *the relation between aspect and Case*. Many languages have so-called "semantically based case-marking" /Dixon 1994/, where the case of the arguments depends on the meaning of the verb.

Why does case depend on the semantic interpretation? Given the hypothesis that aspectual affixes are separate lexical items, they contribute to the syntactic and morphological representation of the verbs. These syntactic and morphological representations, on the other hand, can be distinguished by case. In languages with semantically based case marking, therefore, phonologically null aspectual affixes become “visible” by means of case.

The analysis of argument projection, argument structure alternations, and other syntactic behavior of verbs in terms of null aspectual affixes is shown in this study to have certain advantages over alternative analyses of the same phenomena. However, alternative analyses of these phenomena do exist and one might argue whether we really need to assume the existence of null lexical items to explain these phenomena. On the other hand, if we succeed in showing that the same null aspectual affixes which are used to account for the argument projection and other syntactic properties of the verbs become visible by means of case, then our evidence for the existence of null aspectual affixes has a more solid basis.

In this section we introduce three phenomena that illustrate the relation between the meaning of the verb and case:

- agentivity-based fluid case-marking in active languages,
- aspectual properties of verbal roots and accusative/instrumental cases in Russian,
- perfectivity-based case splits in ergative active languages like Georgian and accusative languages like Finnish.

1.2.1. Agentivity-Based Fluid Case-Marking

Let us start with agentivity based splits in languages with so-called ‘fluid-case marking’ (Dixon 1979, 1994). Languages with fluid case marking are languages where one can use different cases with the same verb. For example, in Tsova-Tush, intransitive verbs can check either nominative or ergative case on their arguments. The difference in case correlates with the difference in meaning:

(11) *Tsova-Tush* (Caucasian)

a. as wože

I-Erg fell (it was my own fault that I fell down)

b. so wože

I-Nom fell (no implication that it was my fault)

/ Mescaninov 1967:82, cited in Holisky 1987/

As the examples in (11) show, the same verb can take either nominative or ergative argument, and the case of the NP correlates with the interpretation of the verb. If the argument is nominative then the action is unintentional, whereas verbs with ergative arguments imply that the action is controlled by the subject.

Similar patterns can be found in Hindi /Mohanan 1990/, Acenhese (an Austronesian language from north Sinatra) /Durie 1985/, Eastern Pomo (A Hokan language of northern California) /McLendon 1978/ and many others.

Given the present analysis of argument projection, we argue below that sentences in (11) project different structures. The difference in the syntactic representations is further shown to account for the semantic interpretation of the two sentences, as well as the difference in case.

1.2.2. Accusative and Instrumental Cases in Russian

Chapter 3 of this thesis discusses several generalizations which show that assignment of accusative and instrumental cases to the objects in Russian is not unpredictable, contra to standard approaches to case assignment in Russian, which assume that instrumental case is lexical or idiosyncratic (Pesetsky 1982, Babby 1984, 1991, Neidle 1988 and others).

The differences between A-roots (i.e. verbal roots that assign accusative case), and I-roots (i.e. roots that assign instrumenal case) also show that aspect is related to case. As we discuss below, the following generalization distinguish the class of I-roots, as opposed to A-roots:

- I-roots cannot form adjectival passive,

- I-roots cannot form accomplishments,
- I-roots cannot take perfectivizing prefixes that adjoin to the verb presyntactically.

The semantic behavior of the two classes of verbal roots in Russian can be illustrated by two verbs that denote the process of selling: *prodavat*' and *torgovat*'. Let us consider the data in (12)-(13):

(12) a. Ivan prodaval cvety chas.
Ivan sold-IMP flowers-ACC hour-ACC
'Ivan was selling flowers for an hour'

b. Ivan prodal cvety za chac
Ivan sold-PERF flowers-ACC in hour
'Ivan sold flowers in an hour'

(13) Ivan torgoval cvetami chas
Ivan trade-IMP flowers-INS hour- ACC
'Ivan was selling flowers for an hour'

One of the differences between the verbs *prodavat'* ('to sell-IMP'), which assigns accusative case, and *torgovat'* ('to trade, to sell-IMP'), which takes an instrumental object, is that the verb *prodavat'* in the perfective form given in (12b) denotes an accomplishment, that is, the sentence in (12b) entails that the flowers were sold, whereas the verb *torgovat'* does not have a morphological form which would entail that the activity of selling has been completed.

The analysis of the two classes of verbal roots proposed below assumes that they differ in the logical type: whereas A-roots are analyzed as one-place predicates, predicated of internal arguments, I-roots are two-place predicates, predicated of both internal and external arguments. Given that syntactic structures are composed by aspectual affixes, NPs and verbs, subject to the rules of compositional semantics, we show that verbs that have different logical type project different structures. Different syntactic representation of A-roots and I-roots in turn accounts for the difference in case.

1.2.3. Perfectivity-Based Case Splits

Further examples of the relation between aspect and case are illustrated by perfectivity-based case splits.

For example, in Gujarati, the subjects of the verbs in perfective aspect are marked with ergative case, whereas the subjects of verbs in imperfective aspect, present or future are nominative:

(14) *Gujarati*

a. Ramesh pen kherid-t-o he-t-o

Ramesh pen buy-IMP-MASC AUX-IMP-MASC

Ramesh was buying the pen

b. Ramesh-e pen kherid-y-I

Ramesh-ERG pen buy-PERF-FEM

Ramesh bought the pen

/Delancey 1981, p.628/

Similar patterns can be found in a few Australian, Austronesian, and Mayan languages, several Caucasian languages (including Georgian), and others.

Perfectivity is also known to condition case splits on the objects. Thompson 1980 discusses several languages, where accusative marking correlates with perfective markers on the verb. For example, in Hungarian, verbs derived by means of a perfectivizing prefix meg- check accusative case, whereas if there is no perfectivizing prefix, then the object is oblique:

(14) *Hungarian*

a. meg-segit valaki-T

Perf-helps somebody-ACC

He helps somebody

b. Segit valaki-NEK

helps somebody-DAT

He helps somebody

/Thompson 1980, p. 267/

Perfectivity-based case splits are thus attested on both external and internal arguments. Independent of the position of the argument, perfective verbs check phonologically overt, or 'marked' cases, which include accusative and ergative, whereas imperfective verbs check either phonologically null nominative or an oblique.

The analysis of this phenomenon which we propose below assumes that phonologically overt accusative and ergative cases mark the logical predication relation between a zero affix and a NP. Given morphological structures and compositional interpetation of perfective verbs, we show that this relation is required in the case of perfective verbs, but is optional in the case of imperfective verbs. This analysis of perfectivity-based case splits is supported by the present lanalysis of the obligatoriness of the internal arguments, selectional restrictions, and other properties of perfective verbs.

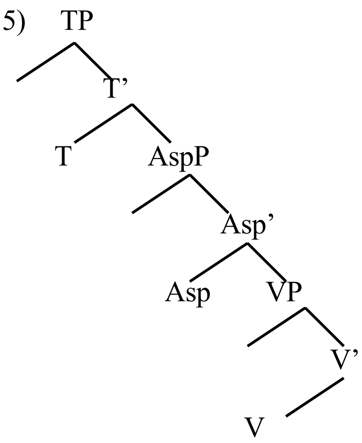
1.3. Basic Assumptions

This section summarizes basic morpho-syntactic assumptions used below to account for the discussed phenomena. Semantic assumptions are introduced in the next chapter.

1.3.1. VP-Structure

All syntactic structures conform to X'-theory (Chomsky 1981, Stowell 1981), where the basic extended projection of V is as follows:

(15)



NPs can be projected freely into different argument positions, which include Spec and complement positions of VP and AspP. There are no linking rules of any type, and information about argument projection is not specified in the lexical entry of a verb.

1.3.2. Morphological Component.

The present analysis further adopts the view on the morphological component, advocated in Baker 1988, Borer 1991, Kratzer 1994a,b, among others, according to which morphology determines well-formedness of combination of morphemes regardless of whether the morphemes are combined together prior to the syntax, or as the result of incorporation. According to this proposal, affixes can either be base-generated as sisters of V, or they can be the heads of separate projections, and adjoin to the verbs as the result of head movement.

Given this assumption, we argue below that zero aspectual affixes can occupy different syntactic positions within a clause (see for example the analysis of transitive and intransitive resultatives presented in chapter 5).

The principles of morphological component used in this study are adopted from the work of Williams 1978, 1981a, 1981b and include the following principles:

- morphological features percolate from the heads
- the heads of morphological structures are suffixes

The features which play an important role below are indices. We assume that indices are percolated from the suffixes in the morphological structure. We further propose that non-morphological heads can be coindexed with syntactic constituents in local configurations, such as Spec-head or sisterhood.

1.3.3. OT Approach to Feature Checking

The syntactic principles which evaluate well-formedness of S-structure under this analysis are presented in terms of Optimality Theory developed in Prince and Smolensky 1993.

The basic principles of Optimality Theory are as follows:

- Constraints are universal
- Constraints can be violated
- Constraints are ranked, and the ranking of constraints defines a grammar of a particular language.

The analysis of Case assumed in this work relies on the assumption that Case is a morphological feature, which can be associated either with a syntactic category, such as V, Tense, or Asp, or with a specific lexical item, such as a verb or an aspectual affix. It further assumes following Chomsky 1992 that features are checked in a Spec-Head configuration.

The major difference with previous approaches to case is as follows. Previous approaches to Case Theory assume a version of a Case filter, which requires that all NPs must be assigned/check Case (e.g. Rouveret and Vergnaud 1980, Vergnaud 1982, Chomsky 1981, 1986). The main hypothesis of the present approach to abstract Case is that Case checking is governed by the principles that require verbal heads to check their features rather than NPs.

Specifically, I propose that Case Theory follows from general universal principles, which require that all heads must check their morphological features:

CH-T: Tense must check its features

CH-Asp: Asp must check its features

CH-V: V must check its features

The following table illustrates all possible rankings of these three constraints. The six case systems derived by these rankings illustrate languages which are known as ergative, accusative, ergative active, accusative active, and three-way languages (in the terminology of Bittner and Hale 1996a), as well as what is called here ergative accusative languages, which have not been discussed in previous GB-based work[2].

	transitive	unergative	unaccusative	
T>> Asp >>V	Erg-Nom	Nom	Nom	ergative (Dyirbal)
T>> V >>Asp	Nom-Acc	Nom	Nom	accusative (Russian)
Asp >>T>>V	Erg-Nom	Erg	Nom	ergative active (Lezgian)
Asp >>V>>T	Erg-Acc	Erg	Acc	ergative accusative (Acenhese)
V >> Asp>>T	Erg-Acc	Nom	Nom	three-way (Nez-Perce)
V>>T>>Asp	Nom-Acc	Nom	Acc	accusative active (East.Pomo)

1.4. Thesis Outline

This thesis examines various phenomena related to aspect, argument structure and case.

Chapter 2 introduces semantic assumptions, such as lexical semantics of aspectual affixes and verbs and the rules of compositional semantics. Given these assumptions, it discusses different aspectual classes of sentences, which are derived by different aspectual affixes. This semantic analysis is supported in this chapter by the analysis of perfective verbs in Russian and English, as well as the obligatoriness of the internal arguments of telic verbs. The reader not interested in the semantics of aspect may skip this chapter, and proceed to the discussion of argument structure (chapters 4 and 5) or case (chapters 6 and 7), which repeat basic semantic assumptions as needed, and are organized for most part as self-contained.

[2] As is discussed in chapter 6, Tense checks nominative case, ergative case is checked by Asp, and V checks either accusative or phonologically null ‘default objective’ case, which we call nominative.

Chapter 3 presents empirical generalizations that relate accusative and instrumental cases to aspectual and morphological properties of verbs in Russian. It further proposes an analysis of these generalizations which assumes that verbs that assign accusative and instrumental cases in Russian differ in their logical type. This analysis crucially relies on the semantic assumptions presented in chapter 2, especially the rules of compositional semantics.

Chapter 4 supports the present compositional approach to argument projection based on the analysis of unacusativity. The phenomena discussed in this chapter include diagnostics of unaccusativity, verbs of variable behavior, transitivity alternation, and semantic correlates of unaccusativity. The main claim of this chapter is that argument projection is not encoded in the lexical entry of a verb, but rather can be predicted by general syntactic and semantic principles, including semantic selection and the tools of compositional semantics.

Chapter 5 argues that resultative constructions are derived by affixation of zero affixes CAUSE and BECOME based on the differences between transitive and intransitive resultatives. It further supports this analysis by the semantic constraints on these constructions, and language variation.

The present analysis of case is presented in Chapter 6. The approach to case developed in this chapter is based on the OT approach to grammar (Prince and Smolensky 1993), and accounts for different case and agreement systems, including accusative, ergative and four types of active systems. This analysis is further supported by the discussion of different types of case and agreement splits, and NP-movement in accusative languages.

The final chapter combines the OT approach to case with the compositional approach to argument structure and aspect to account for the semantic case splits. Such splits are illustrated by agentivity-based splits in active languages and perfectivity-based case splits in Finnish and Georgian.

CHAPTER 2.

ASPECTUAL COMPOSITION.

This chapter introduces semantic assumptions such as lexical semantics of aspectual affixes and verbal roots and the rules of compositional semantics.

These assumptions are illustrated in this chapter by the analysis of perfective verbs in Russian and English. It is argued that perfective verbs are normally derived from imperfective ones by affixation of aspectual affixes and therefore are morphologically more complex than the corresponding imperfective ones. Given the morphological structures and compositional interpretation of perfective verbs, this chapter accounts for different classes of perfective verbs in Russian and English. It further explains the difference between verbs that are ambiguous between a telic and atelic interpretation from those which are not ambiguous in English.

Another consequence of this analysis presented in this chapter is the obligatoriness of the internal arguments of accomplishments discussed in Mittwoch 1982, Tenny 1987, and van Hout 1991. The fact that accomplishments cannot undergo detransitivization is accounted for under the present assumptions as a consequence of the compositional interpretation of this aspectual class.

And finally, this chapter reviews a well-known semantic argument for the aspectual decomposition in the syntax recently discussed in Stechow 1995 which is based on ambiguities with adverbials like ‘again’.

2.1. Lexical Semantics

In this section we present assumptions about the meaning of verbal roots and aspectual affixes. The goal of this discussion is to present only those aspects of meaning that are relevant to the syntactic phenomena discussed in the following chapters.

2.1.1. Verbal Roots

Verbal roots under the present assumptions can be either of the type <e, <i, t>> or type <e, <e,<i, t>>> where e is the type of individuals, t is the type of a proposition (Church 1940, Creswell 1973), and i is the type of time intervals.

Most verbal roots take one individual argument. For example, 'read' is predicated of the argument that is interpreted as a patient or theme (Marantz 1984, Kratzer 1994a,b):

(1) read(t, y) is true if y is being read at t

A small number of verbal roots, as argued in chapter 3 below, take two arguments. These roots can be described as roots that cannot undergo adjectival passivization and assign instrumental case in Russian.

(2) manage(t, x, y) is true iff x is managing y at t.

The lexical meaning of verbal roots and other lexical elements is restricted by selectional restrictions, i.e. presuppositions that constrain the sorts of entities arguments of the lexical items might denote. For example, read(t, y) presupposes that y is a written object.

The hypothesis that selectional restrictions are part of the lexical representation of a verb is not an uncontroversial assumption. For example, Grimshaw 1993 argues that selectional restrictions of the verbs are nonlinguistic based on the following examples:

(3) a. #He drank the meat/car/universe.

b. #He sliced the orange juice.

c. No one can drink meat/cars/the universe.

d. It is impossible to slice orange juice.

/Grimshaw 1993, p.5/

The sentences in (3c,d) show that selectional restrictions can be violated in grammatical sentences; however, these examples do not seem to present evidence in favor of a nonlinguistic analysis of selectional restrictions, since these violations are restricted to specific contexts.

The sentence in (3d), for example, says that there is no world w where the proposition ||slice(orange juice)|| is true.

(4) $w \in ||\text{impossible}(p)||^{M,g}$ iff $||p||^{M,g} = \emptyset$

Given that orange juice does not qualify as an object that can be sliced, the presupposition introduced by the lexical meaning of the verb 'slice' is false. The proposition ||slice(orange juice)|| therefore fails to have a truth value (cf. Frege 1892 et al), and thus denotes an empty set. The sentence in (3d) therefore is predicted to be true.

Another example that seems to violate selectional restrictions is given in (5) (Jane Grimshaw, p.c.):

(5) John tried to read the scratches on the wall, but they were just meaningless marks.

This sentence also illustrates that selectional restrictions can be violated only in intensional contexts. The NP "the scratches on the wall" does not have to satisfy the selectional restrictions of the verb 'read' in the world where the sentence is evaluated, but only in the worlds where the complement of the verb 'try' is true (cf. Hintikka 1969).

This example suggests that lexical presuppositions of verbs like 'read' should be defined as follows:

(6) $\forall w \forall y \forall t\ w \in ||\text{read}(t, y)|| \Rightarrow$ y is a readable object in w

Examples of sentences where selectional restrictions are not satisfied, therefore, do not present an argument against the hypothesis that selectional restrictions are part of the lexical representation of the verb.

Aspectually, verbal roots can refer to different types of eventualities[3], which include states, processes, and events. For example, verbal roots 'read', 'smile', and 'run' denote processes, 'know' and 'see' refer to states, 'arrive' and 'come' denote events. Verbal roots under

[3] The term is from Bach 1981.

this approach have inherent aspectual properties, which make them compatible or incompatible with a certain aspectual affix. Aspectual properties of sentences, as we discuss in section 2.2 below, are determined by the combination of aspectual affixes and verbal roots.

2.1.2. Aspectual Affixes

The aspectual affixes discussed in this thesis include four operators: BE, BECOME, HAVE and CAUSE. The affixes BECOME and CAUSE are defined as in Dowty 1979. The operator BE is an imperfectivizing operator, and HAVE corresponds to the predicate HOLDER in Kratzer 1994a,b. Given that these operators under the present analysis are separate lexical items, it is possible that not all aspects of their meaning can be given an explicit model-theoretic interpretation. Parallel to the lexical restrictions on the meaning of verbal roots, we assume that the meaning of aspectual affixes is constrained by lexically introduced entailments, presuppositions and implicatures. For the purposes of the present discussion, I will consider only those aspects of meaning that are relevant for the syntactic phenomena discussed in the following chapters.

2.1.2.1 The Affix BE

Let us start with the affix BE, which is involved in the derivation of processes and stage-level stative verbs. States and processes can be distinguished from events by means of the subinterval property of Taylor 1977, also discussed in Dowty 1979, which says that if p is true at t, then p is true at all subintervals of t. This condition restricts the argument of the predicate BE, as is shown in (7):

(7) $\forall p \forall t\ BE(p, t) \Rightarrow p(t) \wedge \forall t'[t' \subseteq t \rightarrow p(t')]$

For example, if the sentence "John was sick" is derived by affixation of BE, then the semantics requires that if "John was sick" is true at t, then John was sick at all subintervals of t. Although it has been pointed out by Dowty 1979, Hinrichs 1985 and others that in the case of processes like ‘John run’ the requirement that John was running at all subintervals is too strong, and should be replaced by ‘relatively large not-nested subintervals’, I will leave this constraint as is for the purposes of this study.

2.1.2.2. The Affix CAUSE

Now let us consider the affix CAUSE. The meaning of this affix is constrained not only by lexical entailments, but also by presuppositions, and what we call below the “agentivity implicature”. Lexical entailments introduced by this affix can be defined as in Dowty 1979 (cf. Lewis 1973):

(8) $\forall p \forall q \forall t \ \text{CAUSE}\ (t, p, q) \Rightarrow p(t) \wedge q(t) \wedge \neg p(t) \Box\!\!\rightarrow \neg q(t)$

This semantics, however, cannot capture all properties of this lexical item.

First, the affix CAUSE constrains possible aspectual classes of entities that can stand in a causative relation. One of the presuppositions associated with this affix, therefore, restricts aspectual types of p and q. Given that the predicate CAUSE under this analysis is involved in the derivation of activities and accomplishments, we assume that the property of times p is restricted to processes or activities of Dowty 1979, whereas the variable q can range over either processes or events.

The subinterval property introduced above distinguishes atelic verbs, or processes and states, from telic verbs, i.e. events. Processes and events, on the other hand, can be distinguished from states by means of the activity postulate of Dowty 1979:

(9) <u>Activity postulate</u>

Q(x) is a process iff for all t if Q(x, t) is true, then “there is some physically definable property P such that the individual denoted by x lacks P at the lower bound of t and has P at the upper bound of t”. /Dowty 1979, p.168/

This postulate intends to capture a notion of movement/change present in processes and events as opposed to states. For example, the verb ‘move’ in Dowty 1979 has the following semantics: 'move(x) is true at an interval I iff there is a place p such that Loc(x)=p at the lower bound of I and Loc(x)≠p at the upper bound of i.' /Dowty 1979, p.169/

In the case of processes this change is indefinite, in the sense that the existential quantifier over places has narrow scope with respect to the interval I. Processes, therefore, can satisfy both the subinterval property and the activity postulate. Events, on the other hand, define a definite change, and violate the subinterval property.

Given these assumptions, we can restrict the variables p and q in the lexical translation of CAUSE by the following presuppositions which say that the variable p must satisfy both the subinterval property and the activity postulate, whereas the variable q must satisfy the activity postulate.

(10) Presuppositions

$a.\ \forall P\, \forall q\, \forall x\, \forall t\ CAUSE\ (t, P(x), q) \Rightarrow$

$\forall t'[t' \subseteq t \rightarrow P(t', x)] \wedge \forall t' \forall t''[t' < t'' \wedge t' \subseteq t \wedge t'' \subseteq t \rightarrow \exists R[R(t', x) \wedge \neg R(t'', x)]]$

$b.\ \forall Q\, \forall p\, \forall y\, \forall t\ CAUSE\ (t, p, Q(y)) \Rightarrow$

$\forall t' \forall t''[t' < t'' \wedge t' \subseteq t \wedge t'' \subseteq t \rightarrow \exists R[R(t', y) \wedge \neg R(y, t'')]],$

where R is a "physically definable" or "natural" relation between an individual and a time variable.

Consider, for example, the sentence in (11):

(11) John opened the door

Following Dowty 1979 we assume that this sentence is derived by affixation of CAUSE. Leaving out the past tense operator that binds the variable t (see section 2.3 below), this sentence is translated as in (12). The translations of NPs have the simplest logical type. Names like j are of the type e. Definite NPs are represented as names as well.

(12) $\lambda t\ \exists P\ CAUSE(t, P(j),\ BECOME(open(the\ door))$

This expression is true of a time interval t if John is involved in some activity at t, as the result of which the door became open[4]. The variable P in this translation corresponds to the activity of opening, and P(j) should satisfy the subinterval property, as well as involve some movement or change. The event of 'the door became open' involves a change of state.

Under the present assumptions, all activities and accomplishments involve causation. The notion of change involved in these aspectual classes therefore comes from the lexical semantics of CAUSE.

Aspectual restrictions, however, are not the only type of restrictions that are associated with the affix CAUSE. For example, the domain of the existential quantifier in (12) must be restricted to activities of a certain type, i.e. those activities that naturally lead to the resulting event. To capture this restriction, we assume that the following presupposition must hold as well:

(13) $\forall p \forall q \forall t\ CAUSE\ (t, p, q) \Rightarrow q$ *is an expected result of* p

This condition is aimed to restrict the domain of existential quantification in (12). However, it can also be used to account for the semantic constraints on the resultative constructions, which involve affixation of this operator, as discussed in chapter 5.

Furthermore, we can also restrict the individual causer argument in the translation of CAUSE. If we consider selectional restrictions of the verbs, the general type of a restriction on individual variables is that the argument must be capable to undergo a process or experience a state, denoted by the verb:

(14) a. $\forall y \forall t$ sick(t, y) if y is an object which is capable of being sick

b. $\forall y\ \forall t$ read(t, y) if y is a readable object

Similarly, we can assume that the following presupposition restricts the meaning of CAUSE:

(15) $\forall P \forall q \forall x \forall t\ CAUSE\ (t, P(x), q) \Rightarrow x$ *is capable to cause* q

[4] Given the semantics of BECOME discussed in the next section, the door is open immediately after t.

And finally, the affix CAUSE introduces the agentivity implicature, which is triggered by the individual argument x in the translation below:

(16) $\forall P\, \forall q\, \forall x\, \forall t$ *CAUSE (t, P(x), q)* α *x is an agent of q*

The individual argument of the affix CAUSE can refer to an agent, a natural force ("The wind broke the window), or an instrument ("The key opened the door"). Following Holisky 1987 and Wilkins and V.Valin 1993, we assume that agentivity is a pragmatic inference or implicature rather than a lexical property of a verb.

The agentivity implicature predicts that the default interpretation of sentences involving the predicate CAUSE is agentive. However, this implicature can be cancelled, for example, if we add an adverb like 'accidentally';

(17) a. Larry killed the bear.

b. Larry accidentally killed the deer.

As discussed in Langacker 1990, Delancey 1990, and Wilkins and V.Valin 1993, determination of an agent depends not only on the lexical meaning of the verb, but also on the semantic properties of NPs, as well as pragmatic concerns. For example, the following sentences, discussed in Wilkins and V.Valin 1993, differ in their default interpretations:

(18) a. The looter broke the window

b. The baby broke the window

Whereas agency is strongly implicated in (18a), the default interpretation of (18b) is that the baby accidentally instigated the act, and so is not considered a 'true' agent.

2.1.2.3. The Affix BECOME

Now let us turn to the BECOME predicate. The basic function of this affix is to introduce a change of state, as in Dowty's BECOME functor. The difference with Dowty 1979, however, is that in this analysis the operator BECOME introduces two time variables: the interval t corresponding to the interval before the culmination point, and the interval t' where the result state holds. The set of entailments associated with this operator is given in (19):

(19) BECOME(p, t, t') if the conditions in (i)-(iii) hold:

(i) p(t')

(ii) $\exists t''[\, t'' \text{o}\ t \wedge \forall t''' \,[t''' < t'' \rightarrow t''' < t\,] \wedge \neg\, p(t'')]$

(iii) $t \propto t'$ (t immediately precedes t')

The condition in (19ii) roughly says that there exists a time interval t'' that overlaps the initial bound of t, such that p(t'') is false.

Let us compare this semantics of BECOME to that of Dowty 1979:

(20) BECOME(p) is true at t iff

(i) there is an interval t'containing the initial bound of t such that $\neg$p is true at t',

(ii) there is an interval t" containing the final bound of t such that p is true at t",

(iii) there is no non-empty interval t_o such that $t_o \subset t$ and (i) and (ii) hold for t_o as well as for t. /Dowty 1979, p.141/

Consider, for example the sentence in (21):

(21) John opened the door.

Under Dowty's analysis, this sentence is decomposed as follows:

(22) [[John does something] CAUSE [BECOME[the door open]]]

This is true at t iff the door is not open at some interval before t, and it is open at some interval immediately following t, and t is the largest interval at which such conditions hold.

```
                    t'             t              t''
(23)   ——[——————————[ . ]——————————[.]——————————————]——
        the door is not open   John is acting   the door is open
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Similar truth conditions are predicted by the present analysis, which assumes that the sentence in (21) involves affixation of the affixes CAUSE and BECOME:

(24) $\lambda t\, \exists P$ [CAUSE(t, P(j), $\lambda t \exists t'$ BECOME(open(the door), t, t')]

This expression is true of time interval t if John is involved in some activity at t, and for some interval t' immediately following t, y is open at t', whereas for some interval t'' containing the initial bound of t the door is not open at t''.

t'' t t'

(25) [――――――[.]――――――[.]――――――――]―――

the door is not open John is acting the door is open

The third condition in the semantics of BECOME proposed in Dowty 1979 is the 'maximality' condition, which requires that the interval t must be the maximal interval that satisfies (20i) and (20ii). As Dowty notes, however, this requirement might be a pragmatic implicature rather than a lexical entailment.

The difference with Dowty 1979 is that the operator BECOME is predicated of two time variables: the variable at which the event takes place, and the variable at which the resultative state obtains. This modification is supported by the analysis of perfectivizing prefixes and adjectival passive discussed below.

As in Dowty 1979, we assume that the argument p is restricted to states; however, this restriction might not be universal. For example, in Russian, as we discuss in chapter 3, the affix BECOME can be added to processes as well:

(26) Ivan zapel

Ivan za-sang-PERF

Ivan started to sing

Whereas in English a change from not singing to singing can be captured only by a verbal phrase with an aspectual verb, in Russian this meaning can be conveyed by a single verb. This contrast can be analyzed as a consequence of different selectional properties of the affix BECOME in the two languages.

2.1.2.4. The Affix HAVE

The last affix assumed in this work is the affix HAVE. The lexical entailments of this affix are as follows:

(27) a. $\forall p\ \forall t\ \forall x\ HAVE(t, x, p) \Rightarrow p(t)$

b. $\forall p\ \forall t\ \forall x\ HAVE(t, x, p) \Rightarrow x$ *experiences* $p(t)$

This affix is involved in the derivation of transitive states and achievements, and its main function is to introduce an external argument. It is also involved in the derivation of double object constructions, as illustrated in chapter 7. Aspectually, we assume that this affix presupposes that the property of times p is a state or an event.

2.2. Aspectual Classification

Given these constraints on the meaning of aspectual affixes, we can now turn to different aspectual classes of verbs predicted by these assumptions.

2.2.1. Affix-Verb Combinations

Compatibility of an affix-verb combination under this approach is determined by the selectional restrictions of aspectual affixes. For example, the argument of the affix BE can only refer to a process or a state, and thus this affix is incompatible with events. The affix CAUSE, on the other hand, cannot be adjoined to states.

Verbal roots, as we mentioned above, can refer to eventualities of any aspectual type, i.e. they can denote states, processes, or events. In other words, verbal roots have inherent aspectual properties, which make them compatible or incompatible with a certain aspectual affix.

Different affix-verb combinations under this analysis define different aspectual classes of verbs. Aspectual classification given below distinguishes states, processes, or activities, and two types of events: accomplishments and achievements (Vendler 1967, Dowty 1979). Leaving out tense operators, which bind the variable t (see section 2.3 below), the four aspectual classes are represented as follows:

States:

λt BE(t, sick(j)) ‘John is sick’

λt HAVE(t, j, know(the song)) ‘John knows the song’

Activities

$\lambda t \exists P$CAUSE(t, P(j), $\exists y$ sing(y))[5] ‘John sings’

$\lambda t \exists P$CAUSE(t, P(j), read(the book)) ‘John read the book (for an hour)’

Accomplishments

$\lambda t \exists P$CAUSE(P(j), $\lambda t \exists t'$BECOME(open(the door), t, t’) ‘John opened the door’

Achievements

$\lambda t \exists t'$ BECOME(dead(j), t, t’) ‘John died’

λtHAVE(t, j, $\lambda t \exists t'$BECOME(know(the song), t, t’)) ‘John remembered the song’

This classification is different from Dowty 1979 in several respects.

First, along the lines of Marantz 1984 and Kratzer 1994a,b it assumes that external arguments are introduced by aspectual affixes, specifically the affixes CAUSE and HAVE. Transitive and intransitive sentences under this approach, therefore, can have different representation, as in the case of states and achievements shown above.

Second, in Dowty 1979 the predicates that correspond to verbal roots are stative, whereas activities, accomplishments, and achievements are derived by means of aspectual operators. Under the present analysis, verbal roots can belong to different aspectual classes, whereas zero affixes change aspectual type and/or the argument structure of sentences. For example, the roots ‘read’ and ‘sing’ above are understood as processes, whereas ‘know’ and ‘sick’ refer to states. Most verbal roots, as we show in the next two sections, belong to the class of states or processes, whereas events are usually derived from verbal roots by affixation of aspectual predicates. We do leave a possibility, however, that verbal roots might be inherently classified as events.

The third difference with Dowty 1979 is that the affix CAUSE under this approach is present in the representation of both activities and accomplishments, whereas Dowty 1979 following the tradition of Generative Semantics assumes that activities are derived by the predicate DO. However, the predicate DO is defined as an agentivity operator, and therefore cannot distinguish activities from states, since not all activities are necessarily agentive. Furthermore, as Dowty 1979 discusses, the evidence for postulating the DO operator is less persuasive than that arguing for CAUSE and BECOME. For example, whereas postulating the operator BECOME allows us to describe certain scope ambiguities, as is shown in section 2.7 in the present study, no such ambiguities with DO seem to be attested.

The hypothesis that activities are derived by CAUSE rather than DO is shown below to account for the semantic properties of both agentive and nonagentive activities. Activities are distinguished from statives, according to Dowty 1979, based on the notion of change, as defined in the activity postulate. The activity postulate, on the other hand, is part of the lexical meaning of CAUSE, as we discussed above. Furthermore, the hypothesis that activities are derived by CAUSE plays a crucial role in the analysis of argument projection of this aspectual class, discussed in chapter 4.

Many features of Dowty's classification, however, are preserved under this approach. Thus we assume, for example, that accomplishments are derived by the operators CAUSE and BECOME, where the operator CAUSE has wide scope over BECOME. Achievements, on the other hand, are derived by affixation of BECOME, with no causation involved. The predicate BECOME is present in the representation of all telic verbs (i.e. accomplishments and

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[5] The variable y in this translation, as we argue in chapter 3, corresponds to cognate objects, as in "John sang a song".

achivements), as opposed to atelic verbs (i.e. activities and states). The following discussion presents some tests that can distinguish the four aspectual classes.

2.2.2. (A)telicity

One of the tests that can be used to distinguish telic and atelic verbs, i.e. states and activities from accomplishments and achievements, is based on the ability of a verb to co-occur with 'for'/'in' adverbials. Specifically, only atelic verbs can be modified by for'-durational phrases, whereas 'in'-phrases are restricted to telic verbs[6].

The semantics of the adverbial 'for', as discussed in Dowty 1979, assumes that 'for(p, t)' presupposes that p has the subinterval property at t:

(28) $\text{for}(t, p) \Leftrightarrow \forall t'[t' \subseteq t \rightarrow p(t')]$

This condition, under the present assumptions, is part of the lexical semantics of the affix BE, and the meaning of some verbal roots. For example, the following sentences are predicted to be compatible with a 'for'-durational phrase:

(29) a. BE(t, sick(j)) 'John is sick'

b. HAVE(t, j, know(the song)) 'John knows the song'

c. ∃P CAUSE(t, P(j), read(the book)) 'John read the book (for an hour)'

If the affix BE is present, then the subinterval property is introduced as a lexical entailment of BE. In the examples in (29b,c), however, this property is introduced by the lexical meaning of the verbal roots 'know' and 'read'. The affixes CAUSE and HAVE, when added to these verbs, as we show below, do not change their temporal structure.

Consider, for example, the translation in (29c). Given the meaning of CAUSE, this sentence is predicted to entail the following conditions:

(30) $\exists P\, P(t, j) \wedge \text{read}(t, \text{the book}) \wedge \neg P(t, j) \Box\!\!\rightarrow \neg(\text{read}(t, \text{the book}))$

This sentence is true if the book is being read at t and John participated in some activity P at t that caused this to happen. Temporal properties of this sentence, however, are determined by the verbal root 'read', which presupposes the subinterval property as part of its lexical meaning[7]:

(31) $\forall y \forall t\ read(t, y) \Rightarrow \forall t'[t' \subseteq t \rightarrow read(y, t')]$

Furthermore, as a consequence of the agentivity implicature associated with CAUSE, John is understood as the agent of reading.

Affixation of HAVE also does not change the temporal structure of the event. If the affix BECOME is added, however, then the presupposition associated with a 'for'- adverbial is not satisfied. On the other hand, sentences with BECOME are compatible with 'in'- phrases, which presuppose that the time at which the event takes place is the unique interval (Dowty 1979):

(32) $In(t, p) \Leftrightarrow \forall\ t'[t' \subseteq t \wedge p(t') \rightarrow t=t']$

Uniqueness of the interval in the case of BECOME operator, as Dowty mentions, follows from the maximality condition on the interval at which the event takes place. This condition under the present assumptions is the result of the pragmatic implicature rather than the semantics of BECOME.

The following sentences, therefore, are compatible with 'in' adverbials:

(33) a. $\lambda t \exists P CAUSE(P(j), \lambda t \exists t' BECOME(open(the\ door), t, t'))$ 'John opened the door'

b. $\lambda t \exists t'\ BECOME(dead(j), t, t')$ 'John died'

c. $\lambda t HAVE(t,j,\lambda t \exists t' BECOME(know(the\ song),t,t')$ 'John remembered the song'

2.2.3. Causation

The presence of the affix CAUSE, on the other hand, distinguishes states and achievements from activities and accomplishments. As discussed in Dowty 1979, the presence of

[6] More specifically, 'in'-phrases can co-occur with non-instantaneous telic verbs, which include accomplishments and some achievements (differences between accomplishments and achievements are discussed in the next section)

[7] The derivation of the accomplishment reading of the verb 'read' is discussed in section 2.4 below.

a causal component is the defining distinction between accomplishments and achievements, irrespective of agentivity or duration of change of state.

Agentivity under the present analysis is a lexical implicature of the affix CAUSE. Given that achievements do not involve causation, we predict that they cannot have agentive interpretation. This prediction can be supported, for example, by the inability of achievements to co-occur with adverbs like *deliberately, carefully,* and others (Dowty 1979, attributed to Ryle)[8]:

(34) a. ?? John carefully discovered the solution.

b ?? John obediently noticed the painting.

c ?? John vigilantly found a penny.

/Dowty 1979, p. 59/

Another difference between an accomplishment and an achievement discussed in the literature (e.g. Vendler 1967) is that achievements denote instantaneous events, whereas accomplishments require a development stage. One of the tests that can be used to distinguish instantaneous events from those having a duration is based on their ability to serve as the arguments of the verb ‘finish’, as well as to occur in the Progressive in English.

However, as has been discussed in Dowty 1979 and Parsons 1990, some achievements can have a development portion, and can occur in a progressive form:

(35) a. Samantha is reaching the summit.

b. Henry is winning the race.

/Parsons 1990, p. 24/

According to Parson’s theory of the Progressive, the progressive form of these sentences is true during the development stage, therefore, achievements like ‘reach’ and ‘win’ are not instantaneous.

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[8] Dowty 1979 points out, however, that some achievements seem to be agentive: leave the country, arrive in Boston. Under the present analysis, however, these ‘agentive verbs of change of state’ are analyzed as involving causation (see chapter 4, especially section 4.2.2.1).

Notice that under the present semantics of BECOME, as in Dowty 1979, the duration of a change of state is not specified. We thus expect that there are no syntactic phenomena which are sensitive to this parameter, as opposed to (a)telicity or the absence/presence of a causal component, for example. This prediction is confirmed by the discussion of various phenomena related to argument projection and case in the following chapters.

Section 2.3 below illustrates compositional derivation of different aspectual classes of sentences. Before we turn to the examples, however, let us first present the rules of compositional semantics, which play an important role for the analysis of various phenomena discussed below.

2.3. Compositional Interpretation

The translation rules are adopted from Cross-Linguistic Semantics (XLS), developed in Bittner 1994a,b. Let us illustrate these rules by the example of compositional translation of the transitive sentence in (36):

(36) John read the book (for an hour).

(37) TP[9] 1F. $PAST(\lambda t \exists P\ CAUSE(t,\ P(j),\ read'(b)),\ t_{ev})\ \varnothing$

2Ba. $\lambda x\ PAST(\lambda t \exists P\ CAUSE(t,\ P(x),\ read'(b)),\ t_{ev},)\ \varnothing$

$John_i$ T' 1F. $PAST(\lambda t \exists P\ CAUSE(t,\ P(x_i),\ read'(b)),\ t_{ev},)\ \{x_i\}$

$\lambda p PAST(p,\ t_{ev})\ \varnothing$ AspP 1F. $\lambda t \exists P CAUSE(t,\ P(x_i),\ read'(b))\ \{x_i\}$

2Ba. $\lambda x \lambda t \exists P CAUSE(t,\ P(x),\ read'(b))\ \varnothing$

t_i Asp' 1F. $\lambda t \exists P CAUSE(t,\ P(x_i),\ read'(b))\ \{x_i\}$

1E. $x_i\ \{x_i\}$

Asp VP 1F. $\lambda t\ read'(b,\ t)\ \varnothing$

$\lambda q \lambda t\ \exists P CAUSE(t,\ P(x_i),\ q)$

$\{x_i\}$ the book V' 1U. $\lambda y \lambda t\ read'(y,\ t)\ \varnothing$

V_k 2Ba. $\lambda y \lambda t\ read'(y,\ t)\ \varnothing$

1L. $\lambda t\ read'(y_k,\ t)\ \{y_k\}$

In the structure of the verb in (37) the AspP projection is headed by the predicate CAUSE. The TP projection is headed by the PAST operator, which has the following semantics:

(38) $PAST(p,\ t_{ev}) := p(t_{ev}) \wedge t_{ev} <$ 'now'

The variable t_{ev} corresponds to the time at which the event took place, and is introduced by the PAST operator as a free variable whose value is fixed by the context. (Partee 1973, EnH 1987, among others)

The final translation of this sentence entails the following:

(39) $\exists P\ [P(t_{ev},\ j) \wedge read(t_{ev},\ b) \wedge\ \ t_{ev} <$ 'now' $\wedge\ \neg P(t_{ev},\ j)\ \Box\!\!\rightarrow \neg[read(t_{ev},\ b)$

As discussed in section 2.2.2 above, this sentence is interpreted as an activity. Furthermore, it presupposes that j is capable of reading the book, and that 'reading of the book' is an 'expected result of P(j)'. And, finaly, this sentence implies that John is the agent of reading.

Now let us turn to the compositional translation of this sentence. Each translation has two coordinates: an expression and a store. The store contains any free variables introduced by traces and similar elements, which must be bound higher up in the structure (similar mechanism

[9] In all structures I assume that V incorporates to Asp before LF, given that Asp is headed by affixal categories, which has to be adjoined to V either presyntactically, or as the result of incorporation (Baker 1988, among others). This movement is crucial for our analysis of Case, discussed in chapter 5, as well as the assumption that objects can move from the Spec of VP position to the Spec of TP, developed in chapter 4. However, given the semantics of traces discussed below, this movement is not semantically significant, and to simplify the structures I leave it out for the purposes of the present discussion.

of storage has been proposed in Cooper 1975, 1985, Bach and Partee 1980, and Rooth and Partee 1982).

Rules L, U and F assign translations in a usual manner (formal definitions are given in Appendix 2):

L: Initial translation of lexically filled terminals is determined by the lexicon (cf. Montague 1973)

U: If a node has a unique daughter with a translation, then it inherits that translation

F: Function application (cf. Klein and Sag 1985).

Rule E assigns translations to traces and other indexed empty categories. The logical type of the trace is locally determined based on the structural position of the empty category.

E:

(a) An empty complement or specifier translates into a variable that can serve as an argument of its sister

(b) An empty adjunct translates into a variable of the same type as its sister

(c) The variable must be stored

For example, in (37) the trace of the subject 'Ivan' is translated as the variable of the type e, given that the translation of the Asp' node requires an individual variable as its argument. This variable is stored, and is bound higher up in the tree.

All translations in XLS can undergo at most one transformation, such as type-lifting or Binding rules. Type-lifting rules (see rule T in Appendix 2) can apply only if function application cannot apply directly (cf. Rooth and Partee 1982). The type-lifting rules used below include two existential rules[10]:

(40) a. $<\tau,<i,t>$ $\lambda T\lambda S\lambda t[\exists u_\tau\, (T(u,t)\wedge S(u)]$ $<<\tau, t>,<i, t>$, for any type τ

[10] These rules are modified from the versions of similar rules in Bittner 1994a,b and Bittner 1998 to incorporate the time variables

b. $<\tau,<\tau',<i, t>>$ $\lambda R\lambda S\lambda v_{\tau'}\lambda t[\exists u_{\tau}(R(t,v,u)\wedge S(u)]$ $<<\tau, t>,<\tau',<i, t>>>$, for any types τ, τ'

For example, as proposed in Bittner 1994a,b, the first type-lifting operator applies to the translation of sentences with indefinite NPs like "A man came", where indefinites are analyzed as properties rather than generalized quantifiers along the lines of Kamp 1981 and Heim 1982. Existential force of indefinite NPs comes from existential type-lifting.

(41) $\lambda t\ \exists x\ (come(t, x) \wedge man(x))$

2T. $\lambda P\ \lambda t\ \exists x\ (come(t, x) \wedge P(x))$ $\lambda x\ man(x)$
1. $\lambda x\lambda t\ come\ (t, x)$

Binding rules under this analysis bind variables from the store. As proposed in Bittner 1994a,b, and is used as a crucial assumption in the discussion below, stored variables can be bound only if the index of the variable is 'compositionally visible' from the constituent to which the rule applies. For example, given that the variable x_i is coindexed with the NP 'John$_i$' in (37), the translation of T' can undergo the rule Ba so that the resulting translation can be combined with the NP by function application.

As we propose in this study, the following conventions govern percolation of indices:

- indices percolate from stored variables into terminal nodes
- in morphological structures indices percolate from the morphological heads
- indices can percolate from stored variables into syntactic constituents in local configurations, such as Spec-head or sisterhood.

For example, the trace of the NP in the Spec of AspP position in (37) is coindexed with the variable x_i introduced by CAUSE, given that Asp stands in a Spec-head configuration with the trace. This coindexation licenses application of a Binding rule at the Asp' level, as the result of which the NP 'John' is interpreted as the argument of CAUSE. This semantically significant coindexation is called logical predication below. Consequences of logical predication discussed in this thesis include the obligatoriness of internal arguments of accomplishments (see section 2.6

below), the correlation between telicity and unaccusativity (discussed in section 4.3.1.2), direct object restriction on resultative constructions (see section 5.1.2.2), and the analysis of marked cases (presented in chapters 6 and 7).

Another Binding operation is Substitution Binding (Rule Bb). This operation is introduced in Bittner 1998a, motivated by the semantic analysis of questions. Consider, for example, the lexical derivation of the head of the AspP projection in (37), shown in (42):

(42) Asp_j 1F. $\lambda q \lambda t\, \exists P[CAUSE(t, P(x_i), q)]$ $\{x_i\}$

2Bc. $\lambda S \lambda q \lambda t \exists P[CAUSE(t,P(x_i),q) \wedge S(P)]$ $\{x_i\}$

ARB $\lambda P[P=P]$ Asp_j 1U. $\lambda q \lambda t\, CAUSE(t, P_j(x_i), q)$ $\{P_j, x_i\}$

2Bb. $\lambda q \lambda t\, CAUSE(t, P_j(x_i), q)$ $\{P_j, x_i\}$

Asp_j 1L. $\lambda q \lambda t\, CAUSE(t, p_j, q)$ $\{p_j\}$

The operation of Substitution Binding, as defined in Bittner 1998, substitutes every occurrence of a stored variable by a functional complex, such as P(x) for p. This operation applies to the lexical meaning of the predicate CAUSE, where the variable p_j is substituted by $P_j (x_i)$, and both variables are stored.

Besides Variable Binding (rule Ba) and Substitution Binding (rule Bb), Bittner 1998a proposes a complex transformation, which she calls Lift-Binding. This operation (defined as a rule Bc in Appendix 2) binds a variable from the store according to the rule Ba, and then type-lifts the result according to the rule T.

The translation in (42) also illustrates existential type-lifting, which provides existential closure to the variable P in the translation of CAUSE. To license this operation we assume that the structure in (42) involves affixation of ARB (arbitrary PRO). By the rule L, ARB is interpreted as the trivial property of being self-identical (see Appendix 2).

The rules of Binding, including Substitution Binding, bind stored variables. Crucially then, the argument p of the predicate CAUSE(t, p, q) is introduced in the store.

As is shown in Appendix 2, all aspectual affixes under this analysis introduce at least one variable in the store. This assumption is necessary to account for the compositional derivations of various constructions in the following chapters, where aspectual affixes can be adjoined to different syntactic positions, and thus are combined with expressions of different logical type. The hypothesis that one variable is introduced in the store gives us the freedom needed to modify the type of the aspectual affix.

The hypothesis that aspectual affixes introduce one variable in the store so that this variable can undergo the rule of Substitution Binding, also allows us to assume the lowest logical type for the aspectual affixes CAUSE and BECOME (see evidence for the hypothesis that lexical items are assigned the lowest logical type in Rooth and Partee 1982 and Partee and Rooth 1983). For example, the affix CAUSE is defined in the lexicon as a relation between two properties of times and a time variable: CAUSE(t, p, q). Given that the variable p is introduced in the store, it can be decomposed by the rule of Substitution Binding into the complex P(x), where the variable x refers to an agent. However, given the lexical translation of CAUSE, we would also expect that there are structures where this rule does not apply. Such structures, as we argue in chapter 4, are unaccusative structures derived by CAUSE, which are interpreted as nonagentive.

According to XLS, each LF constituent can be assigned at most two translations: one translation derived by rules L, F, E or U, and the second one derived by semantic transformations (rules B or T).

The final translation of each sentence is assessed by three semantic filters:

Store Filter: The root node has an empty store (cf. Cooper 1983)

Type Filter: Some segment of every IP has a translation of type t (cf. Theta-Criterion, Chomsky 1981)

Vacuity Filter: If a node has no translation, then neither does any daughter node (cf. FI, Chomsky 1986).

Only those structures that satisfy these filters are grammatical.

These rules and lexical assumptions are further illustrated by the analysis of perfective verbs in Russian and English, discussed next.

2.4. Perfectivity in Russian

Verbs in Russian are assigned to one of two aspects, called perfective and imperfective. The notions of perfective and imperfective characterize what Smith 1991 calls a viewpoint. The viewpoint of sentences focuses all or part of a situation denoted by the sentence. The distinction between perfective and imperfective is morphologically encoded in Russian.

This section presents an analysis of different classes of perfective verbs in Russian.

2.4.1. Resultative and Pure Perfectivizing Prefixes

Most unprefixed verbs are imperfective and perfective verbs are derived from them by means of perfectivizing prefixes.

(43) Ivan čital knigu čas

Ivan read-IMP book-ACC hour-ACC

'Ivan read the book for an hour'

(44) Ivan pro-čital knigu za čas

Ivan read-PERF book-ACC in hour

'Ivan read the book in an hour'

Perfectivizing prefixes in Russian differ in several respects (see Forsyth 1970, Bondarko 1971, Townsend 1975, Timberlake 1982, Smith 1991, Klein 1995, among others). The distinction that we analyze in this section is between pure perfectivizing and what we call here 'resultative' prefixes (known as 'lexical' in Slavic literature[11]). Pure perfectivizing prefixes are prefixes like

[11] The term 'lexical prefix' used in this sudy has a different meaning. This term is introduced in the following chapter, and refers to prefixes that are adjoined to the verb presyntactically, as opposed to prefixes which are adjoined to the verbs as the result of head movement.

'pro-' illustrated in (44) above. The function of these prefixes is to indicate that the process denoted by the verb is completed. Resultative prefixes, on the other hand, do not only specify that the process was completed, but also describe the resultative state:

(45) Ivan vykopal klad
Ivan out-dug-PERF treasure-ACC
'Ivan dug out the treasure'

One of the differences between pure perfectivizing and resultative prefixes, which we aim to account for, concerns their selectional restrictions. Specifically, whereas verbs with pure perfectivizing prefixes preserve the selectional restrictions of the verbs (as shown in (43)-(44)), verbs with resultative prefixes usually take different classes of arguments. Thus, the Russian data in (46)-(47) show that the selectional restrictions of the unprefixed imperfective verb *kopat*' (to dig) and the prefixed perfective verb ***vy**kopat'* (to dig out) are different.

(46) a. Ivan kopal zeml'u.
Ivan dug-IMP ground-ACC
'Ivan was digging the ground'

b. *Ivan kopal klad.
Ivan dug-IMP treasure-ACC
'Ivan was digging the treasure'

(47) a. ??Ivan **vy**kopal zeml'u.
Ivan dug-PERF ground-ACC
'Ivan dug out the ground'[12]

b. Ivan **vy**kopal klad.
Ivan dug-PERF treasure-ACC
'Ivan dug out the treasure'

Another example that illustrates different selectional properties of prefixed and unprefixed verbs is given in (48)-(49):

(48) a. Ivan stroil dom.
Ivan built-IMP house-ACC
'Ivan was building a house'

b. *Ivan stroil ploschadku.
Ivan built-IMP area-ACC
'Ivan was building an area'

---

[12] An expression 'to dig the ground out' can be improved if we add a definite article or a modifier like "all" in Russian: Ivan vykopal vsju zeml'u (Ivan dug out all the ground). (see section 7.2.1 below for some discussion of the correlation between perfectivity and definiteness). Crucially, however, the contrasts in (46)-(47) cannot be explained in terms of (in)definiteness.

(49) a. *Ivan **za**stroil dom. b. Ivan **za**stroil ploschadku.

Ivan built-PERF house-ACC Ivan built-PERF area-ACC

'Ivan built up a house' 'Ivan built up an area'

As (48)-(49) shows, the verbs *stroit'* (to build) and ***za**stroit'* (to build up) take different kinds of objects. Furthermore, as the examples in (50)-(53) show, the kind of an object the verb can take crucially depends on the prefix:

(50) Ivan **vs**kopal učastok/*klad /*podzemnyi xod /*červjakov.

Ivan vs-dug PERF lot-ACC/treasure-ACC/underground path-ACC/worms-ACC

'Ivan dug up a lot/a treasure/ an underground path/worms'

(51) Ivan **za**kopal klad /*učastok/*podzemnyi xod /*červjakov.

Ivan za-dug-PERF treasure-ACC/lot-ACC/underground path-ACC/worms-ACC

'Ivan buried a treasure/a lot/an underground path/worms'

(52) Ivan **pro**kopal podzemnyj xod /*učastok/*klad /*červjakov.

Ivan pro-dug- PERF underground path-ACC/lot-ACC/treasure-AC/worms-ACC

'Ivan dug through the underground path/a lot/a treasure/worms'

(53) Ivan **na**kopal červjakov /*klada /*učastka/*podzemnogo xoda.

Ivan na-dug-PERF worms-GEN/ treasure-GEN /lot-GEN/underground path-GEN

'Ivan dug a lot of worms/a treasure/a lot/an underground path'

The analysis of perfectivizing prefixes that we propose assumes that perfectivizing prefixes are derived from prepositions by affixation of the predicate BECOME.

Let us first consider compositional translation of verbs with resultative prefixes illustrated in (45) above.

The lexical translation of the preposition 'out' is given in (54):

(54) $\lambda z\, \lambda t\ out(t, y_j, z)\ \{y_j\}$

Given the rules of compositional semantics, the verb *vykopal* is interpreted as follows:

(55)

V 1F. $\lambda t \exists y \exists t'[\text{BECOME}(\lambda t\, out(t, y, y_k), t, t') \wedge dig(t, y)]$ $\{y_k\}$

2Ba. $\lambda y \lambda t \exists t'$ BECOME $(\lambda t\ out(t, y, y_k), t, t')$ $\{y_k\}$
1F. $\lambda t\ \exists t'$ BECOME $(\lambda t\ out(t, y_j, y_k), t, t')$ $\{y_k, y_j\}$ P_j

V_l 1L. $\lambda t\ dig\ (t, y_l)$ $\{y_l\}$
2Bc. $\lambda Q \lambda t \exists y\ [Q(y,t) \wedge dig\ (y, t)]$

$\lambda P \lambda t\ \exists t'$ BECOME $(P_i(y_k), t, t')$ $\{y_k\}$ Asp

P_j 1L. $\lambda z\ \lambda t\ out(t, y_j, z)$ $\{y_j\}$

Crucially, in this structure the affix BECOME is adjoined to the preposition, and the derived complex is adjoined to V. The translation of the affix BECOME is given in (56). The affix BECOME is defined in the lexicon as having the lowest logical type: $\lambda t' \lambda t$ BECOME(p_j, t, t') $\{p_j\}$. However, when this affix adjoins to the verb, i.e. expressions of the type <e, <i, t>>, then the variable p undergoes the rule of Substitution Binding, and the time interval t' (at which the resultative state obtains) gets existentially bound:

(56)

2Ba. $\lambda P \lambda t\ \exists t'$ BECOME $(P_i(y_k), t, t')$ $\{y_k\}$
Asp_i 1U. $\lambda t\ \exists t'$ BECOME $(P_i(y_k), t, t')$ $\{P_i, y_k\}$

2Bb. $\lambda t\ \exists t'$ BECOME $(P_i(y_k), t, t')$ $\{P_i, y_k\}$
Asp_i 1F. $\lambda t\ \exists t'$ BECOME (p_i, t, t') $\{p_i\}$

ARB
1L. $\lambda t[t=t]$

Asp_i 2∃. $\lambda Q\ \lambda t \exists t'[\text{BECOME}\ (p_i, t, t') \wedge Q(t)]$ $\{p_i\}$
1L. $\lambda t'\ \lambda t$ BECOME (p_i, t, t') $\{p_i\}$

The translation of the sentence in (45) is given below. In this structure, the NP 'the treasure' is coindexed with the stored variable y_k. This coindexation is an instance of a logical predication relation, licensed by the Spec-head configuration between Asp and the NP. As a result of this coindexation, the stored variable y_k is compositionally visible to the Binding rule at the V' level so that the argument 'the treasure' fills its position:

(57) TP $PAST(\lambda t\exists P CAUSE(t, P(j), \lambda t\exists y\exists t'[BECOME(\lambda t out(t, y, the\text{-}treasure), t, t') \wedge dig(t, y)]), t_{ev})$

T $\lambda p PAST(p, t_{ev})$

AspP $\lambda t\exists P CAUSE(t, P(j), \lambda t\exists y\exists t'[BECOME(\lambda t\ out(t, y, the\text{-}treasure), t, t') \wedge dig(t, y)])$

$Ivan_i$

Asp' $\lambda x\lambda t\exists P CAUSE(t, P(x), \lambda t\exists y\exists t'[BECOME(\lambda t out(t, y, the\text{-}treasure), t, t') \wedge dig(t, y)])$

Asp $\lambda q\lambda t\exists P CAUSE(t, P(x_i),q)$ $\{x_i\}$

VP $\lambda t\exists y\exists t'[BECOME(\lambda t\ out(t, y, the\text{-}treasure), t, t') \wedge dig(t, y)]$

the $treasure_k$

V' $\lambda t\exists y\exists t'[BECOME\ (\lambda t\ out(t, y, y_k), t, t') \wedge dig(t, y)]\ \{y_k\}$

V $\lambda t\exists y\exists t'[BECOME\ (\lambda t\ out(t, y, y_k), t, t') \wedge dig(t, y)]\ \{y_k\}$

Given our assumptions about the lexical entailments of BECOME, CAUSE and PAST operators, the final translation of this sentence entails the following:

(58) $\exists y\ dig(t_{ev}, y) \wedge t_{ev} < \text{'now'} \wedge$

$\exists t'\ out(t', y, the\text{-}treasure') \wedge t_{ev} \propto t' \wedge$

$\exists t''\ [\ t'' o\ t_{ev} \wedge \forall t'''\ [t''' < t'' \rightarrow t''' < t_{ev}\ ]] \wedge \neg out(t'', y, the\text{-}treasure') \wedge$

$\exists P\ [P(t_{ev}, j) \wedge \neg P(t_{ev}, j)\ \Box\!\!-\!\!>\ \neg(BECOME\ out(t_{ev}, y, the\text{-}treasure'))]$

In other words, the sentence in (45) is predicted to be true in case

- for some y, y underwent digging at $t_{ev,}$ and

- for some time t' immediately following t_{ev} the treasure is out of y at t', and

- for some time t'' overlapping initial bound of t_{ev} the treasure was not out of y, and

- Ivan participated in some activity at t_{ev} that caused this to happen.

Furthermore, as discussed in section 2.1.2.2 above, in the absence of evidence to the contrary, Ivan is understood as the agent of digging.

The translation in (57) predicts that the argument of digging is different from the object NP 'the treasure'. This prediction accounts for the difference in the selectional restrictions of the prefixed and unprefixed verbs, illustrated in (46)-(47). Specifically, in the case of imperfective verbs, as illustrated in section 2.3 above, the NP is interpreted as the logical argument of the verb. In the case of perfective verbs, on the other hand, the object serves as the logical argument of the prefix rather than the verb. The selectional restrictions of perfective verbs, therefore, are determined by the meaning of the prefix.

Now let us consider compositional interpretation of verbs with pure perfectivizing prefixes, illustrated in (44). The logical translation of the preposition ‘pro’ is given in (59):

(59) $\lambda P \lambda t\ pro(t, z_j, P)\ \{z_j\}$

The meaning of this preposition that we assume is as follows:

(60) pro(t, z, V) iff V(z) is completed at t.

The compositional derivation of the prefixed verb *prochitat*’ (read-PERF) under these assumptions proceeds as follows:

(61)

V_l $\lambda t \exists t' BECOME(pro(y_k, read'), t, t')\ \{y_k\}$

Asp $\lambda P \lambda t\ \exists t'\ BECOME\ (P(y_k), t, t')\ \{y_k\}$

V_l $\lambda z \lambda t\ pro(t, z, read')\ \varnothing$

P_j $\lambda P \lambda z \lambda t\ pro(t, z, P)\ \varnothing$

V_l 2Ba. $\lambda y\ \lambda t\ read'(y, t)\ \varnothing$

1L. $\lambda t\ read'(y_l, t)\ \{y_l\}$

The final translation of the sentence in (44) is as in (62). This translation is true if the conditions in (63) hold:

(62) $PAST\ (\lambda t \exists P\ [CAUSE(t, P(j),\ \lambda t \exists t'\ BECOME(pro(the\text{-}book', read'), t, t'))], t_{ev})$

(63) $\exists t'\ pro(t', the\text{-}book', read') \wedge t_{ev} \propto t' \wedge t_{ev} < \text{‘now’} \wedge$

$\exists t''\ [\ t'' o\ t_{ev} \wedge \forall t'''\ [t''' < t'' \rightarrow t''' < t_{ev}\ ] \wedge \neg pro(t'', the\text{-}book', read') \wedge$

$\exists P\ P(t_{ev}, j) \wedge \neg P(t_{ev}, j)\ \Box\!\!\rightarrow \neg(BECOME(pro(the\text{-}book', read'), t_{ev}, t'))]$

Put differently, the sentence in (44) is predicted to be true in case

- for some time t’ immediately following t_{ev} the reading of the book is completed at t’, and

- for some time t” overlapping initial bound of t_{ev} the reading of the book is not completed at t”, and

- Ivan participated in some activity P at t_{ev} that caused this to happen.

Notice, that the morphological structure of this verb given in (61) is different from the structure of the verbs derived by resultative prefixes, illustrated in (55). Specifically, in the case of verbs with pure perfectivizing prefixes, the preposition is adjoined to the verbal root, and then the derived complex is adjoined to the affix BECOME.

Given this translation, as well as the meaning of the preposition 'pro', we correctly predict that in the case of verbs with pure perfectivizing prefixes, the objects must satisfy the selectional restrictions of the verbal roots.

2.4.2. Aspectual Correlates of Perfectivity

The examples of sentences with perfective verbs *vykopal* (dug out) and *prochital* (read-PERF) discussed above correspond to Vendler/Dowty accomplishments. Given the selectional restrictions of the predicate CAUSE, the causing property of times P(x) refers to a process-like entity. The resulting eventuality denotes an event, given that it involves affixation of BECOME.

When added to stative verbs, however, perfectivizing prefixes change them to achievements.

(64) Ivan (srazu) **vs**pomnil pesnju.

Ivan at once remembered-*PERF* song-ACC

'Ivan remembered a song (at once)'.

Unlike accomplishments, achievements do not specify the action that caused a change of state. As discussed above, achievements are represented by means of the operator BECOME, with no causation involved. The external argument of the transitive achievement is introduced by the predicate HAVE:

Consider, for example, the sentence in (65):

(65) Ivan uznal pesnju.

Ivan u-knew-PERF song-ACC

'Ivan recognized the song'

The structure of this sentence under the present assumptions can be represented as follows:

(66) TP PAST(λt HAVE(t, j, λt∃t'[BECOME (u(know, the song), t, t')]), t_{ev})

λpPAST(p, t_{ev}) AspP λt HAVE(t, j, λt∃t'[BECOME (u(know, the song), t, t')])

Ivan Asp' λxλt HAVE(t, x, λt∃t'[BECOME (u(know, the song), t, t')])

Asp VP λt∃t'[BECOME (u(know, the song), t, t')]

λqλxλt HAVE(t,x,q)

the $song_k$ V' λt∃t'[BECOME (u(know, y_k), t, t')] {y_k}

V λt∃t'[BECOME (u(know, y_k), t, t')] {y_k}

Given lexical entailments of the affixes HAVE and BECOME, this translation predicts that the following conditions should hold:

(67) $\exists t'\ u(t', know', the\ song) \wedge t_{ev} \propto t' \wedge t_{ev} < \text{'now'} \wedge$

$\exists t''\ [\ t'' \circ t_{ev} \wedge \forall t'''\ [t''' < t'' \rightarrow t''' < t_{ev}\ ] \wedge \neg u(t'', know', the\ song) \wedge$

EXPERIENCER (j, BECOME (u(know, y_k), t_{ev}, t')]

where u(t, know, the song) is true iff the song is known at t.

These conditions can be illustrated as follows:

t'' t t'

(68) [[ ] [ ]]

the song is not known the song is known

As the data above shows, accomplishments and achievements are normally perfective in Russian, whereas activities and states are realized by the imperfective verbs. However, the distinctions between (a)telicity and (im)perfectivity are not the same (see the distinction between viewpoint and situation aspect in Smith 1991). For example, prefixed verbs with the imperfectivizing suffix (y)va- in Russian can be described as 'imperfective accomplishments':

(69) Ivan pere-pis-yva-l pis'mo

Ivan pere-write-IMP-PAST letter-ACC

'Ivan was copying the letter'

Given the present analysis, we can describe the notions of (im)perfectivity and (a)telicity as follows. If a verb is derived by affixation of BECOME, then it is telic, independent on the scope of this operator. Whether a verb is perfective or imperfective, on the other hand, depends on the scope of aspectual operators. For example, the translation of the sentence in (69) can be given as follows:

(70) PAST($\lambda t \exists P$ IMP [CAUSE(t, P(j), $\lambda t \exists t'$BECOME(re(wrote, the letter), t, t'))], t_{ev})

This sentence is interpreted as telic because it involves affixation of BECOME. However, it is imperfective, because the imperfectivizing operator IMP[13] has scope over the operator BECOME.

2.4.3. Perfective Unprefixed Verbs

The discussion of perfective verbs above suggested that verbal roots in Russian denote either processes or states, and that perfective verbs are derived by affixation of additional 'perfectivizing' morphology.

However, not all unprefixed verbs are imperfective in Russian. There are a few verbs that are perfective in their unprefixed form, whereas the imperfective form is morphologically more complex, and is derived by the imperfectivizing suffix (y)va[14]:

(71)	otkry-t'	otkry-va-t'
	open-INF	open-IMP-INF
	to open-PERF	to open-IMP

[13] The meaning of this operator is close to the meaning of the progressive operator in English (see Dowty 1979, Landman 1992, among others).

[14] Other examples are the verbs *dat'* (give-PERF) – *davat'* (give-IMP), *organizovat'*(organize-PERF)- *organizovyvat'* (organize-IMP), *li©it'* (deprive-PERF) – *li©at'* (deprive-IMP).

To account for this class of verbs, we can assume that verbal roots in accomplishments might differ whether they denote a process or a resulting state. For example, the verb *otkryt'* ('to open'), can be analyzed as denoting a state of being open rather than a process of opening:

(72) otkry' (t, y) iff y is open at t.

The translation of the sentence in (73a), therefore, is as in (73b), under the assumption that the affix BECOME is adjoined directly to the verb, without a preposition.

(73) a. Ivan otkryl dver'.

Ivan opened-PERF door-ACC

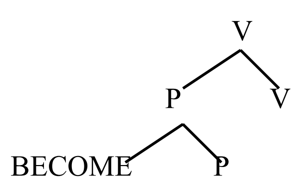
'Ivan opened the door'

b. $\text{PAST}\ (\lambda t\ \exists P[\text{CAUSE}(t, P(j),\ \lambda t \exists t'\ \text{BECOME}(\text{open}'(\text{the door}), t, t')]), t_{ev})$

The verbal root of the verb 'otryt' is adjectival, denoting the state of the door being open rather than describing the process that resulted in this state. In this respect these verbs differ from the roots 'dig' and 'read' above, which describe the manner of action, whereas the resulting state depends on the perfectivizing prefix[15].

To summarize the discussion, we distinguished three types of accomplishments in Russian and English, and proposed an analysis of these classes in terms of the difference in their morphological representation:

<u>1. Accomplishments derived by a resultative prefix:</u>



Ivan vy-kopal klad.

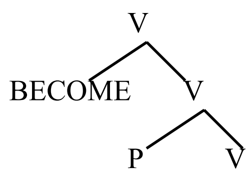
Ivan vy-dug treasure-ACC

[15] There are other classes of verbs in Russian, for example, some verbs are understood as ambiguous between perfective and imperfective forms by Russian speakers. An example is the verb *velet'* ('to command). These verbs can be analyzed under the present analysis as being inherently aspectually ambiguous.

‘John dug out the treasure’

$\exists P CAUSE(t, P(j), \lambda t \exists y \exists t'[BECOME(\lambda t out(y, \text{the treasure}, t), t, t') \wedge dig(y,t))])$

<u>2. Accomplishments derived by a pure-perfectivizing prefix:</u>



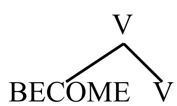
Ivan pro-chital knigu.

Ivan pro-read book-ACC

‘John read the book’

$\exists P\ CAUSE(t, P(j),\ \lambda t \exists t'\ BECOME(pro(\text{the book}, read'), t, t'))$

3. <u>Accomplishments derived by a verbal stem that denotes a resultative state:</u>



Ivan otkryl dver’.

Ivan opened door-ACC

‘Ivan opened the door’

$\exists P\ CAUSE(t, P(j),\ \lambda t \exists t'\ BECOME(open(\text{the door}), t, t'))$

The analysis of the three classes of accomplishments is further supported below by the English data.

2.5. Perfectivity in English

The analysis of perfectivity presented above has been illustrated with Russian data, where perfective verbs are usually marked with a perfectivizing prefix. Let us now see how this analysis can be extended to other languages such as English.

In English perfectivity is either unmarked or is realized by a verb-particle construction.

Verb-particle constructions can be analyzed parallel to perfective verbs derived by the resultative prefixes in Russian, where the function of the perfectivizing operator is not only to indicate the completeness of the action but also to specify a resultative state:

(74) John dug out the treasure.

Perfective verbs derived by a pure perfectivizing operator, as in the case of Russian *prochitat'* (read-Perf), are not marked by overt morphology in English. Furthermore, we can distinguish two classes of verbs: verbs which are ambiguous between atelic and telic interpretation, as shown in (75), and verbs which can only be understood as telic[16]:

(75) a. John read a book for an hour/in an hour.

b. John combed his hair for a minute/in a minute.

(76) a. John built a house *for a year/in a year.

b. John wrote a letter *for an hour/in an hour.

Let us first account for the aspectual ambiguity of the verbs in (75). Under the present assumptions, this and other types of aspectual ambiguities are resolved in terms of affix(es)-root combinations. Specifically, to account for the data in (75) we can propose that English has a zero pure perfectivizing prefix, corresponding to the Russian prefix 'pro'.

The data in (75a) then is analyzed parallel to Russian sentences, where the accomplishment reading of the verb 'read' involves affixation of additional morphology:

(77) a. PAST ($\lambda t \exists P$[CAUSE(t, P(j), read'(the book))], t_{ev})

b. PAST ($\lambda t \exists P$[CAUSE(t, P(j), $\lambda t \exists t'$ BECOME(pro(the book', read'), t, t')], t_{ev})

The verb 'read' in English, as well as the corresponding verb *chitat'* in Russian denotes a process, such that read(t, y) is true iff y is being read at t. Affixation of a pure perfectivizing operator *pro* adds the meaning of completion: pro(t, read, y) is true iff reading of y is completed at t.

If verbs can be combined freely with different affixes, then how can we account for the fact that the verbs 'write' and 'build' in English are not aspectually ambiguous, and can only have an accomplishment reading? Parallel to our discussion of the verb 'open' is Russian, we can assume that in English the verbal roots 'write' and 'build' denote resultative states:

(78) a. build(t, y) iff y is built at t

b. write(t, y) iff y is written at t

Given this assumption, and the selectional restrictions of the affix CAUSE, we can explain why these verbal roots cannot derive activities, as shown in (76). Specifically, as discussed in section 2.1.2.2 and further motivated in chapter 5 by the semantic restrictions on the resultative constructions in English, the argument q of the affix CAUSE(t, p, q) is restricted to processes or events. The following representations violate selectional restrictions of CAUSE, since the second argument denotes a state:

(79) a. #PAST ($\lambda t \exists P$ CAUSE(t, P(j), built(the house)), t_{ev})

b. #PAST ($\lambda t \exists P$ CAUSE(t, P(j), written(the letter)), t_{ev})

On the other hand, if the affix BECOME is added to the verbal root, then the BECOME-root combination denotes an event, and the sentence becomes acceptable:

(80) a. PAST ($\lambda t\ \exists P$[CAUSE(t, P(j), $\lambda t \exists t'$ BECOME(built(the house), t, t'))], t_{ev})

b. PAST ($\lambda t\ \exists P$[CAUSE(t, P(j), $\lambda t \exists t'$ BECOME(written(the letter), t, t'))], t_{ev})

We have thus shown that there are three classes of accomplishments in English, which are exactly parallel to those in Russian. The verbs that belong to the first class are derived by resultative prefixes in Russian and particles in English. Perfectivizing morphology is overtly realized in both languages for this class of verbs. Perfectivizing operators in the case of the class 3 verbs are unmarked in both English and Russian. The two languages differ with respect to the

[16] For the purposes of this discussion, we do not consider aspectual shifts caused by bare plurals and mass nouns, as in "John wrote letters for hours" (cf. Verkuyl 1972, 1989, Dowty 1979, Krifka 1989, 1992).

class 2 verbs in that in English, as opposed to Russian, the pure perfectivizing prefix is phonologically null.

In this section we have also accounted for the aspectual ambiguity of verbs, and proposed that ambiguity can be resolved in terms of affix-root combinations rather than being indicated in the lexical entry of the verb. Furthermore, we have shown that not all verbs are predicted to be aspectually ambiguous under the present analysis, and non-existing aspectual interpretations can be filtered out by the selectional restrictions of aspectual affixes.

2.6. The Obligatoriness of Internal Arguments

The next argument in favor of the 'aspectual composition' of accomplishments comes from the fact that internal arguments of the verbs from this aspectual class are obligatory, as opposed to the internal arguments of activities.

As the data in (81) illustrate, imperfective unprefixed verbs in Russian usually have optional objects. However, when a perfectivizing prefix is added to a verbal root, the object becomes obligatory[17] (cf. Yadroff 1996).

(81) a. Ivan pisal.
Ivan wrote-IMP
'Ivan was writing'

b. Ivan pisal pis'mo.
Ivan wrote-IMP letter-ACC
'Ivan wrote a letter'

(82) a. *Ivan napisal.
Ivan wrote-PERF
'Ivan wrote'

b. Ivan napisal pis'mo.
Ivan na-wrote-PERF letter-ACC
'Ivan wrote a letter'

The obligatoriness of the internal argument in Russian depends on the morphological structure of the verb, i.e. the presence of a prefix, rather than perfectivity or imperfectivity of the

[17] As we discuss in chapter 4, this generalization holds only of the prefixes that are added to the verb presyntactically.

verb. For example, as the following data shows, imperfectivized prefixed verbs require the presence of the object, parallel to perfective prefixed verbs:

(83) a. *Ivan perepisyval. b. Ivan perepisyval pis'mo.
Ivan pere-wrote-IMP Ivan pere-wrote-IMP letter
Ivan was copying Ivan was copying the letter

Similar generalizations are discussed for Dutch in Van Hout 1991 and for English in Mittwoch 1982, Tenny 1987, among others.

For example, Mittwoch 1982 discusses aspectual differences between the sentences in (84):

(84) a. John ate.
b. John ate something.

Based on a variety of tests, she shows that the sentence in (84a) denotes an activity, whereas the sentence in (84b) behaves as an accomplishment.

The question that we address in this section is why do accomplishments require the presence of an internal argument? To answer this question, let us compare compositional interpretation of telic and atelic verbs.

Let us start with the analysis of optional objects, illustrated by the alternation in (85).

(85) a. Ivan chital. b. Ivan chital knigu.
Ivan read-IMP Ivan read-IMP book-ACC
'Ivan was reading' 'Ivan was reading a book'

A standard approach to the analysis of this alternation assumes that the alternate in (85a) is derived from the alternate in (85b) by a lexical operation that saturates the object theta-role (cf. Rizzi 1986). This operation, which we refer to as D(etrasitivisation), changes the type <e,<e,<i,t>>> to <e,<i, t>> and can be defined as follows:

(86) If V is a verbal root translating as $\lambda y \lambda x \lambda t\ V'(t, x, y)$,

then $D(V') \leftrightarrow \lambda x\, \lambda t\, \exists y\, V'(t, x, y)$

Rules of this type for detransitivized verbs and passives have been proposed in Bach 1980, Dowty 1982, Chierchia 1989.

Such rules are usually assumed to be lexical, as is suggested by the fact that existentially quantified implicit objects must always take narrow scope with respect to the other quantifiers in the sentence.

Consider, for example, the sentence in (87):

(87) John is not reading

There are two quantifiers in this sentence: an existentially quantified implicit argument and a negation operator. Normally, when two quantifiers co-occur in a clause, two possible interpretations are expected:

(88) a. there is an x such that John is not reading x

b. it is not true that there is an x such that John is reading x

However, only the reading in (88b) is possible, where the existential quantifier has narrow scope. To account for the unavailability of the reading in (88a), it is usually assumed that the rule that introduces existentially quantified implicit arguments is lexical, and can only apply to V.

Under the present assumptions, transitive verbs take one individual argument. The operation of Detransitivization, therefore, changes the type $<e,<i,t>>$ into $<i,t>$. Furthermore, given the analysis of verbs as composed by aspectual affixes, we can show that the operation of Detransitivization does not have to be defined as a lexical rule, and can be accounted for by a general existential type-lifting rule of compositional semantics.

Specifically, we propose that the detransitivized reading of the verb is derived by affixation of ARB to a verb, which forces application of an existential type-lifting operator:

(89) V $\lambda t \exists y$ read(t, y)

ARB V_l 2Ba. $\lambda y \lambda t$ read(t, y)

$\lambda y[y=y]$ 1L. λt read(t, y_l) $\{y_l\}$

The translation of the AspP headed by this verb is given in (90):

(90) AspP $\lambda t \exists P$ CAUSE(t, P(j), $\exists y$ read(y))

Ivan_j Asp' $\lambda x \lambda t \exists P$ CAUSE(t, P(x), $\exists y$ read(y))

Asp VP $\exists y$ read'(y)

$\lambda q\ \lambda t\ \exists P$ CAUSE(t, $P(x_j)$, q)

$\{x_j\}$ V' $\exists y$ read(y)

V.ARB $\exists y$ read(y)

Now let us compare this translation with the compositional interpretation of accomplishments. Consider, for example, accomplishments from the class 1 above, which are derived by affixation of the affix BECOME to the verbal root.

(91) V_l $\lambda t \exists t'$[BECOME (open(y_k), t, t')] $\{y_k\}$

$\lambda P \lambda t\ \exists t'$ BECOME ($P(y_k)$, t, t') $\{y_k\}$ Asp_j[18] V_l 2Ba. λy open (y) $\varnothing$

1L. open (y_l) $\{y_l\}$

A crucial property of this structure for our purposes is that the index of V is different from the index of the variable y_k, which corresponds to the internal argument. Under the assumptions about feature percolation, assumed in this work, features of terminal nodes percolate from the stored variables introduced by lexical items, whereas in the case of non-terminal nodes features percolate from the morphological heads. We further proposed that features could percolate from stored variables to syntactic constituents, but only in local configurations such as Spec-head or sisterhood.

[18] The index of the Asp node has the index of the stored variable in the lexical translation of BECOME, whereas the index k is introduced by the rule of Substitution Binding Bb. Specifically, as we illustrated in the derivation in (56) above, the lexical translation of the affix BECOME(p_j, t, t') $\{p_j\}$ undergoes the rule Bb, which decomposes this variable into a complex $P_j(y_k)$.

Given these conventions, if there is an overt NP in the Spec of VP position, then the variable y_k can be coindexed with it by virtue of being in a Spec Head configuration. This coindexation is an instance of a logical predication relation, which is a semantically significant coindexation, as a result of which the NP serves as the logical argument of the translation of the head. Specifically, this coindexation licenses application of a Binding rule of XLS, discussed in section 2.3 above, which can apply only if the index of the variable is compositionally visible. Given that the index k is visible at the V' level, the variable y_k can be bound by the Binding rule Ba so that the denotation of the NP is combined with the verb by function application:

(92)

VP 1F. $\lambda t \exists t'$[BECOME (open(the door), t, t')] $\varnothing$
2Ba. $\lambda y\ \lambda t \exists t'$[BECOME (open($y_k$), t, t')] $\varnothing$
the door$_k$ V' 1U. $\lambda t \exists t'$[BECOME (open(y_k), t, t')] $\{y_k\}$
V_l $\lambda t \exists t'$[BECOME (open(y_k), t, t')] $\{y_k\}$

On the other hand, if the Spec of VP position is empty, then there is no NP that can be coindexed with the variable y_k, and its index is not visible at either V or V' level. If this variable cannot be bound, then the final translation violates the Store Filter, which requires the store to be empty. The structure of detransitivized accomplishments, therefore, is ruled out by the tools of compositional semantics.

A similar line of explanation can be given in the case of accomplishments from the classes 2 and 3. Consider, for example, the derivation of the verb '*prochitat''* (to read-PERF), repeated below:

(93)

V_l $\lambda t \exists t'$BECOME(pro(t, y_k, open), t, t') $\{y_k\}$
Asp$_j$ V_l $\lambda z \lambda t$ pro(t, z, open) $\varnothing$
$\lambda P \lambda t\ \exists t'$ BECOME (P(y_k), t, t') $\{y_k\}$
P_j V_l 2Ba. $\lambda y \lambda t$ open (t, y) $\varnothing$
$\lambda P \lambda z \lambda t$ pro(t, z, P) $\varnothing$ 1L. λt open (t, y_l) $\{y_l\}$

Parallel to the example in (91), the variable y_k that corresponds to the internal argument is introduced by a non-morphological head, i.e. the affix BECOME, and therefore its index is different from the index of V. Given the restriction on the application of the Binding rules, this variable cannot be bound, unless there is an overt NP in the Spec of VP position.

Now why is there a difference between perfective and imperfective verbs with respect to the obligatoriness of arguments?

In the case of imperfective verbs, the internal argument is intoduced as a stored variable by the verb. The index of this variable percolates to V, and thus is visible at the V level. The stored variable can be bound independent on whether there is an overt NP in the Spec of VP position.

Perfective verbs are morphologically more complex, and involve affixation of additional morphology. The stored variable that corresponds to the internal argument, as we have argued above, is introduced by the affix BECOME rather than the verb. The index of this variable is not visible at V level. Given our assumptions about the Binding rules, this variable can be bound only if there is an overt NP in the Spec of VP position, otherwise, the final translation violates the Store Filter.

The difference between accomplishments and activities with respect to the obligatoriness of internal arguments can thus be accounted for under the present assumptions as a consequence of their compositional interpretation.

2.7. Ambiguity with 'again'

One of the main arguments in favor of the syntactic decomposition proposed in the literature starting with Generative Semantics, and recently discussed in Stechow 1995, is based on ambiguities of sentences with adverbials.

The sentence in (94), for example, has two interpretations. Under one reading, called 'external', John repeated opening the door. On the other, 'internal' reading, John brought it about that the door was open, but somebody else could have opened the door before.

(94) John opened the door again.

Dowty 1979 discusses this ambiguity as evidence in favor of the decomposition analysis of verbs like 'open', where the two interpretations are derived by a difference in scope of the adverbial 'again':

(95) a. PAST(again (∃P CAUSE(P(j), BECOME (open(the door))) (external reading)

b. PAST(∃P CAUSE(P(j), BECOME (again(open(the door))) (internal reading)

As Dowty 1979 notes, this ambiguity must be analyzed as a structural one, given that the internal reading is only present when the adverbial appears at the end of the sentence. The sentence in (96), for example, lacks the internal reading:

(96) Again, John opened the door.

In Dowty 1979, however, verbs are decomposed in the lexicon. To derive the internal reading, Dowty proposes that adverbs are ambiguous, and there are two *again's:* $again_1$ and $again_2$. The internal reading is derived by the adverb $again_2$, which has narrow scope with respect to CAUSE and BECOME. The meaning of $again_2$ is represented by the meaning postulate, of the type given in (97):

(97) $\forall p \, \forall q \, \forall w \; again_2 \, (CAUSE\ (p,\ BECOME(q)) \Rightarrow CAUSE(p,\ BECOME\ (again(q)))$

Various problems with this analysis are discussed in Stechow 1995. For example, as he notes, this analysis does not generalize to other cases of scope ambiguities, where verbs are not represented by CAUSE and BECOME. Furthermore, the postulate is non-compositional, and cannot account for the dependence of the internal interpretation on the structural position, noted in Dowty 1979 and illustrated in (96).

> "Dowty treats 'again' as lexically ambiguous and the ambiguity is nevertheless sometimes disambiguated by syntactic context. I find this highly unsatisfactory. One would prefer to derive the restriction from the syntactic position of the adverb, i.e., to have one 'again' and to derive the different meanings by a difference of scope. Exactly this is done in Generative Semantics, which regains its attractiveness if compared with its rivals, it seems to me."
>
> /von Stechow 1995, p. 87/

The analysis of the two interpretations discussed in Stechow 1995 assumes that aspectual operators head separate projections so that the ambiguity in (95) can be explained in structural terms. Although his syntactic assumptions are somewhat different from the ones adopted in this thesis, the present analysis illustrated below preserves the structural approach to these ambiguities.

Under the present analysis, the AspP projection is headed by aspectual affixes, such as CAUSE, BECOME, BE and HAVE. The adverb 'again' can be adjoined to maximal projections. When it is adjoined to VP, the internal reading is derived, as shown in (98)[19]:

(98) TP $PAST(\lambda t\ \exists P\ CAUSE(t, P(j), again'(t, \lambda t\ \exists t'\ BECOME(open'(d), t, t'))), t_{ev})$

the door$_k$ T' $PAST(\lambda t \exists P CAUSE(t, P(j), again'(t, \lambda t \exists t' BECOME(open'(y_k),t, t')), t_{ev})$ $\{y_k\}$

T $\lambda p\ PAST(p, t_{ev})$ AspP $\lambda t \exists P CAUSE(t, P(j), again'(t, \lambda t \exists t' BECOME(open'(y_k), t, t'))$ $\{y_k\}$

John$_i$ Asp' $\lambda t \exists P CAUSE(t,P(x_i),again'(t, \lambda t \exists t' BECOME(open'(y_k), t, t'))$ $\{y_k, x_i\}$

$\lambda q \lambda t \exists P CAUSE(t, P(x_i),q)$ $\{x_i\}$ VP $again'(t, \lambda t\ \exists t'\ BECOME(open'(y_k), t, t'))$ $\{y_k\}$

$\lambda p \lambda t\ again(t, p)$ VP $\lambda t\ \exists t'\ BECOME(open'(y_k), t, t')$ $\{y_k\}$

y_k $\{y_k\}$ t_k V' $\lambda y\ \lambda t\ \exists t'\ BECOME(open'(y), t, t')$

V $\lambda t\ \exists t'\ BECOME(open'(y_k), t, t')$ $\{y_k\}$

When the adverb is adjoined to AspP, on the other hand, then the external reading is derived:

---

[19] This reading, however, differs from the internal reading discussed in Dowty 1979 in that *again* has wide scope over BECOME.

(99) TP PAST(again'(t, λt ∃PCAUSE(t, P(j), λt∃t'BECOME(open'(d), t, t'))), t_{ev})

the door$_k$ T' PAST(again'(t, λt∃PCAUSE(t,P(j), λt∃t'BECOME(open'(y_k), t, t')), t_{ev}) {y_k}

T AspP λtagain(t, λt∃PCAUSE(t, P(j), λt∃t'BECOME(open'(y_k), t, t')) {y_k}

λp PAST(p, t_{ev})

λpλt again(t, p) AspP λt∃PCAUSE(t, P(j), λt∃t'BECOME(open'(y_k), t, t')) {y_k}

John$_i$ Asp' λt∃PCAUSE(t, P(x_i), λt∃t'BECOME(open'(y_k), t, t')) {x_i, y_k}

λqλt∃PCAUSE(t, P(x_i),q) VP λt ∃t' BECOME(open'(y_k), t, t') {y_k}

{x_i}

y_k {y_k} t_k V' λy λt ∃t' BECOME(open'(y), t, t')

V λt ∃t' BECOME(open'(y_k), t, t') {y_k}

The hypothesis that aspectual operators head syntactic projections, therefore, allows us to derive different meanings by a difference in scope. However, under the present assumptions, activities have the same syntactic representation as accomplishments, and thus we expect them to show the same kind of ambiguity:

(100) John sang the song again.

(101) a. again (∃P CAUSE(t, P(j), sing(the song)))

b. ∃P CAUSE(t, P(j), again (sing(the song)))

However, the internal reading in (101b) is not available for this sentence.

To answer the question of why activities do not show ambiguity of this type, consider the examples in (102). Although these sentences are accomplishments, they are not ambiguous in the same way as the sentence in (94) above:

(102) a. John read the book again

b. John combed his hair again

c. John ran the distance again

These sentences do not have a narrow scope interpretation, such that somebody else read the book, or combed his hair, or ran the distance, before John did. It thus appears that there are other restrictions besides structural ones on possible interpretations of adverbials. What these restrictions are is beyond the scope of this study[20]. Crucially, however, the assumption that activities are derived by CAUSE does not present a problem for the analysis of these ambiguities, since the unavailability of the internal reading in the case of activities cannot be attributed to the difference between activities and accomplishments, and other explanations should be sought.

2.8. Summary

In this chapter we introduced semantic assumptions, such as lexical semantics of aspectual affixes and the rules of compositional semantics, which are used in the following chapters to account for various problems of the syntax-semantics interface.

These semantic assumptions have been illustrated by the analysis of different classes of perfective verbs in Russian and English. It has been proposed, for example, that accomplishments are derived by affixation of CAUSE and BECOME and, optionally, a preposition. Specifically, we distinguished three classes of accomplishments, which differ in their morphological structure:

(103) a. CAUSE + [BECOME + root]

b. CAUSE + [BECOME + [P + root]]

c. CAUSE + [[BECOME + P] + root]

The first class corresponds to verbs like ‘open’, where the verbal root denotes a resulting state. These verbs are not marked by overt perfectivizing morphology in Russian and English, and cannot be interpreted as activities unless they are involve affixation of imperfectivizing morphology, such as the progressive in English or an imperfectivzing suffix in Russian. Verbal roots like ‘read’ or ‘comb’, on the other hand, are analyzed as denoting a process, and can derive either an activity or an accomplishment reading. The accomplishment reading has the morphological structure in (103b), and involves affixation of a pure perfectivizing prefix, which changes the aspectual type from a process to a state so that the complex [P+root] can serve as the

[20] They seem to be related to agentivity, since the verbs in (102) are necessarily agentive and do not have an unaccusative variant (see the analysis of the transitivity alternation in section 4.5).

argument of BECOME. This prefix is overtly realized in Russian but not in English. The third class are verb-particle constructions in English and verbs with resultative prefixes in Russian. This class has the representation in (103c), where the affix BECOME is adjoined to a preposition. Given compositional translation of this structure, the internal argument of these verbs is interpreted as the argument of the preposition rather then the verbal root. These verbs, therefore, do not preserve the selectional restrictions of the corresponding imperfective verbs.

Different properties of different aspectual classes of verbs under this analysis are accounted for by the tools of compositional semantics. Thus, the analysis of the obligatoriness of the internal arguments of accomplishments, for example, crucially relies on their compositional interpretation. Given that the internal argument in the case of accomplishments is introduced by the aspectual affix rather than the verbal root, we have shown that the structures projected by these verbs cannot be interpreted unless there an overt NP generated in the object position.

And finally, this chapter supported the assumption that aspectual operators are zero affixes rather than part of the lexical entry of a verb, based on scope ambiguities of adverbials like 'again'. Following the work in Generative Semantics (e.g. McCawley 1968, 1971), and recent discussion in Stechow 1995, we have shown that different interpretations of sentences with 'again' under the present assumptions can be described in structural terms, i.e. as a consequence of the syntactic position of the adverb.

CHAPTER 3.

TWO CLASSES OF VERBAL ROOTS IN RUSSIAN.

This chapter presents further evidence for the hypothesis that aspectual operators are separate lexical items based on the analysis of two classes of verbal roots in Russian: the class of A-roots, i.e. roots which take accusative objects, and the class of I-roots, i.e. roots which assign instrumental case.

First, this chapter argues that assignment of instrumental and accusative cases to the direct object in Russian is not unpredictable, contra to the standard approach to Case assignment in Russian, which assumes that instrumental case is lexical or idiosyncratic (Pesetsky 1982, Babby 1984, 1991, Neidle 1988 and others). Specifically, we show that the classes of A-roots and I-roots in Russian differ not only with respect to case, but also with respect to their lexical aspectual properties, the ability to take a certain class of perfectivizing prefixes, and to form an adjectival passive.

The analysis of A-roots and I-roots proposed in this chapter is based on the assumption that the two classes of verbal roots differ in their semantic type. Verbal roots which assign accusative case in Russian are defined as one-place predicates, predicated of the internal argument. This class of roots is thus analyzed along the lines of Marantz 1984 and Kratzer 1994a,b who proposed that external arguments are not the true arguments of the verb, but rather are introduced by an independent head. Verbal roots that assign instrumental case, on the other hand, introduce both arguments in the lexicon, and are defined as two-place relations. The analysis of verbs, therefore, departs from Marantz 1984 and Kratzer 1994a,b in assuming that verbs might differ whether they introduce one or two arguments in the lexicon.

The difference in the logical type of the two classes of verbal roots is further shown to account for their morpho-syntactic differences. Specifically, under this analysis verbal roots and aspectual affixes enter into semantic composition by the rules of compositional semantics. Given that A-roots and I-roots have different logical type, we show that their arguments must be projected into different syntactic positions, otherwise the structures cannot be compositionally interpreted. Different syntactic representations of A-roots and I-roots in turn accounts for the difference in case.

The last section of this chapter accounts for the differences between the two classes with respect to their lexical aspectual properties and formation of adjectival passive.

3.1. A-roots and I-roots in Russian

Russian objects can be assigned four cases: accusative, instrumental, dative and genitive. Genitive case usually alternates with accusative under certain conditions which have to do with (non)specificity, negation, etc. Dative case is assigned to NPs that are structurally different from the accusative, genitive and instrumental objects (cf. Bailyn 1995, Fowler 1996a and others).

The assignment of accusative and instrumental cases in Russian, on the other hand, as we show below, depends on the lexical properties of a verbal root. There are three generalizations that distinguish A-roots, i.e. roots that assign accusative case in Russian, and I-roots, i.e. roots that assign instrumental case. The first difference deals with their ability to take a certain class of perfectivizing prefixes. The next distinction concerns lexical aspectual properties of the two classes of roots. And the third generalization is that only A-roots can form an adjectival passive.

The first generalization that distinguishes A-roots and I-roots in Russian is that the class of I-roots is restricted to a certain type of perfectivizing prefixes that it can take.

As discussed in chapter 2, most unprefixed verbs in Russian are imperfective and perfective verbs are derived from them by means of perfectivizing prefixes. The prefixes that make a verb perfective in Russian can be distinguished in several respects. In chapter 2 above we accounted for the differences between pure perfectivizing and resultative prefixes. The distinction which is crucial for the purposes of the present discussion is based on the syntactic position of the prefix: specifically, I propose to distinguish 'lexical' prefixes, i.e. prefixes which are adjoined to a lexical head, and 'superlexical' prefixes, i.e. prefixes which are adjoined to a functional category.

Superlexical prefixes (the term is adopted from Smith 1991) are known in Slavic literature as Aktionsart or sublexical prefixes (Townsend 1975). They include *za-* in its meaning 'to begin', *ot-, do-* meaning 'to finish', *po-* ('to do for a while'), *pro-* ('to do for a long time'). These prefixes have a regular meaning, and correspond to aspectual words or adverbial phrases in English and other languages. For example, the verbs in (1) are perfective verbs derived from an imperfective verb *pisat'* ('to write') by means of superlexical prefixes *za-* and *po-*.

(1) zapisat'$_{\text{PERF}}$ 'to begin writing'

popisat'$_{\text{PERF}}$ 'to write for a while'

Lexical prefixes, on the other hand, (which include pure perfectivizing and resultative prefixes discussed in chapter 2 above) do not have a stable meaning. The following examples illustrate prefixes *za-* and *po-* when they function as lexical:

(2) a. pisat'$_{\text{IMP}}$ 'to write' zapisat'$_{\text{PERF}}$ 'to write down'

ryt'$_{\text{IMP}}$ 'to dig' zaryt'$_{\text{PERF}}$ 'to dig in'

stroit'$_{\text{IMP}}$ 'to build' zastroit'$_{\text{PERF}}$ 'to build up'

b. ljubit'$_{\text{IMP}}$ 'to love' poljubit'$_{\text{PERF}}$ 'to fall in love'

stroit'$_{\text{IMP}}$ 'to build' postroit'$_{\text{PERF}}$ 'to build'

Under the assumption that the two classes of prefixes differ in the syntactic position, we predict that lexical prefixes modify the meaning of a verb, whereas superlexical prefixes are modifiers of verbal phrases or whole sentences.

One of the tests that can be used to distinguish lexical and superlexical prefixes is based on the correlation between obligatoriness of the internal argument and the presence of a prefix.

As discussed in chapter 2 above, when a lexical prefix is added to a verbal stem, the object becomes obligatory.

(3) a. Ivan stroil (ploščadku). Ivan zastroil *(ploščadku).

Ivan built-IMP area-ACC Ivan za-built-PERF area-ACC

'Ivan was building an area' 'Ivan built up an area'

b. Ivan pisal (pis'mo). Ivan napisal *(pis'mo).

Ivan wrote-IMP letter-Acc Ivan na-wrote-PERF letter-ACC

'Ivan was writing a letter' 'Ivan wrote a letter'

Superlexical prefixes differ from the lexical prefixes in this respect, since optionality or obligatoriness of the object does not depend on the prefix.

(4) Ivan pel (pesnju). Ivan zapel (pesnju).

Ivan sing-IMP song-ACC Ivan started to sing song-ACC

'Ivan was singing a song' 'Ivan started to sing a song'

There are several other tests that can be used as a diagnostics of a lexical prefix. As shown in Schoorlemmer 1995, verbs with superlexical prefixes (Aktionsart verbs in her terminology) cannot form participial passive and do not allow secondary imperfectivization. These tests can also be used as a sufficient (but not a necessary) condition for a lexical prefix.

Given these differences between the two types of perfectivizing prefixes in Russian, we can state the following generalization: *If a verbal root can take a lexical prefix, then it assigns accusative case.*

Examples of verbal roots that can take lexical prefixes are given in (5a-c). These roots assign accusative case.

(5) a. est' jabloko - s''est' jabloko

eat-IMP apple-ACC eat-PERF apple-ACC

'to eat an apple' 'to eat up the apple'

b. pomnit' pesnju - vspomnit' pesnju

remember-*IMP* song-ACC remember-*PERF* song-ACC

'to remember a song' (state) 'to remember a song'(achievement)

c. videt' kartinu - uvidet' kartinu

to see-*IMP* picture-ACC to see-*PERF* picture-ACC

'to see a picture' (state) 'to see a picture' (achievement)

I-roots, on the other hand, cannot take lexical prefixes. Some I-roots cannot take any prefixes, but if a prefix can be added to a root, then it is superlexical:

(6) a. bolet' grippom - zabolet' grippom

be sick-*IMP* flu-INS to get sick-*PERF* flu-INS

'to have a flu' 'to catch a flu'

b. torgovat' cvetami - zatorgovat' cvetami -

sell-*IMP* flower*s* za-sell-*PERF* flowers-INS

'to be selling flowers' 'to start selling flowers'

protorgovat' cvetami celyi den'

pro-sell flowers-INS whole day-ACC

'to be selling flowers for a whole day'

The following verbs that assign instrumental case in Russian are not used with any type of prefixes:

(7) vedat' - 'manage, be in charge of'

verxovodit' - 'lord it over'

voročat' - 'have control of'

dorožit' - 'value'

zavedovat' - 'superintend'

zloupotrebljat' - 'misuse'

pravit' - 'rule over, govern'

predvoditel'stvovat' - 'lead, be the leader of'

prenebregat' - 'scorn, despise, disdain'

raspolagat' - 'have at one's disposal'

/Fowler 1996a/

As a consequence of this generalization, we can now relate accusative case to aspect in Russian. Both classes of lexical and superlexical prefixes make verbs perfective. However, a difference between lexical and superlexical prefixes is that only lexical prefixes can form accomplishments.

As discussed in chapter 2, accomplishments like 'build a house' or 'paint a picture' refer to events that have a development stage and a culmination point. For example, if Mary builds a house, then there is a time at which the building is going on, and then, as the result of this action, there is a time at which the house gets built, i.e. the termination point (if Mary finishes building). In this respect they differ from achievements like 'die', 'lose', 'find' and others, which do not specify an action that caused this change.

As the examples below illustrate, when added to non-stative verbs, lexical prefixes characterize the result or a terminal point of the action denoted by a verbal root. Prefixed verbs in (8), therefore, are accomplishments, as is also supported by the fact that they can co-occur with in-durational phrases.

(8) a. pisat' pis'mo čas - napisat' pis'mo za čas -

to write-IMP letter-Acc hour to write-PERF *l*etter-Acc in hour

'to be writing a letter for an hour' 'to write a letter in an hour' zapisat' adres za minutu

to write down-*PERF* address-Acc in minute

'to write down the address in a minute'

b. stroit' dom god - postroit' dom za god

build-*IMP* house-Acc year build-*PERF* house-Acc in year

'to be building a house for a year' 'to build a house in a year'

Superlexical prefixes, on the other hand, do not specify a result or a final state of the action, but rather focus attention on a particular stage of the action. Verbs with superlexical prefixes, therefore, are not accomplishments, and cannot co-occur with 'in-durational' phrases:

(9) a. * zabolet' grippom za pjat' minut

to get sick-*PERF* flu-INS in five minutes

'to catch a flu in five minutes'

b. *zatorgovat' cvetami za čas

za-sell-*PERF* flowers-INS in hour-ACC

'to start selling flowers in an hour'

Given that only A-roots can take lexical prefixes that turn activities into accomplishments, we can state the following generalization: *If a verbal root can form an accomplishment, then it assigns accusative case.*

Let us consider the data in (10)-(11):

(10) a. Ivan prodaval cvety čas.

Ivan sold-IMP flowers-ACC hour-ACC

'Ivan was selling flowers for an hour'

b. Ivan prodal cvety za čac.

Ivan sold-PERF flowers-ACC in hour

'Ivan sold flowers in an hour'

(11) Ivan torgoval cvetami čas.

Ivan trade-IMP flowers-INS hour- ACC

'Ivan was selling flowers for an hour'

The difference between the verbs *prodavat'* ('to sell-IMP'), which assigns accusative case, and *torgovat'* ('to trade, to sell-IMP'), which takes an instrumental object, is that the verb *prodavat'* in the perfective form given in (10b) denotes an accomplishment, that is, the sentence in (10b) entails that the flowers were sold, whereas the verb *torgovat'* does not have a morphological form which would entail that the activity of selling has been completed. In other words, the verb *prodavat'* describes an action of selling in view of its target or result: *prodavat'* is a goal-oriented activity, whereas *torgovat'* denotes a process of 'selling' without any reference to a potential result of this action.

Note, however, that this generalization can distinguish only non-stative A-roots and I-roots. Stative verbs cannot form accomplishments. Thus, both superlexical prefixes, illustrated in (11), and lexical ones in (12), turn states into achievements:

(11)	bolet' grippom	-	zabolet' grippom
	be sick-*IMP* flu-INS		to get sick-*PERF* flu-INS
	'to have a flu'		'to catch a flu'
(12)	znat' pesnju		uznat' pesnju
	know-IMP song-ACC		u-know-PERF song-ACC
	'to know a song'		'to recognize a song'

Stative A-roots and I-roots, therefore, cannot be distinguished in terms of aspect, and differ only with respect to prefixation and, as the following discussion shows, formation of adjectival passive.

The differences between adjectival and verbal passives in Russian are discussed, for example, in Schoorlemmer 1995. Cross-linguistically, adjectival passives are stative, allow 'un'-

prefixation, and have no implicit external argument. Verbal passives, on the other hand, are eventive, cannot undergo 'un'-prefixation, and always imply an agent of the action (see Wasow 1977, Williams 1981a, among others).

A-roots in Russian can form both verbal and adjectival passives. Some examples of adjectival passives derived by A-roots are given in (13):

(13) a. (ne)postroennyi dom
(un)built house

b. (ne)prodannye cvety
(un)sold flowers

I-roots, on the other hand, in general do not allow formation of both types of passives; however, if a passive participle can be formed from an I-root, then it is verbal.

Some examples of participial passives derived from I-roots are discussed in Fowler 1996a and are given here in (14):

(14) a. otrjad, predvoditel'stvuemyi otvažnym komandirom
detachment led courageous-INS commander-INS
'a detachment led by a courageous commander'

b. prenebregaemyi toboj molodoj čelovek
disdained you-INS young-NOM man-NOM
'the young man disdained by you'

As the data in (15) show, the participial passives in (14) do not allow 'un'-prefixation:

(15) a. *nepredvoditel'stvuemyi
un-led

b. *neprenebregaemyi
un-disdained

Furthermore, an interesting fact about these participles, as opposed to participles derived from A-roots, is that the agentive by-phrase has to be overtly realized:

(16) a. *predvoditel'stvuemyi otrjad
led detachment

b. *prenebregaemyi molodoj čelovek
disdained young man

All these facts show that the passive participles derived from I-roots are not adjectival. The third generalization that distinguishes A-roots and I-roots, therefore, can be stated as follows: *If a verbal root can form an adjectival passive, then it assigns accusative case.*

To sum up, it was shown that the class of A-roots differs from the class of I-roots in that it can take lexical prefixes, form accomplishments, and undergo formation of adjectival passive.

The next sections present an analysis of the differences between the two types of roots, based on the assumption that they differ in their semantic type.

3.2. A Proposal

Kratzer 1994a,b following Marantz 1984 argued that external arguments are not the true arguments of the verb, but rather are introduced by independent functional heads. The hypothesis explored in this chapter is that verbs might differ in whether they introduce external arguments in the lexicon or by functional elements. This difference is proposed to correspond to the difference between A-roots and I-roots in Russian. Specifically, I propose that whereas external arguments of A-roots are not part of their lexical entry, I-roots introduce both external and internal arguments in the lexicon.

As a consequence, A-roots and I-roots can be distinguished in terms of their semantic type: transitive A-roots like *čit* ('read') are of the type <e,<i,t>>, whereas transitive I-roots like *upravl* ('manage') are of the type <e,<e,<i,t>>>. A-roots like *čit* ('read') denote a process of the object undergoing reading: read'(t, y) says that the object y is being read at t. I-roots, on the other hand, denote a process with two participants: manage'(y, x, t) is true iff x is managing y at t.

This analysis, therefore, differs from Kratzer 1994a,b, where it is argued that all external arguments are introduced by functional heads. However, as we show below, the evidence for this approach discussed in Kratzer 1994a,b does not contradict but rather supports the present analysis of A-roots and I-roots.

For example, one piece of evidence in favor of the assumption that external arguments are introduced syntactically is based on the analysis of adjectival passive. As we discuss in more detail in section 3.6 below, the external argument in the adjectival passive is not implicit but rather is completely missing, as opposed to verbal passives, for example. If verbs introduce external arguments syntactically, then adjectival passive constructions are derived by adjectivization of V or VP, where the functional projection which introduces an external argument is not projected. If a verb introduces the external argument in the lexicon, then this argument is always present in the logical representation, independent on the syntactic construction projected by this verb. The fact that A-roots and I-roots differ precisely with respect to this construction, therefore, supports the present analysis of the two classes of roots.

Another piece of evidence, discussed first in Marantz 1984, is based on the difference between selectional restrictions of external and internal arguments. Specifically, as Marantz 1984 observes, there are many examples of verbal phrases where the internal argument triggers a particular interpretation of the verb:

(17) a. throw a baseball

b. throw support behind a candidate

c. throw a boxing match (i.e. take a dive)

d. throw a party

e. throw a fit

f. take a book from the shelf

g. take a bus to New York

h. take a nap

i. take an aspirin

j. take a letter shorthand

(18) a. kill a cockroach

b. kill a conversation

c. kill an evening watching TV

d. kill a bottle (i.e. empty it)

e. kill an audience (i.e. wow them)

/Marantz 1984, p. 25/

As the examples in (17-18) show, there are no semantic restrictions on the type of verb meanings that the internal arguments can trigger. External arguments, on the other hand, as Kratzer 1994a,b notes, can also trigger verb alternations, but they are always restricted to aspectual and/or thematic conditions.

Given this difference between external and internal arguments, we would expect that under the present analysis the external arguments of I-roots can trigger various interpretations of the verbs, which are semantically unrestricted. This is not the case, however, and most of the examples of I-roots given above take agents as their arguments.

We will see in the following section, however, that under the present analysis the external arguments of I-roots serve as the arguments of both the verb and aspectual affixes, and thus are predicted to behave as agents. This analysis of I-roots therefore preserves the generalization about the difference between external and internal arguments discussed in Marantz 1984 and Kratzer 1994a,b.

In summary, the hypothesis that the class of I-roots introduces external arguments in the lexicon does not contradict the analysis of Kratzer 1994a,b, since most arguments[21] in favor of the syntactic status of external arguments are preserved under this analysis.

3.3. Syntactic Structures

Let us now turn to the syntactic structures of A-roots and I-roots in Russian. Given that the two classes of roots have different logical type, we can show that they project different syntactic structures.

One of the main assumptions of the present approach to argument projection is that NPs can be projected freely into different syntactic positions, which include Spec and complement positions of verbal heads. The principles that filter out impossible projections under this approach are the rules of compositional semantics, and selectional restrictions of aspectual affixes and verbs.

Given this approach, we show in this section that the structures of A-roots and I-roots are predicted to be as in (19). In the case of A-roots, both arguments are generated in the Spec positions: the internal argument is in the Spec of VP, whereas the external argument is in the Spec of AspP. In the case of I-roots, on the other hand, both arguments are generated VP-internally.

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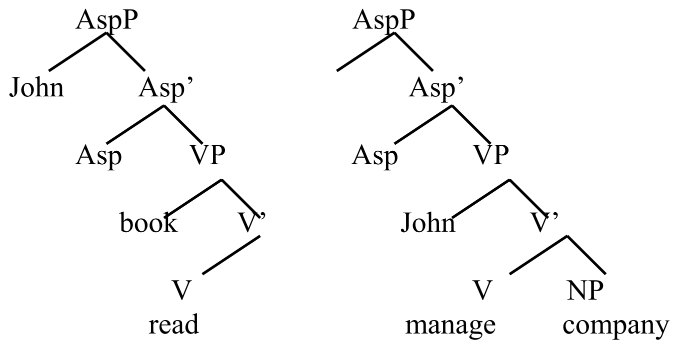
[21] One of the arguments which is not preserved under the present assumptions concerns the analysis of accusative case. In Kratzer 1994a,b, accusative case is assigned by the projection which introduces external arguments, and as a consequence all constructions which do not have this projection cannot assign accusative case. The analysis of accusative case is different in this study, and is motivated in chapters 6 and 7 by different case systems in various languages.

Another argument which we did not discuss is based on different types of ‘ing- nominals in English. This argument, however, requires an analysis of different types of nominals in Russian, which is beyond the scope of this chapter.

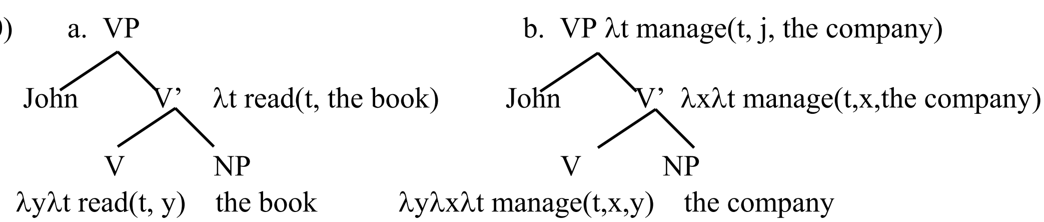
(19) a. A-roots b. I-roots



Why does a difference in the logical type have consequences for the syntactic representation?

Consider for example the structures of A-roots and I-roots in (20), where both NPs are generated in the VP-internal position:

(20)



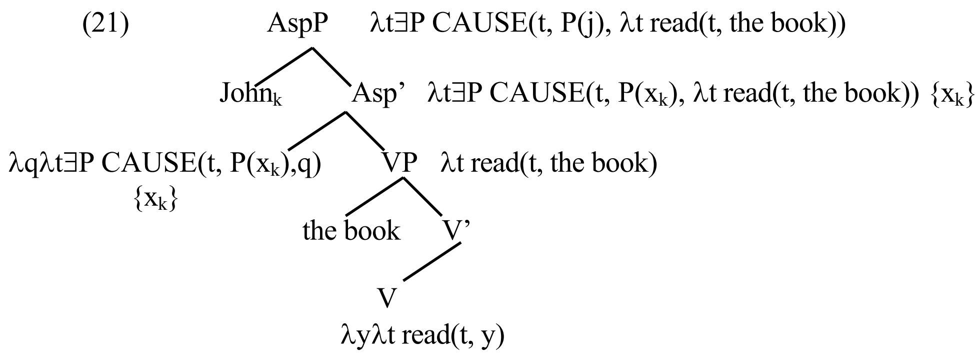
Given the rules of compositional semantics, the structure in (20a), where the VP is headed by an A-root and both arguments are generated VP-internally, is not interpretable. The translation of the V' node is a property of times, which cannot be combined by function application with the translation of the NP. Application of type-shifting operators assumed in this work cannot save this structure either. This structure, therefore, is ruled out as ungrammatical.

If the same structure is headed by an I-root, which denotes a two-place relation between individual variables, then the structure is interpretable, and VP denotes a property of times, as shown in (20b).

We thus have shown that A-roots cannot project their arguments VP-internally, whereas I-roots can. On the other hand, we can also show that if the NPs are generated in the Spec positions, as in (19a), then the structure is interpretable only if it is headed by an A-root.

Compositional translation of the structure headed by A-roots is discussed in section 2.3 above and is repeated in (21) below:

(21)



In this structure the NP 'the book' serves as the logical argument of the verb, whereas "John" is the argument of the affix CAUSE. The structure is interpretable and all selectional restrictions of the verbs and aspectual affixes are satisfied.

Let us note here that nothing under the present assumptions prevents the NP 'John' to be generated in the Spec of VP position, and the NP 'book' to be generated in the Spec of AspP. The derived sentence is interpretable and has the following translation:

(22) $\lambda t \exists P$ CAUSE(t, P(the book), λt read(t, j))

This sentence, however, violates the selectional restrictions of the verb 'read' and the affix 'CAUSE'. These restrictions are presuppositions of the type given in (23) (cf. section 2.1 above)[22]:

(23) a. $\forall y \forall t$ read(t, y) $\Rightarrow$ y is a readable object.

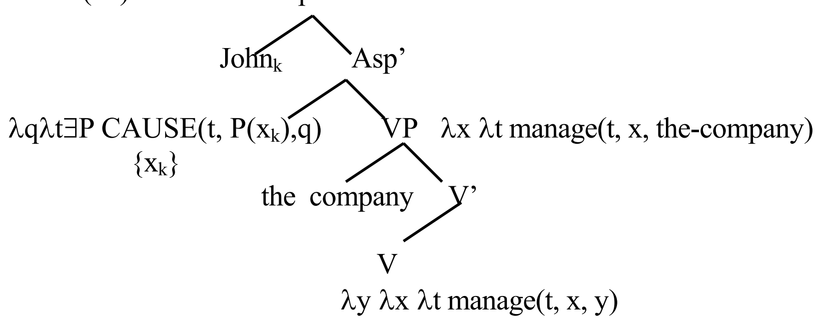
b. $\forall P \forall x \forall q \forall t$ CAUSE (t, P(x), q) $\Rightarrow$ x is capable of bringing about q

The sentence 'The book read John' can be true under this analysis only if we can accommodate a presupposition that 'John' is a readable object, whereas 'the book' has an ability to read.

[22] Since none of the examples in this chapter includes intensional contexts, I leave out the modifications of this presupposition discussed in chapter 2.

Let us now turn to the translation of I-roots. Let us suppose that I-roots project the structure in (24), where NPs are generated in the Spec positions.

(24)

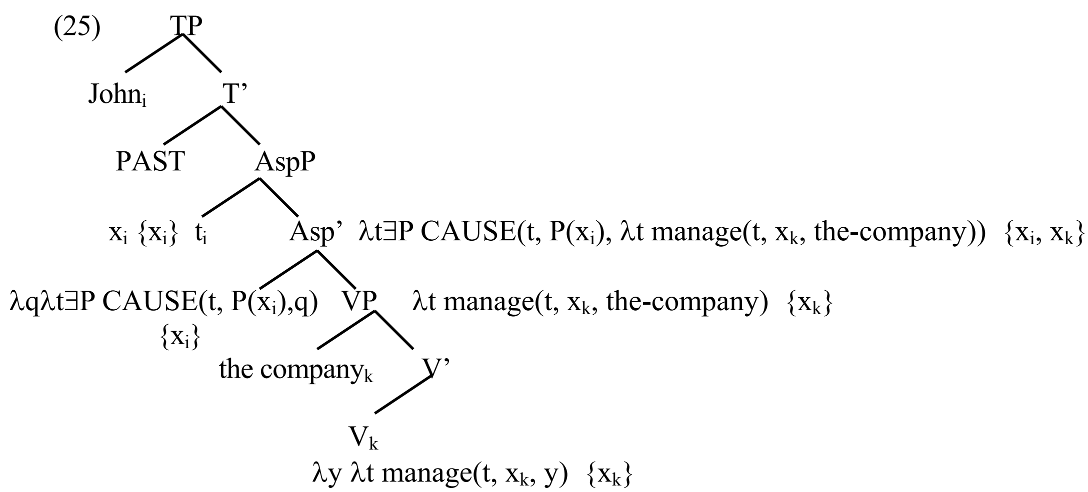


If no type-shifting rules apply, the denotation of VP cannot be combined with the operator CAUSE, since CAUSE requires a property of times as its argument. Is it possible to save this structure?

Given the storage mechanism, discussed in section 2.3 above, we can assume that one of the arguments is introduced in the store. If the variable y is stored, then it gets bound by the NP in the Spec of VP position, and the structure is still uninterpretable.

Let us consider the structure where the variable x is stored:

(25)



In order for this structure to be interpreted, the variable x_k has to undergo a Binding rule, which binds variables from the store. Binding rules, on the other hand, can apply only if the index of this variable is compositionally visible. The index k is visible only within VP, and thus the only NP that can fill its position is the internal argument. In order for the NP ‘John’ to be coindexed with this variable, it has to stand in a local configuration with the predicate that introduces x_k, i.e. V. However, the NP ‘John’ is generated in the Spec of AspP, and hence cannot be coindexed with V. The variable x_k in the structure in (25), therefore cannot be bound, and the final translation violates the Store filter, which requires the store to be empty.

Let us notice here that the indices of x_k and x_i are different in (25). If k=i in this structure, then the variable x_k could be bound at the Asp’ level. However, given our conventions about percolation of indices, the index k percolates from V into the NP in the Spec of VP position so that the NP ‘company’ is coindexed with x_k. Now if k=i in this structure, then the principle C of the Binding Theory would be violated, since a nonpronominal NP is coindexed with a c-commanding NP.

The only structure that can be projected by I-roots, therefore, is the one given in (26):

(26) TP PAST($\lambda t \exists P$ CAUSE(t, P(j), λt manage(t, j, the-company)), t_{ev})

John$_i$ T’ PAST($\lambda t \exists P$ CAUSE(t, P(x_i), λt manage(t, x_i, the-company)), t_{ev}) $\{x_i\}$

PAST AspP $\lambda t \exists P$ CAUSE(t, P(x_i), λt manage(t, x_i, the-company)) $\{x_i\}$

x_i $\{x_i\}$ t_i Asp’ $\lambda t \exists P$ CAUSE(t, P(x_i), λt manage(t, x_i, the-company)) $\{x_i\}$

$\lambda q \lambda t \exists P$ CAUSE(t, P(x_i),q) $\{x_i\}$ VP λt manage(t, x_i, the-company) $\{x_i\}$

x_i $\{x_i\}$ t_i V’ $\lambda x \lambda t$ manage(t, x, the-company)

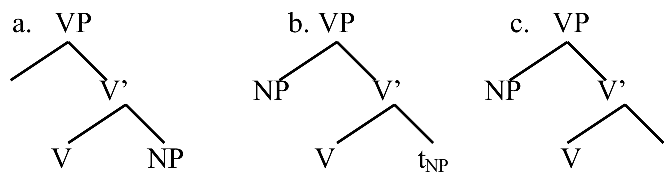
V $\lambda y\ \lambda x \lambda t$ manage(t, x, y) NP the company

In this structure the NP moves to the Spec of TP position through the Spec of AspP. As a result of this movement, given the semantics of traces discussed in section 2.3 above, the NP ‘John’ is interpreted as the argument of the verb and the affix CAUSE. Given the agentivity implicature introduced by CAUSE, the NP ‘John’ is interpreted as an agent.

Given the rules of compositional semantics and the difference in the logical type between A-roots and I-roots, we thus predict that in the case of I-roots the internal and external arguments must be generated VP-internally, whereas in the case of A-roots only one argument can be generated within a VP. The question that we have not addressed, however, is why the internal argument of A-roots is generated in the Spec of VP positionrather than as a complement of V.

Let us consider the structures in (27):

(27)



These structures do not differ from the point of view of compositional semantics. However, given the present Optimality-Theoretic approach to feature-checking, motivated in chapter 6 by the analysis of case, we can show that NPs tend to be generated in the specifier positions.

Let us evaluate the structures in (27) relative to the feature-checking constraint CH-V, introduced in chapter 1, and the constraint Stay, proposed in Grimshaw 1997:

(28) CH-V: Features of V must be checked

Stay: Trace is not allowed

Let us further assume that the constraints CH-V and Stay are the highest-ranked constraints on which the candidates in (27) conflict. Given these assumptions, we predict that independent on the relative ranking of the constraints CH-V and Stay, the structure in (27c), where the argument is generated in the Spec position, is the winning candidate. The structure in (27a) violates the constraint CH-V, since feature checking can only occur in a Spec-Head configuration. The structure in (27b), on the other hand, involves movement of a NP and thus violates the constraint Stay. The structure in (27c) does not violate any of these two constraints, and therefore it is universally the winning structure.

We have thus shown, that given the rules of compositional semantics, and the present approach to feature-checking, the difference in the logical type of A-roots and I-roots predicts that the two classes of verbal roots project different structures. These structures, as we show below, explain the difference in the case-assigning properties of the two classes of roots.

3.4. Case

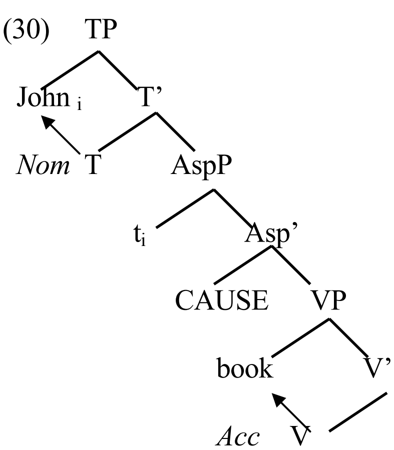
Russian is an accusative language, which under the present analysis has the following ranking of feature checking constraints[23]:

(29) CH-T >> CH-V >> CH-Asp

As the result of this ranking, in accusative languages Tense checks nominative features on the subjects, whereas accusative features of the objects are checked by V.

The optimal structure of the transitive verb under this ranking is shown in (30). The constraint "Check Tense" outranks all other constraints, therefore, the winning structure is the one where Tense satisfies its nominal features. The subject moves to the Spec of TP so that the constraint CH-T is satisfied.[24] The object, on the other hand, stays in situ, where it checks the features of V so that the second highest-ranked constraint CH-V is satisfied too.

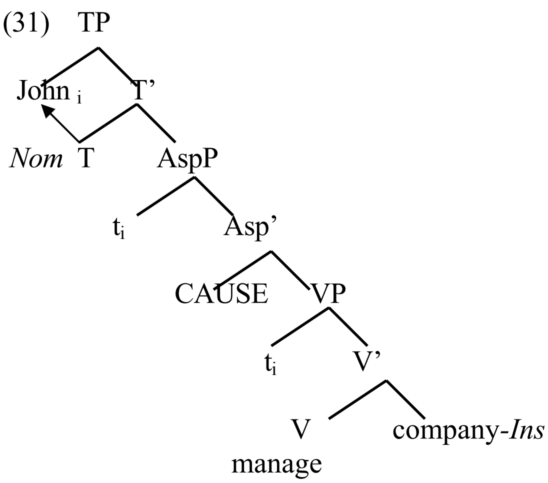
(30)



[23] Accusative languages are discussed in more detail in section 6.1.5 below.

[24] The question of why it is the subject and not the object which moves to the Spec of TP position in accusative languages is addressed in section 6.1 below.

Now let us turn to the structure of I-roots. In this structure the object is generated in the complement position, and therefore, cannot check accusative case by V. The subject, on the other hand, can check either accusative or nominative case. Given that CH-T is the highest-ranked constraint in Russian, we predict that the subject has to move to the Spec of TP position to check its features against Tense.

(31)


The instrumental NP is generated in the complement position, and cannot move to a Spec position to check nominal features of heads. The instrumental case is thus analyzed as a default case of NPs in Russian so that NPs are instrumental when none of feature-checking constraints can be satisfied[25].

The hypothesis that the instrumental case is a default case in Russian has been proposed, for example, in Levin 1985, based on the analysis of unergative verbs with the reflexive clitic sja. As the examples in (32b)-(33b) illustrate, verbs that are derived by affixation of sja- cannot be used with accusative objects[26].

---

[25] The choice of the OT approach to case is not crucial for this discussion. Given the difference in the argument projection of A-roots and I-roots, the difference in case can be accounted by any theory that makes the following predictions: (1) accusative case is checked in a Spec-Head configuration, (2) instrumental case is checked in a complement position, and (3) nominative case takes priority over accusative case.

[26] There are a few exceptions to this generalization, for example the verb 'slushat'sja' (to listen, to obey) has a reflexive clitic sja and takes an accusative object (L. Babby, p.c.):

slushat'sja mamu-ACC

(32) a. Rebenok el bliny.

Child-Nom eat-IMP blini-ACC

'The child ate blini'

b. Rebenok ob'elsja (blinami).

Child-Nom pref-eat-sja blini-INS

'The child overate (on blini)'

(33) a. On zadaval vopros.

He-Nom ask-IMP question-ACC

'He asked a question'

b. On zadavalsja voprosom.

He-NOM zadavalsja voprosom-INS

'He asked himself a question'

/Levin 1985/

The analysis of sja- verbs in Russian proposed in Levin 1985 assumes that sja- signals the inability of a verb to assign accusative case[27]. If a NP cannot check accusative case, then the instrumental case is used. The instrumental case is thus analyzed as the default case used for this purpose in Russian.

The instrumental case is also used for cognate objects, as discussed in section 4.3.1.1 below, and in the case of secondary predicates in Russian, as shown in (34):

'to obey the mother'

[27] In terms of the present analysis, we can account for the inability of sja- verbs to check accusative case if we assume that sja- has accusative case features and is generated in the Spec of VP so that it checks accusative case features against V. The constraint CH-V is satisfied in the case of sja- verbs, and the object is generated in the complement position and has the default instrumental case. This analysis has an advantage with respect to the exceptions like 'slushatsja' (to listen, to obey) which take accusative objects (cf. fn. 25). Specifically if we assume that in the case of these verbs the affix sja- is adjoined to the verb presyntactically, and thus does not stand in a case-checking configuration with a verb, then we can account for the fact that these verbs check accusative case on the NPs.

(34) Ja ljubil eje molodoj devushkoj.

I loved her young-INS girl-INS

'I loved her as a young girl'

In all these examples, instrumental NPs do not stand in a Spec-head configuration with verbal heads, and cannot check their case features.

The exact mechanism of assigning/checking this case is left for future research (see Bailyn and Rubin 1991 for one proposal). It should be pointed out, however, that under this approach the instrumental case on nominal modifiers, cognate objects, arguments of sja- verbs and arguments of I-roots has a unified analysis, being predicted by the syntactic configuration. Under previous approaches, the instrumental case on I-roots was analyzed as idiosyncratic or quirky, as opposed to the other uses of this case.

3.5. The Difference in Prefixation and Aspectual Behavior Explained

The next difference between A-roots and I-roots concerns prefixation, and consequently, aspectual behavior of the two classes of verbal roots. Specifically, as we have shown above, I-roots cannot take lexical prefixes in Russian and cannot form accomplishments.

(35) Ivan pro-torgoval cvetami

Ivan perf-sell flowers

This sentence is unacceptable in the meaning of "Ivan completed selling of the flowers", suggested by the semantics of the prefix 'pro', discussed in chapter 2:[28]

(36) pro(t, y, P) iff P(y) is completed at t.

[28] It is possible to say "Ivan protorgoval cvetami cas', which means "Ivan was selling the flowers for an hour'. In this sentence, however, the meaning of the prefix 'pro' is different from the one we are interested in here.

3.5.1. Why I-roots canot Take Lexical Prefixes

To explain this phenomenon, let us first consider compositional translation of the perfective verb, derived by affixation of a lexical prefix to an A-root. This translation, discussed in section 2.4 above, is repeated below:

(37)

V_l $\lambda t\, \exists t'\, \text{BECOME}(\text{pro}(y_k, \text{read}), t, t')\ \{y_k\}$

Asp $\lambda P \lambda t\, \exists t'\, \text{BECOME}(P(y_k), t, t')\ \{y_k\}$

V_l $\lambda z \lambda t\, \text{pro}(t, z, \text{read})\ \varnothing$

P_j $\lambda P\, \lambda z \lambda t\, \text{pro}(t, z, P)\ \varnothing$

V_l 2Ba. $\lambda y\, \lambda t\, \text{read}(t, y)\ \varnothing$

1L. $\lambda t\, \text{read}(t, y_l)\ \{y_l\}$

Let us now consider the structure where the prefix 'pro' is adjoined to an I-root. I-roots, as we proposed above, are 3 place predicates between two individual variables and a time variable. If we assume that their lexical entries do not introduce variables in the store, then affixation of the prefix 'pro' to an I-root will lead to a type-mismatch. However, as we proposed above, verbal lexical items, such as aspectual affixes and verbal roots introduce one variable in the store. Let us first assume that the variable that corresponds to the external argument is stored in the lexical entry of an I-root. The verb 'pro-torgovat' is then interpreted as follows:

(38)

V_l $\lambda t \exists t' \text{BECOME}(\lambda t\, \text{pro}(t, y_k, \lambda y \lambda t(\text{sell}(t, x_l, y))), t, t')\ \{x_l, y_k\}$

Asp $\lambda P \lambda t\, \exists t'\, \text{BECOME}(P(y_k), t, t')\ \{y_k\}$

V_l $\lambda y \lambda t\, \text{pro}(t, y, \lambda y \lambda t(\text{sell}(t, x_l, y)))\ \{x_l\}$

P_j $\lambda P\, \lambda y \lambda t\, \text{pro}(t, y, P)\ \varnothing$

V_l $\lambda y \lambda t\, \text{sell}(t, x_l, y)\ \{x_l\}$

The problem arises with the compositional interpretation of the syntactic structure of an I-root, given in (39):

(39)

VP

Ivan_k V'

V_l $\lambda t \exists t' \text{BECOME}(\lambda t\, \text{pro}(t, y_k, \lambda y \lambda t(\text{sell}(t, x_l, y))), t, t')\ \{x_l, y_k\}$

flowers

The internal argument in the case of I-roots, as we discussed above, is generated in the complement of V position, whereas the external argument is generated in the Spec of VP position. Given the compositional translation of the prefixed verb in (38), the variables that correspond to internal and external arguments are stored, and therefore has to be bound by the Binding rules of XLS. The Binding rules, on the other hand, as discussed in section 2.3, can only apply if the index of the stored variable is compositionally visible. In the structure in (39), the index l is visible at the V level, since it is the index of the head of V. The index k, on the other hand, is visible at the V' level.

The only interpretation of this sentence that can be derived therefore, is where the NP 'flowers' fills the position of the x_l variable, which corresponds to the external argument, whereas the NP 'John' fills the position of the y_k, i.e. the argument introduced by BECOME. This translation, however, is not possibly true, because the selectional properties of the verb are not satisfied.

Now let us assume that the variable that corresponds to the internal argument is stored:

(40)

V_l $\lambda t\, \exists t' \mathrm{BECOME}(\lambda t\, pro(t, y_k, \lambda x \lambda t\, sell(t, x, y_l)), t, t')$ $\{x_l, y_k\}$

- Asp $\lambda P \lambda t\, \exists t'\ \mathrm{BECOME}\ (P(y_k), t, t')$ $\{y_k\}$
- V_l $\lambda y \lambda t\ pro(t, y, \lambda x \lambda t(sell(t,x,y_l)))$ $\{y_l\}$
  - P_j $\lambda P\ \lambda y \lambda t\ pro(t, y, P)$ $\varnothing$
  - V_l $\lambda x \lambda t(sell(t,x,y_l)$ $\{y_l\}$

Given the semantics of the prefix pro', $pro(t, y_k, \lambda x \lambda t sell(x,y_l))$ is true in case selling of y_k is completed at t. The variable y_k, on the other hand, can only be coindexed with the NP 'John', as shown in (40). The derived interpretation, therefore, also violates the selectional restrictions of the verb.

We have thus shown that prefixes cannot be adjoined to an I-root presyntactically.

3.5.1. Why I-roots Cannot Form Accomplishments

Whereas A-roots cannot take lexical prefixes, they can take superlexical ones. Superlexical prefixes are prefixes that are adjoined to Asp and incorporate into the verb as the result of head movement. The hypothesis that lexical and superlexical prefixes differ in whether they are combined with the verb presyntacticallly, or as the result of syntactic incorporation, explains, for example, the fact that lexical prefixes are idiosyncratic, whereas the meaning of superlexical prefixes is stable and does not differ from one verb to another (see examples in section 2.1).

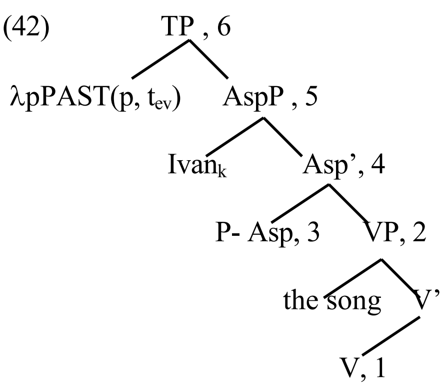
Let us now consider the structure of a prefixed verb in (41), where the prefix is added to the head of AspP projection rather than the verb:

(41) Ivan za-pel pesnju.

Ivan sang-PERF song-ACC

'Ivan started to sing a song'

(42)



1. $\lambda y\ \lambda t$ sing(t, y)

2. λt sing'(t, the song)

3. $\lambda q \lambda t\ \exists t'$ BECOME (za($\exists$P CAUSE(t, P(x_i),q)), t, t') {x_i}

4. $\lambda t\ \exists t'$ BECOME (za($\exists$P CAUSE(t, P(x_i), sing'(the song)), t, t') {x_i}

5. $\lambda t\ \exists t'$ BECOME (za($\exists$P CAUSE(t, P(j), sing'(the song)), t, t')

6. PAST($\lambda t\ \exists t'$ BECOME (za($\exists$P CAUSE(t, P(j), sing'(the song)), t, t')), t_{ev})

The derivation of the prefix adjoined to Asp node is given in (43):

(43) 2Ba. $\lambda q \lambda t \exists t'$BECOME(za($\exists$P CAUSE(t,P($x_i$),q)), t, t') {$x_i$}

$P_{j,k}$ 1F. $\lambda t \exists t'$ BECOME (za($\exists$P CAUSE(t, P(x_i), q_k), t, t') {x_i, q_k}

2Ba. $\lambda R\ \lambda t\ \exists t'$ BECOME (za(R(q_k)), t, t') {q_k}

$\lambda q \lambda t\ \exists$P CAUSE(t, P($x_i$), q) {$x_i$} $P_{j,k}$ 1F. $\lambda t \exists t'$ BECOME (za(R_j(q_k)), t, t') {R_j, q_k}

ARB.Asp $\lambda p\ \lambda t\ \exists t'$ BECOME (p, t, t')

$P_{j,k}$ 2Bb. λt za(R_j(q_k), t) {R_j, q_k}

1L. λt za(p_j, t) {p_j}

Now if we assume that za (p, t):= p(t), the translation of this sentence entails the following conditions:

(44) $\exists t'\ \exists$P CAUSE(t', P(j), sing(song', t)) $\wedge\ t_{ev} \propto t' \wedge t_{ev} <$ 'now'$\wedge$

$\exists t''$ [t''o $t_{ev} \wedge \forall t'''$ [t'''<t'' $\rightarrow$ t'''<t_{ev}] $\wedge\ \neg$CAUSE(t'', P(j), sing(song'))]

Sentences of this type denote inchoation of activities, which according to the classification of Dowty 1979 belong to the class of achievements. Parallel to other achievements discussed above, they do not specify the activity that caused the change from not singing to singing.

t'' t t'

(45) [[.] [ ]]

Ivan is not singing the song

Ivan is singing the song

Although these verbs are derived by the affixes CAUSE and BECOME, they differ from accomplishments in the scope of these operators. Whereas in the case of accomplishments the affix CAUSE has wide scope over BECOME, in the sentence in (41) the affix BECOME has wide scope over CAUSE.

Another difference in the interpretation of lexical and superlexical prefixes, as the translation above illustrates, concerns interpretation of their arguments. When a perfectivizing prefix is added to a verbal root (i.e. V), the argument that undergoes a change of state is the internal argument. On the other hand, if the predicate BECOME adjoins to Asp, then the argument that undergoes a change is the argument in the Spec of AspP position, i.e. the external argument. The sentence in (41), for example, entails that 'Ivan' underwent a change from not singing to singing.

This analysis correctly predicts that instrumental objects cannot undergo a change of state. Furthermore, given that they occupy the complement of V position rather than the Spec position, we also predict that the presence or absence of an instrumental object does not depend on the presence of a prefix, as opposed to accusative objects discussed above.

The present analysis of lexical and superlexical prefixes, therefore, explains the aspectual differences between A-roots and I-roots. Specifically, given that only lexical prefixes can derive accomplishments, and I-roots do not allow prefixation of lexical prefixes, we account for the inability of I-roots to form accomplishments.

3.6. Adjectival Passive

Now let us turn to the analysis of adjectival passive. The analysis presented in this section adopts the hypothesis of Kratzer 1994b, who argued that adjectival passive is derived by adjectivization of V or VP where the projection that introduces external arguments is not projected.

Under Kratzer's analysis, adjectival passives differ from verbal passives in that their external argument is not eliminated or absorbed but is completely missing. The German data in (46a)-(b) from Kratzer 1994b illustrates the difference:

(46) a. Das Kind war gekammt.

the child was combed

'The child was combed' (stative)

b. Das Kind wurde gekammt.

the child got combed

'The child was combed' (eventive)

The sentence in (46a) is an example of an adjectival passive construction, whereas (46b) illustrates verbal passive. The two kinds of passives differ in two major respects. First, adjectival passives are stative, whereas verbal ones are not. Second, whereas (46a) is compatible with the child having combed himself, (46b) says that "they combed him". To account for the second difference Kratzer proposes that whereas in verbal passives the external argument is implicit, in adjectival passive it is completely missing.

If external arguments are introduced in the lexicon, then we need to assume that a verb undergoes several lexical operations in the formation of adjectival passives. Under such analyses (see Borer 1984, among others), when the adjectival passive is derived from a verb the following changes must occur: the external argument is eliminated, the ability to assign accusative case is eliminated, the construction becomes stative and adjectival. These changes affect lexical properties of verbs. The problem which arises deals with the projection principle of Chomsky 1981 which requires all lexical properties to be preserved at each level of syntactic representation. If adjectival passives were lexical, the projection principle would not be violated. However, as Kratzer 1994b shows, there are phrasal adjectival passives that have the same properties as lexical adjectival passives. This means that if we apply an analysis sketched above, which assumes that a verb changes its lexical properties in the formation of adjectival passive, projection principle cannot be preserved.

If we assume, on the other hand, that adjectival passives do not have an external argument, no changes in lexical information are necessary. External arguments do not have to be eliminated, and the projection that introduces external arguments is not projected.

Given these assumptions, let us now turn to the present analysis of the adjectival passive. The sentence in (47a), for example, can be given the translation in (47b).

(47) a. The apple was eaten.

b. $PAST(\lambda t' \exists t\ BECOME(eaten(apple), t, t'), t_{ev})$

This translation can be rewritten as follows:

(48) $\exists t\ t \propto t_{ev} \wedge t_{ev} < \text{'now'} \wedge eaten(apple, t_{ev}) \wedge$

$\exists t'' [\ t'' o\ t \wedge \forall t''' [t''' < t'' \rightarrow t''' < t] \wedge \neg eaten\ (apple, t'')]$

Given this translation, we predict that the adjectival passive construction describes the resulting state of the apple being eaten. The variable t_{ev} in this case binds the variable t' in the translation of BECOME, whereas the time variable which corresponds to the eating event is existentially quantified. In this respect, adjectival passive differs from the active sentences illustrated above, where the PAST operator binds the variable at which the event took place, whereas the variable corresponding to the resulting state is existentially bound.

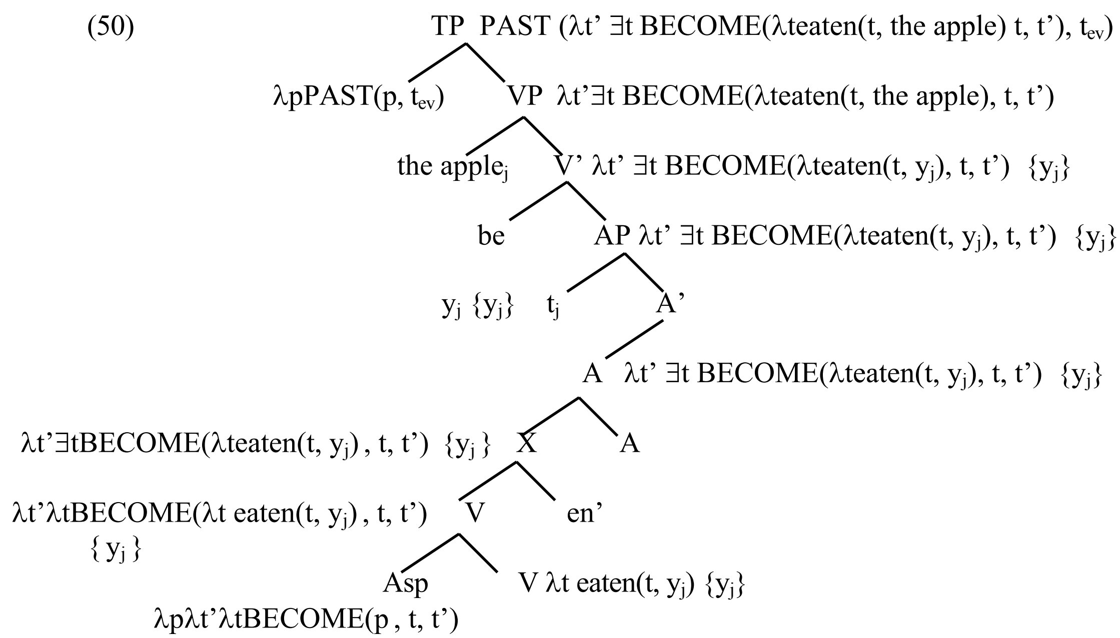
To derive this sentence compositionally, we assume that existential quantification of the variable t in the translation of BECOME operator is provided by the participial ending en-[29]. Specifically, we assume that the suffix 'en' is translated as follows:

(49) $\lambda R\ \lambda\beta\exists\alpha\ R(\beta, \alpha)$, where α, β are expressions of the type τ , $\tau \in \{i,e\}$, and R is of the type $<\tau, <\tau,t>>$.

The structure of the adjectival passive construction and its compositional translation is given in (50):

[29] The suffix 'en' is also involved in the derivation of perfect sentences in English, which can be analyzed parallel to adjectival passive above. Specifically, we can assume that the variable t_{ev} in the perfect constructions binds the second time variable in the translation of BECOME, which corresponds to the resulting state, whereas the first variable, which corresponds to the event itself, is existentially bound. The detailed analysis of the perfect, however, is beyond the scope of this thesis.

(50)



One of the consequences of this analysis is the 'perfectivity restriction' on adjectival passive (Schoorlemmer 1995), which is illustrated with Russian data below:

(51) a. *čitannaja kniga - pro-čitannaja kniga

read book pro-read book

b. * stroennyi dom po-stroennyi dom

built house po-built house

As the data in (51) show, adjectival passive in Russian cannot be derived from imperfective verbs.

A similar phenomenon, as discussed in Levin and Rappaport 1988a, is observed in English. As they note, only telic verbs can appear as perfect participles, whereas participles derived from atelic verbs like 'remain' are unacceptable:

(52) a. the burst pipe, a swollen ankle, rusted rails, wilted lettuce, …

b. *the (recently, stubbornly, deliberately) remained settlers

/Levin and Rappaport 1989, p.327/

The data in (52) follows under the present analysis, given that the participial suffix takes a relation as its argument. If the predicate BECOME is affixed, then the denotation of V is a relation between two time variables. In the case of imperfective verbs, on the other hand, the denotation of V is a property over time variablesrather than a relation. The analysis of adjectival passive presented above, therefore, crucially relies on the assumption that BECOME introduces two time variables.

Given this analysis of adjectival passive, we can now turn to the third generalization that distinguishes I-roots and A-roots in Russian, which says that adjectival passive constructions cannot be derived from the verbs headed by an I-root. An explanation of this generalization follows from the analysis of the adjectival passive construction given above, since this construction requires affixation of a lexical prefix to the verb, and I-roots cannot take lexical prefixes, as we discussed above.

The difference between A-roots and I-roots with respect to adjectival passive, therefore, can be accounted for based on the differences between the two classes of roots with respect to prefixation. However, as we have already mentioned above, there is another explanation of this phenomenon. The analysis of adjectival passive in Kratzer 1994a crucially relies on the assumption that external arguments are introduced syntactically, by an independent head. Now if a verb specifies its external argument in the lexical entry, then this argument has to be present in the logical representation, either realized by an overt NP or existentially bound. Adjectival passive, on the other hand, crucially differs from the other structures in that the external argument is not implicit or existentially bound, but rather is missing. If we do not allow an operation which can eliminate an argument[30], then we do expect that only A-roots, which introduce external arguments syntactically, can undergo adjectival passivization.

[30] This operation clearly cannot be defined in logical terms.

3.7. Summary

In this chapter we presented empirical generalizations that relate accusative and instrumental cases in Russian to aspectual and morphological properties of the verbs. Specifically, we argued that the class of I-roots, i.e. verbal roots that take instrumental objects, differs from A-roots, which assign/check accusative case, in the following respects:

- I-roots cannot take lexical prefixes
- I-roots cannot form an accomplishment
- I-roots cannot undergo adjectival passivization

Given these generalizations, we suggested that assignment of instrumental case in Russian is not unpredictable and idiosyncratic, but rather is determined by the syntactic structure.

The analysis of A-roots and I-roots that we proposed assumes that the two classes of roots have different logical type. Specifically, whereas A-roots are defined in the lexicon as predicates predicated of internal arguments, I-roots introduce both external and internal arguments in their lexical entry. Given this assumption, along with the rules of compositional semantics, we have shown that the syntactic structures of A-roots and I-roots are predicted to be different. Specifically, in the case of A-roots, the accusative object is generated in the Spec of VP position, whereas the external argument must be generated in the Spec of AspP. In the case of I-roots, on the other hand, both NPs must be generated within VP.

The difference in case is accounted for under the assumption that accusative NPs check case in the Spec of VP, whereas the instrumental case is checked in a complement position, when no verbal features can be checked. The hypothesis that the instrumental case is a default case is further supported by other examples of instrumental NPs.

The difference with respect to prefixation and aspectual properties is shown to follow from the compositional interpretation of prefixed verbs, given the analysis of perfectivity proposed in chapter 2 above.

And finally, the fact that adjectival passive cannot be derived from an I-root was related to the fact that I-roots cannot take lexical prefixes, since adjectival passive is known to require the presence of a prefix. However, it was also noted that this fact could be related to the logical type of an I-root, given that I-roots introduce external arguments in the lexicon, and thus cannot derive a construction where the external argument is missing in the logical representation.

CHAPTER 4

UNACCUSATIVITY

This chapter presents evidence for the claim that aspectual operators are separate lexical items based on the analysis of two classes of intransitive verbs, known as unaccusatives and unergatives (Perlmutter 1978).

The analysis of unaccusativity presented in this chapter follows Hoekstra and Mulder 1990 and Borer 1994 who proposed that arguments are not specified in the lexicon as being external or internal, and there are no linking conventions concerning projection of arguments. The present analysis develops this approach by using tools of compositional semantics and selectional restrictions of aspectual affixes and verbs to filter out impossible tree-verb combinations.

One of the consequences of this analysis discussed in this chapter is the existence of verbs that show variable behavior with respect to unaccusativity (Rosen 1984, Hoekstra 1984, Hoekstra and Mulder 1990, Borer 1994). The present analysis distinguishes three classes of verbs of variable behavior. The first class includes verbs that project unaccusative or unergative structures dependent on the semantics of the NP. The next class of verbs of variable behavior is illustrated by the verbs of motion, which pattern with unaccusatives if they take a prepositional phrase that specifies the terminal point of the motion, and as unergatives otherwise. And the third class of verbs of variable behavior is illustrated by fluid case-marking in active languages.

The chapter further discusses different semantic classes of verbs, which include stative verbs, verbs involving causation, and verbs of directed change. The argument projection for each semantic class is shown to be determined by the tools of compositional semantics, the selectional properties of affixes and verbs, and what we call below “economy of computation”. This analysis is shown to predict the correlation between the syntactic projection of the NP and the semantic interpretation, discussed in Van Valin 1990, Dowty 1991 and Levin and Rappaport Hovav 1995.

Further consequences of this approach discussed in this chapter are illustrated by the analysis of the transitivity alternation, and language variation with respect to argument projection.

4.1. Approaches to Unaccusativity

One of the most influential ideas about the argument structure of intransitive verbs is the "Unaccusative hypothesis" of Perlmutter 1978 (earlier discussed in Hall 1965). According to this hypothesis, some intransitive verbs, so-called unaccusative ones, are assigned an object and no subject in their underlying representation, whereas the others, which are called unergative verbs, are assigned an underlying subject. The difference between unaccusative and unergative verbs is reflected in a number of grammatical phenomena, such as auxiliary selection and ne-cliticization in Italian, discussed in Burzio 1986 and others.

Approaches to unaccusativity proposed in the literature differ in whether unaccusativity is represented in semantic, lexical or syntactic terms. Semantic approaches, advocated for example in Van Valin 1990, assume that this distinction is exclusively semantic, and there is no motivation for assuming that the arguments of unaccusatives and unergatives project in different syntactic positions. Lexical approaches, developed in LFG, propose that the two classes have different lexical structure but identical syntax. Most GB based approaches, however, assume that the difference between the two classes is encoded syntactically.

The present approach follows syntactic analyses of unaccusativity in that it assumes that unaccusative verbs differ from unergatives in their syntactic structure so that the grammatical differences between the two classes are explained in syntactic terms (see evidence for this position in Borer 1994, Levin and Rappaport Hovav 1995, among others).

If unaccusativity is represented syntactically, then what are the principles that determine which verb projects which structure? Standard GB analyses assume that lexical entries of the verbs contain some information concerning projection of their arguments so that syntactic expression of arguments is deterministically predicted, given the properties of individual lexical items (Chomsky, 1981, 1986, among others).

Some recent approaches, on the other hand, argued for in Hoekstra and Mulder 1990 and Borer 1994, assume that information about argument projection is not encoded in the lexical entry of a verb, and there are no linking or mapping principles which govern projection of the arguments. Verbs are free to occur in any syntactic constructions, if these constructions are 'compatible' with their meaning. These approaches to argument projection assume a different approach to the lexicon-syntax-semantics interface, according to which "the way in which the argument structure is projected onto the syntax contributes to (or determines within the limits set by the concept a predicate refers to) the meaning" /Hoekstra and Mulder 1990, p. 7/. This type of approaches are called 'predicate driven' in Borer 1994 and 'constructional' in Levin and Rappaport Hovav 1995 (a different version of a constructional approach is discussed in Goldberg 1995).

One of the main advantages of predicate driven approaches to argument projection deals with the analysis of verbs of variable behavior, that is verbs which can exhibit both unaccusative and unergative behavior. (Hoekstra 1984, Rosen 1984, Levin and Rappaport Hovav 1992, 1995, among others). If verbs can enter into different syntactic structures, then the fact that the same verb can project both unaccusative and unergative structures is not unexpected. 'Lexically-driven' approaches, on the other hand, need to assume that these verbs have duplicate categorization in unaccusative and unergative classes.

The present analysis follows predicate driven approaches in assuming that information about argument projection is not encoded in the lexical entry of verbs, and there are no linking conventions of any type. The question that arises, however, is what are the principles that filter out ill-formed projections? The intuitive idea of constructional approaches is that verbs can occur in a certain construction, if this construction is 'compatible with its meaning'. However, existing versions of such approaches do not really answer the questions of what exactly are the properties of the predicate which make it compatible with a certain construction, and how the notion of 'compatibility' can be defined.

The present analysis makes an attempt to answer these questions. Specifically, given the assumptions discussed in the next section, it shows that ill-formed projections can be filtered out by the rules of compositional semantics and the selectional properties of the verbs.

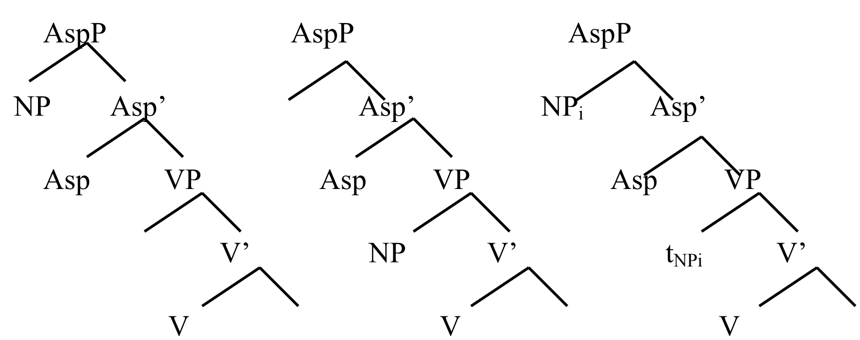
4.2. A Compositional Approach to Unaccusativity

4.2.1. Syntactic Structures

Following predicate-driven approaches, the present analysis assumes that arguments are not explicitly specified as being external or internal. It further assumes that verbs are free to project any structures, subject to general syntactic and semantic principles, and there are no linking conventions concerning the projection of arguments.

Let us consider possible intransitive structures under this approach, i.e. structures that are derived by a verb and one NP[31].

(1) Unergative (2) Unaccusative (3) Reflexive



[31] Note, that the terms 'transitive'/'intransitive' under the present approach distinguish syntactic structures rather than verbs, as well as the notions 'unaccusative' and 'unergative'.

Unaccusativity under this analysis is a purely syntactic phenomenon. If a verb enters into the structure in (1), then it shows unergative behavior, whereas if it enters into the structure in (2), then it behaves like unaccusative. Furthermore, as I argue below, there is a third possible structure, shown in (3), where the NP is generated in the Spec of VP position and then moves to the external argument position, i.e. the Spec of AspP[32]. This structure is called 'reflexive' below. Verbs which project the reflexive structure pattern with unergatives with respect to some phenomena (such as Case and agreement, for example), but with unaccusatives with respect to other diagnostics, such as auxiliary selection in Italian.

A crucial assumption is that verbs can project any of the three structures given above. Which structure(s) survive is determined by the rules of compositional semantics, along with the assumptions about the lexical semantics of verbs and aspectual affixes, as well as the principle of economy of computation, which we discuss below.

The following two sections illustrate two main consequences of the present analysis: 1) the claim that the syntactic position of the NP contributes to the interpretation of the sentence, and 2) that argument projection depends on the selectional properties of aspectual affixes and verbs.

4.2.2. Argument Projection and Compositional Interpretation

Let us compare the structures in (1)-(3) from the point of view of their compositional interpretation. As we show in this section, the interpretation of the NP under the present assumptions depends on its syntactic position, given that it determines its scope with respect to aspectual operators. The present analysis thus follows the agenda of Hoekstra and Mulder 1990 who wrote "the way in which the argument structure is projected onto the syntax contributes to

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[32] The existence of this structure is not critical for the main claim of the present chapter, specifically, that argument projection can be predicted based on selectional properties of the verbs and general semantic and syntactic principles.

(or determines within the limits set by the concept a predicate refers to) the meaning" /Hoekstra and Mulder 1990: p.7/.

In this section we illustrate the present analysis by the discussion of verbs derived by affixation of CAUSE[33]. We show that these verbs are predicted to have either agentive or nonagentive interpretation, dependent on the syntactic position of the argument.

4.2.2.1. Externally-Caused Unergatives

Let us first consider compositional interpretation of the unaccusative structure where AspP is headed by CAUSE. This structure can be illustrated by the sentence in (4) below[34]:

(4) The door opened

TP $PAST(\lambda t\ \exists p\ CAUSE(t, p, \lambda t\ \exists t'\ BECOME(open'(the\ door), t, t')), t_{ev})$

the door$_k$ T' $PAST(\lambda t\ \exists p\ CAUSE(t, p, \lambda t\ \exists t'\ BECOME(open'(y_k), t, t')), t_{ev})\ \{y_k\}$

T $\lambda p\ PAST(p, t_{ev})$ AspP $\lambda t\ \exists p\ CAUSE(t, p, \lambda t\ \exists t'\ BECOME(open'(y_k), t, t'))\ \{y_k\}$

Asp' $\lambda t\ \exists p\ CAUSE(t, p, \lambda t\ \exists t'\ BECOME(open'(y_k), t, t'))\ \{y_k\}$

$\lambda q \lambda t\ \exists p\ CAUSE(t, p, q)$[35] VP $\lambda t\ \exists t'\ BECOME(open'(y_k), t, t')\ \{y_k\}$

$y_k\ \{y_k\}$ t_k V' $\lambda y\ \lambda t\ \exists t'\ BECOME(open'(y), t, t')$

V $\lambda t\ \exists t'\ BECOME(open'(y_k), t, t')\ \{y_k\}$

As the compositional derivation of the sentence in (4) shows, if the NP is in the Spec of VP position, i.e. within the scope of CAUSE, then it is interpreted as the argument of the verb, i.e. as the causee of the action denoted by the verb. The causer of the event is existentially quantified in this translation. The verbs from this class correspond to 'externally caused' unaccusatives in the terminology of Levin and Rappaport Hovav 1995.

Furthermore, given this interpretation, we also predict that unaccusative sentences are understood as nonagentive, as opposed to verbal passives, for example.

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[33] Other semantic classes of verbs are discussed in section 4.6 below.
[34] Evidence that there is a CAUSE predicate in this sentence is discussed in section 4.6.2.1 below.

Compare, for example, the unaccusative and passive sentences in (5)-(6), discussed in Manzini 1983, Roeper 1987, among others:

(5) a. *The window broke by a thief.

b. The window was broken by a thief.

(6) a. *The window broke to rescue the child.

b. The window was broken to rescue the child.

As the data in (5)-(6) show, verbal passive can be modified by agentive phrases and allow the control of purpose clauses, whereas unaccusative verbs cannot. These data suggest that verbal passive, as opposed to unaccusatives, asserts the existence of a causer of the action, which can be modified by the 'by-phrases' and serve as a controller of the purpose clause.

The difference between unaccusative structures and verbal passive under the present assumptions can be accounted for as follows.

First, let us note that the root translation in (4) involves existential quantification over the proposition p, which is not decomposed into a complex P(x), as in the representation of all classes of verbs discussed in previous chapters[36]. Verbal passive under the present assumptions, on the other hand, can be interpreted as follows:

(7) a. The boat was sunk.

b. $\text{PAST}(\lambda t\ \exists P \exists x\ \text{CAUSE}(t, P(x), \lambda t\ \exists t'\ \text{BECOME}(\text{sunk}'(\text{the boat}), t, t')), t_{ev})$

Given this interpretation, we predict that the individual variable x in this translation can be modified by the 'by-phrase', as shown in (8):

(8) $\text{PAST}(\lambda t\ [\exists P \exists x\ \text{CAUSE}(t, P(x), \lambda t \exists t' \text{BECOME}(\text{sunk}'(\text{the boat}),t,t')) \wedge \text{thief}(x)], t_{ev})$

In the case of unaccusative verbs, on the other hand, this modification is not possible, since there is no variable that can be modified by a 'by-phrase'.

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[35] The derivation of this translation of CAUSE is given in section 4.4.1.

[36] If p_i were decomposed in this structure into $P_i(x_k)$ by Substitution Binding, then the structure could not be interpreted, since the index of x_k is not visible at any level (see the analysis of the obligatoriness of

Furthermore, the translations of the verbal passive and unaccusative constructions given above predict that they have different implicatures with respect to agentivity of the action.

Under the analysis of agentivity, discussed in chapter 2, agentivity is an implicature triggered by the causer argument, i.e. the individual argument of the functional complex P(x), which substitutes the variable p_i in the lexical translation of CAUSE. Given that in the case of verbal passive the existence of a participant of the causing proposition is asserted, we expect it to be understood as the agent of the resulting proposition, unless evidence to the contrary exists.

In the case of the unaccusative structure in (4), the existence of an individual causer of the event is not asserted. The sentence in (4) only asserts the existence of a causing proposition p, which brings about the door become open. Whether this change of state has been caused by an agent or not is unspecified in this sentence.

We thus expect that unaccusative sentences have a default nonagentive interpretation, but can be understood as agentive in certain contexts. For example, in the sentence in (9), John is most likely to be interpreted as the agent of the activity of opening the door:

(9) The door opened and John came in.

In summary, we have shown that if a NP is projected into the Spec of VP position, and the AspP is headed by CAUSE, then the NP is interpreted as the argument of the verb, i.e. as part of the resulting proposition, whereas the causing proposition is existentially bound. This translation has been supported by the differences between unaccusatives and verbal passives with respect to agentivity of the action.

4.2.2.2. Internally-Caused Unergatives

In the unergative structure, on the other hand, the NP is generated in the Spec of AspP position, and by the rules of compositional semantics, it serves as the logical argument of the

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arguments in section 2.6). Under these assumptions, we predict that the interpretation in (9) is the only interpretation possible for this structure.

affix CAUSE. The final translation of this sentence says that John caused some running, and it also implies that John is the agent of running.

(10) John ran.

AspP $\lambda t\ \exists P\ CAUSE(t, P(John'), \exists y\ run'(y))$

John

Asp' $\lambda t \exists P\ CAUSE(t, P(x_k), \exists y\ run'(y))\ \{x_k\}$

Asp $\lambda q \lambda t \exists P CAUSE(t, P(x_k), q)\ \{x_k\}$

VP $\lambda t\ \exists y\ run'(t, y)$

V' $\lambda t\ \exists y\ run'(t, y)$

V.ARB $\lambda t\ \exists y\ run'(t, y)$

The analysis of verbs like 'run' adopts the proposal in Marantz 1984 and Kratzer 1994, who argued that external arguments are not the true arguments of the verb. In Marantz 1984, unergative verbs like 'run' are propositions, which do not have any arguments. Under the present assumptions, however, all verbs are either properties or relations. Unergative verbs, therefore, are analyzed as involving an implicit argument. The question that arises is what can this argument refer to?

The implicit argument in the case of verbs of motion like 'run', as we argue below, is the argument that denotes a distance being passed:

(11) $\forall y\ \forall t\ run(t, y)$ if y is a distance

This argument can be overtly realized, as is illustrated in (12):

(12) John ran a mile.

The NP 'a mile' in the sentence in (12) delimits the action in the sense of Tenny 1987, or denotes an incremental theme (Dowty 1991).

To support the claim that that this argument is the true argument of the verb, we can show that it behaves parallel to direct objects in Russian.

Consider for example, the following Russian sentences. In the example in (13b) the sentence entails that John ran the entire mile, whereas the unprefixed imperfective verb in (13a) does not entail that Ivan finished running the mile[37].

(13) a. Ivan bezhal mil'u

Ivan ran-IMP mile-ACC

'Ivan was running the mile'

b. Ivan pro-bezhal mil'u

Ivan perf-ran mile-ACC

'Ivan ran the mile'

These entailments can be explained only if the NP 'the mile' is in the Spec of VP position, and serves as the argument of the perfectivizing prefix (see section 2.4).

(14) a. PAST(λt $\exists$P CAUSE (t, P(j), run'(the-mile)), t_{ev})

b. PAST(λt $\exists$t'$\exists$P CAUSE (t, P(j), BECOME(pro(the-mile, run'), t, t')), t_{ev})

The meaning of the prefix 'pro', as discussed in section 2.4.1, is as follows:

(15) pro(t, y, V) iff V(y) is completed at t

Given this semantics, the translation in (13a) does not entail that John finished running a mile, whereas the translation in (13b) does. A crucial assumption of the analysis of the contrast in (13a)-(b) is that the NP 'mile' is the logical argument of the verb in (13a), whereas in (13b) by the rules of compositional translation it serves as the argument of the prefix. If this NP were a modifier, for example, then the difference in the entailments would be unexpected.

Furthermore, as the data in (16) illustrate, this argument is obligatory when the verb is perfective:

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[37] As has been pointed out to me by B.Partee and V.Borschev, there is a strong implicature to interpret the sentence in (13a) as a finished event. More specifically, this sentence is interpreted as 'John took part in a mile-running event'. However, the completion of the running event cannot be analyzed as an entailment, as the following example shows:
Kogda Ivan bezhal distanciju, u nego zabolela noga, i on ne dobezhal do finisha
When Ivan ran the distance, his leg started to hurt, and he did not make it to the finish line.

(16) a. Ivan pro-plyl *(distanciju)

Ivan perf-swam distance-ACC

'Ivan swam the distance'

b. Ivan pro-shol *(kilometr)

Ivan perf-walked kilometer-ACC

'Ivan walked a kilometer'

The examples in (16) show that the accusative arguments are the arguments of the prefixed verbs. In general, this is not a sufficient evidence for the claim that these NPs are also the arguments of the corresponding unprefixed verbs, since some prefixes are known to change the selectional restrictions of the verb (see discussion of the resultative prefixes in section 2.4.1). However, the prefix 'pro', which derives the perfective forms in (16), is a pure perfectivizing prefix, which does not change the selectional restrictions of the verb. Given the semantics of the prefix 'pro', the data in (16) can be used as evidence that the object satisfies the selectional properties of the corresponding unprefixed verb.

Furthermore, the data in (16) suggests that these NPs are generated in the Spec of VP position. As discussed in section 2.6, the obligatoriness of the arguments of prefixed verbs is a consequence of the assumption that these arguments are coindexed with a prefix by virtue of being in a Spec-head configuration. If these arguments were not generated in the Spec of VP position, then the sentences in (16) could not be interpreted.

The fact that these NPs are accusative in both perfective (see (16)) and imperfective (see (17)) forms further suggests that they are generated in the Spec of VP position, given the analysis of the accusative case in Russian discussed in chapter 3, which assumes that accusative NPs check case by V in a Spec-head configuration.

(17) a. Ivan plyl distanciju

Ivan swam-IMP distance-ACC

'Ivan was swimming the distance'

b. Ivan shol dva kilometra

Ivan walked-IMP two kilometers-ACC

'Ivan was walking for two kilometers'

And the last piece of evidence comes from the fact that some verbs of motion can form an adjectival passive construction in Russian:

(18) projdennoje rasstojanije

walked distance

'a distance which has been walked'

All these data support the hypothesis that verbs of motion have a true argument, and that this argument ranges over distances which are being passed.

Now let us turn to other unergative verbs, like 'smile', 'laugh', 'dance'. If derivation of sentences with these verbs proceeds as proposed for 'run' above, then we predict that they have an implicit argument as well. Leaving out the past tense, we predict that the sentence in (19a) says that there was some laughter caused by John, and implies that John was the agent of the laughter.

(19) a. John laughed.

b. ∃P CAUSE(t, P(John'), ∃y laugh'(y))

As in the case of verbs of motion, we assume that verbs like 'laugh' are predicated of the arguments other than the agents. These arguments, as we argue for in more detail in section 5.1 below, correspond to cognate objects, and range over smiles, laughs and dances.

This analysis of unergative verbs is reminiscent of the analysis in Hale and Keyser 1993, who proposed that unergative verbs are transitive at what they called lexical-syntactic level of representation. The major difference is that the present analysis does not assume that unergative verbs are syntactically transitive, either at the lexical level or some other level of structural representation. The second argument of these verbs appears only in the logical translation of the unergative sentences, as the result of existential type-lifting triggered by a type-mismatch.

Given this analysis of unaccusative and unergative structures, we have shown that the interpretation of intransitive sentences depends on the syntactic position of the argument. If the NP is generated inside VP, it is interpreted as the logical argument of the verb, i.e. the object that undergoes the action. The verb has an externally-caused interpretation in the sense of Levin and Rappaport Hovav 1995. If the NP is generated in the Spec of AspP position, where AspP is headed by CAUSE, then it is interpreted as causing the event denoted by the verb, i.e. the sentence is understood as 'internally-caused".

4.2.2.3. Internally-Caused Reflexives

Given the rules of compositional semantics, and specifically the semantics of traces developed by Bittner 1994, we can further show that in the reflexive structure in (3) the NP is understood as both the undergoer and the causer of the action.

(20) He fell (on purpose)

TP $PAST(\lambda t\ \exists P\ CAUSE(t, P(he), \lambda t\ \exists t'\ BECOME(fallen(he), t, t')), t_{ev})$

He_k T' $PAST(\lambda t\ \exists P\ CAUSE(t, P(y_k), \lambda t\ \exists t'\ BECOME(fallen'(y_k), t, t')), t_{ev})\ \{y_k\}$

T   AspP $\lambda t\ \exists P\ CAUSE(t, P(y_k), \lambda t\ \exists t'\ BECOME(fallen'(y_k), t, t'))\ \{y_k\}$

$\lambda p\ PAST(p, t_{ev})$

t_k Asp' $\lambda x \lambda t\ \exists P\ CAUSE(t, P(x), \lambda t\ \exists t'\ BECOME(fallen'(y_k), t, t'))\ \{y_k\}$

$y_k\ \{y_k\}$

$\lambda q \lambda t\ \exists P CAUSE(t, P(x_k), q)$ VP $\lambda t \exists t'\ BECOME(fallen'(y_k), t, t')\ \{y_k\}$

$\{x_k\}$

t_k V' $\lambda y \lambda t\ \exists t'\ BECOME(fallen'(y), t, t')$

$y_k\ \{y_k\}$

V $\lambda y \lambda t\ \exists t'\ BECOME(fallen'(y), t, t')$

Given the rules of compositional semantics, the NP in this structure fills the argument position of both the affix CAUSE and the verb. Movement to the Spec of AspP position in this structure is semantically significant, as opposed to movement to the Spec of TP, illustrated by the translation of the unaccusative structure in (4).

Why does movement of the NP to the Spec of AspP position in this structure have semantic consequences? The AspP projection in this case is headed by the affix CAUSE. This affix, as discussed in section 2.1.2.2 above, is defined as a relation between properties of times p and q and a time variable, where the variable p is stored: CAUSE(t, p_i, q) {p_i}. The variable p_i can undergo the rule of Substitution Binding, that decomposes this variable into a functional complex $P_i(x_k)$ (see compositional derivation of this translation of CAUSE in section 2.3). The variable x_k in the translation of CAUSE has to be bound by a Binding rule, otherwise the final translation will violate the Store filter. Binding rules, as discussed in section 2.3 above, can apply only if the index of the variable is compositionally visible at the level where this rule applies. The index k, on the other hand, is not visible at the Asp level, given that the index of Asp is percolated from the stored variable in the lexical translation of CAUSE, i.e. the variable p_i. for the variable x_k to be bound, it has to be coindexed with the NP in the Spec of AspP position, otherwise the structure is not interpretable. This coindexation results in a logical predication relation between a NP (or its trace) in the Spec of AspP position and the affix CAUSE[38]. Specifically, as a result of this coindexation, the variable x_k can be bound at the Asp' level, and the NP fills the causer argument in the translation of CAUSE (see section 2.3 for more discussion).

Movement of the NP to the Spec of AspP position, therefore, results in a logical predication relation between the affix CAUSE and the NP. As a result of this coindexation, the NP is interpreted as the argument of CAUSE. The relation of logical predication can arise only between a NP and its potential logical predicate, such as the affix CAUSE, or other predicate which has a stored individual variable in its translation. Therefore, we predict that whereas movement to the Spec of AspP position where Asp is headed by CAUSE is semantically

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[38] Other consequences of logical predication are discussed in sections 2.6, 4.3.1.2, 5.1.2.2 and 6.1.

significant; movement to the Spec of TP position does not have the same semantic consequences[39].

In summary, we have shown that whether a sentence has an agentive or nonagentive interpretation depends on the syntactic position of the NP. If the NP is generated in the Spec of AspP position, or moves to this position, where AspP is headed by CAUSE, then it is interpreted as the argument of CAUSE, and the sentence is understood as internally-caused, or agentive. If the NP is generated in the Spec of VP position, then it is interpreted as the argument of the verb, or the undergoer of the action, and the sentence has a nonagentive reading.

4.2.3. Argument Projection and Selectional Restrictions

Let us now turn to the question of how do we filter out ill-formed projections?

Let us consider the Italian data in (21). The verb in (21a) selects for *avere* 'have' auxiliary, which can be used as a diagnostic of the unergative structure. The verb in (21b), on the other hand, takes *essere* 'be' auxiliary, which shows that the sentence projects the unaccusative structure.

(21) a. Gianni **ha** corso

Gianni has run

b. La finestra si **è** aperta

The door opened

The lexical input corresponding to the sentence in (21a) is given in (22). It includes the NP, the verb, the affix CAUSE, as well as tense and agreement morphemes.

(22) <Gianni, run, CAUSE, …>

If the unergative structure is projected, then the interpretation of the sentence is as in (23b) (compositional translation of this structure is illustrated in (10) above). This sentence says that some running took place, caused by P(j). It also implies that Gianni is the agent of running.

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[39] See also section 6.1 for more discussion

(23) a. Gianni **ha** corso

b. $\exists$P CAUSE(t, P(j), $\exists$y run'(y))

On the other hand, the unaccusative structure can also be projected, in which case the interpretation of the sentence is as in (24b):

(24) a. #Gianni **è** corso

b. $\exists$p CAUSE(t, p, run'(Gianni'))

In this translation, the NP 'Gianni' fills the argument position of the verb 'run'. The verb 'run' on the other hand, as we discussed above, takes distances as its argument. The sentence in (24a), therefore, is unacceptable, because it violates the selectional restrictions of the verb[40].

In general, given that in the unaccusative structure the NP serves as the logical argument of the verb, we can claim that *a verb and a NP can project the unaccusative structure only if the NP satisfies the selectional restrictions of the verb*[41].

Let us now consider the lexical input in (25):

(25) <door, open, CAUSE ..>

Again, both unaccusative and unergative structures can be projected. If the unaccusative structure is projected, then it is interpreted as in (26b). The sentence says that something or someone caused the door to open.

(26) a. La finestra si **è** aperta

b. $\exists$p CAUSE(t, p, open'(the_door'))

If the unergative structure is projected, then it is interpreted as in (27b), and the sentence is understood as 'the door caused something to open'. This translation, however, violates the selectional restrictions of the affix CAUSE described in (2) above, since the NP 'the door' does not have an ability to open something (see the selectional properties of CAUSE in section 2.1.2.2 above).

[40] The sentence in (24a) under this analysis is not ungrammatical, it is just not possibly true.

(27) a. # La finestra ha aperta

b. ∃P CAUSE(t, P(the_door), ∃y open'(y))

Argument projection, therefore, crucially depends on the selectional restrictions of aspectual affixes and verbs.

Further condition that filters out ill-formed projections under this analysis is the principle of economy of computation, discussed in section 4.6 below. However, before we turn to the discussion of various tree-affix combinations, let us first introduce syntactic diagnostics of the three structures given in (1)-(3).

4.3.Syntactic Diagnostics

Let us now consider syntactic differences between the three structures of intransitive verbs.

These structures can be distinguished by the following parameters:

a. The Spec of VP position is empty/not empty at all levels before LF

b. The Spec of AspP position is empty/not empty at all levels before LF

This section discusses morpho-syntactic phenomena that are sensitive to the parameter (a), and therefore distinguish the unergative structure in (1) from the reflexive and unaccusative ones. The next section presents phenomena that are sensitive to the second parameter, and therefore, distinguish the unaccusative structure in (2) from the reflexive and unergative ones.

4.3.1. Diagnostics of the Unergative Structure

Let us start by presenting morpho-syntactic phenomena that distinguish the unergative structure from the unaccusative and reflexive ones. These phenomena include cognate object and resultative constructions, ability to take a lexical perfectivizing prefix and to form an adjectival passive, and auxiliary selection in languages like Italian and Dutch.

[41] As we discuss below, this condition holds only if V does not have complements.

4.3.1.1. Cognate Object Construction

Let us start with cognate object constructions. As we show in this section, the semantic analysis of the unergative structures presented above predicts that a certain type of cognate objects, specifically non-adverbial cognate objects, can be used as a diagnostic of the unergative structure.

The analysis proposed below distinguishes three types of cognate objects[42]:

CO → Adverbial (predicates of events)
CO → Non-adverbial (predicates of individual variables) → Modifiers (Ins in Russian)
Non-adverbial (predicates of individual variables) → Arguments (Acc in Russian)

The difference between what we call ‘adverbial’ and ‘non-adverbial’ cognate objects is defined in semantic terms: adverbial cognate objects predicate of events (or properties of times under the present assumptions), whereas ‘non-adverbial’ ones predicate of individual variables. Cognate objects that predicate of individual variables can be further distinguished as modifiers or arguments.

Let us first note some differences between argument and modifier cognate objects, illustrated by the Russian data in (28):

(28) a. Ivan ulybnulsja schastlivoj ulybkoj.
Ivan smile happy-INS smile-INS
‘Ivan smiled a happy smile’

b. On prozhil dolguju zhizn’.
He perf-lived long-ACC life-ACC.
‘He lived a long life’

The examples in (28) illustrate that cognate objects can be either accusative or instrumental in Russian. The analysis of accusative cognate objects is parallel to the analysis of

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[42] Evidence for distinguishing ‘adverbial’ and ‘argument’ cognate objects is discussed in Pereltsvaig 1999, for example. The present distinction, however, is tripartite, as we argue below.

the internal arguments of verbs of motion discussed in section 4.2.2.2 above. For example, these objects are obligatory if the verb is perfective:

(29) a. On prozhil *(dolguju zhizn').

He perf-lived long-ACC life-ACC.

'He lived a long life'

b. On spel *(pesnju).

He perf-sang song-ACC

'He sang the song'

As discussed in section 4.2.2.2 above, the obligatoriness of the internal arguments of the prefixed verbs provides evidence that these arguments are generated in the Spec of VP position. Furthermore, these data show that these arguments are the true arguments of the verb. Prefixes 'pro' and 's' in the examples in (29) are pure perfectivizing prefixes, which do not change selectional properties of the verbs. The arguments 'life' and 'song', therefore, satisfy the selectional restrictions of the corresponding unprefixed verbs.

The fact that these verbs can form an adjectival passive, as shown in (30), provides additional support for the analysis of accusative cognate objects as being the true arguments of the verb and being generated in the Spec of VP position (see the analysis of the adjectival passive in section 3.6).

(30) a. prozhitaja zhizn'

lived life

b. spetaja pesnja

sung song

If cognate objects are instrumental, on the other hand, then they do not seem to function as the arguments of the verb. Instrumental cognate objects can be omitted if a verb is perfective (see (31a)), and adjectival passive construction can never be formed from these verbs, as shown in (31b):

(31) a. Ivan zaulybalsja.

Ivan smiled-PERF

'Ivan started to smile'

b. * zaulybatyj

smiled

Given the analysis of these phenomena discussed above, we can claim that instrumental cognate objects are not generated in the object position (i.e. the Spec of VP position under the present analysis), but rather are syntactic modifiers. (see Zubizarreta 1987, Jones 1988, among others for further evidence). This hypothesis is supported by the fact that they are instrumental in Russian, given the distribution of the instrumental case discussed in chapter 3.

Now let us turn to the semantic analysis of these constructions.

Given the interpretation of verbs like 'dance' and 'smile' discussed above, the structures with these verbs have an implicit internal argument. Non-adverbial cognate objects, as we propose below, either serve as the internal argument or modify the individual variable introduced by the verb.

(32) a. Ivan ulybnulsja schastlivoj ulybkoj

Ivan smile happy-INS smile-INS

'Ivan smiled a happy smile'

b. $\lambda t \exists P$ CAUSE (t, P(j), $\lambda t \exists x$ smile'(t, x) $\wedge$ happy -smile(x))

(33) a. Ivan pel pesnju

Ivan sang-IMP song-ACC

'Ivan sang a/the song'

b. $\lambda t \exists P$ CAUSE (t, P(j), sing'(the song))

$\lambda t \exists P$ CAUSE $(t, P(j), \exists x\ song'(x) \wedge sing'(x))$

$\lambda t \exists P\ \exists x\ song'(x) \wedge$ CAUSE $(t, P(j), sing'(x))$[43]

This analysis of cognate objects crucially relies on the semantic interpretation of the unergative verbs proposed above, which are predicated of arguments other than the agents. Specifically, as we proposed above, the true arguments of the verbs 'smile', 'laugh', 'dance' range over the smiles, laughs, and dances. These arguments are existentially quantified in the root translation of the unergative structures.

This analysis explains, for example, why modifying cognate objects, i.e. cognate objects which bear instrumental case in Russian, always require the presence of some adjective:

(34) ?? Ivan ulybnulsja ulybkoj

John smiled smile-INS

'John smiled a smile'

The oddness of this sentence is due to a pragmatic requirement on the modifiers to contribute to the meaning of the sentence. In the translation of the AspP node of the sentence in (34), on the other hand, modification by a cognate object is semantically vacuous:

(35) $\lambda t \exists P$ CAUSE $(t, P(j), \lambda t[\exists x\ smile'(x, t) \wedge smile(x)])$

In this respect modifying cognate objects are different from cognate objects which are true arguments, as in the examples below:

(36) a. Ivan pel pesnju

Ivan sang-IMP song-ACC

'Ivan was singing the song'

b. Masha stancevala tanec

Masha perf-danced dance-ACC

[43] If the object is indefinite, then there are two scope options with an existential quantifier having wide or narrow scope. In this respect accusative cognate objects differ from the instrumental ones, where the existential quantifier always has narrow scope.

'Masha danced the dance'

Another difference between instrumental and accusative cognate objects in Russian, as noted in Pereltsvaig 1999, is that instrumental cognate objects cannot co-occur with strong determiners:

(37) * Ulybnis' etoj ulybkoj/ kazhdoj ulybkoj

Smile this smile-INS /every smile-INS

'Smile this smile/every smile'

/Pereltsvaig 1999, p.540/

(38) Stancuj etot tanec/kazhdyi tanec

Dance this dance-ACC/every dance-ACC

'Dance this dance/every dance'

These data can be accounted for under the present analysis, since instrumental NPs modify the existentially quantified variable in the translation of the verb. Accusative cognate objects, on the other hand, are the logical arguments of the verb, and the verb does not detransitivize in this structure (see examples in (13)-(14) above).

Although instrumenal and accusative cognate objects differ in many respects, they are similar in that they are predicated of individual variables. Given this analysis, we can show that non-adverbial cognate objects are restricted to the unergative structures (cf. Marantz 1984, Levin and Rappaport Hovav 1995, among others).

Consider for example, the data in (39)-(40)

(39) a. John smiled a happy smile.

b. *He fell an easy fall.

(40) a. Ivan ulybnulsja schastlivoj ulybkoj.

Ivan smile happy-INS smile-INS

'Ivan smiled a happy smile'

b. *On upal legkim padeniem.

He fell easy-INS fall-INS

'He fell an easy fall'

Given the semantic analysis of the unaccusative and reflexive structures discussed above, we expect that verbs that project these structures cannot take cognate objects, provided that the argument of these verbs is an overt NP. For example, the AspP node of the sentence 'John fell' in the reflexive interpretation is translated as follows.

(41) $\lambda t \exists P$ CAUSE (t, P(he), $\lambda t \exists t'$ BECOME(fallen (he), t, t')

It is easy to see that the modifier $\lambda x[\text{easy}(x) \wedge \text{fall}(x)]$ cannot be combined with any part of the translation of this sentence, given that there is no variable that can be modified by these properties.

However, not all cognate objects are predicates of individual variables. Specifically, it is plausible to assume that there are what we call 'adverbial' cognate objects that predicate of events or properties of times. This type of cognate objects is not restricted to unergative verbs.

Adverbial cognate objects can be illustrated by the following example in Hebrew:

(42) Hu nafal nefila ka©a.

He fell falling hard

'He had a heavy fall'

/Mittwoch 1998, cited in Pereltsvaig 1999/

As discussed in Pereltsvaig 1999, the constructions of the type given in (42) behave as adverbials, and differ from the non-adverbial cognate objects discussed above.

The difference between Hebrew and languages like Russian and English can be explained if we assume that adverbials of the type illustrated in (42) can predicate of events in Hebrew, whereas in English and Russian they can only function as predicates of individual variables.

A more detailed analysis of adverbial cognate objects is left for future research. What we have shown in this section, however, is that non-adverbial cognate objects, which predicate of individual variables, cannot co-occur with unaccusative and reflexive structures, and therefore can be used as a diagnostic of the unergative structure. We further have shown that this analysis of non-adverbial cognate objects supports the present semantic analysis of unergative verbs, which involves an existentially quantified internal argument.

4.3.1.2. Telicity and Lexical Prefixation

Another difference between the unergative structures and the unaccusative/reflexive ones is based on their ability to take a lexical perfectivizing prefixes. Lexical prefixes, as discussed in chapter 3 above, are prefixes that adjoin to the verb presyntactically. These prefixes can be added to V only if there is an overt NP in the Spec of VP position. Specifically, as we showed in section 2.6, prefixes introduce an individual stored variable, which corresponds to the internal argument of the prefixed verb. For this variable to be bound, it has to be coindexed with a NP in the Spec of VP position. If the Spec of VP position is empty, then the index of the stored variable introduced by the prefix is not visible, and this variable cannot undergo Binding rules. The root translation of such a structure violates the Store filter, which requires the store in the root translation to be empty.

As a consequence of this analysis, we predict that verbs with lexical prefixes can only be interpreted if there is a NP (or its trace) in the Spec of VP position. Put differently, verbs with lexical prefixes can project either unaccusative or reflexive structures, but cannot project an unergative structure.

This prediction can be confirmed by the following Russian data. The examples in (43) illustrate that the verbs ‘smejatsja’ (laugh) and ‘blestet’ “shine’, which project unergative structures, do not allow affixation of lexical prefixes:

(43) a. *pro/u/v/s/pri-smejalsja

laugh-PERF

b. *pro/u/v/s/pri-blestel

shine-PERF

The only perfectivizing prefix that can be added to these verbs is the superlexical prefix za-, discussed in chapter 3:

(44) a. za-smejalsja

started to laugh

b. za-blestel

started to shine

Verbs that project other structures, however, allow affixation of lexical prefixes:

Transitive structures:

(45) Danila pro-shol mil'u

Danila pro-walk mile-ACC

'Danila walked a mile'

Unaccusative structures:

(46) Igrushka s-lomalas'

Toy s-broke

'The toy broke'

Reflexive structures:

(47) Ivan pri-shol

Ivan pri-walk

'Ivan came'

Lexical prefixes, as discussed in chapters 2 and 3 above, derive telic verbs, such as accomplishments and achievements. We thus predict that there is a correlation between telicity and unaccusativity, specifically, telic sentences (excluding those derived by superlexical prefixes) cannot project unergative structures. The correlation between telicity and unaccusative structures is a well-known phenomenon, discussed in Van Valin 1990, Dowty 1991, Levin and Rapport Hovav 1995, among others. Under the present analysis this generalization is a consequence of the compositional interpretation of telic structures, which can only be interpreted if there is a NP generated in the Spec of VP position.

4.3.1.3. Adjectival Passive

Similar considerations apply to the restrictions on the adjectival passive construction.

Given the analysis of adjectival passive discussed in section 3.6, this construction can only be derived from the verbs with lexical perfectivizing operators, i.e. verbs derived by presyntactic affixation of BECOME. If a prefix cannot be added, then adjectival passive cannot be formed.

Unergative structures cannot form this construction (see Hoekstra 1984, Levin and Rappaport 1989, among others), since these structures do not have a nominal element in the Spec of VP position, which could be coindexed with the perfectivizing operator.

Although there are other constraints on the availability of adjectival passive (see examples of unaccusative verbs that cannot form this construction in Pesetsky 1995, for example), the following generalization is predicted to hold:

If a verb can only project an unergative structure (i.e. variable behavior excluded), then it cannot form an adjectival passive.

4.3.1.4. Resultative Construction

Resultative construction also depends on the presence of an overt NP in the Spec of VP position.

Consider, for example, the following sentences:

(48) a. The door rolled open.

b. *John laughed silly.

c. John laughed himself silly.

The present analysis of this phenomenon, discussed in more detail in chapter 5 below, is parallel to the analysis of the obligatoriness of internal arguments in the case of transitive and intransitive structures that involve lexical perfectivizing prefixes. Specifically, as we argue in chapter 5, resultative constructions are derived by affixation of the affix CAUSE to the verb, which introduces a stored variable, parallel to the affix BECOME in the structure of perfective verbs. This variable has to be coindexed with a NP in the Spec of VP position in order for the structure to be interpretable.

For example, the sentence in (48a) under the present assumptions projects an unaccusative structure. The stored variable introduced by CAUSE can be coindexed with the NP by virtue of it being in a Spec-Head configuration. This variable, therefore, is compositionally visible to the Binding rules at the V' level, and the sentence is interpretable[44].

If the affix CAUSE is adjoined to a verb in the unergative structure, as in (48b), then the stored variable introduced by CAUSE is not compositionally visible, and the root translation violates the Store filter. To save this structure we can add an overt NP in the Spec of VP, as in (48c). Since this NP can license application of a Binding rule for the stored variable introduced by CAUSE, the result is interpretable, and the structure is considered grammatical.

4.3.1.5. Auxiliary Selection

Another phenomenon that depends on the NP being generated in the Spec of VP position is auxiliary selection in languages like Italian. In Italian, the past tense auxiliary 'essere' is selected over 'avere' in the case of unaccusatives, reflexive verbs, passives, and impersonal 'si' constructions.

One of the attempts to provide a unified analysis of this phenomenon is made in Burzio 1986. In a simplified version his proposal can be stated as follows:

'essere' is selected whenever a 'binding relation' exists between the subject and 'a nominal contiguous to the verb'.

According to this rule, if a NP is generated in the object position, and then moves to the subject position, then 'essere' is selected.

Given this hypothesis, we expect that auxiliary selection distinguishes the structures in (2) and (3) from the unergative structure in (1).

This generalization is supported by the data discussed in the literature:

Unergative structures:

(49) Maria ha esagerato.

'Maria exaggerated"'

Unaccusative structure:

(50) La pressione è aumentata

'The pressure increased'

Reflexive structures

(51) a. Luigi è (*ha) caduto apposta

'Luigi fell on purpose'

b. Luigi è (*ha) intervenuto allo scopo di difenderci

'Luigi intervened for the purpose of defending us'

/Rosen 84, p.64/

If auxiliary selection depends on whether the NP is generated in the Spec of VP position, then we predict that it correlates with telicity but not agentivity. Availability of a telic interpretation, as we have discussed above, depends on the NP being generated in the Spec of VP position. The agentivity implicature, on the other hand, is triggered only by the unergative and

[44] Compositional interpretation of resultative constructions is discussed in section 5.1.2.

reflexive structures (see section 4.2.2 above), i.e. structures where the NP is either generated in the Spec of AspP position, or moves to this position.

We thus predict that telic verbs select for 'essere' auxiliary, independent on whether they are agentive (i.e. project a reflexive structure) or nonagentive (i.e. project an unaccusative one). This prediction is supported by the data from Rosen 1984 in (50)-(51), which shows that both unaccusative nonagentive sentences and reflexive agentive sentences select 'essere'. On the other hand, it has been noted by Rosen 1984, Hoekstra 1984, L.Levin 1986, Van Valin 1990, among others that auxiliary selection correlates with the semantics of the verb. The generalization that emerges under the present analysis is that if the intransitive verb is telic, then 'essere' must be selected[45].

(52) a. Ugo ha corso meglio ieri
'Ugo ran better yesterday'
b. Ugo è corso à casa
'Ugo ran home'

As the data in (52a)-(b) show, if a verb is atelic, then 'avere' is selected, whereas in the case of a telic reading the verb selects for 'essere'. Under the present analysis, telic sentences can be interpreted only if the NP is generated in the Spec of VP position. The sentence in (52b), therefore, can only project a reflexive structure (compositional interpretation of this structure is discussed in section 4.4.2 below), whereas the sentence in (52a), as discussed above, projects the unergative structure.

The correlation between telicity and 'essere' auxiliary under this analysis is not direct, and both phenomena are viewed as a consequence of the syntactic structure. Telic transitive verbs, for example, are predicted to select 'avere'rather than 'essere', since the object does not move from the Spec of VP position. This explains the data in (53) from Everaert 1992, cited in

[45] Notice that the reverse statement is not true, atelic verbs can project unaccusative structures, as discussed in section 4.6.

Borer 1994 and Levin and Rappaport Hovav 1995, which shows that telic verbs select *hebben* in Dutch, if the sentence contains either a light verb construction, or an idiom that involves a verb plus object:

(53) a. Het vliegtuig heeft een landing gemaakt
The plane has a landing made
'The plane has made a landing'
b. Hij heeft zich uit de voeten gemaakt
He has self out of the feet made
'He fled'

These data, as pointed out in these works, supports the syntactic analysis of auxiliary selection, such as that of Burzio 1986.

4.3.2. Diagnostics of the Unaccusative Structure

Unaccusative structures differ from the reflexive and unergative ones in that the NP is not in the Spec of AspP position at any syntactic level. As noted above, in the case of verbs derived by CAUSE, if there is a NP in the Spec of AspP position, then the structure is interpeted as agentive. Unaccusative structures, on the other hand, are interpreted as nonagentive. This analysis predicts that syntactic phenomena that are sensitive to the NP being in the Spec of AspP position correlate with agentivity rather than telicity. This prediction is confirmed in this section by case and agreement in active languages and impersonal passivization in Dutch.

4.3.2.1. Case and Agreement in Active languages

Case and agreement in active languages are often cited as diagnostics of unaccusative verbs (Rosen 1984, V.Valin 1990, among others). Active languages are languages that distinguish semantic categories of agents and patients by means of case, as opposed to accusative languages like English or Italian and ergative languages like Inuit where different case-marking distinguishes grammatical categories of subjects and objects.

In active languages, intransitive sentences fall into two groups: those which occur with an 'agentive' or ergative marker (either on a NP, or a verb, or both), and those which have a 'patientive', i.e. nominative or accusative marker. Different types of active languages are discussed in chapters 6 and 7. For now let us illustrate the phenomenon with the data from Albanian discussed in Rosen 1984.

In Albanian, verbs belong to two morphological classes, which can be distinguished by different agreement markers on the verb, called 'active voice' and 'middle voice' in Rosen 1984:

(54) a. Ai qendroi pranë Dritës

He stood-ACTIVE near Drita

'He stood near Drita'

b. Dega u thye

Branch-the broke-MIDDLE

'The branch broke'

/Rosen 1984/

The two classes of intransitive verbs are analyzed in Rosen 1984 as unaccusative and unergative verbs.

On the other hand, it is also observed in Rosen 1984 that the classes of verbs distinguished by this diagnostic are different from the classes distinguished by auxiliary selection, for example. As the data in (55)-(56) show, whereas verbs of directed motion select for 'essere' in Italian, they pattern with unergatives with respect to agreement in Albanian:

(55) a. Faria shkoi shpejt në shtëpi

Nom went-ACTIVE quickly to home

'Faria went home quickly'

b. Lidia è andato subito a casa

'Lidia went home quickly'

(56) a. Arrita këtë mëngjes nga Korçë

Arrived-ACTIVE this morning from Korçë

'I arrived this morning from Korçë'

b. Sono arrivato stamattina da Korçë

'I arrived this morning from Korçë'

/Rosen 1984/

These data is not unexpected under the present analysis, if the sentences in (55)-(56) project a reflexive structure. If auxiliary selection depends on the NP being generated in the Spec of VP position, then these sentences pattern with unaccusatives in selecting 'essere' in Italian. On the other hand, if ergative case and agreement depend on the NP being in the Spec of AspP position, then we predict that verbs which project a reflexive structure pattern with unergatives with respect to agreement or case.

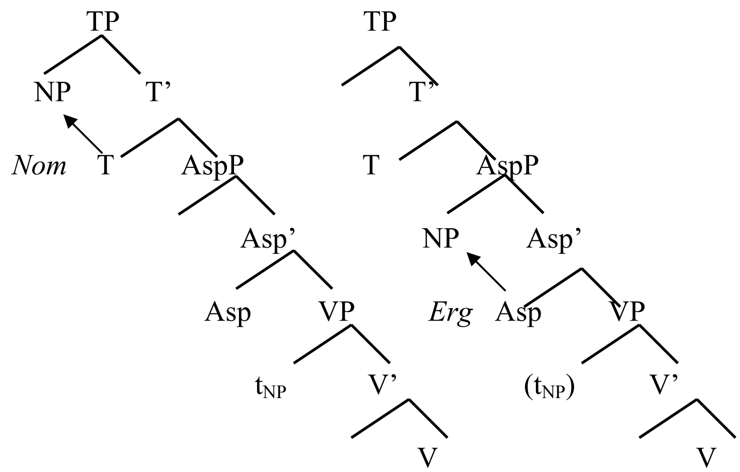
As we argue in chapters 6 and 7 below, the ergative case and agreement features are checked by Asp in the Spec of AspP position. This assumption is supported by the analysis of different active languages, including Georgian, Eastern Pomo, Tsova-Tush, Lakhota and others.

Let us illustrate the present analysis of the ergative case by one class of active languages, which we call ergative active in chapter 6. Ergative active languages are languages with the following ranking of feature checking constraints:

(57) CH-Asp>>CH-T>>CH-V

Given this ranking, as is discussed in more detail in chapter 6, we predict that the nominal features of Asp has to be checked prior to the nominal features of other verbal heads. This follows from the assumption that the constraint CH-Asp in these languages is the highest-ranked constraint. If the argument is generated or moves to the Spec of AspP position, then it checks ergative case features of Asp. If it does not move to this position, then the case features of Asp cannot be checked, and the case/agreement features of the NP are determined by the next highest-ranked constraint, i.e. CH-T. Given this analysis, the structures in (1)-(3) check case as follows:

(58) a. unaccusative structure b. unergative/reflexive structures



Active languages, as we discuss in chapter 6, differ in many respects. However, their unifying property is that different marking of intransitive non-stative sentences in these languages always correlates with agentive/nonagentive interpretation, or ‘protagonist control’ in the terminology of McLendon 1978. The following data is from Hindi, discussed in Mohanan 1990, where the ergative case on the argument of the intransitive verb is associated with what she called ‘conscious choice’, whereas the nominative case implies that the action is unintentional.

(59) a. Raam-ko acaanak šer dik^{h}aa. vah/*us-ne cillaayaa.

Ram-Dat suddenly lion-Nom appear-PERF he-Nom/he-Erg scream-perf

‘Ram suddenly saw a lion. He screamed’.

b. us-ne/*vah jaan buuj^{h}kar cillaayaa.

He-Erg/he-Nom deliberately shout-Perf

‘He shouted deliberately’.

/Mohanan 1990/

The correlation between case and agentivity is not unexpected under the present analysis, since both case features and agentive interpretation depend on the presence of a NP in the Spec of AspP position.

4.3.2.2. Impersonal passivization

Another phenomenon that seems to distinguish the unaccusative structures from the reflexive and unergative ones is the impersonal passivization in Dutch. The ability of a verb to form impersonal passive constructions is often cited as a diagnostic of an unergative verb (see Perlmutter 1978, among others). However, as Zaenen 1988 points out, there is a class of verbs in Italian which pattern like unergatives with respect to impersonal passivization, but like unaccusatives with respect to auxiliary selection. These verbs are illustrated by 'fell' below.

(60) Luigi e caduto apposta.

'Luigi fell on purpose'

/Rosen 1984/

(61) In het tweede bedrijf werd er door de nieuwe acteur op het juiste ogenblik gevallen.

'In the second act was there by the new actor on cue fallen'

/Perlmutter 1978/

The example in (60) shows that in its agentive reading 'fell' selects 'essere' and, therefore, patterns with unaccusatives. The data in (61), on the other hand, shows that the same verb patterns with unergatives in that it can undergo impersonal passivization.

These data can be accounted for, if we assume that impersonal passivization depends on the presence of a NP in the Spec of AspP position. In this study, I will not attempt to provide an analysis of impersonal passive which explains this generalization. However, this assumption can be supported by the fact discussed in Zaenen 1988 that the sentence in (61) is possible only if it has an intentional interpretation.

Another example that illustrates the correlation between agentivity and impersonal passivization is given in (49). This sentence is understood as conveying an unusual assumption that the event is volitional and agentive, and therefore a kind of joke (see also Dowty 1991 for some discussion)

(62) Er werd door de krengen gestongen

'There is stunk by the nasty women'

/Zaenen 1988/

The correlation between agentivity and impersonal passivization is expected if this construction depends on the presence of a NP in the Spec of AspP position. Under this assumption we predict that impersonal passive can be derived from the reflexive and unergative structures, but not the unaccusative ones.

Agentive telic sentences under this assumption project the reflexive structure, where the NP is generated in the Spec of VP and then moves to the Spec of AspP. Reflexive structures under the analysis of auxiliary selection in Burzio 1986 are predicted to select 'essere' auxiliary. However, if impersonal passive can only be formed if there is a NP in the Spec of AspP position at some level before LF, then we predict that reflexive structures pattern with the unergative ones with respect to this construction.

Impersonal passivization, therefore, can also be used as a test to distinguish the unaccusative structure from the unergative and reflexive ones.

Let us conclude the discussion of the diagnostics of the unergative and unaccusative structures by the following table:

	Unergative	Unaccusative	Reflexive
Cognate objects	yes	no	no
Telic interpretation	no	yes	yes
Resultative constructions	no	yes	yes
Auxiliary selection in Italian	avere	essere	essere
Case/agreement in active languages	Erg	Nom	Erg
Impersonal passivization	yes	no	yes

4.4. Verbs of Variable Behavior

One of the consequences of this approach to argument projection concerns verbs of variable behavior with respect to unaccusativity. In this section we distinguish three types of variable behavior, predicted by our analysis.

The first class is the class of verbs that can appear in unaccusative and reflexive structures. Variable behavior of these verbs is agentivity-based: if a verb projects a reflexive structure, then it is interpreted as agentive, if it enters into an unaccusative structure, then it is interpreted as nonagentive.

The second class includes verbs that alternate between unergative and reflexive structures. This alternation is related to telicityrather than agentivity, and is illustrated below by the class of verbs of motion.

And finally, some verbs can enter into either unergative or unaccusative structures dependent on the NP. Specifically, as we show below, if the NP satisfies the selectional restrictions of the verb, then the unaccusative structure is projected. On the other hand, if the NP does not satisfy the selectional restrictions of the verb, but can be the logical argument of the aspectual affix that heads the AspP projection, then the unergative structure is projected.

4.4.1. Agentivity-based Variable Behavior

Let us start with verbs that alternate between unaccusative and reflexive structures. These are verbs like ‘fall’, ‘roll’, and others that may be interpreted either as agentive, i.e. internally-caused, or as externally-caused, or nonagentive.

Consider, for example, verbs that show fluid case marking in active languages, illustrated below by the data from Tsova-Tush (Batsbi). As discussed in Holisky 1987, in this language the same verb can co-occur either with an ergative or a nominative NP. Furthermore, the difference in case-marking correlates with agentivity or intentionality of the action: sentences with ergative NPs are understood as agentive, whereas if the NP is nominative, then the sentence has a nonagentive interpretation.

(63) a. as wože

I-Erg fell

‘I fell’ (it was my own fault that I fell down)

b. so wože

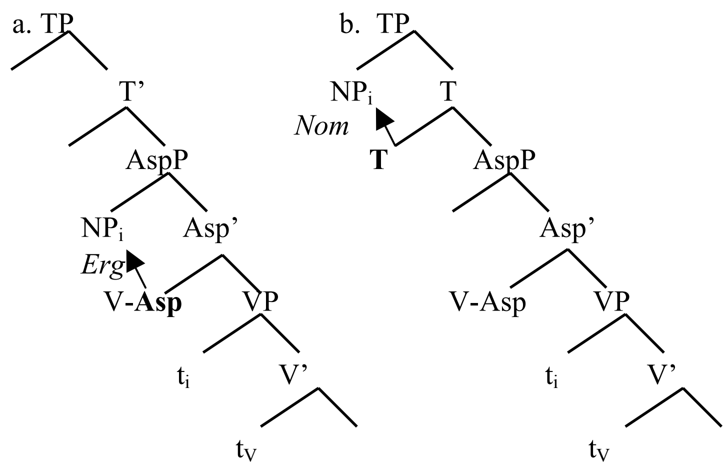
I-Nom fell

‘I fell’ (no implication that it was my fault)

/Holisky 1987/

As we have discussed above, case and agreement in active languages distinguish unaccusative structures from the unergative and reflexive ones. In other words, case in active languages depends on whether the NP is present in the Spec of AspP position at some level before LFrather than on the position where the NP is generated. The structures of the sentences in (63) are given in (64). In both structures, the NP is generated in the Spec of VP position, whereas the s-structure representation of the two sentences is different. Specifically, in the structure in (64a), the NP moves to the Spec of AspP position, whereas in (64b) the NP moves to the Spec of TP position. Given these structures, we can account for the differences in agentivity and case.

(64)



As discussed in section 4.3.2.1 above (see also chapters 6 and 7), in ergative active languages the NP checks ergative case against Asp in the Spec AspP position; however, if the ergative case features cannot be checked, then the NP checks nominative case against Tense.

Furthermore, we have also shown that the sentences in (63) are predicted to have different interpretations. Given that in (64a) the NP moves from the Spec of VP to the Spec of AspP position, by the rules of compositional semantics, it fills the argument position of both the verb and the affix CAUSE. The final translation of this sentence says "I caused myself to fall", where the NP is interpreted as both the undergoer and the causer of the action (see section 4.2.2.3 above):

(65) a. as wože

I-Erg fell

b. ∃P CAUSE(t, P(I), fell'(I'))

On the other hand, if the NP does not move to the Spec of AspP position, then the causing proposition is existentially bound, and the sentence is understood as externally-caused.

(66) a. so wože

I-Nom fell

b. ∃p CAUSE(t, p, fell'(I'))

To summarize the analysis of the Tsova-Tush data, we proposed that in both structures the NP is generated in the Spec of VP and thus is interpreted as the argument of the verb. If the

NP moves to the Spec of AspP, then it checks ergative case, and is interpreted as the agent of falling. On the other hand, if the NP does not move to this position, then it checks nominative case, and the sentence has an externally-caused interpretation.

Further examples of agentivity-based variable behavior can be illustrated by the following Hebrew data discussed in Borer 1994. As the examples in (67) show, verbs like 'wilt' and 'disappear' can behave as unaccusatives in allowing a possessor dative, or as unergatives, allowing a reflexive dative. The two occurrences of the verb correlate with differences in interpretation:

(67) a. ha-prahim navlu li

The-flowers wilted to me

'My flowers wilted'

b. Ha-prahim$_1$ navlu lahem$_1$

the-flowers wilted to-them

'The flowers were wilting' (implies volition or at least self-directed motion)

(68) a. Ha-kelev ne'elam li

the dog was disappeared to me

'My dog disappeared lost'

b. Ha-kelev$_1$ ne'elam lo$_1$

the-dog disappeared to-him

The dog disappeared (implies volition/intention)

/Borer 1994, p. 20-21/

These data can also be accounted for as a consequence of syntactic structures, given that as discussed in Borer and Grodzinsky 1986, the possessor dative in Hebrew can bind either an internal argument, or an adjunct, whereas reflexive datives bind an external argument. Since under this analysis external arguments are associated with the Spec of AspP position, the fact that volitional verbs in (67)-(68) take the reflexive dative is not unexpected.

4.4.2. Telicity-based Variable Behavior

The most discussed class of verbs of variable behavior is the class of verbs of motion like 'run', 'swim', etc. As the Italian data in (69) shows, the verb 'run' patterns with unergatives in selecting auxiliary *avere* 'have'. However, if this verb co-occurs with a directional phrase that specifies the terminal point of the motion, then it shows unaccusative behavior, and is used with the auxiliary *essere* 'be'. (Hoekstra 1984, Rosen 1984, Hoekstra and Mulder 1990, Levin and Rappaport Hovav 1992, 1995 and others).

(69) Gianni **ha** corso

Gianni has run

(70) Gianni **è** corso a casa

Gianni is run to home

/ Hoekstra and Mulder 1990/

As suggested above, verbs of motion like 'run' are predicated of distances being passed. Animate NPs like "Gianni" are not the true arguments of these verbs. The sentence in (69), therefore, as discussed above, can only project an unergative structure, whereas if the unaccusative structure is projected, then the selectional restrictions of 'run' are not satisfied.

A question that arises is why does addition of a directional prepositional phrase change the syntactic projection of the NP?

Let us consider the structure of the sentence in (71). This structure involves affixation of two affixes CAUSE, one is the head of the AspP projection, and the other one is introduced by the preposition:

(71) John ran into the store

TP $PAST(\lambda t\exists P CAUSE(t,P(j), \lambda t CAUSE(t, \exists z\ run(z), \lambda t\exists t' BECOME(in(s, j),t,t')), t_{ev})$

$John_i$ T' $PAST(\lambda t\exists P CAUSE(t,P(y_i), \lambda t CAUSE(t,\exists z run(z), \lambda t\exists t' BECOME(in(s, y_i),t,t')), t_{ev})\{y_i\}$

$\lambda p PAST(p, t_{ev})$ AspP $\lambda t\exists P CAUSE(t,P(y_i), \lambda t CAUSE(t, \exists z\ run(z), \lambda t\exists t' BECOME(in(s, y_i),t,t'))\{y_i\}$

$y_i\ \{y_i\}$ t_i Asp' $\lambda t CAUSE(t,P(y_i), \lambda t CAUSE(t, \exists z run(z), \lambda t\exists t' BECOME(in(s, y_i),t,t'))\{y_i\}$

$\lambda q\lambda t\exists P CAUSE(t, P(y_i), q)$ $\{y_i\}$ VP $\lambda t CAUSE(t, \exists z\ run(z), \lambda t\exists t' BECOME(in(s, y_i),t,t'))\{y_i\}$

$y_i\ \{y_i\}$ t_i V' $\lambda y\lambda t CAUSE(t, \exists z\ run(z), \lambda t\exists t' BECOME(in(s, y),t,t'))$

$\exists z\ run(z)$ V PP $\lambda p\lambda y\lambda t CAUSE(t, p, \lambda t\exists t' BECOME(in(s, y),t,t'))$

P' $\lambda p\lambda y\lambda t CAUSE(t, p, \lambda t\exists t' BECOME(in(s, y),t,t'))$

into NP the_store

$\lambda x\lambda p\lambda y\lambda t\ CAUSE(t, p, \exists t' BECOME(in(x, y), t, t'))$

The argument of the verb undergoes existential closure in this structure, as in the structure of the unergative verb in (69). The NP is generated in the Spec of VP position, but given the translation of the V' node, it fills the argument position of the preposition 'in', and not the argument position of the verb. The sentence is understood as "John is the agent of some running that caused John to become in the store'.

The difference in the argument projection in (69)-(70) can be explained, given that the translation of the V' node is different in the two sentences. If no PP is added, V' denotes a property λy run(y), which cannot be combined with the denotation of the NP 'John', since this NP does not satisfy its selectional restrictions. In the structure in (71) above, on the other hand, the denotation of V' is a property which is true of an individual in case this individual underwent a change of state from not being in the store to being in the store. The NP 'John' can serve as the logical argument of this property, therefore, it can be generated in the Spec of VP position.

The structure in (71) is a reflexive structure, where the NP is generated in the Spec of VP position and then moves to the Spec of TP position through the Spec of AspP. As a result of this movement, as discussed in section 4.2.2.3, the NP 'John' is interpreted as both the argument of the preposition 'in' and the agent of running. Verbs from this class can be described as 'agentive verbs of change of state', where the NP is both the causer and the undergoer of the action.

One of the consequences of this analysis is that it predicts that not all prepositions can form this construction, but only those which can be adjoined to the aspectual affixes CAUSE and BECOME. For example, the preposition 'towards' in English does not specify the terminal point of the motion, and verbs with this preposition behave as unergatives.

As discussed in chapter 2, prepositions that allow affixation of aspectual operators have corresponding prefixes in languages like Russian. Given this assumption, we would expect that the preposition 'in' has a corresponding prefix in Russian, but prepositions like 'towards' do not. This prediction is supported by the following data:

(72) a. Ivan bezhal v magazin

Ivan ran-IMP in the store

Ivan was running to the store

b. Ivan vbezhal v magazin

Ivan v-ran in store

Ivan ran into the store

(73) a. Ivan bezhal k magazinu

Ivan ran-IMP towards store

Ivan was running towards the store

b. Ivan *kbezhal k magazinu

Ivan k-ran towards store

The prepositions *v* 'in', *vy* 'out', *za* 'behind' and others which form the unaccusative construction of directed motion have corresponding prefixes in Russian, as illustrated by the example in (72) (see also examples in section 2.4 above). The preposition *k* 'towards', on the other hand, can never function as a perfectivizing prefix.

The construction of directed motion, as discussed in Levin and Rappaport Hovav 1995, is semantically restricted. Specifically, as they noted, not all unergative verbs can form this construction, but only verbs of manner of motion:

(74) *John laughed into the room

Given the present analysis of this construction, this restriction can be accounted for in terms of the selectional restrictions of the affix CAUSE. One of the presuppositions of this affix, as discussed in chapter 2 above, is that the resulting event q is an expected or natural result of the causing activity. The sentence in (74) under the present analysis is interpreted as ‘some laughing caused John to BECOME in the room’. This interpretation is not intuitively plausible, since activities of laughing are usually not viewed as resulting in a change of location[46].

4.4.3. Variable Behavior Based on the Semantics of a NP

Verbs of variable behavior discussed so far alternate between reflexive structures and either unaccusative or unergative ones. It is also possible, however, that the same verb can enter into unaccusative and unergative structures. As discussed in section 4.2.3 above, whether a verb projects an unaccusative or an unergative structure depends on whether the NP satisfies the selectional properties of the verb. This type of variable behavior, therefore, is based on the meaning of the NP.

Consider, for example, the data in (75) from Rosen 1984, which shows that the same verb in Italian can pattern with unergatives in selecting ‘avere’ auxiliary, or with unaccusatives in taking the verb 'essere’, dependent on whether the argument is animate.

(75) a. Mario ha continuato

‘Maria continued’

b. Il dibattito e continuato

‘The debate continued’

/Rosen 1984/

These data can be accounted for under the present analysis, if we assume that arguments like 'debate' can be analyzed as the true arguments of the verb 'continue', but animate NPs cannot.

If the sentence in (75a) projects the unergative structure, then it is interpreted as internally-caused, where the NP is understood as the agent:

(76) a. Mario ha continuato

b. $\exists$P CAUSE(t, P(m), $\exists$y continue'(y))

If the unaccusative structure is projected, then it is interpreted as in (77b), and the NP is the logical argument of the verb.

(77) a. #Mario **è** continuato

b.$\exists$p CAUSE(t, p, continue'(Mario'))

This sentence is ruled out by the selectional properties of the verb, if we assume that animate NPs cannot serve as the arguments of the verb 'continue'.

Now let us consider the sentence in (75b). If the unaccusative structure is projected, then the interpretation is as in (78). The sentence says that there was some activity that caused the debate to continue.

(78) a. Il dibattito **è** continuato

b. $\exists$p CAUSE(t, p, continue'(the_debate'))

If this sentence projects the unergative structure, then it is interpreted as in (79), and is understood as follows: 'there was some activity performed by 'the debate' that caused something to continue'.

(79) a. #Il dibattito **ha** continuato

b. $\exists$P CAUSE(t, P(the_debate'), $\exists$y continue'(y))

---

[46] See also the discussion of the semantic constraints on the resultative constructions in chapter 5.

This sentence is acceptable if the NP ‘debate’ can be viewed as a potential causer, and the resulting event is an expected and natural result of P(the debate). If these conditions are not satisfied, then the sentence is unacceptable.

The sentences in (77) and (79) are not ungrammatical under this analysis, but rather have an implausible interpretation.

4.5. The Transitivity Alternation

Let us further illustrate the present approach to argument projection by the discussion of the transitivity alternation (also known as ‘ergative’ or ‘causative’ alternation). Examples of the transitivity alternation are given in (80)-(81):

(80) a. Dver’ otkrylas’.

Door-Nom opened-refl

‘The door opened’

b. On otkryl dver’.

He opened door-ACC

‘He opened the door’

(81) a. Okno razbilos’.

Window-Nom broke-refl

‘The window broke’

b. On razbil okno.

He broke window-ACC

‘He broke the window’

As we show below, the present analysis predicts that if a verb and a NP can project an unaccusative structure, then they can also project a transitive one. The transitivity alternation, therefore, can be viewed as an unaccusative diagnostic (e.g. Rosen 1981, Burzio 1986). This section further discusses various exceptions to this generalization, such as the analysis of verbal roots that can enter into unergative and transitive structures, as well as verbal roots that can project an unaccusative structure, but do not have a transitive variant. And finally we present an analysis of verbal roots that have a transitive but no unaccusative alternate.

4.5.1. The Transitivity Alternation and Selectional Restrictions

Let us start our discussion of the transitivity alternation by the analysis of the sentences in (82)-(83). As the data in (82)-(83) show, verbs can behave differently with respect to the transitivity alternation: whereas the sentence in (82) has a transitive variant, the sentence in (83) does not.

(82) a. The leaves burned.

b. The gardener burned the leaves.

(83) a. The fire burned.

b. *The campers burned the fire.

/Levin and Rappaport Hovav, 1995, p. 101/

As discussed in Levin and Rappaport Hovav 1995, the meaning of the verb 'burn' is different in the two examples. In (82a) the verb is used in the 'consume by fire' sense, and denotes an externally-caused eventuality. In (83a), on the other hand, the verb means 'burn' in the sense of 'emit heat or light', and denotes an internally caused eventuality. The contrast in (82b)-(83b) is explained, given that under their analysis only externally-caused verbs can have a transitive alternate.

The present analysis follows Levin and Rappaport Hovav 1995 in assuming that the verbs in (82a) and (83a) have different interpretation; however, it derives this difference in meaning from the selectional properties of the verb 'burn'. Let us assume that the meaning of the verb is constrained by the condition which says that the verb 'burn' can be predicated of leaves, paper, and other objects that can be consumed by fire, but not of flames or candles:

(84) $\forall y\ \forall t$ burn(t, y) if y is being consumed by fire at t

Given this assumption, we can show that the sentence in (83a), as opposed to (82a), cannot be interpreted as externally-caused, and cannot have a transitive alternate.

If (82a) projects the unaccusative structure, then it is interpreted as in (85b) and says "something or someone caused the leaves to burn". The selectional restrictions of the verb are satisfied in this case.

(85) a. The leaves burned.

b. ∃p CAUSE(t, p, burn'(the_leaves'))

If (83a) projects the unaccusative structure, then it is also interpreted as externally-caused. The selectional restrictions of the verb 'burn', however, are violated in this case, since the NP 'fire' cannot be the argument of this verb.

(86) a. The fire burned.

b. ∃p CAUSE(t, p, burn'(the_fire'))

On the other hand, the sentence in (83a) can project the unergative structure, in which case it is interpreted as denoting an internally-caused rather than an externally-caused eventuality:

(87) a. The fire burned.

b. ∃P CAUSE(t, P(the_fire), ∃y burn(y))

Given the selectional restrictions of the verb 'burn', we have thus shown that only (82a) can have an externally-caused interpretation. Furthermore, we can also show that only (82a) can have a transitive alternate.

The translation of the sentence in (88a) is given in (88b).

(88) a. The gardener burned the leaves.

b. ∃P CAUSE(t, P(the_gardener), burn'(the_leaves))

The external argument serves as the logical argument of the affix CAUSE, and thus is understood as the causer or the agent, whereas the internal argument is the logical argument of the verb. This sentence is acceptable, since the selectional restrictions of the verb and the affix CAUSE are satisfied.

In the transitive structure in (89), on the other hand, the object serves as the logical argument of the verb, and the selectional restrictions of the verb are violated.

(89) a. #The campers burned the fire.

b. ∃P CAUSE(t, P(the_campers), burn'(the_fire))

We can thus conclude that *a verb and a NP can project both transitive and unaccusative structures only if the NP satisfies the selectional restrictions of the verb.*

As a consequence, we predict that if a verb and a NP projects an unergative structure, then this sentence does not have a transitive counterpart.

(90) a. John laughed.

b. *Bill laughed John.

(91) a. The jewels glittered/sparkled.

b. *The queen glittered/sparkled the jewels.

/Levin and Rappaport Hovav 1995/

As we argued above, verbs like 'laugh' and 'sparkle' select for cognate objectsrather than NPs like 'John' or "jewels'. These NPs cannot serve as the logical arguments of these verbs, and the transitive variant is ruled out.

Given this analysis, we thus predict that only 'unaccusative verbs' can transitivize. In the next section we discuss counterexamples to this generalization, as well as present an analysis of the fact that verbs that project a reflexive structure do not have a transitive variant.

4.5.2. Why Not All Unaccusatives Can Transitivize.

Given the discussion above, we expect that all verbs that can project unaccusative and reflexive structures can also project a transitive one. This, however, is not the case. For example, the following verbs do not have a transitive counterpart:

(92) a. Ivan umer

Ivan-Nom died

b. *On umer Ivana

He died John-ACC

(93) a. Ivan priexal

Ivan-Nom came

b. *On priexal Ivana

He came Ivan

Verbs like 'die' are analyzed in Dowty 1979 among others as being derived by the predicate BECOME with no causation involved. The same analysis can be assumed under the present assumptions. Events of dying, as opposed to events of killing, are different in that dying does not imply any external cause. In some languages 'die' and 'kill' can be represented by the same verb, which can involve affixation of either BECOME or CAUSE. In languages like English, on the other hand, the difference between these events is lexicalized so that verbs like 'die' can only co-occur with the affix BECOME, whereas verbs like 'kill' necessarily involve causation. To account for the fact that the verb 'die' cannot have a transitive variant in Russian and English, one can suggest, for example, that in these languages this verb is a bound morpheme, which requires affixation of BECOME. Given this assumption, the data in (92) can be accounted for, since if verbs like 'die' cannot co-occur with CAUSE, then the transitive structure cannot be projected.

However, a more plausible explanation seems to be that verbs like 'die' cannot be affixed with CAUSE because of the conversational principles. If a speaker adheres to the conversational maxims, then the verb 'die' would not be used in a causative meaning, if a language has the verb 'kill'.

Consider for example, the behavior of the verb ‘sink’ in Russian and English. Whereas in English this verb has a transitive counterpart, in Russian the transitive reading of the verb ‘utonul’ is blocked by the existence of the verb ‘utopil’, which can only be used in a causative form:

(94) a. The boat sank.

b. John sank the boat.

(95) a. Lodka utonula

Boat-Nom sank

‘The boat sank’

b. On utopil lodku

He sank boat-ACC

‘He sank the boat’

c. *On utonul lodku

He sank boat-ACC

A similar kind of explanation can be given to explain the contrast in (93). Verbs like ‘come’ are analyzed as projecting the reflexive structure. The processes of coming and leaving are always understood as being caused by the argument which undergoes these processes. The ‘externally-caused’ reading of this verb is blocked by the existence of the verb ‘privezti’ (to bring) in Russian:

(96) On privez Ivana

He brought Ivan-ACC

‘He brought Ivan’

The hypothesis that ill-formed transitive structures in (92)-(93) are ruled out by the conversational maxims is supported by the observation in Chierchia 1989, attributed to Carol Rosen (p.c.), that unaccusative verbs tend to have an ‘unstable’ valency. As he notes, “they tend to oscillate in valence from transitive to intransitive and vice-versa, both diachronically and across dialects". In contrast to unergative verbs, "one finds transitive uses even of verbs like morire 'die', rebellare 'uprise', suicidarsi 'commit suicide', etc" (Chierchia 1989, p.23). The unstable valency of the unaccusatives is not unexpected under the present approach, since there are no syntactic and semantic principles that rule out the transitive uses of these verbs.

4.5.3. Why Some Unergatives can Transitivize

Let us now consider examples of the verbs that can project unergative and transitive structures:

(97) a. The soldiers marched to the tents.

b. The general marched the soldiers to the tents.

(98) a. The horse jumped over the fence.

b. The rider jumped the horse over the fence.

(99) a. The mouse ran through the maze.

b. We ran the mouse through the maze.

/Levin and Rappaport Hovav 1995, p.111/

In English, as the data in (97)-(99) show, verbs of manner of motion can enter into unergative and transitive structures. This alternation, however, as discussed in Hale and Keyser 1987, Levin and Rappaport Hovav 1995, among others differs from the transitivity alternation in several respects.

First, in many languages with rich morphology, as noted in Hale and Keyser 1987, the alternation between an unergative and transitive structure of the type given in (97)-(99) has additional causative morphology, as opposed to the transitivity alternation discussed above.

> "In Athapaskan languages, for example, the ergative alternation is marked in the simplest manner, by choice of the so-called 'classifier" (an element appearing in immediate pre-stem position correlating very roughly with transitivity), while the transitivization of "unergative" verbs like *walk* and *run* involves not only this classifier element but special causative morphology as well… In Berber, the contrast is quite clear and regular

(Guerssel 1986) – the ergative alternation is morphologically unmarked, the transitive variant being identical in form to the intransitive, while the transitivization of an unergative verb is overtly marked by the regular causative prefix *ss*-, distinguishing the transitive from the intransitive morphologically. In Warlpiri, of central Australia, the contrast between the two verb types is also extremely clear – while a great many morphologically regular transitive-intransitive pairs representing the ergative alternation exist, there is no such alternation at all involving so-called unergatives. And in the Sioual language Wnnebago, the ergative alternation is similarly realized by transitive-intransitive pairs, while the 'transitivization' of unergatives is part of a distinct syntactic process involving sentential complementation of the causative verb –hii (Nedjalkov 1969)."

/Hale and Keyser 1987, p. 25/

Let us consider, for example, the following Russian sentence:

(100) On vy-guljal sobaku.

He vy-walked dog-ACC

'He walked the dog'

This sentence is derived by affixation of a prefix *vy*-, which changes selectional restrictions of the verb:

(101) *On guljal sobaku

He walked dog-ACC

Perfectivizing prefixes, as discussed in chapter 2 above, can denote a relation between the denotation of a verb, an individual and a time variable. The translation of the sentence in (100), therefore, can be given as follows:

(102) ∃P CAUSE(t, P(he'), vy'(walk', the dog))

The meaning of the prefix vy- in this case probably involves causation, however, we will not attempt to define this meaning. What is important for the purposes of the present discussion is that the NP 'the dog' is not the logical argument of the verbal root 'walk' in this case, but rather is the argument of the prefix[47].

If the NP in the Spec of VP position can be interpreted as the logical argument of the prefix, then the structure is well-formed even if the NP does not satisfy the selectional restrictions of the verb. The question of which 'unergative verbs' can transitivize under these assumptions is reduced to the question of which unergative verbs can involve affixation of resultative prefixes. For example, to account for the fact that in English such alternations can occur only with the verbs of manner of motion, we can suggest that English has a zero prefix of the type illustrated by Russian vy- above, which selects for the verbs of manner of motion.

Not all examples of transitivized unergatives, however, require affixation of a zero perfectivizing prefix. As has been pointed out in Pinker 1989 and Levin and Rappaport Hovav 1995, most examples of such constructions in English involve directional phrase. Furthermore, whereas the directional phrases are optional in the intransitive variants in (103)-(105), they are obligatory in their transitive use:

(103) a. The soldiers marched (to the tents).

b. The general marched the soldiers to the tents.

c. ??The general marched the soldiers.

(104) a. The horse jumped (over the fence).

b. The rider jumped the horse over the fence.

c. ?The rider jumped the horse.

(105) a. The mouse ran (through the maze).

b. We ran the mouse through the maze.

c. *We ran the mouse.

/Levin and Rappaport Hovav 1995, p. 111/

These data suggest that the second causative operator is introduced by a preposition, whose function is parallel to the resultative prefixes illustrated above. Specifically, we can assume that directional prepositions in English involve affixation of affixes CAUSE and

[47] Other examples of verbs with 'resultative prefixes', i.e. prefixes that specify the resultative state and change the selectional properties of the verbs, are discused in section 2.4 above.

BECOME so that the compositional derivation of the sentence in (106), for example, is as follows:

(106) The rider jumped the horse over the fence

TP PAST(λt∃QCAUSE(t,Q(r), λt∃PCAUSE(t, P(h), ∃z jump(z)∧ ∃t'BECOME(over(h, f), t, t')), t_{ev})

The rider$_i$ T' PAST(λt∃Q CAUSE(t,Q(y_i), λt∃PCAUSE(t, P(h), ∃zjump(z)∧ ∃t'BECOME(over(h, f), t, t')), t_{ev}) {y_i}

λpPAST(p, t_{ev}) AspP λt∃Q CAUSE(t,Q(y_i), λt∃PCAUSE(t, P(h), ∃zjump(z)∧ ∃t'BECOME(over(h, f), t, t')) {y_i}

t_i Asp' λt∃Q CAUSE(t, Q(y_i), λt∃PCAUSE(t, P(h), ∃zjump(z)∧ ∃t'BECOME(over(h, f), t, t')) {y_i}

λqλt∃Q CAUSE(t, Q(y_i), q) {y_i} VP λt∃PCAUSE(t, P(h), ∃zjump(z)∧ ∃t'BECOME(over(h, f), t, t'))

the horse V' λxλt∃PCAUSE(t, P(x), ∃zjump(z)∧ ∃t'BECOME(over(x, f), t, t'))

jump V PP λQλxλt∃PCAUSE(t, P(x), ∃zQ(z)∧ ∃t'BECOME(over(x, f), t, t'))

P' λQλxλt∃PCAUSE(t, P(x), ∃zQ(z)∧ ∃t'BECOME(over(x, f), t, t'))

over NP the fence

λyλQλxλt ∃PCAUSE(t, P(x), ∃zQ(z)∧∃t'BECOME(over(x, y), t, t'))

The sentence in (106) entails that the rider caused the horse to do some jumping, and that the horse became over the fence.

The examples of "transitivized unergatives, therefore, do not present a problem for our analysis of the transitivity alternation, since the object NPs in these examples do not have to satisfy the selectional restrictions of the verbal roots, but rather are the logical arguments of a prefix or a preposition.

4.5.4. Why not all Transitive Verbs have an Unaccusative Alternate.

Now let us consider verbs that can project a transitive structure, but do not have an unaccusative variant:

(107) a. Danila prochital knigu

Danila read-PERF book-ACC

Danila read the book

b. *Kniga prochitalas’

Book-Nom read

(108) a. The baker cut the bread

b *The bread cut

(109) a. The assassin murdered the senator

b. *The senator murdered

(110) a. The nurse sterilized the instruments

b. *The instruments sterilized

/Levin and Rappaport Hovav 1995/

The verbs from this class can be described as verbs that refer to agentive events. Unaccusative sentences, on the other hand, as observed in Levin and Rappaport Hovav 1995, refer to eventualities that can occur spontaneously.

Let us consider the translation of the unaccusative form of the verb ‘read’, given in (107b):

(111) ∃p CAUSE (t, p, read(the book))

This translation under the present assumptions does not imply the presence of an agent. Agentivity implicature, as we proposed above, is triggered by an individual variable in the translation of CAUSE (cf. section 2.1.2.2 above):

(112) ∀P ∀q ∀x ∀t CAUSE (t, P(x), q) α x is an agent of q

Since the variable p is not decomposed in the translation of unaccusative sentences, they are interpreted as nonagentive. On the other hand, events of reading are always understood as involving an agent. Conversational principles, therefore, require that information of this kind should be conveyed by an expression that triggers the agentivity implicature, such as a transitive structure or a verbal passive (see discussion of the differences between unaccusatives and verbal passives in section 4.2.2.1).

Similar considerations explain the data in (113):

(113) a. The wind cleared the sky

b. The sky cleared

c. The waiter cleared the table

d. *The table cleared

/Levin and Rappaport Hovav 1995, p. 85-86/

The event described by the sentence in (113d), as opposed to the unaccusative in (113b), is always understood as involving an agent, therefore, the unaccusative form is inappropriate to describe this event.

The analysis of the transitivity alternation presented above assumes that a verb can project a transitive and an unaccusative form if both of them are interpretable and satisfy the selectional restrictions of aspectual affixes and verbs, as well as conversational implicatures. This analysis differs from previous approaches that assume that one form is basic and another one is derived from it as the result of a lexical operation that affects the argument structure (see Levin and Rappaport Hovav 1995 for discussion of these approaches). The data discussed in this section presents a challenge for such analyses, since it shows that not all transitive variants have a corresponding unaccusative one, and not all unaccusative forms have a corresponding transitive variant.

Under the present assumptions, verbs can enter freely into transitive, unergative, and unaccusative structures, whereas ill-formed projections are filtered out by general syntactic, semantic and pragmatic principles. Under this approach there is no need for lexical operations that affect the argument structure. Furthermore, the fact that there is no one-to-one correspondence between transitive and unaccusative forms is not unexpected under this approach, since availability of each construction depends on its specific syntactic and semantic properties.

4.6. Semantic Correlates of Unaccusativity

As we have proposed above, verbs can project three intransitive structures, given in (1)-(3). The AspP projection in each of these structures can be headed by four aspectual affixes: BE, CAUSE, BECOME and HAVE. This section discusses in turn compositional interpretation of all possible tree-affix combinations, and argues that not all such combinations actually occur in a language.

4.6.1. Economy of Computation

To filter out ill-formed projections, we need an additional principle, which we call 'Economy of Computation'. This principle is an extension of Chomsky 1992 principle of economy of derivation:

Economy of Computation:

If two or more structures have equivalent root translations, then the structure with the least application of type-shifting rules is the grammatical one.

A similar principle has been proposed in Rooth and Partee 1982 and Partee and Rooth 1983, motivated by type assignments to extensional and intensional verbs:

(114) "Type Ambiguity Principles
(i) Each basic expression is lexically assigned the simplest type adequate to capture its meaning
(ii) There are general type-lifting rules that provide additional higher-type meanings for expressions
(iii)There is a general processing strategy of trying lowest types first, using higher types only when they are required in order to combine meanings by available compositional rules".
/Partee 1987, p. 117/

Evidence for these principles comes from the data in (115), discussed in Rooth and Partee 1982:

(115) a. John caught and ate a fish.

b. John wants and needs two secretaries.

c. John needed and bought a new coat.

When two extensional verbs are conjoined, as in (115a), the indefinite NP can only have a wide scope reading: "John caught and ate the same fish", but not the narrow scope interpretation: "John caught a fish and ate a fish". On the other hand, when an intensional verb is conjoined with either another intensional verb, as in (115b), or with an extensional verb, as in (115c), then both narrow scope and wide scope interpretations are available.

Extensional transitive verbs like 'eat', 'catch' or 'buy' under their analysis denote relations between two individuals, and are lexically specified as expressions of the type $<e,<e,t>>$, which we refer to as TV_1 below. Intensional verbs, on the other hand, like 'want' or 'need', as proposed in Montague 1973, are expressions of a higher type, such as $<s,t>,<e,t>>$, which we call TV_2 below. Given that conjoined expressions must be of the same logical type, we need to assume that the extensional verb 'buy' in (115c) undergoes type lifting from TV_1 to TV_2 so that it can be combined with an intensional verb 'need'.

When two verbs of the type TV_1 are conjoined, the indefinite NP has a wide scope reading, as in (116):

(116) $\exists x(catch(j, x) \wedge eat (j, x) \wedge fish(x))$

If the verbs of the type TV_2 are combined, then the NP has a narrow scope reading, as is illustrated in (117):

(117) $want([\hat{}\exists x(two(x) \wedge secretary(x) \wedge have(j, x)](j) \wedge need([\hat{}\exists x(two(x) \wedge secretary(x) \wedge have(j, x)](j)$

If type-shifting could apply freely, then we would expect that the verbs 'catch' and 'eat' in (115a) changed their type from TV_1 to TV_2, and the sentence in (115a) could have narrow scope interpretation. To explain why this reading is not available, Rooth and Partee 1982 proposed 'type ambiguity principles', stated in (114), that assume that type-lifting operators apply only if the two expressions cannot be combined otherwise.

The principle of economy of computation is further supported in Babko-Malaya 1999, based on the analysis of ambiguity resolution in processing. As proposed in this paper, interpretation of partial structures proceeds by the general rules of compositional semantics. It is further proposed that in the case of syntactic ambiguity parsing decisions are determined based on the computational complexity of the alternative interpretations, under a cognitively plausible assumption that application of the translation rules leads to an increase in a processing complexity of the input. This proposal is shown in the paper to explain a variety of local effects in syntactic ambiguity resolution, which include argument/adjunct ambiguity, PP-attachment, main verb/reduced relative ambiguity, and other phenomena recently discussed in Abney 1989, Pritchett 1988, Gibson 1991, and Ferreira and McClure 1997. The main hypothesis of the analysis of these phenomena is that the structure with the least application of type-shifting rules is always the preferred one.

In the present framework, economy of computation can be defined as a violable OT constraint on interpreted LF representations:

(118) *Semantic Transformations: Semantic transformations are not allowed.

This constraint is parallel to the principle of economy of syntactic derivation, adopted from Grimshaw 1997:

(119) *Trace: Trace is not allowed.

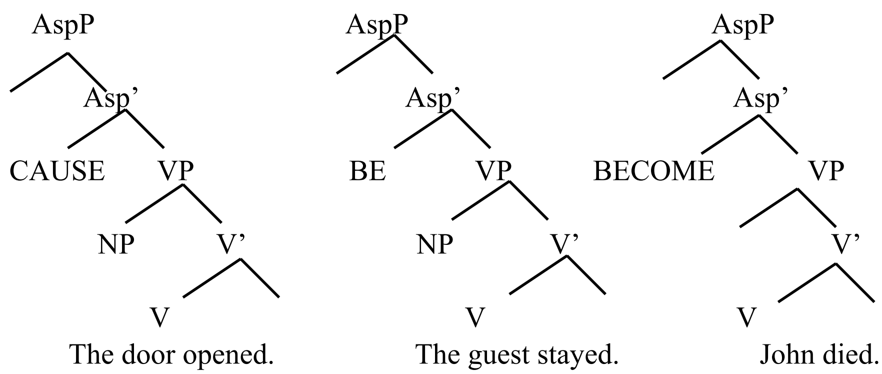
As discussed in Bittner 1998a,b, the type-lifting system of XLS is closely parallel to syntactic movement. For example, both transformations do not allow lowering: i.e. type-lowering in semantics and downward movement in syntax. It does not seem implausible, therefore, that these parallels are carried over to the principle of economy.

Given this principle, we can now turn to different affix-tree combinations.

4.6.2. The Unaccusative Structure

Let us start with the unaccusative structure in (2). This structure, as is shown below, can be derived by a verb in combination with three affixes CAUSE, BE and BECOME. The fourth possible representation, i.e. the unaccusative structure where the AspP is headed by HAVE, is shown below to be uninterpretable.

(120) a. externally-caused verbs b. stative unaccusatives c. verbs of directed change



This analysis predicts that there are three semantic classes of unaccusative verbs: 'externally-caused' unaccusatives, stative unaccusatives and verbs of directed change, in the terminology of Levin and Rappaport Hovav 1995. The following discussion presents compositional interpretation of these three classes, referred to below as (2)$_{CAUSE}$, (2)$_{BE}$ and (2)$_{BECOME}$.

4.6.2.1. Externally-Caused Verbs and Verbs of Directed Change

The present analysis follows Chierchia 1989 and Levin and Rappaport Hovav 1995 who proposed that there are unaccusative verbs with a causative component. In Chierchia 1989, unaccusative verbs have a reflexive reading, i.e. the NP is both the causer and the causee of the event. In Levin and Rappaport Hovav 1995, the unaccusative verbs that have a causative component are analyzed as having an external causer, which is not specified. Under the present analysis, all possibilities are predicted to hold. Some verbs, but not all 'unaccusatives' of Chierchia 1989, project the reflexive structure (3)$_{CAUSE}$. Other verbs project the structure (2)$_{CAUSE}$, which is interpreted as externally-caused in the sense of Levin and Rappaport Hovav 1995. Furthermore, as we argue below, the structure $(2)_{BECOME}$ can also be projected, which corresponds to the representation of unaccusatives in Dowty 1979 and Van Valin 1990.

Let us repeat the interpretation of the unaccusative structure headed by CAUSE:

(121) The door opened.

TP PAST(λt ∃p CAUSE(t, p, λt ∃t' BECOME(open'(the door), t, t')), t_{ev})

the $door_k$ T' PAST(λt ∃p CAUSE(t, p, λt ∃t' BECOME(open'(y_k), t, t')), t_{ev}) {y_k}

T AspP λt ∃p CAUSE(t, p, λt ∃t' BECOME(open'(y_k), t, t')) {y_k}

λp PAST(p, t_{ev})

Asp' λt ∃p CAUSE(t, p, λt ∃t' BECOME(open'(y_k), t, t')) {y_k}

λqλt ∃p CAUSE(t, p, q) VP λt ∃t' BECOME(open'(y_k), t, t') {y_k}

y_k {y_k} t_k V' λy λt ∃t' BECOME(open'(y), t, t')

V λt ∃t' BECOME(open'(y_k), t, t') {y_k}

where the derivation of the Asp node is as follows:

(122) Asp_i λqλt ∃p CAUSE(t, p, q)

ARB Asp_i 2Bc. λSλqλt ∃p [CAUSE(t, p, q)∧S(p)]

λp[p=p] 1L. λqλt CAUSE(t, p_i, q) {p_i}

Given that the predicate CAUSE requires a property of times q to refer to a process or an event (see section 2.1.2.2), we predict that unaccusative structures which involve causation can describe either telic or atelic events. This prediction is confirmed by the following pair of imperfective/perfective verbs in Russian, where perfective counterparts are derived by affixation of a perfectivizing prefix:

(123) a. Steklo lomalos'

Glass broke-IMP

'The glass was breaking'

b. Steklo slomalos'

Glass broke-PERF

'The glass broke'

Both sentences project the unaccusative structure $(2)_{\text{CAUSE}}$, and differ only in the presence of a perfectivizing prefix.

Some analyses of unaccusative verbs, such as Dowty 1979, Van Valin 1990, among others assume that unaccusative verbs are derived by the operator BECOME, whereas CAUSE is present only in the representation of accomplishments, i.e. transitive verbs. The existence of the alternation in (123), on the other hand, supports the present analysis, which assumes that unaccusative verbs can be derived by CAUSE, and optionally, the BECOME operator presyntactically attached to V.

The interpretation of the unaccusative structure where AspP is headed by BECOME is given in (124):

(124) The man died.

TP $\text{PAST}(\lambda t\ \exists t'\ \text{BECOME}\ (\text{dead(the man)}, t, t'), t_{ev})$

The man_k T' $\text{PAST}(\lambda t\ \exists t'\ \text{BECOME}\ (\text{dead}(y_k), t, t')\ \{y_k\}$

$\lambda p\ \text{PAST}(p, t_{ev})$ AspP $\lambda t\ \exists t'\ \text{BECOME}\ (\text{dead}(y_k), t, t')\ \{y_k\}$

Asp' $\lambda t \exists t' \text{BECOME}\ (\text{dead}(y_k), t, t')\ \{y_k\}$

$\lambda q \lambda t \exists t' \text{BECOME}(q, t, t')$ VP $\lambda t\ \text{dead}'(y_k, t)\ \{y_k\}$

$y_k\ \{y_k\}$ t_k V' $\lambda y \lambda t\ \text{dead}'(y, t)$

V $\lambda y \lambda t\ \text{dead}'(y, t)$

Sentences from this class refer to eventualities that denote a change of state. Given the selectional restrictions of BECOME, the property of times q can only refer to a stative eventuality, therefore, the verbal root that projects this structure must denote a state.

Although the structures in (121) and (124) do not differ syntactically, they are predicted to behave differently with respect to phenomena that are sensitive to the presence of a causal relation. For example, only the sentences with the CAUSE affix can specify the causer of the event (which has to be nonagentive, as we discussed above):

(125) a. Lodka perevernulas' ot vetra

Boat-Nom turned over from wind

'The boat turned over because of the wind'

b. #Lodka utonula or vetra

Boat-Nom sank from wind

'The boat sank because of the wind'

(126) a. On pogibnul ot mecha

He-Nom died from sword

'He died from the sword'

b. #On umer ot mecha

He died from the sword

(127) a. Dver' otkrylas' ot vetra

Door opened from wind

'The door opened because of the wind'

b. #Cvetok vyros ot solnca

Flower grew from sun

'The flower grew because of the sun'

The contrast in (125)-(127) suggests that the sentences in (125a)-(127a) involve a causative component, whereas sentences in (125b)-(127b) do not.

Given the present assumptions, verbal roots can be combined with any affixes, and enter into any syntactic structures, provided that all syntactic, semantic, and pragmatic principles are satisfied. For example, as we have discussed in section 4.5 above, there is nothing in the lexical semantics of the verb 'die' that prevents it from being combined with CAUSE. However, if a language has a separate verb with the meaning ‘kill’, then it blocks the causative interpretation of ‘die’.

Given this analysis, we expect that the verbs in (125b)-(127b) do not have a transitive variant (i.e. the causative meaning is realized by a separate verb), whereas those in (125a)-(125b) can undergo the transitivity alternation. This prediction is confirmed by the following data:

(128) a. Veter perevernul lodku

Wind turned over boat-ACC

‘The wind turned over the boat’

b. Zhuchok pogubil urozhaj

Bug killed harvest-ACC

‘The bugs killed the harvest’

c. Veter otkryl dver’

Wind opened door-ACC

‘The wind opened the door’

(129) a. *On utonul lodku

He sank boat-ACC

b. *On umer Petra

He killed Peter-ACC

c. *Solnce vyroslo cvetka

Sun grew flower-ACC

Further evidence for distinguishing the unaccusative structures $(2)_{\text{CAUSE}}$ and $(2)_{\text{BECOME}}$ is based on the discussion of two classes of unaccusative verbs in Italian in Centineo 1995. These classes are illustrated in (130):

(130) a. La finestra <u>si</u> e aperta.

The window Refl is opened

'The window opened'

b. La nave e affondata.

The boat is sunk

'The boat sank'.

/Centineo 1995, p.54/

As is claimed in Centineo 1995, the difference between unaccusatives that take a reflexive clitic, like *aprire* in (130a), and verbs like *affondare*, which reject *si* in their unaccusative form, is not idiosyncratic and unpredictable. For example, as the data in (130) show, the causative construction derived from the verbs of *aprire* class is ambiguous between two different interpretations, whereas the corresponding construction derived with the verbs of *affondare* class has only one reading:

(131) Maria fece aprire la porta

Maria made open the door

'Maria had someone open the door'

'Maria got the door to open'

(132) Tonino fece affondare la barca

Tonino made sink the boat

'Tonino made the boat sink'

* 'Tonino made someone sink the boat'

/Centineo 1995, p. 57/

Likewise, when the two classes of verbs are embedded under perception verbs such as *vedere* 'see' and *sentinere* 'hear', their interpretation is different:

(133) Maria vide aprire la porta

Maria saw open the door

'Maria saw someone open the door'

(134) Maria vide affondare la nave

Maria saw sink the boat

'Maria saw the boat sink'

The analysis of the two classes of verbs proposed in Centineo 1995 assumes that verbs from the 'aprire' class are underlying transitive accomplishments, whereas verbs from the 'affondare' class are intransitive in their underlying form. This difference is encoded in their lexical representation: verbs like 'aprire' have a predicate CAUSE in their lexical entry, and denote a caused change of state, whereas verbs like 'affondare' denote a 'simple/autonomous change of state':

The representation of intransitive verbs in Centineo 1995 is given in (135a) and (135b). Verbs of the 'aprire' class have an implicit causing event, where both the agent and the causing activity are unspecified.

(136) Affondare: BECOME not afloat (y)

Aprire: do(Ø,Ø) CAUSE BECOME open(y)

Under the present assumptions, we can suggest that these verbs differ whether they project $(2)_{\text{CAUSE}}$ or $(2)_{\text{BECOME}}$. The data in (131)-(132), then, can be explained as follows.

Let us assume that in embedded infinitival clauses the Spec of AspP can be optionally filled by an arbitrary PRO, parallel to infinitival clauses in (137):

(137) [ARB to win the race] is impossible

Let us now consider the verbs from the *affondare* class, which project the structure $(2)_{\text{BECOME}}$. If ARB is not generated in the Spec of AspP position, then the interpretation of causative constructions with these verbs is as in (138b):

(138) a.Tonino made [$_{\text{AspP}}$ BECOME [$_{\text{VP}}$ the boat sunk]]

b.made (t, Tonino', λt∃t'BECOME(sunk'(the boat), t, t').

If ARB is generated, then the structure of the embedded sentence is as follows:

(139) AspP

$\lambda y[y=y]$ ARB Asp' $\lambda t \exists t'$ BECOME (λt sunk'(t, the boat), t, t')

$\lambda t \exists t'$BECOME(q_i, t, t') VP λt sunk'(t, the boat)
$\{q_i\}$

the boat V' $\lambda y \lambda t$ sunk'(t, y)

V $\lambda y \lambda t$ sunk'(t, y)

This structure cannot be interpreted, since the translation of ARB cannot be combined with the translation of Asp'.

On the other hand, if the embedded clause projects the structure $(2)_{CAUSE}$, then two interpretations are possible. If ARB is not generated in the Spec of AspP position, then the sentence is interpreted as in (140), where the stored variable p_i in the translation of CAUSE undergoes the Binding rule Ba, and then gets existentially bound (see the compositional translation in section 4.2.2.1):

(140) made (t, m, $\exists p$ CAUSE(t, p, $\lambda t \exists t'$BECOME(open'(the door), t, t'))

If ARB is generated, then the interpretation is different. ARB can be coindexed with the stored variable x_i in the translation of CAUSE, licensed by a Spec-Head configuration. The stored variable p in the translation of CAUSE, therefore, can undergo the rule of substitution binding, which results in the translation of Asp given in (141):

(141) AspP $\lambda t \exists P \exists x$ CAUSE(t, P(x), $\lambda t \exists t'$ BECOME(open(the door), t, t'))
2Ba. $\lambda x \lambda t \exists P$CAUSE(t, P(x),$\lambda t \exists t'$BECOME(open(the door), t, t'))

$\lambda y[y=y]$ ARB_i Asp' 1. $\lambda t \exists P$CAUSE(t, P(x_i),$\lambda t \exists t'$ BECOME(open(the door), t, t'))$\{x_i\}$

$\lambda q \lambda t \exists P$CAUSE(t, P($x_i$), q) VP $\lambda t \exists t'$ BECOME(open(the door), t, t')
$\{x_i\}$

the $door_k$ V' $\lambda t \exists t'$ BECOME(open(y_k), t, t') $\{y_k\}$

V $\lambda t \exists t'$ BECOME(open(y_k), t, t') $\{y_k\}$

Since the index of x_i is visible at the Asp' level, this variable can be bound, and existential type-lifting can apply. The final translation is parallel to that of a verbal passive:

(142) made (t, m, $\exists P \exists x$ CAUSE(P(x), $\lambda t \exists t'$BECOME(open'(the door), t, t')))

The difference in the interpretation of embedded infinitival sentences with BECOME and CAUSE under this analysis can thus be accounted for, given the compositional interpretation of these sentences and the assumption that infinitival clauses allow optional generation of ARB in the Spec of AspP position.

4.6.1.3. Stative Unaccusatives

Stative verbs under the present assumptions can be derived by affixation of either BE or HAVE. The structure of the verb derived by BE is shown in (143):

(143) The guest stayed.

TP PAST(λt BE (t, stay(the guest)), t_{ev})

the guest$_k$ T' PAST(λt BE (t, stay(y_k)), t_{ev}) { y_k}

λp PAST(p, t_{ev}) AspP λt BE (t, stay(y_k)) { y_k}

Asp' λt BE (t, stay(y_k)) { y_k}

λqλtBE(q, t) VP λt stay'(t, y_k) {y_k}

t_k V' λyλt stay'(t, y)

V λyλt stay'(t, y)

The structure in (143) illustrates unaccusative stative verbs. These verbs include, for example, the verbs of existence, such as 'remain', 'stay', 'be', 'exist'. The unaccusative behavior of these verbs is supported by the list of verbs in (144) from Hoekstra 1984, which illustrates some of the verbs that take *essere* in Italian (examples in (a)), *izan* 'be' in Basque (examples in (b)), and *zijn* in Dutch (examples in (c)):

(144) a. rimanere 'remain', stare 'stay/be"

b. egon 'stay/be', gertatu 'happen'

c. blijven 'remain, stay', gebeuren 'happen'

Other verbs that can be analyzed as derived by affixation of BE, are verbs of spatial configuration, such as ‘sit’, ‘stand’, ‘lay’ and others, when they are used nonagentively, or in ‘the simple position sense’ in terms of Levin and Rappaport Hovav 1995:

(145) Throughout the war years there stood six statues of the martyrs on the palace lawn. /Levin and Rappaport Hovav 1995, p. 152/

Verbs of spatial configuration can also co-occur with other affixes, including HAVE, as we will discuss below. Dependent on the affix they take, they show either unaccusative or unergative behavior.

4.6.1.4. Ungrammatical Unaccusatives

Unaccusative structures, as we have shown above, can be projected by the affixes CAUSE, BE and BECOME. Let us now consider the structure in (146) with the AspP projection headed by HAVE:

(146) TP

The guest$_k$ T’

λp PAST(p, t_{ev}) AspP

Asp’ $\lambda x \lambda t$ HAVE (t, x, sit(y_k)) { y_k}

$\lambda q \lambda x \lambda t$HAVE (t, x, q) VP λt sit’(y_k, t) {y_k}

y_k {y_k} t_k V’ $\lambda y \lambda t$ sit’(y, t)

V $\lambda y \lambda t$ sit’(y, t)

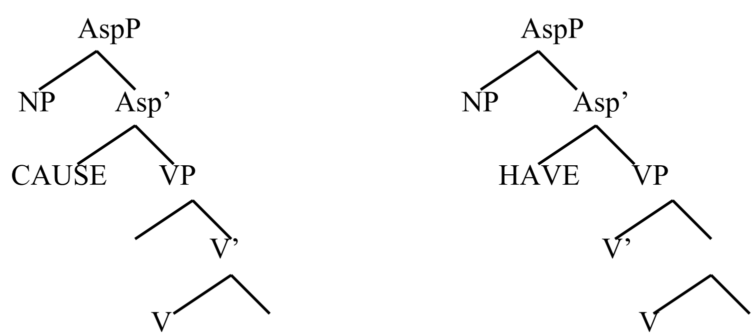
The compositional interpretation of this structure crashes, because the denotation of Asp’ requires an individual argument which would be interpreted as the experiencer of the state denoted by the verb. Given that in the unaccusative structure the Spec of AspP position is empty, nothing seems to be able to serve as the individual argument of the affix HAVE. The structure $(2)_{\text{HAVE}}$, therefore, is ruled out as uninterpretable under the present assumptions.

To conclude the discussion of unaccusative structures, we have shown that unaccusative structures are not semantically uniform, and include three different aspectual classes. The unifying property of the three classes is that the NP is the logical argument of the verb, and thus satisfies its selectional restrictions. In this respect, unaccusative structures are different from the unergative structures discussed below where the NP is interpreted as the logical argument of the aspectual affix.

4.6.2. The Unergative Structure

Unergative structures, as we show in this section, are also not semantically uniform and include stative and non-stative verbs. Specifically, there are two classes of unergative structures, derived by the affixes CAUSE and HAVE.

(147) a. internally-caused unergative b. stative unergative



‘John ran’ ‘John sat’

The class of internally-caused or agentive activities like ‘run’, ‘smile’ and others is represented by the structure in (147a), where AspP is headed by CAUSE. Given that the NP is generated outside the scope of CAUSE in this structure, it is interpreted as causing the action, or in terms of Levin and Rappaport Hovav 1995, such verbs are internally caused. If AspP is headed by HAVE, as is shown in (147b), then the NP is interpreted as experiencing the state denoted by V. The verbs that can project this structure are stative unergative verbs, illustrated by the verbs of ‘maintain position’ or ‘interval statives’ of Dowty 1979.

4.6.2.1. Verbs of Internal Causation

Verbs of internal causation, as discussed above, include agentive activities, such as verbs of manner of motion, verbs like ‘smile’, laugh’, and others. However, this class is not restricted to agentive verbs, given that agentivity under the present assumptions is a cancelable implicature. For example, if the NP is inanimate, then internally-caused verbs are understood as nonagentive.

Consider, for example, verbs of emission, which as proposed in Levin and Rappaport Hovav 1995 belong to the class of internally-caused unergatives. These verbs includes ‘buzz’, ‘clang’, ‘crackle’, ‘hum’, ‘moan’, ring’, ‘roar’, ‘whistle’, ‘flash’, ‘flicker’, ‘gleam’, ‘glitter’, glow’, ‘shimmer’, ‘shine’, ‘sparkle’, ‘reek’, ‘smell’, ‘stink’, ‘bubble’, ‘gush’, ‘puff’, ‘squirt’ and others. As the data in (148) shows these verbs take ‘avere’ auxiliary in Italian:

(148) ha scintillato ‘sparkled’, ha puzzato ‘stank’, ha brillato ‘shone’

/Rosen 1984, cited in Levin and Rappaport Hovav 1995/

The translations of these verbs under this analysis are predicted to be as follows:

(149) a. The watch gleamed.

b. ∃P CAUSE(t, P(watch’), ∃y gleam’(y))

(150) a. Geraniums sparkle.

b. ∃P CAUSE(t, P(geraniums’), ∃y sparkle’(y))

(151) a. The kettle whistled.

b. ∃P CAUSE(t, P(kettle’), ∃y whistle’(y))

The sentence in (151), for example, is understood as ‘The kettle is involved in some process P that caused some whistling’. Evidence for this translation comes, for example, from the fact that these verbs take cognate objects that modify the variable y in the translations above:

(152) a. Chainik svistel nazoilivym svistom.

Kettle-Nom whistle-IMP annoying-INS whistle-INS

‘The kettle whistled an annoying whistle’

4.6.2.2. Stative Unergatives

Now let us consider stative unergative verbs. These verbs, as we show below, are derived by affixation of HAVE. As in the case of unergatives derived by CAUSE, the NP of stative unergatives does not satisfy the selectional restrictions of a verb.

(153) TP $\mathrm{PAST}(\lambda t\ \mathrm{HAVE}\ (t, \mathrm{John}, \exists y\ \mathrm{sat'}(y)), t_{ev})$

John$_k$ T' $\mathrm{PAST}(\lambda t\ \mathrm{HAVE}\ (t, x_k, \exists y\ \mathrm{sat'}(y)), t_{ev})\ \{x_k\}$

$\lambda p\ \mathrm{PAST}(p, t_{ev})$ AspP $\lambda t\ \mathrm{HAVE}\ (t, x_k, \exists y\ \mathrm{sat'}(y))\ \{x_k\}$

$x_k\ \{x_k\}$ t_k Asp' $\lambda x\ \lambda t\ \mathrm{HAVE}\ (t, x, \exists y\ \mathrm{sat'}(y))$

$\lambda q \lambda x \lambda t \mathrm{HAVE}\ (t, x, q)$ VP $\lambda t\ \exists y\ \mathrm{sat'}(t, y)$

V' $\lambda t\ \exists y\ \mathrm{sat'}(t, y)$

V $\lambda t\ \exists y\ \mathrm{sat'}(t, y)$

Given the semantics of the affix HAVE, the individual argument of this affix should be capable of experiencing some state or event. Not all NPs, however, can be viewed as experiencers, and usually it is assumed that experiencers are restricted to animate objects. We thus expect that stative verbs can project an unergative structure only if the NP is animate.

This prediction is confirmed by the discussion of verbs of spatial configuration, such as ‘sit’ ‘stand’, ‘lie’ and others in Levin and Rappaport Hovav 1995. As the data in (154) show, these verbs can co-occur with both animate and inanimate arguments.

(154) a. The socks lie in the drawer.

b. John is lying on the sofa.

Verbs of spatial configuration with inanimate objects, as we have suggested above, project an unaccusative $(2)_{\mathrm{BE}}$ structure. If the argument is animate, on the other hand, then either $(2)_{\mathrm{BE}}$ or $(1)_{\mathrm{HAVE}}$ can be projected.

If sentences with verbs of spatial configuration project an unergative structure with the aspectual operator HAVE, then the subject is understood as the experiencer of the state of lying.

For example, in (154b) John experiences the state of lying on the sofa. Sentences with inanimate arguments, on the other hand, cannot project this structure. NPs like 'socks' in (154) are not likely to be understood as experiencing the state of lying in the drawer. The only structure that can be projected by (154a) is the unaccusative structure $(2)_{BE}$.

Stative verbs, therefore, can project either unaccusative or unergative structure, dependent on whether the argument satisfies the selectional restrictions of the verb and/or the affix HAVE. If the NP can only be interpreted as the argument of the verb, as in the example in (154a), then the only structure that can be projected is the unaccusative structure with the affix BE. If, on the other hand, the NP satisfies the selectional restrictions of both the verb and the affix HAVE, as probably is the case in (154b), then either the unaccusative stative structure is projected by affixation of the predicate BE, or the unergative structure with the predicate HAVE. The semantic difference between the unaccusative and unergative stative verbs, under this analysis, therefore, lies in the interpretation of a NP. As was shown above, NPs of unaccusative stative verbs are logical arguments of the verbs, whereas arguments of stative unergatives are the experiencers of the state denoted by the verb.

Aspectually, unergatives with HAVE are predicted to be always stative. The selectional properties of HAVE, as proposed in chapter 2, allow the argument p in the translation of HAVE to refer to either a state or an event. In other words, structures with HAVE allow presyntactic affixation of BECOME to V (see examples of transitive achievements in section 2.4). In the case of unergative structures, however, the achievement interpretation is not available. As discussed in chapter 2, the predicate BECOME can only be added to V presyntactically if there is an argument in the Spec of VP position. If there is no argument, as in the structure in (1), then the affix BECOME cannot be added, and the structure $(1)_{HAVE}$ can only be interpreted as stative.

4.6.2.3. Ungrammatical Unergatives

The unergative structures illustrated above were derived by the affixes CAUSE or HAVE. The structures derived by BE or BECOME, as we show in this section, are ruled out by the principle of economy of computation.

Let us consider the derivation of the unergative structure with the affix BECOME:

(155) TP 1Ba. 2F. PAST($\lambda t\ \exists t'$ BECOME (dead(the man), t, t'), t_{ev})

The man_k T' 1F. PAST($\lambda t\ \exists t'$ BECOME (dead(y_k), t, t'), t_{ev}) { y_k}

λp PAST(p, t_{ev}) AspP 1Ba. 2F. $\lambda t\ \exists t'$ BECOME (dead(y_k), t, t') { y_k}

1E. y_k {y_k} t_k Asp' 1F. $\lambda t\ \exists t'$ BECOME (dead(y_k), t, t') { y_k}

Asp VP 1U. λy dead'(y)

$\lambda Q \lambda t \exists t'$BECOME(Q($y_k$), t, t')

{y_k} V' 1U. λy dead'(y)

V 1L. λy dead'(y)

The translation of the Asp node is derived as follows:

(156) 2Ba. $\lambda Q \lambda t \exists t'$BECOME(Q($y_k$), t, t') {$y_k$}

Asp 1U. $\lambda t \exists t'$BECOME(Q_i(y_k), t, t') {Q_i, y_k}

2Bb. $\lambda t \exists t'$BECOME(Q_i(y_k), t, t') {Q_i, y_k}

Asp 1L. $\lambda t \exists t'$BECOME(p_i, t, t') {p_i}

In the unergative structure the VP denotes a relation between an individual variable and a time variable. The predicate BECOME, as shown in (155), can be combined with this translation, if it undergoes substitution binding[48]. Moreover, the structure in (155) does not differ from the point of view of compositional semantics from the well-formed structures where the affix BECOME adjoins to the verb presyntactically, and the morphological complex BECOME-verb heads the VP projection (see examples of transitive verbs with perfectivizing prefixes in section 2.4).

The unergative structure $(1)_{BECOME}$, therefore, can be interpreted, and its root translation is equivalent to the root translation of the corresponding unaccusative structure.

What rules out this interpretation is the principle of economy of computation. Consider again the compositional interpretation of the unaccusative structure $(2)_{BECOME}$ repeated below:

(157) The man died.

TP 1Ba. 2F. PAST(λt ∃t' BECOME (dead(the man), t, t'), t_{ev})

The man$_k$ T' 1F.PAST(λt ∃t' BECOME (dead(y_k), t, t') { y_k}

λp PAST(p, t_{ev}) AspP 1U. λt ∃t' BECOME (dead(y_k), t, t') { y_k}

Asp' 1F. λt∃t'BECOME (dead(y_k), t, t') { y_k}

1L.2Ba.
λqλt∃t'BECOME(q, t, t') VP 1F. λt dead'(t, y_k) {y_k}

y_k {y_k} t_k V' 1U. λyλt dead'(t, y)

V 1L. λyλt dead'(t, y)

The verb combines with the NP directly by function application, and the affix BECOME takes the result as its argument. This derivation involves application of two Binding rules, the rest is just function application. The derivation of the corresponding unergative structure in (155), however, involves application of four Binding rules; the resulting expression, however, is equivalent to the one derived by the unaccusative structure. By economy of computation, the unaccusative structure wins over the unergative one in this case.

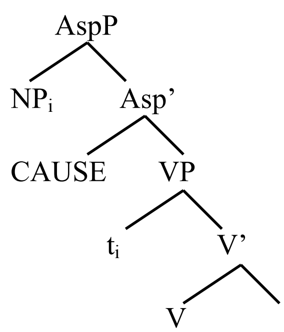
Likewise, we can show that the interpretation of the unergative structure $(1)_{BE}$ is computationally more complex than the interpretation of the corresponding unaccusative structure $(2)_{BE}$, and is ruled out by economy of computation.

[48] The principle of economy of derivation would not be necessary if the translation system did not allow the operation of Substitution Binding. However, this operation plays a crucial role in the analysis of transitive verbs discussed in previous chapters.

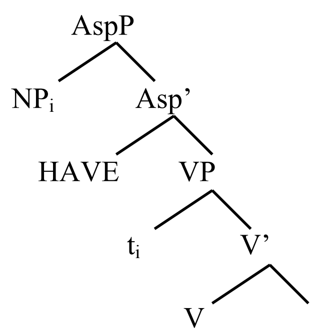
4.6.3. The Reflexive Structure

Now let us consider the reflexive structure, where the NP moves to the Spec of AspP position. As in the case of unergative verbs, this structure can only be projected by the affixes CAUSE and HAVE.

(158) a. internally-caused reflexives b. stative reflexives



'John came'



'John blushed'

As we discussed above, the verbs that project these structures pattern with unergatives with respect to phenomena that are sensitive to a NP being in the Spec of AspP position, such as Case, impersonal passivization and others. On the other hand, they behave as unaccusatives with respect to other phenomena, which depend on the NP being in the Spec of VP position, such as auxiliary selection and resultative constructions.

4.6.3.1. Internally-Caused Reflexives

Compositional interpretation of internally-caused reflexives has been discussed in section 4.2.2.3 above. Given the rules of compositional semantics, we have shown that the NP in this structure is interpreted as the causer of the event denoted by the verb, as well as its undergoer.

The verbs that can project the structure $(3)_{\text{CAUSE}}$ are verbs like 'fall', 'come', 'leave', where the NP is the logical argument of the verb, as well as the agent of the action. One semantic class of the verbs that project this structure is the class of agentive telic verbs. Telic verbs, as we discussed above, require an argument to be generated in the Spec of VP position, otherwise the structure is not interpretable. Agentive interpretation, on the other hand, arises only if the NP is in the Spec of AspP position, where AspP is headed by CAUSE. Under this analysis all agentive telic sentences are predicted to project the reflexive structure $(3)_{\text{CAUSE}}$.

One of the tests that can be used to distinguish the reflexive structure from the structures in (1) and (2) is based on ambiguity under negation (B.Partee, p.c.). Compare for example, the following sentences.

(159) a.?John did not come. I brought him.

b. #A letter did not come. I brought it.

If the first sentence in (a) projects the reflexive structure, then we expect that it can be interpreted as "John did not come by himself". Although the discourse in (159a) is not perfect, it is certainly contrasted with the discourse in (159b). This contrast is predicted, given that the first sentence in (159b) cannot project the reflexive structure $(3)_{\text{CAUSE}}$, since the NP 'the letter' cannot be viewed as a potential causer. The structure projected by this sentence is an unaccusative structure, and the interpretation "A letter did not come by itself' is not available for this sentence.

4.3.3.2. Non-Causative Reflexives

Another affix that can derive a reflexive structure is the predicate HAVE. Parallel to the compositional derivation of causative reflexive sentences, the NP in the structure $(3)_{\text{HAVE}}$ has two semantic roles: it is both the experiencer of the state or an event, and the logical argument of the verb.

Examples of verbs that can be analyzed as projecting this structure are verbs of 'bodily functions', like 'blush', 'sneeze', and others. For example, the sentence in (160a) can be interpreted as in (160b):

(160) a. John blushed

b. HAVE(t, j, $\lambda t \exists t'$ BECOME(blush(j), t, t'))

The NP in these sentences is both the logical argument of the verb as well as the experiencer of blushing. Given the selectional restrictions of HAVE, sentences with these verbs are predicted to describe either atelic or telic events, dependent on whether the verb involves presyntactic affixation of a perfectivizing operator:

(161) a. Danila krasnel.

Danila blush-IMP

'Danila was blushing'

b. Danila pokrasnel

Danila po-blushed-PERF

'Danila blushed'

The imperfective sentence in (161a) can be analyzed as projecting either $(3)_{\text{HAVE}}$ or $(1)_{\text{HAVE}}$. The perfective sentence in (161b), on the other hand, cannot project the unergative structure, since lexical perfectivizing prefixes can be added to verbs only if the Spec of VP position is not empty (see section 2.6 and section 4.3.1.2 above). These verbs, therefore, should be analyzed as projecting a reflexive structure, with the interpretation given in (160b).

This analysis is supported by the discussion of these verbs in McClure 1990 and Levin and Rappaport Hovav 1995. As they showed, in Dutch and Italian the verbs from this class pattern with unaccusatives in the 'perfective', or change of state reading, but with unergatives in the imperfective reading. For example, the sentence in (162) illustrates the imperfective reading of the verb 'bloom' in Dutch, which takes a 'for' durational phrase. This verb selects the auxiliary *hebben* 'have':

(162) Dese bloem heeft het hele jaar gebloeid

This flower has the whole year bloomed

'This flower bloomed for the whole year'

/Levin and Rappaport Hovav 1995, p.161/

The corresponding perfective form of this verb, derived by a particle op-bloeien, takes the auxiliary *zijn* 'be'.

(163) Hij is helemaal op-gebloeid nadat hij van baan is veranderd.

He is completely up-bloomed after he from job is changed

'He completely cheered up/flourished after he changed his job'

/Levin and Rappaport Hovav 1995, p.161/

Given the present analysis of auxiliary selection adopted from Burzio 1986, reflexive structures pattern with unaccusatives in that they select 'essere' in Italian and 'zijn' in Dutch (see section 4.3.1.5 above). The Dutch data, therefore, supports our analysis of perfective verbs from this class as projecting the reflexive structure.

4.3.3.2. Ungrammatical Reflexives

Parallel to unergative structures, reflexive structures can only be projected by the affixes CAUSE and HAVE, whereas the structures $(3)_{BE}$ and $(3)_{BECOME}$ are ruled out by economy of computation. Let us consider the compositional interpretation of the reflexive structure with the affix BECOME:

(164) TP 1Ba. 2F. PAST(λt $\exists$t' BECOME (dead(the man), t, t'), t_{ev})

The man_k T' 1F. PAST(λt $\exists$t' BECOME (dead(y_k), t, t'), t_{ev}) { y_k}

λp PAST(p, t_{ev}) AspP 1Ba. 2F. λt$\exists$t' BECOME (dead'(y_k), t, t') {y_k}

1E. y_k {y_k} t_k Asp' 1F. λt$\exists$t' BECOME (dead'(y_k), t, t') {y_k}

1L.2Ba.

λqλt$\exists$t' BECOME (q, t, t') VP 1F. dead'(y_k) {y_k}

1E. y_k {y_k} t_k V' 1U.λy dead'(y)

V 1L.λy dead'(y)

Let us compare this translation with the translation of the unaccusative structure in (157). First, let us notice that the root translation is the same as the translation of the corresponding unaccusative structure. The reflexive structure, therefore, competes with the unaccusative one with respect to its computational complexity. Second, the number of type-shifting operations that are necessary to interpret the reflexive structure exceeds the corresponding number of operations that are applied in (157). Specifically, the trace in the Spec of AspP position triggers application of an additional Binding rule so that the translation of the reflexive structure involves three type-shifting operations. The reflexive structure $(3)_{BECOME}$, therefore, is ruled out by the economy of computation.

Likewise, the compositional interpretation of $(3)_{BE}$ is computationally more complex than that of the structure $(2)_{BE}$, and is also ruled out under the present assumptions.

4.6.4. Main Generalizations

The correlation between semantic properties of the verbs and their syntactic behavior predicted by the present analysis can be summarized by the following table:

	Atelic	Telic
Agentive	$(1)_{CAUSE}$	$(3)_{CAUSE}$
Nonagentive	$(1)_{HAVE}$, $(2)_{CAUSE}$, $(2)_{BE}$	$(2)_{CAUSE}$, $(2)_{BECOME}$, $(3)_{HAVE}$

As the table shows, the following generalizations are predicted to hold:

(165) *Unergative structures cannot have a telic interpretation,*[49]

Agentive sentences cannot project an unaccusative structure,

Agentive telic sentences project the reflexive structure.

Similar generalizations have been proposed in Dowty 1991, stated in (166) below:

(166) *Agentive atelic verbs are necessarily unergative,*

Nonagentive telic verbs are necessarily unaccusative.

Let us briefly review the present analysis of these generalizations.

First, let us show that if a verb projects the unergative structure $(1)_{\mathrm{CAUSE}}$, then it must have an internally-caused atelic interpretation.

As we discussed above, all verbs which project $(1)_{\mathrm{CAUSE}}$ are interpreted by the rules of compositional semantics as internally-caused, which trigger the agentivity implicature. On the other hand, all verbs that project an unergative structure cannot have a telic interpretation, i.e. allow presyntactic affixation of the affix BECOME, since prefixes cannot be added to V if the Spec of VP position is empty. The verbs that project an unergative structure, therefore, must be atelic.

Second, we can also show that all telic nonagentive verbs project a structure where the NP is generated in the Spec of VP position.

If a verb is telic, then it involves affixation of a perfectivizing prefix. This prefix can either head the AspP projection, as in the structure $(2)_{\mathrm{BECOME}}$, or it can be added to a verb presyntactically. Now if the prefix heads AspP, then by the economy of computation the only structure that can be derived is the unaccusative one.. On the other hand, if the prefix is added to the verb presyntactically, then either an unaccusative or a reflexive structure can be projected.

[49] Except for verbs derived by superlexical prefixes, as discussed in chapter 2:
Ivan za-smejalsja
Ivan za-laugh-PAST
Ivan started to laugh

The unergative structure cannot be projected, given that telic verbs cannot be interpreted unless there is an overt NP in the Spec of VP position. Now if the reflexive structure $(3)_{CAUSE}$ is projected, then the NP is interpreted as the causer of the event denoted by VP, and the sentence has an agentive interpretation. The only nonagentive structures, which can be projected by telic verbs are unaccusative structures, and the reflexive structure $(3)_{HAVE.}$

4.7. Cross-Linguistic Variation

Now let us turn to the question of what the analysis presented above can tell us about language variation with respect to argument projection. Specifically, the question that we address is which semantic classes of verbs allow cross-linguistic variation and which classes do not?

The analysis of unaccusativity proposed in this section assumes that argument projection is governed by the selectional properties of the verbs, along with the universal principles of compositional semantics, economy of computation and conversational maxims. Argument projection, therefore, can vary across languages only to the extent that selectional properties of the verbs can vary from one language to another.

First, we have shown that universally agentive atelic sentences project the unergative structure, but nonagentive telic ones project unaccusative or reflexive structures. These generalizations have been accounted for given the analysis of agentivity as an implicature triggered by the individual argument of CAUSE, and the analysis of telic verbs as derived by perfectivizing operators.

It was further shown that agentive telic sentences are predicted to project the reflexive structure in (3).

The remaining semantic class, the class of nonagentive atelic sentences can vary across languages, if the selectional properties of the verbs in these sentences are different. These generalizations are supported by the data discussed in Rosen 1984, who discussed examples of verbs that show language variation. These are verbs like ‘sweat’, ‘sneeze’, ‘bleed’, ‘suffer’, 'hungry', 'be afraid', 'talk in a delirium' and others, which usually occur in nonagentive atelic sentences.

Consider, for example, the data in (167)-(168) from Rosen 1984:

(167) *Choctaw*

Sa- laksha

I-st-ACC sweat

'I sweated'

(168) *Italian*

Ho sudato

'I sweated'

/Rosen 1984/

The verb 'sweat' in Choctaw checks accusative case, which shows that the argument is in the Spec of VP position. On the other hand, in Italian it selects auxiliary 'avere', which is a diagnostic of the unergative structure.

These data can be explained, if we assume that the verb 'sweat' differs in the two languages in whether it selects for animate NPs, who undergo 'sweating', or entities which correspond to cognate objects:

(169) Italian: sweat(y) iff y is a sweat

Choctaw: sweat(y) iff y undergoes sweating

The question that arises is why languages differ with respect to selectional restrictions, and whether this difference is part of a lexical entry of a verb or extra-linguistic knowledge. If selectional restrictions are meaning postulates, as assumed in this work, then this question is reduced to the question of whether meaning postulates are part of a lexical entry or not. This question is a matter of debate in the literature. In Montague 1973, meaning postulates are assumed to be part of the lexical meaning. The 'constraints' of Barwise and Perry 1983, on the other hand, are argued to be extra-linguistic. I will not attempt to resolve this issue in this study, and leave this question open.

4.8. Summary

The analysis of unaccusativity presented in this chapter is a version of predicate-driven approaches that is based on the assumption that aspectual operators are separate lexical items. As is illustrated in the discussion of different types of verbs, this approach follows closely the agenda of Hoekstra and Mulder 1990 and Borer 1994 who proposed that "the way the arguments are projected into the syntax contributes to the meaning' (Hoekstra and Mulder 1990). Although the present analysis employs the basic idea put forth by the work of Hoekstra and Mulder 1990, Borer 1994, Goldberg 1995, who proposed that verbs can be projected freely into different syntactic configurations, it differs from these approaches in trying to employ semantic principles such as function application and semantic selection to filter out ill-formed projections.

The analysis of argument projection presented in this chapter distinguished three syntactic structures: unergative, unaccusative and reflexive ones. It was shown that some syntactic phenomena, such as auxiliary selection in Italian and Dutch, resultative constructions, and some others distinguish unergative structures from the unaccusative and reflexive ones. Case and agreement in active languages, on the other hand, as well as impersonal passivization in Dutch, distinguish unaccusative structures from the unergative and reflexive ones.

Given the present analysis of these phenomena, we further distinguished three classes of verbs of variable behavior with respect to unaccusativity. The first class is illustrated by fluid case marking in active languages, where the same verb can check either ergative or nominative case dependent on whether it is interpreted as agentive. The verbs that show fluid case-marking are analyzed as verbs that can project either an unaccusative or a reflexive structure. It was shown that if a verb projects the unaccusative structure, then it checks nominative case and has a nonagentive interpretation. If the same verb enters into a refelxive structure, then it checks ergative case and is interpreted as agentive. The second class of verbs of variable behavior was illustrated by the verbs of motion. Verbs of motion project an unergative structure in the absence of a prepositional phrase, but if a directional phrase is added, then the verb projects the reflexive structure. The variable behavior in this case was shown to correlate with telicity rather than agentivity. And the third class of verbs of variable behavior was illustrated by verbs that can project either unergative or unaccusative structures dependent on whether the NP satisfies the selectional restrictions of the verb.

The next phenomenon discussed in this chapter is the transitivity alternation. It was shown that verbs that project unergative and reflexive structures do not have a transitive variant, as opposed to the verbs that can project an unaccusative one. Various exceptions to this generalization were shown to support the present analysis of argument projection, which assumes that this alternation is not the result of application of a lexical rule, but rather that all structures including transitive, unergative, and unaccusative ones are filtered out by general syntactic, semantic, and pragmatic principles.

Given the present assumptions about aspectual affixes, we further accounted for the correlation between semantic properties of the verbs and argument projection, discussed in Van Valin 1990, Dowty 1991, and Levin and Rappaport Hovav 1995, as well as for the problem of language variation with respect to argument projection addressed in Rosen 1984.

CHAPTER 5

RESULTATIVES

This chapter presents evidence for the claim that aspectual affixes are separate lexical items based on the analysis of resultative constructions.

The analysis of resultatives proposed in this chapter assumes that this construction is derived by affixation of the operators CAUSE and BECOME. Given this assumption, we first present an analysis of two types of resultatives in English, called transitive and intransitive resultatives in Carrier and Randall 1992. The differences between the two types of resultatives are shown to follow from the view on morphological component advocated in Baker 1988 and Borer 1991, who argued that affixes can either adjoin to the verb presyntactically, or as the result of incorporation. When the affixes CAUSE and BECOME adjoin to the verb presyntactically, a transitive resultative is formed. When a morphological complex derived by these affixes heads a separate projection and adjoins to the verb as the result of head movement, then the structure of the intransitive resultative is formed. This analysis is shown to predict different behavior of the two types of resultatives with respect to nominalization, formation of adjectival passive and their selectional properties. Given compositional interpretation of both types of resultatives, it further accounts for the fact that resultative phrases can only be predicated of postverbal NPs, known as "Direct Object Restriction" (Simpson 1983, Levin and Rappaport Hovav 1995).

Further consequences of this analysis discussed in this chapter include semantic restrictions on the expressions that can form this construction (Simpson 1983, Hoekstra 1988, Bresnan and Zaenen 1990, Van Valin 1990, Levin and Rappaport Hovav 1995 and others). The semantic constraints on the classes of verbs and resultative phrases are accounted for in terms of selectional properties of the affix CAUSE.

And finally, this chapter discusses language variation in both the typology and the semantic constraints on the resultative constructions (Napoli 1992, Washio 1995).

5.1. Transitive and Intransitive Resultatives

Let us start with the analysis of two types of resultatives in English, which are called transitive and intransitive resultatives in Carrier and Randall 1992. Examples of transitive and intransitive resultatives are given in (1)-(2):

(1) *Transitive resultatives*

a. John watered the tulips flat.

b. The grocer ground the coffee beans into a fine powder.

c. They painted their house a hideous shade of green.

(2) *Intransitive resultatives*

a. The joggers ran their Nikes threadbare.

b. The kids laughed themselves into a frenzy.

c. He sneezed his handkerchief completely soggy.

/Carrier and Randall 1992, p.173/

The two types of resultatives are distinguished based on the transitivity of their verbs, as the data in (3)-(4) show:

(3) a. John watered the tulips.

b. The grocer ground the coffee beans.

c. They painted their house.

(4) a. The joggers ran.

b. The kids laughed.

c. He sneezed.

Further differences between the transitive and intransitive resultatives, as discussed in Carrier and Randall 1992, include their selectional properties, nominalization and formation of adjectival passive.

5.1.1. Syntactic Structures

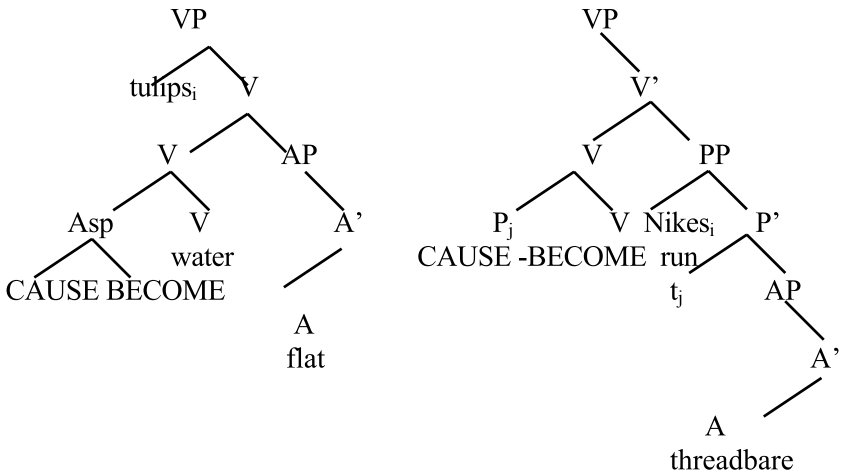
This section presents syntactic analysis of the transitive and intransitive resultatives, and supports this analysis by long-distance extraction, nominalization, adjectival passive and parallel behavior of the perfectivizing prefixes in Russian.

5.1.1.1. A Proposal

The view on the morphological component, assumed in this work, is that of Baker 1988, Borer 1991, and Kratzer 1994b, which assumes that morphology determines well-formedness of combination of morphemes regardless of whether the morphemes are combined together prior to the syntax, or as the result of incorporation. According to this proposal affixes can either be base-generated as sisters of V, or they can be the heads of separate projections, and adjoin to the verbs as the result of head movement.

Resultative constructions under the present analysis are derived by affixation of what we call below a resultative prefix – a morphological complex derived by the affixes CAUSE and BECOME (see the compositional translation of this prefix in section 5.1.2.1 below). This prefix can adjoin to the verb presyntactically, in which case the structure of the transitive resultative given in (5a) is formed. On the other hand, it can also head a separate projection, as shown in (5b), and then be affixed to the verb as the result of incorporation.

(5) *a. Transitive Resultative* *b. Intransitive Resultative*



The structures of transitive and intransitive resultatives differ not only with respect to the presence of a PP projection, but also in the position where the postverbal NP is generated. In the structure of the transitive resultative in (5a), the NP is generated in the Spec of VP position. However, in the structure of the intransitive resultatives the postverbal NP is generated in the Spec of PP position. The question that arises is what governs argument projection?

Kratzer 1994b, in her analysis of prefixes in German, proposed that affixes head a separate projection in case they have an argument to realize. The structures in (5) follow this principle, given that the postverbal NP of intransitive resultatives is generated in the Spec of PP position, headed by aspectual affixes. However the goal of the present discussion is to show that argument projection is not governed by any rules, including rules of this type, but rather follows from general syntactic and semantic constraints, which filter out undesirable projections.

As we show in section 5.1.2.1 below, the argument projection in the case of transitive and intransitive resultatives is a consequence of the compositional interpretation of these structures. However, before we turn to the semantic analysis of the resultative constructions, let us first support the syntactic representation of the two types of resultatives, proposed in (5).

5.1.1.2. Resultative Phrases are Lexically Governed by the Verb

First, the analysis given above predicts that in both structures the resultative AP is lexically governed by the verb. In the case of transitive resultative, the result phrase is the complement of the verb, whereas in the case of intransitive resultatives, the domain of government is extended as the result of incorporation (Baker 1988).

This prediction accounts for the observation in Rothstein 1983, Levin and Rappaport Hovav 1995, among others, that in languages like Icelandic result denoting adjectives can incorporate left to the verb[50]:

(6) a. Þeir máluðu húsið hvítt

they painted house the white

b. Þeir hvítmáluðu húsið

they whitepainted house the

/Levin and Rappaport Hovav 1995/

Another argument in favor of the claim that resultative phrases behave like the arguments of the verb comes from the long-distance extraction out of wh-islands, discussed in McNulty 1988, Carrier and Randall 1992:

(7) Extraction of resultative phrases out of transitive resultatives

a. ?How flat do you wonder whether they hammered the metal?

/McNulty 1988/

b. ? How shiny do you wonder which gems to polish?

c. ? Which colors do you wonder which shirts to dye?

(8) Extraction of resultative phrases out of intransitive resultatives

a. ? How threadbare do you wonder whether they should run their sneakers?

b. ? How hoarse do you wonder whether they sang themselves?

c. ?How dry do you wonder whether the sun baked the field?

/Carrier and Randall 1992/

As the data in (7)-(8) show, extraction out of wh-islands in the case of both transitive and intransitive resultatives results in a Subjacency violationrather than ECP violation, as opposed to extraction out of adjuncts, subjects or depictives:

(9) Long-distance extraction out of adjuncts, subjects and depictives:

a. * How$_i$ do you wonder whether to punish these boys t$_i$?

b. * Who$_i$ do you wonder [which boys]$_j$ t$_i$ should punish t$_j$?

c. * [How angry]$_i$ does Mary wonder whether John left t$_i$?

/Carrier and Randall 1992/

The contrast between (7)-(8) and (9), therefore, is predicted, given that the resultative APs in (9)-(10) are lexically governed by the verb.

5.1.1.3. Resultative Nominalization

The data discussed in this section illustrates the first difference between the two types of resultatives. As discussed in Carrier and Randall 1992, transitive and intransitive resultatives show different behavior with respect to *ing$_{of}$* nominals, i.e. nominals derived by *-ing* suffix that take *of*-NPs:

(10) *Transitive resultative nominals*

a. The watering of tulips flat is a criminal offense in Holland.

b. The slicing of cheese into thin wedges is the current rage.

c. The Surgeon General warns against the cooking of food black.

(11) *Intransitive resultative nominals*

a. *the drinking of oneself sick is commonplace in one's freshman year.

b. *the talking of your confidant silly is a bad idea.

---

[50] The Icelandic examples cited in the literature are based on transitive resultatives. This phenomenon, however, is a

c.*What Christmas shopping means to me is the walking of my feet to pieces.

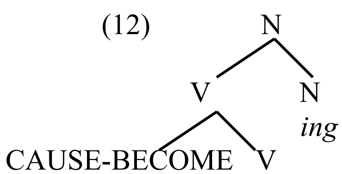
/Carrier and Randall 1992, p. 201/

Let us adopt the proposal in Abney 1987 that this type of nominals is derived by affixation of a nominalizing suffix *-ing* to a verb presyntactically. In this respect *ing*$_{of}$ nominals are different from the other types of *-ing* nominals, which are derived by nominalizing maximal projections.

Given this analysis, we can show that the contrast in (10)-(11) follows from the structures proposed above and two independently motivated assumptions: (i) the resultative prefix cannot be adjoined to nouns[51], and (ii) presyntactic derivation precedes syntactic incorporation.

In the case of transitive resultative nominals, the nominalizing suffix *-ing* attaches to a prefix-verb combination, as (12) shows:

(12)

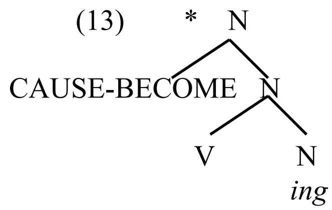


In the case of intransitive resultatives, on the other hand, this structure cannot be derived. *Ing*$_{of}$ nominals, under the analysis of Abney 1987 adopted here, are derived by presyntactic affixation of the affix *ing* to the verb. The resultative prefix, on the other hand, is adjoined to the verb in the syntax, as the result of head movement. If presyntactic derivation precedes the syntactic incorporation, as we have assumed, then the structure in (12) is not acceptable for intransitive resultatives.

Another possible structure is given in (13). In this structure the verb nominalizes in the lexicon, and then the affix CAUSE is adjoined to it as the result of head movement. This structure, however, is ruled out by the morphological subcategorization of the affix, since it is adjoined to a noun, and not a verb.

general property of resultative constructions in Icelandic, independent on whether the resultative is transitive or not.

(13)



5.1.1.4. Adjectival Passive

Another difference between transitive and intransitive resultatives concerns adjectival passive formation. As discussed in Carrier and Randall 1992, this construction can be derived from transitive, but not intransitive resultatives:

(14) *Adjectival passives from transitive resultatives*

a. the stomped-flat grapes

b. the spun-dry sheets

c. the smashed-open safe

(15) *Adjectival passives from intransitive resultatives*

a. *the danced-thin soles

b. *the run-threadbare Nikes

c. *the crowded-awake children

/Carrier and Randall 1992, p.195/

An explanation of this phenomenon that we can propose is parallel to our analysis of nominalization. Specifically, we suggest that this construction cannot be derived in the case of intransitive resultatives, because aspectual affixes cannot be adjoined to a category A.

Adjectival passive, as discussed in section 3.6 above, is derived by affixation of a zero affix A to the verb, which changes its category from V to A. In the case of transitive resultatives, this affix can be added to the Asp-V complex so that the adjectival passive can be formed. On the other hand, in the case of intransitive resultatives, this affix has to adjoin to V presyntactically,

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[51] This restriction seems to be a general property of all aspectual affixes. For example, overt perfectivizing prefixes in Slavic languages and particles in English cannot be adjoined to nouns.

whereas aspectual affixes are added as the result of incorporation, i.e. to the complex V-A. The resulting structure violates morphological subcategorization properties of aspectual affixes, and therefore, is ungrammatical.

5.1.1.5. Parallel Behavior of Overt Perfectivizing Prefixes in Russian

The hypothesis that the difference between transitive and intransitive resultatives lies in whether aspectual affixes adjoin to the verb presyntactically, or head a separate projection can be further supported by parallel behavior of overt perfectivizing prefixes in languages like Russian. As the following sentences illustrate, the perfectivizing prefix 'pere' in (16a) preserves the adicity of a verb, i.e. the number of its arguments, whereas in (16b) it changes an intransitive verb into a transitive one.

(16) a. Ivan perepisal pis'mo.
Ivan pere-write letter-ACC
'Ivan rewrote the letter'
b. Ivan perekrichal otca.
Ivan pere-shout father
'Ivan outshouted the father'

(17) a. Ivan pisal pis'mo.
Ivan wrote-IMP letter-ACC
'Ivan was writing a letter'
b.*Ivan krichal otca
Ivan shouted father-ACC

Given syntactic assumptions discussed above, we can suggest that in (16a) this prefix is lexical, i.e. it is base-generated as the sister of the verb, whereas in (16b) it projects a prepositional phrase. This analysis predicts that the perfectivized verbs in the examples in (16) behave similar to transitive and intransitive resultatives.

Consider for example the data in (18). As in the case of resultative constructions in English, Russian perfective verbs can undergo *ing*$_{of}$ nominalization only if the prefix is base-generated as the sister of the verb:

(18) a. perepisyvanije pis'ma

the rewriting of the letter

b. *perekrichanije otca

the outshouting of the father

A similar pattern can be observed with respect to adjectival passive formation:

(19) perepisannoje pis'mo

rewritten letter

(20) *perekrichannyi otec

outshouted father

Perfectivizing prefixes in Russian, therefore, support the analysis of transitive and intransitive resultatives proposed above.

5.1.2. Semantic Interpretation

This section shows that given the syntactic structures discussed above, and the rules of compositional semantics adopted in this work, the two types of resultatives have different logical translations. The proposed semantic analysis is shown to account for the fact that postverbal NPs in the case of transitive and intransitive resultatives are generated in different positions, discussed above. Furthermore, it explains why resultative phrases cannot be predicated of the subjects and indirect objects (Simpson 1983, Levin and Rappaport Hovav 1995). Finally, the section accounts for different selectional properties of the two types of resultatives (Carrier and Randall 1992).

5.1.2.1. Compositional derivation

The example in (21) below illustrates compositional derivation of the transitive resultative:

(21) John wiped the table clean

AspP $\lambda t\exists P CAUSE(t, P(j), CAUSE\ (t, wipe(table), \lambda t\ \exists t'\ BECOME(clean(table), t, t')))\ \varnothing$

John$_l$ Asp' $\lambda t\exists P CAUSE(t,P(x_l),CAUSE(t, wipe(table), \lambda t\exists t' BECOME(clean(table),t, t')))\ \{x_l\}$

Asp VP$_k$ $CAUSE\ (t, wipe(table), \lambda t\ \exists t'\ BECOME(clean(table), t, t'))\ \varnothing$

$\lambda q\lambda t\ \exists P CAUSE(t, P(x_l), q)$

$\{x_l\}$ table$_j$ V' $\lambda t CAUSE\ (t, wipe(x_j), \lambda t\ \exists t'\ BECOME(clean(x_j), t, t'))\ \{x_j\}$

V AP$_l$ $\lambda y\ clean(y)$

$\lambda t CAUSE(t, wipe(x_j),$

$\lambda t\ \exists t'\ BECOME(P_l(x_j), t, t')\ \{P_l, x_j\}$

This translation involves two affixes CAUSE. The lexical translation of CAUSE, as defined in Appendix 2, is as follows: $\lambda q\lambda t\ CAUSE(t, p_k, q)\ \ \{p_k\}$

When this affix heads the AspP projection, it combines with ARB, which forces existential quantification over the variable P. The compositional derivation of this translation is given in section 2.3. The denotation of the VP node in this case, given the rules of compositional semantics, serves as the resulting event.

In case this affix is adjoined to a verb, the denotation of the verb serves as the argument that corresponds to the causingrather than the resulting event. The translation of CAUSE-BECOME-V can be derived as follows:

(22) $\lambda p \lambda t CAUSE(t, wipe(x_j), \lambda t\, \exists t'\, BECOME(P_l(x_j), t, t')\ \{P_l, x_j\}$

V

2Ba. $\lambda p \lambda t CAUSE(t, p, \lambda t\, \exists t'\, BECOME(P_l(x_j), t, t')\ \{P_l, x_j\}$

1F. $\lambda t\, CAUSE(t, p_k, \lambda t\, \exists t'\, BECOME(P_l(x_j), t, t')$ $\{p_k, P_l, x_j\}$ — Asp_k — V wipe(x_j) $\{x_j\}$

ARB.Asp — Asp_k

2. $\lambda t\, \exists t'\, BECOME(P_l(x_j), t, t')\ \{P_l, x_j\}$ — 1L. $\lambda q \lambda t\, CAUSE(t, p_k, q)\ \{p_k\}$

1[52]. $\lambda t\, \exists t'\, BECOME(p_l, t, t')\ \{p_l\}$

Crucially, the argument of the verb ‘wipe’ and the individual argument of BECOME are coindexed in this structure. If they were not coindexed, then the structure in (21) would not be interpretable, since the NP could not fill both argument positions[53].

The predicate BECOME in this structure introduces two stored variables: P_l and x_j. As we proposed above, indices can be locally percolated from stored variables in a syntactic structure. The individual variable x_j can be coindexed with the NP in the Spec of VP position, since it stands in a Spec-Head configuration. The variable P_l can be coindexed with AP, since AP is a sister of V.

Given these assumptions, the variables from the store can be bound, and the structure is interpretable.

Now let us consider the derivation of the intransitive resultative in (23):

(23) John ran the pavement thin.

AspP $\lambda t \exists P CAUSE(t,P(j),\lambda t CAUSE(t, \exists y run(y), \lambda t\, \exists t'\, BECOME(thin(p), t, t'))\ \varnothing$

$John_l$ — Asp’ $\lambda t \exists P CAUSE(t,P(x_l),\lambda t CAUSE(t,\exists y run(y),\lambda t \exists t' BECOME(thin(p),t,t'))\{x_l\}$

Asp $\lambda q \lambda t\, \exists P CAUSE(t, P(x_l), q)$ $\{x_l\}$ — VP $\lambda t CAUSE(t, \exists y\, run(y), \lambda t\, \exists t'\, BECOME(thin(p), t, t')$

$\lambda t\, \exists y\, run(y, t)$ — V’ $\lambda t CAUSE(t, \exists y\, run(y), \lambda t\, \exists t'\, BECOME(thin(p), t, t')$

ARB.V — PP $\lambda p \lambda t CAUSE(t, p, \lambda t\, \exists t'\, BECOME(thin(p), t, t')$

$pavement_j$ — P_i $\lambda p \lambda t CAUSE(t,p,\lambda t \exists t' BECOME(thin(x_j),t,t')\ \{x_j\}$

2.$\lambda P \lambda p \lambda t CAUSE(t, p, \lambda t \exists t' BECOME(P(x_j), t, t')$

1.$\lambda p \lambda t CAUSE(t, p, \lambda t\, \exists t'\, BECOME(P_l(x_j), t, t'))$ $\{P_l, x_i\}$ — AP_l $\lambda y\, thin(y)$

[52] The derivation of this translation of ARB-BECOME is given in section 2.4.

[53] The question of why V cannot be combined with ARB in this structure so that its argument is existentially bound, is discussed in section 5.1.3.

The lexical derivation of P in this structure is as follows:

(24) 1U. $\lambda p \lambda t CAUSE(t, p, \lambda t\ \exists t'\ BECOME(P_l(x_j), t, t')\ \{P_l, x_i\}$

P

2Ba. $\lambda p \lambda t CAUSE(t, p, \lambda t\ \exists t'\ BECOME(P_l(x_j), t, t')\ \{P_l, x_i\}$
1F. $\lambda t\ CAUSE(t, p_k, \lambda t\ \exists t'\ BECOME(P_l(x_j), t, t')$ $\{p_k, P_l, x_i\}$

Asp_k P

ARB.Asp Asp_k

2. $\lambda t\ \exists t'\ BECOME(P_l(x_j), t, t')\ \{P_l, x_j\}$
1[54]. $\lambda t\ \exists t'\ BECOME(p_l, t, t')\ \{p_l\}$

1L. $\lambda q \lambda t CAUSE(t, p_k, q)\ \{p_k\}$

In the structure in (23) the postverbal NP is generated in the Spec of PP position, and is coindexed with the stored variable introduced by P. This coindexation is licensed by the Spec-Head configuration. If this NP were generated in the Spec of VP, then coindexation between the NP and P would not be licensed, and the structure would not be interpretable. Specifically, the stored variable x_j could not be bound, and the Store filter would be violated (the rules of compositional semantics are discussed in section 2.3 above).

The difference in the argument projection of transitive and intransitive resultatives, therefore, is predicted based on general semantic and syntactic principles, specifically, filters of compositional semantics and the assumption that coindexation can only be licensed in a local configuration.

5.1.2.2. Direct Object Restriction

One of the consequences of this semantic analysis is a restriction on possible interpretations of resultatives, discussed in Simpson 1983, Levin and Rappaport Hovav 1995, among others, according to which resultative phrases can only be predicated of the postverbal NP, but not of the subject, or of an oblique complement. The sentence in (25a) from Levin and Rappaport Hovav 1995, for example, cannot be interpreted as in (25b):

(25) a. Terry wiped the table clean.

b. #Terry became clean as the result of wiping the table.

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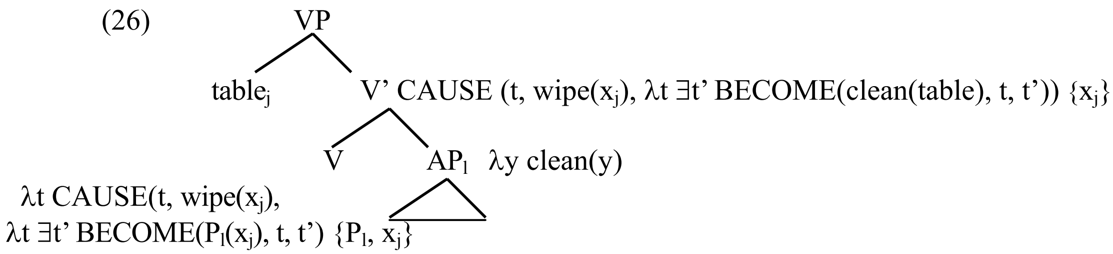
[54] The derivation of this translation of ARB-BECOME is given in section 2.4.

This fact follows from the compositional derivation of the resultative constructions. Consider again the interpretation of the VP structure of the transitive resultative:

(26)



By the rules of compositional semantics, the resultative phrase is interpreted as the predicate of the variable x_j. This variable is introduced by the rule of Substitution Binding as a stored variable[55]. Stored variables, as discussed in section 2.3 must be bound at some point of derivation, otherwise the final translation violates the Store filter that requires the store to be empty. The rules that bind variables from the store can apply only if the index of the variable is compositionally visible, i.e. coincides with the index of one of the sister constituents. Coindexation, on the other hand, as we proposed above, is restricted to local configurations, such as Spec-Head configuration, or sisterhood. The variable x_j, therefore, can only be coindexed with a NP in the Spec of VP position, i.e. the direct object. As a result of this coindexation, given the rules of compositional semantics discussed in section 2.3 above, the NP fills the position of the variable x_j. Given that the subject or oblique complements cannot be coindexed with this variable we predict that they cannot be interpreted as the arguments of the resultative phrase.

Likewise, given the structure of the intransitive resultative, we can show that only the postverbal NP, i.e. the NP generated in the Spec of PP position, can be coindexed with the variable x_j in the translation of the affix BECOME, and thus can serve as the argument of the resultative phrase.

[55] The assumption that the individual variable in the translation of BECOME is introduced by the Binding rule, as discussed in section 2.3, allows us to assign the lowest logical type to the lexical translation of the affix, as well as to account for various constructions where the affix BECOME is adjoined to expressions of different logical type.

This analysis of the "Direct Object Restriction" is exactly parallel to the analysis of the obligatoriness of arguments of perfective verbs, discussed in section 2.6 above. Specifically, we have shown that if a verb is derived by presyntactic affixation of BECOME, then there must be a NP in the Spec of VP position in order for the structure to be interpreted. If there is no overt NP, the stored individual variable introduced by BECOME cannot be bound, and the final translation is ruled out by the filters of compositional semantics.

Under this analysis we thus predict that resultative constructions require a postverbal NP. This prediction is confirmed by the resultative constructions based on unergative verbs. As the examples in (27) illustrate, resultative constructions can be derived based on unergative structures only if there is a 'dummy' NP in the postverbal position, which can be coindexed with the stored variable introduced by BECOME:

(27) a. *John laughed silly.

b. John laughed himself silly.

The function of the postverbal NP in the resultative constructions derived by unergative verbs is to license application of a Binding rule, which binds the individual variable in the translation of BECOME.

If the structure of the unaccusative verb is derived, then the NP is generated in the Spec of VP position, and can be coindexed with the stored variable in the translation of BECOME. Resultatives derived by unaccusative (and reflexive) structures are thus predicted to be interpretable. The final translation of unaccusative structures is illustrated by the example in (28):

(28) a. The door rolled open.

b. $\exists p CAUSE(t, p, CAUSE\ (t, roll(the\ door), \lambda t \exists t' BECOME(open(the\ door), t, t'))$

Given the semantic analysis of the two types of resultatives, we thus have shown that resultative constructions require the presence of a postverbal NP. We further have shown that it is only the postverbal NP that can be interpreted as the argument of the resultative phrase. These facts have been accounted for based on the rules of compositional semantics, conventions on percolation of indices, and assumptions about lexical translations of aspectual affixes.

5.1.2.3. Selectional properties

Now let us turn to the differences in the interpretation of transitive and intransitive resultatives. The final translations of the two types of resultatives are repeated in (29):

(29) a. John wiped the table clean.

b. $\exists$PCAUSE(t, P(j), CAUSE (t, wipe(table), λt $\exists$t' BECOME(clean(table), t, t'))

(30) a. John run the pavement thin.

b. $\exists$PCAUSE(t, P(j), λtCAUSE(t, $\exists$y run(y), λt $\exists$t' BECOME(thin(pvmt), t, t'))

The translations in (29b) and (30b) differ in the following respect. In the case of transitive resultatives the postverbal NP fills the argument position of both the verb and the resultative predicate. In the case of intransitive resultatives, on the other hand, the argument of the verb is existentially bound, whereas the postverbal NP fills only the argument position of the resultative phrase.

As a consequence, we predict that transitive resultatives preserve the selectional restrictions of the verbs, whereas intransitive resultatives do not. This prediction is confirmed by the following data, discussed in Carrier and Randall 1992:

(31) a. The bears frightened the hikers.

b. The bears frightened the hikers speechless.

c. *The bears frightened the campground.

d. *The bears frightened the campground empty.

(32) a. The baby shattered the porringer.

b. The baby shattered the porringer into pieces.

c. *The baby shattered the oatmeal.

d. *The baby shattered the oatmeal into portions.

(33) a. *The joggers ran their Nikes.

b. *The kids laughed themselves.

c. *He sneezed his handkerchief.

/Carrier and Randall 1992/

5.1.3. Why transitive and intransitive resultatives project different structures

The structures of transitive and intransitive resultatives proposed above were motivated by various syntactic and semantic phenomena. Furthermore, we have shown that under the assumption that intransitive resultatives project a separate PP projection, we can derive the fact that the postverbal NP in these structures must be generated in the Spec of PP rather than the Spec of VP. The question that we have not addressed, however, is what forces intransitive resultatives to project a PP, instead of being presyntactically adjoined to V.

This question is important under the present approach to syntactic projection, which assumes that lexical items can project any structures, subject to general syntactic, semantic and morphological principles. Under this view, it is not sufficient to show that if a certain structure is projected, then the behavior of the construction in question can be explained. We also need to show that no other structures can be projected, i.e. structures which can be interpreted and satisfy all lexical and morpho-syntactic constraints.

Let us assume, for example, that the sentence in (34) projects the structure of the transitive resultative, i.e. the resultative prefix in this structure does not head a separate projection but rather is adjoined to V presyntactically.

(34) John ran the pavement thin.

The affix CAUSE-BECOME can be added to the ARB.verb complex, where the individual argument of the verb is existentially bound, and the interpretation of V is as follows:

(35) $\lambda t CAUSE(t, \exists y\ run(y), \lambda t\ \exists t'\ BECOME(P_l(x_j), t, t')\ \{P_l, x_j\}$

V

$\lambda p \lambda t CAUSE(t, p, \lambda t\ \exists t'\ BECOME(P_l(x_j), t, t')\ \{P_l, x_j\}$ Asp ARB.V $\exists y\ run(y)$

The final translation is the same as the final translation of the structure in (23).

To rule out the structure in (35) in the case of intransitive resultatives, we can suggest that the morphological properties of ARB should be restricted. In all examples discussed so far ARB behaves like a prefix. On the other hand, in the structure in (35) it can only be affixed as an infix. If we assume that ARB is lexically specified as being a prefix, then the structure in (35) is considered to be morphologically ill-formed, and intransitive and transitive resultatives are expected to project different structures.

5.2. Resultatives derived by prepositions

A third type of resultative constructions, discussed in Hoekstra 1988, is illustrated in (36). These constructions are based on transitive verbs, however, the selectional properties of the verb in this construction are not preserved:

(36) a. He washed the soap down the sink.

b. #He washed the soap.

c. #He washed. (acceptable on wrong interpretation)

/Levin and Rappaport Hovav 1995/

This construction differs from transitive resultatives in that the resultative phrase is headed by an overt preposition. The prepositions that can occur in this construction are prepositions ‘out’, ‘down’, and others, which are predicated of two individual arguments. The compositional interpretation of this structure is as follows:

(37) AspP $\lambda t \exists P CAUSE(t, P(j), CAUSE\ (t, wash(sink), \lambda t\ \exists t'\ BECOME(down(sink, soap)\ t, t'))\ \varnothing$

John$_l$ Asp' $\lambda t \exists P CAUSE(t, P(x_l), CAUSE\ (t, wash(sink), \lambda t \exists t' BECOME(down(sink, soap)\ t, t'))))$ $\{x_l\}$

Asp VP $\lambda t CAUSE\ (t, wash(sink), \lambda t\ \exists t'\ BECOME(down(sink, soap)\ t, t'))\ \varnothing$

$\lambda q \lambda t \exists P CAUSE(t, P(x_l), q)$ $\{x_l\}$

sink$_i$ V' $\lambda t\ CAUSE\ (t, wash(x_j), \lambda t\ \exists t'\ BECOME(down(x_I, soap), t, t'))\ \{x_j\}$

V $\lambda t CAUSE(t, wash(x_i), \lambda t\ \exists t'\ BECOME(P_l(x_i), t, t')\ \{P_l, x_j\}$

PP$_l$ $down(x_i)(soap)\ \{x_i\}$

soap P' $\lambda z\ down(x_i)(y)\ \{x_i\}$

P $\lambda y \lambda z\ down(y, z)$ t$_i$ $x_i\ \{x_i\}$

In this structure the noun phrases ‘the soap’ and ‘the sink’ are generated within a PP headed by a preposition ‘down’. The NP in the complement of P position moves at LF to the Spec of VP position[56]. This movement is semantically motivated, given that the structure cannot be interpreted if there is no overt NP in the Spec of VP position that can be coindexed with the variable x_j in the translation of V. As a result of this movement, the NP ‘the sink’ serves as the argument of the verb, as well as the preposition.

Given this translation, we predict that the postverbal NP does not have to satisfy the selectional restrictions of the verb (cf. Levin and Rappaport Hovav 1995).

(38) He washed the soap out of his eyes => He washed his eyes

Note that the NP “the soap” can move to the Spec of VP position as well. The structure will be interpretable, and this NP will serve as the argument of the verb. However, the selectional restrictions of the verb ‘wash’’ will not be satisfied in this case, since ‘the soap’ is not a plausible argument of the verb ‘wash’:

(39) #He washed the soap.

Furthermore, as has been observed in Levin and Rappaport Hovav 1995, the resultative phrase in this construction is always a PP, and never an AP.

(40) *I washed the soap slippery.

/Levin and Rappaport Hovav 1995/

This is predicted, given that adjectives denote properties, and the construction illustrated above can only be derived from relational prepositions.

5.3. Semantic Constraints

One of the questions raised in many works on resultative constructions concerns semantic constraints on the classes of verbs and resultative phrases that can form this construction. As discussed in Green 1972, Simpson 1983, Carrier and Randall 1992, Levin and Rappaport Hovav 1995, among others not all possible resultative phrases can actually occur in a resultative construction.

For example, the following resultatives from Goldberg 1995 are not acceptable in English:

(41) a. He drank himself funny/happy.

b. He wiped it damp/dirty. (Green 1972)

c. The bear growled us afraid.

d. He encouraged her confident.

e. He hammered the metal beautiful/safe/tubular. (Green 1972)

/Golberg 1995, p. 195/

The class of adjectives which can function as a resultative phrase in English is limited to stage-level predicates (Rapoport 1991, Hoekstra 1992), 'states which can be changed by being acted upon' (Pustejovsky 1991), or states which denote 'the endpoint of a scale' (Goldberg 1995). Furthermore, resultative phrases cannot be headed by deverbal adjectives (Green 1972, Carrier and Randall 1992).

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[56] To license this movement, we assume that P incorporates to V at LF. In the structure in (37), however, P to V movement is not represented, since it is semantically vacuous.

Some of the constraints on the class of adjectives are aspectual, and can be accounted for in terms of aspectual properties of resultative construction, as has been proposed in Pustejovsky 1991 and Levin and Rappaport Hovav 1995, for example. However, not all constraints on resultative phrases are aspectual, as the data in (41) shows.

The resultative phrases that can occur in a resultative construction have been described as "appropriate and predictable results" /Simpson 1983/, " possible natural entailments' /McNulty 1988/, "focussing on the endpoint of the action" /Napoli 1992/. Without trying to find the right description of the resultative states, the question which I would like to address is why are there semantic restrictions on the resultative phrases, and where are these restrictions represented?

Some analyses of resultatives assume that these restrictions are part of the selectional properties of particular verbs (Simpson 1983, Carrier and Randall 1992). This assumption is not unproblematic, however. Thus, if semantic constraints on resultative phrases follow from lexical idiosyncratic properties of the verbs, then we would expect that no generalizations could be stated about the class of all possible resultative states. The class of phrases that can function as a resultative state, however, is a semantically coherent class, as has been pointed out in all the works cited above.

Given the present analysis of resultative constructions, restrictions on the classes of entities that can participate in this construction can be accounted for in terms of selectional properties of the affixes CAUSE and BECOME.

For example, given aspectual constraints on the classes of entities that can be the arguments of the affix CAUSE, the variable p in the translation of CAUSE(t, p, q) is restricted to processes, and cannot denote a state. We thus can account for a well-known generalization (cf. Dowty 1979, Hoekstra 1988, among others) that the verbs in the resultative constructions cannot be stative.

However, not only aspectual restrictions follow from the present proposal. As we proposed in chapter 2, the semantics of CAUSE requires that a certain relation should hold between the causing and the resultative events. This relation can be described as ‘q is an expected result of p’.

Consider, for example, the sentence in (42):

(42) ??He wiped the table dirty.

This sentnce is odd because the event of the “table becoming dirty’ is not an expected result of wiping the table. If we could accommodate the presupposition that wiping of the table is expected to result in the table being dirty, then the sentence in (42) would be acceptable.

In this study I will not attempt to provide a model-theoretic analysis of these restrictions. The goal of this discussion is to show that under the analysis of resultative constructions as derived by affixation of zero aspectual affixes we do expect that certain restrictions should hold on the classes of entities that form this construction. We further expect that these constraints do not depend on the meaning of the verb, but rather can be described in terms that are related to the meaning of these aspectual affixes. This prediction is confirmed by the description of resultative states as “appropriate and predictable results’ /Simpson 1983/, or “possible natural entailments” /Napoli 1992/, which seem to be related to the notion of causation.

Semantic constraints on resultatives have been used in some works to argue for a constructional approach to grammar, which assumes existence of a resultative construction as a primitive of a language. For example, as argued for in Goldberg 1995, the restrictions on the resultatives are analyzed as properties of the resultative construction itself, rather than the lexical items that participate in this construction.

The present anaysis in this respect preserves the advantages of constructional approaches, since the properties of resultatives depend on the semantics of affixes that form this construction. However, it also preserves the bottom-up approach to grammar, which assumes that the syntax is projected from the lexicon, and constructions are derived by general syntactic and semantic principles.

5.4. Language Variation

Another consequence of his approach concerns cross-linguistic variation in the range of resultative constructions. First, not all languages can form this construction. Second, languages that allow formation of resultatives might differ in the types of resultative constructions and semantic constraints.

Cross-linguistic variation in the range of syntactic constructions under the present analysis can be accounted for in terms of variation in lexical properties of zero aspectual affixes, such as their morphological subcategorization and semantic selection.

For example, if we assume that the affix CAUSE has different subcategorization properties across languages, then we can explain the fact that not all languages can form resultatives. In the case of transitive and unergative verbs derived by CAUSE, this affix heads an AspP projection. In the case of resultative constructions, on the other hand, it either adjoins to V, or to an empty P. If we assume that not all languages allow this type of morphological structures, then the fact that not all languages can form resultatives can be explained.

Furthermore, we can explain the fact that some languages can form transitive, but not intransitive resultatives. An example of a language of this type is Modern Hebrew, as discussed in Levin and Rappaport Hovav 1995. If CAUSE can be adjoined to a verb, but not to a preposition, then intransitive resultatives cannot be formed.

However, language variation in the range of resultative constructions cannot always be explained in syntactic terms, as the Japanese data discussed in Washio 1995, for example, shows. As is illustrated in this work, the class of activities that can be used in a resultative construction in Japanese is more restricted than in English. Specifically, Japanese lacks intransitive resultatives and some transitive ones, which are allowed in English:

(43) a. *John-wa pankizi-o usuku tatai-ta

John-NOM dough-ACC thin pound-PAST

'John pounded the dough thin'

b. John-wa pankizi-o usuku nobasi-ta

John TOP dough-ACC thin roll-PAST

'John rolled the dough thin'

/Washio 1995, p.40/

As discussed in Washio 1995, the difference between the verb *tataku* 'pound' and *nobasu* 'roll' is that *tataku* does not imply the resulting state of thinness, but *nobasu* strongly implies flatness or thinness. The resultatives that are not allowed in Japanese are called 'strong resultatives' in Washio 1995, and include intransitive resultatives and some transitive ones. In strong resultatives "it is impossible to predict from the semantics of the verb what kind of state the patient comes to be in, as the result of the action named by the verb" /Washio 1995, p.9/.

Strong resultatives are opposed to 'weak resultatives', illustrated in (44):

(44) a. uma-ga maruta-o subesurbe-ni hikizut-ta

horse-Nom log-ACC smooth drag-PAST

'The horses dragged the logs smooth'

b. karera-wa sono otoko-o timamire-ni nagut-ta

they-Top the man-ACC bloody hit-PAST

'They beat the man bloody'

c. John-wa kinzoku-o pikapika-ni migai-ta

John-Top metal-ACC shiny polish-PAST

'John polished the metal shiny'

d. John-wa niku-o yawarakaku ni-ta

John-Top meat-ACC soft boil-ta

'John boiled the meat soft'

/Washio 1995/

In weak resultatives, the verbs imply that the activities they name are done for certain specific purposes, which correspond to possible resultative states. Although the verbs like *migaku* 'polish' do not imply a change of state, they imply that if the states of patients change, they would change in a certain specific direction.

The question that arises is why does English allow both weak and strong resultatives, whereas Japanese can form only weak ones? As discussed in Washio 1995, the difference between strong and weak resultatives is not an aspectual difference, given that both activities and accomplishments can form either weak or strong resultatives. Neither this difference can be attributed to any syntactic properties of the verbs, such as transitive/intransitive, for example.

The constraints on the resultative construction, as we discussed above, can be explained in terms of the selectional restrictions of the affix CAUSE. Now if CAUSE is a separate lexical item, we could assume that its selectional restrictions might differ slightly across languages, within limits provided by its conceptual meaning.

Notice that the constraints on the resultative construction in Japanese are also stated in terms that are related to causation. The analysis that derives these restrictions in terms of selectional properties of CAUSE, therefore, seems to be able to capture the described generalizations. Furthermore, the semantic constraints on this construction in English and Japanese are not unrelated, and lie within the limits allowed by the lexical meaning of CAUSE.

5.5. Summary

In this chapter we supported the claim that syntactic constructions are derived by affixation of zero aspectual predicates by the analysis of resultative constructions.

Given the assumption that resultative constructions are derived by affixation of zero affixes, we explained the differences between two types of resultatives in English. Following

Baker 1988 and Borer 1991, we proposed that affixes that form a resultative construction can either be base-generated as sisters of V, or they can project an independent phrasal constituent and adjoin to the verb as the result of incorporation. This analysis has been shown to explain the differences between the two types of resultatives with respect to nominalization, formation of adjectival passive, selectional properties and other phenomena, discussed especially in Carrier and Randall 1992.

Given compositional interpretation of the two types of resultatives, we further showed that the resultative phrase in both constructions could only be predicated of postverbal NPs. The analysis of this phenomenon is parallel to the analysis of the obligatoriness of arguments of perfective verbs, discussed in chapter 2, and the analysis of the fact that telic verbs cannot project an unergative structure, discussed in chapter 4.

We further supported the present analysis by the discussion of semantic constraints on the classes of expressions that can form a resultative. These constraints, as we have shown in this chapter, are related to the notion of causation, and therefore can be accounted for in terms of selectional restrictions of the affix CAUSE.

And finally, we suggested that cross-linguistic variation in the range of resultative constructions can be explained under this analysis as a consequence of different lexical properties of the affix CAUSE.

CHAPTER 6

TYPOLOGY OF AGREEMENT AND CASE

The last two chapters of this study present evidence for the claim that aspectual operators are zero affixes based on the correlation between aspect and case. This chapter discusses the typology of case and agreement systems and presents an Optimality Theoretic analysis of different types of languages. This analysis is further supported by discussion of case and/or agreement splits.

First, this chapter proposes that feature-checking is governed by the principles which require verbal heads to check their nominal features. These principles are stated as violable constraints. The second assumption argued for in this chapter is that the relation of logical predication, motivated by various phenomena in chapters 2-5, has consequences for case. Specifically, we propose that phonologically overt or marked cases, such as accusative and ergative, realize a logical predication relation between a NP and a verbal head. Given this assumption, we show that marked cases can only be checked by ‘thematic’ categories, such as V and Asp, and furthermore, that these cases can only be checked in base-generated positions.

Given these assumptions, we further distinguish the classes of active and stative languages (Comrie 1981), and present an analysis of six case/agreement systems: accusative, ergative, and four active systems.

This analysis is further supported by different types of case and agreement splits, which are illustrated by the case/agreement split in Warlpiri, the specificity-based split in Eastern Pomo, the modality-based split in Russian and the agreement split of direct and indirect objects in Warlpiri.

Finally, the approach to case proposed in this work is motivated by the analysis of case-marking of passive sentences in accusative languages like Japanese, where passive sentences can assign accusative case (contra Burzio's generalization).

6.1. Case/Agreement Systems

6.1.1. Active and Stative Languages

One of the main distinctions in case systems across languages is the distinction between active and stative languages (Comrie 1981 et al).

Stative languages distinguish grammatical categories of subjects and objects by means of agreement and/or case. Examples of such languages include accusative languages like English, French, Japanese, as well as ergative languages like Inuit and Dyirbal. In both types of languages, intransitive verbs check phonologically null or 'unmarked' case, which is called nominative or absolutive. The two classes of languages differ, however, in whether the subject or the object is marked by overt morphology in a transitive clause. In accusative languages the object is marked with the accusative case; whereas in ergative languages, the subject has the overt 'ergative' case:

	Transitive	Intransitive
Accusative	Nom – Acc	Nom
Ergative	Erg – Nom	Nom

Therefore, the case pattern in stative languages can be described as follows:

(1) *Stative languages*

Intransitive: unmarked case

Transitive: one NP is marked, the other one is unmarked

In contast, active languages distinguish 'agentive' external arguments from 'patientive' internal arguments. The case pattern in these languages is different for unaccusative and unergative verbs. There are three different types of active languages, which are given below:[57]

	Transitive	Unergative	Unaccusative	
Ergative active	Erg-Nom	Erg	Nom	Basque
Accusative active	Nom-Acc	Nom	Acc	Eastern Pomo
Ergative Accusative	Erg-Acc	Erg	Acc	Lakhota, Acenhese

In ergative active languages, external arguments (i.e. the subjects of transitive and unergative verbs) are marked by overt ergative case, whereas internal arguments (i.e. the objects of transitive verbs and the subjects of unaccusative verbs) are not marked by overt case morphology. Accusative active languages, illustrated below by Eastern Pomo, mark internal arguments by overt accusative morphology, whereas external arguments are unmarked. The third class of active languages referred to below as ergative accusative, marks both external and internal arguments by overt case.

A unifying property of active languages is that 'agent'-like external arguments, i.e. the subjects of transitive and unergative verbs, are marked differently from 'patient'-like internal arguments, i.e. the objects of transitive verbs and the subjects of unaccusative verbs. As in the case of stative languages, active languages differ in which class of NPs is marked or unmarked.

This discussion suggests that there are two distinctions that are crucial for the analysis of case: the distinction between marked and unmarked cases, and the distinction between active and stative languages.

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[57] The terms ergative active and accusative active are adopted from Bittner 1996a. The class of ergative accusative languages, to the best of my knowledge, has not been distinguished as a separate case system in GB literature.

6.1.2. A Proposal

Following Marantz 1991, we distinguish abstract Case from morphological case. Abstract Case, as proposed below, is governed by the Optimality Theoretic approach to feature-checking, presented in section 6.1.2.1. Morphological case, i.e. what we see on the NPs, is related to the notion of logical predication and is discussed in section 6.1.2.2.

6.1.2.1. OT Approach to Case

Following Chomsky 1992, among others we assume that Case is a feature that must be checked. Furthermore, we assume that features are checked in a Spec-Head configuration.

The major difference is as follows. Previous approaches to Case Theory assume a version of a Case filter (Rouveret and Vergnaud 1980, Vergnaud 1982, Chomsky 1981, 1986), which requires that all NPs must be assigned/check Case. The main hypothesis of the present approach to abstract Case is that Case checking is governed by the principles which require that verbal heads must check their features rather than NPs.

This approach to feature checking is based on the Optimality Theoretic approach to grammar (Prince and Smolensky 1993). According to the Optimality Theory, the principles that require heads to check their features are violable, and the grammatical structure is determined by the ranking of constraints.

The following constraints are used below to account for different case systems:

(2) *CH-T: Tense must check its nominal features*

CH-Asp: Asp must check its nominal features

CH-V: V must check its nominal features

We further assume that nominal features include case and agreement features, and that in order for the constraint CH-X to be satisfied, all features of X must be checked.

Different rankings of these constraints define six possible case/agreement systems, which are discussed in detail below. In addition, the difference between active and stative languages is shown to follow from the relative ranking of the constraint CH-T with respect to CH-V and/or CH-Asp.

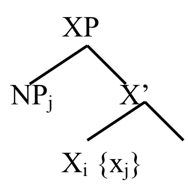
6.1.2.2. Feature Checking and Predication

Now let us turn to the morphological case, i.e. the case morphology seen on the NPs.

The basic assumption governing the present analysis of the morphological case is that overt or marked case realizes the relation of logical predication between a NP and a verbal element.

As noted in previous chapters, the relation of logical predication is a semantically significant coindexation between a stored variable in the translation of a verbal head and a local syntactic constituent, as illustrated in (3):

(3) logical predication



As a result of this coindexation, the NP serves as the logical argument of X (see section section 2.3 above).

The main hypothesis explored below is given in (4):

(4) *The relation of logical predication is realized by a marked case.*

Given this assumption, we can claim that X checks marked case on the NP only if X is the logical predicate of the NP.

Furthermore, we can show that not all syntactic categories can check marked case, and that marked case can only be checked by a verbal category in its base-generated position.

The verbal structure discussed in the previous chapters has three projections: TP, AspP and VP. The relation of logical predication, as illustrated above, can be obtained between a NP and a verbal head if this head introduces an individual level argument. In other words, the translation of a verbal head must be able to serve as the logical predicate of the NP. The heads that can be in a logical predication relation with a NP are thus restricted to V and Asp, which correspond to 'thematic' categories, i.e. categories that introduce arguments. Tense, on the other hand, is a 'nonthematic' category, i.e. it does not introduce individual level variables, and cannot stand in a logical predication relation with a NP. We thus expect that Tense cannot check a marked case.

Given that Tense cannot check a marked case, the features of Tense are realized by 'unmarked' nominative and absolutive cases. The assumption that nominative case is assigned or checked by Tense is a long-standing hypothesis (e.g. Chomsky 1981), and is supported by various data, which show that only tensed clauses can have nominative arguments. The assumption that the absolutive case is unified with nominative has also been proposed in the literature, although it is subject to some debate (see Bok-Bennema 1991, Johns 1992, Campana 1992, Murasugi 1992, Bittner and Hale 1996a,b, contra Levin and Massam 1985, Massam 1985, Bobaljik 1992, 1993). One of the the most straightforward arguments in favor of the approach which unifies the two cases is that both nominative and absolutive are unmarked, as opposed to ergative and accusative cases. Further evidence will be provided when discussing case-agreement splits, as well as various properties of syntactically ergative languages, which all strongly suggest that absolutive arguments check their features by Tense.

Under these assumptionsd, marked cases, such as ergative and accusative, under are checked by V and Asp. In the following discussion, we assume that the marked case of Asp is ergative, whereas the marked case of V is accusative.

One of the consequences of the assumption that Asp checks ergative case is a well-known fact that only external arguments can be ergative (Marantz 1991). That is, ergative case can be checked only on the subjects of transitive and unergative verbs but cannot be checked on the objects of transitive verbs and the subjects of unaccusatives. This generalization follows, given that Aspect can be in a logical predication relation only with the external arguments.

The assumption that the marked case of V is accusative, on the other hand, predicts that accusative can only appear on the internal arguments. This follows, given that V can only stand in a logical predication relation with a NP in the Spec of VP position. This generalization is supported by different types of languages discussed below. It differs, however, from Burzio's generalization regarding accusative case, which says that accusative case can be assigned/checked only if a verb has a thematic subject. However, Burzio's generalization is not universal, as is illustrated by accusative active and ergative active languages below, where unaccusative verbs check accusative case. The dependency of the accusative case on the presence of a subject is predicted to hold in the case of accusative languages (as discussed in section 6.3 below) as a consequence of the ranking of feature checking constraints.

Marked cases, as proposed above, can be checked only if V or Asp stands in a logical predication relation with a NP. If such relation does not hold, then V and Asp check an 'unmarked' nominative case.

For example, V checks an unmarked nominative case, if V is in a Spec-Head configuration with a NP; however, no logical predication relation is obtained. This case is refered to as NOM_V below, which corresponds to the so-called 'unmarked accusative' or 'default objective case' (cf. Belletti 1988, Mahajan 1990, de Hoop 1992, among others).

In summary, the following assumptions governing the distribution of case and agreement across languages are proposed:

- OT constraints that require verbal heads to check their case and agreement features
- Logical predication is realized by marked (i.e. ergative/accusative) case

As a consequence of the second assumption, the case features of verbal heads can be realized as follows:

(5) $Case_T$ – Nom_T

$Case_{Asp}$ - Erg[58]

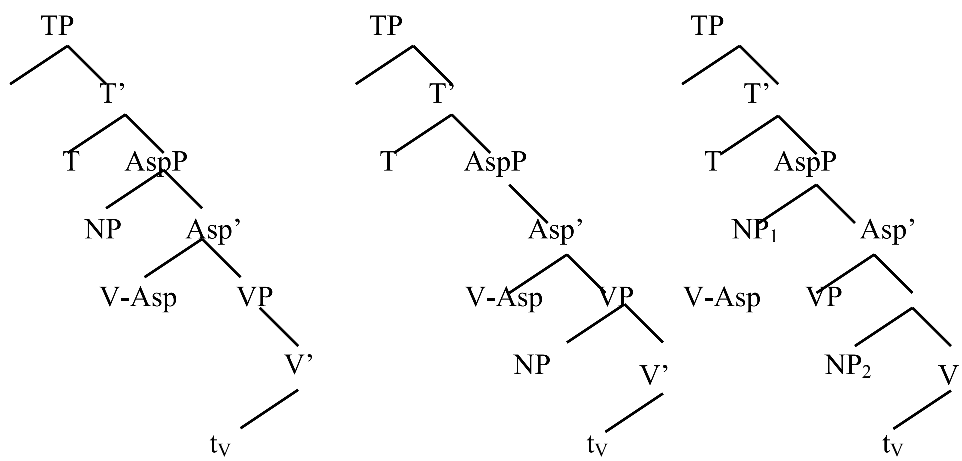
$Case_V$ – Acc or Nom_v

These assumptions, as we show below, can account for different classes of active and stative languages, discussed above, as well as various types of case and agreement splits. Before we turn to the detailed analysis of different types of languages, let us first present the sets of candidates, predicted by the present assumptions.

6.1.3. Sets of Candidates

The structures of the three classes of verbs where arguments are in base-generated positions are given in (6):

(6) a. Unergative b. Unaccusative c. Transitive



To determine which configurations are possible candidates, we need to know whether a NP can move to a certain position to check case, or not. The second question is whether there can be any other projections that can compete with Tense, Asp or V. The third question is whether it is possible that a verbal head does not have a case or an agreement feature in a language?

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[58] In this chapter, we assume that the relation of logical predication always obtains between the NP in the Spec of AspP position and Asp, as supported by compositional interpretation of transitive and unergative structures discussed above. However, we depart from this assumption in the discussion of Georgian in the next chapter.

To present the general typology of languages we restrict the sets of candidates by assuming that the following conditions hold:

(7) a. All verbal heads have both case and agreement features

b. NPs can move to check case

c. The VP structure is TP-AspP-VP, and there are no other projections

Howevr, after we present the general properties of case systems, we will revise the assumptions in (7). Specifically, we show that a detailed analysis of case patterns in a particular language should take into account the interaction of feature checking constraints with the conditions on movement, variation in verbal structure, and variation in morphological features of heads. However, first, we assume that the set of candidates is subject to the conditions in (7).

The tables in (8) show the sets of candidates for transitive, unergative, and unaccusative structures. A set of candidates includes the syntactic structures that have the same syntactic interpretation and conform to Gen (see Prince and Smolensky 1993).

In the case of unergative verbs, the set of candidates includes three structures. In the structure in (8a), the NP moves to the Spec of TP position where it checks nominative case features and agreement against Tense. This structure, as the following table shows, satisfies the constraints CH-Tense and violates CH-Asp and CH-V.

In (8b) the nominal features of the NP are checked against Asp, and the argument is ergative. This candidate satisfies the constraints CH-Asp and violates CH-T and CH-V.

The third possible structure shown in (8c) corresponds to the one where the NP checks its features against V, which is adjoined to Asp as the result of head movement. The case checked by V is unmarked or nominative, given that there is no logical predication relation between V and the NP in the Spec of AspP position.

(8) Unergative:

	CH-T	CH-V	CH-Asp
(a) $[_{TP}$ NP-Nom$_T$ T $[_{AspP}$ t Asp $[_{VP}$ V]]		*	*
(b) $[_{TP}$ T $[_{AspP}$ NP-Erg Asp $[_{VP}$ V]]	*	*	
(c) $[_{TP}$ T $[_{AspP}$ NP-Nom$_V$ Asp-V $[_{VP}$ t_v]]	*		*

Given the set of candidates in (8), the NP in the case of unergative verbs is predicted to be either nominative or ergative. Nominative NPs, i.e. NPs with unmarked case, can check their features either against Tense or V.

The set of candidates for transitive verbs is illustrated by the table in (9). In (9a), the subject raises to the Spec of TP position, whereas the object checks its features against V. This candidate violates CH-Asp and satisfies CH-T and CH-V. This structure, as discussed below, is the winning structure in accusative languages.

If the subject does not move to the Spec of TP, then it checks ergative case features of Asp. In (9b), for example, the subject is ergative and the object checks its features against V. The constraint CH-T is violated.

In (9c), on the other hand, the subject checks ergative case against Asp, and the object moves to the Spec of TP position where it checks the features of Tense.

(9) Transitive

	CH-T	CH-V	CH-Asp
(a)$[_{TP}$ NP$_1$-Nom T $[_{AspP}$ t_1 Asp $[_{VP}$ NP$_2$-Acc V]]			*
(b) $[_{TP}$ T $[_{AspP}$ NP$_1$-Erg Asp $[_{VP}$ NP$_2$-Acc V]]	*		
(c) $[_{TP}$ NP$_2$-Nom T $[_{AspP}$ NP$_1$-Erg Asp $[_{VP}$ t_2 V]]		*	

The candidates in (9) are the only structures on which the constraints can compete.

For example, consider the structure where the object checks case against Tense and the subject checks unmarked nominative against V. This structure is an alternative to the structure in (9a), since it satisfies both CH-T and CH-V. However, if the structures are compared from the point of view of economy of representation (Chomsky 1989, 1992, among others), the alternative in (9a) wins with respect to 'the shortest movement" requirement, since it involves movement of the subject to the Spec of TP, as opposed to the object.

Another possible structure is the one where NP_2 moves to the Spec of AspP position and NP_1 moves to the Spec of TP position so that the constraints CH-T and CH-Asp are satisfied. The structure in (9c), however, wins over this structure with respect to economy of derivation, since it involves one trace rather than two (see the constraint Stay in Grimshaw 1997).

Finally, let us consider the set of candidates for unaccusative verbs. The first structure is where the NP moves to the Spec of TP position and checks nominative case features thus violating the constraints CH-V and CH-Asp.

The candidate in (10b) is derived when the NP checks its features against V. The case checked by V is accusative.

(10) Unaccusative

	CH-T	CH-V	CH-Asp
(a) $[_{TP}$ NP-Nom T $[_{AspP}$ Asp $[_{VP}$ V]]		*	*
(b) $[_{TP}$ T $[_{AspP}$ Asp $[_{VP}$ NP-Acc t V]]	*		*

The set of unaccusative candidates under the present assumptions has only two structures. If the NP moves to the Spec of AspP position, then it can check case by Asp; however, the structure derived by this movement is reflexive rather than unaccusative. As discussed above, reflexive structures can be projected if AspP is headed by CAUSE or HAVE[59]. However, if the NP moves to the Spec of AspP position where AspP is headed by these aspectual affixes, then it is interpreted as the argument of the affix. In other words, this movement is semantically significant, and the interpretation of reflexive structures is different than the interpretation of the corresponding unaccusative structures (see section 4.2 above). The reflexive structure, therefore, does not compete with the unaccusative one, and the candidate where the NP moves to the Spec of AspP is not included in the set of candidates.

This universal set of candidates, as shown below, is evaluated relative to the feature checking constraints. The ranking of constraints determines which candidate is the optimal one for each class of languages.

6.1.4. Active/Stative Languages Revisited

Given these assumptions, let us first account for the existence of the two classes of active and stative languages. The analysis of the active and stative languages that we propose assumes that they differ in the ranking of the constraint CH-Tense with respect to CH-V and CH-Asp.

(11) Stative: CH-T >> CH-V, CH-Asp

Active: CH-Asp >> CH-T, CH-V or

CH-V >> CH-Asp, CH-T

Let us first consider languages where the constraint CH-Tense is the highest ranked. In languages of this type, at least one NP in a clause must check nominative case by Tense. If a clause is intransitive, then the NP checks nominative case against Tense, whereas in a transitive structure, one NP is nominative, and the other NP checks case features against the next highest-ranked head. Languages with this ranking, therefore, are stative languages, as described in (1) above.

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[59] If AspP is headed by BE or BECOME, then reflexive structures are ruled out by economy of computation (see section 4.6)

The NP marked in the case of transitive verbs depends on the next highest-ranked constraint: that is, if Asp is the second ranked, then the subject checks ergative case features against Asp, if V is the next ranked, then the object checks accusative features against V:

	Transitive	Intransitive	
T>> Asp >>V	Erg-Nom_T	Nom_T	ergative (Dyirbal)
T>> V >>Asp	Nom_T-Acc	Nom_T	accusative (Russian)

The analysis of ergative and accusative languages is discussed in detail below. For now, however, we are interested in explaining main differences between stative and active languages, such as the fact that stative languages do not distinguish unergative and unaccusative verbs by means of agreement or case, whereas active languages do.

In stative languages the argument of intransitive verbs checks nominative case by Tense, given that the constraint CH-T is the highest ranked. Whether this NP is generated in the external or internal argument position is not important since NPs can move from both positions to check case against Tense.

Active languages are languages where CH-V and/or CH-Asp outrank CH-T.

If CH-Asp is the highest-ranked constraint in a language, then Asp checks ergative case on the NPs in the Spec of AspP position. In the case of the unaccusative structures, on the other hand, the NP does not move to the Spec of AspP position (as opposed to reflexive structures, discussed above), and Asp cannot check case features on the NP. The case is therefore determined by the next highest-ranked constraint. We thus predict that case systems in these languages distinguish unaccusative and unergative/reflexive structures.

	Transitive	Unergative Reflexive	Unaccusative	
Asp >>T>>V	Erg-Nom_T	Erg	Nom_T	ergative active (Lezgian)
Asp>>V>>T	Erg-Acc	Erg	Acc	ergative accusative (Acenhese)

In languages where Tense is the second ranked constraint, the internal argument checks nominative case against Tense. If V is the highest-ranked constraint, then the internal argument is marked with accusative case.

And finally, let us consider languages where CH-V is the highest ranked. In these languages, both unaccusative and unergative verbs check case by V. However, as discussed in the previous section, marked accusative case can be checked only on the internal arguments, whereas external arguments check 'unmarked accusative', or Nom_V. Therefore, languages with this ranking can also distinguish unaccusative and unergative verbs by means of agreement or case. However, whereas in the case of ergative active and ergative accusative languages external and internal arguments check case by different categories, the difference between internal and external arguments in the case of accusative active languages arises as the result of different morphological realization of the case features of V. This analysis leaves a possibility of three-way languages illustrated by Nez Perce in Bittner and Hale 1998, where intransitive verbs check unmarked case, but the subjects and objects of transitive verbs are marked.

	Transitive	unergative	unaccusative	
V>>T>>Asp	Nom_T-Acc	Nom_V	Acc	accusative active (East.Pomo)
V>>Asp>>T	Erg – Acc	Nom_V	Nom_V	three-way languages (Nez Perce)

The six case systems derived by reranking of the three feature checking constraints describe (to the best of my knowledge) all attested case systems. Stative case systems are ergative and accusative, whereas active languages distinguish ergative active, accusative active, as well as what is called here ergative accusative languages, which have not been discussed in previous GB-based work. Each of the six case systems is discussed in turn in the following sections.

6.1.5. Accusative Languages

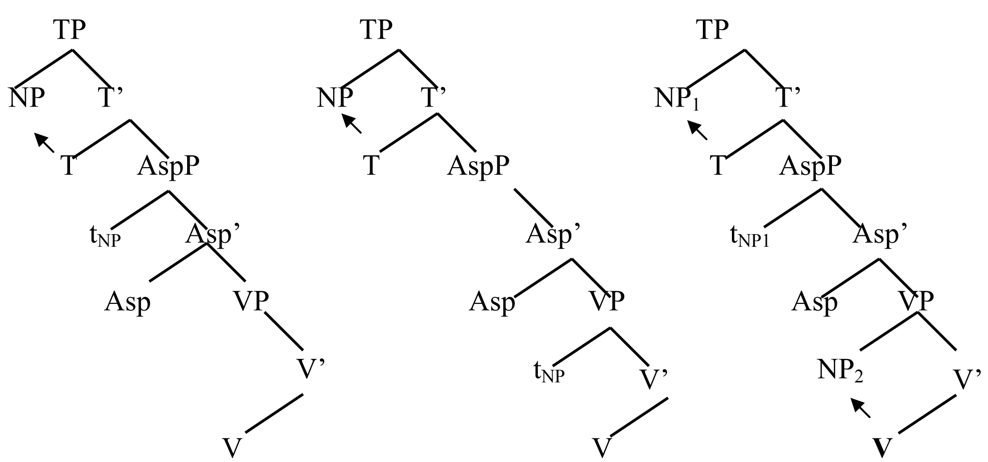
Let us start with languages of a familiar accusative type, such as German, French, Russian, and Icelandic. In these languages, the subjects get the unmarked nominative case, whereas the objects are marked with accusative morphology.

Accusative languages under the present analysis are languages with the following ranking of feature checking constraints:

(13) Accusative: CH-T >> CH-V >> CH-Asp

The optimal structures under this ranking are given in (14). The constraint "Check Tense" outranks all other constraints; therefore, the winning structure is the one where Tense satisfies its nominal features. If a verb has one NP, as in (14a) and (14b), then this NP moves to the Spec of TP position, where it checks the features of Tense. However, if the structure is transitive then the subject moves to the Spec of TP so that the constraint CH-T is satisfied. The object stays in situ, where it checks the features of the second highest-ranked head V.

(14) a. Unergative b. Unaccusative c. Transitive



To show that the structures above are optimal, we can use the tables that compare a set of candidates. These candidates are evaluated relative to the given ranking of constraints. The optimal structure is the winning structure, the other candidates are ungrammatical. The optimal form is the one that best satisfies the highest-ranked constraint on which the competitors conflict.

The following tables show how the sets of candidates are evaluated relative to the given ranking of constraints. In the case of unergative and unaccusative verbs, the optimal structure is the one where the highest-ranked constraint is satisfied, whereas the other constraints are violated.

(15) Unergative:

	CH-T	CH-V	CH-Asp
► $[_{TP}$ NP-Nom$_T$ T $[_{AspP}$ t Asp $[_{VP}$ V]]		*	*
$[_{TP}$ T $[_{AspP}$ NP-Erg Asp $[_{VP}$ V]]	*!	*	
$[_{TP}$ T $[_{AspP}$ NP-Nom$_v$ Asp-V $[_{VP}$ t$_v$]]	*!		*

(16) Unaccusative

	CH-T	CH-V	CH-Asp
► $[_{TP}$ NP-Nom T $[_{AspP}$ Asp $[_{VP}$ V]]		*	*
$[_{TP}$ T $[_{AspP}$ Asp $[_{VP}$ NP-Acc t V]]	*!		*

In the case of transitive verbs two constraints can be satisfied. The winning structure is the one where the two highest-ranked constraints CH-T and CH-V are not violated:

(17) Transitive

	CH-T	CH-V	CH-Asp
► $[_{TP}$ NP_1-Nom T $[_{AspP}$ t_1 Asp $[_{VP}$ NP_2-Acc V]]			*
$[_{TP}$ T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ NP_2-Acc V]]	*!		
$[_{TP}$ NP_2-Nom T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ t_2 V]]		*!	

Agreement in accusative languages under this analysis is subject to the same constraints. Subjects of transitive and intransitive verbs are predicted to check their agreement features by Tense, whereas objects of transitive verbs check their agreement features by V. This analysis thus accounts for the generalization discussed in Bittner and Hale 1998 that in accusative languages object agreement morphology is always closer to the verb than the subject agreement morphemes. (see, for example, the Warlpiri data in (66) below).

Accusative languages illustrate the class of stative languages, where CH-T is the highest ranked. Another class of stative languages is the class of syntactically ergative languages, which are discussed in the next section.

6.1.6. Syntactically Ergative Languages

Ergative languages are languages where the subjects of intransitive verbs and the objects of transitive verbs check nominative case, whereas the subjects of transitive verbs are marked with ergative case. The Dyirbal data below illustrates case assignment of a transitive and intransitive verb:

(18) *Dyirbal* (Pama-Nyungan: Queensland, Australia)

a. payi parrkan pangkul yara-ngku jurrka-nyu

CL-Nom wallaby CL-Erg man-Erg spear-NFUT

'The man is spearing the wallaby'

b. payi yara pani-nyu

CL-Nom man come-NFUT

'The man is coming'

/Bittner and Hale 1996a/

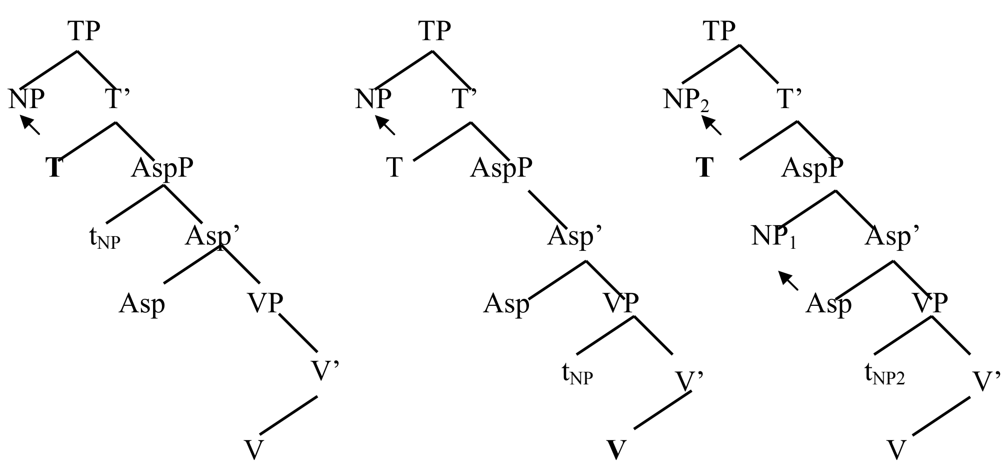
Ergative languages are distinguished as syntactically and morphologically ergative (e.g. Dixon 1972, 1979, 1994, Plank 1979). In this section, we present an analysis of syntactically ergative languages. The analysis of morphologically ergative languages is discussed in section 6.2.1.2.

Syntactically ergative languages under this analysis are languages with the following ranking of constraints:

(19) Syntactically ergative: CH-T >> CH-Asp >> CH-V

In the case of transitive verbs, the features of the subject are checked by Asp, whereas the object moves to the Spec of TP position to satisfy the constraint CH-T. The derived structure is the optimal one, since it satisfies the two highest-ranked constraints. In the case of intransitive verbs, only one constraint can be satisfied, and the NP checks its features by Tense in the Spec of TP position.

(20) a.Unergative b. Unaccusative c.Transitive



The tables showing that the structures in (20) are optimal are given below.

(21) Transitive

	CH-T	CH-Asp	CH-V
$[_{TP}$ NP_1-Nom T $[_{AspP}$ t_1 Asp $[_{VP}$ NP_2-Acc V]]		*!	
$[_{TP}$ T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ NP_2-Acc V]]	*!		
► $[_{TP}$ NP_2-Nom T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ t_2 V]]			*

(22) Unergative:

	CH-T	CH-Asp	CH-V
► $[_{TP}$ NP-Nom T $[_{AspP}$ t Asp $[_{VP}$ V]]		*	*
$[_{TP}$ T $[_{AspP}$ NP-Erg Asp $[_{VP}$ V]]	*!		*
$[_{TP}$ T $[_{AspP}$ NP-Nom_v Asp-V $[_{VP}$ t_v]]	*!	*	

(23) Unaccusative

	CH-T	CH-Asp	CH-V
► $[_{TP}$ NP-Nom T $[_{AspP}$ Asp $[_{VP}$ V]]		*	*
$[_{TP}$ T $[_{AspP}$ Asp $[_{VP}$ NP-Acc t V]]	*!	*	

Given the ranking of feature checking constraints, we thus predict that

- if there is one NP in a clause, then it checks nominative case

- if there are two NPs in a clause, then the subject is ergative and the object is nominative.

The winning transitive structure in the case of syntactically ergative languages is where the object moves to the Spec of TP position, whereas the subject stays in situ. It is thus predicted that nominative objects in ergative languages are syntactically higher than the ergative arguments at the level where nominal features are checked. This prediction, as shown below, can explain various properties of syntactically ergative languages, as opposed to morphologically ergative languages (cf. 'nested' vs. 'crossing' languages in Murasugi 1992).

The distinction between syntactic and morphological ergativity has been recognized since Dixon 1972, 1977. In his study of the Australian language Dyirbal, Dixon showed that Dyirbal differs from many other ergative languages in that it distinguishes the subjects of transitive verbs from the objects and the subjects of intransitives not only by the pattern of case, but also by some other syntactic phenomena, such as relativization and coordination.

For example, when two clauses with transitive verbs are conjoined in a coordinate structure, they must share the object and not the subject, as in accusative languages such as English.

(24) *Dyirbal*

ηuma yabu-ηgu bura-n jaja-ηgu ηamba-n

Father-Nom mother-Erg see-NFUT child-Erg hear-NFUT

'Mother saw father and the child heard him'

/Dixon 1972/

If one of the clauses has an intransitive verb, then the conjoined structure shares the object of the transitive and the subject of the intransitive verb.

(25) *Dyirbal*

ηuma yabu-ηgu bura-n banaga-n^{y}u

Father-Nom mother-Erg see-NFUT return-NONFUT

'Mother saw father and he returned'

/Dixon 1972/

Coordination, therefore, is a nominative-oriented phenomenon in Dyirbal, since nominative NPs are set apart from the ergative ones.

Another nominative-oriented phenomenon in Dyirbal is relativization. As the following example shows, the gap in the relative clause corresponds to the nominative argument rather than the ergative one:

(26) ŋuma banaga-ŋu yabu-ŋgu bura-n

Father-Nom return-REL-Nom mother-Erg see-NONFUT

'Mother saw father who was returning'

/Dixon 1994, p. 169/

Dyirbal illustrates syntactically ergative languages, i.e. languages that group nominative arguments apart from the ergative ones not only with respect to case, but also with respect to other syntactic phenomena. In this respect they differ from the class of morphologically ergative languages, which show the ergative pattern of case but behave like accusative languages in all other respects.

The present analysis of syntactic ergativity follows Bok-Bennema 1991, Bittner 1994b, Bittner and Hale 1996a,b who argued that in syntactically ergative languages the nominative argument is more prominent at some syntactic level than the ergative one.

The analyses of syntactically ergative languages, cited above, assume existence of at least two levels of syntactic representation. This is based on the fact that some phenomena are universally subject oriented. One of such universal subject-oriented phenomena is control, as the data from Dyirbal in (27) shows:

(27) *Dyirbal*

a. yara–ŋgu mija wamba-n

man-Erg house build-NFUT

'The man built the house'

b. yara–ŋgu [mija wamba-n] ŋuyma-n

man-Erg PRO house build-NONFUT do.properly-NONFUT

'The man built the house properly'

/Dixon 1994/

Syntactically ergative languages, therefore, show dual behavior: whereas some syntactic phenomena like control are subject oriented, relativisation and topic chaining are nominative oriented.

To account for this dual behavior, Bittner and Hale 1996a,b, for example, proposed that the universal subject oriented phenomena like control are sensitive to the level of d-structure representation, whereas coordination and relativization depend on the prominence of the arguments at the s-structure level.

The assumption that nominative arguments are more prominent at the level of s-structure is supported in these works by other phenomena, such as agreement and scope options of nominative arguments (see especially Bittner and Hale 1996b).

For example, as these works note, the scope options of nominative arguments are different in syntactically ergative and accusative languages.

In English and other accusative languages nominative subjects always have wide scope with respect to negation.

(28) A boy did not see a book

The subject NP can only be interpreted as having a wide scope reading, whereas the narrow scope reading 'there is no boy x such that x saw a book' is unavailable for this sentence.

In syntactically ergative languages, as the data from Inuit in (29) shows, nominative objects have only wide-scope reading, parallel to nominative subjects in English. The sentence in (29b), on the other hand, shows that ergative subjects can have either wide scope or narrow scope with respect to negation.

(29) *Inuit* (Eskimo-Aleut: West Greenland)

a. illumi miiraq ataasiq qia-nngu-la-q

today child one cry-not-IND-3SG

'One child did not cry today'

b. illumi atuartu ataatsi-p Juuna uqalugatigi-nngi-la-a

today student-ERG one-ERG Juuna talk.to-not-IND-3SG.3SG

(i) 'No student talked to Juuna today'

(ii) 'One student did not talk to Juuna today'

/Bittner and Hale 1996b/

The analysis of this phenomenon proposed in Bittner 1987, 1994b, Bittner and Hale 1996b assumes that s-structure determines minimal scope options. Subject NPs in English raise to the position where they are assigned nominative case. This position is higher than negation; therefore, nominative arguments always have wide scope with respect to negation. In this respect nominative arguments differ from the accusative ones, which get their case assigned/checked in the VP-internal position. In their s-structure position, accusative arguments have narrow scope; however, if they undergo QR, then they can have a wide scope interpretation as well.

In syntactically ergative languages, nominative objects raise to the Spec of some functional projection (IP in their structure), whereas the ergative arguments stay in situ. Therefore, nominative NPs are higher than negation at s-structure and can only have the wide scope reading. The ergative subjects, on the other hand, are lower than negation at s-structure, and therefore have both scope options available.

These data support the analysis of syntactically ergative languages, which assumes that the nominative objects in these languages are more prominent at s-structure than the ergative arguments.

The difference between the present analysis and previous analyses of these languages lies in the source of cross-linguistic variation. In Bittner and Hale 1996b, for example, the ergative system arises as the result of the inability of a verb to assign accusative case. If a verb cannot assign or check case on the object, then the object must move to be assigned case.

Under the present analysis, NPs move to satisfy feature checking constraints. If the highest-ranked constraint is CH-T, then one NP must move to the Spec of TP position. Therefore, intransitive clauses check nominative case by Tense in such languages. If the clause is transitive, on the other hand, then one NP checks nominative case against T, and the case of the other NP is determined by the second ranked constraint, i.e. CH-Asp. The winning structure is the one where the object moves to the Spec of TP, and the subject checks case against Asp.

To summarize the discussion of stative languages, it has been shown that the stative pattern of case arises when CH-T is the highest-ranked constraint. The difference between ergative and accusative languages has been explained as a consequence of the second highest-ranked constraint: CH-Asp for syntactically ergative languages, and CH-V in the case of accusative ones.

The next sections present the present analysis of different types of active languages, i.e. languages where unaccusative and unergative verbs check different case.

6.1.7. Ergative Active Languages

Ergative active languages assign ergative case to the subject of transitive and unergative verbs and nominative to the object of transitive and the subject of unaccusative verbs. That is, in these languages external arguments are marked, but internal arguments are not marked by overt case morphology.

As the data in (30)-(31) show, ergative languages like Dyirbal differ from ergative active languages like Basque in the case pattern of unergative verbs. In Dyirbal, unergative verbs check nominative case; in Basque, the subjects of unergative verbs are ergative.

(30) *Dyirbal*

a. payi parrkan pangkul yara-ngku jurrka-nyu

CL-Nom wallaby CL-Erg man-Erg spear-NFUT

'The man is spearing the wallaby'

b. payi yara pani-nyu

CL-Nom man come-NFUT

'The man is coming'

(31) *Basque*

a. Miren-ek ni jo n-au

M.-Erg me-Nom hit have

'Miren hit me'

b. Miren-ek hitz egin du

M.-Erg word done have

'Miren spoke'

c. Miren erori d-a

M-Nom fallen be

'Miren fell'

/Bittner and Hale 1996a/

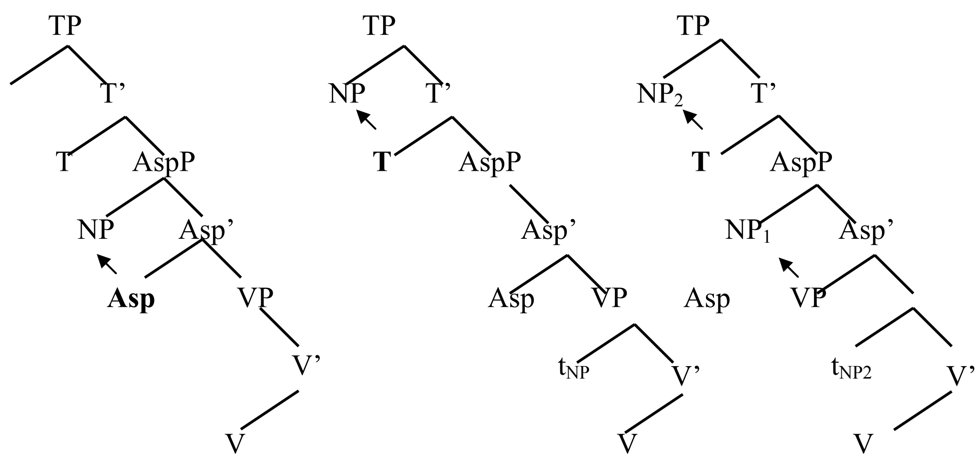
The difference in the case systems of ergative and ergative active languages is explained by different ranking of the constraints CH-Asp and CH-T:

(32) Ergative: CH-T >> CH-Asp >> CH-V

Ergative active: CH-Asp >> CH-T >> CH-V

In the case of transitive verbs, the two highest-ranked constraints must be satisfied, and the case pattern of ergative active languages is not different from the ergative ones. In the case of unaccusative verbs, Asp cannot check its features, and the NP checks nominative against Tense in both types of languages. In the case of unergative verbs, the case is different: in ergative active languages the highest-ranked constraint CH-Asp explains the appearance of the ergative case on the subject, whereas in ergative languages the NP checks nominative against Tense.

(33) a. Unergative b. Unaccusative c. Transitive



The tables showing that the structures in (25) are optimal are presented below.

(34) Transitive

	CH-Asp	CH-T	CH-V
[$_{TP}$ NP_1-Nom T [$_{AspP}$ t_1 Asp [$_{VP}$ NP_2-Acc V]]	*!		
[$_{TP}$ T [$_{AspP}$ NP_1-Erg Asp [$_{VP}$ NP_2-Acc V]]		*!	
► [$_{TP}$ NP_2-Nom T [$_{AspP}$ NP_1-Erg Asp [$_{VP}$ t_2 V]]			*

(35) Unergative:

	CH-Asp	CH-T	CH-V
[$_{TP}$ NP-Nom T [$_{AspP}$ t Asp [$_{VP}$ V]]	*!		*
► [$_{TP}$ T [$_{AspP}$ NP-Erg Asp [$_{VP}$ V]]		*	*
[$_{TP}$ T [$_{AspP}$ NP-Nom_v Asp-V [$_{VP}$ t_v]]	*!	*	

(36) Unaccusative

	CH-Asp	CH-T	CH-V
► [$_{TP}$ NP-Nom T [$_{AspP}$ Asp [$_{VP}$ V]]	*		*
[$_{TP}$ T [$_{AspP}$ Asp [$_{VP}$ NP-Acc t V]]	*	*!	

An alternative analysis of ergative active languages (Laka 1993, Bobaljik 1993, Bittner and Hale 1996a, among others) assumes that in these languages unergative verbs are syntactically transitive where the object incorporates into the verb. The case pattern is assumed to be the same as in ergative stative languages. Whereas some languages like Basque (as discussed in Laka 1993 and Bobaljik 1993) give some plausibility to this assumption, in many ergative active languages, like Georgian, there is no independent evidence that unergative verbs are syntactically transitive. Furthermore, the existence of other types of active languages is not expected under this analysis, which tries to unify the active patterns with the stative patterns of case.

6.1.8. Accusative Active Languages

The next class of active languages is the class of accusative active languages in the terminology of Bittner and Hale 1996a. Parallel to ergative active languages, the classes of external and internal arguments in these languages differ in that one class is marked and the other one is not. However, if in ergative languages it is the class of external arguments that is marked by ergative case, in accusative active languages it is the class of internal arguments that is marked by accusative case.

The case pattern of accusative active languages is illustrated by the following data from Eastern Pomo. As the data in (37)-(38) show, the classes of accusative and accusative active languages differ only in the case pattern of unaccusative verbs: in accusative active languages the arguments of unaccusative verbs are accusative, whereas in accusative languages they check nominative case.

(37) *Russian*

a. On ubil ego

He-Nom killed him-Acc

'He killed him'

b. On upal v vodu

He-Nom fell into water

'He fell into the water'

c. On poshol domoj

He-Nom went home

'He went home'

(38) *Eastern Pomo (Hokan: California)*

a. míp míp-al šáka

He-Nom him-Acc kill

'He killed him'

b. míp-al xá bakúma

Him-Acc in.the.water fell

'He fell in the water' (accidentally)

c. míp káluhuya

He-Nom went.home

'He went home'

/McLendon 1978, cited in Bittner and Hale 1996a/

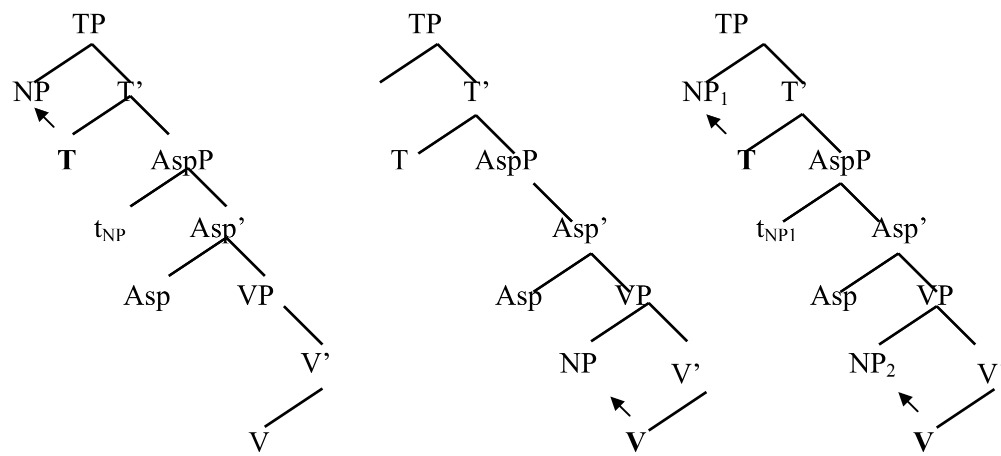
The analysis of accusative active languages which we propose assumes that this class of languages differs from the accusative languages in the relative ranking of CH-T and CH-V:

(39) Accusative: CH-T >> CH-V >> CH-Asp

Accusative active: CH-V >> CH-T >> CH-Asp

The optimal structures for the class of accusative active languages are predicted to be as follows:

(40) a.Unergative b. Unaccusative c. Transitive



In the case of transitive verbs, the two highest-ranked constraints must be satisfied so that both Tense and V check their features:

(41) Transitive

	CH-V	CH-T	CH-Asp
► [$_{TP}$ NP_1-Nom T [$_{AspP}$ t_1 Asp [$_{VP}$ NP_2-Acc V]]			*
[$_{TP}$ T [$_{AspP}$ NP_1-Erg Asp [$_{VP}$ NP_2-Acc V]]		*!	
[$_{TP}$ NP_2-Nom T [$_{AspP}$ NP_1-Erg Asp [$_{VP}$ t_2 V]]	*!		

In the case of unergative verbs the subject checks its features against V. The case checked by V for unergative verbs is unmarked nominative rather than accusative, given that V cannot stand in a logical predication relation with the external argument.

(42) Unergative:

	CH-V	CH-T	CH-Asp
$[_{TP}$ NP-Nom T $[_{AspP}$ t Asp $[_{VP}$ V]]	*!		*
$[_{TP}$ T $[_{AspP}$ NP-Erg Asp $[_{VP}$ V]]	*!	*	
► $[_{TP}$ T $[_{AspP}$ NP-Nom$_v$ Asp-V $[_{VP}$ t_v]]		*	*

In the case of unaccusative verbs, on the other hand, the winning candidate is the one where the NP checks accusative case:

(43) Unaccusative

	CH-V	CH-T	CH-Asp
$[_{TP}$ NP-Nom T $[_{AspP}$ Asp $[_{VP}$ V]]	*!		*
► $[_{TP}$ T $[_{AspP}$ Asp $[_{VP}$ NP-Acc t V]]		*	*

This analysis thus predicts that external arguments are unmarked in these languages, whereas internal arguments are marked by accusative case. The assumption that plays a crucial role is that V can check either accusative or nominative case, dependent on the syntactic position of the NP. If the NP is generated in the Spec of VP position, then accusative case is checked. If it is generated in the Spec of AspP position, then V can only check the unmarked case.

Furthermore, we predict that the arguments of unaccusative verbs in these languages do not move from their base-generated position (see Bittner and Hale 1996a for evidence from the subject obviation data).

The analysis of accusative active languages discussed in Bittner and Hale 1996a assumes that these languages have a zero expletive in the subject position in the case of unaccusative verbs so that unaccusative verbs are syntactically transitive. The case pattern of these languages is unified with the case pattern of the accusative stative languages. However, as discussed in section 6.2.2, Eastern Pomo shows the accusative active pattern only when the NPs are specific/animate, whereas nonspecific/common NPs conform to the ergative case pattern. Under the present analysis, this split can be explained based on restrictions on movement of certain semantic types of NPs (see section 6.2.2). However, it is not obvious that semantic properties of NPs can be related to the presence of a zero expletive in the external argument position.

6.1.9. Ergative Accusative Languages

The next class of active languages is the class of ergative accusative languages, which have the following ranking of feature checking constraints:

(44) Ergative Accusative: CH-Asp >> CH-V >>CH-T

As shown below, languages derived by this ranking check ergative case on the subjects of transitive and unergative verbs and accusative case on the objects of transitive and unaccusative verbs. Examples of languages from this class are Lakhota, Acenhese, and other languages that distinguish agents and patients by overt case/agreement morphology.

As discussed in Mithun 1991 and Van Valin 1993, in Lakhota the subjects of unergative verbs are signaled by the same affix as the transitive subjects, whereas the arguments of unaccusative verbs are marked by the same morphology as transitive objects.

(45) *Lakhota*

a. ∅-**wa**-kte

3sgAcc-1sgErg-kill

‘I killed him/it’

b. **ma**-∅-kte

1sgAcc-3sgErg-kill

‘He killed me’

c. **wa**-ksapa

1sgErg-prudent

'I am prudent'

d. **ma**-khuže

1sgAcc-sick

'I am sick'

/Van Valin 1993/

Another language that distinguishes agents and patients by different marking is Acenhese. In Acenhese, agentive and patientive markers also appear as agreement markers on the verb:

(46) *Acenhese* (Austronesian: Northern Sumatra)

a. Gopnyan na-lon-timbak-geuh

He be-1Erg-shoot-3Acc

'I shot him'

b. lon-croh pisang

1Erg fry banana

'I am frying banana'

c. gopnyan saket-geuh

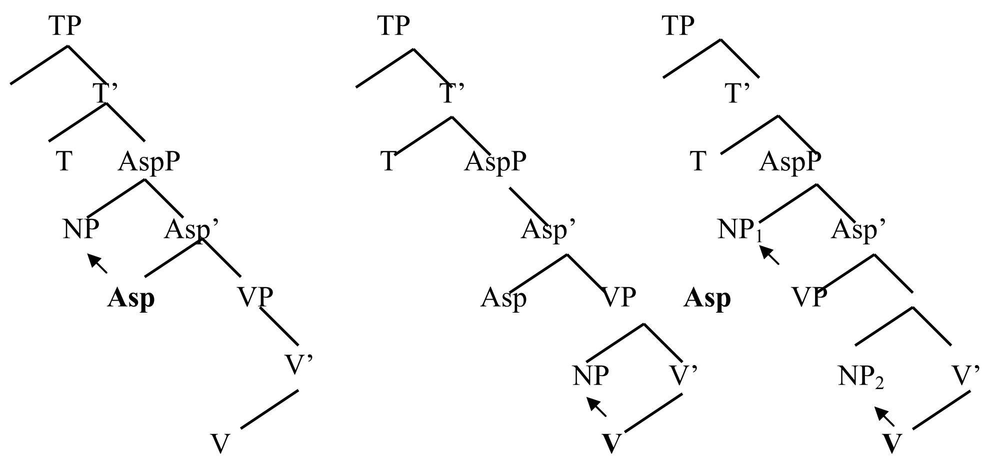
He sick-3Acc

'He is sick'

/Durie 1985/

As the following tables show, the ranking above defines languages of the Lakhota and Acenhese type. In the case of transitive verbs, the two highest-ranked constraints determine the ergative case on the subject and the accusative case on the object. Given that CH-Asp is the highest-ranked constraint, unergative verbs check ergative case. In the case of unaccusative verbs, however, CH-Asp cannot be satisfied, and the case on the NP is checked by the next highest-ranked head V.

(47) a. Unergative b. Unaccusative c. Transitive



The tables which show that the structures in (47) are optimal are given below.

(48) Transitive

	CH-Asp	CH-V	CH-T
[$_{TP}$ NP$_1$-Nom T [$_{AspP}$ t$_1$ Asp [$_{VP}$ NP$_2$-Acc V]]	*!		
► [$_{TP}$ T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ NP$_2$-Acc V]]			*
[$_{TP}$ NP$_2$-Nom T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ t$_2$ V]]		*!	

(49) Unergative:

	CH-Asp	CH-V	CH-T
[$_{TP}$ NP-Nom T [$_{AspP}$ t Asp [$_{VP}$ V]]	*!	*	
► [$_{TP}$ T [$_{AspP}$ NP-Erg Asp [$_{VP}$ V]]		*	*
[$_{TP}$ T [$_{AspP}$ NP-Nom$_v$ Asp-V [$_{VP}$ t$_v$]]	*!		*

(50) Unaccusative

	CH-Asp	CH-V	CH-T
$[_{TP}$ NP-Nom T $[_{AspP}$ Asp $[_{VP}$ V]]	*	*!	
► $[_{TP}$ T $[_{AspP}$ Asp $[_{VP}$ NP-Acc t V]]	*		*

Ergative accusative languages, therefore, distinguish external and internal arguments by different marked case.

To sum up the discussion of active languages, the following classes of active systems are distinguished:

- ergative accusative languages, where both external and internal arguments are marked,
- ergative active languages, where external arguments are marked and internal ones are unmarked,
- accusative active languages, where internal arguments are marked and external ones are unmarked.

The differences between these three case systems are accounted for in terms of different rankings of feature-checking constraints, which satisfy the condition that CH-T is not the highest ranked.

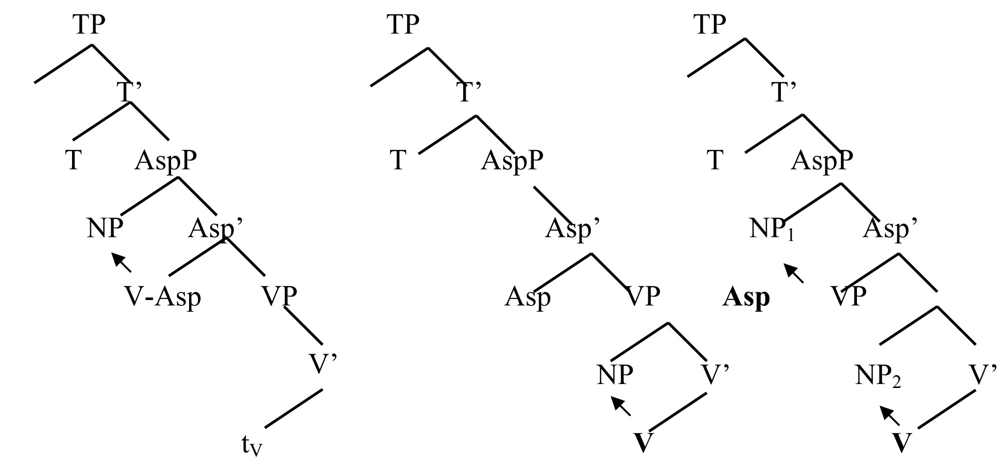
6.1.10. Three-way Languages

The sixth possible ranking of feature checking constraints is as follows.

(51) Three-way: CH-V >> CH-Asp >> CH-T

The class of languages derived by this ranking are languages where the subjects of transitive verbs check ergative case by Asp, whereas the objects of transitive verbs and the subjects of intransitives check case by V.

(52) a. Unergative b. Unaccusative c. Transitive



Languages of this type can be illustrated by three-way languages in the terminology of Bittner and Hale 1996a. An example of a language of this type is Nez Perce, illustrated below. In this language, transitive verbs checks ergative and accusative cases, whereas intransitive verbs check nominative case.

(53) *Nez Perce* (Penutian: Oregon)

a. wewukiye-ne pee-wi-ye haama-nm

elk-Acc shoot-PRF man-Erg

'The man shot an elk'

b. hi-paayn-a haama

arrive-PRF man-Nom

'The man arrived'

/ Rude 1985, cited in Bittner and Hale 1996a/

The optimal candidate for the transitive structure is the same as in the case of accusative-ergative languages, where Asp checks features of the subject, and V checks features of the object:

(54) Transitive

	CH-V	CH-Asp	CH-T
[$_{TP}$ NP_1-Nom T [$_{AspP}$ t_1 Asp [$_{VP}$ NP_2-Acc V]]		*!	
► [$_{TP}$ T [$_{AspP}$ NP_1-Erg Asp [$_{VP}$ NP_2-Acc V]]			*
[$_{TP}$ NP_2-Nom T [$_{AspP}$ NP_1-Erg Asp [$_{VP}$ t_2 V]]	*!		

Unergative verbs, on the other hand, check nominative case on the subject by V:

(55) Unergative

	CH-V	CH-Asp	CH-T
[$_{TP}$ NP-Nom T [$_{AspP}$ t Asp [$_{VP}$ V]]	*!	*	
[$_{TP}$ T [$_{AspP}$ NP-Erg Asp [$_{VP}$ V]]	*!		*
► [$_{TP}$ T [$_{AspP}$ NP-Nom_v Asp-V [$_{VP}$ t_v]]		*	*

Unaccusative verbs under the present analysis check case by V. Given that the case of V can be either Acc or Nom_V, it can be assumed that in these languages V checks unmarked case on the NPs of unaccusative verbs. However, the question of why internal arguments of transitive and unaccusative verbs are different in this respect is left for future research.

(56) Unaccusative

	CH-V	CH-Asp	CH-T
► [$_{TP}$ T [$_{AspP}$ Asp [$_{VP}$ NP-Nom_V t V]]		*	*
[$_{TP}$ NP-Nom T [$_{AspP}$ Asp [$_{VP}$ V]]	*!	*	

To summarize the discussion of case/agreement systems, let us present the following table, which lists all possible rankings of the three feature-checking constraints:

	transitive	unergative	unaccusative	
T>> Asp >>V	Erg-Nom	Nom	Nom	ergative (Dyirbal)
T>> V >>Asp	Nom-Acc	Nom	Nom	accusative (Russian)
Asp >>T>>V	Erg-Nom	Erg	Nom	ergative active (Lezgian)
Asp >>V>>T	Erg-Acc	Erg	Acc	ergative accusative (Acenhese)
V >> Asp>>T	Erg-Acc	Nom	Nom	three-way (Nez-Perce)
V>>T>>Asp	Nom-Acc	Nom	Acc	accusative active (East.Pomo)

6.2. Splits

The previous discussion of case systems presented general features of case patterns across languages. However, languages do not strictly conform to these general patterns and show further variation in agreement and case. In this section, we discuss three sources of such variation across languages, which explain the existence of different types of case and/or agreement splits.

to account for the splits, let us reconsider the restrictions on the sets of candidates given in (7), which are repeated below:

(57) a. All verbal heads have both case and agreement features

b. NPs can move to check case

c. VP structure is TP-Asp-VP, and there are no other projections

The first assumption that is made is that all verbal heads have case and agreement features. If we now depart from this assumption and suppose that languages might differ in whether a particular category has case and/or agreement features, then we can account for languages where case and agreement patterns are different. These languages are illustrated below by Hindi and Nepali, discussed in Mahajan 1990, and morphologically ergative languages like Warlpiri, discussed in Bittner and Hale 1996a,b.

The next assumption made above is that all NPs can move to check case. However, it is plausible that this condition does not always hold. Specifically, along the lines of Diesing 1990, 1992, Diesing and Jelinek 1995, some languages may not allow movement of nonspecific or existential NPs to the Spec of TP position. In OT- based framework, this means feature-checking constraints compete with another constraint that prohibits such movement. Given this hypothesis, we can account for the case splits which are based on the semantics of NPs. Such splits are illustrated by the data from Eastern Pomo below.

Finally, the third assumption made above is that the verbal structure has only three projections. Some sentences, however, allow optional projections, such as NegP, PP, ModP, or CP. If a sentence has an additional projection, and consequently, another competing verbal head, then the case pattern in a language might change. The splits conditioned by the difference in the verbal structure, therefore, include main clause/subordinate clause splits, modality based splits, negation-based splits, and others.

6.2.1. Splits Conditioned by the Morphological Features of Verbal Heads

Let us first reconsider the assumption that all heads have both case and agreement features. Specifically, let us suppose that verbal heads can have following combinations of nominal features:

(58) Tense {Nom, Agr_T}, {Nom}, {Agr_T}

Asp {Erg, Agr_{Asp}}, {Erg}, {Agr_{Asp}}

V {Acc, Agr_V}, {Acc}, {Agr_V}

If verbal heads in a language have both case and agreement features, then the case and agreement patterns in this language are the same. However, let us assume that the highest-ranked head in a language has either case or agreement features. The optimal form in this case, as we illustrate below, is one where the NP checks one feature against the highest-ranked head, and the other feature against the next highest-ranked head. That is, in this case, the NP checks its features against two heads.

For example, in a language where Tense does not have case features but has agreement features, arguments with marked cases (such as ergative, dative, and others) can move to the Spec of TP to check their agreement features. Examples of such languages discussed below are Nepali and Georgian. On the other hand, if Tense has both case and agreement features, then only nominative arguments can check their agreement features against Tense. Languages of this type are called languages with 'nominative agreement' and are illustrated below by Hindi data.

6.2.1.1. Agreement and Lexical Case in Hindi and Nepali

The data discussed in this section is based on the discussion of case and agreement in Hindi and related languages in Mahajan 1990. As is discussed in this work, Hindi shows nominative agreement (i.e. only nominative arguments can agree with the verb, whereas if the argument is ergative or dative, then agreement is blocked).

The example in (59a) illustrates a sentence with a nominative subject. The verb agrees with the subject in this example. On the other hand, in (59b), the subject is ergative, and the verb agrees with the nominative object:

(59) *Hindi*

a. raam roTii khaataa thaa

Ram (m.) bread (f.) eat(imp. m.) be (pst.m.)

'Ram (habitually) ate bread'

b. raam ne roTii khaayii

Ram (m.) erg bread (f.) eat (perf. f.)

'Ram ate bread'

/Mahajan 1990/

As discussed in Mahajan 1990, some languages that are closely related to Hindi and show a similar pattern of case differ from Hindi in that ergative arguments in these languages can agree with the verb. An example of such languages is Nepali:

(60) *Nepali*

John-le phul kinyo

John-erg egg(s) bought (3sg.)

'John bought egg(s)'

/Dalrymple 1984, cited in Mahajan 1990/

Both Hindi and Nepali are ergative active languages with the following ranking of constraints:

(61) Ergative active: CH-Asp >> CH-T >> CH-V

The difference between them lies in the features of Tense: in Hindi, Tense has both case and agreement features; in Nepali, it has only agreement features:

(62) Hindi: Tense {Nom, Agr}

Asp {Erg[60]}

Nepali: Tense {Agr}

Asp {Erg}

Given these assumptions, we predict that in Hindi the subject stays in situ, whereas the object moves to the Spec of TP position and checks nominative case and agreement.

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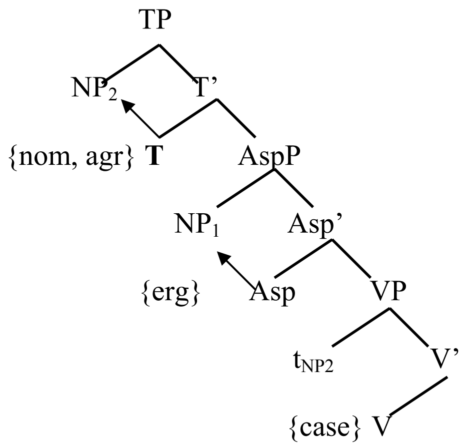
[60] In both Hindi and Nepali Asp checks ergative case only if the sentence is perfective. An analysis of this phenomenon is presented in the next chapter. For the purposes of this discussion we consider only the perfective sentences, which show the agreement contrast.

(63) Hindi (example (59b))



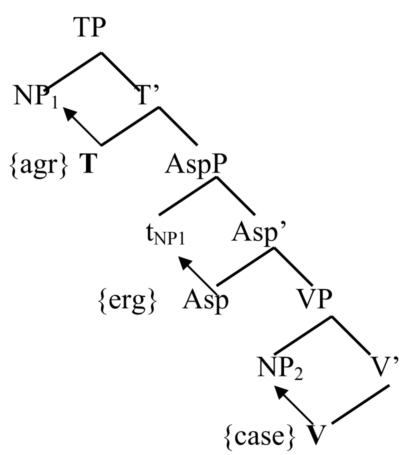
This form is optimal, as the following table shows:

(64)

	CH-Asp	CH-T	CH-V
[$_{TP}$ NP$_1$-Nom T [$_{AspP}$ t$_1$ Asp [$_{VP}$ NP$_2$-Acc V]]	*!		
[$_{TP}$ T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ NP$_2$-Acc V]]		*!	
► [$_{TP}$ NP$_2$-Nom T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ t$_2$ V]]			*

Now if Tense in a language has agreement features only, whereas Asp lacks agreement features, then this language behaves like Nepali:

(65) Nepali:



The subject NP_1 in this structure checks ergative case features of Asp so that the constraint CH-Asp is satisfied. However, it can further move to the Spec of TP position, to satisfy agreement features of Tense. The object checks the features of V. The resulting structure is the optimal one, since it satisfies all three constraints.

It is thus possible under this analysis that one NP checks features against two different heads, if these heads have different nominal features. Another language that is similar to Hindi in the pattern of case but has subject agreement instead of nominative agreement, is Georgian, which is discussed in the next chapter.

6.2.1.2. Morphological Ergativity

Languages with case/agreement splits can further be illustrated by morphologically ergative languages. Morphologically ergative languages have the ergative pattern of case, but differ from syntactically ergative languages in that they do not have any nominative-oriented phenomena and have the accusative agreement pattern.

Examples of such languages are Warlpiri (Hale 1973, Bittner and Hale 1996b) and Burushaski (Morin and Tiffou 1988, Palmer 1994).

Consider, for example, the following Warpiri data:

(66) *Warlpiri* (Pama-Nyungan: Central Australia)

a. ngarrka-jarra ka-**pala** parnka-mi

man-Du-Nom Pres-2-Du run-Nonpast

'The two men are running'

b. kurdukurdu ka-lu parnka-mi

children-Nom Pres-3pl run-Nonpast

'The (several) children are running'

c. ngarrka-jarra-rlu ka-**pala**-jana kurdukurdu nya-nyi

man-Du-Erg Pres-2Du-3pl children-Nom see-Nonpast

'The two men see the children'

/Bittner and Hale 1996b/

The case pattern of Warlpiri is ergative, i.e. the subjects of intransitives and the objects of transitive verbs are nominative, whereas the transitive subjects are marked with ergative case. However, agreement morphology is identical for transitive and intransitive subjects, as opposed to transitive objects, and shows the 'accusative' pattern.

In this respect, morphologically ergative languages differ from the syntactically ergative languages, like Inuit, which have the ergative agreement pattern:

(67) *Inuit*

a. angut qungujup-p-u-q

man-Nom smile-Ind-[-tr]-3sg

'The man smiled'

b. (uanga) qungujup-p-u-**nga**

me-Nom smile-Ind-[-tr]-1sg

'I smiled'

c. anguti-p (uanga) urnip-p-a-a-**nga**

man-Erg me-Nom approach-Ind-[+tr]-3sg-1sg

'The man approached me'

/Bittner and Hale 1996b/

As the examples in (67a)-(c) show, the agreement morphology of transitive objects and intransitive subjects is identical in Inuit. That is, the agreement pattern is the same as the pattern of case in this language: all ergative NPs have 'ergative' agreement, whereas nominative arguments have 'nominative agreement'. In morphologically ergative languages, on the other hand, agreement distinguishes the subjects from the objects rather than the ergative arguments from the nominative ones.

The analysis of morphologically ergative languages that is proposed in this section assumes that these languages have accusative ranking of feature checking constraints, but the verbal heads in these languages have the following nominal features:

(68) Warpiri: CH-T >> CH-V >> CH-Asp

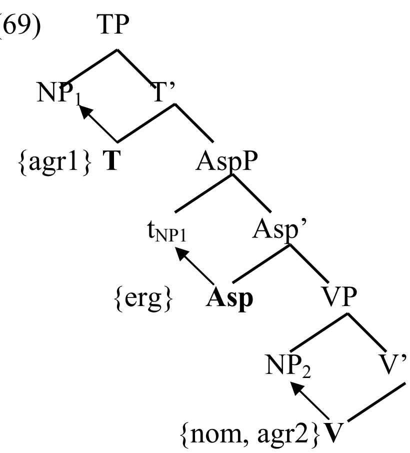
T {agr1}

Asp {erg/nom}

V {nom, agr2}

Let us consider the structure of the transitive verb in (69):

(69)



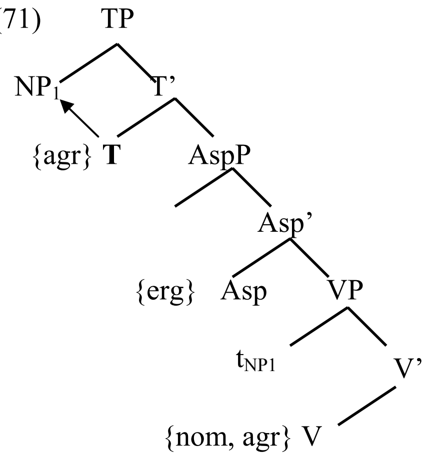
In this structure, the subject checks ergative case features against Asp and agreement features against Tense. The object checks nominative case and agreement features against V. As the table below illustrates, the structure in (69) is optimal, since it satisfies all three constraints.

(70)

	CH-T	CH-V	CH-Asp
► $[_{TP}NP_1$-agr1-T$[_{AspP}$ t_1-Erg Asp$[_{VP}NP_2$-Nom_V,agr2- V]]			
$[_{TP}$ T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ NP_2-Nom, agr2 V]]	*!		
$[_{TP}$ NP_2-agr1 T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ t_2-Nom V]]		*!	

Unaccusative verbs, as the following structure shows, check agreement by Tense:

(71)

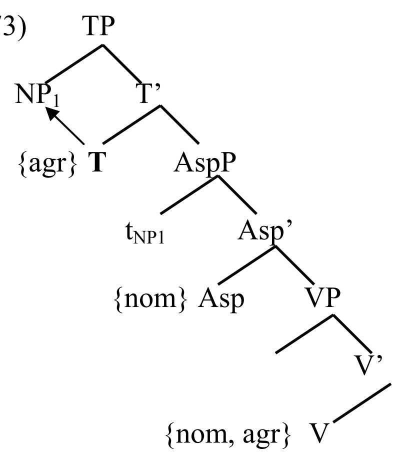


(72)

	CH-T	CH-V	CH-Asp
► [$_{TP}$ NP- agr$_T$ T [$_{AspP}$ Asp [$_{VP}$ t$_{NP}$ V]]		*	*
[$_{TP}$ T [$_{AspP}$ Asp [$_{VP}$ NP-Nom, agr$_V$ V]]	*!		*

Now let us consider the structure of the unergative verb in (73):

(73)



The optimal structure is the one where the NP checks agreement features against Tense, whereas the case features are checked by Asp.[61] Note that the NP cannot satisfy CH-T and CH-V

[61] The question of why the case of the NP is unmarked nominative rather than ergative in this structure, as we have assumed in all structures discussed so far, is left as an unresolved problem. However, the assumption that Asp can check either marked or unmarked case is consistent with the present analysis of the marked morphological case, and is further motivated by the analysis of Georgian in chapter 7.

in this structure, since V has both case and agreement features, and feature-checking requires that all features of V are checked.

(74)

	CH-T	CH-V	CH-Asp
$[_{TP}$ NP$_1$-agr1 T $[_{AspP}$ t_1 Asp $[_{VP}$ V]]		*	*!
$[_{TP}$ T $[_{AspP}$ NP-Nom, agr2 Asp $[_{VP}$ V]]	*!		
► $[_{TP}$ NP$_1$-agr1 T $[_{AspP}$ t_{NP1}-Nom Asp $[_{VP}$ V]]		*	

The present analysis preserves the hypothesis in Bittner and Hale 1996a,b that in morphologically ergative languages, as opposed to syntactically ergative ones, the prominence of arguments does not change from D-structure to S-structure. This hypothesis accounts for the accusative behavior of these languages with respect to SS sensitive phenomena.

According to Bittner and Hale 1996a,b, morphologically ergative languages are languages that are transparent to government, and therefore, nominative arguments are licensed in the underlying position. Syntactically ergative languages, on the other hand, are raising languages, which are not transparent to government, and arguments must move to be assigned Case.

Under the present approach to Case, the fact that the prominence of arguments does not change follows from the ranking of feature-checking constraints, as well as the assumption that heads might differ in the set of nominal features associated with them.

6.2.2. Splits Conditioned by Restrictions on Movement

Further splits in case and agreement systems can be conditioned by restrictions on movement. For example, one of the hypotheses discussed in the literature is that nonspecific NPs do not move out of their base-generated positions. The analysis of this phenomenon which we adopt follows Enc 1991, Laka 1993, Borer 1994, among others in assuming that nonspecific NPs are bare NPs (i.e. they do not have a DP projection) and must incorporate into the verb at LF. A crucial part of this proposal for the purposes of the present discussion is that nonspecific/indefinite NPs are not allowed to move to the Spec of TP. This assumption can also be supported by the data discussed in Diesing 1990, 1992 and subsequent work.

Given this assumption and the present OT approach to case, we can account for case splits that are based on the specificity/definiteness of the NPs. This analysis is illustrated by Eastern Pomo below.

Eastern Pomo, as discussed above, is an example of accusative active languages, i.e. languages where the agents are unmarked for case, and patients are marked by accusative morphology. This pattern, however, is restricted to a certain type of NPs, which is called the class of animates in McLendon 1978 and include pronouns, kinship terms, and proper names. The data that illustrate the accusative active pattern of NPs of this type is given in (75):

(75) *Eastern Pomo* (Hokan: Northern California)

a. míp míp-al šăka

He-Nom him-Acc kill

'He killed him'

b. míp-al xá bakúma

Him-Acc in.the.water fell

'He fell in the water' (accidentally)

c. míp káluhuya

He-Nom went.home

'He went home'

/McLendon 1978, cited in Bittner and Hale 1996a/

If a NP is a common noun, then the case system is different. The class of common nouns in this language can never be marked with accusative case but can co-occur with the ergative case marker. As the examples in (76) illustrate, if the subject of a transitive verb is a common noun, then it is marked with the ergative suffix -la/-ula:

(76) *Eastern Pomo*

Xásulà wí kokóya

Rattlesnake-Erg me-ACC bit

'Rattlesnake bit me'

/McLendon 1978/

The case pattern for the class of common nouns is thus ergative. That is, common nouns are ergative only if they function as the subjects of transitive verbs and nominative otherwise:

(77) *Eastern Pomo*

Xás wá-dukìya

Rattlesnake-Nom went away

/McLendon 1978/

The generalizations about the case patterns in this language can be stated as follows: *The class of animate nouns conforms to the accusative active pattern, whereas common nouns follow the ergative pattern.*

Thus, common nouns in this language are marked if and only if they function as the subjects in a transitive clause. The NPs from the class of animates, on the other hand, are marked if patients and unmarked if agents. The following data illustrates this point:

(78) *Eastern Pomo*

a. Ka·čil bu·ráqal šá·ka

Ka·čil-Nom bear-Nom killed

'Ka·čil killed a bear'

b. Bu·ráqalla· Ka·čiliy šá·ka

A bear-Erg Ka·čil-Acc killed

'A bear killed Ka·čil'

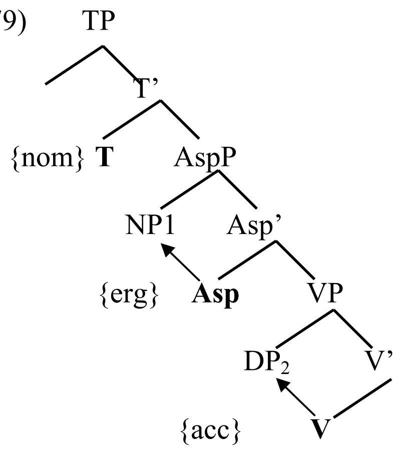
/McLendon 1978/

The analysis of this split proposed below assumes that in Eastern Pomo animate or referential NPs are DPs, whereas common or nonspecific NPs are bare NPs. This assumption can be supported by the absence of determiners in this language.[62] Since bare NPs have to incorporate to a verb at LF, they cannot move to the Spec of TP position. The Spec of TP position is thus the position of the class of animates in this language. This assumption is reminiscent of basic generalizations that relate specificity/definiteness and syntactic structure, discussed in Diesing 1990, 1992, and are explained in terms of the Mapping Hypothesis.

Consider, for example, the sentence in (76), where the subject is a common noun and the object is a pronoun. This sentence under these assumptions checks features as follows:

[62] In general, we can assume that bare NPs are more likely to occur in a language which lacks determiners (see, for example, the analysis of Basque in Laka 1993).

(79)



In this structure the subject is a bare NP, and thus cannot move to the Spec of TP position. This means that the candidate where T checks the features of the subject is missing in the set of candidates for this sentence. Therefore, the optimal structure is the one where NP1 checks ergative case features by Asp and hence satisfies CH-Asp.

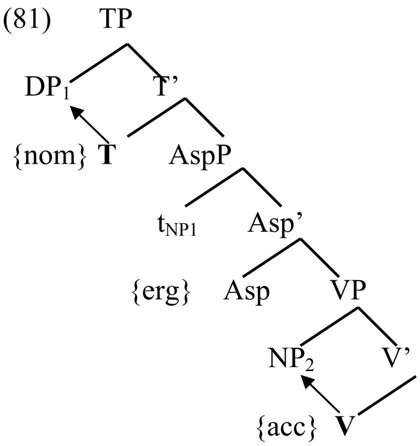
(80)

	CH-V	CH-T	CH-Asp
► $[_{TP}$ T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ NP_2-Acc V]]		*	
$[_{TP}$ NP_2-Nom T $[_{AspP}$ NP_1-Erg Asp $[_{VP}$ t_2 V]]	*!		

Now if we consider a transitive construction where the subject is a pronoun, then this subject is a DP and can move to the Spec of TP position. This subject, therefore is predicted to be nominative (see (75a) above).

As the structure below shows, the subject raises to the Spec of TP position, where it checks nominative case features. The object checks its features by V.

(81)



(82)

	CH-V	CH-T	CH-Asp
► [$_{TP}$ NP$_1$-Nom T [$_{AspP}$ t$_1$ Asp [$_{VP}$ NP$_2$-Nom V]]			*
[$_{TP}$ T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ NP$_2$-Nom V]]		*!	
[$_{TP}$ NP$_2$-Nom T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ t$_2$ V]]	*!		

The assumption that movement of common NPs to the Spec of TP position is blocked in Eastern Pomo, therefore, predicts that this language shows a case split. Given that the ranking of feature checking constraints in this language is CH-V >> CH-T >> CH-Asp, we predict that if the subject can check features of Tense, then the case system is accusative active. If movement of the subject to the Spec of TP position is blocked, then the ranking of constraints which determines the case pattern in this language is CH-V >> CH-Asp, and we get the ergative case on the subjects of transitive verbs.

The assumption that movement of common NPs to the Spec of TP position is not allowed in Eastern Pomo, combined with the present Optimality approach to Case, predicts a split on the subjects, which depends on the semantics of the NP.[63]

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[63] This analysis, however, does not account for the split on the objects. Specifity-based splits on the objects are discussed in chapter 7, based on Finnish data, where it it proposed that definiteness/specificity is related

6.2.3. Splits Conditioned by the Verbal Structure

Another possible source of splits is a difference in the verbal projection. Let us assume that a certain construction involves an additional verbal projection, such as NegP or ModP. If the head of this projection has case and/or agreement features, then the case/agreement pattern of this construction depends on the ranking of this head with respect to the other verbal heads.

Suppose that we have a ranking CH-X>>CH-Y>>CH-Z, where X is an optional head such as Neg or Mod. If the sentence involves XP projection, then the case system for this sentence is determined by the ranking CH-X>>CH-Y. If, on the other hand, XP is not projected, then the case system corresponds to languages with the ranking CH-Y>> CH-Z.

Examples of optional heads are Neg, Mod, P and C. We thus expect that there are languages that show splits conditioned by the presence of these heads. This prediction is supported by the discussion of case/agreement splits in Dixon 1979, 1995 and Palmer 1994, who described main/subordinate clause splits and negation-based splits, for example. In this section I discuss two other types of splits: a case split based on the presence of a ModP projection, illustrated by Russian data, and an agreement split conditioned by the presence of a PP in Warlpiri.

6.2.3.1. Modality-based Split in Russian

Russian is an accusative language, where the subjects of tensed clauses are nominative. However, the subjects of the following sentences are dative rather than nominative:

(83) *Russian*

a. Emu nado prochitat' etu knigu

He-Dat need PERF-read-INF this-ACC book-ACC

'He has to read this book'

---

to logical predication. This analysis can probably be extended to account for the Eastern Pomo data, however, I leave it out for future research.

b. Ej nuzhno budet skoro uexat'

She-Dat must be-FUT soon leave-INF

'She will have to leave soon'

c. Mne mozhno budet pojti v kino

Me-Dat may be-FUT go-PERF-INF to movies

'I can (will be allowed to) go to the movies'

In sentences in (83), the dative case on the subject appears in the presence of modals like *nado* ('need'), *nuzhno* ('must'), *mozhno* ('may/can'). These modals do not show any agreement, as opposed to modal verbs or adjectives in Russian, shown below in (84):

(84) *Russian*

a. On dolzhen prochitat' etu knigu

He-Nom must-3SG-M PERF-read-INF this-Acc book-Acc

'I have to read this book'

b. Ona dolzhna budet skoro uexat'

She-Nom must-3SG-F be-FUT soon leave-INF

'She will have to leave soon'

c. Ja smogu pojti v kino

I-Nom can-FUT-ISG go-INF to movies

'I will be able to go to the movies'

As discussed in Kondrashova 1993, agreeing modals in Russian belong to verbal categories, such as verbs, adjectives and participles, whereas non-agreeing modals project a ModP projection.

Let us assume that the sentences in (83) differ from those in (84) in that they have a ModP projection in their representation. Let us further assume that CH-Mod in Russian outranks the other feature-checking constraints, and that the nominal features of Mod have dative case features and no agreement:

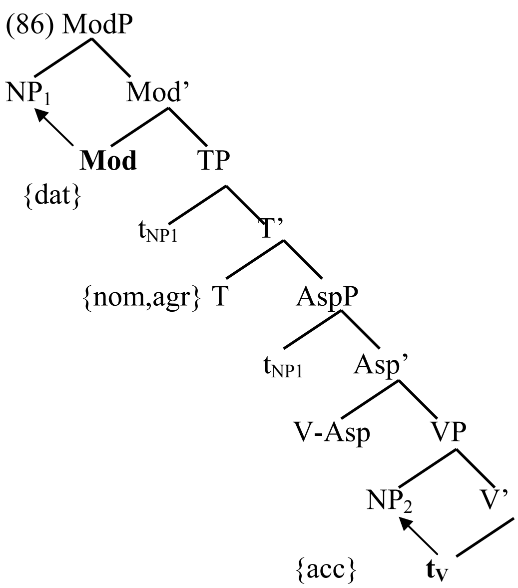
(85) Russian: CH-Mod >> CH-T >> CH-V >> CH-Asp

Mod {Dat}

If there is no ModP in the structure, then CH-Mod is vacuously satisfied, and Tense checks nominative case on the subject.

If ModP is projected, then the case of the subject is checked by Mod:

(86)



In the structure in (86), the subject moves through the Spec of TP position to the Spec of ModP, where it checks dative case against Mod. The highest-ranked constraint CH-Mod is thus satisfied. Given that Tense in Russian has both case and agreement features and feature checking requires all features of Tense to be checked,[64] we predict that the dative NP cannot check agreement against Tense. Parallel to the analysis of Hindi discussed above, where ergative NPs do not check agreement features, we predict that the dative arguments in Russian do not agree with the verb.

The structure of a transitive verb in (86) satisfies the constraints CH-Mod and CH-V. Given that the second highest-ranked constraint is CH-T rather than CH-V, we would expect that the optimal candidate is the one where the subject checks case by Mod and the object checks case by Tense. This candidate, however, is not in the set of candidates. Specifically, movement of the object to the Spec of TP position is blocked by the trace of NP_1. Crucially, in this structure NP_1 cannot move directly to the Spec of ModP position, since its trace in the Spec of AspP position would not be properly governed. Long movement of NPs is allowed only if the government domain is extended as the result of incorporation (Baker 1988). For example, movement of internal arguments from the Spec of VP to the Spec of TP position is allowed since V incorporates into Asp. Tense, on the other hand, does not incorporate into Mod, since Mod is a non-affixal category, and in order for the trace of NP_1 in the Spec of AspP position to be properly governed, NP_1 has to move to the Spec of TP position first, thus blocking movement of the object to this position.

As the table below shows, there are two candidates that can satisfy CH-Mod. In the structure in (87a), the subject checks case by Mod and the object checks case by V. In the structure in (87b), the object moves to the Spec of TP position, and then moves to the Spec of ModP. The only head that can check the features of the subject in this case is Asp. The winning candidate, as the table below shows, is the candidate in (a):

(87)

	CH-Mod	CH-T	CH-V	CH-Asp
(a) $[_{ModP}$ NP_1-Dat Mod $[_{TP}$ t_1 T$[_{AspP}$ $[_{VP}$ NP_2-Acc V]]		*		*
(b) $[_{ModP}$ NP_2-Dat Mod $[_{TP}$ t_2 T$[_{AspP}$ NP_1 Asp $[_{VP}$ t_2 V]]		*	*!	

[64] An exception are agreement features in the case of unergative verbs in Warlpiri discussed above.

6.2.3.2. Dative Objects in Warlpiri

Another split conditioned by the verbal structure is illustrated by the agreement pattern of the objects in Warlpiri. As discussed in Bittner and Hale 1996b, Warlpiri has a puzzling agreement pattern. Whereas the first agreement marker in this language is always construed with the subject (see section 6.2.1.2), the second agrees with "the most prominent object"- dative, if there is one, nominative otherwise:

(88) *Warlpiri*

a. nyuntulu-rlu ka-npa-ju maliki-jarra ngaju-ku yi-nyi

you-Erg Pres-2sg-1sg dog-Du-Nom me-Dat give-Nonpast

'You are giving me two dogs'

b. ngarrka-jarra-rlu ka-pala-jana kurdukurdu nya-nyi

man-Du-Erg Pres-2Du-3pl children-Nom see-Nonpast

'The two men see the children'

/Bittner and Hale 1996b/

This pattern is unexpected under the analysis in Bittner and Hale 1996a,b, who argued that morphologically ergative languages like Warlpiri are transparent to government, and therefore, objects can agree with any functional head in a transparent domain. It is not clear under their analysis why the 'most prominent' object is the dative rather than the nominative, which is higher up in the syntactic structure.

The structure of the double object construction which we assume follows Larson 1988, among others who proposed that the double object construction involves an extra projection. Following Pesetsky 1995 we further assume that this extra projection is PP.

As has been discussed in the analysis of Warlpiri, it is an accusative language, which is consistent with the following ranking of constraints:

(89) Warlpiri: CH-T>>CH-P>>CH-V>>CH-Asp.

The morphological features of the verbal heads in this language are as in (90):

(90) Tense {agr}

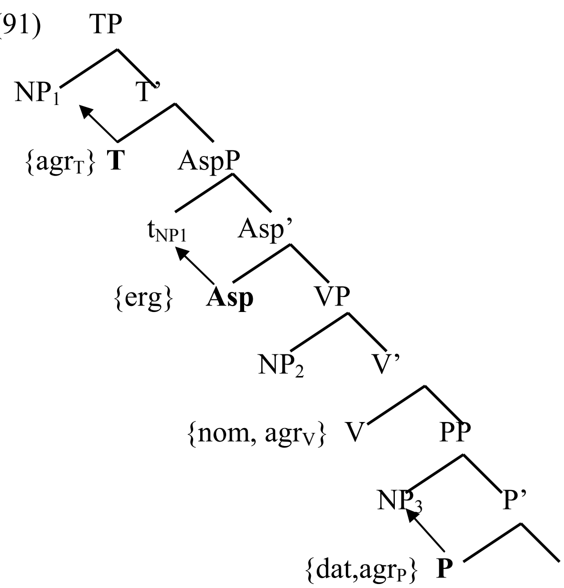
Asp {erg}

V {nom, agr}

P {dat, agr}

Given this ranking, we predict that the structure where T and P check their agreement features wins over the structure where CH-T and CH-V are satisfied:

(91)



The subject checks ergative case and agr_T in this structure so that the constraints CH-T and CH-Asp are satisfied (see section 6.2.1.2 above). The indirect object checks its case and agreement features against P. Given that there are only two agreement markers in a clause, V cannot check agreement features against the direct object and CH-V cannot be satisfied. The direct object in this structure has unmarked case features. The optimal structure, therefore, is the one in (91), which satisfies CH-T, CH-P, and CH-Asp, and violates CH-V.

6.3. Passive and NP-movement in Accusative Languages

One of the consequences of the present analysis is that NP movement in passive and raising verbs is forced by the principle that says a verbal head must check its features. In standard GB analysis of passive, on the other hand, movement of the object to the Spec of IP is forced by the properties of the NP rather than verbal heads (Chomsky 1981, 1986, among others). Specifically, under these approaches, passive, unaccusative and raising verbs do not have a capacity to assign Case. On the other hand, Case filter requires that all NPs must be assigned Case. The arguments of the verbs which cannot be assigned Case, therefore, must move to the subject position, where they are assigned nominative case by Infl.

However, as discussed in Marantz 1991, the assumption that passive and unaccusative verbs cannot assign case in accusative languages does not seem to be true.

The first example that shows that passive verbs can assign accusative case discussed in Marantz 1991 is based on the Japanese passive constructions, illustrated in (92):

(92) *Japanese*

a. Hanako$_i$-ga (dorobo-ni) t_I yubiwa-o to-rare-ta

Hanako-NOM (thief-by) ring-ACC steal-pass-past

'Hanako had a thief steal her ring on her'

b. Hanako-ga ame-nihu-rare-ta

Hanako-NOM rain-DAT fall-pass-past

'Hanako had rain fall on her'

/Marantz 1991/

The examples in (92a) and (92b) illustrate two types of passives in Japanese: a direct passive and an indirect or adversity passive. As discussed in Kubo 1989, based on a variety of tests, passives like those in (92a) involve movement of a NP to a non-thematic position, whereas in adversity passives such as (92b) no such movement is involved. Movement of the NP in (92a) cannot be explained by the inability of a verb to assign Case, since the passive verb in (92a) assigns accusative case to the object.

Another example is from Bresnan and Moshi 1990, which illustrates double object constructions in Kichaga. The example in (93a) shows an active sentence where the verb agrees with both objects. The examples in (93b) and (93c) show passive constructions, derived by NP movement of one of the objects, where the passive verb agrees with the second object. Object agreement is usually assumed to be one of the realizations of the abstract accusative Case[65]. The examples of the passive verbs in (93b) and (93c) can also be used as evidence that passive verbs have a capacity to assign accusative Case.

(93) *Kichaga*

a. N-ä-ï-lyì-í-à m-kà k-élyà

(He$_i$) AGR$_{Si}$-Agr$_{Oj}$-Agr$_{Ok}$-eat-BEN wife$_j$ food$_k$

'He is eating food for his wife'

b. M-kà n-ä-ï-lyì-í-ò k-élyà

Food$_k$ AGR$_{Sk}$-Agr$_{Oj}$- eat-BEN-pass wife$_j$

'Food is being eaten for the wife'

c. K-élyà k-ï-lyì-í-ò m-kà

Wife$_j$ AGR$_{Sj}$-AGR$_{Ok}$-eat-BEN-pass food$_k$

'The wife is being beneficially affected by someone eating food'

/Marantz 1991, p. 239/

A crucial property of passive sentences that have the ability to assign accusative Case is that they have two arguments; in contrast, if a passive verb has one argument, then it cannot assign accusative case.

Given this generalization, Marantz 1991 suggests that accusative case is a 'dependent Case', which depends on the presence of an additional argument in the clause. Thus, accusative case can be assigned by any verb (including passive and unaccusative one), if this verb has at

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65 Under the present assumptions abstract accusative Case is realized by the nominal features of V.

least two arguments. More specifically, accusative case can be assigned to an argument if and only if V+I governs another argument.

Under the present approach to Case, the fact that the Case-assigning properties of the verb depend on the number of arguments follows given that feature-checking constraints are violable principles. Thus, in languages where CH-T is the highest-ranked constraint, if a clause has one argument, then it checks nominative case by Tense. If, on the other hand, the verb has two arguments, then two constraints can be satisfied, and both nominative and accusative case features are checked.

For example, in the case of a passive sentence with one argument, this argument must move to the Spec of TP position to satisfy the features of Tense. If there are two arguments in a clause, as in the case of Japanese and Kichaga passives in (92)-(93), then the two highest-ranked constraints can be satisfied, as the tables below show[66].

(94) Passive sentences with one argument

	CH-T	CH-V	CH-Asp
► $[_{TP}$ NP-Nom T $[_{AspP}$ Asp $[_{VP}$ V-pass]]		*	*
$[_{TP}$ T $[_{AspP}$ Asp $[_{VP}$ NP-Acc t V-pass]]	*!	*	

[66] A plausible analysis of passive along the lines of Baker, Johnson and Roberts 1989 is that a passive morpheme is an argument, which can check features of a verbal head. One can assume, for example, that the passive morpheme checks the features of Asp so that CH-Asp is satisfied in the passive constructions. This analysis predicts, for example, that passive verbs can never check ergative case. However, the present discussion of passive sentences with accusative arguments is compatible with any alternative analysis of passive, and, therefore, I leave it as a suggestion for the purposes of this discussion.

(95) Passive sentences with two arguments:

	CH-T	CH-V	CH-Asp
► [$_{TP}$ NP$_1$-Nom T [$_{AspP}$ Asp [$_{VP}$ NP$_2$-Acc V-pass]]			*
[$_{TP}$ T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ NP$_2$-Acc V-pass]	*!		
[$_{TP}$ NP$_2$-Nom T [$_{AspP}$ NP$_1$-Erg Asp [$_{VP}$ t_2 V-pass]]		*!	

The passive data, therefore, supports the proposed analysis, which assumes that NP-movement is forced by the requirement of verbal heads to check their features. These data are unexpected under previous analyses of NP-movement being forced by the inability of a verb to assign accusative Case.

The passive data discussed in this section also shows the role of Optimality Theory in the present approach, which crucially assumes that certain rules of UG, such as a requirement of a head to check its features can be violated in grammatical structures. Thus, comparison of passive sentences with one and two arguments shows that passive verbs have accusative case features; however, they do not always realize them on a NP. The Optimality Theoretic approach to Case enables us to derive this generalization from the ranking of feature checking constraints, without any additional assumptions.

6.4. Summary

This section presented an analysis of six case systems: accusative, ergative, accusative active, ergative active, ergative accusative, and three way languages. It has been proposed that cross-linguistic variation in case systems arises as the result of different rankings of three feature checking constraints: CH-T, CH-Asp, and CH-V.

The approach to case presented above explains the difference between active and stative languages in terms of different ranking of CH-T with respect to CH-V and CH-Asp.

If CH-T is the highest-ranked constraint, then the stative system is derived. In stative systems at least one NP must move to the Spec of TP position to check unmarked or nominative case. In languages of this type, intransitive verbs check nominative case, whereas transitive verbs check nominative and either ergative or accusative cases.

Whether a stative language has an ergative or accusative system depends on the second highest-ranked constraint. In accusative languages, the second-ranked constraint is CH-V, so that the object is marked with accusative case. In ergative languages, the second-ranked head is Asp, and the subject of transitive verbs gets ergative case.

In many works on ergativity, ergative and accusative cases are analyzed as 'second structural' cases, dependent upon the assignment of nominative (Campana 1992, Murasugi 1992, Bittner and Hale 1996a). The present analysis follows these approaches; however, this dependency is derived as the result of ranking of violable constraints rather than as a separate principle of grammar.

If CH-T is ranked below CH-Asp or CH-V, then the language has an active system. In languages with this ranking, the case of external and internal arguments is different given that Asp and V can only check marked case in base-generated positions.

Alternative analyses of active languages, as discussed above, try to assimilate them to ergative or accusative systems. One of the problems with these approaches is the existence of ergative accusative languages, which mark both classes of agents and patients by overt case. The present analysis accounts for all possible types of languages based on different rankings of three feature-checking constraints, plus the assumption that marked case is a reflex of logical predication, i.e. a semantic relation between a NP and its logical predicate.

This chapter further showed that different types of splits in case and agreement systems can be accounted for by the interaction of feature-checking constraints with further sources of lanaguage variation.

For example, variation in the morphological features of verbal heads can explain the existence of languages where case and agreement patterns are different. Restrictions on movement of certain types of NPs in a language predict the split conditioned by the semantics of NPs. And finally, the presence of optional verbal heads in a structure, such as Neg, Mod, P and C, can explain the existence of splits that are related to negation, modality, double object constructions, as well as main/subordinate clause splits.

The last section in this chapter motivated the present analysis by the discussion of NP-movement in accusative languages. It was shown that the analysis of NP-movement being forced by the requirement of Tense to check its features correctly predicts the existence of passive verbs that assign accusative case.

CHAPTER 7.

SEMANTIC CASE SPLITS

In this final chapter, we combine the theory of case proposed in chapter 6 with the approach to aspectual composition of verbs presented in previous chapters to account for semantic case splits.

Semantic case splits are splits that depend on the meaning of verbs and/or NPs. The goal of this chapter is to account for the splits that are based on the semantics of the verbs, such as agentivity-based fluid case marking and perfectivity-based case splits (e.g. Dixon 1979, Palmer 1979).

Under the present assumptions, there are three sources of semantic case splits.

First, splits can be conditioned by the difference in the syntactic structure. As discussed in chapter 4, the way NPs are projected into a syntactic structure determines their semantic interpretation. For example, NPs are interpreted as agentive only if they are in the Spec of AspP position at some level before LF. On the other hand, the case of the NPs in active languages, as discussed in chapter 6, also depends on whether the NP is in the Spec of AspP position. We thus predict that active languages show agentivity-based case splits.

Second, splits can be conditioned by the differences in the morphological structure. Such splits are related to the notion of logical predication given the assumption proposed in chapter 6 that marked cases realize the logical predication relation between a verbal head and a NP. The relation of logical predication, on the other hand, depends on the morphological structure of the verb. For example, as discussed in chapter 2, perfective verbs require this relation in order to be interpreted, whereas imperfective verbs do not.[67] We thus expect that perfective verbs check

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[67] The fact that perfective verbs require a logical predication relation has been derived as a consequence of their compositional interpretation, under the assumption that perfective verbs involve affixation of

marked cases, as opposed to imperfective verbs, which can check either marked or unmarked case. This analysis is supported in this chapter by Finnish and Georgian data.

Third, given the present analysis of aspectual composition, we can assume that zero affixes can have lexical features, parallel to lexical or quirky cases checked by some verbs. As shown below, the splits conditioned by the lexical features of aspectual affixes do not depend on the syntactic position, as opposed to splits conditioned by the logical predication.

The three types of splits are supported below by the data from various languages, including Finnish and Georgian.

7.1. Agentivity Based Case Splits

Let us start first illustrate semantic case splits with agentivity based 'fluid-case marking' (Dixon 1979, 1994). The analysis of fluid case marking in ergative active languages is presented in section 4.3.2.1 above. The questions that we discuss in this section are which classes of languages can show agentivity based case splits, and how these splits are different form the other types of semantic case splits.

Languages with fluid case marking are languages where one can use different cases with the same verb. For example, as discussed in chapter 4 above, in Tsova-Tush, intransitive verbs can check either nominative or ergative case on their arguments. The difference in case correlates with a difference in meaning:

(1) *Tsova-Tush* (Batsbi, Caucasian)

a. as wože

I-Erg fell (it was my own fault that I fell down)

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perfectivizing morphology. One of the consequences of this analysis discussed in chapter 2 is the oblogatoriness of internal arguments of perfective verbs, as opposed to the imperfective ones.

b. so wože

I-Nom fell (no implication that it was my fault)

/Mescaninov 1967, cited in Holisky 1987/

In general, nominative case appears on the verb if the action is unintentional, whereas verbs with ergative arguments imply that the action is controlled by the subject.

As discussed in Holisky 1987, there are three classes of intransitive verbs in this language: the class of verbs that can only occur with an ergative subject, the class of verbs that can only occur with a nominative subject, and the verbs that can take either nominative or ergative arguments. The class of verbs that takes ergative arguments only are the verbs which are always interpreted as being controlled. Some of these verbs are listed below:

(2) *Tsova-Tush*

axar 'bark'

lalar 'talk'

datar 'run',

tesar 'believe'

lap'c'ar 'play'

/Holisky 1987/

Under the present assumptions, these verbs can only project an unergative structure.

Verbs that can only occur with nominative arguments, on the other hand, are always understood as externally caused, and cannot project an unergative structure. These verbs include:

(3) *Tsova-Tush*

mildar 'be cold'

halO dek'dar 'tremble'

maicdar 'be hungry'

q'andalar 'get old'

/Holisky 1987/

Most verbs, however, can take both ergative and nominative arguments. As discussed in section 4.3.2.1, these verbs can project either unergative or unaccusative structure.

The analysis of Tsova-Tush proposed above assumes that it is an ergative active language,[68] where agents, or external arguments, check ergative case by Asp, and patients, or internal arguments, check nominative case by Tense. The ranking of feature-checking constraints in this language is as follows:

(4) Tsova Tush: CH-Asp >> CH-T >> CH-V

The highest-ranked constraint is CH-Asp; however, Asp can only check ergative case features on the NP in the Spec of AspP position. If the argument is generated or moves to this position, then it checks ergative case. If the argument does not move to this position, as in the unaccusative structures, then it checks case by the next highest-ranked head Tense.

Agentivity, on the other hand, also depends on the NP being in the Spec of AspP position. If a verb projects the unergative structure where AspP is headed by CAUSE, then it is understood as being intentional, or internally caused. If it projects an unaccusative structure, then it is understood as externally caused.

The correlation betweeen agentivity and case is thus not unexpected in the case of ergative active languages.

Ergative accusative languages, i.e. languages with the ranking CH-Asp>>CH-V>>CH-T are predicted to show fluid case marking as well. Given that CH-Asp is the highest-ranked constraint in Acenhese, we predict that ergative agreement is checked on the subjects of transitive and unergative verbs in such languages. If the NP does not move to the Spec of AspP position, then it checks accusative agreement against V.

[68] The ergative active pattern in Tsova-Tush, however, applies only to the first and second person pronouns, the third person NPs follow an ergative pattern.

This analysis can be supported by the Acenhese data, discussed in Durie 1985. As is noted in this work, about thirty intransitive verbs in Acenhese can show either ergative or accusative marking:

(5) *Acenhese* (Austronesian)

a. gopnyan hana-inseueh **-geuh** keu-lôn

he NEGBE feel compassion-3 DAT-I

'He has no sympathy towards me'

b. gopnyan hana-**geu**-inseueh keu-lôn

he NEGBE 3 feel compassion DAT-I

'He has no sympathy towards me'

/Durie 1985/

As illustrated in chapter 5, the 3 person agreement marker 'geu' in Acenhese is ergative, which marks the features of the subjects of transitive and unergative verbs. The 3 person agreement marker 'geuh', on the other hand, marks the objects of transitive and unaccusative verbs. In the case of verbs with fluid case marking, illustrated in (5), the marking correlates with a regular semantic contrast: ergative agreement implies intentionality, whereas accusative agreement does not.

Languages where CH-V is the highest-ranked constraint also can show fluid case-marking, given that V can check marked case only in its base-generated position (see section 6.1.2.2 above). For example, accusative active languages such as Eastern Pomo have the ranking CH-V >> CH-T >> CH-Asp, and use either nominative or accusative case on the animate argument of certain verbs (see the discussion of Eastern Pomo in section 6.2.2):

(6) *Eastern Pomo*

a. bé·k^{h1} če·xélk^{h}ma·

They-Nom are sliding

b. bé·kal^{1} če·xélka·

They-Acc slipped

/McLendon 1978/

In this language unergative verbs check nominative case, whereas unaccusative verbs check accusative case[69]. As is expected, nominative arguments are understood as controlling the action, as opposed to the accusative arguments.

The analysis of languages with agentivity-based splits proposed above predicts that case-marking depends on agentivity or intentionality of the action only if a language is active, i.e. ergative active, accusative active or ergative accusative. As discussed in the previous chapter, these languages are languages where CH-V or CH-Asp are ranked higher than CH-T.

Given that the case splits in these languages are governed by the ranking of feature checking constraints, different combinations of marked/unmarked cases are possible:

(7) Agentivity-based split

	Agentive	Nonagentive
Ergative accusative:	Erg	Acc
Ergative active:	Erg	Nom
Accusative active:	Nom	Acc

Agentivity-based splits differ crucially from perfectivity-based case splits, discussed below in that the case in agentive/nonagentive structures is checked by different syntactic

[69] As discussed in section 6.2.2, the accusative case can be checked only on the class of animates (McLendon 1978), which we analyzed as full DPs.

categories. In the case of perfectivity-based case splits, on the other hand, different cases are checked by the same category. One of the consequences of this analysis is that agentivity-based splits are restricted to intransitive structures, i.e. the case pattern distinguishes unergative/reflexive versus unacusative structures. Perfectivity-based splits, as shown below, are attested on both transitive and intransitive verbs.

Another difference between the two types of splits, predicted by this analysis, is that whereas agentivity-based splits can have marked cases for both nonagentive and agentive interpetations, if a split is perfectivity-based, then perfectivity is always marked whereas imperfectivity is unmarked.

7.2. Perfectivity-Based Splits

Perfective verbs, as discussed in chapter 2 involve affixation of additional morphology to the verb, which results in a logical predication relation. This relation, as proposed in chapter 6 above, is realized by marked case.

Given the hypothesis that perfectivity-based splits are related to logical predication, we predict that there are two types of such splits: accusative/nominative splits on the objects and ergative/nominative splits on the subjects.

(8) Perfectivity-based splits:

	Perfective	Imperfective
Accusative, accusative active and ergative accusative:	NP2-Acc	NP2-Nom
ergative, ergative active and ergative accusative:	NP1-Erg	NP1-Nom

The classes of languages which allow splits on the object are languages where CH-V is ranked high enough so that V checks case in these languages. Examples of such languages are accusative, accusative active, and ergative accusative. In languages from this class, perfective verbs check marked accusative on the internal argument, whereas imperfective verbs can check either unmarked nominative or marked accusative case.

The classes of languages which allow splits on the subjects are languages where perfectivizing morphology is added to Asp; and therefore, such languages are restricted to ergative, ergative active and ergative accusative. In all these languages we expect that perfective verbs mark the external arguments with ergative case, whereas imperfective verbs can check either ergative or nominative case.

These splits are thus different from the agentivity-based splits discussed above in that, first, they are not restricted to intransitive structures, and, second the perfective/imperfective opposition is always realized by marked/unmarked case.

7.2.1. Perfectivity, Definiteness, and Accusative Case

Thompson 1980 discusses several languages where accusative marking correlates with perfective markers on the verb. For example, in Hungarian, verbs derived by means of a perfectivizing prefix meg- check accusative case, whereas if there is no perfectivizing prefix, then the object is oblique:

(9) *Hungarian*

a. meg-segit valaki-T

Perf-helps somebody-ACC

He helps somebody

b. Segit valaki-NEK

helps somebody-DAT

He helps somebody

/Thompson 1980, p. 267/

These data suggest that accusative case marking is associated with a perfectivizing prefix meg-.

In Estonian, as the data below shows, the verb with the resultative particle *ära* ‘away’ has genitive case features, whereas the corresponding imperfective verb checks partitive case:

(10) *Estonian*

a. Ta tundis seda naist

he knew this woman-PART

He knew this woman

b. Ta tindis selle naise *ära*

He knew this woman-GEN away

He recognized this woman

/Thompson 1980/

In Palaulan, perfective/imperfective verbs are morphologically distinguished, and only perfective verbs agree with the object:

(11) *Palaulan*

a. A ngalęk a milęnga a ngikęl

child eat-IMP fish

The child was eating the fish

b. A ngalęk a kill-ii a ngikęl

child eat-PERF-AGR fish

The child ate up the fish

/Thompson 1980/

The most discussed language where perfective verbs are distinguished from the imperfective ones by the accusative case is Finnish. In Finnish, as discussed in traditional grammars, as well as Tenny 1987, de Hoop 1992, transitive verbs can assign accusative or partitive case, dependent on whether the action is completed:

(12) *Finnish*

a. Anne rakensi taloa

Anne built house-PART

Anne was building a/the house

b. Anne rakensi talon

Anne built house-ACC

Anne built a/the house

/De Hoop 1992, p. 64/

(13) a. Maria kantoi kirjaa

Maria carried book-PART

Maria was carrying a book

b. Maria kantoi kirjan

Maria carried book-ACC

Maria carried a book

/Heinamaki 1984, cited in Tenny 1987/

As the data in (12)-(13) show, telic verbs in Finnish check accusative case.

If the verb is atelic, on the other hand, then the choice of case can depend on the definiteness/specificity of the object. The examples which illustrate this point are as follows:

(14) *Finnish*

a. Näen ihmisiä

I see people-PART

'I see (some) people'

b. Näen ihmiset

I see people-ACC

'I see the people'

(15) a. Anne tapaa vieraita

Anne meets guests-PART

'Anne meets some guests'

b. Anne tapaa vieraat

Anne meets guests-ACC

'Anne meets the guests'

/De Hoop 1992/

The generalizations which describe distribution of accusative and partitive cases in Finnish, therefore, can be summarized as follows:

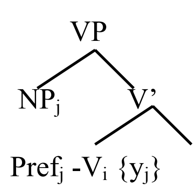
(16) a. If a verb is telic, then the object must be accusative

b. If a verb is atelic and the object is indefinite, then the verb checks partitive case

c. If a verb is atelic and the object is definite, then the verb checks either partitive or accusative case.

Under the present analysis, the marked accusative case realizes a logical predication relation between V and the NP in the Spec of VP position. Furthermore, as discussed in section 2.6, perfective verbs cannot be interpreted unless the NP is in the logical predication relation with V. This relation is sketched in (17):

(17) <u>Perfective Verbs</u>

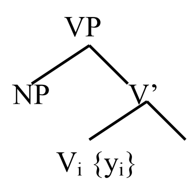


Perfective verbs under this analysis are derived by perfectivizing prefixes. The NP in the case of perfective verbs is the logical argument of the prefix rather than the verb. Given the rules of compositional semantics, discussed in chapter 2, this NP must be coindexed with a stored variable introduced by the perfectivizing prefix, in order for the structure to be interpreted. As a result of this coindexation, which we called logical predication above, the NP fills the position of the variable y_j.

Crucially, in the perfective structure, the index of V is different from the index of y_j. The index of the individual variable y_j is introduced by the perfectivizing prefix. The index of V, on the other hand, percolates from the morphological head, i.e. the verbal root. Given the Binding rules of XLS (see section 2.3 and Appendix 2), variables from the store can be bound only if the index of this variable is compositionally visible at the level where this rule applies. The variable y_j can only be bound, therefore, if it is coindexed with the NP in the Spec of VP position.

Imperfective verbs, on the other hand, do not require a logical predication relation. As is shown in (18), the index of the stored variable is introduced by the verbal root, and therefore, is visible at the V level, independent of whether the NP is coindexed with y_i or not.

(18) Imperfective Verbs



Verbs derived by perfectivizing prefixes are thus different from imperfective ones in that they obligatorily stand in a logical relation with the NP. This analysis is supported in section 2.6 by the obligatoriness of the internal arguments of perfective verbs, as opposed to imperfective verbs, which usually take optional objects.

Given this difference between perfective and imperfective verbs, as well as the hypothesis that marked case realizes a logical predication relation, we can now account for the correlation between perfectivity and the marked accusative case.

Let us illustrate this analysis by the discussion of the Finnish data.

Finnish is an accusative language with the following ranking of feature checking constraints:

(19) Finnish: CH-T >> CH-V >> CH-Asp

The objects in languages with this ranking check their Case features by V.

To explain the generalizations in (16), we assume that telic verbs in Finnish are derived by affixation of a zero pure perfectivizing prefix, parallel to English verbs discussed in section 2.4. The relation of logical predication is required in order for the structure to be interpreted. Given that logical predication is marked by the accusative case, we explain the generalization in (16a) that all telic verbs check accusative case.

Now let us turn to the generalization in (16b). In order to explain the difference in case related to definiteness/specificity, we can relate the logical predication relation to the logical type of the NP.

Definite NPs under this analysis are analyzed as names. Let us consider the interpretation of the structure where there is no logical predication relation between V and the NP. The stored variable in this case gets bound at the V level by the Binding rule Ba since the index of the variable is visible at this level.

(20) Definite NPs, no logical predication

VP 1F. λt read (t, the-book)

the-book V' 1U. λy λt read(t, y)

V_i

2Ba. λy λt read(t, y)

1L. λt read (t, y) $\{y_i\}$

If the variable y_i is coindexed with the NP, then the variable gets bound at the V'level:

(21) Definite NPs, logical predication

VP 1F. λt read (t, the-book)

the-book$_i$ V' 2Ba. $\lambda y\ \lambda t$ read(t, y)

1U. λt read (t, y) $\{y_i\}$

V$_i$

1L. λt read (t, y) $\{y_i\}$

If the NP is definite, therefore, then the structure can be interpreted independent on logical predication.[70] The NP can check either accusative or partitive case.

Indefinite NPs, on the other hand, are properties, and the interpretation of VP requires application of an existential type-shifting rule:

(22) Indefinite NPs, no logical predication

VP $\lambda t\ \exists x$ (read(t, x) $\wedge$ book(x))

λy book(y) V' 2T. $\lambda P\ \lambda t\ \exists x$ (read(t, x) $\wedge$ P(x))

1U. $\lambda y\ \lambda t$ read(t, y)

V$_i$

2Ba. $\lambda y\ \lambda t$ read(t, y)

1L. λt read (t, y) $\{y_i\}$

In this structure, the variable y_i must be bound at the V level, given that the rule of existential type-shifting must apply at the level of V', and by the rules of XLS (Bittner 1994, 1998, see Appendix 2), only one transformation rule is allowed at each level. The relation of logical predication does not hold in this structure, and the NP checks partitive case.

If the NP moved at LF, then the trace in the Spec of VP position would be interpreted as an individual variable (see Appendix 2), and logical predication relation could hold. This analysis, therefore, assumes that in the structure in (22) partitive NPs do not move out of their base-generated position (cf. de Hoop 1992, Borer 1994).

[70] The same is true of the quantificational NPs that move at LF, given that the trace in the Spec of VP position is interpreted as an individual variable.

As a consequence of this analysis, we predict that scope options of partitive and accusative indefinite NPs are different. Specifically, given that partitive NPs do not move out of their base-generated position, they have narrow scope readings, or nonspecific interpretation. On the other hand, if indefinite NPs move at LF, then the relation of logical predication can obtain, the NP checks accusative case, and has a wide-scope, or specific, interpretation. The relation between accusative case and specificity, therefore, is not unexpected under this approach (see de Hoop 1992, among others).

Furthermore, given that perfective verbs require a logical predication relation between a verb and a NP, we predict that in the case of perfective verbs, indefinite NPs must move out of their base-generated position and hence have a specific interpetation. This prediction is supported by the data discussed in Krifka 1989, Filip 1993, 1994, among others, which show that telic verbs usually require specific/definite objects.

A more detailed analysis of the relation between specificity and case is beyond the scope of this study.[71] What we tried to show in this section, however, is that definiteness/specificity can be related to logical predication under this analysis, and therefore to accusative case.

7.2.2. Perfectivity and Ergative Case in Georgian

Further examples that illustrate the relation between perfectivity and marked case are based on languages where perfective verbs check ergative case on the subjects, whereas the subjects of imperfective verbs are unmarked. Such languages are illustrated by the Georgian data below. As we show in this section, the case/agreement system in Georgian shows interaction of all three types of semantic splits: splits conditioned by the difference in the syntactic structure

[71] The questions that must be addressed concern language variation with respect to these phenomena, for example, differences between languages like Finnish, Turkish and Russian. Although in all these languages unmarked partitive/nominative/genitive cases can be checked only on nonspecific NPs, the exact distribution of these cases is different in these languages.

(i.e. agentivity-based split), splits conditioned by the logical predication relation (i.e. perfectivity-based), and splits conditioned by the lexical features of aspectual affixes.

7.2.2.1. The Data

The case and agreement pattern of Georgian is summarized in the table in (23). First, Georgian shows a perfectivity-based split. As the table in (23) shows, aorist (or perfective tense series) have the ergative active system of case; however, future, present, and imperfect series show the accusative pattern.

Second, the agreement pattern in Georgian in series I and II is subject oriented. Both nominative and ergative subjects show s(ubject) agreement, whereas objects show o(bject) agreement, independent on whether they are dative or nominative. In this respect, Georgian differs from languages with nominative agreement such as Hindi, where verbs always agree with nominative arguments.

Third, besides perfective series and imperfective/future tense series, Georgian has a third tense series, called perfect. Its case system is parallel to ergative active, except that the case of the agent is dative rather than ergative. Agreement in the series III follows the pattern of case: all dative arguments show indirect object agreement, whereas nominative arguments show subject agreement.

(23)

:	Aorist, optative (tense series II)	future, present, imperfect (tense series 1)	perfect (tense series III)
Class 1 (trans)	Erg-Nom s o	Nom-Dat s o	Dat-Nom i.o s
class 2 (unacc)	Nom s	Nom s	Nom s
Class 3 (unerg)	Erg s	Nom s	Dat i.o.
Class 4 (psych.)	Dat -Nom i.o s	Dat-Nom i.o s	Dat-Nom i.o s

7.2.2.2. A Proposal

To account for these data let us assume that the ranking of feature checking constraints in Georgian is ergative active:

(24) Georgian: CH-Asp >> CH-T >> CH-V

Let us further assume that the morphological features of heads are as in (25):

(25) T {s}

Asp {case}

V {o}

The case features of Asp in Georgian can be realized either by ergative or the unmarked nominative case. In this respect, Georgian is different from the languages discussed so far (except for the morphologically ergative languages), where Asp checks ergative case on the external arguments. The assumption that Asp checks marked ergative case is supported by the fact that logical predication is required between the aspectual affix and the NP in the Spec of AspP position.[72] To account for the Georgian data we propose that Georgian allows double indexation of syntactic heads. This assumption, as we show below, accounts for the fact that ergative case is checked only in the perfective or aorist tense series.

Besides ergative case, Georgian has a marked dative case which can appear both on the subjects and on the objects. The analysis presented next assumes that dative is a lexical case of aspectual affixes, parallel to lexical or quirky cases of the verbs (e.g. Babby 1984, 1991, Zaenen et al 1985, Yip et al 1987, Zaenen and Maling 1990). Dative case features under this analysis are introduced by the affixes HAVE and BE:

(26) HAVE {Dat, i.o.}

BE {Dat}

Given these assumptions, we can now account for the case and agreement pattern of Georgian summarized in the table above.

7.2.2.3. Aorist (Series II)

The problem which we address first is the appearance of the ergative marker on the subjects of the verbs from classes 1 and 3 in aorist tense series.

The proposal which we explore is that aorist tense series are derived by affixation of the affix BECOME to Asp, parallel to superlexical prefixes in Russian, discussed in chapter 2. Unlike superlexical prefixes in Russian; however, the affix BECOME in Georgian is also a tense operator, where the variable t' has a permanent value corresponding to 'now':

(27) BECOME(p, t, now) is true iff $p(t) \wedge \neg p(now) \wedge t \propto now$

This assumption accounts for the fact that sentences in aorist in Georgian are always understood as denoting completed actions which occurred in the past (e.g. Tschenkeli 1958).

[72] For example, if AspP is headed by CAUSE, then the individual variable that corresponds to the agent is introduced as a stored variable by the Substitution Binding rule, which decomposes the variable p in the translation of CAUSE(t, p, q). Coindexation between the NP in the Spec of AspP position and this variable is required for this variable to be bound (see section 2.3).

	present, future	*aorist*
(28)	a. nino acvenebs suratebs gias	b. ninom acvena suratebi gias
	nino-Nom shows pictures-Acc Gia-Dat	Nino-Erg showed pictures-Nom Gia-Dat
	'Nino is showing pictures to Gela'	'Nino showed the pictures to Gela'
(29)	a. nino amtknarebs	b. ninom daamtknara
	Nino-Nom she-yawns	Nino-Erg she yawned
	'Nino yawns'	'Nino yawned'
(30)	a. es saxli ausendeba	b. namcxvari gamocxva
	this house-Nom will be built	pastry-Nom it-baked
	'The house will be built'	'The pastry baked'
(31)	a. sen pelamusi giqvars	b. sen pelamusi geqvar
	you-Acc pelamusi-Nom like	you-Acc pelamusi-Nom liked
	'You like pelamusi'	'You liked pelamusi'
		/Harris 1981/

Consider, for example, the sentence in (29b). This sentence is translated as follows:

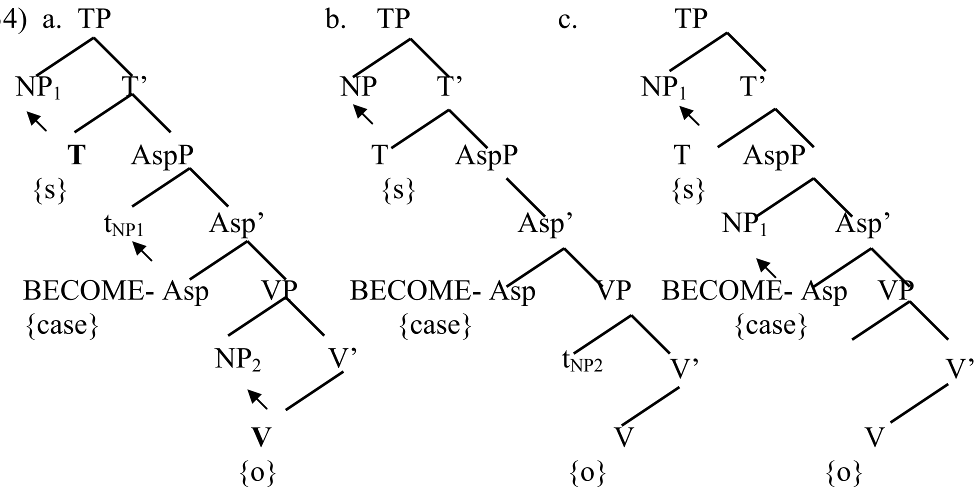
(32) $\exists P$ BECOME(λt CAUSE(t, P(n), $\exists y$ yawn(y)), t_{ev}, now)

Given the semantics of BECOME above, this sentence entails that 'Nino yawned' is true at t_{ev} and is not true now, and t_{ev} precedes now:

(33) $\exists P$ CAUSE(t_{ev}, P(n), $\exists y$ yawn(y)) $\wedge$ t_{ev} $\propto$ now $\wedge \rceil$ $\exists P$ CAUSE(t_{ev}, P(n), $\exists y$ yawn(y))

The structures that illustrate case and agreement in Georgian aorist sentences are given in (34):

(34)



In the transitive structure in (34a), the subject checks ergative case features against Asp and then moves to the Spec of TP position to check agreement features by Tense. The object NP checks its features against V. This structure is optimal since it satisfies all three constraints: CH-T, CH-Asp, and CH-V.

If the structure is unergative, as in (34c), then the subject checks ergative case by Asp and agreement by Tense. The two highest-ranked constraints, CH-T and CH-Asp are satisfied.

In the case of unaccusative structures, shown in (34b), the NP checks agreement by Tense, whereas the case features are unmarked. Although this structure violates the highest-ranked constraint CH-Asp, it is the optimal one given that there is no candidate in the candidate sets for unaccusative verbs where CH-Asp is satisfied. (see discussion of candidate sets in section 6.1.3 above).

The hypothesis that ergative case is related to the presence of the BECOME operator is supported by the following data. The verbs given below alternate between ergative/nominative marking. As the data in (35)-(37) show, only the verbs with ergative NPs take 'in'-durational phrases, which, as discussed in chapter 2, are compatible with the BECOME operator:

(35) a. Vano elaparaka *etsi saati

Vano-Nom talked-to him in an hour

b. Vanom ilaparaka etsi saati

Vano-Erg talked in an hour (he talked in general and already finished, cf. Russian “**po**govoril”)

(36) a. Vano etamasha *etsi saati

Vano-Nom played with him in an hour

b. Vanom itamasha etsi saati

Vano-Erg played in an hour

(37) a. Vano ecxuba *etsi saati

Vano-Nom fought with him in an hour

b. Vanom ebrdzoba etsi saati

Vano-Erg fought in an hour (srazilsja)

These data suggest that ergative case in Georgian correlates with the presence of the predicate BECOME.

In Holisky 1981, on the other hand, it is argued that ergative case in Georgian is associated with agentivity or intentionality of the action. This generalization is not always true, however.

For example, the following sentence illustrates an agentive verb in the aorist which checks nominative rather than ergative on the subject:

(38) Vano specialurad elaparaka

Vano-Nom talked to him on purpose

Furthermore, as the data in (39) shows, nonagentive transitive achievements assign ergative case:

(39) a. Vanom dainakha

Vano-Erg saw it (achievement)

b. Vanom zaigsna

Vano-Erg heard it (achievement)

c. Qarma gaago panjara

Wind-Erg window-Nom opened-aor

d. Cvivam veranda daasvela

Rain-Erg porch moistened

The data above supports the assumption that it is the predicate BECOME rather than agentivity of the verb, which determines the ergative case on the subject.

On the other hand, the observation made in Holisky 1981 about the corelation between agentivity and ergative case is not surprising under this analysis, given that Georgian is analyzed as an ergative active language. In ergative active languages, as discussed in section 7.1 above, case marking distinguishes unergative and unaccusative structures. Specifically, ergative case can appear only on the subjects of transitive and unergative verbs, whereas unaccusative verbs always check nominative case:

(40) namcxvari gamocxva

Pastry-Nom baked-2-Aor

'The pastry baked'

/Harris 1981:43/

Whether a verb projects an unaccusative or unergative structure, as we have discussed above, correlates with agentive/nonagentive interpretation. Consider, for example, the data from Holisky 1981, also discussed in King 1994:

(41) a. Vanom imγera

Vano-Erg sang-3-Aor

'Vano sang'

b Vanom qinulze isriala

Vano-Erg ice.on slipped

'Vano slid on the ice'

(42) a. *čaidanma imγera   b. *pexma qinulze (da)isriala

teakettle-Erg sang-3-Aor   foot-Erg ice.on slipped

'The teakettle sang'

/Holisky 1981, cited in King 1994/

The translations of these sentences are as follows:

(43) a. $\exists$P [BECOME(λt CAUSE(t, P(Vano), $\exists$y sing(y)), t_{ev}, now)

b. $\exists$P [BECOME(λt CAUSE(t, P(Vano), $\exists$y slid-on the ice(y)), t_{ev}, now)

(44) a. $\exists$P [BECOME(λt CAUSE(t, P(teakettle), $\exists$y sing(y)), t_{ev}, now)

b. $\exists$P [BECOME(λt CAUSE(t, P(foot), $\exists$y slip-on the ice(y)), t_{ev}, now)

As discussed in chapter 2, the predicate CAUSE imposes selectional restrictions on the arguments that can qualify as potential causers of singing or sliding on the ice. The ungrammaticality of the sentences in (42) can be explained if we assume that these selectional restrictions are violated in these sentences. If NPs like 'teakettle' or 'foot' cannot qualify as potential causers of these actions, then the unergative structures cannot be derived, and hence no ergative case can appear on their subjects.[73]

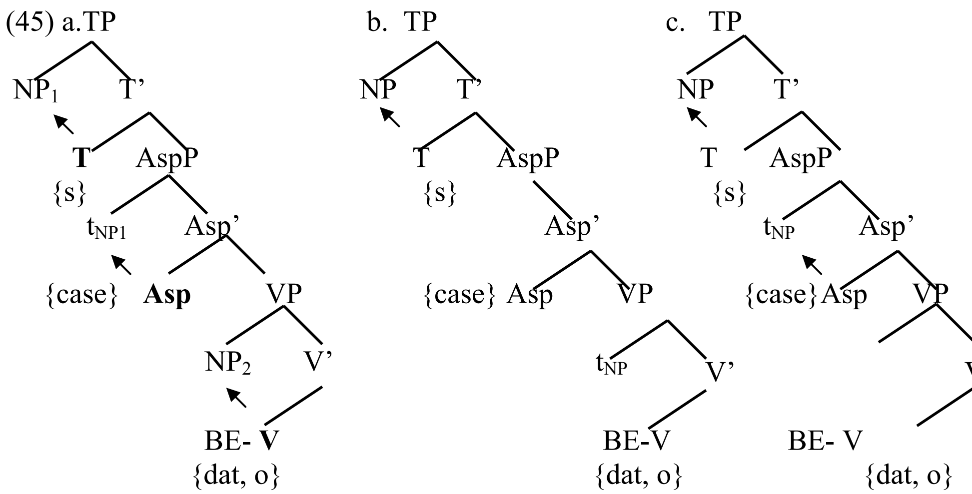
To summarize the discussion of aorist sentences, we have shown that ergative case appears only on the verbs that involve affixation of the BECOME operator. However, given that this operator adjoins to Asp, and Asp can check case only on external arguments, we predict that intransitive verbs in Georgian can check ergative case only if they enter into an unergative (or reflexive) structure. Intransitive verbs in Georgian, therefore, are predicted to show an agentivity-based split as well as perfectivity-based.

The question which we left unanswered is why does Asp check ergative case only when the predicate BECOME is affixed? Put differently, why does the relation of logical predication in this language is required only in the presence of BECOME? We will address this question in the discussion of series I, where we compare compositional derivation of sentences in the aorist and present/future tenses.

7.2.2.4. Series I

Now let us turn to the Series 1, which include future, present, and imperfect. Given the ranking of feature checking constraints and the morphological features of verbal heads, we predict that the optimal structures in series 1 are as follows:

(45)



In the structure of a transitive verb in (45a) the subject checks case against Asp and agreement against Tense. The object checks nominal features by V. The structure is optimal since all heads check their features.

Unaccusative and unergative verbs, on the other hand, check subject agreement by Tense. The case of the subjects is unmarked.

The question which we address now is why is the case of Asp realized by the unmarked nominative case in series 1, whereas in the aorist Asp checks marked ergative on the NP?

Marked ergative case under the present assumptions realizes a logical predication relation between Asp and a NP in the Spec of AspP position. Let us consider the compositional translation

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[73] Unaccusative structures, on the other hand, can be projected by these sentences, in which case they will have an externally-caused interpretation (see section 4.2.2).

of the Asp node in the aorist, which is derived by affixation of a perfectivizing prefix to Asp, parallel to superlexical prefixes in Russian, discussed in chapter 3:

(46) 2Ba. $\lambda q \lambda t\ \exists t'$ BECOME (za($\exists P$ CAUSE($t,P(x_i),q$)), t, t') $\{x_i\}$

$P_{i,k}$ 1F. $\lambda t\ \exists t'$ BECOME (za($\exists P$ CAUSE($t, P(x_i),q_k$), t, t') $\{x_i, q_k\}$

2.Ba $\lambda R\ \lambda t\ \exists t'$ BECOME (za($R(q_k)$, t, t') $\{q_k\}$

$\lambda q \lambda t\ \exists P$ CAUSE($t,P(x_i),q$) $\{x_i\}$ $P_{j,k}$ 1F. $\lambda t \exists t'$ BECOME (za($R_j(q_k)$, t, t') $\{R_j, q_k\}$

ARB.Asp $\lambda p \lambda t\ \exists t'$ BECOME (p, t, t')

$P_{j,k}$ 2Bb. λt za($R_j(q_k)$, t) $\{R_j, q_k\}$

1L. λt za(p_j, t) $\{p_j\}$

As the derivation of the structure in (46) shows, the index of the variable x_i, which corresponds to the external argument, is different from the index of the root node, and logical predication is required. This logical predication relation, as we proposed above, is realized by marked ergative case.

To explain why logical predication is not required in series I, where the perfectivizing prefix is not added, let us point out that the structure in (46) can only be interpreted if double indices are allowed. In a language where double indices are not allowed, CAUSE and the external argument must stand in a logical predication relation (see the derivation in (42) in chapter 2 above). However, in Georgian, the derivation in (46) is grammatical, and hence we can suggest that the derivation in (47) is grammatical, too.

(47) $Asp_{j,i}$ 1F. $\lambda q \lambda t\ \exists P[CAUSE(t, P(x_i), q)]$ $\{x_i\}$

2Bc. $\lambda S \lambda q \lambda t\ \exists P[CAUSE(t, P(x_i), q) \wedge S(P)]$ $\{x_i\}$

ARB $\lambda P[P=P]$ $Asp_{j,i}$ 1U. $\lambda q \lambda t$ CAUSE($t, P_j(x_i), q$) $\{P_j, x_i\}$

2Bb. $\lambda q \lambda t$ CAUSE($t, P_j(x_i), q$) $\{P_j, x_i\}$

$Asp_{j,i}$ 1L. $\lambda q \lambda t$ CAUSE(t, p_j, q) $\{p_j\}$

In both derivations, the second index is the result of the Substitution Binding operation, applied to the terminal translation, which introduces two stored variables. The feature percolation conventions are satisfied in these structures, since indices percolate from stored variables of terminal nodes and then further percolate to non-terminal nodes from the morphological heads.

If the index of the variable x is the same as the index of the Asp node, then logical predication relation is not required for the structures to be interpreted, since the stored variable x can undergo a Binding rule at the Asp level. Unmarked case, therefore, is checked in this case.

The next question is why does V check dative case on the objects of transitive verbs in series I?

Dative case under the present assumptions is a lexical feature of a particular aspectual affix. In the case of series I we assume that dative is a lexical feature of some affix adjoined to V, which is involved in derivation of these series. We called this affix BE in this structure, although further research is needed to determine the nature of this affix. Main evidence for the assumption that dative case is lexical in Georgian comes from the perfect constructions and other instances of dative case marking discussed next.

7.2.2.5. Perfect (Series III)

Perfect series have a case pattern similar to series II in that external arguments, i.e. subjects of transitive and unergative verbs have a marked case. However, the case of external arguments is dative rather than ergative.

Ergative case under the present assumptions is the marked case of Asp, whereas dative case is assumed to be a lexical case feature of the affix HAVE. This assumption has certain consequences for the distribution of the two cases. Specifically, ergative case can only be checked by Asp on the NPs in the Spec of AspP position, and does not depend on particular affixes that head AspP. Lexical dative case, on the other hand, can be checked in any syntactic position, including Spec of VP, AspP, PP, if the head of this projection involves affixation of HAVE.

For example, dative case appears on the NPs in double object construction, which under the present analysis is derived by the affix HAVE:

(48) rezo samajurs ačukebs dedas

Rezo-Nom braclelet-Dat he-gives-her-ir-I-1 mother-Dat

'Rezo is giving mother a bracelet'

/Harris 1981/

Under the present asumptions, this sentence can be translated as follows:

(49) ∃PCAUSE(t_{ev},P(rezo), CAUSE(t_{ev},give(bracelet),BECOME(HAVE(mother, bracelet)))

The affix HAVE in this construction heads a PP projection as a complement of V, and checks dative case on the NP in the Spec of PP position (cf. the structure of the double object construction in Warlpiri in section 6.2.3.2).

If the affix HAVE heads AspP, as in the case of stative transitive verbs in our analysis, and the subject checks case by Asp, then we would expect that the subject gets dative case. This prediction is confirmed by the class 4 verbs in Georgian which check dative case and indirect object agreement on the subjects:

(50) Vanos uqvars tavisi tavi

Vano-Dat he-loves-him-I-4 self's self-Nom

Vano loves himself

/Harris 1981/

The examples of the verbs from this class are given in (51). These verbs are stative transitive verbs, where the predicate HAVE introduces the external argument (cf. chapter 2):

(51) uqvars 'he loves him'

mosçons 'he likes it'

aviçqdeba 'he forgets it'

axsovs 'he remembers it'

esmis 'he hears, understands it'

unda 'he wants it'

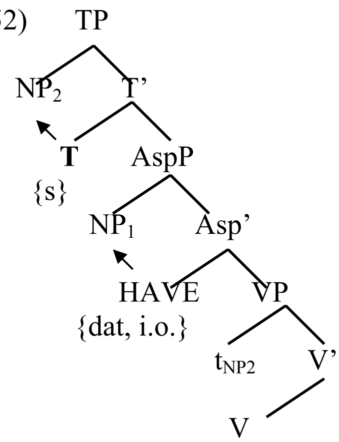
aklia 'he finds it lacking, necessary'

surs 'he wants it, wishes for it'

/Harris 1981, p. 267/

Given the ranking of feature-checking constraints in Georgian, the external arguments check case by Asp. Now if Asp is headed by HAVE, as is shown below, then the lexical case features of HAVE are checked against Asp, and the subject has dative case and indirect object agreement features. The object, on the other hand, checks its features against Tense, given that CH-T is the second-ranked constraint:

(52)



Lexical case checked by an aspectual affix is thus different from structural cases in that it can appear on the NPs in different syntactic positions provided that aspectual affixes can occupy different positions in the syntactic tree. In this respect, it differs from the structural accusative and ergative cases, which are checked by a syntactic category, and do not depend on the presence of particular aspectual affixes.

Double object construction and the class 4 verbs in Georgian support our assumption that the predicate HAVE has lexical dative case and indirect object agreement features. We will further argue below that this predicate also participates in the derivation of the perfect construction in this language.

In the perfect construction, as in the case of the verbs from the class 4, the external argument is dative and the internal argument is nominative. Perfect series denote evidential mood, as reflected by 'apparently' in English glosses:

(53) a. rezos samajuri učukebia dedistvis

Rezo-Dat braclete-Nom he gave-it-III-1 mother-for

'(Apparently) Rezo gave a bracelet to his mother'

b. daglodebivar (me) (šen)

I awaited-you-III-2 I-Nom you-Dat

'(Apparently) I awaited for you'

c. deidas umyeria

aunt-Dat she sang-it-III-3

'(Apparently) the aunt sang it'

/Harris 1981/

The analysis of the perfect constructions that we propose assumes that this construction is derived by affixation of the predicate HAVE to Asp so that the external argument is interpreted as the experiencer of the action. For example, the sentence in (54a) can be interpreted as in (54b):

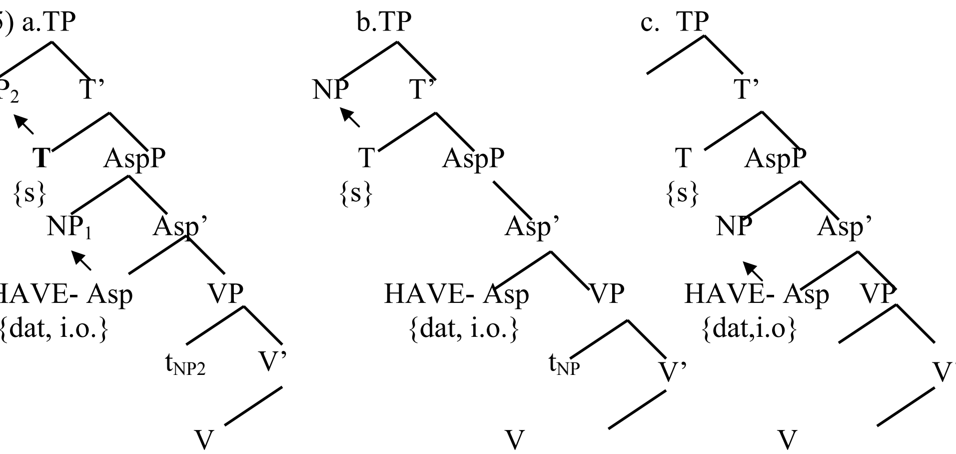
(54) a. John had written a letter.

b. PAST(λt'[$\exists$tHAVE(j, BECOME(written, letter, t, t'), t')], t_{ev})[74]

Harris 1981 argues based on a variety of syntactic and morphological phenomena that both class 4 verbs and perfect constructions involve what she calls 'inversion' and 'unaccusative' rules, as the result of which the subject is demoted to the indirect object, and the direct object advances to the subject. Her analysis distinguishes two levels of syntactic representation. At the level of initial grammatical relations, which corresponds to D-structure in GB analysis, the dative arguments are more prominent than nominative ones. At the level of final grammatical relations, which corresponds to S-Structure, the nominative argument is more prominent than the dative one.

Inversion of the arguments in the perfect supports our analysis of case and agreement in Georgian, which predicts that the following structures are the optimal ones:

(55)



In the structure of a transitive verb in (55a), the external argument checks dative case and indirect object agreement features by the highest-ranked head Asp. Given that the next highest-ranked constraint is CH-T, we predict that the internal argument raises to the Spec of TP position, where it checks subject agreement by Tense. The structure in (55a) is optimal since it satisfies the two highest-ranked constraints: CH-Asp and CH-T. Consistent with the discussion in Harris 1981, nominative NPs in this structure are more prominent at the S-structure level than dative NPs.

In the case of the unergative verbs, as shown in (55c), the subject checks dative case and agreement against the highest-ranked head Asp. However, in the case of the unaccusative verbs, illustrated in (55b), Asp cannot satisfy its features, and the next highest-ranked constraint CH-T determines the subject agreement on the NP.

[74] Parallel to the present semantic analysis of the adjectival passive discussed in section 3.6, in this translation the event of the letter became written immediately precedes the reference time, bound by the PAST operator.

The case pattern of the perfect sentences is parallel to the case pattern of the aorist constructions in that the external arguments are distinguished from the internal ones. The fact that only external arguments are marked by ergative/dative cases in series II and III is accounted for under this analysis given that the highest-ranked constraint in Georgian is CH-Asp, and Asp can only check case on the NPs in the Spec of AspP position.

This analysis also accounts for the fact that perfect sentences differ from the aorist sentences with respect to agreement. As the table in (23) illustrates, whereas agreement pattern of aorist sentences is accusative, the agreement pattern of perfect sentences is the same as the case pattern: that is ergative active. The accusative pattern of agreement in aorist sentences, as we have shown above, is a consequence of the assumption that Asp does not have agreement features, and thus, ergative NPs check their agreement by Tense. Dative subjects, on the other hand, check indirect object agreement against HAVE, given that this affix has both case and agreement features.

To conclude the discussion of Georgian, we have shown that the perfectivity-based split in this language is accounted for under the assumption that affixation of the aorist operator to Asp changes its morphological structure and results in a logical predication relation. Given the assumption that Georgian is an ergative active language, we also explained a puzzling relation between ergative case and both perfectivity and agentivity in this language.

7.3. Summary

In this final chapter, we presented consequences of the present approach to aspectual composition and the OT analysis of agreement and case, based on semantic case splits.

The relation between aspect and case is one of the most poorly understood puzzles of the syntax-semantics interface. In this chapter we proposed three sources of semantic splits, which rely on the assumption that aspectual operators are separate lexical items, which can either head syntactic projections or presyntactically adjoin to the verbs.

The correlation between agentivity and case has been explained in terms of the difference in the syntactic representation of agentive and nonagentive verbs. A crucial part of this analysis is that syntactic structure determines semantic interpretation, as we argued in chapter 4. Specifically, we have proposed that in the case of unaccusative structures NPs cannot check case against Asp, because if the NP moves to the Spec of AspP position, then the resulting structure will have different interpretation, and thus will not compete with the other candidates.

The correlation between perfectivity and marked accusative/ergative cases has been explained in terms of logical predication. The relation of logical predication is a consequence of the hypothesis that verbal categories, including aspectual affixes, introduce a variable in the store, given the storage mechanism and Binding rules of Bittner 1994, 1998. This assumption is independently motivated by the compositional analysis of various structures discussed in this work, which could not be interpreted otherwise. This relation has been shown to explain the obligatoriness of the internal arguments of telic transitive verbs (see chapter 2), the correlation between telicity and unaccusative structures (see chapter 4), the direct object restriction on the resultative constructions (see chapter 5), and finally the difference between marked and unmarked cases. In this chapter, we supported the hypothesis introduced in chapter 6 that marked case realizes a logical predication relation by the analysis of perfectivity-based case splits in Finnish and Georgian. We have shown that this hypothesis can explain certain properties of this type of splits, as opposed to agentivity-based splits. Specifically, it predicts that, first, perfectivity-based case splits do not depend on whether the verb is intransitive or transitive, and, second, that perfectivity is always marked by overt accusative or ergative case, whereas imperfectivity is realized by unmarked null case.

And finally, given the assumption that verbs are composed by aspectual affixes, we proposed that such affixes might become visible by means of agreement case. For example, dative case and indirect object agreement in Georgian has been analyzed as lexical case features of the affix HAVE. The splits conditioned by the lexical features of aspectual affixes differ crucially from the other types of splits in that they do not depend on the syntactic position.

Appendix 1

ILT (Intensional Logic with Times)

(Church 1940, Creswell 1973, Bennett and Partee 1972, Dowty 1979)

Syntax: 1. Let e, i and t be distinct objects. *The set T* is the smallest set such that:(i) $e \in T$ (ii) $i \in T$ (iii) $t \in T$ (iv) if $\tau, \tau' \in T$, then $<\tau,\tau'> \in T$.

Type, τ	Con_τ	Var_τ
e	{John', Sue',...}	$\{v_{o,e}, v_{1,e}, \ldots\}$
$<e,t>$	{boy', class', ...}	$\{v_{o,<e,t>}, v_{1,<e,t>}, \ldots\}$
$<e,<i,t>>$	{come, read, laugh,...}	$\{v_{o,<e,<i,t>>}, v_{1,<e,<i,t>>}, \ldots\}$
$<e,<e,<i,t>>>$	{manage', own', ...}	$\{v_{o,<e,<e,<i,t>>>}, v_{1,<e,<e,<i,t>>>}, \ldots\}$
$<<e,t>,t>$	{every', ...}	$\{v_{o,<<e,t>,t>}, v_{1,<<e,t>,t>}, \ldots\}$
$<t,t>$	$\{\neg, \ldots\}$	$\{v_{o,<t,t>}, v_{1,<t,t>}, \ldots\}$
$<t,<t,t>>$	$\{\wedge, \square\rightarrow, \ldots\}$	$\{v_{o,<t,<t,t>>}, v_{1,<t,<t,t>>}, \ldots\}$

...

3. For any type τ, *the set of meaningful expressions of type τ (ME_τ)* is defined as follows:

B: $Con_\tau \cup Var_\tau \subseteq ME_\tau$

F: If $\beta \in ME_{<\tau,\tau'>}$ and $\alpha \in ME_\tau$ then $\beta(\alpha) \in ME_{\tau'}$

Q: If $u \in Var_\tau$ and $\alpha \in ME_t$, then $\exists u\alpha \in ME_t$

L: If $u \in Var_\tau$ and $\alpha \in ME_{\tau'}$, then $\lambda u[\alpha] \in ME_{<\tau,\tau'>}$

U: If $\alpha \in ME_\tau$, then $the[\alpha] \in ME_\tau$

4. Abbreviations:

$x := v_{o,e}$, $y := v_{1,e}$, $z = v_{3,e}$,

$P{:=}v_{o,<e,<i,t>>}$, $Q{:=}v_{1,<e,<i,t>>}$,

$p{:=}v_{o,<i,t>}$, $q{:=}v_{2,<i,t>}$,

$t{:=}v_{o,i}$, $t'{:=}v_{1,i}$,

…

$\alpha(\beta_{n,\tau n}, ..., \beta_{1,\tau 1}) := \alpha(\beta_1)...(\beta_n)$

$\forall u_\tau \alpha_t := \neg\exists u \neg\alpha$

$(\alpha -> \beta) := \neg(\alpha \wedge \neg\beta)$

$(\alpha \vee \beta) := \neg(\neg\alpha \wedge \neg\beta)$

Semantics

1. Let W, D, and I be non-empty disjoint sets. For any $\tau \in T$, $\Delta_{\tau,D,W,I}$ is defined as follows:

(i) $\Delta_{e,D,W,I} = D$ (ii) $\Delta_{i,D,W,I} = I$ (iii) $\Delta_{t,D,W,I} = \wp(W)$ (iv) $\Delta_{<\tau,\tau'>,D,W,I} = (\Delta_{\tau',D,W,I})^{\Delta\tau,D,W,I}$

2. A model for ILT is a structure <D, W, I_a, <, A, ≤, F}>, where

(a) D (the set of basic entities), I_a (the set of atomic intervals or moments of time) and W (the set of possible worlds) are non-empty disjoint finite sets

(b) < (temporal precedence) is a strict linear ordering of I_a

(c) The set of intervals of time I is the set of all subsets of I_a such that

if $i \in I$ then for all $m_1, m_2, m_3 \in I_a$, if $m_1, m_3 \in i$ and $m_1 < m_2 < m_3$, then $m_2 \in i$.

(d) A is a function which assigns to each $w \in W$ a subset, A_w, of W

(e) ≤ is a function which assigns to each $w \in W$ a weak order $\leq_w$

(f) F (interpretation function): $\cup Con_\tau -> \cup\Delta_{\tau,D,W,}$ such that (I) and (ii) hold:

(i) if $\tau \in T$ and $\alpha \in Con_\tau$, then $F(\alpha) \in \Delta_{\tau,D,W,I}$

(ii) if $\pi, \pi' \in \Delta_{t,D,W,I}$, $\lambda \in \Delta_{<e,t>,D,W,I}$, $\delta \in \Delta_{e,D,W,I}$ and $\iota, \iota' \in \Delta_{i,D,W,I}$, then:

$F(\wedge)(\pi)(\pi') = \pi \cap \pi'$

$F(\neg)(\pi) = W - \pi$

$F(<)(\iota')(\iota)=\{w\in W$: for all $m_1\in\iota$ and for all $m_2 \in\iota'$ $m_1<m_2\}$

$F(\propto)(\iota')(\iota)=\{w\in W$: for all $m_1\in\iota$ and for all $m_2\in\iota'$ $m_1<m_2$ and for all m_3 if $m_3<m_2$ and $m_3\notin\iota$, then $m_3 < m_1\}$

$F(\subseteq)(\iota')(\iota)= \{w\in W: \iota\subseteq\iota'\}$

$F(o)(\iota)(\iota')=\{w\in W: \iota\cap\iota'\neq\varnothing\}$

$F(\Box\!\!\rightarrow)(\pi)(\pi')= \{w\in W: \{w'\in W$: w' is a minimal element in $<A_w\cap\pi, \leq_w>\}\subseteq\pi'\}$

3. If $M=<D, W, I_a, <, A, \leq, F\}>$, is a model for ILT, then an (M)-assignment is a function $g: \cup Var_\tau \rightarrow \cup\Delta_{\tau,D,W,I}$ such that if $u\in Var_\tau$ then $g(u)\in\Delta_{\tau,D,W,I}$

4. B. Let $M==<D, W, I_a, <, A, \leq, F\}>$. Then for any $\alpha\in Con_\tau$, $||\alpha||^{M,g}=F(\alpha)$,

and for any $u \in Var_\tau$, $||u||^{M,g}=g(u)$

F. $||\beta(\alpha)||^{M,g} = ||\beta||^{M,g} (||\alpha||^{M,g})$

Q. $||\exists u\alpha||^{M,g} = \{w\in W: \{\delta\in\Delta_{\tau,D,W,I}: w\in||\alpha||^{M,g\,[u/\delta]}\}\neq\varnothing\}$

L. $||\lambda u[\alpha]||^{M,g} = h: \Delta_{\tau,D,W,I} \rightarrow \Delta_{\tau',D,W,I}$

$\delta \quad \rightarrow ||\alpha||^{M,g[u/\delta]}$

U. $||the[\alpha]||^{M,g}(\delta)= \{w\in W: \delta$ is the unique element of the set $\{\delta'\in D: w\in||\alpha||^{M,g} (\delta')\}\}$ for any $\delta\in\Delta_{e,D,W,I}$

Appendix 2

Cross-Linguistic Semantics (XLS)

(Bittner 1994)

In what follows, the translation language is ILT; ME = $\cup ME_\tau$; VAR = $\cup VAR_\tau$.

Lexicon (sample)

Item	Category	Basic Translation	Type
read	V	$<\lambda t\ read(y_{k,}\ t),\ \{y_k\}>$	$<i,t>$
boy	N	$<\lambda y\ boy(y),\ \varnothing>$	$<e, t>$
BE	Asp	$<\lambda t\ BE(p_j,t),\ \{p_j\}>$	$<i,t>$
BECOME	Asp	$<\lambda t'\lambda t BECOME(p_l, t, t'),\ \{p_l\}>$	$<i,<i,t>>$
CAUSE	Asp	$<\lambda q\lambda t\ CAUSE(t, p_{i,}\ q),\ \{p_i\}>$	$<<i,t>, <i,t>>$
HAVE	Asp	$<\lambda x\lambda t HAVE\ (t, x, p_k),\ \{p_k\}>$	$<e,<i,t>>$
ARB	N	$<\lambda\alpha[\alpha=\alpha],\ \varnothing>$	$<\tau, t>$

…

Type-Lifting operators

	Type of input	Operator	Type of output
∃: a.	$<\tau, <i, t>$	$\lambda P\lambda Q\lambda t[\exists u_\tau\ (P(u,t)\wedge Q(u)]$	$<<\tau, t>,<i,t>$, for any type τ
b.	$<\tau, <\tau', <i, t>>$	$\lambda R\lambda Q\lambda v_{\tau'}\lambda t[\exists u_\tau(R(t,v,u) \wedge Q(u)]$	$<<\tau, t>,<\tau',<i, t>>>$, for any types τ, τ'

2. Let ME= $\cup_{\tau\in T}$ ME_t and ε, ε' are meta-language variables over ME.

Then f is a function such that:

(i) $Dom(f)=\{<\varepsilon,\varepsilon'>: (\{\varepsilon(\varepsilon'),\varepsilon'(\varepsilon)\}\cap ME)\neq\varnothing\}$

(ii) if $<\varepsilon,\varepsilon'>\in Dom(f)$, then $f(\varepsilon,\varepsilon')$ is the unique element of $ME \cap \{\varepsilon(\varepsilon'),\varepsilon'(\varepsilon)\}$.

Translation system

In the following rules, α, β, γ are meta-variables over nodes, $v_{i,\tau}$ are variables of the type τ.

Core rules:

L: Let α be a lexical item of category κ, and let $<\varepsilon,\sigma>$ be a translation of α. Then $<\varepsilon,\sigma>$ is a translation of $[_{\kappa}\alpha]$.

U: Let α be a daughter of β, let $<\varepsilon,\sigma>$ be a translation of α and let any other daughter have no translation. Then $<\varepsilon,\sigma>$ is a translation of β.

F: Let α and β be daughters of γ, $<\varepsilon,\sigma>$ be a translation of α, $<\varepsilon',\sigma'>$is a translation of β, and $<\varepsilon,\varepsilon'> \in Dom(f)$.

Then $<f(\varepsilon,\varepsilon'), (\sigma\cup\sigma')>$ is a translation of γ.

E: Let e_i be an empty node with the subscript i, and let τ be a type, such that (i) or (ii), hold:

(i) e_i is a complement or specifier, α is sister to e_i, $<\varepsilon,\sigma>$ is a translation of α, and $\varepsilon\in ME_{<\tau,\rho>}$;

(ii) e_i is a plain adjunct, α is a sister to e_i, $<\varepsilon,\sigma>$ is a translation of α and $\varepsilon\in ME_{\tau}$

Then, $< v_{i,\tau}, \{v_{i,\tau}\}>$ is a translation of e_i.

Type-adjusting rules:

B: Let $<\varepsilon,\sigma>$ be a translation of α, $v_{i,\tau} \in\sigma$, ω be a type-shifting operator, and let α or a sister of α have the subscript i.

Then either (a), (b) or (c) holds:

a. $<\lambda v_{i,\tau} [\varepsilon], (\sigma-\{v_{i,\tau} \})>$ is a translation of α.

b. $<f(\lambda v_{i,\tau} [\varepsilon], f(v_{i,<\tau',\tau>}, v_{j,\tau'})), (\sigma-\{v_{i,\tau} \})\cup \{ v_{i,<\tau',\tau>}, v_{j,\tau'}\}>$ is a translation of α.

c. $<f(\omega, \lambda v_{i,\tau} [\varepsilon]),(\sigma-\{v_{i,\tau} \})>$ is a translation of α, if $\omega(\lambda v_{i,\tau} [\varepsilon])\in ME$

T: Let α and β be sisters, $<\varepsilon,\sigma>$ be a translation of α, $<\varepsilon',\sigma'>$ be a translation of β, $<\varepsilon,\varepsilon'> \notin Dom(f)$, ω be a type-lifting operator and $<\omega,\varepsilon> \in Dom(f)$.

Then $<f(\omega,\varepsilon), \sigma>$ be a translation of α.

Semantic filters

Vacuity filter: If a node has a translation, then so does any dominating node.

Root filter: The root node has a translation $<\varepsilon,\sigma>$, where $\varepsilon \in ME_t$.

Store filter: The root node has a translation whose second member is $\emptyset$.

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