

The Acquisition of Verbs at the Syntax- Semantics Interface

The Acquisition of Verbs at the Syntax- Semantics Interface:

Early Predicates

By

Paolo Lorusso

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To the memory of my father, and to my mother,
who taught me my early verbs.

TABLE OF CONTENTS

Foreword	x
Acknowledgements	xii
Introduction	1
Chapter One.....	6
The Atoms of VPs and their Acquisition	
1.0 Introduction	6
1.1 The Lexicon-Syntax Interface.....	7
1.2 Lexicalist Approaches: Levin & Rappaport Hovav	11
1.3 The Constructivist approach: Hale & Keyser	18
1.3.1 The functional version of the constructivist approach: Borer & Van Hout	23
1.4 Structural meaning and acquisition.....	29
1.5 Labeling the world through language	30
1.6 Noun and Verbs: Gentner and the Natural Partition Hypothesis ...	32
1.6.1 An overview of the timetable of lexicon-appearance in acquisition: nouns before verbs	36
1.6.2 The appearance of verbs and the lexical spurt.....	39
1.7 The bootstrapping of argument-structure.....	41
1.7.1 Semantic Bootstrapping (Pinker)	43
1.7.2 Syntactic Bootstrapping (Gleitman)	46
1.8 Acquisition at the Interface	51
Chapter Two.....	54
Early Subjects and Verb Classes	
2.0 Introduction	54
2.1 The distribution of overt subjects in non-pro-drop languages	55
2.1.1 Grammatical accounts	56
2.1.2 Grammar-External Accounts.....	60
2.1.3 Informational-Structure Accounts	62
2.2 Background studies on the distribution of overt subjects in Italian ..	64
2.3 Null subjects in a corpus of spontaneous speech	67
2.3.1 Corpus	67
2.3.2 Coding.....	69

2.3.3 General data.....	70
2.3.4 Longitudinal data.....	72
2.3.5 Null Objects.....	75
2.3.6 Number of Arguments.....	80
2.3.7 Discussion	82
2.4 L-syntactic distribution of overt subjects	84
Chapter Three	89
Linearization and Overt Subject-Position	
3.0 Introduction.....	89
3.1 Subject position and scope-discourse semantics.....	91
3.2 The position of the overt subject in the corpus	97
3.2.1 General data	97
3.2.2 Longitudinal data	99
3.2.3 Discussion	102
3.3 A comparative view of the spell-out domain and linearization....	106
3.3.1 Cross-linguistic evidence	108
3.3.2 Clitic-doubling parameters	111
3.3.3 Aphasic Data	112
3.4 Post-verbal subjects	114
3.4.1 Post-verbal subjects with unergatives.....	115
3.4.2 Post-verbal subjects with unaccusatives.....	117
3.5 Pre-verbal subjects	122
3.5.1 Pre-verbal subjects with unaccusatives	126
3.5.2 A challenge to the unique-phase requirement	128
3.6 Verbs at the interface of acquisition.....	131
Chapter Four.....	134
A Few Remarks on Auxiliaries and Structural Meaning	
4.0 Introduction	134
4.1. The Appearance of Aspect	136
4.1.1. A Few Notes on Aspectual-Tense Interpretation in Italian...	142
4.2. Auxiliary-Selection and Structural Meaning.....	146
4.2.1. Syntactic Account: The Unaccusative Hypothesis	148
4.2.2. Lexical Features and Aspectual Meaning.....	150
4.2.3. Children's Auxiliaries in the Italian Corpus.....	152
4.3. The Developmental Pattern in the Production of Aspectual	
Auxiliaries	158
4.3.1. Acquisition of Aspect	162
4.3.2. Production Task.....	166
4.3.3. Discussion	174

4.4. Comprehension of Semantic Features in Compounds	175
4.4.1. Experiment	175
4.4.2. Results	177
4.4.3. Discussion	181
4.5. Encyclopedic Semantic Features vs. Compositional Lexical Aspect.....	184
4.7. Concluding Remarks: Interface Effects in the Developmental Pattern	187
Chapter Five	189
Conclusion: Acquisition at the Interface	
5.0. Introduction	189
5.1. Lexical-Syntactic Verb Classes	190
5.2. Bootstrapping Verb-Meaning	194
5.3. Mapping the complexity of the world at different stages.....	195
5.4. Building Interface-Relations	197
5.5. Epilogue	198
References	199
Appendix 1	218
Appendix 2	242

FOREWORD

An issue in the study of language acquisition that has attracted much attention is the nature of early verbs. At around the age of 2 years, children start to combine words and produce their first verbs. Verbal items appear later than nouns and refer to the relational concepts in the world that are represented in syntax through argument-structure. This book discusses the results I collected for analysis in my PhD dissertation, which I discussed in 2014 at the Universitat Autònoma de Barcelona. My aim was to examine the features of first verbal productions in the Italian language. Since the appearance of verbs implies the mastery of a mapping procedure between syntactic positions and semantic roles, the topic under examination has consequences not only for describing the timeline of lexicon-acquisition, but also for the definition of a general model of the interface between syntax and lexical-semantics in the early stages. The proposal is that syntactic-semantic features are at work early in children's grammar when determining clausal derivation.

Verbs involve structural and idiosyncratic meaning: while structural meaning is derived from the few syntactic frames (the number and features of the arguments) in which a verb can appear, idiosyncratic meaning is given through the relationships in the world that each verbal root denotes. The architecture of the syntax-semantics interface for verbs implies a mapping procedure from a few syntactic frames to many relationships in the world and/or *vice versa*.

The structural meaning of early verbs is explored through an analysis of the distribution of the overt arguments and the auxiliaries in a corpus of spontaneous speech of children and adults. The results will show that the lexical classes of verbs influence the distribution of null subjects and the choice of the position in which the subjects are expressed in the sentences. Verb classes also seem to be at work in the selection and the distribution of the auxiliaries: children properly select auxiliaries depending on the lexical-syntactic information encoded in the VP-layer.

At the age that their first verbs appear, children are simultaneously learning the syntactic derivations that involve the IP and CP layers. Some

differences between children's and target grammar are found in the syntactic domains used for the spell-out at the syntax-phonology interface: a lower initial spell-out domain may not favor the derivations of high clausal positions where scope-discourse semantic features like topic and focus are checked.

Two experimental tasks were designed to observe the effects of the presence of an overt object in the VP in determining an aspectual reading. The interaction between the perfective aspect encoded in the present-perfect (*passato prossimo*) and the lexical aspect of the VPs is investigated in the production and comprehension of perfective compound tenses. The results show that children do not use the present-perfect with all verbs, like adults. The aspectual information encoded in the VP – both the structural meaning linked to the projection of the objects and the idiosyncratic meaning of the verbal root – influences children's understanding of aspectual perfective morphology until the age of 7.

The main conclusions of this work show that the relationships at the syntax-semantics interface are already well established by the time children utter their first verbs. These relationships influence the pattern of the distribution of overt/null arguments, the clausal derivation of the scope-discourse semantic position, and aspectual interpretation. While we cannot determine whether the first verbs are bootstrapped by semantic or syntactic representations, we can argue that both the structural and idiosyncratic meanings encoded in the VPs are at work at the different stages of language acquisition.

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INTRODUCTION

This book is about the characteristics of early verbs in the acquisition of Italian. The verb is a member of the morpho-syntactic class of words that: typically signals events and actions; constitutes, alone or in a phrase, a minimal predicate in a clause; governs the number and types of other constituents which may occur in the clause; and in inflectional languages may be inflected for such specifications as number, person and tense. The appearance of the first verbal items determines an increase in the complexity of the produced utterances: children start to put together words and enlarge the size of their vocabularies (Bates, Dale and Thal, 1995). While in the previous stage, children use nouns to individuate some referents in the world, by introducing verbs into their productions, they are able to refer to the relationships between these referents (Gentner, 1982). So, verbal items involve particular types of referential items, and the structural information that allows the creation of complex sentences, to be introduced into language. But do first verbs denote the same structural and referential properties in the grammar of both children and adults? And do the characteristics of early verb structures change across the different stages of language acquisition? The aim of this work is to address these questions through the analysis of natural data about the syntactic and lexical-semantic features of the first verbal utterances.

The first step in examining the features of early verbs is defining the relationships that exist between lexical semantics and syntax in verbal phrases. Verbs describe events but they require participants of varying types (depending on the event being described) in order to properly depict a particular scene and form a grammatical sentence. These participants are the arguments of the verbs. *Break* is a verb that needs only one argument to form a grammatical sentence. In (1) the noun phrase, *the window*, is the argument of *break*, which describes it as having undergone a specific kind of change.

(1) The window broke.

Break can also describe a complex event where an entity causes a change to an object.

(2) John broke the window

While *John* in (2) is an *agent* and the initiator of the action, *window* in (1) and (2) is the *patient* or the *undergoer* – the entity undergoing the effect of some action. These semantic roles are mapped onto syntax: agents are usually mapped onto subject positions and the undergoers onto object positions. The phenomena involved in the mapping between semantic roles and overt syntactic positions are commonly defined as the relations at the lexicon-syntax interface. In Chapter 1, we will review some influential models proposed in the literature to account for the mapping between the lexical meanings and the syntactic structures. We will describe the relations at the lexicon-syntax interface as involving two types of meaning: the structural-verb meaning, which refers to the syntactic environment in which a verb is uttered; and the idiosyncratic meaning, which refers to the relational concept encoded in the verbal root. How structural and idiosyncratic meanings intervene in the acquisition of the lexicon is the topic of the second part of Chapter 1, where we provide a timetable of the acquisition of the lexicon. The differences in the lexical-syntactic mapping procedures for nouns and verbs determine varying mechanisms of acquisition: respectively, a world-to-word mapping and a sentence-to-world mapping (Gleitman, 1990). Depending on whether we assume either lexicon or syntax to be responsible for the bootstrapping of verb meaning, we can have two developmental proposals for the process of acquisition: semantic or syntactic bootstrapping, respectively.

We perform an analysis of the structural characteristics of early VPs and their longitudinal development, based on a syntactic and semantic review of how the arguments are projected by each verb class: we provide the data from a corpus of spontaneous speech and two experimental tasks.

The clausal subjects are analyzed in their occurrences with different lexical verb classes: verbs differ in the loci of subject-generation. While unaccusative subjects are generated in an internal position and are generally understood as patients/undergoers, unergatives and transitives project subjects in a vP external position and are interpreted as agents/initiators. These lexical-syntactic features of the subjects influence the pattern of omission: external arguments seem to be more likely to be omitted than internal subjects. Since Italian is a pro-drop language and null subjects are licensed by the rich agreement-morphology in verbs, the omission of the subjects has generally been accounted for in terms of informational structure (Serratrice, 2005). In Chapter 2, we propose an analysis of spontaneous speech: the results show that children omit a

slightly higher number of subjects than adults do, and the null subjects are crucially linked to the structural position of external arguments. The loci of subject-projection within the VP influence the distribution of subjects in spontaneous speech and inform us that the structural meaning of verbs is already at work in determining the pattern of the distribution of the overt/null subjects. A grammatical account based on the I-syntactic structure of first verbs can back up the informational-structure account of subject-omission in Italian: informational structure, in fact, works within the boundaries of grammar.

In Chapter 3, overt subjects found in spontaneous speech are further analyzed for their position in overt syntax, to see whether they are pre-verbal or post-verbal. The loci of subject-generation within the VP-layer, once more, influence the position of overt subjects. While external arguments are produced in a preferential pre-verbal position, internal arguments are more likely to be uttered post-verbally. The scope-discourse semantic features checked in the IP, trigger this pattern of linearization: post-verbal subjects in Italian represent new information and are checked in a low FocusP in the IP layer (Belletti, 2001, 2004), or in the VP-layer in the case of unaccusatives. Internal arguments are, usually, patients or undergoers. They are inherently linked to the event denoted by the verb at the lexicon-syntax interface and typically encode new information: internal arguments in both adults' and children's data are more likely to be produced post-verbally. The comparison between the distribution and the position of overt subjects suggests that children tend to omit more external arguments (preferentially SV) than internal arguments (preferentially VS): they produce more overt subjects with unaccusatives since there are two available positions for post-verbal subjects (Belletti, 2004; Bianchi & Belletti, 2014). Adults do not show this pattern since they omit more with transitives. We argue that the differences found between adults and children are not linked to an erroneous mapping between lexical semantics and syntax, but to an early-production limitation that intervenes at the spell-out in phonology: the derivation of clausal subject to higher position in the IP/CP might be limited by a lower spell-out domain at the early stage (Friedman and Costa, 2009, 2011).

The effects of the distribution of overt objects are considered in Chapter 4. The projection of direct objects has a relevant role in the attribution of the lexical aspect of the VPs' event-structure: in Italian, the presence of an overt object (internal argument) triggers a telic aspectual reading of the event denoted in the VP-layer. Telicity, in fact, can be determined compositionally through an internal argument (structural

meaning), or directly by the aspectual features of the verbal head (idiosyncratic meaning). The aspect encoded in the VPs interacts with the aspectual properties of the auxiliary morphology of the perfective forms of present-perfect (*passato prossimo*). We checked the relationship between the projection of an overt object and the distribution of perfective auxiliaries for our general purposes of describing the structural verb-meaning at work in children's Italian. We observed, in the corpus of spontaneous speech, that there is a delay in children producing their first perfective forms with unergatives. We designed two experimental tasks to check the role of direct objects in an analysis of aspect in early Italian. The first experiment was a production task in which children were forced to use perfective morphology with all verb classes (with or without overt objects). The second experiment was a comprehension task in which children had to interpret the perfective reading encoded in the present-perfect (*passato prossimo*) across verb classes: once more the variable was the presence of an overt object in the VPs. The results show that, until the age of 7, children link the perfective aspectual reading mainly to compositional telicity – to the projection of an overt object. Nevertheless, in a few cases, they also refer to the idiosyncratic meaning of verbs in order to assign a perfective reading. These findings suggest that both the structural meaning and the idiosyncratic meaning are at work in language acquisition in determining the distribution of aspectual morphology, but in the very early stage we can find a pattern crucially linked to the presence of an overt object. From our perspective, the effects of the structural and idiosyncratic meaning at the lexicon-syntax interface are found at different rates in the entire process of Italian-acquisition. The non-adult-like behaviors are linked to the interaction with functional projections outside the scope of the lexicon-syntax interface. The verbs, from their very first appearance, seem to be projected with the proper syntactic and semantic information.

These findings provide a partial answer to the two main questions we formulated at the beginning of this section.

The first question was about differences in the structural and referential properties of verbs in children's and adults' grammar. We can suggest that children project verbs at the lexicon-syntax interface in an adult-like way. The primitive elements at work in determining the verb-meaning seem to be properly employed: the distribution of subjects, the projection of objects, and the idiosyncratic meaning of the lexical verbal root. The non-adult-like behaviors are restricted to derivations involving either functional projections higher than VPs in which scope-discourse semantic features

are checked, or lexical-syntactic classes that are not used frequently in the context of acquisition (parents' stimuli).

The second question was about the characteristics of verbs during the different stages of acquisition. We can suggest that verbal I-structures do not differ in the different stages of acquisition, but the overt realization of the structural meaning and its interpretations varies at different periods. In Chapter 5, we propose a longitudinal analysis of our findings in which we identify different stages of acquisition. At each stage, children's performances can be accounted for in terms of adjustments in fulfilling the requirements of the scope-discourse semantic interface, and in the aspectual interpretation of the event-structure.

CHAPTER ONE

THE ATOMS OF VP AND THEIR ACQUISITION

1.0 Introduction

Verbal items are heads of maximal projections that determine the creation of chunks made of different constituents, and which operate at various interfaces: lexicon, argumental and scope-discourse semantics, and phonology. These items obviously differ from other morpho-syntactic classes such as nouns. A noun is a member of a class that includes words that refer to people, places, things, ideas, or concepts. Nouns are selected by the predicates of the sentences and in inflectional languages may agree in number and/or gender with the verbs. So, sketchily, while nouns refer directly to an object (or an abstract entity) in the world, verbs refer to the event-types that are undergone by one or more of the objects in the world. These minimal semantic features of verbs are mapped onto syntax in different ways. We find verbs that represent events in which a given object or entity in the world performs an action or activity, such as in (1), or in which an object undergoes a process or a movement described by the verb, such as in (2).

- (1) The clown plays the guitar
- (2) The train arrived at the station

The verbs in (1) and (2) show different syntactic features. For example, *play* in (1) can be used in a passive sentence like (3), while the verb *arrive* cannot undergo the same process of passivization, as in (4).

- (3) The guitar was played by the clown
- (4) *The station was arrived by the train

So, intuitively, we can see that the semantic features play a relevant role in determining the syntactic properties of a verb. How, then, are the semantic features of a verb organized or linked to syntax? Different proposals have been put forward. This chapter is devoted to providing an overview of the

analyses that can be found in different theoretical frameworks, in order to account for the diverse semantic values and their surface overt-syntactic behavior. After classifying the semantic and syntactic features involved in verb structures, we will review the analyses that have been proposed for their acquisition.

In the first sections, we will highlight the differences between frameworks in the way they account for the relationship between lexicon and syntax. We will use Marantz's (2013) categories: the lexicalist approaches that claim that verbal syntactic structure is projected from a structured lexicon (section 1.2), and the constructivist approaches that claim verb-meaning is read from syntactic structure (section 1.3). Each approach makes different predictions about acquisition (section 1.4), which will be the main topic of the following part of the chapter.

In the following sections, we will analyze the conceptual differences between nouns and verbs (section 1.5), describing Gentner's (1982) generalization (section 1.6), and reporting data in which nouns and verbs are seen in the process of acquisition (verbal elements are acquired later than nominals). In section 1.7, we will describe two proposals that are in the literature about the bootstrapping of verb-meaning: semantic bootstrapping (Pinker, 1994), and syntactic bootstrapping (Gleitman, 1990).

The purpose of this chapter is to provide the theoretical background upon which our analysis of structural verb-meaning in acquisition will rely.

1.1 The Lexicon-Syntax Interface

The background to this work is the general and complex task of acquiring a language. When we learn a language, we learn to match a physical acoustic element (the phonological string) with different levels of linguistic representation in our brain. In detail, we refer to a lexicon-syntax interface that holds the relations between lexical items and their pre-syntactic structures. Verbs and arguments represent the principal items which are at work at this interface. Different types of analysis of these relations are available in the literature. We will sketch them using

theoretical tools from both the ‘government and binding’ and ‘minimalism dialectic’ perspectives.¹

Current understanding of argument structure within linguistics has incorporated the results of various lines of exploration that Marantz (2013) divides in two big groups: the lexicalist and constructivist traditions. Lexicalist approaches are linked to the theoretical insights that started with Chomsky’s ‘Remarks on Nominalization’ (1970): verbs are stored in the lexicon as items that project syntactic structures from the argument structures associated with each of them. Constructivist approaches, in Marantz’s classifications, are the ones linked to the work of Hale & Keyser (1993, 2002). They emphasize the role of syntax in constructing the meanings traditionally attributed to argument structure.

Lexicalist approaches rely on the general assumptions of Chomsky’s (1981) framework of ‘government and binding’. The argument structure (or sub-categorization frame) of a given morpho-syntactic item consists of the number and type of elements that are selected from a lexical item. For example, a transitive verb like *break* in (5) has an argument structure in which two elements are selected: the agent (John) and the object that undergoes the action represented by the verb (the vase).

(5) **John broke the vase**

The syntactic realization of thematic roles in argument structure is constrained and secured by the projection principle and the θ -Criterion (Chomsky, 1981), for which the representations at a syntactic level are projected from the lexicon, each of them bearing only one thematic role (and each thematic role being assigned to only one syntactic position) in the optic of the uniformity of theta assignment hypothesis (UTAH), proposed by Baker (1988), as shown in (6).

(6) Uniformity of Theta Assignment Hypothesis

Identical thematic relationships between items are represented by identical structural relationships between those items at the level of D-Structure.

(Baker 1988: 46)

¹ For an overview of the model of the grammar of ‘principles and parameters’ we refer to Chomsky (1981); for the minimalist program we refer to Chomsky (1993, 1995, 2001).

Within constructivist approaches, Hale & Keyser (2002) propose a syntactic lexical primitive structure that they call the lexical-syntactic structure (LSS). An LSS is a representation of argument structure in the form of a head that projects its category to the phrasal level and determines, within that projection, structural relations with its arguments (its complement and, if present, its specifier). Hence, the notion of argument structure by which verbs are lexically characterized is a syntactic entity, characterized by syntactic structures which are projected by lexical heads.

The model of verbs' representation put forward by Hale & Keyser (1993, 2002) is based on the assumption that the predicative categories are associated with syntactic structures referred to as *l-structure* (lexical structure). The eventive properties of predicates are syntactically decomposed.² These syntactic structures go under the name of *l-syntax*, in order to distinguish them from the syntax of the entire sentence referred to as *s-syntax*,³ such as TP and the other functional categories responsible for overt clausal realizations, like FocusP or TopicP.

Within the grammatical architecture of Chomsky's minimalist program (1993, 1995), syntax is the sole generative engine of grammar. Although the semantic and phonological representations of sentences are subject to their own constraints and principles, and are constructed with units appropriate to the interfaces with meaning and sound, they are dependent on syntax for their hierarchical and compositional structure. The smallest syntactic domains available at the semantic-phonological interface are the phases — structures that are interpreted cyclically. So, in a model in which syntax determines the basic relationships between the chunks of grammatical information to be sent at the interface, the 'late insertion' of lexical elements is also an available option, as in the account of distributed morphology (Halle et al., 1993). The minimalist architecture of grammar seems to be more compatible with constructivist approaches, in which

² Marantz [2013: p.153, fn.1] points out: 'Crucially important to the contemporary move from the theta roles to event structure was the work of Jackendoff (e.g., 1987), who identified theta roles with positions in the primitive predicates into which verb meanings would decompose, and Hale and Keyser (e.g., 1993), who "syntacticized" the event structures that Jackendoff identified as lexical properties'.

³ We will come back to the interaction between the *l-syntax* of verbs and overt *s-syntax* in Chapter 3.

syntax has a core role in determining the environment in which lexical items can be inserted through the operations of feature-checking.

Both types of approaches agree that verb-meaning is built up from the interaction between the syntactic frame in which the verbs are found, and the verbal root as it is stored in the lexicon. Although different proposals have been developed in order to account for verb-meaning, all of them share a common insight: ‘there are “constructional” meanings which are independent of the particular lexical items that make up the sentence’ (Zubizarreta and Oh, 2007: 1).

The notion of constructional meaning varies across theories. This variation is linked to whether constructional meaning is stored in the lexicon or is built up syntactically. The common insight is that there are structures that carry meaning. This is what we refer to as the structural verb-meaning; it is the meaning that is shared by verbs of the same class. For example, the part of meaning which is common in the sentences in (7). We refer to them as ‘closed class items’ (since they are in every language), like prepositions, conjunctions and determiners.

- (7) a. Sara eats a lot of food
 b. Sara drinks a lot of water

The difference between the two sentences is provided by the two verbal roots, *eat* and *drink*. What is involved in *eat* and *drink*, regardless of the syntactic frame in which they are found, is what we refer to as the idiosyncratic meaning. We can refer to them as ‘open class items’. Their root is given in a target language: although they may appear in different syntactic frames, they may vary across languages or within the same language diachronically. Their existence is almost arbitrary.

With respect to our proposal, the atoms of verb-meaning are, on the one hand, structural verb-meaning and, on the other hand, idiosyncratic verb-meaning. Before introducing the problems of the acquisition of verbs, we will present the lexicalist approach of Levin and Rappaport Hovav (1995) and Rappaport Hovav and Levin (1998), in which structural meaning is given in the lexicon (section 1.2), and two constructivist approaches in which structural meaning is read-off from the syntactic structure of the event denoted by the verb (section 1.3) – the classical I-syntactic approach inspired by Hale and Keyser (1993, 2002); and the ‘functional’ approach of Borer (1994, 2005) or Van Hout (1998), which states that all structural meaning is given in syntactic functional-heads.

1.2 Lexicalist Approaches: Levin & Rappaport Hovav

Verb classes are distinguished according to the type of arguments they project in overt syntax. Burzio (1986) identifies two classes of intransitive verbs. With unergative verbs (8.a), the single argument bears the agent theta role, which is understood as the doer of the action and is projected in an external-argument position. With unaccusatives (ergatives in Burzio's terms), the single argument bears the theme theta role; the subject is understood as the undergoer of the action and is projected in an internal-argument position, as in (8.b).⁴

(8) a. **Unergative Verb:** NP_[VP V]

b. **Unaccusative Verb:** ______[VP V NP/CP]

(9) a. Paul eats (unergative verb)

b. Paul arrives (unaccusative verb)

Intuitively, we can see that while the external-argument in (9a) is the 'performer' of the action, in (9b) the argument undergoes a process described by the verb, *arrives*. We can add the transitive verb class that projects two arguments: an agent/doer projected in an external-argument position, and a theme/undergoer projected in an internal-argument position, such as in (10) and (11).

(10) **Transitive Verbs:** NP_[VP V NP/CP]

(11) Paul buys two apples. (transitive verb)

The different loci of argument-generation for each verb class account for various syntactic phenomena. The argument of the unaccusatives shows a syntactic behavior similar to the object of transitives, while the argument of unergatives shows a syntactic behavior similar to the subject of transitives.

Following the statements of the UTAH, we would expect that analogous syntactic positions share a one-to-one mapping onto thematic roles – external-arguments would correspond to agents, while internal-

⁴ Burzio's generalization in its original formulation states that a verb can assign a theta role to its subject-position if (and only if) it can assign an accusative case to its object. Accordingly, if a verb does not assign a theta role to its subject, then it does not assign accusative case to its object.

arguments would correspond to themes. Anyway, the only aspect of the various mapping universals that is universally agreed-upon is that agents appear in the subject-position in all languages. No other thematic role behaves quite so predictably. Thus, the theme (the element affected by the predication of the verb) can appear in the subject or object position, and the experiencer (the element that experiences the state predicated by the verb) can appear in the object, subject or indirect positions in psychological verbs, as shown in Belletti & Rizzi (1988).

The lexicon, in fact, can be seen as the domain of idiosyncrasies across and within languages. Children acquiring a language should create a rule for each verb – a very heavy and slow computational operation. Levin and Rappaport Hovav propose a structured lexicon where variability is reduced via some structured templates.

In their publications (Levin and Rappaport Hovav, 1995; Rappaport Hovav and Levin, 1998), Levin and Rappaport Hovav propose a lexical decomposition, directly in the lexicon, in which both aspects of verb-meaning are encoded. The idiosyncratic meaning is given in terms of constants – the phonological string of each verb. On the other hand, the structural meaning is given by a small number of lexical-semantic templates formed via the combination of:

- *Primitive predicates* such as ACT, CAUSE, BECOME and STATE.
- *The modifiers* of the primitive predicates, such as MANNER and INSTRUMENT.
- The variable number and characteristics of the arguments.

The meaning of a verb results from the association of a constant with a particular lexical-semantic template – the ‘event-structure template’. In (12), we give the basic inventory for the ‘event-structure template’: Levin & Rappaport Hovav identify Vendler’s (1957) classification of events into states, activities, accomplishments, and achievements.⁵ The constants or

⁵ Vendler’s (1957) classic four-way classification. All verbs can be classified as denoting states, activities, achievements and accomplishments. We define them following Rosen’s (1999) analysis in (1) - (4).

- (1) *Activities*
 Events that go on for a time, but do not necessarily terminate at any given point.
 E.g. *Terry walked for an hour.*

open-class items, are drawn from a fixed ontology (e.g. manner, instrument, state, etc.) and are represented within the angle brackets of the event template. Each constant is also associated with a name (i.e. a phonological string).

- (12) a. [*x* ACT<*MANNER*>] (activity)
 b. [*x* <*STATE*>] (state)
 c. [BECOME [*x* <*STATE*>]] (achievement)
 d. [*x* CAUSE [BECOME [*y* <*STATE*>]]] (accomplishment)
 e. [[*x* ACT<*MANNER*>] CAUSE [BECOME [*y* <*STATE*>]]]
 (accomplishment)

(Rappaport Hovav and Levin, 1998:108)

Furthermore, they propose the ‘canonical realization rule’, for which each minimal element of meaning encoded in the constants has to be syntactically expressed. Each lexical-event structure is realized

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- (2) *Accomplishments*
 Events that proceed towards a logically-necessary terminus.
 E.g. *Terry built two houses in one year.*
- (3) *Achievements*
 Events that occur at a single moment and therefore lack continuous tense.
 E.g. *The vase broke.*
- (4) *States*
 Non-actions that hold for some period of time but lack continuous tenses.
 E.g. *Terry knows the answer.*
 ?? *Terry is knowing the answer.*

As (4) shows, another factor is relevant in describing the events encoded in a verb: the tense in which the verbs appear. We can see that *states* (4), for example, cannot appear with continuous form. The interaction-interface effects between the grammatical features of the tense system and the event structure of a verb will be addressed in Chapter 4, when we will discuss the acquisition of the compound tense forms.

syntactically through two well-formedness conditions: the *sub-event identification condition* (13) and the *argument realization condition* (14)

(13) Sub-event Identification Condition

Each sub-event in the event structure must be identified by a lexical head (e.g. a V, A or P) in the syntax.

(14) Argument Realization Condition

a. There must be an argument XP in the syntax for each structure-participant in the event structure.

b. Each argument XP in the syntax must be associated with an identified sub-event in the event structure.

The argument realization condition is a version of Levin & Rappaport Hovav's theta criterion, stated by Chomsky (1981), in which each theta-role (argument) is borne by something in the syntax, in a one-to-one relation.

The event structure templates are then projected onto syntax through some linking rules: they determine which participants in the event template are linked with which grammatical functions in the syntax. Levin and Rappaport Hovav (1995) proposes two basic linking rules:

(15) Immediate Cause Linking Rule (ICLR)

The argument of a verb that denotes the immediate cause of the eventuality denoted by the verb that is its external argument.

(16) Direct Change Linking Rule (DCLR)

The argument of a verb that denotes an entity undergoing a directed change, denoted by the verb, is its internal argument.

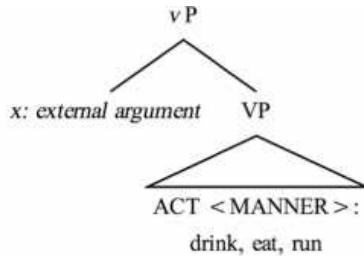
ICLR states that when we have an agent in the lexical event structure, it will be projected onto syntax as an external argument. Conversely, when we deal with a theme or patient, we will have (in overt syntax) an internal-argument, as follows from DCLR.

Unergatives are mono-argumental verbs that only project external-arguments. They are projected onto syntax through the immediate cause-linking rule. Unergatives are mostly activities, like *run*, *eat*, and *drink*, and

they will have the event-structure template in (12a), where the constants refer to the sub-event ACT. Since x is the immediate cause of the eventuality denoted by the verb, for the ICLR we will find (in the syntax) an external-argument in the specifier position of a functional vP head, as in (18).

(17) [x ACT<MANNER>] (activity)

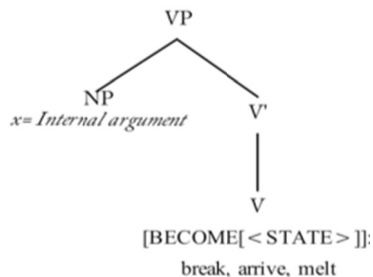
(18) Unergative verb of activity



In the case of unaccusatives, the internal object projected in the syntax is an x entity, which undergoes a directed change denoted by the verb, as in (16). The majority of unaccusatives denote, in fact, achievement-events (19). Verbs like *break* and *melt* (and verbs like *arrive*), in which the constant STATE implies a locative or a path, project an internal-argument in the syntax, as in (20). The nominal argument x undergoes a change denoted by the sub-event BECOME STATE.

(19) [BECOME [x <STATE>]] (achievement)

(20) Unaccusative verb of achievement



The same is true for the projection of transitive verbs that are accomplishments in sentences, like *Paul melted the ice*, where *Paul* is

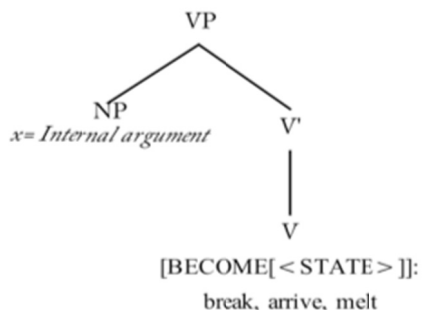
what causes the accomplishment. The argument that is an entity that undergoes a change is projected as an internal-argument for (16), while the one that is the cause is projected as an external-argument for (15). Verb constants, like *melt* or *break*, in their causative transitive versions have a syntactic structure, like (22). Two types of causative events are recognized: internally-caused (*bloom*, *rot*, *rust*, *sprout*) are associated with the template in (21a); and externally-caused (*break*, *dry*, *melt*) are associated with the template in (21b).

(21) (Causative accomplishments)

a. [*x* CAUSE [BECOME [*y* <STATE>]]]

b. [[*x* ACT<MANNER>] CAUSE [BECOME[*y* <STATE>]]]

(22) Transitive (causative) accomplishments



There is, anyway, no full coincidence between the verb classes of Burzio and the typical event-structure template of Levin and Rappaport Hovav:

- Not all transitives are (causative) accomplishments.
- Not all unergatives are activities.
- Not all unaccusatives are achievements.

We will not review all these cases of L&RH mapping rules, but there is a high variability in the type of event-structures that lay behind a few of the syntactic frames.⁶ We find verbs with alternating behaviors. For

⁶ They also formulate an extra linking-rule for all the arguments that cannot be put forward by the *ICLR* and *DCLR*. The default linking rule states that: ‘an argument of a verb that does not fall under the scope of the other linking rules is its direct