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Tolga KAYADELEN

YÜKSEK LİSANS TEZİ

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Danışman
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Mersin Üniversitesi, Sosyal Bilimler Enstitüsü Müdürlüğüne,

Tolga KAYADELEN tarafından hazırlanan *Plurals, Mass Nouns, and Telicity in Turkish* başlıklı bu çalışma, jürimiz tarafından İngiliz Dili ve Edebiyatı Anabilim Dalında YÜKSEK LİSANS TEZİ olarak kabul edilmiştir.

Başarılı	Başarısız		
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Onay

Yukarıdaki imzaların, adı geçen öğretim elemanlarına ait olduklarını onaylarım.

... / ... / 20..

Prof. Dr. A. Nükhet ADIYEKE

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ÖZET

Bu çalışmanın genel amacı Türkçe'de sözlüksel görünüş yapısına bütüncül bir yaklaşım sunmaktır. Çalışma özellikle sözlüksel görünüş kavramlarından biri olan hedefte-bitişlilik kavramının çoğulluk ve sayılamazlık kavramlarıyla ilişkisini irdeler.

Çalışmanın vurguladığı temel bir nokta doğal dilde adsal alan ile eylemsel alan arasındaki paralelliklerdir. Her iki alandaki bazı anlambilimsel ayrımların, sadece anlambilimsel tekillik ve anlambilimsel çoğulluk ayrımına indirgenebileceği savunulur. Anlambilimsel tekillik ve çoğulluk ayrımı, adsal alanda tekil ve çoğul adları ayırmanın yanı sıra, grup gönderimli ve dağılımsal okuma alan adları birbirinden ayırır. Ayrıca, sayılamaz ve salıyabilir adlar arasındaki farklılık da bu anlambilimsel ayrım tarafından belirlenir. Çalışma, grup gönderimli adların ve sayılabilir adların anlambilimsel olarak tekil, sayılamaz adların ve dağılımsal okuma alan adların ise anlambilimsel olarak çoğul olduğu görüşünü benimser.

Eylemsel alanda ise, anlambilimsel tekillik ve çoğulluk görünüşsel yapıya göre belirlenir. İçsel olarak hedefte-bitişli eylemler sözlükçeden [+tekil] olarak gelirlerken, içsel olarak hedefte-bitişsiz eylemler ise [+çoğul]dur. Bunun yanı sıra, bazı yüklemler belirsizdir ve bu yüklemlerin [+tekil] veya [+çoğul] yorumu eylemin eylem öbeğindeki dolaysız nesne ile kuracağı anlambilimsel ilişkiye göre belirlenir. Bu ayrım ışığında, görünüşsel eylem sınıflarından Aktiviteler çoğul, Olmalar tekil ve Tamamlamalar belirsiz olarak tanımlanır.

Son olarak, tümce düzeyinde hedefte-bitişliliğin anlambilimsel tekilliğin bir yansıması olduğu savunulur. Hedefte-bitişlilik anlambilimsel olarak [+tekil] değere sahip bir yüklemin, anlambilimsel olarak [+tekil] üyelerle birleşiminden doğar. Buna göre, hedefte-bitişli bir tümcede çoğul adlar ve sayılamaz adlar tür-değiştiren anlambilimsel

işlevler aracılığıyla [+tekil] okuma alırlar. Bütün bunların ışığında, çalışma Türkçe'de hedefte-bitişlilik kavramının görünümlerini bütüncül bir biçimde açıklamayı hedefler.

Anahtar Kelimeler: Anlambilimsel tekillik, anlambilimsel çoğulluk, hedefte-bitişlilik, sözlüksel görünüş.

ABSTRACT

This study is primarily concerned with aspectual composition in Turkish. Although some work has recently been done on lexical aspect in Turkish, none have directly investigated the interaction of lexical aspectual feature of telicity with plurality and mass nouns. This study aims to fill this gap.

An important area of investigation is the parallelism between the domain of events and the domain of individuals. It is argued that a number of semantic distinctions both in the nominal and verbal domains can be reduced to a distinction between semantic singularity versus semantic plurality. Apart from distinguishing singular count nouns from plural nouns in the nominal domain, semantic singularity/plurality separates sum-denoting individuals from group-denoting individuals, and mass nouns from count nouns. Count nouns and groups are semantically singular, while mass nouns and sum-denoting individuals are semantically plural.

On the other hand, it is argued that in the verbal domain semantic singularity and semantic plurality are aspectually defined. Inherently telic predicates come out of the lexicon with a [+singular] value, while inherently atelic predicates come with a [+plural] value. Some predicates are underspecified and they get their value as a result of the semantic interaction between the noun phrase and the verb inside the verb phrase. The underspecified class corresponds to accomplishments, while the singular class is achievements and plural class is activities.

Finally, sentential telicity is argued to be an expression of semantic singularity; a predication of a semantically singular predicate to semantically singular arguments. Under telic predication, plural and mass nouns shift to semantically singular readings via type-shifting semantic operators which are either abstract or in some cases

morphologically realized. All in all, the study aims to give a unified analysis of sentential telicity in Turkish.

Keywords: Semantic singularity, semantic plurality, telicity, aspect.

CONTENTS

LIST OF LOGICAL SYMBOLS AND ABBREVIATIONS

$\wedge$	conjunction (*and*)
$\vee$	disjunction (*or*)
$\rightarrow$	material implication (*if…then*)
$\leftrightarrow$	equivalence (*if, and only if / iff*)
$\neg$	negation (*it is not the case that*)
λ	lambda operator
$\exists$	existential quantifier (*a / some*)
$\forall$	universal quantifier (*all / every*)
P	predicate
$\uparrow$	group operator
*	plurality operator[1]
| |	cardinality
ϕ	propositional function
d	type of an individual
e	type of an event
D	domain of individuals
^{D}	distributivity operator
x, y, z, a, b, c	individual variables
{ }	sets
<a, b>	ordered pairs of elements
>	is greater than

[1] We will use the symbol "*" both to mark plurality and to mark the ungrammaticality of sentences. The context will distinguish the two from one another.

$\neq$	is not equal to / does not entail
$\leq$	part of relation
$\subseteq$	subset relation
$\subset$	proper subset relation
aOb	a overlaps b
$\cup$	sum-formation / set-theoretical union
$\cap$	set-theoretical intersection
<1, U>	one unit of x
τ	time
t_i, t_{ii}, t_{iii}	variables representing points in time
σ	supremum operator
M-ATOM	measured-atom
MEAS	measure function
MAX.	Maximality
BECOME	become event
V	verb
VP	verb phrase
N	noun
NP	noun phrase
BN	bare noun
LCS	lexical conceptual structure
DS	deep structure
vs.	versus
Coll.	Collective

Dist.	Distributive
AIH	Aspectual Interface Hypothesis
AG	Agent
TH	Theme

INTRODUCTION

This study follows the semantic tradition which investigates the relationships between the temporal domain and the spatial domain in natural language. The main area of research is aspect and its interaction with plural and mass nominals. More particularly, the study investigates the relationship between one aspectual property – telicity – with plurality and massness through Turkish data.

The term "aspect" has a double life in linguistics. First of all, it differs from another temporal notion, tense, in that while tense refers to a moment in time determined by context in which the expression is used – the past or the present, for example – aspect refers to the temporal structure of the event described by the verb or the verb phrase. Furthermore, the definition of aspect has been a matter of debate for some time in linguistics literature. On the one hand, the term is used to refer to the perfective / imperfective distinction realized by inflectional morphology on verbs, especially in Slavic languages. An example of the realization of both tense and imperfective aspect can also be seen in Turkish as in (1).

(1) Ali dün saat 14:00'te ders çalışıyordu.

Tense in the example above is signalled by the morpheme -DI, which indicates the remoteness in time of the action expressed by the verb phrase to the context of utterance. The progressive -IYOR marks imperfective aspect by characterizing the event as ongoing.

Although aspectual information is indicated by verbal morphology above, this does not always have to be so. It has been found out that a lot of aspectual information is inherent in the lexical meaning of the verb itself, and/or conveyed by the interaction between the verb and the arguments. Independent of any verbal morphology, a verb has its own inherent temporal contour or structure, which provides the information of whether the

event described by the verb and/or verb phrase has a definite endpoint in time, involves a momentary or gradual change over time, or is durative without no change and endpoint defined. For example, the expression BİR RESİM ÇİZ- denotes an event that has an inherent endpoint, while an expression like KONUŞ- does not. Moreover, while both BİR RESİM ÇİZ- and BUL- are change of state predicates, in the former the change is gradual and takes time, while in the latter it is momentary.

In order to distinguish this type of verb (phrase) inherent aspectual information from aspectual distinctions related to inflectional morphology, different researchers have coined different terms. The perfective / imperfective distinction expressed by inflectional morphemes has been called the "grammatical aspect" or the "viewpoint aspect". On the other hand, aspectual information inherent to verb (phrase) has been called the "lexical aspect" (Comrie, 1976; Van Valin 1990) or *Aktionsarten*. Our study limits itself with the study of lexical aspect, and its interaction with plurality and massness.

Eventually, the discovery that verbs and verb phrases have their inherent temporal features led to the birth of aspectual verb classes, which were introduced into modern linguistics first by Vendler's (1957, 1967) seminal works, actually dating back to Aristotle's *Metaphysics*. Vendler (1957) proposed the classification of verb meanings into four aspectual categories: states, activities, achievements, and accomplishments.

States	Activities	Achievements	Accomplishments
BİL-	KOŞ-	FARK ET-	BİR RESİM ÇİZ-
İNAN-	YÜRÜ-	BUL-	BİR BİNA İNŞA ET-
SAHİP OL-	YÜZ-	KAYBET-	BİR BARDAK SU İÇ-
NEFRET ET-	İT-	VAR-	BİR MEKTUP YAZ-
SEV-	KONUŞ-	ÖL-	BİR ŞİİR OKU-

These classes are the ones that have been influential in linguistics literature since Vendler (1957), although some additions or exclusions for them have been proposed by some researchers.

The aspectual classes above have usually been distinguished from one another as to three semantic parameters: stativity, durativity, and telicity.

Stativity

Stativity describes an event that does not involve dynamicity. Predicates like SEV-, NEFRET ET-, HAYRAN OL- are static while predicates like KOŞ-, İNŞA ET-, BUL- are dynamic. In general, stativity distinguishes states from activities, achievements, and accomplishments.

Durativity

Durativity characterizes events that have duration. Activities such as YÜRÜ-, İZLE-, YÜZ- etc. and accomplishments such as BİR EV YAP-, BİR DAİRE ÇİZ- describe events that take time, and therefore they are durative. In contrast, achievements describe momentary events, therefore they are not durative. Finally, durativity is not applicable to states because states do not even involve dynamicity.

Telicity

Telicity, the main topic of this study, refers to the boundedness of an event in time. In a telic expression, the event has a specific endpoint at which it comes to an end and continues no longer. In other words, an event is telic if it goes on for a fixed length of time and ends – the question of whether that length of time is 3 seconds or 3 decades not being

important. The opposite of telicity, i.e. atelicity, refers to an event which has no such endpoint. Moreover, some other terminology has been used instead of telicity in the literature; among them are *culmination* (Moens, 1987), and *delimitedness* (Tenny, 1987, 1994). This thesis will stick to the term telicity.

Telicity distinguishes achievements and accomplishments from states and activities. A stative predicate as in (2a) and an activity predicate as in (2b) describe atelic events:

(2) a. Ali Berna'yı seviyor.

b. Ali denizde yüzdü.

The sentence (2a) describes no definite endpoint for the SEV- event. The event may continue for five days or forever; no restrictions are imposed on how long it may go on. Similarly, in (2b) the sentence does not define a finite duration at the end of which the YÜZ- event comes to an end. On the other hand, an accomplishment predicate as in (3a) and an achievement predicate as in (3b) describe telic events:

(3) a. Ali elmayı yedi.

b. Ali sandalyeden düştü.

The event described by (3a) has a definite endpoint; the event is over when the apple is consumed. (3b) describes a momentary event. Even though it takes second(s) to fall down the chair, the sentence is still telic because the DÜŞ- event is over at the moment Ali falls.

In general, the three parameters discussed give us the following feature matrix of events:

Event Types	*Static*	*Durative*	*Telic*
States	+	n/a	n/a
Activities	—	+	—
Achievements	—	—	+
Accomplishments	—	+	+

n/a: non-applicable

There are several tests that are used to check the (a)telicity of a predicate, the most common of which has been introduced by Dowty (1979: 56):

> If we can add a *for* adverbial to the sentence it is telic. If, on the other hand, we can add a *in* adverbial, then it is atelic.

This test is applicable to both Turkish and English examples:

(4) a. Allan swam for hours.

b. ? Allan swam in an hour.

c. Allan swam a mile in an hour.

d. ?Allan swam a mile for an hour.

(5) a. Cem saatlerce koştu.

b. ?Cem bir saat içinde koştu.

c. Cem bir saatte bir kilometre koştu.

d. ?Cem bir saat boyunca bir kilometre koştu.

The *for/in x time* test will constantly be used throughout this study to test (a)telicity of sentences. Some more tests which can be used in Turkish will be introduced in chapter I.

Once the notion of telicity entered into semantics, the question now was under which circumstances the sentences were telic and why. Researchers like Verkuyl (1972, 1993) and Krifka (1989, 1992, 1998) have shown that telicity is compositional, that it is a

property determined not on the basis of the meaning of the verb all the time, but on the basis of the interaction between the verb and its internal arguments. As will be shown in chapter 1, for Krifka (1989, 1992, 1998) telicity is the result of a homomorphism between the event and its theme, which is the direct object. For Verkuyl (1993), telicity is the result of the interaction between a certain kind of V – a V that has a [+ADD TO] value – with a certain kind of noun phrase – one which has the [+SQA] value. For Tenny (1987, 1994), telicity is determined in the syntax by what she calls "aspectual roles".

Although all of these researchers have emphasized the compositional nature of telicity and lexical aspect, it can be argued that a comprehensive work which directly investigates the interaction between telicity and mass noun phrases and bare plurals in the subject and object positions is missing. As will be shown in chapter I, Tenny (1987, 1994) leaves the role played by plural and mass subjects and direct objects in aspectual composition out of discussion. In fact, it is not even possible to account for the semantic influence of mass and plural noun phrases on telicity using Tenny's theory. Verkuyl (1993) and Krifka (1989, 1992, 1998) do show that mass and bare plural noun phrases can cause telicity of verb phrases and/or sentences under certain circumstances, but problematic cases emerge in both theories. This study aims to present a unified analysis of the interaction between telicity, massness and plurality through Turkish data. The main premise of this study is that inquiring into the nature of circumstances under which plurals and mass nouns create telicity has important repercussions both for our understanding of telicity and for our understanding of plurality and massness.

Purpose of the Study

The main purpose of this study is to determine, through Turkish data, the conditions under which plural and mass noun phrases create telic interpretations of sentences, and to develop a preliminary aspectual framework that can account for the interaction of telicity with plurality and massness.

Theoretical Framework

The study mostly follows the theory of atomicity developed in an array of works by Rothstein (2004, 2007a, 2007b, 2008). Furthermore, some changes and modifications to the theory will also be presented in chapter III.

Methodology

The explanations throughout the study will follow the tradition of formal semantics, which strictly adheres to the principle of compositionality by taking the meaning of an expression as derived monotonically from the meaning of its parts. The interpretations of expressions will be presented as logical formulas.

Hypotheses

The main hypotheses to be defended are as follows:

1. Telicity is semantic singularity in the verbal domain, while atelicity is semantic plurality.

2. Different aspectual event types have different feature values. Achievements have [+singular] value, while activities are [+plural]. Accomplishments, on the other hand, are

underspecified. They can shift towards both ways depending on the interaction between the verb and the direct object.

3. If a sentence is telic, it means that there is a singularity mapping between the predicate and both the internal and external arguments. A telic sentence is the predication of a semantically singular predicate to semantically singular arguments.

4. Following 3, plural and mass NPs in the subject and direct object positions of telic sentences take on a *semantically* singular interpretation.

5. In Turkish, the accusative case marker -(Y)I can be defined as carrying an atomic function.

6. The traditional distinction between mass and count nouns does not show up in the Turkish grammar. The problematic behavior of Turkish mass nouns can be accounted for using the theory of atomicity developed by Rothstein.

The Data

The data of the study consists of a) sentences collected from naturally occurring data (spoken and written) and electronic databases, b) Turkish translations of sentences from English works on lexical aspect where relevant, c) sentences that the researcher made up himself. Some of the data is further tested for native speaker judgments. The subjects were adult native speakers of Turkish with random linguistic backgrounds. The results can be found in the appendices.

Limitations

The study limits itself with the study of activities, achievements, and accomplishments. No discussion on states is made.

Plan of The Study

The study is structured as follows. In the first chapter, we will review studies on lexical aspect and discuss how they treat the issue of telicity. In the second chapter, we will inquire into the semantics of mass nouns, bare nouns, and bare plurals in Turkish. The last chapter is devoted to the investigation of how semantics of these nouns interacts with semantics of telicity.

It should also be noted that the theory that we will base our study on, Rothstein (2004, 2007a, 2007b, 2008), is divided into two parts and presented in chapter II and chapter III. We will discuss Rothstein's theory of atomicity in the nominal domain in chapter II, when we discuss the semantics of mass nouns in Turkish. Atomicity in the verbal domain, on the other hand, is presented in relation to our discussion on telicity in chapter III.

CHAPTER I

REVIEW OF LITERATURE

The main purpose of this chapter is to introduce syntactic and semantic approaches to telicity. First, we will introduce Tenny's theory which takes telicity to be a result of a one-to-one correspondence between the internal argument of the event which "measures out" the event and the direct object of the verb in the deep structure. Afterwards, we will discuss two semantic approaches to telicity, Verkuyl (1993) and Krifka (1989, 1992, 1998), respectively. A general criticism of these theories will also be presented.

The aspectual verb classes that were introduced in the introduction will be taken for granted. To remind them once more:

States: SEV-, NEFRET ET-, İNAN-, SAHİP OL-, BENZE-, BİL- etc.

Activities: KOŞ-, YÜRÜ-, İT-, AĞLA-, BEKLE-, DİNLE-, DOLAŞ-, EĞLEN-, ARAŞTIRMA YAP-, KONUŞ-, YÜZ- etc.

Achievements: BUL-, KAYBET-, ÖL-, VAR-, ULAŞ-, DÜŞ-, PATLA-, DOĞ-, FARK ET-, GÖR-, KAZAN- etc.

Accomplishments: BİR KİLOMETRE YÜRÜ-, BİR MEKTUP YAZ-, BİR ELMA YE-, BAĞLA-, BİR ŞARKI SÖYLE-, BİR ŞİİR OKU-, OLGUNLAŞ-, ÖR- etc.

Although these classes are the ones that are widely discussed in the literature, some researchers argued for an addition to them. Smith (1991), for example, puts forward that we need to have one more aspectual verb class, which she names *semelfactives*.

Semelfactives are single occurrence events such as KANAT ÇIRP-, ÖKSÜR-, HAPŞIR-, NEFES AL-, GÖZ KIRP- etc. The events described by semelfactive predicates are non-durative and atelic. However, characterizing the aspectual properties of semelfactives is somewhat problematic because, as discussed by researchers like Smith (1991) and Moens and Steedman (1988), the usual tests to distinguish telic predicates from atelic predicates, such as the *for x time / in x time* test, may themselves induce telicity or atelicity on a semelfactive predicate:

(1) a. Ali bir anda hapşırdı.

b. Ali 5 dakika boyunca hapşırdı.

In (1a), the predicate is telic. Here the semelfactive behaves like an achievement: it denotes a momentary change at the end of which the event comes to an end. On the other hand, the *for x time* adverbial in (1b) causes the semelfactive predicate HAPŞIR- to iterate and become atelic. This time the event described is an activity: it is durative and there is no endpoint defined for the event.

One question related to semelfactives is whether we really need to define them as a separate class or not. We will touch this issue briefly in section III.3.2.; other than that, semelfactives are mostly left out of discussion in this study due to their unstable nature.

As we have said before, among the four Vendlerian verbal classes above only achievements and accomplishments denote telic events, while states and activities do not. There are a number of tests that can be used to distinguish these four types of classes from one another in Turkish. In the following section we will give a brief review of these tests.

I.1. Tests for Aspectual Classes in Turkish

1. x (zaman) boyunca / x (zaman) içinde (for x time / in x time)

This test was first introduced by Dowty (1979) to distinguish telic predicates from atelic predicates. Dowty (1979) notes that telic predicates, i.e. achievements and accomplishments, are compatible with *in x time* adverbials while atelic predicates, i.e. states and activities, are compatible with f*or x time* adverbials:

(2) a. Cem bir saat boyunca koştu.

b. ?Cem bir saat içinde koştu.

(3) a. *Cem iki gün içinde hastaydı

b. Cem iki gün boyunca hastaydı.

(4) a. Cem üç gün içinde öldü.

b. *Cem üç gün boyunca öldü.

(5) a. ?Cem üç yıl boyunca mektubu yazdı.

b. Cem mektubu üç yıl içinde yazdı.

2. Adverbials için *and* -lİğİnE *in Turkish*

As noted by Taylan (2001), in Turkish adverbials like *için* and *–lİğİne* are not compatible with telic predicates and they can only modify atelic predicates:

(6) a. Berna iki hafta için / iki haftalığına bir şirkette çalıştı. (Activity)

b. Berna iki hafta için / iki haftalığına Mersin'de. (State)

c. *Berna iki hafta için / iki haftalığına okula vardı. (Achievement)

d. *Berna iki hafta için / iki haftalığına okula yürüdü. (Accomplishment).

3. The ϕ-di ve hala ϕ-iyor *construction in Turkish*

This construction was employed by Johanson (1971) to distinguish activities from the other aspectual classes. States are not compatible with this construction because of the fact that they lack dynamicity. Achievements and accomplishments, on the other hand, are not compatible with this construction because they are telic. Therefore, the *ϕ-di ve hala ϕ-iyor* construction modifies predicates that describe dynamic and atelic events[1]:

(7) a. *Ali hasta ve hala hasta (State)

b. *Berna eve vardı ve hala varıyor. (Achievement)

c. ?Cem elmayı yedi ve hala yiyor (Accomplishment)

d. Deniz bir saat yüzdü ve hala yüzüyor. (Activity)

4. Punctual adverbs in Turkish

Punctual adverbs like *ansızın, aniden, birdenbire* are widely used to distinguish achievements from other aspectual classes (Güven, 2006; Johanson, 1971; Taylan, 2001) These adverbs modify events that are telic and momentary. Therefore, they are compatible with achievements, but not normally with states, activities, and accomplishments:

(8) a. Adam *ansızın / aniden / birdenbire* yere düştü.

b. *Adam *ansızın / aniden / birdenbire* hasta.

c. ?Adam *aniden / birdenbire / ansızın* şarkı dinledi.

d. ?Adam *aniden / birdenbire / ansızın* bir mektup yazdı.

[1] It has also been shown by Göksel and Kerslake (2005: 334-335) that this test distinguishes predicates which are ambiguous between achievement and stative readings in Turkish:

(1) Ali sandalyeye oturdu ve hala oturuyor.

In (1) the –DI morpheme emphasizes the achievement event of OTUR-, while the imperfective -IYOR marks the stative use of the same predicate. Among other verbs that denote both achievement and stative events are verbs like GÖR-, -UYU etc.

5. Postverb Constructions in Turkish

As Emre (1945) notes, there are three types of postverb constructions in Turkish:

(i) converb + auxiliary “ver”

(ii) converb+ auxiliary “kal”

(iii) converb + auxiliary “dur”

The postverb construction (i) describes a sudden change. As a result, it is compatible with momentary events which are telic; i.e. achievements:

(9) a. Adam yere düşüverdi.

b. Adam kafasını duvara çarpıverdi.

c. Adam anahtarını buluverdi.

In another vein, when this construction is applied to telic events that do have duration in their internal temporal structure, i.e. accomplishments, they describe the event as happening faster than expected, rather than happening suddenly:

(10) a. Ali kitabı 1 ayda okudu.

b. Ali kitabı 10 günde okuyuverdi.

The other two classes of postverb constructions, converb+auxiliary “dur” and converb+auxiliary “kal” have the features of [+duration] and [– telic]. Therefore they are compatible with activities, and not compatible with achievements:

(11) a. Ali yüzedurdu.

b. Berna yürüyedurdu.

(12) a. *Ali eve varadurdu

b. *Arabanın lastiği patlayadurdu

On the other hand, when these postverb constructions are used with accomplishments, they make us interpret events as not yet completed; therefore create atelicity out of the telic predicates:

(13) a. Ali kitabı bir saat içinde okudu. (telic)

b. Ali kitabı (*bir saat içinde) okuyadurdu. (atelic)

c. Berna elmayı 5 dakikada yedi. (telic)

d. Berna elmayı (*5 dakikada) yiyedurdu. (atelic)

I.2. An Apparent Problem for Adverbial Modification: Aspectual Shift

Strictly speaking, using adverbial modification to determine the aspectual classes of verbs is not always very reliable. Although it is true that in most cases certain adverbials tend to occur with certain kind of aspectual predicates, it is also true that the compatibility-based analysis of adverbials does not do justice to a very productive phenomenon in natural language: the phenomenon of aspectual shift.

Many aspectual predicates which are inherently telic, such as the accomplishment predicates in (14a) and (14b), *can* be used with the atelic modifier *for x time* as in (15a-b), and the result is neither anomaly nor ungrammaticality, but simply a shift in the aspectual properties of the events described.

(14) a. Ali kitabı bir saatte okudu. (telic)

b. Annem kazağı 15 günde ördü. (telic)

(15) a. Ali kitabı bir saat boyunca okudu (atelic)

b. Annem kazağı bir ay boyunca ördü, (atelic)
ama bitiremedi.

In the examples above, the telic accomplishment predicates in (14a-b) lose their telic value and become atelic in (15a-b). Under the modification of *for x time* adverbials, the accomplishment predicates now take on an activity reading, since in (15a-b) they describe events which go on and on with no endpoint reached at the end. The phenomenon of aspectual shift via adverbial modification is so much beyond the scope of this thesis, and we will just briefly touch this issue in section III.4.3. Other than that, we will continue to employ the *for x time / in x time* test to check (a)telicity of sentences in cases where the question of aspectual shift does not create problems for our arguments.

On the other hand, aspectual shift does not only show up in cases of adverbial modification. An inherently atelic activity predicate as in (16a) becomes telic when PP adjuncts which define movement along a finite path are added to the VP as in (16b-c):

(16) a. Ali bir saat boyunca yürüdü.

b. Ali bir saat içinde *bir kilometre* yürüdü.

c. Ali okula bir saatte yürüdü.

In the examples above, the atelic activity predicate YÜRÜ- in (16a) becomes accomplishment in (16b-c). In (16b), the sentence describes a telic event of walking one kilometer. When the path of one kilometer is traversed; the event comes to an end. Similarly, in (16c) the event is again telic because it comes to an end at the moment when Ali arrives at the school.

Presenting the tests that are widely used in Turkish to distinguish aspectual classes from one another, let us come to the question of telicity and its syntactic and semantic determinants.

I.3. Telicity: Between Nouns and Verbs

The fact that noun phrases affect the aspectual values of predicates has been shown in English with the following data:

(17) a. Allan ate an apple in five minutes / ?for five minutes.

b. Allan ate apples for five minutes / ?in five minutes

(18) a. Allan drank wine for 15 minutes / ?in fifteen minutes.

b. Allan drank a glass of wine in 15 minutes / ?for fifteen minutes.

In (17), the accomplishment VP headed by EAT is telic when the direct object is a singular count noun as in (17a), while the same predicate is atelic when there is a bare plural in the direct object position. Considering (18), one may see that mass and plural nouns behave the same way. In (18a), the mass noun *wine* as direct object results in atelicity of the VP, while in (18b), the same mass noun used with the measure phrase *a glass of* creates telicity.

By contrast, (a)telicity features of verbal predicates headed by activity verbs such as PUSH, WATCH, LISTEN TO etc. are not affected by the properties of the direct objects. Activities are always atelic, whether or not the direct object is a singular count noun (19a), plural count noun (19b), or a mass noun with or without a measure phrase inside the NP (20a-b):

(19) a. Allan watched the movie for 30 minutes.

b. Allan watched movies for 30 minutes.

(20) a. Barry listened to music for an hour.

b. Barry listened to a piece of music for an hour.

More importantly, although activities can be made telic sometimes, it is not generally the direct objects, but indirect objects that create telicity[2]:

(21) Allan pushed a cart / carts to school in 15 minutes.

In (21), what induces telicity on the VP is not the direct object a *cart / carts*, but the indirect object *school*. As a result, while direct objects of accomplishment VPs clearly affect the (a)telicity features of predicates, direct object of activities do not.

That much is the agreed-upon aspects of aspectual theories. What follows is the beginning of linguistic wars. The main question that is the reason of controversy is the question of whether the effects of direct objects on telicity should be accounted for in syntactic or semantic terms. If syntactic, what kind of syntactic rules are at play? If semantic, what semantic relationship between the verb and the noun phrase is the origin of telicity?

In what follows, we will first review Tenny's (1987, 1994) syntactic account and then Verkuyl's (1993) and Krifka's (1989, 1992, 1998) semantic accounts, respectively. We will argue that there are problematic aspects of the approaches, mainly because of the following reasons: Verkuyl's and Krifka's theories mostly limit themselves with VP-internal telicity, and although the role played by plural subjects in determining the telicity of sentences is argued in these theories somewhat secondarily, important problems exist. Moreover, in both of these approaches, mass direct objects are thought to always create atelicity, but in Turkish there are cases where they do induce telicity. Tenny's

[2] This is not true for the transitive use of WALK, RUN etc. As we have said, although they are atelic in their intranstive use (1a-b), when they are transitivized they can be telic as in (2a-b).

(1) a. Allan ran for an hour.
b. Allan walked for two hours.

(2) a. Barry walked a mile in an hour.
b. Barry ran the marathon in half an hour.

To avoid any confusion, when we say the activity WALK, RUN, we mean the intransitive use of these verbs. As we have said before, the transitive and telic use of these verbs fall under the accomplishment category.

syntactic approach is more problematic for a study that tries to investigate the relationship between telicity and mass / plural NPs. Tenny's theory relies heavily on the notion of autonomy of syntax; for her, telicity derives from certain syntactic positions in the deep structure which are assigned certain kind of "aspectual roles" by the verb. Since there is no room for an explanation of systematic meaning-relationships between the semantic properties of the argument and the verb in that kind of an approach, as Filip (1999: 99) notes, "on Tenny's account, it is not possible to state the rules that govern the influence of count…mass…and bare plural…nominal arguments on the telicity of verbal predicates in a uniform way".

I.4. Approaches to Telicity

I.4.1. Syntactic Determinants of Telicity: Tenny (1987, 1994)

In Tenny's[3] theory, internal arguments are argued to enter into aspectual composition as a result of a one-to-one correspondence between their syntactic positions in the deep structure (DS) and argument roles in the lexical conceptual structure (LCS) of verbs. For Tenny, telicity[4] is the result of the fact that direct objects in the DS are uniformly mapped onto an aspectual MEASURE role in the LCS. More concretely, the direct objects take on the role of "measuring out" the event described by the verb by providing a "scale" at the end of which a change of state occurs and the event comes to an end:

[3] The name *Tenny* refers to both of the works of the researcher.
[4] Actually *delimitedness* for Tenny. However, the two are the same phenomenon, and the choice of term *delimitedness* instead of *telicity* reflects Tenny's view that telicity is syntactically determined.

(22) a. Ali pastayı yedi.

b. Berna Ankara caddesini yürüdü.

c. Cem masayı temizledi.

In (22a), the direct object *pasta* is the MEASURE of the YE- event. It measures-out the event by virtue of the fact that the event is over when the cake is completely eaten. The same is true of (22b) and (22c). The YÜRÜ- event is over when the Ankara street is traversed, and the TEMİZLE- event is over when the table becomes clean.

Following this, Tenny defines three types of accomplishments where the direct objects of verbs measure out the events described by the verbs. First, predicates like YE-,İÇ-,OKU- etc, which are called "incremental theme verbs" (Dowty, 1991). Second, change of state verbs like TAMİR ET- , TEMİZLE-, BOYA- etc. Finally, verbs that take path arguments, such as the transitive YÜRÜ- and transitive KOŞ- etc.

The commonality between these predicates is that they all assign an aspectual MEASURE role in the LCS, which is invariably mapped onto the direct object in the DS. These verbs, then, have the following aspectual role grids:

(23)

Verb	Asp. Role Grid
YE-	[(MEASURE)]
BOYA-	[(MEASURE)]
KOŞ-$_{TR}$	[(MEASURE)]

To guarantee that the aspectual MEASURE roles that these verbs assign in the LCS are mapped all and only to direct objects in the DS, Tenny (1994: 11) defines the following constraint:

Measuring out Constraint on Direct Internal Arguments

(i) The direct argument of a simple verb is constrained so that it undergoes no necessary internal motion or change, unless it is a motion or change that which measures out the event over time (where measuring-out entails that the direct object plays a particular role in delimiting the event).

(ii) Direct internal arguments are the only overt arguments which can measure out the events.

(iii) There can be no more than one measuring out for any event described by a verb.

There are two claims made by the above constraints on direct objects. Constraint (i) argues that the argument which measures out the event is at the same time the argument that is affected by the event (that is why Tenny calls the three types of accomplishments defined above as "affectedness verbs"). On the other hand, constraints (ii) and (iii) specify that no argument other than the direct object can measure out the event.

Apart from the MEASURE role, Tenny defines two more aspectual roles -- PATH and TERMINUS – mainly to deal with cases like the following:

(24) a. Ali arabayı 20 dakika boyunca / ?20 dakika içinde itti.

b. Ali arabayı ?20 dakika boyunca / 20 dakika içinde yola kadar itti.

In (24a), the direct object provides a measure for the event, but it is not enough for the event to be telic. Tenny argues that in activities such as İT-, SÜRÜKLE- TIRMAN- etc, it is the indirect objects that delimit the event by indicating the spatial terminus which parallels the event's temporal terminus. Thus, in (24b), the Goal PP *yola kadar* makes the event telic by means of specifying the location of the direct object at the end of the event.

A similar case is the case of (25) in English:

(25) a. Allan walked the road for 45 minutes / in 45 minutes.

b. Allan walked the road to Los Angeles in 45 minutes/
?for 45 minutes.

In (25a), the transitive WALK takes a PATH direct object argument. However, the PATH argument cannot itself delimit the event, as can be seen from the compatibility of (25a) both with *for x time* and *in x time* adverbials. In (25b), the indirect object *Los Angeles* participates into aspectual composition by providing the TERMINUS point of the event. The event is over when this point is reached; when Allan walks the road and arrives at *Los Angeles.*

Therefore, in Tenny's theory there are three aspectual roles: MEASURE, TERMINUS, and PATH. While MEASURE role is mapped onto the direct object, TERMINUS is mapped onto the indirect object. PATH, on the other hand, accompanies TERMINUS:

> The Terminus Constraint On Indirect Internal Arguments
>
> (i) An indirect internal argument can only participate in aspectual structure by providing terminus for the event described by the verb. The terminus causes the event to be delimited.
>
> (ii) If the event has a terminus, it also has a path, either implicit or overt.
>
> (iii) An event described by a verb can only have one terminus.
>
> (Tenny, 1994: 68)

As a result, Tenny's theory is one in which predicates are distinguished from one another as to what kind of aspectual role grids they provide in their LCS for the syntax. Incremental theme verbs such as YE-, İÇ-, OKU- etc., change of state predicates such as TAMİR ET-, TEMİZLE- etc. and predicates such as YÜRÜ-, KOŞ- in their transitive use as in (26.3) are delimited solely by the MEASURE roles:

(26)	Verb	Asp. Role Grid	Example
(1)	YE-	[(MEASURE)]	elmayı ye-
(2)	TEMİZLE-	[(MEASURE)]	masayı temizle-
(3)	YÜRÜ-	[(MEASURE)]	Ankara caddesini yürü-

On the other hand, some predicates, such as İT-, SÜRÜKLE- and the ditransitive example of YÜRÜ- in (27.2.) in contrast to (26.3), are delimited by [PATH+TERMINUS] roles:

(27)	Verb	Asp. Role Grid.	Example
(1)	İT-	[(PATH, TERMINUS]]	arabayı yola it-
(2)	YÜRÜ-	[(PATH, TERMINUS)]	köprüyü sonuna kadar yürü-

Tenny represents predicates that are atelic such as those in (28) as in (29):

(28) a. Ali arabayı bir saat boyunca / ?bir saat içinde itti.

b. Yaprak havada dakikalarca / ?bir dakika içinde süzüldü

(29)	Verb	Asp. Role Grid
	İT-	[ ]
	SÜZÜL-	[ ]

These predicates do not assign any aspectual roles in the LCS, therefore they are not telic.

Finally, to guarantee that all these aspectual structures of predicates in the LCS are visible to syntax, Tenny formulates the Aspectual Interface Hypothesis (AIH):

> Aspectual Interface Hypothesis
>
> The mapping between cognitive structure and syntactic argument structure is governed by aspectual properties. Only the aspectual part of the cognitive structure is visible to syntax.
>
> (Tenny, 1987: 247)

The aspectual interface hypothesis is the main linking system between the aspectual roles in the LCS and the argument positions in the syntax. It governs the way aspectual roles are mapped onto syntactic arguments in the deep structure. Moreover, the AIH and the

constraints that accompany it amount to the claim that only the VP internal arguments, i.e. direct and indirect objects, play a role in delimiting the event. The VP external arguments cannot participate into aspectual composition for Tenny.

Problems for Tenny (1987, 1994)

Problem 1: All direct objects are not the same

Tenny argues that incremental theme verbs like YE-, İÇ-, YAZ- are represented in the LCS with an aspectual MEASURE role, because their direct objects in the DS measure out the events described by these verbs. However, problematic for Tenny (1987, 1994) are cases where direct objects cannot provide such a measure, especially cases where the direct objects are mass nouns, as in:

(30) a. Ali bir saat boyunca meyve yedi.

b. Cem bir saat boyunca propaganda yazdı.

Now, for Tenny, predicates that are atelic are not associated with any aspectual structure in the LCS. Therefore, following Tenny's theory, we would have to represent cases of YE- and YAZ- above as in (31):

(31)

Verb	Asp. Role Grid
YE-	[ ]
YAZ-	[ ]

However, this causes a contradiction because the same verbs are represented with MEASURE roles when their direct objects do provide a measure, i.e. when the direct objects are singular count nouns as in (32):

(32) a. Ali 10 dakika içinde bir elma yedi.

b. Ali 3 yıl içinde bir kitap yazdı.

(33)

Verb	Asp. Role Grid
YE-	[(MEASURE)]
YAZ-	[(MEASURE)]

The main problem with Tenny's theory is that it ends up with two representations for the same predicates depending on the semantic nature of the direct objects they combine with. Thus, as Filip (1999) observes, in Tenny's approach this amounts to the claim that a verb like YE- is ambiguous between (34a) and (34b), depending on whether it takes a mass noun direct object or a singular count noun direct object:

(34)

Verb	Asp. Role Grid
$YE-_1$	[ ]
$YE-_2$	[(MEASURE)]

This, however, seems to be an unnecessary and not-so-well-motivated complication of the grammar because the semantic properties of the verb YE- itself does not change depending on the properties of the direct object it takes. As a result, Tenny's syntax-based approach cannot account for the fact that the aspectual difference between (30a) and (32a) above is not due to a difference between the semantic properties of the verb YE- in the two sentences, but due to a difference between the semantic nature of mass and count nouns.

Problem 2: All telic predicates are not the same

It can be argıued that Tenny's theory is too strict, and makes very strong assumptions on how telicity can occur. For Tenny, there are two ways for a predicate to be telic: a) the event that the verb describes has to be measured and delimited by the MEASURE role that the direct object carries; b) the event that the verb describes has to be

delimited by a combination of a PATH direct object and a TERMINUS indirect object. In both cases, the internal arguments play a significant role in the delimitation of the event.

However, there are predicates where the event is not telic because of the properties of the direct or indirect objects, but simply because of the semantic properties of the verb itself. In achievement class, telicity of the event has nothing to with the direct and indirect objects. For example, the events below are telic whether the direct objects are count, mass, or plural:

(35) a. Ali sınav kağıdında bir *hata* farketti.

b. Ali bir anda duvarda *kan* gördü.

c. Ali *bombaları* 10 dakika içinde patlattı.

Considering examples in (35), one cannot argue that achievement verbs like FARK ET-, GÖR-, PATLA- etc. assign MEASURE roles in the LCS because they are telic no matter what kind of direct objects they combine with, which is in direct contrast to examples like (30) and (32) above. These examples show that in achievement class being telic is a direct result of the semantics of the verb alone, rather than being an outcome of the relationship between the verb and the internal arguments. However, there is no way to account for this fact in Tenny's theory, because the theory works on the assumption that telicity should *always* derive from an interaction between the verb and its internal arguments.

I.4.2. Semantic Determinants of Telicity

I.4.2.1. Verkuyl (1993)

Verkuyl (1993) is regarded as the first theory that has emphasized the compositional nature of telicity and lexical aspect by showing that both the semantics of

the verbs and the semantics of the NPs contribute to the final telic or atelic value of sentences in different ways. For Verkuyl, there are two criteria for a sentence to be telic:

a) The verb in the sentence has to have a [+ADD TO] value. The [+ADD TO] value indicates, in simplistic terms, whether the verb involves dynamicity or not. In that respect, activities, achievements, and accomplishments are characterized by the [+ADD TO] value, while states are [– ADD TO].

b) The NPs should have a [+SQA][5] value. The [+SQA] value indicates whether the set that an NP denotes is quantized or not. In that respect, a determined[6] plural and a singular count noun will have a [+SQA] value, while mass nouns and bare plurals will be [–SQA].

On the other hand, Verkuyl argues that the VP-internal NPs and VP-external NPs interact with telicity at different levels. First, the interaction between the verb and the internal arguments will determine VP-internal telicity, by giving a [±T(elic)][7] value to the VP. Following examples are adapted from Verkuyl (1993: 22):

(36) a. EAT THREE APPLES [+ADD TO] + [+SQA] = $[+T]_{VP}$

b. EAT APPLES [+ADD TO] + [–SQA] = $[-T]_{VP}$

c. WANT A SANDWICH [–ADD TO] + [+SQA] = $[-T]_{VP}$

d. WANT SANDWICHES [–ADD TO] + [–SQA] = $[-T]_{VP}$

Afterwards, the VP external NP gives the sentence its final telic or atelic value. If the VP external NP also has the [+SQA] value and the VP itself has the [+T] value, then the sentence is telic. This is named *the plus principle* by Verkuyl (1993). If either of the components fail to satisfy *the plus principle*, then the sentence will be [–T], i.e. atelic.

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[5] Specific Quantity of A.
[6] Verkuyl (1993) gives determiners quantifitional force by using generalized quantification over NPs.
[7] Actually *Terminative* for Verkuyl (1993). Both termination and telicity refer to the boundedness of an event over time.

(37) a. Judith ate three apples [+SQA] + [+T] $_{VP}$ = [+T] $_{S}$

b. Judith ate apples. [+SQA] + [−T] $_{VP}$ = [−T] $_{S}$

c. Nobody ate an apple. [−SQA] + [+T] $_{VP}$ = [−T] $_{S}$

d. Nobody ate apples. [−SQA] + [−T] $_{VP}$ = [−T] $_{S}$

This, of course, is a very simplistic summary of Verkuyl's theory. We have only presented the results that he reaches about telicity, without presenting the highly complex analytical process which leads to these results. Still, though, there are at least two more points that need further emphasis, both of which are problematic for Verkuyl, and for which he himself offers some solutions.

One problematic case for Verkuyl's (1993) theory is what he calls *push verbs*, a term that he coins to cover predicates like DRIVE, PUSH, PAINT etc. which do not obey the plus principle. For example, the verb PUSH – the prototypical member of this class – is a [+ADD TO] verb, since it is dynamic. However, even when it comes together with a [+SQA] NP, the sentence is [−T], as we have also seen in our discussion of Tenny:

(38) He pushed a cart for hours / ?in an hour.

Verkuyl's solution to this problem is postulating that these verbs need special particles to become "complex verbs". It is the interaction between the verb and the particle that determines the final [±T] value of that complex verb. Later on, the interaction between the complex verb and the NPs will determine the [±T] value of the sentence.

For example, the verb PUSH itself is [−T], despite the fact that it is a [+ADD TO] verb. Now the combination of this verb with a particle like *away*, for example, will make the verb [+T], as can be seen from the telicity of (39b). By contrast, a particle like *on*, will cause the PUSH verb remain [−T], as in (39c):

(39) a. Allan pushed the cart for 3 minutes. PUSH = [–T]

b. Allan pushed the cart away in 3 minutes. PUSH = [+T]

c. Allan pushed the cart on for 3 minutes. PUSH = [–T]

Thus, depending on the particle, the verb will be [+T] or [–T] in Verkuyl's theory.

For the sake of argument, let us just conclude Verkuyl's discussion of pu*sh verbs* by stating that how this kind of complex verb formation with *push verbs* would take place in a language like Turkish is not so clear, because Turkish does not have any particles.

A second point that needs emphasis in Verkuyl's theory is his treatment of distributive and collective readings of plural subjects. Verkuyl shows that plural subjects influence the aspectual composition of sentences by creating a distributive-collective ambiguity.[8]

(40) a. Four men carried a table upstairs in five minutes.

b. Four men carried a table upstairs for two hours.

In telic (40a), the plural subject is interpreted collectively; in atelic (40b), however, it is interpreted distributively. Therefore, a distributive plural creates an atelic sentence, and a collective plural creates a telic sentence.

Although Verkuyl remarks that distributive-collective ambiguity affects the telicity values of sentences, there is a theoretical problem that Verkuyl's theory creates, especially when it attempts to account for the interaction of VPs with plural subjects such as those in (40) above. The problem can be stated as follows: As we have said before, Verkuyl argues that the semantic values of VP-external NPs decide the final telic or atelic values of sentences. Taking plural subjects into consideration, this means that a collective

[8] A detailed explaination of distributive-collective ambiguity, and analysis of its interaction with telicity will be presented in chapters II and III.

plural will have a [+SQA] value and therefore create a [+T] sentence, and a distributive plural will have a [−SQA] value and create a [−T] sentence. This amounts to the claim that distributivity-collectivity ambiguity is inside the NPs themselves, and a distributive or a collective interpretation of a plural NP is determined independently of the VP, which is what Verkuyl argues in his treatment of aspectual composition in his 1993 book[9]. However, this view is quite problematic, and there are a lot of arguments which favor the idea that the distributive-collective ambiguity is not inside the NP but inside the VP. These arguments will be presented in detail in chapter II, when we introduce the theory of plurality that we will follow in trying to account for the interaction with plural NPs with telicity. In contrast to Verkuyl, we will propose through chapter II and chapter III that instead of claiming that distributivity creates atelicity and collectivity creates telicity, claiming that collectivity is *the result of* telicity and distributivity is *the result of* atelicity works for the better.

I.4.2.2. Krifka's (1989, 1992, 1998) Theory of Quantization and Homomorphism

Krifka's[10] theory, like the other theories presented so far, is built mainly on the following kind of data:

(41) a. Ali 1 yıl içinde bir ev inşa etti

b. Ali 1 yıl boyunca ev/evler inşa etti.

(42) a. Ali 10 dakika içinde bir sandalye boyadı

b. Ali 10 dakika boyunca mobilya boyadı.

Both in (41) and in (42) the verbs are accomplishment verbs. In (41a) the singular count noun creates a telic VP; while in (41b) a bare noun[11] in Turkish or a plural noun creates an

[9] Later on, in 1994, Verkuyl changes his views and proposes that there is no distributive-collective ambiguity at all.

[10] The name *Krifka* refers to all the three works of the researcher, unless otherwise noted.

atelic VP. On the other hand, in (42b), the mass noun *mobilya* results in atelicity of the VP, while the singular noun in (42a) makes the VP telic.

In Krifka's theory, the data above is accounted for by defining a homomorphism between the domain of objects and the domain of events, which is realized by thematic relations between verbs and their complements. A homomorphism is a mereological notion, concerning whether various part-whole entailments between objects, events, and their parts hold. For example, in the domain of individuals, a singular count noun like *bir sandalye* above has no parts which are itself under the denotation of *bir sandalye*. However, a mass noun like *mobilya* and/or a plural noun like *sandalyeler* do have parts which are themselves under the denotation of *mobilya* and *sandalyeler*. Moreover, while the sum of two instances of *bir sandalye* does not fall under the denotation of *bir sandalye*, the sum of two sets of *mobilya* or two sets of *sandalyeler* falls under the denotation of predicates *mobilya* and *sandalyeler*.

Krifka distinguishes these two types of objects in the individual domain from each other. Singular count nouns are quantized:

A predicate X is quantized iff:

$\forall x\ \forall y\ [X(x) \wedge X(y) \rightarrow [x \subseteq y \rightarrow x=y]$

Whenever X applies to x and y, x cannot be a part of y.

On the other hand, bare plurals and mass nouns are cumulative:

A predicate X is cumulative iff:

$\forall x\ \forall y\ [X(x) \wedge X(y) \wedge \neg x=y \wedge \forall x\ \forall y\ [X(x) \wedge X(y) \rightarrow X(x \cup y)]$

Whenever X applies to x and y, it also applies to the sum of x and y, if x and y are distinct.

---

[11] Bare nouns in Turkish display an ambiguity between singular and plural readings (Dede, 1986). In (41b), one can interpret the bare noun as denoting a plurality, therefore the sentence becomes atelic.Analyses of the effects of bare nouns on the aspectual composition of Turkish will be given in chapters II and III.

Afterwards, Krifka argues that by means of thematic relations, structures of these objects are mapped onto the structures of events. This way, an event-object homomorphism is reached: a quantized direct object combining with an accomplishment verb results in a quantized predicate. As we can see, for example, an event of painting a chair has no parts which are themselves events of painting a chair. On the other hand, cumulative direct objects combining with accomplishment verbs will result in cumulative predicates. Therefore, in (41b) the predicate EVLER İNŞA ET- is cumulative because two events of building houses will again be under the denotation of the event of building houses.

As we have said, the homomorphic mapping between objects and events is possible via thematic roles. To guarantee this, Krifka follows Davidsonian (1967) event semantics framework where thematic relations are taken as one-place functions between individual variables and event variables. Krifka argues that the thematic relation between the objects and the events in examples like (41) and (42) above is a special one: it is a *Gradual Patient Relation*. The gradual patient relation has three entailment properties.

First of all, Krifka argues that in Gradual Patient Relation, every subevent of the event has a subobject assigned, and that every subevent and every subobject are under the same thematic relation to each other[12]. This is called *Mapping to Objects*:

Mapping to objects:

$\forall R\ [\text{MAP-O}(R) \leftrightarrow$

$\forall e, e', x\ [R(e, x) \wedge e' \leq e \rightarrow \exists x'\ [x' \leq x\ \ R(e', x')]]]$

If x is the Patient of an event e which has a proper part e', then x has a proper part x' which is the Patient of e'.

[12] The notions *subevent* and *subobject* will be explicated in more detail in chapter III.

Mapping to Objects guarantees that every proper part of the event of painting a chair corresponds to a proper part of that chair, and that the event is over when last part of the chair is painted.

Krifka also defines *Mapping to Events*, which is the reverse of *Mapping to Objects* and which means that for every subpart of the object a subevent exists, and that all subobjects and subevents are under the same thematic relation:

Mapping to Events:

$\forall R$ [MAP- E (R) $\leftrightarrow$

$\forall e, x, x'$ [R (e, x) $\wedge$ x' $\leq$ x $\rightarrow$ $\exists e'$ [e' $\leq$ e $\wedge$ R (e', x')]]]

If x' is a proper part of x which is the Patient of e, then there is a proper part of e, e', of which x' is the Patient.

Mapping to events guarantees that every proper part of the chair that is painted is a proper part of the painting event.

Finally, Krifka formulates the property of *Uniqueness of Objects*, which tells that every event is related only to one object via the *Gradual Patient Relation.*

Uniqueness of Objects:

$\forall R$ [UNI-O (R) $\leftrightarrow$ $\forall e, x, x'$ [R (e, x) $\wedge$ R (e, x') $\rightarrow$ x=x'

If both x and x' are the Patients of an event e, then x=x'.

This guarantees that an event of painting a chair cannot apply to two chairs at the same time, but only to various portions of the same chair.

As a result, for Krifka the distinction between telic and atelic predicates in sentences like (41) and (42) above is a distinction between quantized and cumulative properties of the direct objects that the accomplishment heads combine with. A singular count noun is quantized, therefore when it comes together with an accomplishment verb, it

creates a quantized predicate and thus the predicate is telic. A bare plural or a mass noun is cumulative, therefore when they come together with accomplishment verbs, they create cumulative predicates, and thus the predicates are atelic.

Although this theory captures in an elegant way the intuition that there is a special relation between an individual like a chair and an event of painting a chair (the relation of quantization) and that of furniture and painting furniture (the relation of cumulativity), it is easy to find some weaknesses of the theory by showing various cases where it makes wrong predictions. In the following paragraphs we will discuss some problems for Krifka's theory.

The main problem with Krifka's theory is his treatment of telicity as quantization. Consider the following examples, which are adapted from Rothstein (2004: 150-151).

(43) a. Ali 10 dakikada en az üç sandalye boyadı.

b. Ali 10 dakikada en fazla üç sandalye boyadı.

In both of the sentences above, the direct objects are cumulative, since a sum of two sets of *at least three chairs* can still be under the denotation of *at least three chairs*, and a sum of *at most three chairs* with *at most three chairs* can still be under the denotation of *at most three chairs*. However, the sentences are still telic. These examples show that quantization cannot be the root of telicity, because a non-quantized predicate can also result in a telic VP.

A second problem relates to Krifka's argument that a mass noun in the direct object position creates atelicity. First of all, Krifka disregards the fact that achievements are telic whether there is a mass direct object and/or mass subject in a sentence:

(44) a. Yardım yaralıya 10 dakikada ulaştı.

b. Adam yolda yürürken yerde para gördü.

In (44b) above, one can no longer speak of a homomorphism between the object and the event because the structural properties of the mass direct object are not transferred onto the structure of the event. Also, there are cases where a mass noun in the direct object position of an accomplishment VP creates telicity in Turkish, especially when that mass noun is accusatively marked:

(45) a. Boyacı mobilyayı 15 dakikada boyadı.

b. Ali parayı 5 dakikada saydı.

c. Ayşe suyu 15 dakikada içti.

As a result, it seems like if one wants to account for the effects of mass nouns on telicity, more than homomorphism and quantization is needed.

Finally, Krifka argues that atelicity is a result of cumulativity. This view seems plausible, and in fact that is what we are going to argue in our discussions of atelicity. However, the problem with Krifka's theory is that it does not show us how a cumulative property of a VP interacts with VP-external arguments, such as plural subjects. Similar to Verkuyl (1993), Krifka does argue that a plural subject participates into aspectual composition by creating a distributive-collective ambiguity. However, for Krifka this ambiguity is again inside the NP. Thus, for him, a cumulative or a quantized property of a predicate is not effective in determining a possible distributive or collective interpretation of the plural subject. We will not go into detailed examples of his treatment of collectivity and distributivity here; let us simply conclude for now by saying that in the following chapters we will argue against his view.

Presenting different theories on telicity in this chapter, we will devote the next chapter to a discussion of the semantics of plurals, mass nouns, and bare nouns in Turkish. The following chapter will specify in more detail what kind of problems for aspectual composition these nouns create and raise some ideas on how they can be treated.

CHAPTER II

SEMANTICS OF PLURALS AND MASS NOUNS IN TURKISH

This chapter is divided into two parts. In the first part – from II.1. to II.2 – we will present a short outline of plural semantics. The main topics to be discussed are the structure of plural nouns and the distributive-collective ambiguity that the plural NPs display (section II.1.1.), followed by a presentation of two influential theories of plurality that try to account for this ambiguity in section II.1.2. In section II.1.3, we will ask some questions about how plural semantics interacts with lexical aspect and telicity in Turkish. Finally, in section II.1.4., we will discuss an issue different from but related to the issue of plurality: the issue of preverbal bare nouns in Turkish. The need to incorporate such a subject into a discussion of plurality is that in Turkish, preverbal bare nouns show a singular-plural ambiguity.

We should note that the plurality phenomenon is highly complicated and problematic in its own right, and we by no means claim to provide any solutions to its problems here. The main purpose is to touch briefly on some main topics about plurality (such as the distributive-collective distinction) and raise some questions about their relatedness to the phenomenon of lexical aspect and telicity. In that respect, this chapter presents more questions than answers, because the questions that we will raise about how plural semantics relates to the semantics of lexical aspect and telicity will not be answered until chapter III.

The second part of the chapter is about the semantics of mass nouns and their problematic behaviour in Turkish. Throughout sections II.2.-II.2.3, we will present different views on the mass-count distinction and discuss their problems. Section II.2.3. will introduce a theory of atomicity and countability developed by Rothstein (2007a),

which tries to account for the mass-count distinction in natural language. In section II.2.4, we will discuss how Rothstein's theory can be used to account for the problematic behaviour of mass nouns in Turkish. Similar to the first part, the second part of the chapter ends with some questions on how the semantics of mass nouns interacts with lexical aspect and telicity in Turkish.

II.1. Plurality in Turkish

II.1.1. The Distributivity-Collectivity Distinction

It is well-documented in the literature that a plural NP in a sentence can oscillate between different interpretations. This section provides an introduction to what these interpretations are and how they occur.

Consider sentence (1), in which there are two numerical plural noun phrases (NPs), one in the subject and the other in the direct object position.

(1) Dört garson üç masa taşıdı.

The sentence above might be said to express five (or maybe more) different scenarios depending on how we interpret the each NP and how they interact with each other. One of the interpretations can be called "the double collective" interpretation. In this interpretation, the sentence expresses a relation between two *groups* of individuals. More concretely, there is a group which consists of *dört garson* and another which consists of *üç masa*, and these two groups are in the relation expressed by the two place predicate TAŞI-. The reason why this reading is called "the double-collective" reading is that both of the NPs have collective reference in this reading. In other words, four individual waiters come together to form a *collection* of waiters, which carries another *collection* of individuals,

formed by three tables. All in all, there is only one TAŞI- event, with one collection as the agent, and the other as theme, which can be expressed as in (2):

(2) X=4 → Y=3[1]

From this relatively simple interpretation of sentence (1), we can move towards more complex ones when distributivity enters the stage.

In a different interpretation of sentence (1), one of the NPs might have a "distributive" reference while the other still refers collectively. For example, instead of saying that in sentence (1) a collection of four waiters carries a collection of three tables, we can also truthfully state that the sentence above defines a scenario where each individual member of the set denoted by the subject *dört garson* carries a different collection of three tables. This possibility arises when the plural NP *dört adam* takes distributive wide scope over the collective NP in the direct object position. All in all, there are 12 tables involved in this scenario (3 for every member of *dört garson*), and there are 4 different TAŞI- events. This can formally be represented as in (3), and graphically[2] as in (4):

(3) $\forall x\ [x \in [\text{dört.garson}]] \rightarrow$ üç.masa.taşı-(x)]]

(4) X=1 ⟶ Y=3

X=1 ⟶ Y=3

X=1 ⟶ Y=3

X=1 ⟶ Y=3

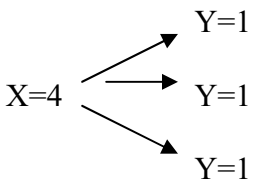
It is not only the subject that can take on a distributive reference, but the roles can be reversed and the object can refer distributively while the subject still refers

[1] "X" stands for *garson* and "Y" stands for *masa*, and "→" is the relation expressed by the verb TAŞI-.
[2] The graphical representations of plural readings throughout the section II.1.1. are adopted from Schwertel (2005: 18).

collectively. In that case, the sentence again expresses a scenario where a collection of four waiters carries three tables, however; this time they do not carry a group of three tables, but carry one of the tables first, and then the second, and finally the third. In other words, they carry the members of the set denoted by *üç masa* one by one. Formal representation of this reading is as in (5), which is picturized as in (6):

(5) $\exists x\ [x=[\text{dört.garson}]] \wedge \forall y\ [y \in [\text{üç.masa}]] \rightarrow (\text{TAŞI-'}\ (x,y))]]$

(6)



All in all, there are 3 tables involved and 3 TAŞI- events, with a different table for every TAŞI- event.

Finally, there remains the reading where both the subject and the object NP are interpreted distributively. In this interpretation, each member of the set {dört garson} carries a different set of three tables, and carries the members of the set of three tables one by one. This way, there is a distributive subject, which takes distributive scope over the distributive object:

(7) $\forall x\ [x \in [\text{dört.garson}]] \wedge \forall y\ [y \in [\text{üç.masa}]]\ \rightarrow (\text{TAŞI-}\ (x,y))]]$

(8) X=1 → Y=1 – Y=1 – Y=1

X=1 → Y=1 – Y=1 – Y=1

X=1 → Y=1 – Y=1 – Y=1

X=1 → Y=1 – Y=1 – Y=1

The sentence expresses a scenario where there are 12 distinct tables and 12 different TAŞI- events.

What has been discussed so far are four different readings of sentence (1) where the subject NP takes scope over the object NP. It has been argued that in sentences with two plural NPs, the scopes of the two NPs might be reversed and the object can also take wide scope over the subject. When this happens, four more interpretations of sentence (1) become available and the number of possible interpretations for a simple sentence like (1) arises to eight. However, it is still a matter of debate whether in Turkish this scope alternation really occurs (see, for example, Aygen 2007 on this issue). Since the main reason why we discuss the collective-distributive ambiguity here is to see how this phenomenon interacts with telicity and lexical aspect in chapter III, we simply exclude such scopal issues from our discussion here on the grounds that they are not relevant to our purposes.

There is, however, yet another reading of sentence (1) that will be important for our purposes, which was first noticed and named as the "cumulative" interpretation in a seminal work by Scha (1981). Scha (1981) distinguishes the cumulative reading from distributive and collective readings. In the cumulative reading, neither of the NPs have scope over the other (that is why sometimes this reading is called the *scopeless reading*) and the only information that the sentence gives us is that the total number of waiters who carried a table is four and the total number of tables that were carried by a waiter is three. More concretely, assume that the set denoted by the NP *dört garson* consists of {Ali, Bülent, Cem, Deniz}. Sentence (1) is also true if Ali and Bülent carried table 1 together, and then Bülent and Deniz carried table 2, and Cem carried table 3 by himself. Differently from the distributive and collective readings, in this reading there is no one-to-one

mapping between the sets *dört garson* and *üç masa*. Thus, the cardinalities of the two NPs are determined independently of each other[3].

To sum up, we have seen that a sentence like (1) might have (at least) five different interpretations depending on whether we interpret the plural NPs distributively, collectively, or cumulatively. In general, it can be said that distributivity arises when the individual members of the set denoted by a plural NP carry out the action expressed by the predicate separately, while collectivity implies that they are involved in the action together.

Of course, the distributive-collective distinction does not only show up in sentences where there are two plural NPs. The distinction can be observed, for example, in sentences where only the subject is plural, a case which will be more important for our purposes in our discussions on telicity and lexical aspect. In a sentence like (9), the plural subject can both be interpreted collectively or distributively depending on how we interpret the bare noun direct object:

(9) Adamlar masa taşıdı.

It has usually been argued that in Turkish preverbal bare nouns are underspecified in that they can both be interpreted as singular or plural (Dede, 1986). If we interpret the direct object *masa* as singular in sentence (9), then the plural subject is interpreted collectively, i.e. the sentence expresses that there is only one table which is being carried and therefore the men doing the carrying event are carrying it together. In the distributive interpretation, however, there is a plurality of tables and thus every individual member of the plural *adamlar* is allowed to carry a different table, or tables.

[3] After Scha (1981), a number of researchers have doubted whether the grammar needs to deal with the cumulative reading as a seperate reading, and questioned the possibility of reducing the it to collective or distributive readings. Among these researchers are Roberts (1987), Dowty (1986) and Landman (1989, 1997, 2000). See section II.1.2.3. where we discuss Landman's theory.

More importantly, distributive or collective interpretation of a plural subject in a sentence also depends on the semantics of the predicate in that sentence. Some predicates, such as UYU-, KOŞ-, YÜRÜ- etc., are only compatible with the distributive reading. We can understand this from the fact that every (a) sentence below entails every (b) sentence. Assume that the plural NP *çocuklar* in (10) and (11) below denotes the set {Ali, Berna, Cem}:

(10) a. Çocuklar yürüdü.

b. Ali yürüdü, Berna yürüdü ve Cem yürüdü.

(11) a. Çocuklar dört saat uyudu.

b. Ali dört saat uyudu, Berna dört saat uyudu ve Cem dört saat uyudu.

Some other predicates, on the other hand, make sense only on the collective interpretation of the plural NP, since they cannot sensibly apply to singular individuals. Such examples are predicates like TOPLAN-, BULUŞ-, DAĞIL- etc. (Dowty 1986; Gillon 1996 for more examples). As can be observed in the following examples, the (b) sentences are anomalous:

(12) a. Çocuklar evin önünde toplandı.

b. *Ali evin önünde toplandı, Berna evin önünde toplandı ve Cem evin önünde toplandı.

(13) a. Öğrenciler dağıldı.

b. *Ali dağıldı, Berna dağıldı ve Cem dağıldı.

One question related to the distributive-collective ambiguity that a plural subject displays is the question of whether only the verb or the whole VP is responsible for the ambiguity. Arguing that distributivity and/or collectivity results only from the

semantics of the verb seems implausible because, although intransitive verbs such as UYU- vs. TOPLAN- can make available their choices as to distributivity or collectivity, when transitive verbs are the issue, the distributive or collective interpretation of a plural subject is not determined on the V level but on the VP level. Consider the following examples:

(14) a. Çocuklar yukarı sandalye taşıdı.

b. Çocuklar sandalyeyi yukarı taşıdı.

c. Çocuklar yukarı bir sandalye taşıdı.

In all the sentences above, the verb remains constant. But in sentence (14a), the distributive interpretation of the plural subject is allowed, due to the semantic nature of the preverbal bare noun in the direct object position. In (14b) and (14c), where the direct objects are marked with the accusative and quantified by "bir" respectively, the only possible interpretation of the plural NP is the collective interpretation in Turkish[4]. Thus, sentences (14b-c), but not necessarily (14a), denote an event of a group of children's carrying a chair upstairs together.

As a result of such and similar examples, many researchers have agreed on the idea that the distributive/ collective ambiguity resides inside the VP, i.e. the whole predicate is responsible for the ambiguity (Lonning, 1987, Schwarzchild, 1991, 1996, Landman 1997, 2000, Lasersohn, 1990, 1995, Link 1983, 1984, among others)[5].

If the collective-distributive distinction is a result of the semantics of the VP, then the crucial question is what is inside the semantics of different VPs that motivates this

[4] The restriction to Turkish is essential here because in the English counterparts of (14b-c), i.e. *The children carried the chair upstairs* and *The children carried a chair upstairs*, the subject NPs are allowed to be interpreted distributively as well. For a detailed explanation of this difference between the two languages, see Aygen (2007). See also section (III.4.2.), where we have a brief discussion of Aygen's work.

[5] Of course, this approach has its rivals. There are also some researchers who argue that the ambiguity is not in the VP but in the NP. For discussions, see Bennett (1975), Gillon (1992), Scha (1981), among others. We do not present their discussions in our work because we will go with the VP view, especially when we discuss the interaction between telicity and plurality in chapter III.

distinction. In order to provide some answers, in section II.1.2. we will review two influential theories of plurality (Link 1983, 1984 and Landman 1989, 1997, 2000), and explain how they handle the phenomenon of distributivity and collectivity. It should be noted that the choice of these two theories, to the exclusion of others, is not random. These theories (in particular Landman 1989, 1997, 2000) are the ones that we will use and constantly refer back to when we discuss the interaction of plurality with telicity and lexical aspect in chapter III.

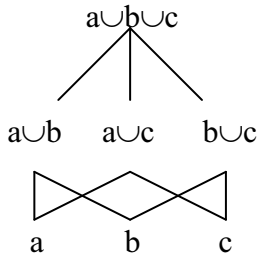
II.1.2 Theories of Plurality

II.1.2.1. Link (1983, 1984)

Basic ideas of Link's theory can be summarized as follows. In the nominal domain a) the domain where singular and plural nouns find their denotation is best represented as an algebraic complete join semi-lattice; b) the lattice is ordered by an atomic part of relation ≤.; c) the use of a lattice structure captures the "cumulative reference property" of plural nouns, which is also a shared property of mass nouns. In the verbal domain a) distributivity-collectivity ambiguity is inside the VP; b) distributive predicates are represented by a $^{\mathbf{D}}$ operator, i.e. ^{D}P.

In his (1983) paper, Godehard Link proposes that the domain from where plural nouns take their denotation should be represented by a complete join semi-lattice. The domain consists of a set of individuals, {d[6]}, and their sums under an operation of sum-formation, ∪:

[6] Usually, the set of individuals is represented in formal semantics with the lowercase letter *e*. However, we save that symbol to refer to events in chapter III, and instead of it we use *d* for individuals (in accordance with Landman 1997, 2000) to prevent terminological confusion.



The bottom line of the structure represents the individuals of the model, the atoms of the model which Link associates with singularities. Thus, a singular count noun like *masa* denotes a set of atomic individuals:

(15) [masa] = {a,b,c}

[masa] ⊆ ATOM

Pluralization is an operation in the nominal domain which applies to a singular noun and adds to its denotation all the sums that can be formed with the elements of the set that is under the extension of the singular noun. Link (1983) associates pluralization with the star operator *. Thus:

(16) [masa] = {a, b, c}

[*masa] = {a, b, c, a∪b, a∪c, b∪c, a∪b∪c}

As a result, the plurality operator applies to a set of ATOMS (i.e. singular individuals) and creates SUMS of atoms (i.e. plural individuals). It is an operation of sum-formation and a plural noun is a noun that denotes a sum:

(17) [masa] ∈ ATOM → [*masa] ∈ SUM

For Link (1983), the use of the lattice structure to represent the semantics of plurals is desirable for two reasons. First of all, this structure can capture a shared semantic property of plurals and mass terms, which is usually called the “cumulative reference property” (or *cumulativity*). Both mass nouns and plural nouns are said to refer

cumulatively in that if two elements, say x and y, are under the extension of a plural or mass predicate P, then their sum, x∪y, is also under the extension of P.

(18) P is cumulative iff:

$$\forall x\ \forall y\ [x \in P \wedge y \in P \rightarrow [x \cup y] \in P\ ]]$$

We see that the lattice structure above captures the cumulativity relation easily. It captures this property by virtue of the fact that every bottom element is a member of the elements in the middle row, and every element in the middle row is a member of the elements in the upper row, and through the rule of transitivity, every element in the bottom row is also a member of the uppermost element. This guarantees that (19a) entails (19b), and that (20a) entails (20b):

(19) a. Ali bir öğretmendir ve Berna bir öğretmendir.

b. Ali ve Berna öğretmendir.

(20) a. Benim bardağımda *su* var ve senin bardağında *su* var.

b. Bizim bardaklarımızda *su* var.

Moreover, since both mass nouns and plural nouns have the cumulativity property, Link (1983) argues that both domains can be represented using the lattice structure. The difference, however, is that in the mass domain the bottom elements (i.e. the atoms) of the lattice is removed, since for Link (1983) a mass noun like *su* does not have minimal atomic parts (at least not in the way how we perceive it cognitively)[7].

Secondly, and less importantly for our purposes, by representing the domain of individuals as a lattice-theoretic model, Link (1983) is able to provide a uniform analysis

[7] In section II.2.3, however, we will see that the mass domain should also be represented as an atomic domain (Chierchia, 1998; Rothstein, 2007a). Let us stick to Link's claim for now.

of the definite article; i.e. *the* in English[8]. Definiteness is associated with the *supremum* operator: σ. When it applies to a (singular or plural) noun, it chooses the uppermost element under the extension of the noun. To give an example, the set denoted by the plural noun *sandalyeler* is:

(21) [*sandalye] = {a, b, c, a∪b, a∪c, b∪c, a∪b∪c}

When this noun is used as a definite NP, the σ operator will pick out the maximal sum under the denotation of it. Thus:

(22) σ[*sandalye] = {a∪b∪c}

This accounts for the fact that when we say

(23) Bu odadaki sandalyeler temiz değil.

we refer to all the chairs inside the room, i.e. to the maximal sum of chairs. The same is true about the semantics of the definiteness operator with singular count nouns. Only this time, since a singular count noun does not have sums in its extension,

(24) [sandalye] = {a, b, c}

the definiteness operator has no maximal sum that it can pick out. Therefore, the output of the operator will again be an atom.

(25) σ [sandalye] = {a} ∨ {b} ∨ {c}

Finally, Link (1983) argues that the lattice structure above is an atomic part-of structure governed by a partial order relation: ≤. We can think of the partial order relation as the opposite of the summing operation, ∪. Partial order means that every element in the domain, say a, b or a∪b, is an atomic part of the higher elements in the domain, i.e. a ,b ∈ a∪b; and a∪b ∈ a∪b∪c etc. Thus, for the partial order relation, the following holds:

[8] Turkish does not have a definite article. It has usually been assumed that subject NPs get definite interpretation according to their position in the sentence. In that respect, sentence-initial position has been argued to mark definitiness for subjects in Turkish. Definiteness of direct objects, on the other hand, is marked with the accusative case.

(26) $\forall x\ \forall y\ [x \leq y \rightarrow x + y = y]$

So, for example, the sum of the set {a∪b} with its atomic part {a} will again give us the set {a∪b}. This accounts for the fact that a sentence like (28a) entails (28b):

(27) a. Ali ders çalıştı ve daha sonra Ali ve Berna birlikte ders çalıştılar.

b. Ali ve Berna ders çalıştı.

To sum up, for Link (1983) the domain of individuals is represented by a complete join semi-lattice. The lattice structure is atomic and governed by an atomic partial order relation. Pluralization, which Link (1983) associates with the star operator *, is an operation that applies to ATOMS and create SUMS. The use of the lattice structure and the * operator accounts for the fact that plural nouns, similar to mass nouns, have "cumulative reference property".

Let us now come to the interpretation of verbal predicates in Link's theory.

II.1.2.2. Distributivity and Collectivity in Link (1983, 1984)

Link's treatment of distributivity and collectivity assumes that there is an abstract distributivity operator, ^{D}, which applies to distributive predicates and distinguishes them from collective predicates in the verbal domain. First of all, inherently collective predicates such as BULUŞ-, TOPLAN- are predicates that do not take singular individuals into their extension. They only take sums of individuals. Thus a sentence like (28a) can be represented as (28b):

(28) a. 4 çocuk parkta toplandı.

b. $\exists X\ ([*\text{çocuk}]\ (X) \wedge |X| = 4 \wedge \text{TOPLAN-}\ (X))$

Here, the fact that X inside the cardinality symbol "| |" is bound by the existential quantifier ∃ outside the formula requires that the plural NP be interpreted as collective. The

formula can roughly be translated as there is *one* X such that X is a plurality of children and the cardinality of X is four, and the predicate TOPLAN- applies to X. Thus the predicate applies only to whole set, i.e. to the sum of children, not down to all the singular individuals of the set. Given this, it is clear that (29a) does not entail (29b):

(29) a. [*çocuk] ∈ TOPLAN- ≠

b. ∀x ∈ [*çocuk] : x ∈ TOPLAN-

Thus, an inherently collective predicate such as TOPLAN- does not take individual atoms (i.e. singularities) but only takes sum-atoms (i.e. pluralities) into its extension.

For distributive interpretation, Link (1983) needs an operator to specify that the predicate applies down to the minimal atoms of the sum as well. Link (1983) argues that inherently distributive predicates such as YÜRÜ-, AĞLA- etc. are represented by a ^{D} operator. Hence:

(30) AĞLA- → ^{D}AĞLA-

The importance of the ^{D} operator is that it allows us to quantify over the individual atoms of a sum that a distributive predicate, ^{D}P, applies to. The meaning postulate of the operator that allows us do this is something of the following form (Landman, 2000: 148):

(31) ^{D}P {d ∈ D: ∀a ∈ AT (d): a ∈ P}

The formula above tells us that a distributive predicate applies down to all the atomic parts of an element *d* that is a member of the domain of individuals *D*. This guarantees that a sentence like (32b) can be entailed by a sentence like (32a), through a process defined by (33) - (36):

(32) a. Çocuklar ağladı.

b. Ali ağladı, Berna ağladı ve Cem ağladı.

Assume that the set denoted by *çocuklar* is {Ali, Berna, Cem}. Hence:

(33) σ [*çocuk] = {a∪b∪c}.

Sentence (32a) expresses that this set is a member of the set of individuals that cried:

(34) {a∪b∪c} ∈ ^{D}AĞLA-

Now, through the meaning of the ^{D} operator, the predicate AĞLA- applies down to all the atomic parts of the set {a∪b∪c}:

(35) ^{D}AĞLA- {∀x ∈ AT (a∪b∪c) : x ∈ AĞLA-}

Since both *a* and *b* and *c* are the minimal atoms of the sum {a∪b∪c}, we derive the meaning of sentence (32b), represented as (36):

(36) a ∈ AĞLA- ∧ b ∈ AĞLA- ∧ c ∈ AĞLA-.

(32a) is able to entail (32b) by the definition of three facts: a) the definition of the plural operator *, b) the definition of the distributive operator ^{D}, c) the fact that *D* (domain of individuals) is an atomic part of structure. Since * creates plural nouns that denotes cumulatively, every atomic part of a sum that is under the denotation of the plural is under the denotation of ^{D}P. As a result, when a distributive predicate applies to a sum, it can apply down to all the atomic parts of the sum.

Distinguishing inherently distributive predicates from collective predicates by a ^{D} operator, Link (1983) puts forward that mixed predicates, i.e. predicates that are neither inherently collective nor inherently distributive, are ambiguous between P and ^{D}P. For example, in the following sentence, we can read the plural NP both collectively and distributively:

(37) Adamlar yukarı masa taşıdı.

Therefore, the predicate YUKARI MASA TAŞI- is able to take both atoms and sums of atoms into its extension. The predicate generates two readings of sentence (37):

(38) a. [*adam] $\in$ YUKARI MASA TAŞI = COLLECTIVE

b. [*adam] $\in$ ^{D}YUKARI MASA TAŞI- = DISTRIBUTIVE

Notice that the interpretation of the NP is stable in both cases; it denotes a set of atoms closed under sum-formation. However, the predicate determines whether it reaches down to the minimal atoms of this sum or not. This amounts to the claim that the distributive-collective ambiguity is inside the VP. By arguing that the ambiguity is located inside the VP, Link (1983) separates from his precursors such as Scha (1981). For Scha (1981), the ambiguity is not inside the VP but in the NP. Link (1984) provides a sentence similar to (39) as counter-evidence to Scha's claim:

(39) Çocuklar evin önünde buluşup yukarı eşya taşıdılar.

In (39), the predicate EVİN ÖNÜNDE BULUŞ- requires a collective interpretation of the plural NP, but the same NP is at least allowed to get a distributive interpretation under the predication of YUKARI EŞYA TAŞI-. Therefore, it should be the VP, but not the NP, that creates the ambiguity (see also Roberts (1987) for some more arguments against Scha's claim).

Up to now, Link's theory gives us two types of individuals: atoms and their sums. When a collective VP applies to a plural NP, it only takes sums into its extension. When a distributive VP applies to a plural NP, it also takes the singular atoms of the sum into its extension. In 1984, Link extends his theory by stating that we need a different kind of individuals, mainly to deal with sentences like:

(40) *Ali ve Berna* **ve** *Cem ve Deniz* birbirlerini iyi tanıyorlar.

From what we have so far, we can get two interpretations of (40): the distributive and the collective one. The collective interpretation means that Ali, Berna, Deniz, and Cem are all under the "know each other" relation, which is not quite exactly what the sentence tries to

explain (of course, it is still a possibility). In the distributive interpretation, however, sentence (40) entails something like

(41) *Ali birbirini iyi tanıyor ve Berna birbirini iyi tanıyor ve Cem birbirini iyi tanıyor ve Deniz birbirini iyi tanıyor.

which is not acceptable. What sentence (40) actually means is that *Ali and Berna*, as a couple, and *Cem and Deniz*, as a separate couple, know each other well. In that respect, the sentence is neither entirely collective (since it does not apply to the sum of *all* individuals, but only to separate sums of individuals), nor exactly distributive (since it does not apply down to *all* minimal atoms of individuals, but able to distributive down to the level of separate sums). The sentence is something in between; it denotes a *distribution to collections*.

The problem with sentence (40) for Link's (1983) theory is that although we need our predicate to distribute, we want it to distribute down only to the level of two sums of individuals, not down to all the atomic individuals. Link's theory so far cannot achieve this, because the distributivity operator distributes all the way down to individuals and collective predicates do not distribute at all.

To account for such cases, Link (1984) introduces the category of GROUPS. A group is an entity which is a sum that behaves like an atom. Let us explain it this way: We have said before that a plural noun denotes a set of atoms and their sums, i.e.

(42) $[*X] \rightarrow \{a, b, a \cup b\}$

Now, when the plural noun shifts its interpretation from SUM to GROUP, the atoms that are part of the sum are erased and the set is closed off by a group operator $\uparrow$[9]. Hence:

[9] This is actually Landman's (1989, 1997, 2000) symbol for GROUPS. We use it for the sake of uniformity here because when we discuss Landman's theory in the next section, we will represent GROUPS with $\uparrow$ as well.

(43) $\{a, b, a \cup b\} \rightarrow \uparrow\{a \cup b\}$.

As a result of the semantic effect of this group operator, the sum in turn becomes an atomic entity in its own right, because now it has no parts except for itself (which is what being an atom is all about).

Link (1984) argues that this explains why in sentence (40) the predicate cannot distributive down to all the singular atoms. Since the plural NPs *Ali ve Berna* and C*em ve Deniz* denote groups in (40), their atomic parts are erased by the group operator and they themselves became atoms. Therefore, distribution is possible only down to these group atoms, not down to all the individual atoms. Sentence (40) has the interpretation in (44):

(44) $\uparrow (a \cup b) \cup \uparrow (c \cup d) \in {}^{D}$TANI-

By allowing the two plural NPs to have a group denotation and the predicate TANI- to have distributive reference, Link (1984) solves the problem of distribution to collections.

To sum up, in Link's theory the domain of individuals is represented by a complete join semi-lattice which contains individual atoms and their sums under sum-formation, $\cup$. We have two kinds of semantic operators: * creates plurals in the nominal domain by applying to a set of atoms and adding to the denotation of it all the sums that can be formed with the atoms; and ^{D} creates distributive predicates. On the level of individuals, we have three different categories of individuals: SINGULAR ATOMS, SUMS, and GROUP-ATOMS. Distributivity is predication of a distributive predicate, ^{D}P, to a set of atoms and their sums, i.e. a plural set {*X}. Collective predicates, on the other hand, apply only to sums without applying down to the individual atoms. To account for *distributivity to collections*, Link uses a different category from sums and (singular) atoms, i.e. GROUPS.

II.1.2.3. Landman (1989, 1997, 2000)[10]

The basic ideas of Landman's theory can be summarized as follows.

1. Link's (1983, 1984) theory of plurality complicates things too much and misses important generalizations.

2. The distinction between the plurality operator * in the nominal domain and the distributivity operator ^{D} in the verbal domain is not well-motivated. The ^{D} operator can be defined in terms of the * operator.

3. The distinction between SUMS and GROUPS in collective predication is also not well-motivated. All collective predicates should be taken as predication only to GROUPS.

4. We can simplify the grammar by means of taking distributivity as semantic plurality and collectivity as semantic singularity in the verbal domain.

In Link's (1983, 1984) theory, pluralization operator in the nominal domain creates sums out of singular atoms. We have seen that Link mainly uses the * operator to capture the "cumulative reference property" of plurals in the nominal domain. In Link (1983), nominal predicates as in (45) are made plural by assuming that they get the same interpretation as the plural noun they are predicated of:

(45) a. Ali bir öğretmendir ve Berna bir öğretmendir.

b. Ali ve Berna öğretmendir.

Given what cumulativity says, it is easy to see that the * operator captures the cumulative reference property of plurals in the nominal domain:

(46) a.*P is cumulative iff:

$a \in P \wedge b \in P \rightarrow [a \cup b] \in *P$

[10] Throughout section II.1.2.3., we will use the name *Landman* to refer to all the three works of the researcher, i.e. 1989, 1997, 2000. When we want to refer to a specific work, we will simply enclose that work in parantheses, as usual.

b. $a \in$ ÖĞRETMEN $\wedge$ $b \in$ ÖĞRETMEN

$\rightarrow [a \cup b] \in$ *ÖĞRETMEN.

On the other hand, for cases of distributivity Link (1983) introduces a different operator on verbal predicates, the operator ^{D}. Therefore, in Link's (1983) theory, plurality and cumulativity are strictly distinguished from distributivity.

The main idea of Landman's theory is that there is no need to complicate the grammar by using different operators in different domains. In the verbal domain as well, for any sentence that is distributively true, cumulativity also holds. Comparing (47) to (45) above:

(47) a. Ali iki saat uyudu ve Berna iki saat uyudu.

b. Ali ve Berna iki saat uyudu.

we see that the same cumulative inference as in (45) naturally follows from a distributive predicate as (47). So, the equivalence of (47a) to (47b) is nothing but the verbal counterpart of the equivalence between (45a) and (45b). As a result, Landman (2000: 153) notes that "what explains the equivalence for nominal predicates [should be] the same as what explains the equivalence for verbal predicates." Link's (1983) theory, with a * operator to explain the equivalence in (45) and ^{D} operator to explain the equivalence in (47), fails to capture this generalization.

Following this, Landman argues that we should not use separate operators in the two domains, but the ^{D} operator can be defined as the * operator and thus the * operator can replace ^{D} in the verbal domain.

(48) $^{D}P = *\{a \in AT: a \in P\}$

The formula tells us that a distributive predicate is defined as a plural predicate (since it is defined by the * operator) such that every atomic member of the sum that the predicate

applies to is a member of the predicate. Sentences such as (47a-b) above attest to the validity of this judgment.

In practice, defining distributive predicates with a * operator instead of a ^{D} operator has no different semantic effects on how distributivity works: in both cases distributivity is an application of a predicate to sums and individual atoms of the sums. In theory, however, this seemingly small change in the use of the operators has very important results. By using the plurality operator * for distributive predicates as well, Landman reduces distributivity (and also cumulativity) to semantic plurality in the verbal domain, which results in the simplification of the grammar to a great extent. Understanding distributivity as semantic plurality helps us explain the equivalence between (45a-b) and (47a-b) in a unified way. Instead of postulating two different operations for (45) and (47) in two different domains,

> [we] can assume that the grammar contains a single operation that forms semantically plural predicates out of semantically singular predicates: in the nominal domain, pluralization leads to plural nouns; in the verbal domain, the same operation creates distributive interpretations.
>
> Landman (2000: 152)

Thus, what explains the cumulativity property of plurals in the nominal domain (i.e. semantic plurality) is what explains the same property in the verbal domain. In other words, since cumulativity is the natural result of distributivity in the verbal domain, distributivity corresponds to the realization of semantic plurality in the verbal domain.

Landman also argues that this unified analysis of plurality in the nominal and verbal domain is supported on philosophical grounds as well. In the nominal domain, the pluralization operation on nouns offers us an economical way of saying things:

> Without the plural, we would have to say: John is a boy and Bill is a boy and Henry is a boy; with the plural we can say that in one swoop: John and Bill and Henry are boys.
>
> Landman (2000: 155)

Although semantic plurality is not grammaticalized on verbs as it is on nouns, we see that in the verbal domain the economy of expression provided by plurality shows up as well, this time in cases of distributive predication. Instead of saying *Ali ağladı ve Berna ağladı ve Cem ağladı*, we can say *Ali, Berna ve Cem ağladı* "in one swoop". Thus, functionally, what plurality does for nouns is what distributivity does for verbal predicates.

As a result, in Landman's theory distributive predication is **plural predication** to individual atoms and their sums. We do not need different operators to mark distributivity and plurality in different domains, but one and the same operation, semantic plurality, marks both plurality and distributivity in the nominal and verbal domain. Thus, a distributive sentence like (49a) is represented as a predication of a plural predicate, *P, to a plural individual, as in (49b):

(49) a. Öğrenciler araştırma yaptı.

b. σ [*öğrenci] ∈ *ARAŞTIRMA YAP-

Another argument that Landman puts forward against Link (1983, 1984) concerns the distinction that Link makes between collectives and groups. Landman further argues that the distinction between collectives and groups is also not well-motivated, for reasons that will be made explicit below.

In Link's (1984) theory, a collective predicate only applies to sums, while a distributive predicate distributes down to the atoms of sums as well. To account for cases of *distribution to collections*, Link introduces the idea of GROUPS, which are made up of sums but behave like singular atoms. However, Landman argues that cases of *distribution to collections* such as (50) are problematic for Link (1984). In the distributive interpretation of TOPLAN- below, sentence (50a) is equivalent to sentence (50b). This

interpretation is triggered, for example, if we modify the predicate with an expression like *ayrı odalarda* (Landman, 1997: 426):

(50) a. Öğrenciler ve öğretmenler (ayrı odalarda) toplandı.

b. Öğrenciler toplandı ve öğretmenler toplandı.

To get the *distribution to collection* reading of (50a) in Link's theory, we have to represent the two NPs in the sentence with a group operator $\uparrow$ and the predicate TOPLAN- with a ^{D} operator, as in (51a).

(51) a. $\uparrow [\sigma (*\text{öğrenci})] \cup \uparrow [\sigma (*\text{öğretmen})] \in {}^{D}\text{TOPLAN-}$

On the other hand, the equivalent of (50a), i.e. (50b), is simply represented as a predication of a collective predicate to sums, as in (51b):

(51) b. $\sigma [*\text{öğrenci}] \in \text{TOPLAN-} \wedge \sigma [*\text{öğretmen}] \in \text{TOPLAN-}$

Notice that there is no need for a ^{D} operator on the predicate TOPLAN- here; meaning that it is a collective predicate that does not distribute down to the individual atoms of the sum that it applies to.

The problem starts to appear here. By means of a logical conversion of the formula (51a), the interpretation of (50a), we can make it equivalent to (52):

(52) $\uparrow [\sigma (*\text{öğrenci})] \in \text{TOPLAN-} \wedge \uparrow [\sigma (*\text{öğretmen})] \in \text{TOPLAN-}$

Now, since (52) is (51a), and (51a-b) are equivalent, it follows that (52) should also be equivalent to (51b). However, it is not. The problem is that in (51b) we represent the collective predicate TOPLAN- as taking sums into its extension, while in (52) we represent it as taking group-atoms into its extension. Hence, we end up with two interpretations of one and the same predicate, which is obviously a contradiction. What we need to do is to decide whether collective predicates takes sums or groups into their extension, because we would want our theory to be unified and not ambiguous.

To solve the problem, Landman proposes that all collective predicates should be represented as taking only group-atoms into their extension. There is no need, he argues, to assume that collective predicates normally apply to sums but in dist*ribution to collection* cases they apply to groups, because "no empirical evidence ….shows that….we can distinguish between the two collective readings" (Landman, 2000:154). To give a unified analysis of collectives, Landman argues that in all cases of collective predication (rather than only in cases of *distribution to collections*) sums become group-atoms. To account for this, Landman postulates a type-shifting operation on sums:

↑ is a one-to-one function from SUM onto ATOM such that
1. ∀d ∈ SUM-IND : ↑ (d) ∈ GROUP
2. ∀d ∈ IND: ↑(d) = d. Landman (1997: 434)

Thus, any collective predicate in Landman's theory forces a plural NP take on an atomic, i.e. group, reading. A sentence like (53a) is represented as (53b):

(53) a. Çocuklar toplandı.

b. ↑ [σ (*çocuk)] ∈ TOPLAN-.

As a result, without complicating the grammar with two separate categories (SUMS and GROUPS) to explain sentences like (50a-b), we can use one and the same category (i.e. GROUPS) for a unified analysis of (50a-b).

Again, all these discussions of collectivity in Landman's theory have important theoretical consequences. Remember that Landman reduces distributivity (and cumulativity) to semantic plurality by suggesting that a distributive predicate is a semantically plural predicate, i.e. *P, because it applies to sums and also to the minimal atoms of sums. Now, collective predicates only apply to groups, and groups are, as we have stated above, atomic elements in their own right. They are atomic because their part structure is removed by the group operator:↑. On the other hand, all atoms are, by

definition, semantically singular entities. Therefore, since collective predicates only take into their extension semantically singular entities, collectivity corresponds to semantic singularity for Landman. Collective predication is a predication of a singular (or *basic* for Landman[11]) predicate to a set of singular atoms (group or individual atoms). As a result, Landman's theory is one in which predicates are distinguished according to what kind of objects they take into their extension. There are two modes of predication:

> a) singular predication applies a basic predicate to an atomic (singular or group) individual.
> b) plural predication applies a plural predicate distributively to a plural sum of such atomic individuals. Landman (1997: 428)

In conclusion, we see that Landman manages explain (or "reduce," in his own words) a relatively large number of phenomena related to plurality with a simple semantic distinction: semantic singularity and plurality. A collective predicate is a singular predicate; therefore it only applies to semantically singular sets, i.e. group atoms. A distributive predicate is a plural predicate; therefore it applies to semantically plural sets, i.e. sums and minimal atoms of the sums.

II.1.3. Questions on Plurality and Telicity

We have said that for Landman collective predication is singular predication, so an inherently collective verb such as TOPLAN- is a singular predicate. On the other hand, distributive predication is plural predication, so an inherently distributive verb such as AĞLA- is a semantically plural predicate, i.e. *AĞLA-.

[11] Landman argues that all basic predicates are singular predicates. Plurality operation on the predicates is the marked case.

One question related to Landman's theory is: apart from inherently collective and inherently distributive predicates, what can be said for mixed predicates? For example, a verb like YE- can be predicated collectively to a singular set of individuals (i.e. a group-atom) as in (54a), or distributively to a plural sum of individuals, as in (54b):

(54) a. Çocuklar bir elma yedi.

b. Çocuklar elma yedi.

Landman's explanation would be: in (54a) the predicate BİR ELMA YE- is a singular predicate, therefore it takes a singular collection of individuals into its extension. In (54b) the predicate ELMA YE- is semantically plural, therefore it applies distributively to a plural sum of individuals. Thus, a * operator appears on *ELMA YE-, but not on BİR ELMA YE-.

What we need an explanation for is this. What motivates, apart from the fact that in (54b) there is a possible distributive interpretation of the subject, the appearance of the * operator on the predicate ELMA YE-? Similarly, apart from the fact that the subject in (54a) is interpreted collectively, what can be taken as evidence to the claim that a predicate like BİR ELMA YE- is a singular predicate? In short, what we are looking for is a theory that is independent of the theory of plurality to provide independent justification for the claim that some predicates are indeed semantically plural while others are semantically singular. The belief that we are entitled to ask for such an independent justification derives from the idea that if predicates can really be distinguished as to semantic singularity and semantic plurality in the verbal domain, then we would expect other linguistic phenomena to be sensitive to this distinction as well.

We believe that one such phenomenon can be lexical aspect. Considering the following examples, we see that there is a systematic correspondence between telic-atelic

features of different event types and distributive-collective interpretations of plural subjects that they are predicated of. Activities, which are atelic, create distributive interpretations:

(55) a. Öğrenciler bir saat boyunca ders çalıştı.

b. Çocuklar bir saat boyunca uyudu.

Achievement VPs, which are inherently telic, create collective interpretations[12]:

(56) a. Çocuklar dağın tepesine 5 dakikada ulaştı.

b. Bardaklar bir anda yere düştü.

Accomplishments, (and/or incremental theme verbs) create collective interpretations when they are telic (57b), distributive interpretations when they are atelic (57a):

(57) a. İşçiler 10 dakika boyunca su içti.

b. İşçiler 10 dakikada bir bidon suyu içti.

The possibility, then, is to state that telicity versus atelicity is sensitive to semantic singularity versus semantic plurality and that atelic predicates; i.e. activities, denote inherently semantically plural events[13], while telic predicates; i.e. achievements, denote semantically singular events. If we are going to claim this, we need an explicit theory of events to tell us on the basis of what criteria different aspectual event types can be distinguished from one another as to semantic singularity versus semantic plurality. Expanding on this question is what we are going to do in chapter III.

As a result, here is what the aspectual event semantics account that will be argued for in chapter III should look like:

a) It should explicate – independently from collective-distributive debates and taking into consideration only the temporal, lexical aspectual features of

[12] We assume, following Filip and Rothstein (2005) and many others, that (a)telicity moves from the verbal head upwards, i.e. from V to VP, and from VP to the whole sentence.

[13] It is interesting that many (if not all) inherently distributive verbs such as UYU-, AĞLA-, YÜRÜ-, KOŞ- etc. correspond to activities in the lexical aspectual domain. If we can prove what we say here is true (i.e. that activities are semantically plural predicates), then this correspondance stops being a matter of coincidence.

different event types – how activity, achievement, and accomplishment event types are distinguished from one another as to singularity versus plurality.

b) Afterwards, it should explain in a unified way how plurality interacts with telicity and atelicity.

c) The results that the aspectual account reaches about singularity and/or plurality of events should not create contradictions to Landman's claim that collectivity is singular predication and distributivity is plural predication.

II.1.4. Semantics of Bare Noun Direct Objects

In this short section, we will give a brief outline of the semantics of bare noun (henceforth: BN) direct objects and show the problems they create for aspectual composition. Similar to the last section, we will just define the problems here, which will be worked on in detail after we obtain the necessary tools for the job in chapter III.

As noted by Aksan (2007), Nilsson (1986) and Schroeder (1999) there are two types of BN + verb combinations in Turkish, both of which are very productive. The first type is called the "idiomatized" BN + verb combination, where the literal meanings of the object and the verb are somewhat merged together and lost. Some typical examples are predicates like BALIK TUT-, OMUZ SİLK- etc. (Aksan, 2007: 108). Aksan (2007: 108) notes that in the case of BALIK TUT-, "the verb *tutmak* ….undergoes a 'semantic specialization' in that it denotes a semantic sub-concept of its general meaning." In this case, the BN direct objects are said to be "incorporated"; they have a non-definite and non-referential status.

The other type – the type which we will mainly be dealing with in our discussions on lexical aspect – is the non-idiomatized object+verb combination. In contrast

to the former type; in these combinations the literal meanings of the members of the predicate are not lost. This time they are referential, indefinite, and non-incorporated. Some examples are predicates like KİTAP OKU-, MEKTUP YAZ-, ELMA YE-, OTEL YAP- etc. (Aksan, 2007: 107-108).

There are a number of syntactic, semantic, and pragmatic tests that are employed to distinguish these two types of BNs from one another clearly, as shown by Aksan (2007) and Schroeder (1999). We will not go into detailed explanations of these tests, but briefly; they are about (i) the scope of the modifiers that modify VPs with BN direct objects, (ii) the ability of the BN direct objects to leave their syntactic positions, and (iii) the ability of BN direct objects to establish discourse referents. If the direct object is an incorporated, non-referential BN, the modifier preceding the BN modifies the whole VP, not the noun only. If it is referential and non-incorporated, however, the modifiers take scope over the noun only. On the other hand, incorporated BN direct objects cannot move out of their preverbal position and only let focus particles or question clitics to occur between the noun and the verb, while non-incorporated BNs can easily shift their syntactic positions in the sentence. Finally, it has been argued that non-incorporated, referential direct objects can establish discourse referents, while incorporated, non-referential BNs cannot.

Now, let us come to the problems that non-incorporated, referential BNs pose for aspectual composition. It has usually been argued that non-incorporated BNs have a "transnumeral" reading, i.e. they are underspecified as to singularity and plurality (Dede, 1986). In a sentence like:

(58) Ali mektup yazdı.

we do not know whether Ali wrote only one letter or more than one letter; the sentence is true in both interpretations. It is exactly this underspecified property of these preverbal BNs that is problematic for aspectual theories. We see that the sentence can be interpreted either as telic or atelic:

(59) a. Ali 10 dakikada mektup yazdı.

b. Ali 10 dakika boyunca mektup yazdı.

Therefore, what we need is an aspectual account to explain how, and also why, both telicity and atelicity is possible in sentences like (59).

In the preceding section, we have implied that Landman's (1989, 1997, 2000) theory of plurality gives us a chance to associate atelicity with semantic plurality and telicity with semantic singularity. Landman argues that collectivity is singular predication and distributivity is plural predication; and we have said that telic predicates create semantically singular (i.e. collective) interpretations of plural NPs. Now, when we consider the interpretation of transnumeral BNs under telic and atelic predication, we observe a similarity between their countability properties and that of the plural NPs. In telic sentences, the objects are allowed to take on singular interpretations, in atelic sentences, they cannot:

(60) a. Deniz 10 dakikada arkadaşına mektup yazdı ve onu yolladı.

b.*Deniz 10 dakika boyunca arkadaşına mektup yazdı ve onu yolladı.

(Aksan, 2007: 111)

In telic (60a), the fact that *mektup* can be the antecedent of *onu* shows that it is allowed to take on a singular interpretation. In atelic (60b), however, there is no such possibility. So, once again there seems to be a correspondence between telicity and semantic singularity.

Thus, we come back to the same questions that we asked at the end of the preceding sections. Telicity and atelicity seems to display a correspondence between semantic singularity and semantic plurality both in terms of the interpretation of plural NPs and in terms of the interpretation of preverbal bare nouns. Therefore, once again the need for an event semantics account to explain how different aspectual event types can be distinguished from one another as to semantic singularity and semantic plurality arises. The hope is that such an account can account in a uniformed way for the behavior of plural NPs in aspectual composition on the one hand and preverbal bare nouns on the other.

II.2. Mass Nouns in Turkish

From II.1. to II.2., we have discussed the semantics of plurals and preverbal bare nouns; and also questioned how an account of telicity and lexical aspect can treat these nouns by presenting the problems that they raise for aspectual composition. From now on, we will work on the semantics of mass nouns in Turkish. The organization is as follows.

In section II.2.1., we will introduce what has come to be known "the mass-count distinction" in linguistics literature. In section II.2.2., we will present different approaches to mass-count distinction, which we will name "the grammatical approach" and "the ontological approach" respectively, and show that both approaches run into problems, especially in terms of Turkish. To account for these problems, in section II.2.3., we will introduce a theory of atomicity and countability developed by Rothstein (2007a), and propose to analyze the mass nouns and their problematic behavior in Turkish using that theory in section II.2.4. As has become usual by now, the part will end with a reference to chapter III, by raising some questions on what problems mass nouns pose for telicity and

aspectual composition and how they can be treated. Finally, section II.3. will conclude chapter II.

II.2.1. The Mass-Count Distinction

In many languages, one can find a difference between two types of singular nouns, namely; mass nouns and count nouns. Mass nouns are usually classified as:

(61) a. liquids: su, çay, kahve, süt, etc.

b. powders : kum, şeker, tuz, un, toz etc.

c. substances : metal, altın, tahta, çamur etc.

d. abstract objects : bilgi, zaman etc.

e. superordinates (also called *Fake Mass Nouns*) : mobilya, yük, ekipman.

Of course, there are many other mass nouns such as *hava, kirlilik, hayranlık* etc. that can be put under one category or another. On the other hand, nouns like *kalem, masa, elma, ev, dolap* etc. are count nouns. Although the classification seems well-defined at first sight, it is not as clear-cut as one would expect. There are many problems surrounding the mass-count distinction, both in terms of grammatical, semantic and philosophical considerations.

To name just a few, a first problem is the fact that it is not always the noun per se, but the whole NP that is responsible for a noun's mass or count value (Allan, 1980; Bunt, 1985; Quine, 1960 among many others). A typical count noun like *elma* can have a mass use as in (62):

(62) Salataya *biraz elma* ekle.

Moreover, one and the same word may have different senses, one of which is count while the other is mass. For example, in sentences (63a-b), the word *tavuk* has a count and a mass

value (respectively) depending on whether it refers to the animal or the meat of the animal (Behrens, 1995):

(63) a. Çiftlikte 3 *tavuk* var.

b. Tabağındaki *tavuğu* bitir.

A maybe more important problem is that, while some languages, such as English, has strict grammatical codifications of the mass-count distinction; in others, such as Chinese, Japanese and as we shall see Turkish, the mass-count distinction is (at least grammatically) neutralized. We will see this in more detail in the next section.

Different researchers in the literature have approached in different ways and have proposed different criteria for the mass-count distinction. In the following sections, we will summarize two approaches to the issue – the grammatical approach and the ontological approach – both of which have been widely discussed in the literature. While the grammatical approach deals mainly with the grammatical distribution of mass and count nouns, the ontological approach concerns itself with the nature of the entities that mass nouns denote and with the question of the inherent structure of these entities.

II.2.2. Approaches to Mass-Count Distinction

II.2.2.1. The Grammatical Approach

The grammatical approach, the main proponent of which is Bloomfield (1933), argues that the only proper way of distinguishing mass nouns from count nouns is their syntactic distribution, i.e. their cooccurence restrictions with certain types of determiners, quantifiers, and morphological markers. Empirically, mass nouns are distinguished from count nouns in terms of their grammatical behavior along the following parameters. To give examples from English:

(64) *Occurrence with the plural marker.*

Only count nouns can be pluralized, while mass nouns cannot:

a. pencils, doors, chairs.

b. *waters, *informations.

(65) *Cooccurence with numerals.*

Mass nouns cannot be used with numerals by themselves, but count nouns can.

a. three pencils, four cars, two bottles.

b. *three sands, *two informations, *five airs.

(66) *Cooccurence with measure phrases or classifiers.*

For a mass noun to combine with a numeral, a measure or a classifier phrase has to mediate between the numeral and the noun inside the NP.

a. three pieces of furniture, two pieces of music.

(67) *Cooccurence with certain determiners.*

a. Some determiners are compatible only with count nouns:

every, each, a, several, few, a few, many, both.

b. Some determiners are compatible only with mass nouns:

little, much.

c. Some determiners are compatible with both sets of nouns:

the, some, any, no.

d. Some determiners are compatible with plurals and mass nouns.

a lot of, plenty of, more, most.

For the grammatical approach, these syntactic parameters are the only means for us to classify the mass nouns and the count nouns in the lexicon, and the distinction has nothing to do with meaning whatsoever. Palmer (1971: 34-35) articulates such a view:

> It is easy enough to show that grammatical distinctions are not semantic ones by indicating the many cases where there is not a one-to-one correspondence. An often noted example is that of *oats* and *wheat*. The former is clearly plural and the latter singular. [….] Further examples are to be found in *foliage* vs. *leaves*, in English *hair*, which is singular and French *cheveux*, plural. These distinctions are grammatical and do not correspond to any categories of meaning.

However, the grammatical approach creates some serious problems.

Problems with the Grammatical Approach

"It turns out to be a tricky matter to define the class of mass nouns on the basis of syntactic properties," writes Bunt (1985: 9), "so tricky that most authors on mass term semantics avoid the issue". There are two important problems that the grammatical approach raises. First of all, if mass-count distinction has nothing to do with meaning, then we cannot explain systematic meaning differences between mass nouns and count nouns in any proper ways (Behrens, 1995; Joosten, 2003). Typical mass nouns like *su, altın, kum,* can all be said to denote *substances* "in a chemist's sense" of the word (Parsons, 1970: 365), while count nouns all denote discrete objects. Thus, under the grammatical approach, we have no means to account for that kind of a systematic difference between the referential properties of mass nouns and count nouns, and we have to assume that the difference is purely coincidental.

A second problem is that the mass-count grammar outlined above is not universal. There are languages, such as Turkish, where although language-users have a cognitive grasp of the distinction, the distinction does not manifest itself in the grammar as systematically as it does in English. Many of the distributional parameters that are used to

distinguish the two types of nouns form one another cannot be applied successfully to Turkish. In Turkish:

(68) Mass nouns can be pluralized.

a. Bu işte büyük *paralar* var.

b. Bir sene içinde yöre hakkında edindiği *bilgileri* bir kitapta derledi.

c. Masadaki *suları* kim içti?

(69) Mass nouns are compatible with numerals without the mediation of classifier or measure phrases.

a. Bana *bir su* ver.

b. İçime *bir rahatlık* girdi.

c. Güzel *bir pirinç* buldum. (Göksel and Kerslake 2005: 164-165)

(70) Distribution of determiners is vague. Many determiners can be used successfully both with count nouns and mass nouns. To give some examples:

(70.1.) birçok:

a. Birçok yeni *insan*la tanıştım.

b. Birçok *mobilya* tamir ettim.

(70.2.) her:

a. Her *şehrin* ayrı bir güzelliği var.

b. Her *toprak* ekin vermez.

(70.3.) çok / az:

a. Toplantıya çok / az *kişi* katıldı.

b. Bu denizde çok *tuz* yok. / Bu denizde az *tuz* var.

(71) The only case where the mass-count distinction manifests itself in the determiner system in Turkish seems to be *birkaç* vs. *biraz*. *Biraz* is only compatible with mass nouns, while *birkaç* can only be used with count nouns:

.a. Bana *biraz para* ver. / *Bana *biraz sandalye* ver[14].

b. *Bana *birkaç para* ver / Bana *birkaç sandalye* ver.

As can be seen from these examples, relying only on grammatical distinctions to define the class of mass nouns can be problematic for languages like Turkish.

II.2.2.2. The Ontological Approach

The ontological view asserts that mass-count distinction is a distinction between real world entities. In this view, there are two semantic parameters that separate mass nouns from count nouns: homogeneity and cumulativity. These are inherent lexical properties of mass nouns in the lexicon and related to the structure of the denotata that mass nouns refer to. We will review them in turn.

Homogeneity

A distinctive property of mass nouns is that the entities they refer to have a homogeneous structure, while the entities that are denoted by count nouns are said to be heterogeneous. A first explanation of this difference was given in a seminal work by Quine (1960: 91):

> To learn 'apple' it is not always sufficient to learn how much of what goes counts as an apple; we must learn how much counts as an apple, and how much as another. Such terms possess built-in modes, however arbitrary, of dividing their reference ….consider

[14] There are cases where *biraz* can precede a count noun in a sentence. For example, while the expression **biraz kitap* is anomalous by itself, in a sentence like *Ben dün biraz kitap okudum*, *biraz* occurs immediately before the noun *kitap*. However, this time the modifier does not modify the noun only, but the whole VP. The sentence means that *I did some reading*, not that *I read some book(s)*. That is, it is the VP that is modified, not the noun.

> 'shoe,' 'a pair of shoes,' and 'footwear': all three range over exactly the same scattered stuff, and differ from one another solely in that the two of them divide their reference differently, and the third not at all.

What Quine (1960) explains above is that mass nouns and count nouns have different modes of "dividing their reference". More clearly, when we divide the reference of a mass noun in two, what we have is still under the denotation of that mass noun. For example, if I have some *flour* in my plate and I divide it into two and put half of it to another plate, what I have in my plate is still *flour*. However, for count nouns like *apple*, *car* etc., this does not hold. If I divide *an apple* into two, what I have is not under the denotation of *an apple*, but two halves of apples. If I divide my car into two, what I have is certainly not a car. Cheng (1973) expresses this property of mass nouns in semi-formal terms as follows:

(72) Any part of the whole of the mass object which is x is x.

Therefore, mass nouns refer to homogeneous entities (i.e. entities whose part has the same denotation as the whole), while count nouns denote heterogeneous entities (i.e. entities whose part does not have the same denotation as the whole).

Cumulativity

In the discussions on plurality in section II.1.2.1, we have seen that cumulativity is a defining property of plural NPs. For cumulativity, the following holds:

$$\forall x \forall y\, [x \in P \wedge y \in P \rightarrow [x \cup y] \in P]$$

So, for example, if there are some *children* in a room and some more *children* enter the room, what we have inside the room is still under the denotation of the word *children*. Mass nouns are just like plural nouns in that respect. If I have some *water* in my glass and I pour some more *water* in it, what I have is still under the denotation of the word *water*. We see that singular count nouns, on the other hand, do not display this property. If there is an apple in the basket and I add one more apple, the object in the basket is no longer *an*

apple, but *two apples*, or *apples*. Therefore, while plural nouns and mass nouns are cumulative, singular count nouns are not.

In general, it can be said that homogeneity and cumulativity are about downward and upward closure properties of entities, respectively. These criteria have been used considerably to distinguish mass nouns from (singular) count nouns in the literature. Although they do capture the semantics of these nouns intuitively, we will see that at a formal level they run into problems. In her theory of atomicity, Rothstein (2007a) discusses these problems in detail, and proposes some amendments. Therefore, in the next section, we will discuss the problems about the ontological approach in relation to Rothstein's theory of atomicity.

II.2.3. Rothstein (2007a): Atomicity in the Nominal Domain

Rothstein's (2007a) theory is actually a theory of counting and/or countability rather than a theory of mass nouns. The two issues, however, are tightly interrelated, and the hypotheses she formulates and conclusions she reaches about what counting is affect the way we understand the mass-count distinction in very important ways. Moreover, as we shall see, her theory provides insightful answers to the problems that the ontological approach poses on the one hand, and gives us some ideas on how the problematic behavior of mass nouns in Turkish – in particular their compatibility with the plural – can be accounted for.

Rothstein argues that although criteria of cumulativity and homogeneity make sense intuitively, the ontological approach runs into problems almost immediately (although she does not explicitly call it "the ontological approach"). The first problem relates to the fact that the ontological approach takes mass-count distinction to be a

distinction between real-world entities; i.e. a distinction between the structure of the denotata. However, many cross-linguistic examples show that the distinction is independent of the structure of the denotata. First of all, if the distinction was between the real-world entities only, then we would expect all languages to make the same choices for the same entities, but this is certainly not the case. While a language refers to an entity with a mass noun, a different one refers to that same entity with a count noun:

(73) a. chalk (mass in English) – tebeşir (count in Turkish)

b. grape (count in English) – du raisin (mass in French)

A second problem is that the homogeneous or heterogeneous properties of a real-world entity does not stop a language-user from referring to that entity both by a mass noun (therefore homogeneously) and by a count noun (therefore heterogeneously). Canonical examples are pairs like:

(74)

mass	count
footwear	shoes
change	coins
carpeting	carpets

Thus, the ontological distinction does not suffice here because the ontological split between the structures of the real world entities does not always make its way into natural language semantics. It seems that one may conceptualize the same reality in different ways, depending on the context.

Finally, it appears that some languages – such as Chinese – only have mass nouns as unmarked nouns (Rothstein cites Krifka (1995) here) and count usages in the language require the mediation of classifiers. Thus, if we assumed that the mass-count distinction is purely ontological, we would have to say that Chinese people always conceptualize reality in a homogeneous way, which would be very hard to believe. As a

result of these cross-linguistic examples, Rothstein (2007a: 4) argues that although "the mass-count distinction is clearly influenced by the structure of the matter; it is not taken over from it."

Another problem regarding the ontological approach is about the criteria of cumulativity and homogeneity themselves. According to Rothstein (2007a: 4) "homogeneity and/or cumulativity cannot be at the root of the mass/count distinction." Let us explain why Rothstein thinks so with some reference back to Link's (1983) theory of plurality.

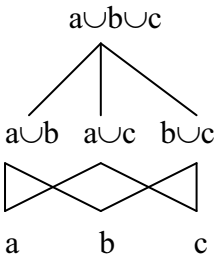
Link (1983) argues that what parallels mass nouns in terms of their upward and downward closure properties is plural count nouns. We have seen that both mass nouns and plural count nouns refer cumulatively. As a result, Link (1983) proposes that both domains can be represented as Boolean semi-lattices. The difference between the two domains is at the level of homogeneity. A mass noun is always homogeneous: no matter how many times you divide a mass entity into two, what you get is still under the denotation of that mass noun referring to the entity. Plural count nouns, on the other hand, are not as homogeneous as mass nouns. This is mainly because a plural noun like *kalemler*, for example, has minimal atoms under its extension (i.e. individual *kalem* atoms from which sums of the lattice are created) and when you divide an individual pencil into two, what you get is no longer a pencil. Therefore, homogeneity does not apply down to all the minimal parts of a plural entity. For Link (1983) a mass noun like *su*, however, does not have minimal *su* atoms from which sums are compositionally generated. Bunt (1985: 5) advocates a similar view:

> Since a mass term does not individuate its reference, it would seem that we should not use sets in the same way in formalizing the denotation of a mass term. Indeed, it seems intuitively wrong to ask what members constitute the sets that mass terms like 'orange juice', 'money', or 'music' refer to.

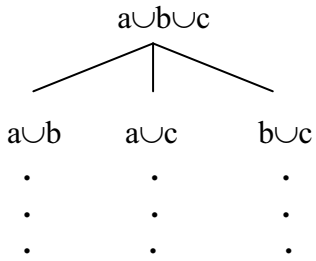
So, while we know "what members constitute" the members of the set denoted by a plural noun like *kalemler* (every *kalem* atom), we cannot know what members constitute the set denoted by a mass noun like *su*, because mass nouns do not have atoms under their extension, at least not for Link (1983) and Bunt (1985).

In that respect, Link (1983) argues that in contrast to the domain which represents plural nouns, the domain which represents mass nouns should be atom-less and/or non atomic, i.e. it should not have atoms under its extension. Thus:

PLURALS



MASS NOUNS



For Rothstein (2007a), however, this view poses the following problems.

First of all, it is not true that all mass nouns are completely homogeneous. Especially two classes of mass nouns – the powder class and superordinates – reject strict homogeneity. Powders like *rice, salt* etc. do have minimal atoms under their extension – rice and salt atoms – and dividing them into two, one no longer gets rice and salt. Superordinates like *furniture, cutlery* are not fully homogeneous either. Although a chair is a minimal part of furniture, part of a chair – say the leg of the chair – is not furniture. Similarly, a spoon or a fork is cutlery, but parts of a spoon or fork are not. Therefore, the criterion of homogeneity is somewhat problematic.

It is not only homogeneity that is problematic, but cumulativity has problems too. As we have said, plurals and masses have cumulative reference property, while

singular count nouns don't. So *su*+*su*= *su* and *kalemler* + *kalemler* = *kalemler* but *kalem* + *kalem* ≠ *kalem.* In this respect, cumulativity is said to distinguish mass nouns from (singular) count nouns in the nominal domain. However, there are also many (singular) count nouns which do have cumulative reference, and these have been noted by various researchers in the literature. Mittwoch (1988) shows that *line* is count but it is also cumulative, because adding line on a line will still give us *line*. Krifka (1992) makes the same observation for count nouns like *sequence* and *twig*, and Gillon (1992) for *rope* and *stone*. Rothstein (2004, 2007a: 6) adds more examples to the class of cumulative (and also homogeneous) count nouns which shows that "the phenomenon is even more general" – so general that it casts doubt on the sufficiency of cumulativity as a criterion to distinguish mass nouns from count nouns. Some of her examples are count nouns like *fence* (çit), *wall* (duvar), *hedge* (çimenlik), and *bouquet* (buket). Following Rothstein's (2007a: 7) example, "[if] my house and yours adjoin each other, and both of us build a fence between our houses and the street which meet at a certain point, we would call it 'a fence' or 'two fences', depending on the context". Therefore, fence is cumulative because two separate fences can be summed to form one bigger fence, and it is also homogeneous because the same piece of fencing can be analyzed as one fence or several fences, depending on the context.

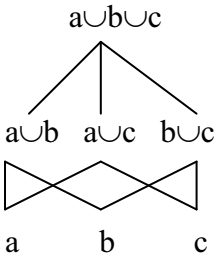
As a result, Rothstein (2007a) argues that neither cumulativity nor homogeneity are sufficient conditions for being mass (although it seems like we can argue that they are at least the necessary conditions), and being count does not always mean the absence of such properties[15].

[15] It should be noted that Rothstein (2007a) does not mean that we should disregard homogeneity and cumulativity altogether. They *are* defining properties in the nominal domain (and as we shall see in the eventual domain) and mass nouns are sensitive to those properties. They are only not defining enough to cover all the examples in the natural language.

Mass Domain as an Atomic Domain

The data so far shows that the mass-count distinction cannot be explained properly in terms of the structure of the denotata. Arguing that count nouns are not cumulative while mass nouns are creates problems, because the property of cumulativity can sometimes characterize count nouns as well. More importantly, arguing that count domain is atomic while mass domain is not does not fare any better, because there are a number of mass nouns which do have atomic parts. To solve these problems, Rothstein (2007a) – following mainly Chierchia (1998) and Gillon (1992) – argues that mass domain should be represented as an atomic domain as well.

Chierchia (1998) puts forward that the structure of the plural count nouns and the structure of mass nouns are the same. This means that, in contrast to Link (1983) and Bunt (1985), the lattice that represents the denotation of mass nouns do have minimal atoms at the bottom line. Thus, both plurals and masses are represented as:



This novel approach to mass nouns has two theoretical outcomes: a) it treats mass nouns as semantically plural b) it brings a different perspective on what counting is. Let us start with explicating the first outcome.

As we have seen before, in Link's (1983) theory the structure above was used to capture the semantics of plurals, and mass nouns were represented with the same structure minus the atoms at the bottom line. Now, by using the same structure for both masses and plurals, Chierchia (1998) argues that mass nouns are semantically plural

although they are grammatically singular, "they come out of the lexicon with plurality already built in, and ….that is the (only) way in which they differ from count nouns" (Chierchia, 1998: 53). Hence, while a singular count noun denotes a set of atoms (i.e. {a, b, c}), and the plural of this noun denotes the closure of these atoms under sum (i.e. {a, b, c, a∪b, a∪c, b∪c, a∪b∪c}), a mass noun denotes "the closure under sum of a set of atoms" (Rothstein, 2007a: 9). In other words, although a mass and a plural count noun denote the same set, the set that the mass noun denotes was already closed by sum-formation the moment that the noun is lexicalized.

We can see that this approach is able to account for some important facts. First of all, it explains why mass nouns are not pluralizable. Since in this approach mass nouns come out of the lexicon as already plural, they are not subject to further pluralization in the grammar (of some languages, at least)[16]. Secondly, and more importantly, the approach can account for the fact that one and the same entity can be referred to either by a mass or a plural expression. To follow Rothstein's (2007a) example, assume that the set denoted by a singular predicate like *a piece of furniture* is (75a). Now the plural of that expression, i.e. *pieces of furniture*, becomes (75b). Since the mass noun *furniture* is by itself a plurality, the set it denotes is equal to (75b), as shown by (75c):

(75) a. a piece of furniture :{ chair1, chair2, table1}

b. pieces of furniture :{c1, c2, t1, c1∪c2, c2∪t1, c1∪t1, c1∪c2∪t1}

c. furniture :{c1, c2, t1, c1∪c2, c2∪t1, c1∪t1, c1∪c2∪t1}

As a result, we can understand how language users can say both (76a) and (76b), and both (77a) and (77b), pointing at the same set of objects:

[16] Nevertheless, we have seen that in Turkish mass nouns **are** pluralizable. We will come to this issue in the next section and argue that the plural marker on mass nouns takes on an extra function besides pluralization.

(76) a. That *furniture* is brown.

b. These *pieces of furniture* are brown

(77) a. That *carpeting* is old.

b. Those *carpets* are old

Another important point in Chierchia's (1998) and Rothstein's (2007a) approach to mass nouns is the following. We know that for mass nouns of the superordinate type, (i.e. furniture, cutlery) the individual atoms of the sets denoted by the mass nouns are at least perceptually salient, i.e. the atomic members of a mass noun like *furniture* is every individual *table*, *chair* etc., as we have seen above. Since the atoms refer to discrete entities in this type of nouns, the idea that mass domain is atomic is indeed very plausible. But what about mass nouns such as *water*, *mud* etc. where the atoms are not as salient as in *furniture*, *cutlery* or *rice*? In fact, we have no cognitive idea of what a minimal atom of *mud* or *water* is and for most of the mass nouns this is the case. For these kinds of nouns, Chierchia (1998) and Rothstein (2007a) argue that the minimal atoms are relevant quantities of *mud*, *water* etc, "what the minimal elements are may be specified by context, or may be left vague and unspecified" (Rothstein, 2007a: 13). Therefore, although these mass nouns also have minimal atoms under their extension, these atoms are unspecified and vague, and only by context we may reach those atoms.

There is, however, an important question that this approach has to answer. In natural language, if a noun takes its denotation from the atomic domain, then we can grammatically count that noun easily. The count domain is atomic, thus we can easily say *three pencils, four chairs* etc. Now, if we argue that the mass domain is also atomic, how are we going to account for the fact that we cannot grammatically count the atoms of a mass noun? In other words, why are expressions like **three furnitures,* *four waters,* *eight*

muds etc ungrammatical? As an answer to this question, Rothstein (2007a) argues that we should first understand what grammatical counting really is, and what kind of semantic operation is involved in grammatical counting.

Rothstein's idea is that "grammatical counting requires an operation on the denotation of a root nominal which picks out a set of elements each of which counts as one entity by some specified unit of measurement" (Rothstein, 2007a: 13). The operation, which she calls the M-ATOM operation, has the following structure:

(78) M-ATOM (N) = λx. N (x) $\wedge$ MEAS (x) = <1, U>.

This means that the M-ATOM operation applies to a root noun, and by using a standard measuring operation MEAS, it measures the minimal atomic units under the denotation of the noun which count as 1 entity according to a specified unit of measurement U. Crucially, the unit of measurement, U, need not be fixed, but can be supplied either by the lexical meaning of the predicate that the operation applies to or by context. The important point is that the output of the M-ATOM operation is constrained to be a set of non-overlapping atoms, and they must have cardinality 1, i.e. <1, U>, so that they become grammatically countable. Let us see how this works.

First of all, for Rothstein (2007a) all root nouns are mass[17] in their unmarked form, so they are all represented by the Boolean semi-lattice. The function of M-ATOM operation is to get down to the minimal atoms, i.e. the singularities {a, b, c}, under the denotation of the root nouns so that the noun becomes grammatically countable. When we know what an atomic unit of N is, we can count that N. It follows that if a noun N is able to specify by its lexical meaning what counts as 1 atomic entity of that N at a time (i.e. if it

[17] Kratzer (2005) also argues that all root nouns are semantically plural. Since, as we have seen, semantic plurality equals to massness in the nominal domain, Kratzer's argument is essentailly the same with Rothstein's argument. However, we neither have aim nor scope to delve into such questions here, and we hold no theoretical assumptions on this issue. What we are chiefly interested in is the M-ATOM operation and what it does.

can provide us a value with which the unit of measurement U can be supplied), the M-ATOM measures the atoms easily and thus creates a count noun. As we have seen, nouns such as *kalem, elma, bilgisayar* naturally denote a set of non-overlapping atoms in that they are neither cumulative nor homogeneous. These nouns are *naturally atomic*, and our world knowledge provides us with the information of what counts as one minimal unit *kalem, elma, bilgisayar* at a time. This means that we do not need any information from context whatsoever to determine what an atomic unit of *elma, kalem* etc is. As a result, the M-ATOM operation applies these nouns naturally, and the value of the unit of measurement, U, is supplied simply by the lexical meaning of the noun. Thus, we derive *KALEMcount* from *KALEMroot* via the M-ATOM operation as in (79):

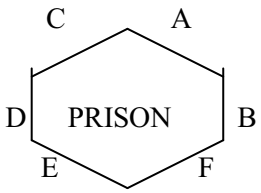
(79) $||\text{KALEMcount}|| = \text{M-ATOM}(||\text{KALEMroot}||$
$= \lambda x.\ \text{KALEM}(x) \wedge \text{MEAS}(x) = \langle 1, \text{KALEM} \rangle$

Consequently, the M-ATOM function in these cases is not context-dependant and it easily measures what the atomic elements under the denotation of the noun are simply by using the information provided by the lexical meaning of the noun. This is because these objects come in individuated units thus their lexical meaning provides the unit value, U. There is a different type of count nouns, however, where the value for U cannot be supplied so easily.

The second class of count nouns contains nouns like *çit, duvar*, etc. which are both homogeneous and cumulative. These nouns are not naturally atomic, since, for example, the same piece of fencing can be analyzed as one fence or separate fences depending on the context. Therefore, in contrast to nouns such as *kalem, elma, masa* etc., they do not have a given cardinality. The question is: how are we going to account for the fact that these nouns are also count although what counts as an atomic unit of these nouns are not provided by the lexical meanings of the nouns?

Rothstein argues that for predicates like these, the unit of measurement is contextually determined (Rothstein, 2007a: 15). Since these nouns lack a criterion of specifying what one atomic unit of N is, the M-ATOM operation uses the context and assigns these nouns cardinality 1 by a context-dependant unit of measurement. Crucially, what counts as 1 atomic unit of *çit* or *duvar* does not have to be identical to the set of minimal atoms in the denotation of the root noun. Let us see how this works with an example similar to Rothstein's.

Consider a prison, surrounded by six walls as in the example:



Now if I am asked how many walls there are surrounding the prison, I may answer six, where I pick out the minimal elements of the set as the atomic walls in the context. However, for the same question, I can answer "there are three walls surrounding the prison", where I pick out the sets {A∪B}, {C∪D}, and {E∪F} as atomic units of wall in the model and assign them cardinality 1, i.e. refer each of them as 1 unit of wall. Therefore, for cumulative and homogeneous nouns like *çit, duvar* etc, the M-ATOM operation applies to the root nominal (DUVARroot) and creates the count noun (DUVARcount) by specifying a value for U which determines the atomic elements under the denotation of the noun with the help of the context. The derivation process is thus represented as follows:

(80) $\| \text{DUVAR}_{\text{COUNT}} \| = \text{M-ATOM} (\| \text{DUVAR}_{\text{ROOT}} \|)$
$= \lambda x.\ \text{DUVAR}(x) \wedge \text{MEAS}(x) = \langle 1, U \rangle$

Consequently, these nouns are count because the M-ATOM operation is able to specify the value for U with the help of the context.

To sum up, we can say that all count nouns have the following structure:

(81) $\lambda x.\ P(x) \wedge MEAS(x) = \langle 1, U \rangle$. (Rothstein, 2007a: 14)

This means that they automatically undergo the M-ATOM operation the moment they are lexicalized. With count nouns like *kalem*, the lexical meaning of the noun determines the value for U, with others like *çit*, the context.

We may now come back to the important question. Although mass domain is also atomic, why cannot we count mass nouns? The answer, following the discussion so far, is as follows. As we have said before, the atoms under the denotation of mass nouns are "unspecified or vague". This is not true for count nouns. In the count domain, the nouns give us an explicit criterion of choosing the atoms of the set either by their lexical meaning or by context. Therefore, the crucial difference between count and mass nouns is that since the atoms of mass nouns are vague, mass nouns cannot provide such an explicit criterion of choosing the atoms. As a result, although the mass domain is also atomic, the atoms under the denotation the mass nouns are not "accessible" to grammatical operations. A very illustrative evidence of this comes from Gillon (1992):

(82) a. The curtains and the carpets resemble each other.

b. The curtaining and the carpeting resemble each other

(cited in Rothstein, 2007a: 9)

In (82a) above, there is an ambiguity between the reading where each curtain resembles to every other curtain and each carpet to other carpets, and the reading where the curtains as a whole resemble the carpets. In (82b), however, only the second interpretation is possible. There is no interpretation of the sentence where the each minimal curtain resembles to other curtains and each minimal carpet to other carpets; although it is certain that the entities denoted by *curtaining* and *carpeting* do have minimal parts. Rothstein argues that

this minimal pair elegantly captures the fact that although mass nouns do have atoms, they are not accessible to grammatical operations, such as the reciprocal operation in (82).

As a result, the question of why mass nouns are not countable is answered. Grammatical operation of counting realizes in the M-ATOM operation, which requires that the noun it applies to provides a specific value for U, i.e. for measuring the minimal atoms of the noun. Since mass nouns does not provide such a value with which we can access to the minimal atoms under their denotation, the M-ATOM operation (similar to the reciprocal operation above) cannot be successfully applied to the atoms of mass nouns. Thus, it is impossible for us to count mass nouns.

To sum up, grammatical counting is the atomicity (i.e. M-ATOM) operation on root nouns. The M-ATOM operation applies to a root noun and creates a count noun out of that root noun by specifying what counts as 1 atomic unit of the entity denoted by the noun at a time. It requires that either the lexical meaning of the predicate or the context is able to provide a value with which to measure the atomic entities under the extension of the noun. Therefore, although both mass domain and the count domain is atomic, only count nouns are sensitive to grammatical counting because while they can provide such a value, mass nouns cannot due to the unspecified and vague nature of the atoms under their extension.

II.2.4. The Question of Mass Pluralization in Turkish

In section II.2.2.1., we have argued that mass nouns are compatible with plural marking in Turkish. Relevant examples are given below:

(83) a. Ali *suları* içti.

b. *Mobilyalar* dün boyandı.

c. Polis olay hakkında önemli *bilgilere* ulaştı.

d. *Paraları* bana yarın getirecek.

Now, following Chierchia (1998) and Rothstein (2007a), we have seen that mass nouns are semantically plural, although they are grammatically singular. So, the question is: how are they further pluralizable in Turkish?

Defining what the atomic function is and how it works in the last section, we might postulate two possible answers to this question. First, we can say that contrary to languages like English, in Turkish the atoms of the set denoted by mass nouns are not vague or unspecified; therefore they *are* accessible to grammatical pluralization in the syntax. However, taking this road leads us to a *cul-de-sac.* First of all, if the atoms were really specified and not vague, then we would always have a fixed cognitive idea of what counts as one specific unit of *su, bilgi,* or *para* at a time. This is not true, however. We really do not have a specific and fixed idea of what counts as an atomic unit of these entities at a time, and the atomic units of *su, para, bilgi, kum* etc. are sensitive to change from one context to another. Therefore, the fact that the atoms under the extension of mass nouns are accessible to grammatical operations such as pluralization does not entail that they are cognitively specified. As Chierchia (2004) argues, even in languages where mass-count distinction is neutralized grammatically, the distinction still remains in our cognitive system.

An alternative approach to the problem would be questioning the semantic nature of the plural marker on mass nouns in Turkish. As we have said, grammatical operations, such as counting or pluralization, require that the atoms under the extension of a noun are specified and not vague, which are semantic properties that mass nouns do not possess. But in Turkish plural marker does apply grammatically to mass nouns. In that

respect, we can argue that the plural marker on mass nouns first makes the atoms under the denotation of the mass noun semantically specific by mapping them onto a particular unit of measurement with the help of the context, and then pluralizes these atoms. The argument seems to make sense intuitively. In sentence (83a), for example, the plural mass noun *sular* can be interpreted as different *glasses of* water, or *bottles of* water etc. depending on the context. Thus, a unit of measurement, i.e. *glass-of* or *bottle-of*, can be applied to the mass noun at least contextually. This is what we are going to claim now, but before that, we will first review some parts of a psychological test carried out by Barner and Snedeker (2005) which will turn out to have an important value for our claim.

Barner and Snedeker (2005) carry out an experiment on children and adult native speakers of English which tests their quantity judgments under different circumstances. Showing the subjects pictures of different quantities of some entities, they ask them the question "who has more x" under three situations:

1- where the entity x is a mass like *mud*

2. where the entity x is a mass superordinate term like *furniture*

3-where the entity x can be referred to both by a mass or count term such as *rock/rocks, stone/stones*.

We will concern ourselves only with the results of situation 3; a more detailed analysis of and explanations about the results of all the tests of the experiment can be found in Barner and Snedeker (2005) and Rothstein (2007a).

In English, nouns like *rock, stone* display a similar behavior to Turkish mass nouns. *Rock* is a mass noun, but it also has a count usage, therefore it is pluralizable as *rocks*. The same is true for the pair *stone/stones* as well. In their test, Barner and Snedeker (2005) show the subjects a picture of an individual who has one big stone, and another

individual who has three small stones. Crucially, the volume of the one big stone is greater than the volume of the three small stones combined. Showing these pictures, Barner and Snedeker (2005) ask the question "who has more x" in two different ways and get two different replies. When the question is asked using the mass noun, i.e. "who has more *stone*", the subjects judge one big stone to be more than three small stones. When the question is asked using the count noun, i.e. "who has more *stones*", the subjects go with *three small stones* rather than *one big stone*, even though the volume of the latter is greater than the volume of the former.

Barner and Snedeker (2005) reach several conclusions from this test, but the one conclusion that is important for our purposes is this: Barner and Snedeker conclude that count syntax individuates, it requires that the elements under the denotation of the noun are specific individual units. As a result, no native speaker prefers one big stone to be more than three small stones when the question is asked with a count noun.

Following the results of Barner and Snedeker (2005), we argue that the plural marker on mass nouns brings about a semantic individuation of the unspecified atoms of mass nouns. The plurality marker uses the M-ATOM operation to make mass nouns countable. As we have said, mass nouns cannot provide a fixed value for the M-ATOM operation with which what counts as 1 unit of the entity that the mass noun denotes, i.e. <1, U>, can be measured. Therefore, a mass noun like *su* has the following structure, as shown by Rothstein (2007a):

(84) $su \rightarrow \lambda x\ P(x)$.

Now, when the mass noun is marked with the plural, the plural marker provides a context-dependant value for U and thus makes the unspecified atoms under the denotation of the mass noun specific, and pluralizes them at the same time: Therefore *sular* is:

(85) sular → λx [*SU](x) ∧ MEAS (x) = <1, U>.

As can be seen, the unit of measurement can change from context to context. At a dinner table, for example, we can interpret the word *sular* as referring to different glasses of water. In a water company which sells distilled water, on the other hand, we would probably interpret the word *sular* as referring to bottles, or galloons of water. The important point is, in every possible interpretation a unit of measurement, i.e. glass-of, bottles of etc., is imposed on the atoms under the extension of the noun by plural marking.

To conclude what we have said so far: we have argued, following Rothstein (2007a) and Chierchia (1998), that both the mass domain and the count domain is atomic. There are, however, differences between the semantic properties of the atoms under the denotation of count nouns and mass nouns. While the atoms of count domain are cognitively specified, the atoms of the mass domain are not and thus they are vague. Grammatical counting, which is the M-ATOM operation, is an operation on root nouns. It applies to an *Nroot* and derives *Ncount* if and only if the noun is able to provide a semantic criterion by which a value for measuring the atomic units of that noun can be determined. Count nouns can provide such a value, but mass nouns cannot due to their vague and unspecified nature. On the other hand, we have shown that Rothstein's and Chierchia's theory gives us a way to account for mass pluralization in Turkish. Using their theory, it is possible to define the plurality marker as a semantic measuring operation. When plurality applies to mass nouns, it uses the M-ATOM operation and makes the vague atoms of the mass noun semantically specified by providing a context-dependant criterion of what counts as 1 atomic unit of that entity at a time.

Providing the semantics of mass nouns and their behavior in Turkish, we now move on to defining what problems they pose for telicity and aspectual composition of Turkish in the next section.

II.2.5. Questions on Mass nouns and Telicity

In many accounts of aspectual composition, it is assumed that mass nouns create atelicity (Krifka, 1989, 1992, 1998; Verkuyl, 1993 among others). Although this is true in some cases (as in 86a-b-c), we see that in Turkish there are conditions where mass nouns in the direct object and subject positions do create telic readings of the sentences, (as in 87, 88, 89).

(86) a. Ali 10 dakika boyunca su içti

b. Araştırmacı 1 sene boyunca konu hakkında bilgi topladı.

c. Berna yarım saat boyunca mobilya boyadı.

(87) a. Ali 5 dakika içinde *suyu* içti.

b. Araştırmacı konu hakkında yeterli *bilgiyi* 30 günde topladı.

(88) a. *Yardım* bize 15 dakikada ulaştı.

b. Bir anda duvarda *kan* gördüm.

(89) a. *Buz* 10 dakikada dondu.

b. *Mobilya* 20 dakikada yandı.

While all the sentences in (86) are atelic, we see that in (87), (88), (89) the appearance of mass nouns in the sentences do not result in atelicity. Comparing (86) to (87), for example, it seems that the appearance of the accusative case marker on the direct object mass nouns create telicity of the sentences. So, the question is: why the accusative case on mass direct objects brings about a telic interpretation of sentences in Turkish? On the other hand, in

(88a-b), achievement predicates ULAŞ-, GÖR- do not seem to be affected by the fact that the subject in (88a) and the direct object in (88b) are mass nouns, because the sentences are still acceptable under telic interpretation (Rothstein, 2008). Therefore, another question is why achievements are always telic independent of the properties of the direct objects and subjects? Finally, in (89), the inchoative accomplishment predicates DON-, YAN- are telic, although in both cases the subjects are mass.

Considering the examples above, we can argue that there is a need to incorporate the semantics of mass nouns into the semantics of telicity and lexical aspect in a proper way. Now, we have said that mass nouns are semantically plural predicates; they have a structure which is identical to plural count nouns. Moreover, in the earlier pages of this chapter, we have also implied that the interaction between plural nouns and telicity can be accounted for if we can find a way to define how aspectual event types can be distinguished from one another in terms of semantic plurality and semantic singularity. As a result, since mass nouns are also semantically plural predicates, it appears that an event semantics framework which can explain the interaction between telicity and plural nouns in terms of semantic singularity versus semantic plurality can explain the interaction between mass nouns and telicity in the same way. This is what we will try to do in chapter III. Consequently, in the next chapter, we will first develop an event semantic framework which attempts to account for the behavior of plural NPs in telic and atelic predicates, and then apply that framework to mass NPs.

II.3. Summary

In this chapter, we have discussed the semantics of plurals, preverbal bare nouns, and mass nouns in Turkish. Discussing plurality first and following Landman (1989, 1997, 2000), we have seen that predicates can be distinguished from one another as to semantic singularity and semantic plurality: semantically singular predicates apply to groups and are thus collective while semantically plural predicates apply distributively to sums of individuals. We have maintained that what we need is independent criteria which can tell us that some predicates are really semantically plural and some are semantically singular. One such criterion, as we will see in the next chapter, will come from lexical aspectual domain.

On the other hand, in our discussion on mass nouns, we have argued that the mass-count distinction in Turkish does not manifest itself in the grammar, and then used Rothstein's (2007a) theory of atomicity to account for the problematic behaviour of mass nouns in Turkish. Importantly, we have arrived at the conclusion that in Turkish plural marker on mass nouns behaves like a measure function; it makes the underspecified atoms under the extension of mass nouns specified by providing a context-dependant unit of measurement.

Presenting the semantics the plurality and massness, we have also defined the problems that they pose for aspectual composition and raised some questions and ideas on how these problems can be treated. In the following chapter, we will work on these problems and try to develop an account which can explain how these categories interact with telicity and lexical aspect.

CHAPTER III

PLURALITY, MASS NOUNS AND TELICITY IN TURKISH

In this chapter, we will propose a unified account of telicity which attempts to explain the interaction of different aspectual event types with plural NPs, mass NPs, and preverbal transnumeral direct objects in Turkish. The account will be based to a great extent on the theory of atomicity developed by Rothstein (2004, 2007b, 2008). Still, though, we will have our own modifications and extensions of the theory. The organization of the chapter is as follows. In section III.1., we will have a quick review of the questions and problems that we will be working on in the chapter, which are mainly the questions that derived from the discussion of plurality and massness in chapter II. In section III.2., we will present Rothstein's theory of atomicity in the domain of events, which will form the basis of the account that we will propose in section in III.3. Presenting our proposal in III.3., we will then discuss how the proposed account can explain the interaction of the lexical aspectual feature of telicity with plurality and massness. Section III.7. will conclude our discussions.

III.1. Introduction: The Problems

Throughout the preceding chapter, we have raised several questions the answers of which we have postponed until this chapter. Before starting the answering and analysis process, it is useful to have a quick review of the questions we will work on in this chapter. The first question is related to the aspectual behavior of plural NPs. First of all, we have seen that some predicates are ambiguous between a collective reading and a distributive reading, as in:

(1) a. Çocuklar yolda yürüdü.

b. Çocuklar masayı yukarı taşıdı.

Afterwards, following Landman (1989, 1997, 2000), we have seen that distributive predicates can be defined as semantically plural predicates which apply to SUMS of individuals. On the other hand, collectivity can be said to define singularity in the verbal domain because when a collective predicate applies to a plural NP, the plural NP is interpreted as a group-atom, which is a semantically singular entity. It follows that the predicate YÜRÜ- in (1a) is a plural predicate thus the NP is interpreted as a SUM of individuals (a plurality), while MASAYI YUKARI TAŞI- in (1b) is a singular predicate, thus the NP is interpreted as a group-atom (a singularity).

Although the argument is appealing, we have argued that there are still some questions that can be raised about it: what criteria, apart from distributivity and collectivity, distinguish singular predicates from plural predicates in the verbal domain? In other words, why is a predicate like YÜRÜ- a plural predicate and why is a predicate like MASAYI YUKARI TAŞI- a singular predicate? We have seen in the last chapter that collective and distributive interpretations correspond to telic-atelic interpretations. Therefore, a more important question is: how does Landman's theory of plurality interact with the telicity phenomenon? These are some of the questions that we will work on in this section.

A different issue we have dealt with in the preceding chapter is the issue of preverbal transnumeral bare nouns in Turkish. We have demonstrated that, similar to plural NPs, preverbal bare nouns are ambiguous between a singular and a plural reading as in (2a-b).

(2) a. Öğretmen ilk bakışta sınav kağıdında hata buldu. (hata=1)

b. Ahmet bütün gün çiçek suladı. (çiçek > 1)

Therefore, another question we raise is whether it is possible to define a semantic relationship between telicity and the ambiguous behavior of preverbal bare objects in Turkish. Clearly, this question is very much related to the question of identifying the semantic circumstances under which telicity interacts with distributivity and collectivity. The hope is that if we can find the answer to the question of how telicity interacts with plurality, then we can find an answer to the question of how telicity interacts with preverbal bare nouns.

Finally, we touched the issue of mass nouns in Turkish and their aspectual behavior. First of all, we have seen that the widely accepted idea that mass nouns cause atelic readings of VPs all the time is open to criticism. There are cases where mass nouns in the direct object position do not result in atelicity of the VP, as in (3a-b). Furthermore, there are also cases where a mass noun even in the subject position results in a telic interpretation of a sentence, as in (4):

(3) a. Bir anda yerde *kan* gördüm.

b. 10 dakika içinde tanıktan cinayetle ilgili yeterli *bilgiyi* topladım.

(4) a. *Su* 5 dakikada dondu.

b. *Buz* 15 dakikada eridi.

Thus, a further question we need to answer is how it is possible for a mass noun to bring about a telic interpretation of a sentence or a VP.

At this final chapter of the study, we will answer these questions in the framework of a theory of eventual atomicity developed in an array of works by Rothstein (2004, 2007b, 2008). Although we mostly base our arguments on Rothstein's theory, we will also argue against and modify some aspects of her ideas at times. In section III.2., we

will first introduce Rothstein's (2004, 2007b, 2008) classification of aspectual event types and then discuss her theory of atomicity in the domain of events.

III.2. Rothstein's (2004, 2007b, 2008) Classification of Event Types

Rothstein's event classification relies heavily on the traditional classification put forward by Vendler (1957, 1967). Although the same verbs fall under the same categories in the classification of both researchers, Rothstein differs from Vendler in terms of the criteria she uses to explain the behavior of different verb classes. According to Rothstein[1], who cites Dowty (1979), the classification of verb types into four categories (i.e. states, activities, achievements, and accomplishments) should be based on two criteria: a) different *intervals* that the events expressed by the verbs hold; b) the question of whether the events inherently denote *change*.

The idea that different event types show difference as to whether they hold at intervals or instants of time is borrowed from the seminal work of Dowty (1979). For example, states are said to hold at instants. Truth conditions of a sentence like (5a) is given as (5b) by Dowty (1979: 74):

(5) a. Ali üç yıl boyunca Berna'yı sevdi.

b. (∀t: t ∈ üç yıl) AT (t, SEV- (Ali, Berna))

Dowty's (1979) strategy here is adding the standard predicate logic a set of variables which represent points in time; the variable {t}. He furthermore uses the AT operator which represents the point at which the event expressed by the predicate is true. Thus, the above formulation tells us that for all the moments of time during the period of three years, it was true that Ali loved Berna. The formula manages the capture the semantics of the stative

[1] In this part of the chapter, the name *Rothstein* refers to the works (2004, 2007b, 2008) of the researcher, if not noted otherwise.

predicate in question by allowing the AT operator to pick up any arbitrary moment in time. Normally, the points in time which Dowty (1979) represents with the set {t} are ordered by an *earlier than* relation; i.e. ($t_i < t_{ii} < t_{iii} \ldots < t_n$). This relation, however, is ignored in the representation of states, which guarantees the fact that if a state holds at t_i, it also holds at t_{ii}, t_{iii}, and so on. If P has the property "stative":

(6) $\lambda P\,[P \in t \wedge (t_i, t_{ii}, t_{iii}) \in t] \rightarrow [P \in (t_i, t_{ii}, t_{iii})]$

States are said to hold at instants of time because, as we can see above, they are true of all the minimal instants expressed by the temporal modifier.

The property of being true at instants determines in turn whether the sub-parts of (i.e. the minimal events) of an event are inherently temporally extended or not. Since states hold at instants, the minimal events that they consist of are not inherently temporally extended. This roughly means that the predicate SEV- distributes down to *all* the minimal parts of the event, and all these minimal parts themselves denote SEV- events.

Two important facts derive from the above mentioned properties of states: they are strongly homogeneous and cumulative. As we have seen in the discussion of the nominal domain in the last chapter, homogeneity and cumulativity are about the downward and upward entailment properties of entities. When it comes to eventual domain, being homogeneous and/or being cumulative is one of the main reasons of being atelic. States are strongly homogeneous in the sense that a stative predicate like NEFRET ET-, for example, has parts which are also under the denotation of the predicate NEFRET ET-. That is, if I hated a friend of mine for four years, say from 1995 to 1999, then it is true to say that I also hated him during the period from 1995 to 1997. This part-whole relationship is represented as follows in Rothstein (2004: 10):

(7) X is strongly homogeneous iff:

$\forall x\,[X(x) \rightarrow \forall y\,[y \subseteq x \wedge \neg y{=}x \wedge X(y)]$

The opposite of this property is cumulativity. We have seen before that plural NPs, mass nouns, and some singular count nouns such as *duvar, çit,* etc. denote cumulative entities. States in the eventual domain are just like them. That is, similar to the fact that two separate walls can be combined and referred to as one wall, two NEFRET ET- events can be combined and referred to as one NEFRET ET- event. In that respect, if I hated that friend of mine from 1998-2000 and then from 2000 to 2002, then we can truthfully state that I hated him from 1998 to 2002 (and that I am a very hateful person). In semi-formal terms, a predicate X is said to be cumulative if the sum of X with X is still under the denotation of X (Krifka, 1998). Formally;

(8) X is cumulative iff :

$\exists x \exists y\,[X(x) \wedge X(y) \wedge \neg x \subset y \wedge \forall x \forall y\,[X(x) \wedge X(y) \rightarrow X(x \cup y)]$

Most of the above mentioned properties of states are applicable to activity verb type as well, except for the fact that activities are dynamic and that they hold at not instants of time but at intervals of time. This is noted by a number of researchers such as Bennett and Partee (1978), Taylor (1977), and then by Dowty (1979: 166), who writes, "[i]f α is an activity verb…, then $\alpha(x)$ is only true at an interval larger than a moment."

What does it mean for an activity event to hold at intervals rather than instants? Consider, for example, a typical activity verb like YÜRÜ-. For an activity predicate like *Ahmet yürüdü* to be true, it is clearly not enough if Ahmet only lifted his foot. There should be a larger minimal event which takes more than just the instant at which Ahmet lifts his foot in order for that event to constitute a minimal event of walking. Namely, there should at least be an event of taking one step (or most probably more than one step because it is

questionable if taking just one step would be considered as a minimal event of walking; see Dowty (1979)). As a result, with activity predicates such as YÜRÜ-, the internal minimal events (minimal walking events) are not instantaneous. This means that they hold at not instants but intervals of time since it takes more than just an instant of time to decide whether a minimal part of the event described by the activity verb is under the denotation of that activity event or not. What constitutes a minimal interval at which an activity event X is true, on the other hand, is dependant on the context and our world-knowledge. Sometimes an event of taking one step can be considered as a minimal interval of walking, while sometimes walking a mile may be considered as a minimal event of walking. However, just lifting your foot can never be considered as a minimal event of walking. Dowty (1979: 171) gives a very succinct explanation of this. Consider an activity predicate like *x waltz[ed]:*

> What minimal conditions must an interval meet for x waltz[ed] to be true of that interval? Now since the waltz involves sequences of three steps, …it is reasonable to maintain that any interval at which x takes less than three steps is not an interval at which x waltz[ed] is true,… but merely an interval at which x makes certain movements with his or her feet.

The conclusion is that activity events have the *subinterval* property. A sentence like *Ali 30 dakika boyunca yürüdü* is true of all the relevant minimal subintervals that make up the period of 30 minutes, while the definition of what a minimal subinterval is depends on the context.

Similar to states, activities also have a homogeneous structure. There is, however, a slight difference between the level of homogeneity that states and activities display. In contrast to states, an activity predicate X is not homogeneous down to all the minimal parts, because, as we have discussed above, there are minimal events under the denotation of an activity predicate X which are too small to count as a minimal event of

X^2. Moreover, similar to states, activities also display the cumulativity property. To give an example, if I watched TV from 9:00 to 9:45 and then from 9:45 to 10:00, then it is certainly true that I watched TV from 9:00 to 10:00. Therefore two activity events under the denotation of a predicate X comes together to form a larger activity event which is again under the denotation of X. All in all, let us conclude the discussion on activities for now by emphasizing that the last mentioned characteristic of activities, i.e. that they are cumulative, will be of crucial important for us in the later sections.

Pertaining to achievement events, Rothstein argues that they denote minimal non-extended changes. Achievements are different from both states and activities in that they hold neither at instants of time nor at intervals of time. Instead, achievements are said to hold at *two adjacent instants* of time, i.e. they are true of two successive points in time $<t_i, t_{ii}>$ where if X is an achievement predicate, $\neg X$ is true at t_i and X is true at t_{ii}. Consider the following achievement predicates as examples:

(9) a. Ali dağın tepesine ulaştı/vardı.

b. Berna anahtarını buldu/kaybetti.

c. Cem öldü.

In order for us to attest to the truth of any of these sentences, we apparently need evidence from two successive points in time. Put another way, we can only say that the sentence (9a), *Ali dağın tepesine ulaştı*, is true at an instant of time, say at t_{iii}, if and only if we know that the same proposition is false at the very instant immediately preceding t_{iii}. Since achievements are near-instantaneous this way, it is usually assumed that they have a partless structure. An event of finding, for example, has no proper parts that are themselves

[2] Many writers have named this issue as "the problem of smallest and minimal parts" in the literature. We simply skip this issue here because it is neither relevant to our purposes nor affects the way we language users conceptualize events. As Filip (1999: 43) notes, the problem of smallest parts and the problem of minimal parts "do not invalidate the insights" we gain from the inherent structural properties of events. See also Bunt (1985) and Bach (1981) for similar views.

events of finding; an event of dying has no proper parts which are themselves events of dying etc.

The notion of cumulativity is not applicable to achievement event type as well. Remember we said that if there are two events of walking, say x^1 and x^2, under the denotation of the activity predicate like YÜRÜ-, then these two events can be summed and their sum will still fall under the denotation of the predicate YÜRÜ- (i.e. X ($x^1 \cup x^2$)). We see that this entailment property does not apply to achievements. If I reached the mountain summit once at 9:00 and then came back and reached there again at 10:00, then the sum of these two events certainly do not denote one event of reaching, but two events of reaching. As a result, achievements differ from states and activities in three respects: they head telic VPs, they hold at two adjacent instants, and they are neither homogeneous nor cumulative, but instantaneous.

Accomplishments are the most complicated case, since they display hybrid behavior in that sometimes they are telic like achievements and sometimes they are atelic like activities. In terms of temporal logic, accomplishments hold at intervals of time, therefore the minimal events under the denotation of an accomplishment verb are also inherently temporally extended.

An important defining characteristic of accomplishments is the following. In contrast to activities and achievements, the question of whether an accomplishment VP denotes atomically or cumulatively is not determined on the basis of the lexical semantics of the verb alone, but on the semantics of the interaction between the verb and the arguments. For example, a VP headed by an accomplishment verb ÇÖZ- may or may not be cumulative depending on whether the direct object is atomic and/or quantized (10a-b), or whether it is a bare count noun or a mass noun (11a-b). In sentences (10a-b), the VPs are

not cumulative predicates. In sentence (11a), the VP may or may not be cumulative depending on whether we interpret the bare N as singular or plural, i.e. if we interpret the noun *problem* as 1 problem and say that the VP denotes an event of *solving one problem*, then we cannot say that a sum of two events of *solving one problem* fall under the denotation of *solving one problem*, but solving two problems, or simply solving problems. If we interpret the bare noun as plural, and say that the VP denotes an event of *solving problems*, then obviously a sum of two events of *solving problems* will still be under the denotation of the event of *solving problems*. Finally in sentence (11b), the event has a cumulative denotation again:

(10) a. Matematikçiler problemi (10 dakika içinde) çözdü.

b. Matematikçiler (10 dakikada) 3 problem çözdü.

(11) a. Matematikçiler problem çözdü.

b. Matematikçiler su içti.

Moreover, telicity or atelicity of the verb phrases above highly depends on the property of cumulativity as well. Similar to achievement predicates, accomplishments are telic when they are not cumulative, similar to activities, they are atelic when they are cumulative.

One last criterion that is important in the characterization of event types in Rothstein's works is the notion of change. Among these verb classes, only achievements and accomplishments denote change, where an event of change is an event that "bring[s] about a specific situation or state of affairs" (Rothstein, 2008: 2). An activity predicate such as *Ali yürüdü* does not normally denote an event of change. Although it is true that there is a change in the agent's location (i.e. the agent moves continually from one location to another by walking), the point is that the predicate does not denote a change which specifies an *endpoint* at which the agent enters into a new state of affairs. Achievements

are inherently change-denoting predicates. As we have seen before, the sentence *Ali dağın tepesine vardı* denotes a minimal non-extended change between two adjacent instants of time. Contrary to achievements, accomplishments are said to denote events of change that are extended, since minimal events of an accomplishment event are inherently temporally extended. The event denoted by the predicate BİR KİTAP YAZ-, for example, denotes a change in stages from the state where there is no book,¬ϕ, to a state where the book becomes written, ϕ.

Considering this, some researchers like Dowty (1979) and Rothstein (among others), argued that there is an inherent BECOME event in the lexical structure of accomplishments, which simply tells us that the direct object in question enters into a new state of affairs at the end of the event, i.e. it becomes V-ed. A point of interest is that in accomplishments, the question of whether the event denotes a change or not is again dependant on the properties of the arguments. If the object contains a numeral as in the example of BİR KİTAP YAZ-, the VP denotes a *specific/determined* change because we know how many books are involved in the event of writing and thus we also know how many BECOME events are involved. The fact that there is one book involved in the event of writing allows us see when the event is over; it is over when the book becomes written. Since there is only one book, there is only one BECOME event and there is only one change that the VP denotes. As a result, the VP is telic. If the direct object is a bare noun, however, as in the example of (12a), or it is a mass noun as in the example of (12b),

(12) a. Ali kitap yazdı.

b. Ali propaganda yazdı.

we do not know how many books or how many pieces of propaganda are involved in the event, which in turn makes it impossible for us to understand how many BECOME events

are involved. As a result, the sentence does not specify an endpoint at which a *final* event of change occurs and the event comes to an end. The event this time simply consists of a plurality of changes, i.e. an iteration of writing books / propaganda etc, which results in the atelicity of the VP in question.

Following these criteria, Rothstein (2004: 194) arrives at the following classification:

	Minimal Events are Extended	Event of Change
States	—	—
Activities	+	—
Achievements	—	+
Accomplishments	+	+

Different grammatical operations are sensitive to these properties of verb classes. Among these verb classes, only those that are extended are allowed to occur in the progressive (in English). More importantly, only those event types that can denote a specific event of change are allowed to occur normally in telic VPs, i.e. achievements and accomplishments.

Observing Rothstein's arguments and analysis, we believe a couple of important points need further emphasis. First of all, cumulativity turns out to be a decisive factor in determining telicity and atelicity. Predicates that are cumulative tend to display atelic behavior. Predicates that are inherently non-cumulative, on the other hand, are telic predicates, as also noted by Krifka (1989, 1992, 1998). Moreover, the property of cumulativity correlates with the property of change. Predicates which denote a specific change are not cumulative, while events that do not denote change are cumulative. These observations lead us to think that a deeper analysis of what exactly cumulativity is and how it works in the domain of events might be of substantial help in determining the interaction

of arguments with different verb classes in terms of lexical aspect. We will discuss this issue in detail in section III.3., but before that, some discussions about how Rothstein characterizes atomicity and telicity in the verbal domain are due.

Telicity as Atomicity in the Verbal Domain

In section II.2.3., we have introduced how Rothstein (2007a) defines the atomic function in the nominal domain to account for the mass-count distinction. Rothstein (2007a) defines an M-ATOM operation which has the structure in (13), and which applies to root nouns to derive count nouns.

(13) $\lambda x.\ P(x) \wedge MEAS(x) \wedge \langle 1, U \rangle$

The crucial point about the M-ATOM operation is that the noun which undergoes the operation should be able to specify an explicit criterion of what counts as 1 unit of the denoted entity at a time for the operation to apply successfully. Nouns such as *kalem, masa* etc. specify that criterion by their lexical meanings because the world knowledge gives us the idea of what 1 unit of *kalem, masa* is at a time. Others, like *çit* or *duvar* specify that criterion with the help of the context. Consequently, both classes of nouns undergo the M-ATOM operation which turns them into count, atomic, and singular nouns that have cardinality 1.

According to Rothstein (2008), the M-ATOM operation in the verbal domain has the same function. In the verbal domain as well, the M-ATOM operation is a measure operation which applies to an event *e* and measures what counts as 1 atomic event of *e* at a time according to specific unit of measurement. Whether an event is atomic or not in the verbal domain determines in turn whether that event is telic. Only atomic events are telic,

while non-atomic events are atelic. So, atomicity is telicity while non-atomicity corresponds to atelicity.

Rothstein (2008) argues that similar to count nouns, all verbs have the following structure:

(14) $V \rightarrow \lambda e.\ P(e) \wedge MEAS\ (e) = \langle 1,U \rangle$

At this point, however, verbs are underspecified; we do not know whether they denote atomically or not, thus we also do not know whether they are telic or not. Telicity and atomicity of events are not determined on the V level but on the VP level (see for example Filip and Rothstein, 2005 on this issue) and different Vendlerian verbal classes, i.e. achievements, activities, and accomplishments, interact differently with the M-ATOM operation by providing different measuring options for the operation to use. We will see how it works now.

According to Rothstein (2008), while the necessary condition for atomicity of entities in the nominal domain is being (measured as) 1 atomic entity; in the eventual domain an atomic event is an event which denotes 1 defined event of change. Rothstein (2008) argues that achievements like VAR-, BUL-, ULAŞ-, PATLA-, ÇARP-, ÖL-, DÜŞ- etc. denote naturally atomic events. This is because they inherently denote minimal non-extended changes from $\neg\phi$ to ϕ where at the instant immediately following $\neg\phi$, ϕ holds. Thus, similar to the naturally atomic nouns like *masa, sandalye* etc., these events come out as naturally bounded entities because these verbs satisfy the criterion of being an event of change by their lexical meanings. Therefore, with achievements, the lexical meaning of the verbal head alone is able to measure the atomicity of the event. As a result of this property of achievements, neither the context nor the properties of the direct objects or subjects they combine with affect the telicity value of an achievement predicate. Sentences like:

(15) a. Ali *bombaları* 5 dakikada patlattı .

b. Ali bir anda *bomba* patlattı

c. *Bomba* bir anda patladı.

d. Bir anda yerde *kan* gördüm.

e. *Para* bize yarım saatte ulaştı.

are telic regardless of the fact that in (15a-b) the direct object is a plural and a bare noun, in (15c) there is a bare noun subject, and in (15d-e) the direct object and the subject are mass nouns, respectively. According to Rothstein (2008), then, achievement events have the following structure:

(16) $\lambda e.\ P(e) \wedge MEAS(e) = \langle 1, P(e)\rangle$
$\wedge MAX(e)_{\lambda e.\ P(e) \wedge MEAS(e) = \langle 1, P(e)\rangle}$

A telic achievement VP such as PATLA - is interpreted as (17):

(17) *PATLA – (TELIC)*

$\lambda e.\ PATLA\text{-}(e) \wedge MEAS(e) = \langle 1, \lambda e.\ PATLA(e)\rangle$
$\wedge MAX_{\lambda e.\ PATLA\text{-}(e)}$

We see that with achievements, the M-ATOM operation is the identity operation. What counts as 1 PATLA- event is what we cognitively know about what 1 PATLA- event is.

Activities like KOŞ-, YÜRÜ-, AĞLA-, BAĞIR-, BEKLE-, DOLAŞ-, KONUŞ-, ANLAT-, ARAŞTIRMA YAP- etc., on the other hand, are not atomic predicates. As we have seen, they are characterized by the cumulativity property, which means that they have parts which are themselves events of KOŞ-, YÜRÜ-, and AĞLA- etc. Since they are not atomic, they cannot inherently denote telic events. According to Rothstein (2008), an atelic activity predicate KOŞ- as in (18) has the structure of (19):

(18) Ali 3 saat boyunca koştu.

(19) KOŞ-
$\lambda e.\ KOŞ\text{-}(e). \wedge MEAS(e) = \langle 1, U\rangle$

This tells us that the event denoted by the verb KOŞ- is indeed atelic because what counts as 1 unit of KOŞ- event, i.e. <1,U>, is not specified either by the lexical meaning of the verb or by context. Therefore, we do not know what constitutes one maximal event of running.

It follows from the argument above that activity predicates can be made telic only if other grammatical factors specify for us what counts as 1 instant of *e* at a time and thus turn the predicate into an atomic predicate. Consider the following sentences, for example:

(20) a. Ali bir saatte okula koştu.

b. Berna 25 dakikada bir kilometre yürüdü.

c. Cem sabaha kadar ağladı.

All these sentences are telic because in all of them the modifiers *okula*, *bir kilometre*, *sabaha kadar* provides us with the necessary measuring criterion to determine what counts as 1 maximal unit of running, walking, and crying event, respectively. Namely, in sentence (20a) one maximal event of running is an event of *running to the school,* in (20b) one maximal event of walking is *walking 1 kilometer* etc. In all these sentences, an event of change is defined on the activity predicates by the modifiers; i.e. these modifiers provide a measuring criterion according to which what counts as 1 instantiation of events of *running, walking, crying* is determined. As a result, the modifiers here turn the cumulative events of *running, walking* and *crying* into atomic events which have cardinality 1. An activity predicate which is atomic (and therefore telic) such as the one in (20b) above has the following structure:

(21) *BİR KİLOMETRE YÜRÜ- (TELIC)*

λe. YÜRÜ- (e) ∧ MEAS-(e) = <1 KİLOMETRE>
∧ MAX $_{\lambda e.\ \text{YÜRÜ- (e)} \wedge \text{MEAS-(e)} = <1\ \text{KİLOMETRE}>}$

Notice that this time the event is neither homogeneous nor cumulative. An event of walking 1 kilometer has no parts which are themselves events of *walking 1 kilometer,* and if two events of *walking 1 kilometer* are combined, the resulting event is no longer under the denotation of *walking 1 kilometer*, but *walking two kilometers* or simply *walking*. This is another proof for the claim that these events are indeed atomic, since, as we have noted before, being atomic is being partless.

Accomplishments are more complicated than these two verb classes. According to Rothstein (2008), accomplishments are characterized by two types of behaviour. First, similar to activities they are inherently temporally extended. Second, similar to achievements they denote coming about of changes of state. Considering this, Rothstein (2004, 2008) argues that accomplishments have a complex structure[3]; they consist of an activity event (e^1) (which accounts for the fact that accomplishments are extended events) accompanied by a BECOME event (e^2) (which explains that accomplishments are change-denoting). The BECOME event applies to the activity event and turns it into a change of state predicate by specifying what counts as 1 maximal instantiation of the event. Let us see how this works with an example. Inherently an accomplishment verb such as İÇ- has the following structure:

(22) λe. İÇ- (e) ∧ MEAS (e) ∧ <1,U>

Now question of whether this event is atomic or not depends on the question of whether the inherent BECOME event is atomic, which, in turn, depends on whether the direct

[3] Rothstein partly follows Dowty (1979) here.

object that the BECOME event applies to is atomic. If the direct object is not an atomic entity, as in (23):

(23) Ali *3 dakika boyunca / *3 dakika içinde* **su** içti

then the BECOME event cannot specify what 1 event of change is. This is because the mass direct object has no extent and, metaphorically, the BECOME event keeps applying to the mass direct object again and again. As a result, there is no endpoint at which the event comes to an end and a change of state occurs: there is no endpoint at which the proposition that the direct object becomes V-ed is true. Therefore, the predicate is not atomic and it has the following structure:

(24) $\lambda y.\ \lambda e.$ İÇ- $(e_1) \wedge$ AG (e_1) = Ali $\wedge$ TH (e_1) = SU $\wedge$ MEAS$(e_1) \wedge$ <1, U>
.BECOME-İÇ- $(e_2) \wedge$ ARG.(e_2) = TH (e_1)

Notice that the unit of measurement, i.e. <1,U> is left unfulfilled this time, which means that what counts as 1 event of drinking is not specified. If the direct object is atomic, on the other hand, as in (25):

(25) Ali *bir bardak* su içti.

then the BECOME event applies to the atomic direct object and thus itself is atomic. In other words, it tells us that the event is over when the entity of 1 glass of water is V-ed. As a result, the BECOME event has the required criterion to tell us what 1 instantiation of change is. What counts as one event of change is the change happening to the bounded entity that the BECOME event applies to, i.e. the change from the state where the glass is full to a state where it becomes drunk. A telic accomplishment VP as in (25) has the structure in (26):

(26) $\lambda y.\ \lambda e.$ İÇ- $(e_1) \wedge$ AG (e_1) = Ali $\wedge$ TH (e_1) = BİR BARDAK SU
$\wedge$ MEAS$(e_1) \wedge$ <1 BARDAK>
$\wedge$ BECOME İÇ- $(e_2) \wedge$ ARG (e_2) = TH (e_1)
$\wedge$ MAX $\lambda e.$ İÇ- $(e) \wedge$ AG (e) = Ali $\wedge$ TH (e) = BİR BARDAK SU $\wedge$ MEAS-(e) = <1 BARDAK>

This correctly predicts that the telicity-atelicity properties of an accomplishment depend on the properties of the direct object. Put another way, it is the semantics of the direct object that specifies a measure value for the M-ATOM operation to determine what counts as 1 instantiation of that event at a time.

Notice also that the homogeneity and cumulativity properties once again show variation according to whether the event denotes a telic, atomic event or not. The atelic predicate in (23) is both cumulative and homogeneous since the sum two instants of drinking water are still under the denotation of the VP *drink water*. The event in (23) is similar to an activity event here; the event denotes a sum of events with no change of state happening at all. The telic VP in (25), however, is neither cumulative nor homogeneous: the sum of two instants of drinking a glass of water is not under the denotation of the event of *drink a glass of water,* but *drink two glasses of water,* or simply *drink water.*

To sum up, for Rothstein (2004, 2007b, 2008) being telic is being atomic. She argues that similar to count nouns in the nominal domain, all verbs have an atomic structure:

(26) $V \rightarrow \lambda e.\ P(e) \wedge MEAS\ (e) = \langle 1,U \rangle$.

At this point, however, they are underspecified and they interact with atomicity in their own idiosyncratic ways by providing different measuring options for the atomicity operation to use. The atomicity operation applies to achievements naturally because an achievement verb is able to measure what counts of one event of *e* at a time by its lexical semantics. Therefore, atomicity of an achievement predicate is determined on the basis of the lexical semantics of the verb alone. Activities cannot provide such a value for atomicity to apply, and they need semantic information from other grammatical factors such as modifiers or PP adjuncts to determine what counts as one atomic instantiation of the event

they denote. Therefore, with activities, atomicity is determined on the basis of the interaction between the verbal head and the modifiers. Finally, accomplishments take their atomic or non-atomic value from the semantics of the direct objects they combine with. As a result, atomicity of an accomplishment VP is determined on the basis of the interaction between the verbal head and the direct object.

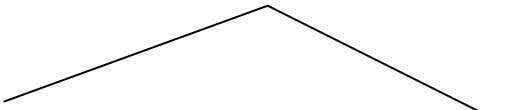
III.3. Proposal: An Aspectual Classification in Turkish Based on the (Semantic) Singularity and Plurality of Events

III.3.1. Semantic Singularity and Semantic Plurality

Up to now, we have discussed the semantics of plural and mass NPs in chapter II, and the semantics of telic and atelic predicates in the preceding sections of this chapter. Discussing the semantics of these categories, we see that one criterion turns out to be of special importance: the criterion of cumulativity. Cumulativity has different instantiations in different domains, but there seems to be one semantic criterion which underlies cumulativity in all the domains where it is a factor in semantic interpretation.

First of all, we see that in the domain of individuals in general, cumulativity distinguishes between plurals and mass nouns from singular count nouns. The first two have cumulative reference, while the latter is atomic and thus not cumulative. Also, we have seen that plurals which refer to groups are atomic, while plurals which refer to sums are cumulative.

CATEGORIES IN THE NOMINAL DOMAIN



CUMULATIVE	ATOMIC
Sums	Groups (Collectives)
Mass nouns	Singular count nouns

Cumulativity is not only a distinguishing property in the nominal domain, but it is also very effective in the verbal and eventual domains. When it comes to verbal domain, cumulativity distinguishes between distributive and collective predicates. Distributive predicates are cumulative while collective predicates are atomic and singular. When it comes to eventual domain, cumulativity distinguishes atelic predicates from telic predicates. Inherently cumulative events, i.e. activities, are atelic. Inherently atomic events, i.e. achievements, are not cumulative and they are telic. Accomplishments stand in between; if an accomplishment verb comes together with an atomic direct object, then the event it denotes is atomic and telic. If it comes together with a direct object that denotes cumulatively, the event in turn is cumulative and atelic. All in all, we see that in the domain of events cumulativity versus atomicity corresponds to telicity versus atelicity. Therefore:

CATEGORIES IN THE VERBAL DOMAIN

CUMULATIVE	ATOMIC
a) Atelic Events	a) Telic Events
1. Activities	1. Achievements
2 Accomplishments with	2. Accomplishments

non-atomic direct objects

b) Distributive predicates

with atomic direct objects

b) Collective predicates

Now, it appears that cumulativity and atomicity are really two opposite poles of the same continuum, and they are decisive factors in the semantic categorization both in the nominal and verbal domains. When we bring together the classifications created by cumulativity and atomicity in the nominal and verbal domain in one picture, we get the following result:

CATEGORIES IN THE NOMINAL AND VERBAL DOMAINS

CUMULATIVE ENTITIES	ATOMIC ENTITIES
Sums	Groups (Collectives)
Mass Nouns	Singular Count Nouns
Atelic Events	Telic Events
Distributive Predicates	Collective Predicates

The picture above is interesting for two reasons. First of all, it expresses that atelicity, plurality and massness and distributivity are all under the same ontological category. Second, it tells us that singularity, telicity, and collectivity also form another notional and ontological class.

These observations lead us to question whether it is possible to develop a semantic account which tries to explain the interaction of telicity-atelicity with plurality and massness by putting the criteria of cumulativity versus atomicity at the very heart of the aspectual differences. If we are going to do this, however, we need to answer some important questions about cumulativity and atomicity in the domain of events in the first place. Let us start with cumulativity first. The questions we need to ask and answer are:

a) What does it mean for an aspectual event to be cumulative?

b) How does the cumulativity property of an event affect the interpretation of the direct object and/or subject?

Let us start with question (a). Following Landman's discussion of cumulativity in the verbal domain (1989, 1997, 2000), we argue that cumulativity in the lexical aspectual domain derives from (semantic) plurality as well. A number of arguments can be put forward in favor of this claim. First of all, as Link (1983, 1984) has shown, plural NPs are governed by the cumulativity principle (see section II.1.2.1). Moreover, we know that mass nouns are also cumulative. Following this, Chierchia (1998) and Rothstein (2007a) have observed that mass nouns are also semantically plural despite their singular morpho-syntax (see section II.2.3). Both mass nouns and plural NPs denote a set of atoms closed under the operation of summing (which creates plurality), represented by using the Boolean semi-lattice. Furthermore, following Landman (1989, 1997, 2000), we have seen that cumulative interpretation naturally follows from distributive predicates:

(27) a. Ali ağladı ve Cem ağladı

b. Ali ve Cem ağladı.

Therefore, for Landman, the grammar of plurality does not need semantic operators to deal with cumulativity separately. The only distinction that it needs to deal with is the distributivity-collectivity distinction, where collectivity is semantic singularity and distributivity is semantic plurality. The crucial point is that, Landman here reduces cumulativity to distributivity, which again reduces to semantic plurality (see section II.1.2.3). Following all these discussions, it seems that in all domains, there is a general tendency for cumulative categories to produce semantic plurality. In that respect, we argue

that in the lexical aspectual domain as well, cumulativity is the expression of semantic plurality.

Moreover, we have said that in the aspectual domain, atelic events display the cumulative reference property. As a result, we conclude that atelicity is the expression of semantic plurality and an aspectually atelic predicate is a semantically plural predicate.

On the other hand, we have seen that atomicity is just the opposite of cumulativity both in the nominal and verbal domains. Therefore if cumulativity is semantic plurality, atomicity should be semantic singularity. This again seems plausible. After all, singular count nouns are those that have atomic reference. In the domain of plurality, groups (i.e. collectives) which act like one singular entity also have an atomic denotation. In the domain of events, telicity corresponds to atomicity, where being an atomic event means being *one* and *only one* defined event of change. Therefore we argue that while atelicity corresponds to semantic plurality, telicity corresponds to semantic singularity.

Now let us see how this way of understanding telicity and atelicity will affect our understanding of aspectual event types.

III.3.2. Semantically Singular and Plural Events

Following the discussion on semantic plurality and semantic singularity above, we put forward the following characterization of aspectual event types. Cumulative events are semantically plural events. It follows that **activities**, which are inherently cumulative predicates, denote a plurality of events. At the opposite pole of cumulativity is atomicity. While cumulative events are semantically plural, naturally atomic events, i.e. **achievements**, are semantically singular (this view on achievements is also implicit in Rothstein, 2008). It is because when we have an achievement event at hand, the lexical

meaning of the verb alone is able to specify for us what counts as 1 instantiation of that event (Rothstein, 2008; see section III.2.1.). We put forward that **Accomplishment** events denoted by verbs such as YE- İÇ-, İNŞAA ET- etc. are underspecified as to semantic plurality versus singularity distinction. This is because, as we have discussed in the previous section, the question of what an accomplishment event is cannot be answered by considering the meaning of the verb alone, but by taking into account the interaction of the verb with the direct object. We have seen that when an accomplishment verb combines with a bare N or mass direct object, it may denote cumulatively; when the direct object is atomic, it denotes atomically. Therefore, accomplishment VPs with bare N or mass direct objects are allowed to be semantically plural events, while those with atomic direct objects are singular events. In this framework, we ascribe the following structures to the event types (mostly using Rothstein's (2008) formal notations but in a different fashion):

(28) **Achievements** → **Singular events (telic)**

$\lambda e.\ P(e) \wedge MEAS(e) \wedge \langle 1, \lambda e.\ P(e)\rangle$
$\wedge |e| = 1$
An achievement event is singular because what counts as 1 event is measured by the lexical meaning of the verb alone. (Rothstein, 2008)

Activities → **Plural Events (atelic)**

$\lambda e.\ P(e) \wedge |e| > 1$
An activity event is plural because the meaning of the verb does not provide us a criterion with which to measure what counts as 1 event of *e* at a time.

Accomplishments → **Underspecified**

$\lambda e.\ P(e) \wedge MEAS(e) \wedge \langle 1, U\rangle$[4]

Accomplishment events are born with an underspecified structure. If their

[4] Notice that in Rothstein's (2008) classification this formal structure is ascribed to all event types. This is because Rothstein argues that all verbs are born as underspecified. We only ascribe this structure to accomplishments here because we believe that only they are underspecified and their singularity or plurality depends on the measure of <1, U> to be supplied by the semantics of direct objects.

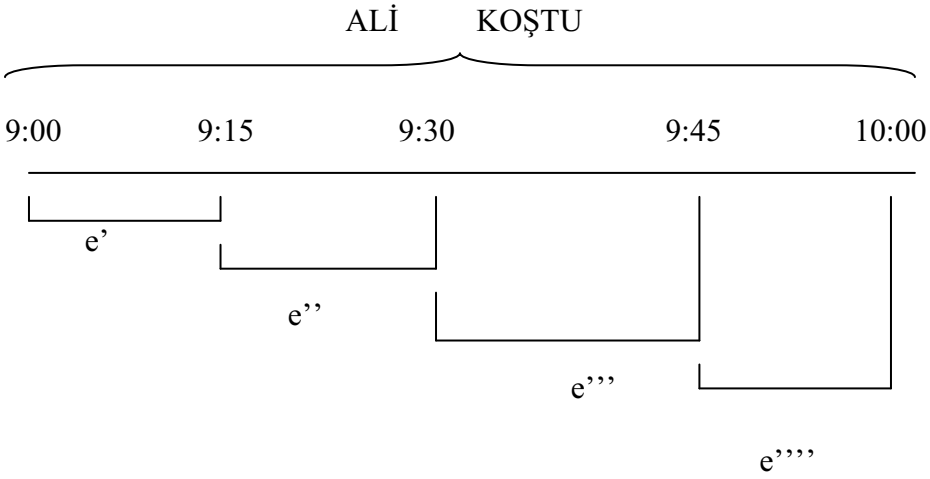
> direct object inside the VP provides a measure for what counts as 1 event, i.e. <1, U>, can be determined, they are singular; otherwise they are plural.

Notice that we differ sharply from Rothstein (2004, 2007b, 2008) in two important ways here. For Rothstein, cumulativity in the eventual domain does not create plurality, but singularity. To define cumulativity in the eventual domain, she postulates an operation of S(ingular)-summing instead of the operation of sum-formation. For Rothstein (2004, 2007b, 2008), the event type which we have argued to be plural, i.e. activities, are summed under this S-summing operation and thus are turned into singular events. We believe that this is not very plausible. We will see why in the following paragraphs of this section. Moreover, in contrast to Rothstein's claim that all verbs are born as underspecified, we put forward that only accomplishments are underspecified, and activities and achievements have a [+plural] and [+singular] value in their lexical semantics, respectively.

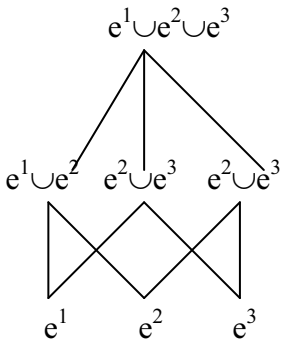
Of course, at this point what we say above remains only a stipulation. We need to prove that aspectual event types can really be distinguished as to singularity and plurality. We assume that the idea of achievements being singular is clear enough, and here we simply agree with Rothstein's observation on achievements. Since the part we differ mainly from Rothstein's theory is related to activities, the important question is how to prove that they really are semantically plural. To this now we turn.

We believe we have three kinds of independent evidence in support of the claim that activities are indeed semantically plural; one structural (evidence 1), one distributional (evidence 2), one theoretical (evidence 3).

Evidence 1: As we have seen in the preceding section, an activity event described by the sentence *Ali koştu* itself consists of minimal events which are events of running. Showing this in a picture of a time line:



If Ali ran from 9:00 to 10:00, then it is true that he also ran from 9:00 to 9:15, 9:15 to 9:30 etc. So, we see that an activity event consists of event parts (i.e. e’, e’’, e’’’ etc.) which have the same denotation with the larger event *e*. This is structurally the same as plural entities; a plural NP such as *çocuklar* denotes an entity the parts of which can still be under the denotation of *çocuklar*. It follows that, similar to plural NPs, activities can also be represented by the Boolean semi-lattice that Link (1983, 1984) uses to represent plurals in the nominal domain:



What we have to do now is to make sure that this algebraic semi-lattice that represents plurals really applies to activities as well. One way of doing this is to check whether the logical entailments that govern it are also applicable to activities. The frame above is

governed by three logical entailment rules (Link, 1983; Filip, 1999; Rothstein, 2007a among others):

a) $x \subseteq y \rightarrow x \cup y = y$

If a set x is a part of another set y, then the sum of x and y equals to y.

Applying this to activities, if an event of running from 9:00 from 9:15 is contained in another event, say from 9:15 to 9:45, then it is obvious that the sum of two events denote the latter event.

b) $\forall x, y\ [xOy] \rightarrow \exists z\ [x \subseteq z \wedge x \subseteq y]$

For every x and y, if set x overlaps set y and x and y are distinct, then there is at least a set z such that z is a part of x and z is a part of y.

Thus, it is obvious that two events of running, say from 9:00 to 9:20 and 9:15 to 9:30, have a part that overlaps, i.e. an event of running from 9:15 to 9:20.

c) $\forall x, y\ [x \subseteq y] \wedge \neg x{=}y \rightarrow \exists z\ [x \cup z = y]$

For every x and y, if the set x is a part of set the y and x and y are distinct, then there is at least one set z such that the sum of x and z equals to the set y.

Again, this applies to activities successfully. If the event of running from 9:00 to 9:45 is a part of a larger event of running, say from 9:00 to 10:00, then it is certain that there is another part of that larger event, i.e. the event of running 9:45 to 10:00 such that the sum of two parts equals to that larger event.

Since the logical entailments that govern pluralities also govern activities, it can be concluded that activities and pluralities logically fall under the same category and that activities are semantically plural.

Evidence 2: The semantics of "biraz"

The modifier *biraz* in Turkish can modify both nouns and events:

(29) a. Bacadan *biraz duman* çıktığını gördüm.

b. Dün okulda hocayla *biraz sohbet ettik.*

However, it is sensitive to the semantics of the nouns and VPs it can modify. In the nominal domain, we see that it only modifies mass nouns:

(30) a. biraz su

b. biraz kül

c. biraz para

(31) a. *biraz masa

b. *biraz bardak

c. * biraz kalem

Remember the discussion that mass nouns are actually semantically plural predicates (Chierchia 1998; Rothstein 2007a). Therefore, another way to state the same proposition is to say that *biraz* applies to semantically plural predicates only, and it cannot be applied to atomic, singular predicates. We see that this feature of the modifier correlates with its distribution in the domain of events as well. In the eventual domain, *biraz* cannot modify singular events. Thus, it is not compatible with achievements:

(32) a. * Biraz okula vardım.

b. * Biraz geldim

c. * Biraz dağın tepesine ulaştım.

Activities, on the other hand, can be modified by *biraz* easily:

(33) a. Biraz yürüdüm.

b. Biraz şehirde dolaştım

c. Biraz araştırma yaptım.

Therefore, it seems that in the verbal domain as well, *biraz* can only modify semantically plural events. Notice that with accomplishments as well *biraz* display the same behavior. If

an accomplishment verb combines with an atomic direct object and thus has a singular denotation, *biraz* is not compatible with the VP:

(34) a. *Biraz bir elma yedim.

b. *Biraz 3 odun kırdım.

c. *Biraz bir bardak su içtim

However, if the direct object is a bare noun or a mass noun, it can modify the event easily:

(35) a. Biraz odun kırdım.

b. Biraz bardak yıkadım.

c. Biraz kelime ezberledim.

(36) a. Biraz su içtim

b. Biraz bilgi topladım.

It is crucial to note that in sentences (35) above the direct objects are interpreted as plural. For example, in (35a) there are certainly more than one *odun* involved in the action, in (35b) there are more than one *bardak*, and in (35c) more than one *kelime* is involved. The question is where this plural reading comes from. It cannot be said that *biraz* only modifies the direct objects here because count nouns, as we have seen, are not compatible with *biraz*, so **biraz kelime* or **biraz bardak* is anomalous. The explanation should be that *biraz* modifies the whole VP, and the plural reading of the direct objects inside the VPs derives from the fact that the VPs denote a plurality of events; therefore there is a plurality of the objects involved in each sentence. This, again, supports the claim that accomplishments with bare noun direct objects may be plural and activities are always inherently semantically plural.

Evidence 3: The case of semelfactives

Semelfactives are verbs that denote "single occurrence" events such as GÖZ KIRP-, KANAT ÇIRP-, NEFES AL-, ÖKSÜR-, HAPŞIR-, ZIPLA- etc. It has widely been acknowledged in the literature on lexical aspect that they are a little problematic for theories of aspectual classification (Smith 1991; Rothstein 2004, 2007b, 2008 among others). The problem relates to the fact that these verb types display a fuzzy behavior. On one hand, they can be conceived of as achievements since they denote single events and are compatible with telic modifiers:

(37) a. Ali birdenbire göz kırptı.

b. Kuş aniden kanat çırptı.

c. Çocuk birden hapşırdı.

On the other hand, all semelfactive verbs have an activity reading where they denote iteration of the same event when they are used with atelic modifiers, such as:

(38) a. Ali 30 saniye boyunca göz kırptı.

b. Kuş dakikalarca kanat çırptı, sonra öldü.

c. Çocuk 5 dakika boyunca durmadan öksürdü.

It is easy to see that when semelfactives are used with atelic modifiers such as *for x time*, they do not denote single events but a plurality of events. In the sentences above, there is a plurality of blinking, flapping wings, and coughing, respectively. Considering this, Rothstein (2008) argues that *for x time* adverbials are a kind of plurality inducing adverbials on events. So, they create plural events out of singular events. The only difference between semelfactives (in their activity use) and true activities is that while with the former the minimal events that make up the plurality are grammatically countable (i.e. if there is an event of jumping going on for 15 minutes, for example, we can grammatically

count how many events of jumping have occurred, so we can say: *Ali x kere zıpladı*); with the latter we do not have grammatical access to the minimal events (meaning that we cannot grammatically count how many minimal running events have occurred in an event expressed by a sentence like *Ali koştu*). Rothstein (2007b) shows this with the following picture:

ZIPLA- KOŞ-

With an event of jumping in its activity use, i.e. *Ali 10 dakika zıpladı*, we know the starting and ending points of each minimal jumping event that make up the activity; we know, in other words, each minimal event where Ali moves his feet from the ground and falls back to the ground again, as represented in the picture. With an activity such as KOŞ-, on the other hand, where each minimal event of KOŞ- starts and ends is not grammatically accessible. That much of Rothstein's discussion of semelfactives is what we agree with.

The part that we do not agree with is the following. We see that according to Rothstein (2008) *for x time* adverbials bring about a plural reading of semelfactives, which originally denote singular events in their unmarked use. Furthermore, we also know that activities are naturally compatible with *for x time* adverbials. Now, if we accept that *for x time* adverbials are really plurality inducing, should not it be the case that they are compatible with activities because activities already have plurality buried into them in their inherent structure? Saying both that *for x time* adverbials have the feature [+plural] and that

activities are singular events appears to create a theoretical contradiction here. As a result, we do not agree with Rothstein's assumption that activities are singular events, and we take the distributional similarity between plural semelfactives and activities (i.e. the fact that they are both compatible with *for x time* adverbials) as further evidence that activities are indeed semantically plural.

As a result, we end up with the following conclusions at the end of this section:

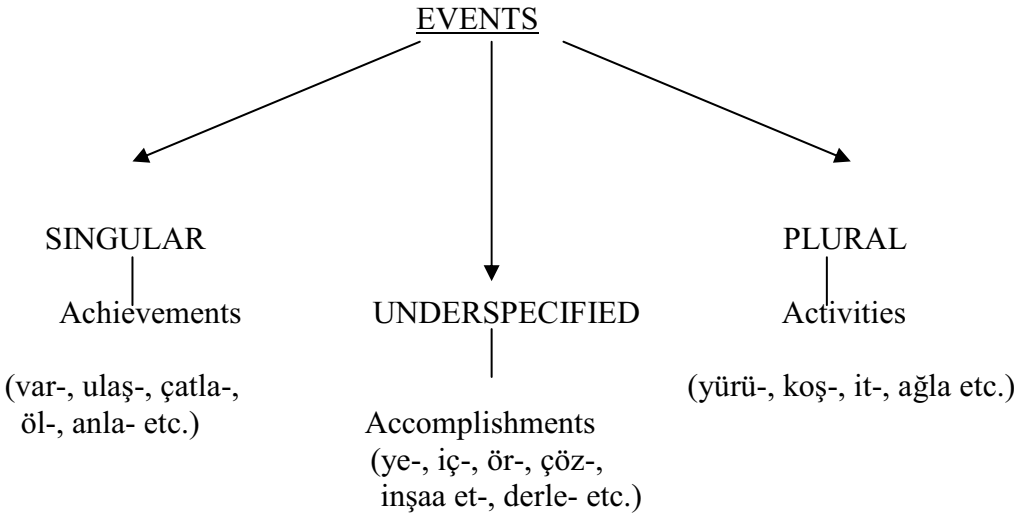
- Event types are distinguished from one another according to singularity versus plurality.
- Cumulativity is semantic plurality, and atomicity is semantic singularity.
- Activities are inherently semantically plural events because an activity event does not provide us any means with which to measure what counts as 1 event at a time. They have the following formal structure:

  $\lambda e.\ P(e)$

- Achievements are inherently semantically singular events since they are naturally atomic (This is also Rothstein's (2008) idea on achievements). The lexical meaning of an achievement provides us the measure to determine what counts as 1 event at a time. Achievements have the following formal structure.

  $\lambda e.\ P(e) \wedge \text{MEAS}(e) \wedge \langle 1, \lambda e.\ P(e) \rangle$.

This picture gives us a broad binary classification of event types: achievements versus activities. These two are somewhat "primitive" types: i.e. they are lexicalized as [+singular] and [+plural]. To this classification we add types which are underspecified: verbs that denote accomplishment events. Graphically:



The important characteristic of the underspecified class, i.e. accomplishments, is their ability to move towards either of the directions. They get their value from the information provided by their direct objects, and depending on the semantics of the direct objects, they can either be semantically singular or semantically plural.

Stating our conclusions, we will now move on to define how this classification of event types can explain telicity and/or atelicity of sentences with plural NP subjects, bare N direct objects and mass subjects/direct objects.

III.3.3. Telicity as Semantic Singularity, Atelicity as Semantic Plurality

We have the following hypotheses:

1. Telicity or atelicity derives from a one-to-one cardinality mapping between events and their arguments.

2. Telicity is semantic singularity in the domain of events. If a sentence is telic, it means that a semantically singular event is predicated of a semantically singular argument (or a set of arguments).

3. Atelicity is semantic plurality in the domain of events. If a sentence is atelic, it means that a semantically plural event is predicated of a semantically singular or plural set or arguments.

To test the truth of our hypotheses, in the following parts we will work on the interaction between event types and NPs. We will first work on how the events classified above interact with plural subjects and under which conditions the interaction results in telicity or atelicity. This, of course, requires an incorporation of a theory of plurality into the framework above. Following Rothstein (2008), we will employ the view of plurality present in Landman's works (1989, 1997, 2000), introduced in chapter II. Afterwards, we will move on discussing the interaction of the event types with mass nouns and preverbal bare N direct objects in Turkish based on the classifications we have made.

III.4. Plurality and Telicity

In this part, we will explicate how the above framework of event types interacts with the plurality phenomenon. To do this, we will "merge," so to speak, Landman's theory of plurality with the account we have put forward. Although we have presented Landman's (1989, 1997, 2000) theory of plurality in detail in section II.1.2.3., we will review some important parts of his theory here in order to be able to show explicitly how we will incorporate his theory into the account of lexical aspect discussed in the previous section.

In Landman's theory of plurality, all plural readings are reduced to a mere distinction between collectivity and distributivity. He interprets the domain of individuals, D, as a structure <D,∪, IND, GROUP, ↑, ↓>; which is basically the Boolean semi-lattice that Link (1983, 1984) uses to represent individuals and their plural sums, but also contains

additional features such as GROUP and an operator, "↑", which creates groups. The main idea in Landman's theory is that distributive and collective readings of plural NPs derive from different modes of predication. He maintains that *only distributivity is semantic plurality* and represents distributives with the star operator, *, to clarify that they are indeed semantically plural. For Landman, a sentence like (39a)

(39) a. Ali ve Berna parkta yürüdü.

is an application of a starred, plural predicate to a sum of individuals as in:

(39) b. ∃e [*YÜRÜ]: *AG (e) = [A∪B]

there is an event e such that e is a plural event of walking and the agent of e is a plurality.

So, for Landman, distributivity is the result of the application of a sum of events (i.e. a plural event), to a sum of individuals (i.e. semantically plural NPs), which creates semantic plurality in the domain of events. Since both the event and the argument that it is predicated of is semantically plural, the predicate is able to distribute down to the minimal parts of the argument. To account for this relationship, Landman (1997: 435) postulates a *pluralization on roles* principle, which creates *plural roles:*

Plural Roles:

Let *R* be a role.
**R*, the plural role based on R is defined by
**R* = ∪ ({*r* (e'): e' ∈ AT (e)}
if for every *e'* ∈ AT(e): *R(e')* is defined: otherwise undefined.

This roughly tells us that every minimal event part e' of a plural predicate *P is in the R relation to every minimal part of the plural role *R (Rothstein, 2008). We have seen in the previous section that the predicate YÜRÜ- has event parts, i.e. e', e'', e''', which are themselves under the denotation of the predicate YÜRÜ-. All these event parts are then in the R relation to all the minimal parts of the plural NP (*Ali ve Berna* in sentence 39), which

accounts for the fact that a sentence like *Ali yürüdü ve Berna yürüdü* is an entailment of the sentence (39).

In contrast to distributives, collectives are not regarded as semantically plural in Landman's theory. This is because they act like one singular entity, i.e. they are involved in the action denoted by the verb as a group, an **atomic** collection of individuals. For example, in the sentence (40):

(40) Ali ve Berna masayı yukarı taşıdı.

it is not the case that the individual children do the carrying event separately, but a *singular collection of children* do it together. To account for this fact, Landman (1997: 434) postulates a type shifting operation,↑, on sums of individuals which turns these sums into collective, atomic individuals:

↑ is a one-to-one function from SUM onto ATOM such that:

1. $\forall d \in$ SUM-IND: $\uparrow (d) \in$ GROUP
2. $\forall d \in$ IND : $\uparrow(d) =$ d.

The important point is that groups, or collectives, are atomic entities by themselves; a collective entity acts like a singular entity "in its own right". Thus, in contrast to distributivity, collectivity implies singular predication. The plural NP in the sentence (40) is interpreted as a collective entity because the singular predicate MASAYI YUKARI TAŞI- applies to a sum of individuals [*A∪B] and consequently turns that sum into an atomic, (semantically) singular collection of individuals: ↑[A∪B]. The sentence (40) is formally represented as follows:

(41) ∃e. MASAYI YUKARI TAŞI-: Ag(e) = ↑ [A∪B]

Notice that this time the predicate is not starred *, meaning that it is not a plural predicate.

Having presented these properties of Landman's theory, we have argued in section II.1.3. that what we would need is a way of generalizing which predicates are plural predicates and which predicates are singular predicates. How do we define a plural predicate? How do we know that YÜRÜ- is plural while MASAYI YUKARI TAŞI- is singular predication in Landman's theory? Landman's theory does not actually concern itself with these questions because for Landman all basic predicates of our metalanguage are singular predicates, and they are pluralized, similar to the pluralization operation in the nominal domain, with an operation which he associates with the symbol *. There are still some questions to ask about this view, though. Why, then, does the * operation apply to a predicate like YÜRÜ- while it does not normally apply to a predicate like MASAYI YUKARI TAŞI-?

Now let us see how the incorporation of Landman's ideas on plurality into the aspectual event framework accounts for some important facts about telicity and plurality, and also answers the question we asked above. First of all, remember how we defined the criterion of being telic:

Telicity Criterion:

Telicity is the application of a semantically singular predicate to semantically singular arguments.

Following Rothstein (2008), achievements are "by definition" singular, and thus an achievement predicate naturally denotes a telic event. For Landman, collectivity implies predication of a singular event to a group of individuals. Thus, it follows that since achievements are by definition semantically singular, when they are predicated of a plural NP, they force us to read the plural as a collective. This view can account for the fact that achievements are always telic whether they combine with plurals or not. Since they are

semantically singular, they require a semantically singular reading of the plural. As a result, the singularity condition on telicity is satisfied and the sentence is telic. That much was also put forward by Rothstein (2008), but now we can extend this approach to accomplishments and activities as well.

Accomplishment verbs are born as underspecified. Therefore, the question of whether an accomplishment event is semantically singular or semantically plural depends on the properties of the direct object. Similar to achievements, if an accomplishment event denotes a semantically singular event, it makes us read the plural that it is predicated of as a semantically singular entity, i.e. a collective. If the accomplishment VP is semantically plural, then a semantically plural (i.e. distributive) reading of the plural is allowed. This seems to provide the answer to the question of why a predicate like MASAYI YUKARI TAŞI- brings about a collective reading of the plural subject. The predicate MASAYI YUKARI TAŞI- is a singular predicate because it denotes one specific event of change. It provides us with the information of what a maximal event of TAŞI- is, i.e. a maximal event of TAŞI- is an event of change from the state where the table is downstairs to a state where it is upstairs. Since it is singular this way, it is telic, as can be seen with its compatibility with the telic modifier below:

(42) Ali 5 dakikada masayı yukarı taşıdı.

Now since the event is singular and telic, it follows from the telicity criterion that when it is predicated of a plural, the plural will also have a semantically singular reading. Therefore, in the sentence:

(43) Çocuklar masayı yukarı taşıdı.

the plural subject is interpreted as a collective. More examples and discussion will be presented in the section that follows.

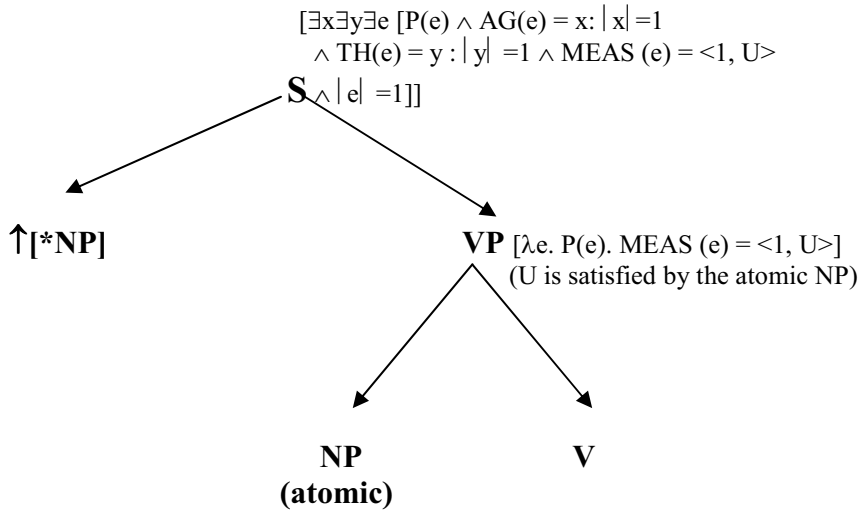
What remains is activities. Activities are semantically plural. It follows that in contrast to achievements, when they are predicated of a plural subject, they allow semantically plural (i.e. distributive) readings. And regardless of whether we interpret the plural subject as collective or distributive, telicity will never be possible because singularity criterion will never be satisfied due to the semantically plural nature of the events that activities denote.

This way of understanding events seems to answer the question of what can be taken as evidence to Landman's claim that some predicates are plural while others are singular. In this approach, we conclude that:

1. Semantic singularity and semantic plurality of predicates are aspectually defined.
2. A semantically singular predicate is a predicate that denotes a telic event.
3. A semantically plural predicate is a predicate that denotes an atelic event.

What we have said thus far about telicity and the interaction between telicity and plurality can be picturized, only for convenience, in a syntactic tree as in (44). Sentential telicity is possible iff a semantically singular VP, i.e. a VP which denotes an event where what counts as 1 maximal instantiation of that event can be measured, is applied to semantically singular arguments:

(44) **TELIC SENTENCE**[5]



The task that remains now is to check with examples whether what we have said about accomplishments, activities, and achievements and their interaction with plural subjects really hold. Let us start with accomplishments first.

III.4.1. Accomplishments with Plural Subjects:

Consider the following sentences, the first one of which is an accomplishment with a numerally quantified direct object, the second is accomplishment with an accusatively marked direct object, and in the last one there is a bare noun direct object, respectively:

(45) a. Öğrenciler bir mektup yazdı.

b. Öğrenciler mektubu yazdı.

c. Öğrenciler mektup yazdı.

For the sentences (45a-b), the only interpretation is that the students, as a singular collection of individuals, are involved in the writing of the letter together. There is no

[5] * = Plural Operator, ↑ = Group Operator, U = Measure Unit, {|x| = 1} = x is *semantically* singular

interpretation where the event can distribute down to the minimal parts of the plural NP. In contrast, it makes us read the plural NP as an atomic, singular entity[6].

Following what we have discussed so far, the plural subject is interpreted as a group because the VPs BİR MEKTUP YAZ- and MEKTUBU YAZ- denote atomic, singular events. In other words, with these VPs, the criterion of what counts as 1 maximal event of writing is measured by the properties of the direct objects. In both of the sentences, the direct objects *bir mektup* and *mektubu* specify that there is only 1 *mektup* involved in the event of writing[7]. Therefore, what counts as 1 maximal, atomic event of writing is an event of writing a letter. As a result, these VPs are singular and they are interpreted as:

(46) $\lambda e.\ P(e) \wedge$ YAZ- $(e) \wedge$ Meas $(e) = <1, \text{MEKTUP}>$

$\wedge \mid e \mid = 1$

Since the events are semantically singular this way, they require a semantically singular (i.e. collective) reading of the plural NPs in question. Thus the plural NPs in the subject position are turned into atomic entities by the operation of group formation, $\uparrow$:

(47) Öğrenciler bir mektup / mektubu yazdı.

$\exists x\ \exists e\ [\text{YAZ-}(e) \wedge \text{Ag}(e) = \uparrow [*\text{ÖĞRENCİ}]$

$\wedge \text{Th}(e) = x : x \in \text{MEKTUP} \wedge \mid x \mid = 1$

$\wedge \text{Meas}(e) = <1, \text{MEKTUP}> \wedge \mid e \mid = 1$

This tells us that the event is a singular, atomic event with a semantically singular Agent and a singular Theme.

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[6] See also the native speaker judgments on the collective/distributive interpretations of sentences in the form of (45a-b) in the appendix.

[7] We will discuss in section III.6. how the accusative marking -(Y)I behaves like the numeral "bir" here and provides a singular interpretation of the noun.

We see that telicity naturally derives from these facts. We have said that only semantically singular events with a singular (collective) reading of the plural subject are telic events, while plural events are atelic. When the sentences in (45a-b) are tested with the standard telicity test *in x time,* it becomes clear they are telic:

(48) a. Öğrenciler *bir saat içinde* bir mektup yazdı.

b. Öğrenciler mektubu *bir saat içinde* yazdı.

Therefore, our assumption that telicity derives from (or an expression of) semantic singularity in the domain of events seems to hold.

Now consider sentence (45c). In (45c), the reading where the students write letters separately is an allowed one. Thus, the VP MEKTUP YAZ- can distribute down to the minimal parts of the plural NP, which results in a plural reading of the event and a distributive interpretation of the plural subject. The explanation is as follows. We have said that preverbal bare Ns are transnumeral in that they can either be interpreted as singular or plural. Now, since a plural reading of the bare N is an allowed one, whenever we interpret the bare N as plural, we have a plural event in our hands. This is because the accomplishment verb YAZ- has an underspecified structure as to singularity or plurality and it needs information from the direct object to determine what counts as 1 maximal, singular event of YAZ-. If the direct object bare noun is interpreted as plural, however, it cannot provide such as measure, therefore the VP MEKTUP YAZ- has cumulative, thus semantically plural, denotation. The VP in this case has the following interpretation (we use Landman's * (star) operator to show that the event and the roles (Ag, Th, etc) denote a plurality):

(49) $\exists x \exists e$ [*MEKTUP YAZ- (e) $\wedge$ *Th (e) = x : x $\in$ *MEKTUP $\wedge |x| > 1$
$\wedge$ MEAS (e) = <1, U> (U cannot be defined)]
$\wedge |e| > 1$

Now, since the event is a plural event, it has event parts, e', e'', e''' etc. which are themselves under the denotation of the same event. As such, all these minimal event parts are in the *R* relation (see section III.4.) to the minimal parts of the plural NP ÖĞRENCİLER. As a result, every subpart of the event chooses (or distributes down to) a subpart of the plural NP, which means that for every subevent e', e'' ∈ MEKTUP YAZ-(e), a subpart of the plural NP (i.e. an individual student) is assigned as agent. This accounts for the fact that the distributive reading where each individual student writes a different letter is an allowed one. Hence, the sentence (45c) is interpreted as (50):

(50) $\exists x \exists e$ [*MEKTUP YAZ- $\wedge$ *Ag (e) = [*ÖĞRENCİ]
$\wedge$ *Th (e) = x: x $\in$ *MEKTUP $\wedge |x| > 1$
$\wedge \forall e'$: MEKTUP YAZ- (e') $\wedge$ e' $\subseteq$ e: $\exists y$: y$\subseteq$x $\wedge$ y $\in$ MEKTUP]
$\wedge$ Meas (e) = <1, U>, (U cannot be defined)
$\wedge |e| > 1$

Again, if there is a semantically plural event and a semantically plural (i.e. distributive) interpretation of the plural subject, then telicity is not a possibility. Sentence (45c) is compatible with the atelic modifier *for x time*:

(51) Çocuklar bir saat boyunca mektup yazdı.

Before continuing any further, it is important to note that we restrict the distributive interpretation of the plural subject here with the condition of the preverbal bare N's being interpreted as plural. If it is interpreted as singular, then a collective (semantically singular) reading of the plural subject becomes available again, and sentences can be telic. We will discuss this further in section III.5. Also, see the native speaker judgments in the appendix which show that in an accomplishment with a preverbal bare N as direct object and a plural NP as subject, the readings where the plural NPs are interpreted distributively and collectively seem to be equally available to native speakers.

Following the examples (45a-c), we see that the same distribution is observable with different accomplishment verbs that have plural NPs in their subject position. Whenever the direct object of an accomplishment VP creates a singular event out of the otherwise underspecified accomplishment verb, the plural subject is interpreted as a singular collection of individuals, and therefore the sentence is telic. If the direct object cannot do so, the event is semantically plural and therefore the plural subject is interpreted as distributive (i.e. semantically plural) as well. As a result, the sentence is atelic. Consider the following sentences where the abbreviations *Sub* is subject, *S* sentence, *Dist*. is Distributive, and *Coll*. is collective. In all the (a) sentences below, the direct object is a bare noun. Since we can interpret the bare noun both as plural, a plural event reading is also possible. Therefore, the plural subject is allowed to have a distributive reading and the sentence can be telic. In all the (b) and (c) sentences, the direct objects provide us with the information of what counts as 1 maximal, singular event. Therefore, there is a semantically singular event with the plural subject being interpreted as semantically singular (i.e. collective) as well. Since these two criteria are satisfied, telicity is the natural result:

(52) a. Çocuklar *10 dakika boyunca* elma yedi. (Sub= Dist., S= Atelic)

b. Çocuklar *10 dakikada* bir elma yedi. (Sub= Coll., S= Telic)

c. Çocuklar elmayı *10 dakikada* yedi. (Sub= Coll., S.= Telic)[8]

(53) a. Matematikçiler *1 saat boyunca* problem çözdü.

b. Matematikçiler *bir saatte* bir problem çözdü.

c. Matematikçiler problemi *bir saatte* çözdü.

[8] For convenience, we use the explanations in parentheses only for sentences in (52). The same distribution applies to all the other examples in the same order.

(54) a. Ali, Berna ve Cem *10 dakika boyunca* şarkı söyledi.

b. Ali, Berna ve Cem *10 dakika içinde* bir şarkı söyledi.

c. Ali, Berna ve Cem şarkıyı *10 dakikada* söyledi.

(55) a. Aşçılar *10 dakika boyunca* yemek pişirdi.

b. Aşçılar *10 dakikada* bir yemek pişirdi.

c. Aşçılar *10 dakikada* yemeği pişirdi.

(56) a. Müteahhitler *3 yıl boyunca* bina inşa etti.

b. Müteahhitler *3 yıl içinde* bir bina inşa etti.

c. Müteahhitler *3 yıl içinde* binayı inşa etti.

(57) a. Sanatçılar *1 yıl boyunca* şarkı besteledi.

b. Sanatçılar *1 yıl içinde* bir şarkı besteledi.

c. Sanatçılar şarkıyı *1 yıl içinde* besteledi.

(58) a. Çocuklar *5 dakika boyunca* ip düğümlediler.

b. Çocuklar *5 dakikada* bir ip düğümlediler.

c. Çocuklar *5 dakikada* ipi düğümlediler.

As a final remark, we should note that there are also cases where the atelic readings of some of the (b) and (c) sentences above are meaningful. Sentences (54b-c), for example, are compatible with the *for x time* adverbials as in (59a-b):

(59) a. Ali, Berna ve Cem *10 dakika boyunca* bir şarkı söyledi

b. Ali, Berna ve Cem *10 dakika boyunca* şarkıyı söyledi.

However, there is an important difference between the meaning of (54b-c) and (59a-b). In contrast to (54b-c), in (59a-b), the interpretation is that Ali Berna ve Cem sang the same song *again and again* for ten minutes, which is a plural, repetitive interpretation of the event. In other words, the sentences here shift their interpretation from a telic

accomplishment reading to an activity reading. We have said that activities denote semantically plural events. Therefore, the examples in (59a-b) do not contradict our assumption that atelicity is semantic plurality while telicity is semantic singularity. Consider further the sentences (56b-c) with the incremental verb of creation İNŞA ET-. When we modify the verb phrases with *for x time* adverbials as in the following example:

(60) Müteahhitler *3 yıl boyunca* binayı/bir bina inşa etti.

there is no longer a singular interpretation of the event because the sentence expresses that the event of building went *on and on* for three years without being completed. In other words, what counts as 1 maximal event of change cannot be described by the VP. This is because the event again shifts to an activity interpretation under the *for x time* reading, and is again cumulative, thus plural. We can easily attribute this aspectual shift to the type changing behavior of *for x time* adverbials. When these adverbials are predicated of an atomic event, they create a plural reading of the event (Dowty 1979, Rothstein 2007b, 2008; see the discussion on semelfactives in section III.3.). Thus, once again the fact that these sentences are compatible with *for x time* adverbials does not contradict to our assumption that atelicity is semantic plurality.

To sum up, we see that a telic event is a semantically singular event. Telicity moves from the verbal head upwards. Only if both the VP and the plural subject are interpreted as semantically singular can telicity be possible. If the VP denotes a semantically plural event, however, as in the case of activities or semelfactives (with activity reading), the sentence is atelic. Consequently, the examples here support the hypothesis that telic predication is predication of a semantically singular predicate to semantically singular roles, while atelic predication is plural predication.

III.4.2. Some Scopal Considerations

An interesting difference between Turkish and English is that while the English sentences below allow both the distributive and the collective interpretations, their Turkish counterparts seem to permit only the collective interpretation:

(61) a. The children built a raft.

= Every children built a separate raft. (Distributive)

= All the children built a raft together. (Collective)

b. John and Bill carried the piano upstairs.

= John and Bill carried the piano upstairs seperately. (Dist.)

= John and Bill carried the piano upstairs together. (Coll.)

(62) a. Çocuklar bir sal yaptı

NOT Her çocuk ayrı bir sal yaptı.

BUT Çocuklar hep birlikte bir sal yaptı

b. Ali ve Berna piyanoyu yukarı taşıdı.

. **NOT** Her biri piyanoyu ayrı ayrı yukarı taşıdı.

BUT Ali ve Berna piyanoyu yukarı birlikte taşıdı.

This, in turn, affects the telicity conditions of the Turkish and English sentences. While in English the accomplishment VPs above allow atelic interpretation under the distributive readings, since there is no distributive reading available in the Turkish sentences, they can not be atelic.

Aygen (2007) attributes the different interpretations of the Turkish and English sentences as to distributivity and collectivity to the semantics and the scopal behaviour of "bir" and the accusative case marking. It has been argued by Enç (1991) that "bir" is a weak determiner in Turkish. Challenging this account, Aygen (2007) puts forward that if "bir" was a determiner, then theoretically there would be no position for it in the

hierarchical structure of the sentences where it can escape the scope of the plural subject and exclude distributivity[9]. However, since "bir" is not under the scope of the plural subject and distributivity is excluded in the Turkish sentences above, "bir" cannot be a determiner but a numeral, and NPs in the form of *bir N* "should be classified as G(roup) denoting QPs in Turkish" (Aygen, 2007: 58). This way, the phrase *bir sal* is a quantifier phrase and it can be independent of the scope of plural subject and thus exclude the distributive interpretation. For a sentence like (62b), Aygen (2007) argues that a distributive interpretation is not allowed because of the semantic nature of the accusative case. For Aygen (2007: 58), an "overt case morpheme, be it structural or inherent, has the semantic property of allowing the noun to escape the scope of higher QPs". As a result, the plural subject cannot take distributive wide scope over the object and it is interpreted collectively.

The way Aygen's (2007) analysis is relevant to our claims on telicity can be explained as follows. Aygen's (2007) arguments indirectly support the idea that telicity is possible iff there is a singularity mapping between the events and arguments. The numerally quantified and accusatively marked direct objects in sentences (62a-b) escape the scope of the plural subject. Since they do so, the plural subject cannot impose a plural reading on them and as a result they have to be interpreted as singular. The singular interpretation of the direct objects in turn cause the event denoted by the VP to have a [+singular] value, since with accomplishments it is only the properties of the direct object that give a value to the event. As a result, there is a semantically singular event predicated of semantically singular arguments, which results in the telic interpretation of the sentences.

[9] See Aygen (2007) for details.

III.4.3 Achievements and Activities with Plural Subjects

Following Rothstein (2008), achievement verbs such as PATLA-, ÇARP-, ÇÖK-, KIRIL-, ZİYARET ET-, ULAŞ-, VAR- etc. denote naturally atomic events. These events denote minimal non-extended changes from $\neg\phi$ to ϕ where $\neg\phi$ is true at t_i and ϕ is true at t_{ii}. They are naturally atomic since what counts as 1 event of *e* with these verbs is determined by the lexical meaning of the verb alone, i.e. by the nature of change that the verb denotes (see III.3.). As is shown by Rothstein (2008), an achievement verb such as VAR- has the following formal structure:

(63) $\lambda e\ VAR(e) \wedge MEAS(e) \wedge <1, \lambda e.\ VAR(e)>$

Thus, achievements are by definition singular. When they are predicated of plural subjects, they make us read the plural subject as an atomic, semantically singular entity. In other words, the sum of individuals in the extension of the predicate is interpreted as a singular collection of individuals. This results in the telic interpretation of the sentences because telicity, as we have predicted, is the natural outcome of semantic singularity:

(64) a. Misafirler *beş dakika* içinde geldi.

b. Turistler *10 dakikada* dağın zirvesine ulaştı.

c. Sarsıntı sonucu binalar *birdenbire* çöktü.

d. Çocuklar *aniden* ağaçtan düştü.

e. Öğrenciler *1 saatte* okula vardı.

In sentence (64a), the interpretation is that it took *all* the guests 5 minutes to arrive, not that every guest arrived in a different five minutes period. In (64b), the modifier *10 dakikada* modifies the *single* event of a group of tourists' arriving to the mountain peak, not each tourist's arriving to the mountain peak separately etc. Thus, a sentence such as (64b) is

interpreted as (65), where the plural sum in the subject position is turned into a group-atom by ↑ formation:

(65) $\lambda e.\ P(e)\ [ULAŞ\ (e) \wedge AG\ (e) = \uparrow [*turist]$

$\wedge\ PATH\ (e) = [DAĞIN\ ZİRVESİ]$

$\wedge\ MEAS\ (e) = <1, \lambda e.\ ULAŞ(e)> \wedge |e| = 1.$

The explanation is that, since achievements are "by definition singular", they "require a singular argument and force a collective reading on a bare plural argument" (Rothstein, 2008: 16).

There are also cases when achievements can also denote a plurality of events and therefore allow a distributive interpretation of the plural subject. This is when plurality is induced on them by atelic modifiers such as *for x time*. Rothstein (2008: 22) analyses an atelic modifier such as "for an hour" as (66):

(66) $\lambda e.\ \exists e\ [\tau\ (e) = 1\ HOUR \wedge P\ (e) \wedge \forall i \subseteq \tau\ (e)\ \exists\ (e')$

$\wedge\ e' \subseteq e \wedge t\ (e') = i]]$[10]

For an hour applies to a predicate P to yield a set of events in P whose running time was an hour such that at all subintervals of the running times of these events, an event in the denotation of P was going on.

It follows from the definition of *for x time* adverbials that for them to apply a predicate, that predicate should denote a cumulative, i.e. semantically plural event. That is, the event should have event subparts e', e'' etc., which hold at every relevant subinterval of τ (i), and for every subpart $i \in \tau$ (i), a subpart of *e* should be true. We know that achievements are partless events in that they are singular and naturally atomic. Therefore, *for x time* adverbials should not be normally compatible with these events.

[10] This is actually a translation of an earlier analysis of these modifiers by Dowty (1979) to an event semantics framework.

However, compatibility-based analyses of atelic modifiers have been disregarded recently on the grounds that they cannot present a satisfactory analysis of event modifiers. In fact, the result of applying a *for x time* adverbial on achievement predicates as in (67):

(67) a. Yıllar boyunca Mevlana türbesini turistler ziyaret etti.

b. Garsonların dikkatsizliği sonucu bütün gece bardaklar kırıldı.

c. Yıllar boyunca bu şehirde binalar çöktü, evler yıkıldı.

is not semantic anomaly or ungrammaticality, but simply aspectual shift. More precisely, the achievement predicates ZİYARET ET-, KIRIL-, ÇÖK- shift to an activity interpretation where they denote the same event happening *again and again*. The sentence (67a) denotes the visiting of the tomb by different tourists at different times for years, (67b) denotes the breaking of different individual glasses at different occasions during the night etc. Regarding this, a number of proposals have been made for the semantics of these adverbials. Smith (1991) argues that adverbials have a stronger value than verb "constellations" and that their values "override" the feature values of "verb constellations", the process which she names "the principle of external override". Güven (2003) modifies Smith's proposal and argues that the verb constellations have underspecified aspectual values and they remain so until an external adverb specifies their value. Otherwise, they are assigned their default values. Gründer (2007) proposes a similar account and argues that aspectual shifts of this kind are motivated by "supervaluation" of the aspectually underspecified verb constellations by adverbials.

What is important for our purposes is that, in all the sentences above, achievements (which are inherently singular events) shift to a plural event reading as a result of the application of *for x time* adverbials, in which case they denote the set of

minimal events of ZİYARET ET- , KIRIL- , ÇÖK- closed under sum. In this respect, it can be said that an atelic modifier *for x time* is the eventual counterpart of the nominal plural marker. In the nominal domain, the main function of the plural marker –lAr is to apply a set of atoms and create sets of sums of these atoms closed under ∪, which gives us plural denotations. Similarly, when the atelic modifier *for x time* applies to a set of atomic, singular events, it creates plural sums of these events. Thus, it is possible to define *for x time* adverbials as a *one-to-one plurality function on events* such that:

(68) 1. $\forall e \in$ ATOM; *for x time* (e) $\in$ SUM

2. for x time (e) = $[e^1 \cup e^2 \cup e^3 \cup ….. \cup e^n]$

A more important point is that when singular achievement predicates are pluralized by *for x time* adverbials, the plural subjects that they are predicated of are no longer interpreted as a singular collection of individuals but are able to take on distributive interpretations. In (67a), the sentence does not denote the visiting of the tomb by a collection of tourists at one specific time (as in 67b), but visiting of the tomb by different individuals at different times, where for each minimal visiting event a **different** individual (or groups of individuals) is involved. Thus, the sentence (67a) is interpreted as (69):

(69) Yıllar boyunca Mevlana türbesini turistler ziyaret etti.

$\exists e \exists x$ [*ZİYARET ET(e) $\wedge$ *Ag(e) = x : x = [*turist]

$\wedge \forall e'$: ZİYARET ET(e') $\wedge$ e' $\subseteq$ e : $\exists x'$: x' $\subseteq$ x

$\wedge \forall e, e' \subseteq$ [YILLAR BOYUNCA]

$\wedge$ MEAS(e) = <1, U> where U is not defined

$\wedge |e| > 1$.

As a result, the event ZİYARET ET- here is a plural event for every part of which a part of the plural NP is assigned. All these discussions again amount to the claim that atelicity is

semantic plurality, so that only in atelic sentences where the event denotes a plurality; a distributive interpretation of the plural NP is allowed. While in telic sentences, there is a singular event with semantically singular arguments.

Before concluding our discussion on achievements, one related issue needs to be touched briefly. Sezer (1978) points out that in (70):

(70) a. Bakanlar yeni devlet başkanını kutladı.

b. Bakanlar yeni devlet başkanını kutladı*lar*.

c. Yedeksubaylar and içti.

d. Yedeksubaylar and içti*ler*.

there seems to be a slight difference between the meaning of the sentences in which the VPs are marked with the plural marking and where they are not. When there is a plural marking on the verb phrase, the distributive reading of the subject is more immediate; when there is no such marking a collective reading is stronger. Sezer's discussion here relies on the observation that the plural marking on VPs might be argued to cause plurality in the eventual domain, similar to *for x time* adverbials, for example.

If this observation is correct, then these differences can be incorporated into the discussion of semantic singularity versus semantic plurality in the eventual domain that we have been pursuing.[11]. If we accept that the plural marking on the verb phrases really create plural events, then Sezer's observation supports the idea that semantically plural events choose a semantically plural (i.e. distributive) reading of the plural subject, while semantically singular events choose a semantically singular (i.e. collective) reading of the plural subject. Still, though, we have to be careful, because it is not the case that every time there is a plural marking on the VP the distributive reading of the plural subject is

[11] Thanks to Engin Sezer (p.c.) for pointing this out to me.

enforced. Many informants reported that even though there is a plural marker on the VP in the following sentence, the subject is still interpreted as collective:

(71) Çocuklar masayı yukarı taşıdı*lar*.

Although we will not pursue this topic any more here and leave it for further investigations, our humble view is that the issue of the plural marker on VP seems to be a fruitful area of research in the domain of event plurality.

Concluding our discussion on achievements here, we see that the aspectual behaviour of achievement events support our claim that telicity is semantic singularity while atelicity is semantic plurality. Achievements are naturally atomic events, thus they are by definition singular. Since they are semantically singular, they require a collective, semantically singular interpretation of the plural subject that they are predicated of and the result of this interaction is telicity (Rothstein, 2008). If *for x time* adverbials are applied to an achievement event, then the singular event is pluralized by these adverbials. This time, the plural subject is allowed to be interpreted as distributive and an atelic reading of the event is brought about.

Finally, activities are, as we have stated before, semantically plural events in that they have a cumulative structure (see section III.3.). It follows from their being semantically plural that when they are predicated of a plural subject, they allow distributive reading of the sentence. In the sentences in (72):

(72) a. Çocuklar ağladı.

b. Öğrenciler araştıma yaptı.

c. Ali ve Berna müzik dinledi.

d. Annemle babam parkta dolaştı.

e. Adamlar arabayı itti.

f. Gençler dün partide çok eğlendi.

the interpretation is that the events denoted by the VPs apply to every single member of the sets denoted by plural subjects. Put another way, the sentence (72a) denotes that every child cried, the sentence (72b) denotes that every student did a research, the sentence (72c) denotes that both Ali and Berna listened to (a possibly different piece of) music etc. The event semantics explanation is as follows. Since activities are inherently semantically plural, they have event parts, e', e'', e''' etc. which are under the denotation of the event *e* denoted by the VP. As a result, it is possible for every subevent ∀e' that is a member of *e* to apply to a subpart of the plural sum of individuals denoted by the subject NP. This gives us the following interpretation for sentence (72a):

(73) $\exists e \exists x$ [*AĞLA(e) $\wedge$ *Ag(e) = x : x = [*çocuk]

$\wedge \forall e'$: AĞLA(e') $\wedge$ e' $\subseteq$ e : $\exists x'$: x' $\subseteq$ x

$\wedge |e| > 1$.

Thus, the plural event AĞLA- is able to see the minimal parts of the plural subject *çocuklar*, and in every minimal AĞLA' event, a minimal part of the plural (i.e. a different child) is involved. As a result, activities are semantically plural and thus they allow a distributive interpretation of the plural subject. Finally, since they are semantically plural this way, the sentences are atelic:

(74) a. Çocuklar *1 saat boyunca / ?1 saat içinde* ağladı.[12]

b. Öğrenciler *1 saat boyunca/ ? bir saat içinde* araştırma yaptı.

c. Ali ve Berna *bir saat boyunca / ?bir saat içinde* müzik dinledi.

d. Annemle babam *bir saat boyunca/ ? bir saat içinde* parkta dolaştı.

e. Adamlar *bir saat boyunca / ?bir saat içinde* arabayı itti.

[12] The sentence *Çocuklar bir saat içinde ağladı* can be meaningful only if the interpretation is that the children *started* to cry in an hour, which is a marked case. The same is true for all the other examples as well.

f. Gençler *bir saat boyunca / ?bir saat içinde* eğlendi

At the end of this section, we have a number of conclusions that we have reached. First of all, we have discussed that aspectual event types are distinguished from one another as to semantic singularity and semantic plurality. We have argued that only achievements denote semantically singular events (following Rothstein 2008), and that activities are semantically plural. We have provided several piece of evidence in favor of the semantically plural nature of activities, the most important of which, we believe, is that they are compatible with *biraz* in Turkish while semantically singular events (i.e. achievements) are not. We have argued that accomplishments are underspecified, and an accomplishment VP relies on the properties of the direct object to get a singular or plural value. Finally, we have used this classification to account for sentential telicity, in particular for the interaction of plural subjects with different event types. We have said that telicity is semantic singularity in the domain of events, so when a semantically singular event is predicated of a plural NP, the plural NP is interpreted as semantically singular (i.e. collective). The canonical example for this was the case of achievements, also discussed in Rothstein (2008). On the other hand, if an accomplishment VP has a singular value, then the plural NP in the subject position is semantically singular as well, and thus the sentence is telic. If not, the plural NP is distributive and the sentence is atelic. As for activities, since they are always semantically plural, they allow a distributive interpretation of the plural NP subject, and telicity is never allowed.

We hope that the results we reached have implications both in the domain of plurality and in domain of lexical aspect. In the following sections, we will apply the same framework to preverbal bare N direct objects, and finally to mass nouns in the subject and object position and try to explain how they interact with this view of telicity.

III.5. Bare Noun Direct Objects and Telicity

As we have seen in section II.1.4., preverbal transnumeral bare objects in Turkish create problems for aspectual theory. This is mainly due to the fact that they are underspecified as to singularity and plurality, and thus they can make us interpret the sentences either as telic or atelic (Aksan, 2003, 2007). In this section, we will try to provide a preliminary account on the countability properties of direct object bare nouns in achievement and accomplishment VPs and their interaction with telicity.

Let us consider a familiar problem in English first. In English, plural direct object NPs can create a collective/distributive ambiguity and thus affect the telicity condition of the sentences. Consider the following examples:

(75) a. She summarized the proposals. (Dowty, 1986: 107)

b. John juggled with six plates. (Link, 1998: 32)

c. Samantha quickly polished the boots. (Parsons, 1990: 46)

(cited in Schwertel, 2005: 11)

In sentence (75a), the collective interpretation of the plural object means that only the main ideas of the proposals were summarized, without each proposal being summarized separately. In sentence (75b), collectivity implies that John juggled with all the plates at the same time, while distributivity implies that he juggled with them one after the other. Finally, in Parson's example, distributive reading means that the polishing of each boot was quick, i.e. every minimal polishing event is quick, while in the collective interpretation there is only one event of polishing a collection of boots which is said to be quick (Schwertel, 2005). Only in the collective interpretation of the plural objects can the sentences be telic (76a-b), and if there is an atelic interpretation of the sentences, it means that there is distributivity involved (77a-b):

(76) a. She summarized the proposals in an hour. (telic, coll.)

b. Samantha polished the boots quickly in an hour. (telic, coll..)

(77) a. Samantha polished the boots for an hour. (atelic, dist..)

b. She summarized the proposals for an hour. (atelic, dist.)

It has been argued by Aksan (2003) that in Turkish bare nouns create a similar ambiguity. We have seen in the previous section that a sentence like:

(78) Muhalifler meclis oylamasında hata buldu.

has two possible interpretations depending on how we interpret the bare noun. First, there is a singular interpretation of the bare noun, in which case the VP expresses that there is only one mistake found. On the other hand, there is also a plural interpretation of the bare noun where there is a plurality of mistakes found. Notice that the plural reading of the bare noun implies distributivity of the VP, i.e. if the direct object is plural, then for every different mistake; there is a different BUL- event, and so there is a plurality of events. The question is how we can account for this ambiguity following the aspectual framework we have presented in the previous section.

We have seen in the previous section that telicity is singularity in the eventual domain, while atelicity is semantic plurality. We have seen that this helps us resolve the collective-distributive ambiguity of plural subjects; i.e. if there is a telic, semantically singular event, there is a collective, (semantically) singular interpretation of the plural subject. If the event is atelic and therefore semantically plural, the plural subject is interpreted as distributive. Now, it seems like if we expand on this idea, we can form a link between the singular/plural interpretation of bare N direct objects and telic/atelic interpretation of VPs.

The intuition is as follows. The singular/plural interpretation of bare Ns depends on the telic-atelic interpretation of the VPs. If there is telicity implied, a singular reading of the bare N is available, if the VP is atelic, it means that the VP denotes a semantically plural event; therefore the bare N is interpreted as plural.

Now let us consider sentence (78) again, repeated as (79):

(79) Muhalifler meclis oylamasında hata buldu.

The first observation is that since the bare N itself is underspecified as to singularity and plurality, the VP in turn is underspecified as to telicity-atelicity[13]. That is, the sentence can both be telic and atelic depending on how we interpret the bare N. Consider what happens when we modify this underspecified VP by telic and atelic modifiers. If it is made obvious by a telic modifier such as *in x time, suddenly* etc. that the VP is telic; the bare N is always interpreted as singular:

(80) a. Muhalifler *5 dakika içinde* meclis oylamasında *hata* buldu.

b. Muhalifler *ilk bakışta* meclis oylamasında *hata* buldu.

c. Muhalifler *hemen* meclis oylamasında *hata* buldu.

In all the sentences in (80), the modifiers make it clear that there is a telic event. As a result, there is a singular event of finding with a singular mistake as theme. But how can a temporal notion like "telicity" can affect the number features of a bare N? We believe this is only possible if we construe telicity as semantic singularity, so that a telic event is one which has semantically singular arguments. Note that this proposal is further supported by the interpretation of the plural subjects in (80). Whenever we interpret the bare N as singular and thus the VP as telic, the plural subjects shift their denotation to a collective

[13] The achievement verb BUL- itself denotes a singular, naturally atomic event. The underspecificity here derives from the fact that the bare N does not have a fixed interpretation, So it is not the V that is underpsecified but the VP.

reading. So, in sentences (80a-b-c), the interpretation is that all the members of the opposition, as a group, were engaged in the activity of finding a mistake.

In contrast, if we modify the VP by an atelic modifier and thus create semantic plurality:

(81) Muhalifler *bir saat boyunca* meclis oylamasında hata buldu.

the sentence allows the interpretation that each and every member of the opposition finds a different mistake (or a set of mistakes, for that matter), and thus distributivity is allowed. As a result, once again it is observable that atelicity is a plural interpretation of the arguments and events involved, while telicity is an atomic, singular interpretation of the arguments and events.

The sentence (80a) has the interpretation in (82a), while the sentence (81) is represented as (82b):

(82) a. Muhalifler 5 dakika içinde meclis oylamasında hata buldu.

$\lambda e.\ P(e)\ [BUL\ (e) \wedge AG\ (e) = \uparrow [*muhalif]$

$\wedge\ TH\ (e) = x \wedge x = [HATA]: x=1$

$\wedge\ LOC\ (e) = [MECLİS\ OYLAMASI]$

$\wedge\ MEAS\ (e) = <1, \lambda e.\ ULAŞ(e)> \wedge |e| = 1.$

b. Muhalifler bir saat boyunca meclis oylamasında hata buldu.

$\exists e \exists x \exists y\ [*BUL\ (e) \wedge *AG(e) = x : x = [*muhalif]$

$\wedge TH\ (e) = y: y = [*hata]$

$\wedge\ \forall e' : BUL(e') \wedge e' \subseteq e : \exists x' : x' \subseteq x\ \wedge\ \exists y' : y' \subseteq y$

$\wedge\ \forall e, e' \subseteq [BİR\ SAAT\ BOYUNCA]$

$\wedge\ MEAS(e) = <1, U>\ U\ is\ not\ defined$

$\wedge |e| > 1.$

Interpretation (82a) tells us that the event BUL- is a singular event which has a singular theme and a (semantically) singular, i.e. collective, agent. Therefore the event has cardinality 1 and it is telic. The interpretation (82b) tells us that the event BUL- is a plural event which has a plural theme and a semantically plural, i.e. distributive, agent. Therefore the event is a plural event and is atelic.

We see that the same pattern is productive and applies to other examples. In the following sentences, a telic interpretation means that the bare noun direct object is interpreted as singular, and plural subject is interpreted as collective. In atelic readings, the bare noun is allowed to be interpreted as plural, and the event can be distributive.

(83) a. Öğrenciler bir saatte mektup yazdı. (Mektup=1, Öğr. = Coll.)

b. Öğrenciler bir saat boyunca mektup yazdı. (Mektup≥ 1, Öğr= Dist/Coll.)

(84) a. Matematikçiler 10 dakika içinde problem çözdü.

b. Matematikçiler 10 dakika boyunca problem çözdü.

(85) a. Çocuklar 5 dakika içinde ağaçtan elma düşürdü.

b. Çocuklar 5 dakika boyunca ağaçtan elma düşürdü.

Some comments are due, especially on the interpretation of the sentence (85a). For this sentence, some informants have reported that the plural interpretation of the bare N is also a possibility even though the sentence is telic. This is really intuitive in that the sentence might be expressing an event where a group of children shake the tree for five minutes and finally reach a point where they cause some apples to fall down the tree. Notice that, however, even when we read the bare N as a plurality, we still read it as a collective plural. Intuitively, the sentence (85a) expresses a minimal change from an instant where all the apples are on the tree to the immediately following instant where a **group of** apples fall down the tree **together and at the same time**. In other words, it is not the case that the

sentence expresses a falling of different apples from the tree one after the other. Since groups are also semantically singular entities, the plural interpretation of the bare N in sentence (85a) is not really a counter fact to our idea that telicity is semantic singularity and atelicity is semantic plurality.

To sum up, we believe that the behavior of preverbal bare nouns in accomplishment and achievement VPs provide evidence for our claims on telicity. Whenever there is an apparently telic interpretation of a sentence in which the direct object is a bare N, the bare N is interpreted as singular. As a result, a singular event is created. More interestingly, the singular interpretation of the bare N direct object also motivates the collective interpretation of the plural subject. Thus, the claim that in telic sentences there is a one-to-one singularity mapping between the events and the arguments involved is once again supported[14].

III.6. Mass Nouns and Telicity

In this part of the chapter, we will commit ourselves to inquiring the nature of the relation between mass nouns and telicity in Turkish. The need to credit this relation a separate section derives from two observations on mass nouns. The first observation is the fact that in Turkish mass-count distinction seems to be grammatically neutralized. As was discussed in section II.2.2.1, contrary to some languages, such as English for example, mass nouns in Turkish are compatible with the plural marker and this is a very productive phenomenon:

[14] It should be noted that what we have presented is only a very preliminary analysis of the countability properties of preverbal bare nouns, and it by no means claims to be exhaustive or in-depth. We only argue them as evidence to our claims on telicity, and do not deal with a lot of complicated issues about their syntactic and semantic properties here.

(86) a. Bu kitaptaki *bilgiler* oldukça faydalı.

b. *Mobilyalar* dün tamir edildi.

c. Ali *suları* içti.

d. Bu işte büyük *paralar* var.

To account for this behaviour of mass nouns, following Chierchia (1998) and Rothstein (2007a), we have argued that mass nouns, similar to plurals, take their denotation from the atomic domain. The only difference between mass and plural count nouns is that with the former the minimal atoms are not lexically accessible, i.e. we do not have a prototypical cognitive idea of what an atomic unit of *su* is, so there is no natural language predicate that allows us to access those atoms. With the latter, however, the minimal atoms *are* lexically accessible, i.e. we know that the minimal atoms of a plural like *çocuklar* are every individual *çocuk* (Chierchia, 1998; Rothstein, 2007a). Following this, we have argued that the plural marking on mass nouns behaves like a contextual measure function. It applies to a mass noun and makes the minimal atoms of the set lexically and cognitively accessible to the language user by determining what counts as 1 unit of that entity at a time with the help of the context. That is, although we have no prototypical idea of what a minimal atom of *su* is when we utter the word *su*, when we utter the word *sular* as in:

(87) Masadaki suları kim içti?

the atoms of *su* becomes accessible, i.e. the word *sular* is interpreted as glasses of water or bottles of water etc; which means that in every possible interpretation a **unit** reading is assigned on the substance. As a result, with the application of the plural marker on a mass noun, we derive minimal plural atoms, i.e. individuated units, of that noun. This was formulated as follows, where we use * to represent plurality of the set:

(88) a. su → λe. P(e)

b. sular → λe. P (e) ∧ MEAS (e) = *<1, GLASS-OF>

So, the word *sular* denotes a plurality of the atomic units of water.

Another observation on mass nouns which is obviously more important for our purposes is that mass nouns in Turkish *do* induce telic readings under certain circumstances. This happens a) when a mass noun is in the subject/direct object position of achievement sentences (89a-b); b) when a bare or a plural mass noun is marked with the accusative case in the direct object position of accomplishment verb phrases (90a-b-c-d); c) when a bare or plural mass noun is in the subject position of certain inchoative verbs as in (91a-b).

(89) a. Bir anda yerde *kan* gördüm.

b. *Para* bize 15 dakikada ulaştım.

(90) a. Ali *suları* 10 dakikada içti.

b. Ali *suyu* 10 dakikada içti.

c. Boyacı *mobilyaları* yarım saatte boyadı.

d. Boyacı *mobilyayı* yarım saatte boyadı.

(91) a. *Su (lar)* 10 dakikada dondu.

b. *Buz (lar)* 5 dakikada eridi.

The data above seem diverse; we have different occurrences of mass nouns in different grammatical slots with different VPs, and in all cases sentences are telic. However, we believe that all these occurrences of mass nouns in telic sentences can be accounted for using the criterion of singularity on telicity we have been arguing for.

Let us start with case (89). In (89a-b), there are achievement verbs GÖR-, ULAŞ-, as lexical heads of the VPs. As we have noted before, achievements denote

naturally atomic, events, therefore they are inherently semantically singular (Rothstein, 2008). This explains the fact that an achievement predicate can be telic whether it is used with a plural subject or a transnumeral bare count object in Turkish:

(92) a. Binalar 5 dakika içinde yıkıldı.

b. Çocuk birdenbire yere bardak düşürdü.

The explanation is that, since achievements are naturally atomic, they force an atomic, semantically singular reading on their arguments. Consequently, the plural subject in (92a) is interpreted as a collective, a singular collection of individuals, which is atomic. Similarly, the transnumeral bare N in the object position in (92b) is interpreted either as singular or as a collective plural, both of which denote semantically singular, atomic entities.

It can be argued that the case with mass nouns is a similar one. Since achievements are naturally atomic events, an implicit quantity reading is assigned on mass nouns by them in sentences (89a-b). Thus, the object *kan* in (89a) is interpreted as "a specific piece of blood," and the subject *para* in (89b) is interpreted as "a certain amount of money". This means that in both cases they take on atomic interpretations. As a result, since the sentences in (89) are composed of atomic events and atomic arguments, the semantic singularity criterion is satisfied and telicity becomes available.

The case in (90) is a little more complicated. This time the VPs are headed by incremental theme verbs (or accomplishments, as a matter of fact). We know that they are neither naturally atomic nor inherently singular as achievement verbs are, so when they come together with mass nouns, they result in atelic readings:

(93) a. Ali 10 dakika boyunca su içti.

b. Ali 10 dakika boyunca bilgi topladı.

c. Ali 10 dakika boyunca mobilya boyadı.

However, in sentences from (90a) to (90d), where the accomplishment verbs are used with plural and bare mass nouns which are marked with the accusative, telic readings are available. Since the only difference between the sentences (90a-d) and sentences (93a-c) is the appearance of the accusative case, there should be something in the semantics of the accusative that delimits the event. The idea is not new and has been put forward by a number of researchers in the relevant literature before. To just name a few, Ramchand (1997) discusses the affects of the accusative case on aspectual composition in Scottish Gaelic, Kratzer (2004) approaches the same issue from a syntactic point of view, and Aksan (2007) makes the case for Turkish. The question to ask is: what kind of semantic operation can the accusative be said to involve that it makes telic readings available in sentences with mass subject and direct objects? And how can that semantics be incorporated into the semantics of telicity that we have been discussing?

We propose to treat the accusative marker as an atomic function on individuals. In fact, it is just the morphological realization of the type-shifting operation $\uparrow$ that Landman (1997, 2000) postulates. Formally, it is a one-to-one function from SUM denotations to ATOM denotations such that:

(94) 1. $\forall d \in$ SUM-IND : $\uparrow (d) \in$ GROUP

2. $\forall d \in$ IND: $\uparrow (d) \in d$

In this respect, we argue that the accusative case is a type-shifting operation from SUMS to ATOMS, i.e. from semantically plural denotations to semantically singular denotations[15]. This has the following outcomes.

[15] A similar observation on the semantics of the accusative is made by Aksan (2007) and Nilsson (1985). Both researchers argue that the accusative case brings about "a semantic individuation" of the object in question.

If the input for the operation is an inherently singular, atomic object, than the output of the operation will again be a singular, atomic object, through the application of rule 2 above such that:

(95) $\forall d \in IND : \uparrow (d) \in d$

Inherently atomic objects are count nouns, so whenever a count noun is marked with the accusative, it will have a singular denotation:

$\forall$ [kalem, masa, sandalye etc.] $\in$ IND

$\forall \uparrow$ [kalem, masa, sandalye etc.] $\in$ IND

This is almost tautological. It tells us that every atomic object such as *kalem, masa, sandalye* etc. marked with the accusative case will again have an atomic denotation. We see that this works, considering the atomic, singular denotation of the direct objects in (96):

(96) a. Ali kalemi bana verdi

b. Ayşe sandalyeyi getirdi.

This much being said, the importance of the operation arises when we consider individuals that denote sums, i.e. plurals and mass nouns. Through the application of Rule 1 above, the operation turns a sum of individuals into an atomic individual. Take, for example, plural NPs like *sular, kalemler, masalar* etc., represented as [*kalem, *su, *masa] below. Rule 1 tells us that for every

(97) [*kalem, *masa, *su etc.] $\in$ SUM

the case marking will create an atom out of this sum. Thus, it will turn the plural individual into a singular collection of individuals, which has an atomic denotation such that:

(98) $\uparrow$[*kalem, *masa, *su] $\in$ ATOM

As a result, plurals marked with the accusative will have a collective denotation. We see that this really is the case:

(99) a. Kalemleri sana geri vermeyi unutmuşum.

b. Bardakları önce Ali, sonra Berna, sonra da Cem taşıdı.

c. Adam suları yere döktü.

In sentence (99a), the plural NP has an atomic, collective denotation. The sentence tells us that there is a group of pencils that I forgot to give you. Similarly, in sentence (99b), there is one singular collection of glasses which is first carried by Ali, then Berna and finally by Cem; and it is not the case that different glasses are carried by different agents separately. Finally, in sentence (99c), there is only one group of water atoms, a collection, which undergo the action denoted by the verb DÖK-.

This view can also explain the denotation of case marked mass nouns. Similar to plurals, mass nouns also denote sums. Thus, the atomic function which is instantiated in the accusative case again turns the sum into an atom through the application of the rules 1 and 2 discussed above:

(100) a. Adam *mobilyayı* evde bıraktı.

b. Çocuk *suyu* bitirdi.

c. Ben *parayı* ona verdim.

We see that in sentence (100a), the accusative marked mass noun *mobilyayı* denotes a singular, atomic instantiation of *mobilya*. In (100b), the noun *suyu* is interpreted as 1 specific unit of water, be it a glass or a bottle. Finally, the noun *parayı* presupposes that there is one specific amount of money, it again denotes atomically.

We can turn back to our question now. How come sentences like

(101) a. Ali *suları* 10 dakikada içti.

b. Ali *suyu* 10 dakikada içti.

(102) a. Araştırmacı *bilgileri* 1 senede bir kitapta derledi.

b. Bulduğum *bilgiyi* kağıda geçirmem 5 dakika sürdü.

(103) a. Mobilyacı *mobilyayı* 5 dakikada boyadı.

b. Mobilyacı *mobilyaları* 15 dakikada boyadı.

are telic even if they have mass nouns in the direct object position? Following the discussion above, they are telic because the direct objects are case-marked. Telicity is possible if and only if there is a singular event with semantically singular arguments. Accusative marking turns SUM denotations into ATOM denotations and atoms are, by definition, singular elements. Since with accomplishment verbs such as İÇ-, DERLE- , BOYA- etc., the singularity of the event depends on the semantic singularity of the direct object, and since the direct objects in the sentences above denote atomically and thus are semantically singular, the events in turn are singular and telic. That is, the sentence (101a) tells us that there is only one event of drinking with a collection of atomic units of water as theme, represented as (104a). Sentence (101b) expresses that there is only one event of drinking which has an atomic unit of water as theme (represented as 104b), and so on.

(104) a. $\lambda e.\ P(e)\ [\text{İÇ}\ (e) \wedge \text{AG}\ (e) = \text{ALİ}$

$\wedge\ \text{TH}\ (e) = x \wedge x = \uparrow[*\text{SU}]$

$\wedge\ \text{MEAS}\ (e) = <1, \uparrow [*\text{SU}]>]$

$\wedge\ |e| = 1$

b. $\lambda e.\ P(e)\ [\text{İÇ}\ (e) \wedge \text{AG}\ (e) = \text{ALİ}$

$\wedge\ \text{TH}\ (e) = x \wedge x = \uparrow[\text{SU}]$

$\wedge\ \text{MEAS}\ (e) = <1, \uparrow [\text{SU}]>]$

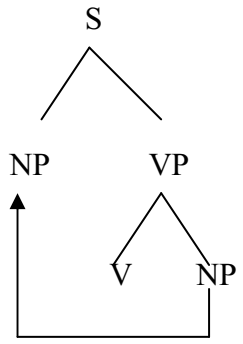
$\wedge\ |e| = 1$

Finally, the sentences in (91a-b), repeated as (105a-b), seem to provide syntactic evidence for our claim. In (105a-b) below, a bare and/or pluralized mass noun is in the surface subject position of a sentence with no overt case morpheme. However, we see that telic readings of these sentences are perfectly acceptable:

(105) a. *Su* 10 dakikada dondu.

b. *Buzlar* 10 dakikada eridi.

The crucial point is that the accomplishment verbs DON-, ERİ- are also inchoative. The syntax of inchoative verbs is such that the subjects in the surface structure are actually the direct objects in the deep structure, and they advance to the subject position via an argument deletion operation that takes place in the deep structure. (see, for example, Dowty 1979 among others). This can, pretty naively, be represented as follows:



Now, this seems to explain why these sentences are telic. In Turkish, the direct object position is where the accusative case marking is canonically realized. If these mass nouns in the subject position are really the direct objects in the deep structure, then it is plausible to think that they take their atomic denotation from the accusative case in the deep structure before advancing to the subject position. If semantic interpretation takes place in the deep structure, and if, as is usually assumed in transformational frameworks, transformations are meaning-preserving (Katz and Postal 1964), then our intuitions and

assumptions seem to be true. Thus, the mass subjects in the surface structure in these sentences take on atomic interpretation in the deep structure and cause the event to be telic.

III.7. Summary and Further Remarks

In this final chapter of the study, a unified account on sentential telicity is proposed. First of all, it is argued that events are distinguished from one another on the basis of semantic singularity and semantic plurality. Following Rothstein (2008), we have stated that events expressed by achievement verbs are inherently semantically singular. In contrast to Rothstein (2008), activities are analyzed as semantically plural events, and only events expressed by accomplishment verbs are underspecified.

Afterwards, we have used this classification to account for the interaction of these event types with plural NPs, mass NPs, and preverbal bare Ns in Turkish. A singularity criterion on telicity is defined. We have proposed that telicity is the predication of semantically singular events on semantically singular arguments. As a result, following Rothstein (2008) we have argued that when an achievement VP is predicated on plural or mass NPs, they require us to read them as semantically singular entities. More specifically, the plural NP is interpreted as a collective entity, which is semantically singular. And an atomic, implicit quantity reading is imposed on the mass NP by the achievement VP, which again makes them atomic and thus semantically singular. As a result, the telicity criterion is satisfied in both cases.

It has been argued that accomplishment verbs are born as underspecified, therefore a plural or a singular value that an accomplishment event can take depends on the semantic properties of the direct object that the verb combines with. If the direct object is atomic, then the event denoted by the VP is semantically singular; if not, it is semantically

plural. It is shown that the interpretation of plural NPs in the subject position shows variation as to whether the accomplishment VP denotes a semantically singular or plural event. Only if it is semantically singular can the plural NP be interpreted as semantically singular (i.e. collective); and if the VP denotes semantically plural event the plural NP can be interpreted as semantically plural (i.e. distributive). It is further argued that telicity is possible only in cases where there is a semantic singularity mapping between the events and the arguments.

Another conclusion reached concerns the semantics of the accusative case in Turkish. It is argued that in Turkish there are cases where mass nouns in the subject or direct object position of accomplishment VPs create telicity, contrary to what has been assumed so far in the literature. This is possible, however, only if the mass nouns are marked with the accusative case. In regards to this, the accusative case marker is analyzed as an atomic function. It applies to individuals and sums of individuals and creates atomic denotations of these individuals. It follows that the mass noun, when it is accusatively marked, has an atomic, semantically singular interpretation. As a result, the semantically singular interpretation of the mass noun is what motivates telicity in accomplishments with mass direct objects, because telicity derives from semantic singularity.

It has been argued that activities are semantically plural events. One piece of evidence for this claim (among others) is considered to be the semantics of the modifier *biraz* in Turkish. It is shown that in the nominal domain, *biraz* only modifies semantically plural nouns, i.e. mass nouns while it does not normally modify singular count nouns. In the verbal domain as well, *biraz* is shown not to be compatible with singular events, i.e. achievements; while it easily modifies activities. The fact that activities are semantically plural events correlates with their interaction with plural NPs. Contrary to achievements

which are singular by nature and accomplishments where a singular event reading is provided by the semantics of the direct object, when an activity VP is predicated of a plural NP, the distributive (i.e. semantically plural) reading of the plural NP is allowed. Finally, it follows from the telicity criterion that since activities denote semantically plural events, they can never be telic.

Finally we have extended the approach to account for the transnumerality of preverbal bare nouns in Turkish. It is shown that preverbal bare nouns in accomplishment and achievement VPs in Turkish allow us to interpret the event both as telic and as atelic. Following the telicity criterion, it is shown that a preverbal bare noun direct object takes on a singular interpretation only if the event is telic, and if it is atelic, it means that the preverbal bare noun is plural.

Telicity: A Singular-Plural or Mass-Count Distinction?

Before we conclude our chapter, we believe some final remarks are needed about the choice of terms *semantically singular* versus *semantically plural*, which we have used to account for the semantics of aspectual event types and the telicity-atelicity distinction.

Throughout the whole chapter we have tried to find a link between the eventual domain and nominal domain which could explain the interaction of these two domains in terms of telicity, and this link turned out to be semantic singularity. We should note that, however, this effort is not a new one and different ideas on how this interaction can be explained are abundant in the literature. Among them, an important one is Bach's (1981, 1986) arguments. Bach argues that atelic events are like mass nouns in the nominal domain, because similar to mass nouns atelic events also do not have an extent at the end

of which the event comes to an end. As a result, it follows that telic events are analogous to count nouns. So, for Bach (1981, 1986) telic-atelic distinction in the eventual domain is analogous to mass-count distinction in the nominal domain.

In our proposal, we have replaced these terms with semantically singular and semantically plural, and argued that telicity is semantic singularity while atelicity is semantic plurality. It should be noted that this replacement is not just a trivia; in fact it has, we believe, some important repercussions.

First of all, in theories where the telicity-atelicity distinction is supposed to be an expression of the mass-count distinction, the interaction of telicity with plural subjects cannot be explained properly. Many researchers have assumed that plural subjects are just like mass nouns in terms of aspectual composition; i.e. since they are extent-less, they cannot provide an extent to the event and delimit it. However, this idea seems to be paradoxical because plural NPs are at the same time count nouns, which is just the opposite of massness. Moreover, it is not the case that all plural NPs are extent-less, we have seen that plurals which have a collective denotation are atomic, therefore they are bounded, and they do have an extent. In the mass-count approach, however, all plural NPs are assumed to have the same effect on telicity and the collectivity-distributivity question is disregarded altogether. However, we have seen that this distinction influences aspectual interpretation in very important ways.

We believe that the terminology used here is more preferable for two reasons. First of all, it is not the case that plural nouns are just like mass nouns, but vice versa; i.e. mass nouns are just like plural nouns semantically. We have seen, following Chierchia (1998) and Rothstein (2007a), that mass nouns are also semantically plural despite their singular morpo-syntax. In that respect, mass nouns are just a proper subset of plural nouns,

and plural nouns are ontologically "greater than," or more basic than mass nouns. So, if we are going to relate telicity-atelicity distinction to some distinction in the nominal domain, that distinction better be the plural-singular distinction instead of the mass-count distinction. Furthermore, while mass-count approaches have no adequate tools to incorporate the distributive-collective denotations of plural NPs into telicity and atelicity, we see that an approach that takes telicity as semantic singularity and atelicity as semantic plurality has. If we understand telicity as semantic singularity and atelicity as semantic plurality, we understand when a plural NP may induce a telic or atelic reading on a sentence, i.e. it creates telicity if it also has a semantically singular (i.e. collective) denotation, and atelicity if it has a semantically plural (i.e. distributive) denotation. However, if we see atelicity as equivalent to massness, and telicity to countness, there is no way to account for the fact that a plural which has a distributive interpretation creates atelicity because distributivity has nothing to do with massness. In other words, if we had assumed that activities are mass events, then the idea that a mass event creates a distributive interpretation of the plural subject would be very hard to grasp, since there is no apparent link between massness and distributivity. If we assume that activities are semantically plural, however, then the distributivity reading can be explained, because distributivity also implies semantic plurality.

CONCLUSION

This study aimed at providing a preliminary aspectual framework that can explain the interaction between telicity, plurality, and massness through Turkish data.

Many valuable studies in the literature on lexical aspect have clarified that telicity is a result of a semantic relationship between verbs and nouns in a sentence. Presentation of various studies on telicity in chapter I has shown that the semantic status of the interaction between telicity and mass nouns on the one hand, and telicity and bare plurals on the other is still a lively issue of debate.

Following chapter I, chapter II was devoted to exploring the semantics of bare plural NPs and mass nouns in Turkish. Priority was given to three semantic phenomena. First, following Landman (1989, 1997, 2000), we have shown that distributive-collective ambiguity of a bare plural subject derives from the semantic properties of predicates. There are two types of predication: singular predication and plural predication. Singular predication applies a singular predicate to sets of atoms, which are semantically singular entities. Plural predication applies a plural predicate to sums of these atoms, which are semantically plural entities. As a result, when a singular predicate applies to a bare plural NP, the plural NP takes on a singular, atomic reading, and thus interpreted as a group atom (i.e. collectively). On the other hand, distributive predicates are semantically plural and when they apply to a bare plural NP, that plural NP is interpreted as a sum, a semantically plural entity, rather than as a group atom.

Another important issue we have dealt with in chapter II was the issue of preverbal bare nouns in Turkish. We have shown that preverbal bare nouns are problematic for aspectual composition because they are ambiguous between singular or plural readings.

Finally, we have discussed the semantics of mass nouns in Turkish. First of all, it has been shown that the mass-count distinction is grammatically neutralized in Turkish, because mass nouns are grammatical in count syntax, such as pluralization, for example. To account for the problematic behaviour of mass nouns in Turkish, we have adapted a theory of atomicity and countability developed by Rothstein (2007a). Following Rothstein, we have argued that mass nouns come out of the lexicon with plurality already built in. The only difference between mass nouns and plural count nouns is that the atoms under the extension of plural nouns are grammatically and semantically specified, while the atoms under the extension of mass nouns are unspecified and vague, and accessible only through contextual information. In that respect, it is argued that plurality marker on mass nouns behaves like a context-dependant measuring operation; it makes the unspecified atoms under the denotation of mass nouns semantically and pragmatically specified by mapping them onto a context-dependant unit of measurement, and then pluralizes those atoms.

An important result that derived from chapter II was that a simple semantic distinction – the distinction between semantic singularity and semantic plurality – cross-categorizes nominals in the domain of individuals. Mass nouns are semantically plural, while count nouns are semantically singular. Moreover, group denoting individuals are semantically singular, while sum denoting individuals are semantically plural.

The last chapter, chapter III, was where we have questioned how the semantics of mass nouns, bare plurals, and preverbal bare nouns in Turkish interacts with the semantics of telicity. Exceptionally helpful theories were those of Landman's and Rothstein's (2004, 2007b, 2008). Following Landman, we have argued that predicates can be distinguished as to semantic singularity and semantic plurality in the verbal domain. Differently from Landman, we have proposed that semantic singularity versus semantic

plurality in the verbal domain is aspectually defined. We have agreed with Rothstein's observation that achievements are by definition singular predicates, because they denote naturally atomic events. They come out of the lexicon with a [+singular] value. In contrast to Rothstein, it has been put forward that inherently atelic predicates, i.e. activities, come out of the lexicon with a [+plural] value, and that only accomplishments are underspecified as to semantic singularity and semantic plurality. They can be [+singular] or [+plural] depending on the semantic nature of the direct object that an accomplishment head combines with in the verb phrase.

In order to explain the interaction of these semantic properties of event types with bare plurals and mass nouns in terms of telicity, a telicity criterion is defined. Telicity is argued to be an expression of semantic singularity; a predication of a semantically singular predicate to semantically singular set of arguments. Therefore, in a telic sentence, semantically plural nouns take on semantically singular readings via type-shifting operators which are either abstract or morphologically realized. It has been argued that if a telic, semantically singular predicate applies to a bare plural NP in the subject position, the plural NP gets a group interpretation, and therefore it is interpreted as semantically singular. The semantic operator that creates the group interpretation is Landman's $\uparrow$. In atelic predication, however, the plural is allowed to be interpreted as a sum, therefore creating distributivity and semantic plurality.

On the other hand, mass direct objects are argued to allow telic interpretations of sentences if they also shift to semantically singular readings. Under achievement predicates, they always allow telicity because the [+singular] feature of achievements impose an implicit quantity reading on mass nouns. Under accomplishments with mass direct objects, telic interpretation occurs particularly when the direct objects are

accusatively marked. The accusative marker in Turkish has been identified as the realization of an atomic function; a type-changing operation from singular and plural sets to atomic, semantically singular sets. In that respect, a mass direct object in an accomplishment verb phrase causes telicity of the verb phrase if it is accusatively marked because the accusative marker brings about a semantically singular interpretation of the mass noun, thus satisfying the telicity criterion. Finally, we have argued that singular/plural interpretation of preverbal bare nouns in Turkish correlates with telic/atelic properties of predicates. Since telic predication is singular predication, under telic predication a preverbal bare noun has to be interpreted as a singularity. Under atelic predication, however, there is no such obligation.

All in all, the study argued that a number of distinctions regarding the semantic properties of nouns in the nominal domain and those regarding the aspectual properties of events in the verbal domain can be defined in terms of a simple distinction between semantic singularity and semantic plurality.

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APPENDICES

Appendix I: A perception test for the collective-distributive interpretation of plural subjects in accomplishment sentences with direct objects quantified by *bir*.

Aşağıdaki tümceleri okuyarak takip eden seçeneklerden sizce en doğru olanı işaretleyiniz.

1. Matematikçiler bir problem çözdü

a) Her matematikçi ayrı bir problem çözdü.

b) Matematikçilerin hepsi bir problemi birlikte çözdü.

c) Yukarıdakilerin hepsi.

2. Ali, Berna ve Cem bir şarkı söyledi.

a) Ali ayrı bir şarkı söyledi, Berna ayrı bir şarkı söyledi ve Cem ayrı bir şarkı söyledi.

b) Ali, Berna ve Cem hep birlikte bir şarkı söyledi.

c) Yukarıdakilerin hepsi.

3. Aşçılar bir yemek pişirdi.

a) Her aşçı ayrı bir yemek pişirdi.

b) Aşçılar hep birlikte bir yemek pişirdi.

c) Yukarıdakilerin hepsi.

4. Sanatçılar bir şarkı besteledi.

a) Her şarkıcı ayrı bir şarkı besteledi.

b) Sanatçıların hep birlikte bir şarkı besteledi.

c) Yukarıdakilerin hepsi.

5. Müteahhitler bir bina inşa etti.

a) Her müteahhit ayrı bir bina inşa etti.

b) Müteahhitler hep birlikte bir bina inşa etti.

c) Yukarıdalilerin hepsi.

Appendix I: Choices made by native speakers

	Sentence 1	Sentence 2	Sentence 3	Sentence 4	Sentence 5
S1	B	B	B	B	B
S2	B	B	B	B	B
S3	C	C	C	C	C
S4	B	B	B	B	B
S5	B	B	B	B	B
S6	B	B	B	B	B
S7	B	B	B	B	B
S8	B	B	B	B	B
S9	C	C	C	C	C
S10	B	B	B	B	B
S11	B	B	B	B	B
S12	B	B	B	B	B
S13	B	B	B	B	B
S14	C	C	C	A	C
S15	B	B	B	B	B
S16	C	C	C	C	C
S17	B	B	B	B	B
S18	A	A	A	A	B
S19	B	B	B	B	B
S20	C	C	C	C	C
S21	B	A	B	B	B
S22	B	B	B	A	B
S23	A	B	A	B	B
S24	B	B	B	B	B
S25	B	B	B	B	B
S26	C	B	A	A	B
S27	B	B	B	B	B
S28	B	B	B	B	B
S29	A	B	B	B	A
S30	B	B	B	B	B
S31	B	B	B	B	B
S32	C	B	B	A	A
S33	B	B	B	B	B
S34	B	B	B	B	B
S35	B	B	B	B	B
S36	B	B	B	B	B
S37	C	B	C	A	C
S38	B	B	B	B	C
S39	C	C	C	C	C
S40	B	B	B	B	B

S= Subject

Appendix I: Distribution of Choices

	Sentence 1	Sentence 2	Sentence 3	Sentence 4	Sentence 5
A	3	2	3	6	2
B	28	32	30	29	30
C	9	6	7	5	8

A= Distributive interpretation of the plural subject.

B= Collective Interpretation of the plural subject.

C= Both collective and distributive interpretation of the plural subject.

Comments on Choices

The choices made by the subjects show that in accomplishments with singular count nouns quantified by *bir* as direct objects, the tendency is towards interpreting the plural as collective. Among 200 choices, the collective interpretation is chosen by native speakers 149 times. On the other hand, the ratio of distributive interpretation is only 16. 35 times the native speakers judged that the plural subjects are ambiguous between collective and distributive readings.

Appendix II: A perception test for the collective-distributive interpretation of plural subjects in accomplishment sentences with accusatively marked direct objects.

Aşağıdaki tümceleri okuyarak takip eden seçeneklerden sizce en doğru olanı işaretleyiniz.

1. Matematikçiler problemi çözdü.
a) Matematikçiler problemi ayrı ayrı çözdü.
b) Matematikçiler problemi hep birkilte çözdü.
c) Yukarıdakilerin hepsi.

2. Ali, Berna ve Cem şarkıyı söyledi.
a) Ali, Berna ve Cem şarkıyı ayrı ayrı söyledi.
b) Ali, Berna ve Cem şarkıyı birlikte söyledi.
c) Yukarıdakilerin hepsi.

3. Aşçılar yemeği pişirdi.
a) Aşçılar yemeği ayrı ayrı pişirdi.
b) Aşçılar yemeği birlikte pişirdi.
c) Yukarıdakilerin hepsi.

4. Sanatçılar şarkıyı besteledi.
a) Sanatçılar şarkıyı ayrı ayrı besteledi.
b) Sanatçılar şarkıyı birlikte besteledi.
c) Yukarıdakilerin hepsi.

5. Çocuklar ayakkabıyı boyadı.
a) Çocuklar ayakkabıyı ayrı ayrı boyadı.
b) Çocuklar ayakkabıyı birlikte boyadı.
c) Yukarıdakilerin hepsi.

Appendix II: Choices made by native speakers

	Sentence 1	Sentence 2	Sentence 3	Sentence 4	Sentence 5
S1	C	B	B	A	B
S2	B	B	B	B	B
S3	B	B	B	B	B
S4	B	B	B	B	B
S5	B	B	B	B	B
S6	C	C	C	C	C
S7	B	B	B	B	B
S8	B	B	B	B	C
S9	B	B	B	B	B
S10	B	B	B	B	B
S11	C	B	A	B	A
S12	B	C	B	B	B
S13	C	B	B	A	B
S14	B	B	B	B	B
S15	B	B	B	B	B
S16	C	C	B	B	B
S17	C	C	C	C	C
S18	B	B	B	B	B
S19	B	B	B	B	B
S20	B	B	B	B	B
S21	B	B	B	B	B
S22	C	C	B	B	B
S23	C	C	B	B	B
S24	B	B	B	B	B
S25	C	C	C	B	A
S26	B	B	B	B	B
S27	B	B	C	C	B
S28	B	B	B	B	C
S29	B	B	B	B	B
S30	C	B	B	B	B
S31	B	B	B	B	B
S32	B	B	B	B	B
S33	C	B	B	B	A
S34	B	B	B	B	B
S35	C	B	B	A	B
S36	A	B	B	B	B
S37	C	B	B	B	B
S38	B	B	B	B	B
S39	C	C	C	C	C
S40	B	B	B	B	B

Appendix II: Distribution of choices

	Sentence 1	Sentence 2	Sentence 3	Sentence 4	Sentence 5
A	1	-	1	3	3
B	25	32	34	33	32
C	14	8	5	4	5

A= Distributive interpretation of the plural subject.

B= Collective interpretation of the plural subject.

C= Both distributive and collective interpretation of the plural subject.

Comments on choices

Result of the test show that in accomplishments with accusatively marked direct objects, native speakers mostly interpret the plural subjects as collective. Collective interpretation is preferred by the native speakers 156 times, while distributive interpretation is preferred only 8 times. Native speakers judged the plural subjects to be ambiguous between collective and distributive readings 36 times.

Appendix III: A perception test for the collective-distributive interpretation of plural subjects in accomplishment sentences with bare noun direct objects.

Aşağıdaki tümceleri okuyarak takip eden seçeneklerden sizce en doğru olanı işaretleyiniz.

1. Matematikçiler problem çözdü.

a) Matematikçiler ayrı ayrı problem çözdü.

b) Matematikçilerin hepsi bir problemi birlikte çözdü.

c) Yukarıdakilerin hepsi.

2. Ali, Berna ve Cem şarkı söyledi.

a) Ali, Berna ve Cem ayrı ayrı şarkı söyledi.

b) Ali, Berna ve Cem hep birlikte bir şarkı söyledi.

c) Yukarıdakilerin hepsi.

3. Aşçılar yemek pişirdi.

a) Aşçılar ayrı ayrı yemek pişirdi.

b) Aşçılar hep birlikte bir yemek pişirdi.

c) Yukarıdakilerin hepsi.

4. Müteahhitler bina inşa etti.

a) Müteahhitler ayrı ayrı bina inşa etti.

b) Müteahhitler hep birlikte bir bina inşa etti.

c) Yukarıdalilerin hepsi.

5. Sanatçılar şarkı besteledi.

a) Sanatçılar ayrı ayrı şarkı besteledi.

b) Sanatçıların hep birlikte bir şarkı besteledi.

c) Yukarıdakilerin hepsi.

Appendix III: Choices made by native speakers

	Sentence 1	Sentence 2	Sentence 3	Sentence 4	Sentence 2
S1	C	A	B	C	A
S2	A	A	C	A	B
S3	A	B	B	B	B
S4	C	C	C	C	C
S5	C	B	B	B	B
S6	A	A	A	A	A
S7	C	C	C	C	C
S8	A	B	A	B	A
S9	C	C	C	C	C
S10	C	C	B	B	A
S11	C	C	C	C	C
S12	C	C	C	C	C
S13	C	C	A	A	A
S14	B	C	C	B	C
S15	A	A	A	B	B
S16	B	B	A	A	A
S17	B	B	B	B	B
S18	A	A	A	A	A
S19	C	C	A	A	A
S20	C	B	C	B	A
S21	C	C	C	C	C
S22	A	B	B	C	B
S23	B	B	B	B	B
S24	B	B	B	B	A
S25	C	C	A	A	A
S26	A	C	B	C	A
S27	B	B	A	A	A
S28	B	A	A	B	A
S29	C	C	C	C	A
S30	C	C	C	C	C
S31	C	C	C	C	C
S32	C	B	C	C	A
S33	B	B	B	B	A
S34	A	A	A	A	A
S35	B	B	B	B	B
S36	C	B	C	B	B
S37	B	A	B	B	A
S38	C	B	A	B	A
S39	A	C	C	C	C
S40	A	C	A	C	A

Appendix III: Distribution of Choices

	Sentence 1	Sentence 2	Sentence 3	Sentence 4	Sentence 5
A	11	8	13	9	21
B	10	15	12	16	9
C	19	17	15	15	10

A= Distributive interpretation of the plural subject

B= Collective interpretation of the plural subject

C= Both distributive and collective interpretation of the plural subject

Comments on Choices

Results of this last test show that in Turkish, the distributive-collective ambiguity of a plural subject shows up when the direct object is a bare noun in a verb phrase headed by an accomplishment verb. The distributive interpretation of the plural subjects in the sentences above is preferred 62 times by native speakers. Accordingly, native speakers also judged the plural subject to be collective 62 times again. The number of ambiguous readings, on the other hand, is 76, which means that native speakers thought the plural subjects as ambiguous between collective and distributive readings 76 times.

All in all, the results of the three tests confirm our claim that the transnumerality of bare noun direct objects in a verb phrase headed by an accomplishment verb can cause the event that the verb phrase denotes to be interpreted as both plural and singular, thus creating a distributive-collective ambiguity of the plural subject in that sentence. On the other hand, when the direct object is quantified by *bir* and/or marked with the accusative in an accomplishment verb phrase, the verb phrase denotes a singular event, therefore the plural subject is interpreted collectively (i.e. semantically singular), as is shown by the results of the first two tests.