# On The Semantics of Classifiers: A New Perspective from an Optional Classifier Language, Turkish

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## INTRODUCTION

The goal of this paper is to investigate the nature of classifiers in numeral constructions and the semantics of number by analyzing a language where the usage of classifiers is optional, i.e. Turkish. The numeral constructions of Turkish can optionally include the classifier *tane*, and although a plural marker exits in the language, the nominals inflected by it cannot be used in those constructions.

A formal account of the semantics of nominals is provided to shed light on the semantics of counting and classifiers, analyzing them as belonging to three classes: lexical singulars (l-singular-denoting sets of atomic individuals), lexical plurals (l-plurals-denoting sets of atomic individuals and their sums in the sense of Link, 1983, 1987, Landman, 1989), and a third class, morphological plurals where nominals receive the plural marker *-lAr* (m-plurals-denoting sets of atomic individuals and their sums as l-plurals). The first two classes of nominals can be both predicative (denoting properties of <e, t> type) and argumental (denoting kinds of <s, e> or <e> type) whereas m-plurals can only be argumental (denoting kinds of <s, e> or <e> type).

Ionin and Matushansky's (2006) semantics for numerals is adopted where they are treated as modifiers the lexical complements of which are required to be atomic (cf. Link, 1987). It is shown that the classifier in Turkish cannot take a kind denoting nominal as its argument contra Krifka (1995) and Chierchia (1998). Instead, it combines with a property denoting nominal; hence, with l-singulars and l-plurals, but not with m-plurals, and returns the set of atomic entities, making it available for counting (i.e. to combine with a numeral).

The analysis is further extended to a discussion on the status of Turkish in Chierchia's (1998) system mainly with regards to Nominal Mapping Parameter, arguing that it is a [+arg, +pred] language, from which the optionality of the classifier is shown.

First in Section 1, the core data and the semantics of numerals are presented. Section 2 is concerned with a three-way classification of nominals and the semantics of number, and Section 3 is devoted to an analysis of counting with l-singulars and the semantics of the classifier. As a follow-up, in Sections 4 and 5, analyses of counting with l-plurals and m-plurals is given, respectively. Finally, in Section 6, further implications of the study, including the status of Turkish in Chierchia's system are elaborated[1].

[1] Abbreviations used in glosses are the following: abl: ablative, acc: accusative, aor: aorist, CL: classifier, cop: copula, dat: dative, fut: future, loc: locative, neg: negation, pass: passive, past: past, pl: plural, poss: possessive, prog: progressive, QP: Question Particle, rel: relative marker, sg: singular, 1: 1st person, 2: 2nd person, 3: 3rd person.

## 1. The Problem of Turkish Numeral Constructions

This section is aimed at laying out the core facts of Turkish numeral constructions and questions arising with regards to the claims on classifiers and classifier languages discussed in the general framework (e.g. Krifka, 1995, Chierchia, 1998).

I will first present the data regarding Turkish numeral constructions showing that the classifier is optional and that nominals with the plural morpheme *-lAr* cannot occur in those constructions, comparing them with obligatory classifier languages like Chinese and non-classifier languages like English. Then, I will discuss why I adopt Ionin and Matushansky's (2006) (I&M, henceforth) semantics for numerals, in which they are treated as modifiers whose complements are required to be atomic, instead of following other theories which include Link (1987) where numerals are proposed to be restrictive modifiers.

### 1.1 The Core Data

The problem of Turkish numeral constructions come in two forms.

First, Turkish uses classifiers optionally in numeral constructions as opposed to obligatory classifier languages like Chinese, Japanese and Korean (Jiang, 2012, Kim, 2009 among others) as shown in (1a)[2]. Second, nominals pluralized with the plural marker *-lAr* cannot occur in numeral constructions just as in obligatory classifier languages, but as opposed to the non-classifier language, English (Ionin and Matushansky, 2006, Bale et al, 2010) as shown in (1b)[3].

(1) a. iki (tane) çocuk
two item child
'two children'
b. *iki (tane) çocuk-lar
two item child-pl

Let us start with the optionality of the classifier.

Classifiers are widely thought to be a means of mediating between the denotation of a noun and the numeral. For example, Chierchia (1998) proposes that in the classifier languages like Chinese, which require the existence of classifiers between the numeral and the nominal obligatorily, nominals uniformly denote kind terms of <s, e> type as they come out of the lexicon. Since kinds are inherently plural, all nominals in those languages are equal to mass nouns in some sense, whose atomic instances are not readily available for counting. Therefore,

[2] Turkish uses two different classifiers at least to my knowledge. One is *tane* and it is compatible with all kinds of count nominals, and the other is *adet* and it is compatible with non-human count nominals. In this study, I will only refer to *tane* while exemplifying numeral constructions with classifiers due to the fact that the distribution of both classifiers is the same and *tane* is more commonly used.
We know that they are classifiers, but not measure words, because they have exactly the same properties as the classifiers in other languages. As defined in Kim (2009), (i) classifiers are only compatible with count nouns whereas measure words are compatible with both count and mass nouns, (ii) they cannot be modified by an adjective as opposed to measure words, and (iii) they can be used with quantifiers compatible with count nouns. The fact that Turkish classifiers also have these properties are shown below respectively.

(i) a. İki tane elma b. #iki tane kan (unless *kan* is used referring to a sample of blood)
two CL apple two CL blood
(ii) a. İki tane büyük elma b. #iki büyük tane elma c. İki büyük paket prinç
two CL big apple two big CL apple two big package rice
(iii) a. Birkaç tane elma
a few CL apple

[3] Turkish also contrasts with another optional classifier language like Armenian in that respect. In Armenian pluralized nominals can optionally occur in numeral constructions. See Borer (2005) and Bale et al (2010).

languages such as Chinese resort to classifiers in order to reach the atomic level of the kind in light of the claim that atoms are crucial in counting (Chierchia, 1998, Ionin and Matushansky, 2006). In other words, classifiers are considered as functions from pluralities (i.e. kinds) into sets of atoms constituted by the members of the pluralities (i.e. instantiations of kinds).

However, considering Turkish data in regards to Chierchia's definition of the classifier, one is urged to question the role of classifiers. The first question that arises is the following:

(i) Are nominals in Turkish also kind terms as in Chinese, given the fact that Turkish also uses classifiers?

The next question that is borne out as a follow up to the first question is the following:

(ii) If this is the case, in the absence of the classifier what is the medium between the atomic parts of the nominal and the numeral? In other words, how can classifiers be optional in a language?

Now let us consider the incompatibility of nominals carrying the plural morpheme *-lAr* with numeral constructions. We should consider it from the perspective of both Chinese-like languages and English-like languages.

In Chierchia's system, obligatory classifier languages are claimed to lack plural morphology because all nominals in those languages are already inherently plural mass terms. Namely, the function PL will have no argument that is defined for it. Therefore, in those languages singular/plural alternations of the nominals are not expected[4].

Turkish, on the other hand, takes advantage of overt plural morphology as opposed to those languages, which is not very surprising considering the fact that the classifier in this language is optional. It opens the possibility that not all nominals are kind terms; therefore, those ones which do not denote kinds can freely combine with a plural marker (the details of which are discussed throughout the rest of the paper).

This possibility would classify Turkish with English, though. In Chierchia's system, English is a language where not all nominals, but mass nouns and bare plurals can denote kinds. As a result, in English an overt plural morpheme exists in contrast to the languages where all nominals are inherently mass, and pluralized nominals can occur in numeral constructions without resorting to (at least overtly realized) classifiers[5]. Even though Turkish is similar to English in having a plural morpheme, contrary to it, the nominals inflected by this morpheme cannot occur in numeral constructions in Turkish.

So, from the perspective of the existence of a plural morpheme in Turkish, the following question arises:

[4] In fact, in those languages, there exist a plural marker, but they tend to be non-obligatory on nominals. Kim (2009) shows that plural markers in those languages mark more than plurality as opposed to languages like English. For example, Chinese plural marker *-men* (see Yang, 2001), and Japanese plural marker *-tachi* (see Kurafuji, 1999) include definiteness in their denotation, whereas Korean plural marker *-tul* denotes specificity.

[5] Ionin and Matushansky (2006) claims against a null classifier in English. Instead, they argue that plural marking on NP in numeral constructions is misleading and that it is actually number agreement (semantic concord). They claim that true plurals cannot combine with numerals because a plural noun such as *books* denotes a set of individuals x where each x is a plurality of books and these pluralities do not necessarily have the same cardinality. In other words, *books* in *two books* has to be semantically singular, only denoting a set of atomic individuals. See next section where their semantics for numerals are summarized.

(iii) Where does Turkish stand in Chierchia's system (Nominal Mapping Parameter) compared to Chinese-like languages on the one hand, and English-like languages on the other hand, considering the fact that it has similarities to both languages?

I attempt to give answers to those main questions throughout the discussion of the paper. In order to understand the semantics of the classifier and counting in Turkish, first we need to understand the nature of the nominals. Before starting the discussion on this, in the next section I will adopt I&M style of semantics for numerals eliminating other possible analyses, which treat numerals either as determiners or as predicates, in light of the independent evidence given in I&M.

### 1.2 Semantics of Numerals

So far in the literature numerals have been treated as both determiners of type <<e, t>, <<e, t>, t>> (Bennett, 1974, among others) and predicates of type <e, t> (Partee, 1987, Link, 1987, among others). Among the ones who treat numerals as predicates, Link (1987) analyzes them as restrictive modifiers (see also Bale et al, 2010). However, all those studies mainly focus on simplex numerals.

I&M rules out both analyses by showing evidence from complex numerals. They show that if simplex numerals were of determiner type, then it would not be possible to derive the semantics of complex numerals, like *two hundred*. For example, if *hundreds* (presumably <<e, t>, <<e, t>, t>>) combined with *books* (type <e, t>) first, the resulting NP is a generalized quantifier of type <<e, t>, t>>. Consequently, this NP cannot combine with another numeral because there would be a type clash if *hundred books* (type <<e, t>, t>) combines with *two*, for instance.

They also claim that treating numerals as predicates of type <e, t> faces the same problem; the semantic composition of numerals would fail in a complex numeral construction. This time, the problem is not about type clash, but predicate modification would result in incorrect truth-conditions. Their illustration is simplified below (pg. 321).

(2) a. $[\![\text{two}]\!] = \lambda x [\ |\lambda y [\ y \leq x \wedge AT(y)]| = 2]$
b. $[\![\text{hundred}]\!] = \lambda x [\ |\lambda y [\ y \leq x \wedge AT(y)]| = 100]$
c. $[\![\text{two hundred books}]\!] = \lambda x [\text{çocuk}(x) \wedge |\lambda y [\ y \leq x \wedge AT(y)]| = 2 \wedge |\lambda y [\ y \leq x \wedge AT(y)]| = 100]$

Supposing the semantics shown in (2), the NP *two hundred books* would denote the empty set since for no x it is the case that the set of atoms is equal to both two and hundred simultaneously.

As a result, they claim that numerals are of type <<e, t>, <e, t>> treating them as modifiers the lexical complement of which has to be atomic (following Kratzer, 1989 and Chierchia, 1998). A sample lexical entry for the simplex cardinal *two* is shown below (pg. 318).

(3) $[\![\text{two}]\!] = \lambda P \in D_{<e,t>} . \lambda x \in D_{<e>} . \exists x \in D_{<e,t>} [\Pi(S)(x) \wedge |S| = 2 \wedge \forall s \in S\ P(s)]$

S is a partition $\Pi$ of an entity x if it is a cover of x and its cells do not overlap.

(4) $\Pi(S)(x) = 1$ if and only if
S is a cover of x, and
$\forall z, y \in S [z = y \vee \neg \exists a [a \leq_i z \wedge a \leq_i y]]$

(5) A set of individuals C is a cover of a plural individual X iff X is the sum of all members of C: $\sqcup C = X$

Informally, ⟦two books⟧ can be stated as follows:

(6) $\lambda x \in D_e$ . x is a plural individual divisible into 2 non-overlapping individuals $p_i$ such that their sum is x and each $p_i$ is a child.

Based on the reasoning presented above, I follow the semantics of numerals proposed in I&M.

Now, I will start presenting my analysis of how counting works in Turkish, first examining the semantics of nominals in the following section.

## 2. A Three-Way Classification of Turkish NPs

This section is concerned with separating two classes of nominals in Turkish- one is lexically singular (denoting only atoms) and one which is lexically plural (denoting atoms and their sums)- and showing how all the nominal elements combine with an overt plural marker (*-lAr*) the result of which can be considered as a third class.

### 2.1 The Core Phenomenon

In this section, I will show that Turkish nominals sometimes appear to call for a number neutral interpretation (lack of specification with respect to number) and sometimes to receive a strict singular interpretation, which raises the issue of whether nominals in Turkish denote sets of atoms and their sums or only sets of atoms.

Turkish bare nominals receive a number neutral interpretation when they occur in non-cased marked object position as shown in (7) and in the predicative position as shown in (8) (see also Bale, et al, 2010, Öztürk, 2005).

(7) Ali **kitap** oku-du.
Ali book read-past
'Ali did book-reading (one or more books).'
(8) Ali ile Merve daha **çocuk**.
Ali and Merve still child
'Ali and Merve are still children.'

In (7), the bare nominal *kitap* 'book' is interpreted ambiguously, not specifying strict singularity or plurality despite the lack of an overt plural morpheme. In (8), the subject denotes a plural entity, but the predicative bare nominal does not need to have a plural marker.

At first glance, the sentences in (7) and (8) imply that Turkish nominals denote sets of atoms as well as their sums being neuter in terms of number. In fact, this is the conclusion that has been reached in Bale, et al (2010), but this claim is too hasty. In subject position, some nominals are interpreted as strict singular as in (9) and some are ambiguous in denoting a singular or a plural entity as in (10).

(9) **Çocuk** kitab-ı-nı oku-du.
child book-poss-acc read-past
'The child read his book.'
Not:'The children/Children read their book.'
(10) Bu dönem **öğrenci** ders-i-ne çok çalış-tı.
this semester student homework.poss-dat very study-past
'The student has studied hard this semester.'
'The students/Students have studied hard this semester.'

When they are overtly case-marked the generalization above still holds. The nominals *kitap* 'book' and *çocuk* 'child' denote strict singularity under overt accusative and dative case marking as opposed to the examples in (7) and (8).

(11) Ali **kitab-ı** oku-du.
Ali book-acc read-past
'Ali read the book.'
Not: 'Ali read the books/books.'
(12) Ali **çocuğ-a** elma-yı ver-di.
Ali child-dat apple-acc give-past
'Ali gave the apple to the child.'
Not: 'Ali gave the apple to the children.'

Nevertheless, nominals like *polis* 'policeman' and *öğrenci* 'student' keep their ambiguity under overt case-marking. Compare the examples in (11) and (12) with (13) and (14).

(13) Ali **polis-i** arı-yor.
Ali polis-acc call-prog
'Ali is calling the policemen/the policeman.'
(14) **Öğrenci-ye** kitap ver-il-di.
student-dat book give-pass-past
'A book/books were given to the student/the students.'

In summary, some nominals denote singularity whereas some nouns are ambiguous denoting singularity or plurality in subject and overtly case-marked object positions whereas in non-case marked direct object and predicative positions, they can all receive a number neutral interpretation.

### 2.2 Lexical Singulars and Lexical Plurals

In addressing the behavior of Turkish nominals above, I claim that there are two types of nominals in the lexicon. One class denotes sets of atoms, which I will refer to as *lexical singulars* (l-singulars, henceforth) and another class are inherently plural in denoting sets of atoms and their sums (in the sense of Link, 1983, 1987 and Landman, 1989, henceforth L+L[6]), which I will refer to as *lexical plurals* (l-plurals, henceforth) (see Section 2.3 for the inclusiveness of plurals in Turkish). All nominals in Turkish such as *çocuk* 'child' and *kitap* 'book', etc are l-singulars[7]. However, some nominals such as *öğrenci* 'student, *öğretmen* 'teacher', *seyirci* 'audience, *polis* 'policeman', etc are ambiguous in being l-singulars and l-plurals. This classification immediately explains the behavior of ambiguous nominals in Section 2.1.

Here, I first show why I group nominals like *öğrenci* 'student' and *polis* 'police' under the sets of both l-singulars and l-plurals instead of simply analyzing them as denoting number neutral sets, and then discuss how we can explain the apparent number neutrality of l-singulars in non-cased marked direct object and predicative positions.

Number neutrality, which is also widely known as the notion of 'general number' (Corbett, 2000), has been known to be 'inclusive' of atoms as well as their sums (Krifka, 2004, Sauerland

[6] In L+L, plural terms are argued to denote the closure of the set of individuals under sum including the atomic elements. For example, if a singular NP *çocuk* 'child' denotes the set {a, b, c} then the plural NP *çocuk-lar* 'children' denotes the set {a, b, c, a+b, a+c, b+c, a+b+c} under L+L view. See Section 2.3 for plurality.
[7] I exclude the group denoting nominals such as *takım* 'team', *komite* 'committee', *millet* 'nation', etc.

et al, 2005, Zweig, 2009, among others), similar to the plurality proposed in L+L. One can claim that the ambiguity of nominals like *öğrenci* 'student' and *polis* 'police' is due to their being number neutral denoting a set of atoms and their sums. However, I claim that this small set of nominals are ambiguous in denoting sets of atoms only; hence, singularity, and sets of atoms and their sums; hence, plurality. The reasoning behind this is the unambiguously singular interpretation for them when they are preceded by a demonstrative as shown in (15) (cf with (10)).

(15) Bu **öğrenci** ders-i-ne çalış-tı.
this student homework-poss-dat study-past
'This student studied.
Not: 'These students studied.'

*Öğrenci* 'student' in (15) cannot receive a plural interpretation although the demonstrative *bu* 'this/these' is compatible with plurality as shown in (16) where the nominal followed by it is inflected by the plural morpheme.

(16) Bu **öğrenci-ler** ders-i-ne çalış-tı.
this student-pl homework-poss-dat study-past
'These students studied.'
Not: 'This student studied.

What blocks the plural interpretation of *öğrenci* 'student' when it is used with a demonstrative is not clear to me at this point. Nevertheless, the example in (15) implies that if *öğrenci* denoted a number neutral set, then it would be possible to interpret it not specifying singularity and plurality as in pseudo incorporation and predicative positions.

To make it more clear, the ambiguity in a number neutral set is different than the ambiguity that I propose for the nominals at issue. In the former, whether the nominal denotes a singular or plural entity is not the emphasis of its denotation, and the ambiguity arises as a result of a lack of such a specification. In the latter, the nominal denotes two distinct sets, one is strictly singular and the other is plural (in the sense of L+L). The ambiguity in these nominals arise as a result of two different denotations that they bear lexically.

The classification of nominals are summarized in Table 1:

**Table 1:** *Classification of nominals with respect to number*

| **l-singulars** | **l-plurals** |
|---|---|
| **All nominals** | ***öğrenci*** 'student' |
| *çocuk* 'child' | ***polis*** 'policeman' |
| *kitap* 'book' | ***seyirci*** 'audience' |
| *insan* 'human | ***öğretmen*** 'teacher' |
| *araba* 'car' | etc. |
| ***öğrenci*** 'student' | |
| ***polis*** 'policeman' | |
| ***seyirci*** 'audience' | |
| ***öğretmen*** 'teacher' | |
| etc. | |

Let us now consider the behavior of l-singulars in non-case marked direct object positions.

Öztürk (2005) claims that non-case marked bare nominals immediately preceding the verb and occupying a direct object position are an instance of pseudo-noun incorporation following

Massam (2001), among others. The number neutrality of bare nominals is the hallmark of those structures. Dayal (2011) argues that singular nominals in pseudo-incorporation position are not semantically number neutral but their neutrality is dependent on the aspectual specification. Namely, number neutrality is only possible under atelic contexts whereas in telic contexts singular interpretation of the pseudo-incorporated nominal is forced.

This argument is also supported by Turkish. Although most pseudo-incorporated nominals are incompatible with telic contexts, some nominals are felicitous. In the latter case, the nominal can only be interpreted as singular. Consider the example in (17).

(17) Ali iki saat-te **araba** tamir et-ti.
Ali two hour-in car fix-past
'Ali fixed a car in two hours.'
Not: 'Ali fixed one or more cars in two hours.'

The sentence in (17) can be easily interpreted in a context where one wants to emphasize how good a mechanic Ali is and the evidence is that Ali fixed a car in two hours, which was relatively quick. In such a context, we can only mention the existence of one single car, not more than that. In other words, the sentence in (17) supports Dayal's claim. If all pseudo-incorporated nominals denoted number neutral sets, (17) would be good in a context where Ali fixed more than one car in two hours.

So, following Dayal (2011), I claim that pseudo-incorporated nominals in Turkish are not semantically neutral but whether they receive a number neutral interpretation is dependent on aspectual properties.

I will now turn to the behavior of l-singular nominals in predicative position. As shown in (8) repeated here as (18), the problem is that we have a plural entity in the subject position but the predicate does not need to bear a plural marker.

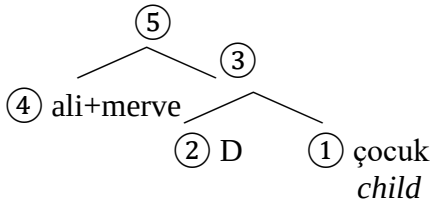
(18) Ali ile Merve daha **çocuk**.
Ali and Merve still child
'Ali and Merve are children.'

The solution to this problem (following a suggestion by Veneeta Dayal (p.c.)) is the existence of a Distributive Operator in the sense of Link (1983) which distributes the property denoted by the NP in the predicative position to the individuals in the subject position. Note that D operator is generally considered as a V level operator. However, in Turkish the issue whether there exists a null copula after the predicative nominal in structures like (18) is controversial (Kornfilt 1996, Kelepir, 2003, Sağ, 2013, among others). If we assume that there is a null copula in (18), the D operator is a V level operator. However, if we assume that there exists no copula in (18), I suggest that the D operator can also combine with a predicative NP of <e,t> type, yielding to the same results as in the existence of a verbal element as shown in (19) and (20). In other words, the idea of the existence of a D operator in the sense of Link (1983) is compatible both in 'null copula' analysis and 'no copula' analysis[8].

[8] When the predicative noun is *partner* 'partner' or *rakip* 'competitor', it can still appear as singular, but we should not get the distributive reading in that case because these nominals are non-distributive inherently. With the covert D operator suggested above, we wrongly predict that each individual in the subject has the property denoted by these nominals. Consider the following example:

(i) Ali ile Merve rakip.
Ali and Merve competitior.
'Ali and Merve are competitiors.'

(19)




(20) 1. ⟦çocuk⟧ = λx [çocuk (x)] = {ali, merve}
2. ⟦D⟧ = λP λx ∀y [[y≤x ∧ AT(y)] → P(y)]
3. ⟦D [çocuk]⟧ = λx ∀y [[y≤x ∧ AT(y)] → çocuk(y)] = {ali, merve, ali+merve}
4. ⟦Ali ve Merve⟧ = ali+merve
5. ⟦Ali ve Merve D [çocuk]⟧ = ∀y [[y≤ ali+merve∧ AT(y)] → çocuk(y)] = 1 iff *ali* is *çocuk* and *merve* is *çocuk*.

In summary, we have shown that positing two groups of nominals combined with plausible explanations for the source of number neutrality of l-singulars in pseudo-incorporated nominals (Dayal, 2011) and predicative positions (Link, 1983) accounts for the variable interpretations of nominals in Turkish.

### 2.3 Morphological Plurals

In this section, I will discuss the properties of bare nominals that combine with the plural marker *-lAr*, which I will refer to as *morphological plurals* (henceforth, m-plurals). All (count) nominals (except for mass nominals), which we can also consider as l-singulars, can combine with the plural marker[9].

Based on the fact that plural nominals in Turkish cannot occur in numeral constructions, Bale, et al (2010) argues that plurals in Turkish denote strict plurality (only containing the sums but not the atoms) as opposed to the definition of plurality given in L+L[10].

As briefly introduced in the previous section, in L+L, a mereological theory of plurality is proposed and this has become a well-established tradition in the semantic literature. For example, a complete atomic join semilattice with David, Tina, and Chris as singular individuals include the atoms d, t, c, and their closure under sum d+t, t+c, d+c, and d+t+c. In a model where David, Tina, and Chris are the children the set denoted by *çocuk* is {d, t, c}, the set denoted by *çocuk-lar* is {d, t, c, d+t, t+c, d+c, d+t+c}. On the other hand, if *çocuk-lar* is strict plural as suggested by Bale et al it should denote the set {d+t, t+c, d+c, d+t+c}.

I will not adopt 'strict plurality' analysis for plurals in Turkish (both l-plurals and m-plurals), instead assuming that pluralities have the inclusive denotation as proposed by L+L. My

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In the light of a same kind of derivation shown in (20) below, 'Ali is a competitor' and 'Merve is a competitor'. However, these two sentences cannot be true independently. I suggest that we can account for the apparent problem if we assume the following for (i):

(ii) ∀y [[y≤ ali+merve∧ AT(y)] → rakip(y)] =1 iff ∃z z≤ali+merve ∧ z≠y ∧ y is a competitor of z ∧ z is a competitor of y.

[9] It is not clear whether l-plurals can combine with *-lAr* because they are already inherently plural. However, note that all nominals are l-singulars and only a smaller set has also an l-plural denotation. Therefore, nominals in this set can still combine with the plural marker with their l-singular denotations.

[10] Bale, et al (2010) argues for a restrictive (subsective) modification analysis for the semantics of numerals in Turkish as opposed to the claim adopted here (Ionin and Matushansky, 2006). The reasons why restrictive modification cannot be adopted are discussed in Section 1.2 above.

reasoning for the inclusiveness of m-plurals follows from arguments for the inclusiveness of English plurals in Krifka (2004), Sauerland et al (2005), and Zweig (2009).

Krifka (2004) and Sauerland et al (2005) argue for a number neutral account of bare plurals in English, and Zweig (2009) extends the same argument by also discussing the dependent plurals. In these works, it has been observed that although bare plurals in English contain multiplicity as part of their denotation in positive contexts, they lose that requirement in downward entailing and question contexts. In other words, 'more than one' meaning of bare plurals do not seem to be a strict requirement in their interpretation. It has been claimed that this is due to the number neutral denotation of bare plurals, the multiplicity condition of which arises as a result of a conversational implicature in the positive contexts. So, a bare plural in English denotes a set of atomic individuals and their closure under sum as proposed in L+L.

Consider the example from Zweig (2009: 9).

(21) A: Did you see bears during your hike?
B: #No, I saw one.
B: Yes, I saw one.

Because seeing one bear is an efficient answer to the question in (21), the denotation of bare plural *bears* cannot be 'more than one' bear.

Krifka's, Sauerland et al's, and Zweig's observations about English bare plurals also hold for Turkish plurals as seen in the following example, where an m-plural is used.

(22) A: Orman-da **ayı-lar-a** rastla-dı-nız mı**?**
forest-loc bear-pl-dat come.across-past-2pl QP
'Did you come across bears in the forest?'
B: Evet, bir tane gör-dü-k.
yes, one CL see-past-1pl
'Yes, we saw one.'
B:# Hayır, bir tane gör-dü-k.
no, one CL see-past-1pl
'No, we saw one.'

If we had gone to the forest and come across one bear, it would be bizarre to respond to the question in (22) as 'no'.

The fact that an l-plural also behaves like an m-plural can be evidenced with the following sentence where there is a downward entailing context and the 'more than one' meaning of the l-plural is lost.

(23) **Öğrenci** sokak-ta top oyna-mı-yor[11].
student street-loc ball play-neg-prog
'Students are not playing ball on the street.

The sentence in (23) would be felicitous in a context where there is no student playing ball on the street. However, it cannot mean that more than one student is not playing ball on the street though there is one student playing.

[11] This sentence has also the meaning 'The student is not playing ball on the street.' However, the one given above is relevant to the issue being discussed.

Therefore, in light of the argumentation in Krifka, Sauerland et al, and Zweig for English bare plurals, I assume that Turkish plurals are also number neutral, and the multiplicity condition in positive contexts arise as a result of conversational implicature[12].

As an interim summary, I analyze plurals in Turkish as denoting sets of atoms and their sums following L+L[13].

In rest of this section, I will show that we get some insight into the difference of Turkish *-lAr* on the one hand, and l-singulars/l-plurals on the other hand, within a deeper investigation. Recall that the l-singulars/l-plurals can appear in pseudo-incorporation structures (non-case marked direct object position) and predicative positions. However, m-plurals behave distinctly. Firstly, they cannot occur in pseudo-incorporation structures unless modified by postpositional phrase or a relative clause as shown in (24) and (25)[14].

(24) a. Ali **kitap(*-lar)** oku-du.
Ali book-pl read-past
'Ali read books.'
b. Ali **öğrenci(*-ler)** ağırla-dı.
Ali student-pl host-past
'Ali hosted students.'

(25) a. Ali **fizik hakkında kitap-lar** oku-du.
Ali physics about book-pl read-past
'Ali read books about physics.'
b. ?Ali **durumu kötü ol-an öğrenci-ler** ağırla-dı.
Ali situation bad be-rel student-pl host-past
'Ali hosted students with bad financial situation.'

Pseudo-incorporated nominals are analyzed as property denoting by various linguistics among which Dayal (2011, 2015) claims that incorporated nominals are interpreted as predicates and

[12] Consider the following sentence, where the context is positive and there is a multiplicity condition on the interpretation of the m-plural: The m-plural *dosyalar* 'files' cannot be used in a context where you ask your secretary to bring the files that you want to work on, but she only brings one of them.

(i) #Merve dosya-lar-ı getir-di.
Merve file-pl-acc bring-past
Intended: 'Merve brought the file.'
Good: 'Merve brought the files.'

This is because in the absence of a downward entailing or question context, multiplicity condition arises as a scalar implicature as suggested in Zweig for the English bare plurals. See Zweig (2009) for further details.

[13] Bale, et al (2010) refers to the following example showing it as a counter-example to the idea that plurals in Turkish denote sets of atoms and their sums, instead of sets of sums only (pg. 8). They claim that if plurals in Turkish were inclusive of atoms, the sentence in (i) would be grammatical. However, in the following part of this section, I argue that *-lar* in predicative position is either 3rd person plural agreement or if it is the plural morpheme appearing on nominals it can only receive an equative reading. In the first case, we can immediately explain why (i) is bad because the subject is not plural, so plural agreement would not occur. However, let us assume that in (i) we attempt to get the equative reading where *-lar* is the plural marker, not person agreement. We would still expect (i) to be bad because the equative reading requires the maximal unique plural individual in the denotation of *çocuklar*. The subject *John*, however, is an atomic individual. See the rest of the section for the details about the m-plurals.

(i) *John çocuk-lar.
John child-pl

[14] The reason of why postpositional or relative clause modification turns an otherwise ungrammatical structure into a grammatical one is not clear to me at this point. However, such kind of modifications are known to have similar effects in the literature. See Longobardi (2000) for Italian bare plurals, and Dayal (1998, 2004b) for English 'any'.

combines with the verb via predicate modification (see also Bittner, 1994, van Geenhoven, 1998, among others). In light of this claim a bare m-plural in Turkish cannot be interpreted as a predicate despite the grammaticality of the sentences in (25).

This leaves us with the question of why *-lAr* is acceptable in a predicative position as shown in (26). However, there is convincing evidence that *-lAr* in the following example is actually a third person plural agreement instead of being a plural morpheme appearing on bare nominals.

(26) Ali ile Ayşe daha **çocuk**(-lar).
Ali and Ayşe still child(-pl)
'Ali and Ayşe are still children.'

The evidence comes from the stress pattern. In (26), the stress falls on the syllable preceding *-lAr* whereas it falls on *-lAr* itself when it appears on bare nominals in argumental positions. It has been claimed that there is a null copula between the nominal element and the person agreement markers in Turkish, and it is present tense realization of the copula *-i*, which is a clitic. Clitics in Turkish shift the stress to the preceding syllable (e.g. Kornfilt, 1996, Kelepir, 2003). (The syntax of (26) can be considered as the following: [$_{AgrP}$[$_{TP}$ Ali ile Ayşe [$_{VP}$ daha [[$_{NP}$ çocuk] cop] T] *-lar*])

Even if we do not adopt the claim of 'null copula', the evidence of stress pattern still holds. It has also been claimed that the person agreement markers that appear on nominal elements in Turkish are clitics themselves, so they shift the stress to the preceding syllable when they are attached to the predicative nominals (Göksel and Kerslake, 2005, Sağ, 2013).

However, sometimes when an m-plural appears in predicate position, the stress might pattern regularly; namely, appearing on *-lAr* (p.c. with Ömer Demirok). Consider the example in (27), where we cannot assume that *-lAr* is 3rd person plural agreement (also given the fact that the person agreement is *-ız* which is 2nd person plural marker).

(27) Ali ile ben **doktor-lar**-ız.
Ali and I doctor-pl-2pl
'Ali and I are the doctors.'
Not:'Ali and I are doctors.'

In (27), we get an equative reading though, where the plural entity in the subject position and the plural entity in the predicative position are equated. Here, *doctorlar* 'doctors' is not of predicative type <e, t>, but an argumental type, either <e> or <<e, t>, t>, with definite interpretation.

Looking at the data above, we can say that m-plurals in Turkish cannot occur as a property of type <e,t> but they can only be argumental as opposed to l-singulars and l-plurals which can occur in both argumental and predicative positions.

In summary, bare nominals with the plural marker *-lAr,* in other words m-plurals, are inclusive of atoms and their closure under sum similar to the plural denotation of l-plurals. However, differently from l-singulars and l-plurals they can only occupy the argumental position and their presence in the pseudo incorporation position is only possible if modified by a post positional phrase or a relative clause.

## 3. Counting with Lexical Singulars

So far, the behavior of Turkish nominals have been discussed showing that there are two types of nominals in the lexicon, one of which is *l-singulars* and the other being *l-plurals*. All

nominals can combine with the overt plural marker *-lAr* which has been referred to as *m-plurals*, leading to a third class.

In this section, I will start the discussion of how counting works in Turkish by analyzing counting with l-singulars. I start with the discussion of l-singulars because it also sheds light on the semantics of counting with l-plurals and m-plurals. I propose that l-singulars are ambiguous in being impure atomic kinds and denoting properties. The classifier cannot access instantiations of impure atoms; therefore, the property denotation of l-singulars is what matters for counting in Turkish. As opposed to the general view according to which classifiers take kind terms as their arguments (e.g. Krifka, 1995, Chierchia, 1998), the implication of this proposal is that the classifier in Turkish can only play with property denoting nominals.

In Section 3.1, I will show that l-singulars are similar to and at the same time differ from l-plurals and m-plurals under kind, generic and episodic contexts, and that l-singulars are impure atomic kind terms. In Section 3.2, I will show how counting works with l-singulars and finally in Section 3.3 I will discuss the further implications of the analysis.

### 3.1 Introducing Kinds into the Picture

In this section, I will show that nominals in Turkish are compatible with kind and generic contexts besides episodic ones. First, I will show the compatibility of m-plurals with these contexts and then I will discuss the l-singulars and l-plurals along the same lines.

#### 3.1.1 Morphological plurals

M-plurals in Turkish behave like bare plurals in English in having primary readings: kind, generic and existential (Carlson, 1977) as shown below.

*Kind readings*

(28) a. **İnsan-lar** maymun-dan türe-di(-ler). *m-pluralized l-singular*
human-pl ape-abl evolve-past-3pl
'Human beings evolved from apes.'

b. ?**Polis-ler** bu bölgede çok yaygın. *m-pluralized l-plural*
policeman-pl this region very common
'Policemen are very common in this region.'

*Generic readings*

(29) a. **Çocuk-lar** genelde yaramaz ol-ur(-lar). *m-pluralized l-singular*
child-pl generally troublesome be-aor-3pl
'Children are generally troublesome.'

b. **Öğrenci-ler** genelde tembel ol-ur(-lar). *m-pluralized l-plural*
student-pl generally lazy be-aor-3pl
'Students are generally lazy.'

*Existential readings*

(30) a. **Çocuk-lar** sokak-ta top oynu-yor(-lar). *m-pluralized l-singular*
child-pl street-loc ball play-prog-3pl
'Children are playing ball on the street.'

b. **Öğrenci-ler** sokak-ta top oynu-yor(-lar). *m-pluralized l-plural*
student-pl street-loc ball play-prog-3pl
'Students are playing ball on the street.'

I suggest following Chierchia (1998) and Dayal (2004a) that bare plurals start as type <s, <e,t>> and become kind terms of type <s,e> via Chierchia's nominalization operation (down, $\cap$) which

is shown in (31) (Dayal, 2004a: 399). This implies that bare plurals can directly combine with a kind-level predicate.

(31) $^{\cap}$: $\lambda P_{<s,<e,t>>} \lambda s\, \iota x\, [P_s(x)]$

When they combine with object-level predicates, further operations come into the picture (Chierchia, 1998). One of these operations is the inverse of nom, called pred (up, $^{\cup}$), which takes the extension of the kind and returns the set of singular and plural entities which are the instantiations of the kind. The other is Derived Kind Predication (*DKP*), which provides sort adjustment introducing existential quantification over the instantiations of the kind provided by pred in a given situation when a kind level argument combines with an object level predicate. They are shown in (32a) and (32b) respectively (Dayal, 2004a: 399).

(32) a. $^{\cup}$: $\lambda k_{<s,e>} \lambda x\, [x \leq k_s]$
b. *DKP*: If P applies to objects and k denotes a kind, then $P(k) = \exists x\, [^{\cup} k(x) \wedge P(x)]$

Application of *DKP* also results in narrow scope interpretation of bare plurals as in English as shown in (33) (see Carlson, 1977, 1989 and Chierchia, 1998 for English).

(33) a. **Köpek-ler** havla-ma-dı.
dog-pl bark-neg-past
'Dogs didn't bark.'
b. Köpekler havlamadı = $\neg$ bark ($^{\cap}$dogs) = *DKP* $\Rightarrow \neg \exists x\, [^{\cup\cap}\text{dogs}(x) \wedge \text{bark}(x)]$

In summary, m-plurals in Turkish are like bare plurals in English in having kind, generic and narrow scope existential readings, and they are kind terms which can directly combine with kind-level predicates via nom.

### 3.1.2 L-singulars and l-plurals

This section is devoted to the discussion of the compatibility of l-singulars and l-plurals with kind, generic, and existential readings.

As m-plurals, l-singulars and l-plurals can also combine with kind level and generic predicates as shown in (34) and (35).

*Kind readings*

(34) a. **İnsan** maymun-dan türe-di. *l-singular*
human ape-abl evolve-past
'Man evolved from apes.'
b. ?**Polis** bu bölgede çok yaygın. *l-plural*
Policeman in this region very common
'Policemen are very common in this region.'

*Generic readings*

(35) a. **Çocuk** genelde yaramaz ol-ur. *l-singular*
child generally troublesome be-aor-3pl
'Children are generally troublesome.
b. **Öğrenci** genelde tembel ol-ur. *l-plural*
student generally lazy be-aor
'Students are generally lazy.'

However, in episodic contexts, l-singulars are interpreted as strict singular and definite as opposed to l-plurals which receive an existential reading as shown in (32).

*Existential readings*

(36) a. **Çocuk** sokak-ta top oynu-yor. *l-singular*
child street-loc ball play-prog
'The child is playing ball on the street.'
Not: 'Children are playing ball on the street.'
Not: 'The children are playing ball on the street.'

b. **Öğrenci** sokak-ta top oynu-yor[15]. *l-plural*
student street-loc ball play-prog
'Students are playing ball on the street.'
'The student is playing ball on the street.'
'The students are playing ball on the street.'

From the data above we can conclude that l-plurals behave like m-plurals in having kind, generic and existential readings. In other words, they start their life as a kind term via nom operator and when they occur with an object-level predicate, pred and *DKP* apply.

L-plural kinds allow access to their instantiation sets. The evidence supporting this conclusion comes from both generic and episodic contexts with the tests showing that access to instantiations is necessary (Schwarzchild, 1996). To recall, for object level predicates, (generic and episodic) to combine with a kind term, access to the instantiations of that kind term is required (via operations pred and DKP, Chierchia, 1998). Below, among tests used by Schwarzchild, the compatibility with *reciprocals* and the predicate *live in different cities* are applied to the nominal *öğrenci* 'student'[16]. The felicity of the nominal with these adverbs shows that l-plurals have a transparent relation to their instantiations. (37a) and (37b) exemplify generic and episodic contexts respectively. Note that an m-plural behaves the same in the following examples[17]:

(37) a. ?Burada **öğrenci** farklı şehirler-de yaş-ar ve her gün okul-a arabayla
here student different cities-loc live-aor and every day school-dat with.car
gid-er gel-ir.
go-aor come-aor
'Here, students live in different cities and every day commute to school.'

b. ?Bu dönem **öğrenci** birbirine çok yardım et-ti.
this semester student each other very help-past
'This semester, students helped each other a lot.'

However, l-singulars do not behave like l-plurals. First of all, in an episodic context an l-singular denotes only strict singularity as shown in (36a) as opposed to an l-plural (cf. (36a) with (36b)). They behave more like definite singular kinds in English which has been broadly discussed in Dayal (2004a).

Dayal claims that even though kinds (singular or plural) are conceptually plural, singular kinds are grammatically atomic. They are different from plural (and mass) kinds in that they do not have a semantically transparent relation to their instantiations; namely, they are impure atomic in the sense of Link (1983) and Landman (1989) behaving more like a collective noun (see Schwarzchild, 1996 and Barker, 1992 for the discussion on atomicity of collective nouns). The

[15] This sentence would be felicitous in a context where a teacher looks out of his window, watches the students playing ball on the street, and utters it (plural interpretation). An alternative context can be the one where the teacher only sees one student playing ball on his own, and utters that sentence (singular interpretation).

[16] These tests are used to show that collective nouns do not allow access to instantiations in Schwarzchild (1996).

[17] I represent those sentences with one question mark because the informants state that the pluralized version of the nominals would be preferred more although they do not find those sentences weird.

singular definite kinds in English are not compatible with object-level contexts (episodic as well as generic) unless they refer to the whole species as a singleton set (taxonomic kinds). The same holds for l-singulars in Turkish. The fact that l-singular kinds do not allow access to their instantiations can be evidenced by the following example (cf with (37b)), where the l-singular kind is used in an episodic context and the test with reciprocals from Schwarzchild (1996) is applied to it.

(38) #Bu dönem **çocuk** *birbirine* çok yardım et-ti.
this semester child each other very help-past
'This semester, children helped each other a lot.'

The sentence in (38) shows that lexical singular kinds do not have plural instantiation sets that the predicate modified with a reciprocal can have an access to. However, if an l-singular kind refers to the whole species as a prototypical object as in (39), then it is compatible with episodic statements.

(39) **Kitap** bu ülke-ye çok geç gel-di.
book this country-dat very late come-past
'The book reached this country very late.'

As noted by Dayal (2004a), in generic statements singular kinds are acceptable again if they refer to the whole species and in this way we can explain why l-singular kinds in Turkish are compatible with generic statements as in (35a). The fact that l-singulars do not have a transparent relation to their instantiations also holds for the generic contexts and it is evidenced by the example in (40), where the l-singular noun *çocuk* 'child' is applied the test of the predicate *live in different cities* (cf with (37a)).

(40) #Burada **çocuk** farklı şehirler-de yaş-ar ve her gün okul-a arabayla
here student different cities-loc live-aor and every day school-dat with.car
gid-er gel-ir.
go-aor come-aor
'Here, children live in different cities and every day commute to school.'

In Table 2, the properties of Turkish nominals based on the discussion so far are summarized.

**Table 2:** *Properties of nominal types in Turkish*

| **nominal types** | **kind** | **generic** | **existential** | **access to instantiations** |
|---|---|---|---|---|
| *m-plurals* | ✓ | ✓ | ✓ | ✓ |
| *l-plurals* | ✓ | ✓ | ✓ | ✓ |
| *l-singulars* | ✓ | ✓ | ✗ | ✗ |

In summary, the general conclusion for l-plurals is that they behave like m-plurals and start their life as a kind term being able to directly combine with a kind-level predicate. We can also assume the same for l-singular kinds but differently from the other group they do not have plural instantiation sets and they do not permit access to their atomic level in generic and episodic readings. They are impure atomic terms whose only instantiation set represents a prototypical object. To wrap up, the story presented in Dayal (2004a) fits in with Turkish data.

### 3.2 Back to the Counting Paradigm

In this section, I propose that l-singular nominals (and l-plurals, to be discussed in Section 4) are ambiguous in being kind terms and denoting properties. The classifier *tane* takes the property denotation of l-singulars as its argument and returns sets of atomic individuals (applying vacuously).

As mentioned in Section 1, l-singulars can occur with numerals either with a classifier in between or in the absence of it. An example for it is shown again in (41).

(41) a. iki (tane) kitap
two CL book

Recall that classifiers are thought to be the means of counting between a kind denoting nominal and the numeral. In languages where classifiers are obligatorily used in numeral constructions, all nouns are generally considered to be kind-terms similar to mass nouns. For example, Chierchia (1998) argue that all common nouns in Chinese are mass being a kind-term of type <s,e>, and mass nouns are inherently plural (see also Krifka, 1995). In numeral constructions, based on the view that counting occurs in the atomic level, classifiers are considered as functions from kinds into the sets of atomic instantiations of kind-terms.

In the previous section, we have concluded that l-singular kinds are impure atoms; in other words, their relation with their instantiations are not semantically transparent. So, they do not allow access to the atomic individual level. In light of this, we would not expect the classifier *tane* to take an l-singular kind as its argument, because the job of the classifier is to get access to the atomic level of a kind. If the nominal does not allow it, then the classifier *tane* should be incompatible with it. However, as seen in (41), an l-singular nominal is perfectly good with *tane*.

This implies that an l-singular kind cannot be an argument to the classifier in Turkish. Then, how is an l-singular nominal compatible with it in numeral constructions? I propose that l-singulars (and l-plurals) are ambiguous in being kind terms and denoting properties (see Dayal, 2004a for a similar ambiguity in singular definites of English). When they occur in numeral constructions, they denote properties, and the classifier *tane* takes a property as its argument and returns sets of atomic individuals. To recall, in Section 2, it has been proposed that l-singulars denote sets of atomic individuals as properties, so the classifier applies vacuously to the properties denoted by l-singulars.

The semantics for *tane* is given below:

(42) $[\![\text{tane}]\!] = \lambda P_{<e,t>}\, \lambda x_{<e>}\, [AT(x) \wedge P(x)]$

I follow the semantics for the numeral proposed by I&M (2006) as repeated below:

(43) $[\![\text{iki}]\!] = \lambda P \in D_{<e,t>} . \lambda x \in D_{<e>} . \exists x \in D_{<e,t>} [\Pi(S)(x) \wedge |S| = 2 \wedge \forall s \in S\ P(s)]$

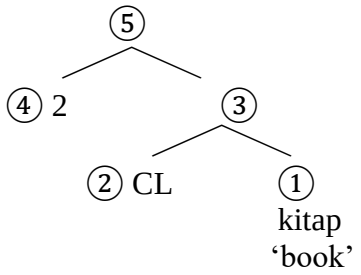
S is a partition $\Pi$ of an entity x if it is a cover of x and its sells do not overlap.

(44) $\Pi(S)(x) = 1$ if and only if
S is a cover of x, and
$\forall z, y \in S\ [z = y \vee \neg \exists a\ [a \leq_i z \wedge a \leq_i y]]$

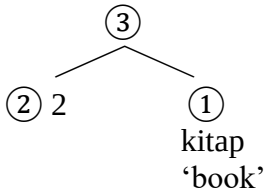
(45) A set of individuals C is a cover of a plural individual X iff X is the sum of all members of C: $\sqcup C = X$

Based on the proposal made for the semantics of *tane* and the semantics for numeral *iki* 'two' given above, the structures and derivations for the numeral constructions with and without a classifier can be represented as follows[18]: Below, I assume a model where *kitap* denotes the set {a, b, c}.

(46) a.




b.




(47) = (46a)

1. ⟦kitap⟧ = λx [kitap (x)] = {a,b,c}
2. ⟦CL⟧ = λP λx [AT(x) ∧ P(x)]
3. ⟦CL kitap⟧ = λx [AT(x) ∧ kitap(x)] = {a,b,c}
4. ⟦iki⟧ = λP λx ∃x [Π(S)(x) ∧ |S| = 2 ∧ ∀s ∈ S P(s)]
5. ⟦iki CL kitap⟧ = λx ∃x [Π(S)(x) ∧|S| = 2 ∧ ∀s ∈ S [AT(s) ∧ kitap(s)]]
   = {a+b, b+c, a+c}

(48) = (46b)

1. ⟦kitap⟧ = λx [kitap(x)] = {a,b,c}
2. ⟦iki⟧ = λP λx ∃x [Π(S)(x) ∧ |S| = 2 ∧ ∀s ∈ S P(s)]
3. ⟦iki kitap⟧ = λx ∃x [Π(S)(x) ∧ |S| = 2 ∧ ∀s ∈ S [kitap(s)]]
   = {a+b, b+c, a+c}

Informally, ⟦iki (CL) kitap⟧ is the following (in the sense of I+M) considering that the classifier when present applies vacuously.

(49) λx ∈ $D_e$ . x is a plural individual divisible into 2 non-overlapping individuals $p_i$ such that their sum is x and each $p_i$ is a book.

[18] Syntactically, there is convincing evidence that CL forms a constituent with the numeral rather than taking the nominal first as represented in (46). Consider the following example:

(i) a. Bana verdikleri kitap-lar iki tane-y-di.
me that.they.gave book-pl two CL-cop-past
'The number of books that they gave to me was two.'
b. *Bana verdikleri tane kitap(-lar) iki-y-di.
me that.they.gave CL book-pl two-cop-past

As seen in (ia), a numeral and CL can be predicative to a nominal, whereas a numeral alone cannot be a predicate to a nominal + CL combination as shown in (iia). This suggests that the numeral and CL form a constituent but not a nominal and CL in the exclusion of the numeral.

Because this syntactic structure does not affect the semantics of CL (where only the order of the composition would change), I follow the general representation followed in the literature as in (46) for expository reasons.

In summary, the general conclusion is that l-singulars are ambiguous in being kind terms and properties, and the classifier *tane* takes the property denotation of them as its argument. Because l-singular properties denote sets of atomic individuals only, the classifier applies vacuously.

### 3.3 Further Implications

In this section, I discuss both the language-internal and cross-linguistic implications of the proposal made in the previous section.

Firstly, so far we have emphasized the view that classifiers should be incompatible with impure atoms because of the blockage in an access to their instantiations. L-singular kinds have been argued to be impure atomic behaving more like a collective/group nominal in light of Dayal's (2004a) claim on English definite singular kinds. One can think that if collective nominals are impure atoms as in the sense of L+L, then they should not be compatible with a classifier, either. This appears not to be borne out as evidenced by the following examples.

(50) a. Bu sezon altı (tane) **takım** oyna-yacak.
this season six CL team play-fut
'This season, six teams will play.'
b. Suriyeli mültecilere yardım ed-en iki (tane) **millet** var.
Syrian refugees.dat help-rel two CL nation exist
'There are two nations that help Syrian refugees.'

The impure atomicity of nominals *takım* 'team' and *millet* 'nation' can be evidenced by the application of the same tests used for l-singulars in Section 3.1.2 as shown in (51). (Only the test with reciprocals will be applied here).

(51) a. #**Takım** *birbirine* yardım et-ti.
team each other help-past
'#The team helped each other.'
Intended meaning: 'The team members helped each other.'
b. #**Millet** *birbirine* yardım et-ti[19].
nation each other help-past
'#The nation helped each other.'
Intended meaning: 'The people belonging to the nation at issue helped each other.'

When we take a closer look at (50), however, we see that there is no real problem. What is being counted is the number of the teams, not the team members. This is compatible with our earlier claims that the classifier cannot combine with impure atoms.

To wrap up so far, a classifier is compatible with an impure atomic property denoted by a group denoting/collective nominal whereas it cannot combine with an impure atomic kind, i.e. l-singular kinds.

Secondly, the proposal made about the semantics of classifiers contrasts with the one of Krifka (1995) and Chierchia (1998), where classifiers are argued to take kind terms as their arguments returning the sets of their instantiations (atomic individuals). The impure atomic nature of l-singular kinds and their compatibility with a classifier have led us to conclude that the classifier in Turkish takes a property instead of a kind term. The proposal made so far opens the question of whether we should aim at coming up with a unified semantics for classifiers cross-

[19] Sometimes, *millet* is used to mean 'people', and in such a case, (51b) can be considered to be felicitous. However, this usage of *millet* cannot be considered as an impure atomic group, but instead a plural entity whose instantiations would be accessible.

linguistically or designating various semantics for classifiers in different languages would still be possible. To be able to answer this question a wider cross-linguistic research is called for, which I leave for further research.

In summary, in Section 3, I have discussed the semantics of l-singular nominals arguing that they are ambiguous in being kind terms and denoting properties, and proposed that the classifier in Turkish takes a property as its argument, instead of a kind-term as argued in Chierchia (1998) for Chinese classifiers.

## 4. Counting with L-plurals

In this section, I discuss the counting paradigm with l-plurals showing that the optionality of the classifier immediately follows from the account that I propose for ambiguous nominals such as *öğrenci* 'student' in Turkish.

Recall that in Section 2.2, I claim that a class of nominals like *öğrenci* 'student, *öğretmen* 'teacher', *seyirci* 'audience, *polis* 'policeman', etc. denote two distinct sets, one of which contains only atoms (i.e. singularity), and the other containing atoms as well as their sums (i.e. plurality), grouping them both as l-singulars and l-plurals. In Section 3.1.2, I also show that l-plural denotation of these nominals can denote kinds. Therefore, I further propose that these nominals, as other nominals which only have l-singular denotations (e.g. *kitap* 'book', *çocuk* 'child', etc.), are ambiguous in denoting properties and being kind terms.

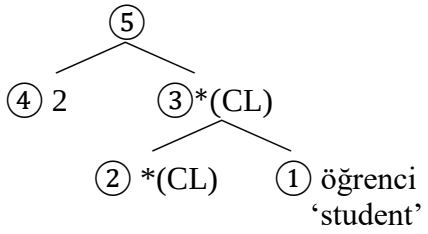
In the absence of the classifier, numerals take the singular property denotation of the nominals at issue as their complements. Numerals cannot take the plural denotation of them because in the absence of the classifier there is no other way to extract atoms out of the set denoted by the plural nominal. Since numerals require atomic individuals, the derivation would result in an empty set. In addition, as discussed in the previous section, the classifier cannot take an l-singular kind term, either, because of its impure atomic nature.

In the presence of the classifier there are two options. The classifier can either take the plural property denoted by these nominals or kind denotation of them (or it can take the singular denotation of them applying vacuously). In both cases, the role of the classifier is to take the sets denoted by l-plurals and return the sets of atomic individuals. Note that l-plural kinds allow access to instantiations as opposed to l-singular kinds as discussed in Section 3.1.2; therefore, they are expected to be compatible with classifiers.

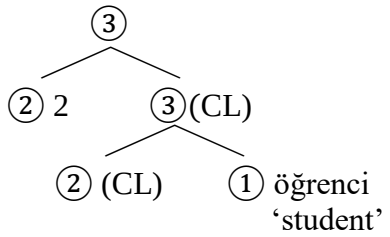
These two possibilities raise the question whether the classifier has a dual semantics in Turkish, one of which takes a property as its complement, and the other taking a kind term as its complement. For expository reasons, in this section I will assume the semantics for the classifier *tane* is the one in which it takes a property as its complement based on the analysis proposed for l-singulars. However, we have not ruled out the possibility that *tane* can also take a kind terms as its complement, yet. We will rule out this possibility when we discuss counting with m-plurals in the following section.

Based on the proposal made for the semantics of *tane* and the semantics for numeral *iki* 'two' given in (42) and (43), the structures and derivations for the numeral constructions of l-plurals with and without a classifier can be represented as follows: Note that I assume a model where *öğrenci* denotes the set {a, b, c, a+b, b+c, a+c, a+b+c} in its l-plural interpretation as shown in (53) and the set {a, b, c} in its l-singular interpretation as shown in (54).

(52) a.




b.




(53) = (52a)

1. ⟦öğrenci⟧ = λx [öğrenci (x)] = {a, b, c, a+b, a+c, b+c, a+b+c}
2. ⟦CL⟧ = λP λx [AT(x) ∧ P(x)]
3. ⟦CL öğrenci⟧ = λx [AT(x) ∧ öğrenci(x)] = {a,b,c}
4. ⟦iki⟧ = λP λx ∃x [Π(S)(x) ∧ |S| = 2 ∧ ∀s ∈ S P(s)]
5. ⟦iki CL öğrenci⟧ = λx ∃x [Π(S)(x) ∧|S| = 2 ∧ ∀s ∈ S [AT(s) ∧ öğrenci(s)]]
   = {a+b, b+c, a+c}

(54) = (52b)

1. ⟦öğrenci⟧ = λx [öğrenci (x)] = {a, b, c}
2. ⟦iki⟧ = λP λx ∃x [Π(S)(x) ∧ |S| = 2 ∧ ∀s ∈ S P(s)]
3. ⟦iki öğrenci⟧ = λx ∃x [Π(S)(x) ∧ |S| = 2 ∧ ∀s ∈ S [öğrenci (s)]]
   = {a+b, b+c, a+c}

In summary, the optionality of the classifier with nominals such as *öğrenci* 'student' and *polis* 'policeman', etc. directly follows from the dual semantics of them. In the absence of it, the numeral directly combines with the singular denotation of those nominals, whereas in the presence of it, the classifier takes out the atoms out of their plural denotation and then combines with the numeral.

## 5. Counting with Morphological Plurals

In this section, I will discuss the reasons why m-plurals do not occur in numeral constructions in Turkish as repeated in (55).

(55) *iki (tane) kitap-lar
two CL book-pl

Recall that m-plurals are similar to l-plurals in denoting sets of atoms and their sums as proposed in Section 2.3, in being kind terms as shown in Section 3.1.1, and allowing access to their instantiations as mentioned in Section 3.1.2[20]. However, differently from l-plurals, they cannot denote properties of type <e,t> as evidenced by their inability to be interpreted as predicative (see Section 2.3), and they cannot occur in numeral constructions.

[20] The ability of m-plurals to allow access to their instantiations have not been discussed specifically, but in Section 3.1.2 I state that the tests applied to l-plurals also apply to m-plurals.

Although I do not have convincing evidence, I suggest that the inability of m-plurals to denote properties follows from the semantics of the plural morpheme *-lAr*, which takes a property denoting nominal and turns them into an argument type after pluralizing it.

I claim that the reason these nominals do not participate in numeral constructions is because they do not denote properties that the classifier or the numeral can combine with.

This claim, however, needs some discussion. The incompatibility of m-plurals with numeral constructions sheds light on the semantics of the classifier in Turkish. Previously, I have argued that the classifier in Turkish can take a property denoting nominal, the property of which is independent of its kind denotation based on the evidence coming from l-singular kinds, the instantiations of which are not accessible. However, we have not ruled out the possibility of a dual semantics of the classifier, where it can also take a kind denoting nominal as its argument. Now let us consider this possibility.

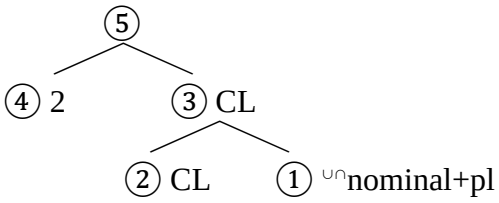
If the classifier in Turkish had the ability to take a kind term as its argument, it would be possible for m-plurals to occur in numeral constructions in the presence of a classifier, because m-plurals are also kind terms, which allow access to their instantiations as l-plurals. (Note that without a classifier they would still not occur in numeral constructions because they denote sets of atoms and their sums, but counting requires access to the atomic level, which is only possible with a classifier.) Because it is not borne out, we predict that the classifier in Turkish cannot take a kind term as its argument. This leaves us with the possibility that the classifier can only take a property denoting nominal as its argument.

We still expect m-plurals to occur in numeral constructions in the presence of a classifier even if they cannot denote properties because Chierchia's pred operator which is shown in (32a), and repeated here in (56), could turn m-plural kinds into properties.

(56) $^{\cup}$: $\lambda k_{<s,e>}\ \lambda x\ [x \leq k_s]$

In other words, even though m-plurals cannot denote properties themselves, they are capable of type shifting to properties derived from kinds because they allow access to instantiations and this is possible by pred operation. Therefore, we would expect the following structure in (57) to be grammatical, but it is not. In (57) the classifier takes a property denoting nominal which is derived from kind via pred as its argument.

(57)




To restate the problem, even if m-plurals cannot denote properties independently of its kind denotation as opposed to l-singulars and l-plurals, they can be type shifted to <e,t> type derived from kind. The classifier would be expected to take that property as its complement, making it possible for m-plurals to occur in numeral constructions.

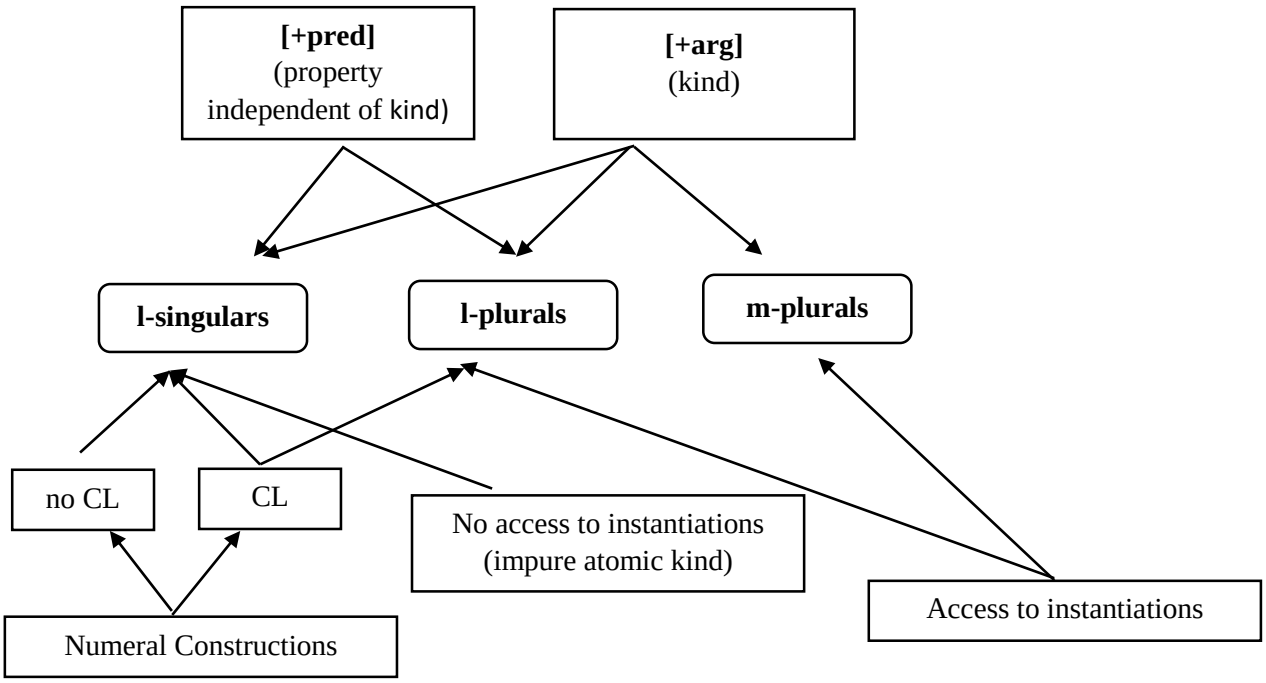
There are two possible explanations why derived m-plural properties cannot be arguments to classifiers, as opposed to what is predicted. First, it might be the case that m-plural kinds cannot undergo type shifting via pred unless it is accompanied by ∃ quantifiers (Chierchia's Derived Kind Predication (DKP), see section 3.1.1). Second, it might be the case that properties derived from kind and properties independent of kind are different, and the classifier in Turkish requires property denoting nominals which are not derived from kinds as its argument.

Although it sounds radical it is more sensible to go for the second possibility because there is no clear reason why pred should always be accompanied by ∃ quantifier only with m-plurals, but not with l-plurals. However, claiming that properties derived from kinds are not the same as properties independent of kinds require an extensive cross-linguistic study. Therefore, I will leave this issue open to discussion, which I will remark on in Section 6.1 below.

In summary, because m-plurals cannot be an argument to the classifier in numeral constructions although they can be kind terms and allow access to instantiations, we have ruled out the possibility that the classifier in Turkish can also take a kind term as its argument.

Below I represent the interactions proposed so far in an attempt to summarize the big picture.

**Figure 1:** *Mapping of Turkish nominal system*




## 6. Wider Implications

In this section, I will discuss the broader implications of this study and the unanswered questions open to further inquiry. These include the issue of a potential difference between properties derived from kinds and properties independent of kind as introduced in the previous section, the status of Turkish in Chierchia's (1998) Nominal Mapping Parameter, and the implications of my analysis on Avoid Structure, an economy principle originally proposed by Rizzi (1997) and discussed in Chierchia (1998).

### 6. 1 Properties Derived from Kinds vs. Properties Independent of Kinds

In the previous section, I have shown that m-plurals cannot occur in numeral constructions even in the presence of a classifier due to the fact that the classifier in Turkish requires a property denoting nominal as its argument but m-plurals cannot be of <e, t> type.

I have also suggested that the classifier in Turkish cannot take a kind term as its argument and access to its atomic level; if it were so, m-plural kinds would be good with numeral constructions with the classifier, contrary to what is attested.

We can support this idea that there is a difference between properties derived from kinds and the ones independent of kinds by also looking at English bare plurals. Basically, in neo-Carlsonian framework, bare plurals refer to kinds not only when they are an argument to a kind level predicate but also when they occur in episodic contexts (as originally proposed in Carlson, 1977). However, not every bare plural refers to kinds. Indexical bare plurals (as called in Dayal, 2013), typically those that are modified by relative clause or PP, are not compatible with kind level predication (besides being incompatible with individual level predicates).

In Chierchia's system, bare plurals that can refer to kinds undergo DKP repeated below, which takes the extension of the kind at an index and turns it into a predicative type (via pred), existentially binding into this predicate (see Section 3.1.1). Because the ∃ quantifier is introduced when the sort adjustment is required (when a kind denoting bare plural is an argument to non-kind level predicate), bare plurals obligatorily take narrow scope.

(58) *DKP*: If P applies to objects and k denotes a kind, then $P(k) = \exists x\, [^{\cup} k(x) \wedge P(x)]$

However, a nominal with a predicative type of <e, t> is turned into an argumental type via nom, iota and ∃. Among these, ∃ (from Partee, 1987) turns an <e, t> type nominal into a generalized quantified expression also introducing ∃ quantificational force. Those nominals behave like indefinites in terms of flexibility in scope properties.

Let us compare a bare plural derived from a kind term via DKP and an indefinite formed via ∃. We get the following contrast (Dayal, 2013):

(59) a. Dogs are barking.
b. $\exists x\, [^{\cup\cap}\text{dogs}(x) \wedge \text{barking}(x)]$
a. # Dogs, Max, Buddy, and Charlie, are barking.

(60) a. Some dogs are barking.
b. $\exists x\, [\text{dogs}(x) \wedge \text{barking}(x)]$
c. Some dogs, Max, Buddy, and Charlie, are barking.

The contrast above shows that the instantiations of a kind term cannot be named individually whereas it is possible with a property denoting nominal which is independent of kinds.

The same contrast also holds between a bare plural that has undergone DKP as in (59) and indexical plurals as shown in (61). Because indexical plurals are not kinds we expect naming the individuals to be possible, and indeed it is the case as shown in (61).

(61) Parts of that machine, motor coupler, drain pump, and clutch, are working.

To wrap up, the possibility that properties derived from kinds are of different nature than the properties independent of kind, which contrast in English deserves further inquiry. The facts for Turkish numeral constructions are relevant to this issue.

### 6.2 The Position of Turkish in Chierchia's Nominal Mapping Parameter

In this section, I will discuss where Turkish stands in Chierchia's Nominal Mapping Parameter, showing that it is a [+arg, +pred] language.

Nominal Mapping Parameter is an attempt to set up a typology of NP denotation cross-linguistically, and every language is parametrized with respect to the feature pair [+/-argumental, +/-predicative]. [+arg] means that nominals can be mapped onto argumental type, whereas [-arg] means they cannot. Along the same lines, [+pred] means nominals can be mapped onto property type, but [-pred] nominals cannot.

For example, in a [+arg, -pred] language like Chinese, nominals uniformly denote kinds. In languages with this setting, every NP is of type e, and bare nominals are allowed to occur freely in argument positions. Because in Chierchia's system kinds are inherently plural being considered mass terms, in Chinese-like languages all nominals are mass, in some sense. Therefore, those languages do not have plural marking on their nominals because mass nominals are already inherently plural. In addition, since mass nouns cannot be counted directly, they will always be accompanied by a classifier. To sum up, in [+arg, -pred] languages (i) bare nominals are allowed in argumental positions, (ii) the extensions of all nominals are mass, (iii) plural marking is absent, and (iv) classifiers are obligatory.

In [-arg, +pred] languages, like French, all nominals are of predicative type and no bare nominals are allowed in argumental positions. As opposed to Chinese-like languages, nominals in this setting have mass/count distinction; hence, plural marking is active.

Finally, in [+arg, +pred] languages, of which English is an example, nominals can either denote kinds or properties. Among nominals, those that can denote kinds can freely occur in argumental positions. All [+arg] nominals are mass and all [+pred] nominals are count. Therefore, plural marking will be active in those languages. Besides those, free use of nom operator is allowed but it is only defined for plural nominals (because kinds are plural entities).

If we consider where Turkish stands in this parameter, we can say that it is a [+arg, +pred] language like English, given the proposals made in this study. However, in this setting, nominals in English are divided into two groups, mass nominals and bare plurals on the one hand, and count nominals (singular and plural) on the other hand. The first group of nominals are [+arg], and the second group of nominals are [+pred]. However, in Turkish the parameter [+arg, +pred] works slightly differently than English. The two nominal types, i.e. l-singulars and l-plurals, can be predicative and at the same time argumental, but m-plurals can only be argumental.

In other words, while the ambiguity lies in different classifications of nominals in English, in Turkish it is within the same class of nominals. This type of ambiguity in Turkish, we saw, can explain the optionality of the classifier in numeral constructions and the existence of a plural marker in the nominal system of the language.

The different status of Turkish is not a problem for Chierchia's parameter, as opposed to what it might seem. In English there is also an ambiguity within the same class of nominals, i.e. plurals which can either denote kinds or be of predicative type (when they are restrictors to quantifiers). The difference between the two languages is just that more types of nominals can be ambiguous in being argumental and predicative in Turkish than in English.

### 6.3 Does the Classifier Violate Avoid Structure?

In this section, I will discuss the implications of the analysis of Turkish for Avoid Structure.

Avoid Structure is an economy-based constraint (Rizzi, 1997). In Chierchia's system an instance of Avoid Structure has been defined as the following (pg. 393):

(62) Avoid Structure
Apply SHIFT at the earliest possible level.

SHIFT is a type shifter which turns a property denoting nominal into an argumental one.

An issue discussed in Chierchia (1998) is the incompatibility of English definite plurals with generic and kind-oriented contexts, whereas a bare plural is perfectly good in similar contexts. This is proposed to be due to the following. In English SHIFT can apply on plurals at the NP

level (due to its being a [+arg, +pred] language). If this option (the one without a D projection) is available, then it must be chosen over the option where D projects. In other words, if variants with and without a D have identical meanings, and the one with less structure wins under the economy principle Avoid Structure.

When we consider the optionality of the classifier in Turkish, it seems that it violates Avoid Structure. Namely, although the numeral constructions without the classifier have less structure, Turkish also allows the ones with the classifier which results in more structure. This is a problem for Avoid Structure because both variants have identical meanings. However, a deeper investigation reveals that this may not be so.

Although reaching to a conclusion would be very hasty at this point, it seems that while numeral constructions without the classifier can have a definite interpretation, the version without a classifier cannot[21].

(63) a. İki (tane) öğrenci gör-düm. **İki öğrenci** de ders çalış-ıyor-du.
two CL student see-past-1sg two student both study-prog-past
'I saw two students. Both of them were studying.'
b. İki (tane) öğrenci gör-düm. #**İki tane öğrenci** de ders çalış-ıyor-du.
two CL student see-past-1sg two CL student both study-prog-past

As seen in (63a), a numeral construction without the classifier can be anaphoric as definites referring to 'two students' introduced in the context previously, but the variant with the classifier does not have this ability as is the case in (63b). This reveals a clear difference between the two constructions.

Also consider the following examples.

(64) a. İki (tane) öğrenci konuşu-yor-du. **İki öğrenci** de çok kızgın-dı.
two CL student talk-prog-past two student both very angry-past
'Two students were talking. Both of them were very angry.'
'Two students were talking. Two other students were very angry.'
b. İki (tane) öğrenci konuşu-yor-du. **İki tane öğrenci** de çok kızgın-dı.
two CL student talk-prog-past two CL student both very angry-past
'Two students were talking. Two other students were very angry.'
Not:'Two students were talking. Both of them were very angry.'

In these examples, the variant without the classifier (64a) can refer to either the two students introduced in the first sentence or two other students (as a secondarily possible reading). However, this optionality is not possible with the variant including the classifier, which can only refer to two other students. Although I cannot characterize the difference in clear terms, we have enough evidence to show that the conditions for Avoid Structure do not apply.

In conclusion, due to a meaning difference between the two variants of numeral constructions, we cannot consider a violation on Avoid Structure because only the ones with identical meanings can compete and result in a blockage of the one with more structure[22].

[21] Note that for reasons which are not clear to me at this point, if de 'both/also' is absent, the second sentences in (63a&b) get degraded.

[22] Note also that the contrast presented above is against a possible claim that in the absence of an overt classifier, there is actually a covert one.

## CONCLUSION

In this paper, I have investigated numeral constructions in Turkish where the classifier is optionally attested and the nominals inflected by the overt plural morpheme *-lAr* cannot occur. I have mainly focused on the nature of the classifier in Turkish in light of the previous proposals on classifiers in obligatory classifier languages such as Chinese (e.g. Krifka, 1995, Chierchia, 1998).

I have first analyzed the semantics of number in Turkish, proposing that there are three main classes of nominals, i.e. l-singulars (denoting sets of atomic individuals), l-plurals, and m-plurals (denoting sets of atomic individuals and their sums in the sense of Link, 1983, 1987 and Landman, 1989). Unlike m-plurals which can only be [+arg], l-singulars and l-plurals are ambiguous in being kind terms, hence [+arg], and having an independent property denotation (i.e. not derived from kinds), hence also [+pred]. Differently from l-plurals, l-singulars denote impure atomic kinds (in the sense of Dayal, 2004a).

The impure atomic nature of l-singulars which are still compatible with the classifier led to the proposal that the classifier in Turkish cannot take a kind term as its argument contra Krifka (1995) and Chierchia (1998), but instead it takes a property denoting nominal which is independent of its kind denotation. The role of the classifier is to return the set of atomic individuals which is taken as an argument by a numeral in return (following the semantics proposed by Ionin and Matushansky, 2006). In the absence of the classifier, which is only possible when the nominal is an l-singular, the numeral combines directly with the set of atomic individuals denoted by the nominal.

I have also pointed that the analysis of Turkish numeral constructions has further important theoretical implications that I hope to take up in the future.

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