

Morphosyntax and semantic type
of noun phrases in Turkish

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May 2014

Submitted in partial fulfillment
of the degree of Bachelor of Arts in Linguistics
at Haverford College

Abstract

Chierchia (1998) proposed that the semantic type of nouns varies across languages: in some languages, nouns denote entities; in others, nouns denote predicates; in yet others, nouns of both types are attested. Chierchia posits the existence of two parameters to account for this division—namely $[\pm\text{arg}]$, which determines whether a language contains nouns denoting arguments, and $[\pm\text{pred}]$, which determines whether a language contains nouns denoting predicates. Chierchia then makes generalizations about each group.

This paper examines the noun phrase semantics of Turkish. My analysis shows that not all $[\text{+arg}, \text{-pred}]$ languages have nouns that act alike: while Turkish patterns in key ways with Chinese, a $[\text{+arg}, \text{-pred}]$ language, it does not follow all of Chierchia's predictions for $[\text{+arg}, \text{-pred}]$ languages. In particular, it appears that some Turkish nouns, while being “mass” in the sense that they denote kinds, are countable.

Based on these findings, I introduce a third language parameter relevant to the semantic type of nouns, which I label $[\pm\text{count}]$: languages with countable nouns of type e , such as Turkish would be $[\text{+count}]$, while languages with no countable nouns, such as Chinese, would be $[\text{-count}]$. Such a parameter accounts for the Turkish data described.

Based on these observations, I work out a possible analysis of Turkish noun phrases that satisfies the Turkish data and corroborates the extended typology. This analysis posits that the “plural” suffix in Turkish has a determiner-like function, selecting a plural individual from a kind.

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Acknowledgments

I would like to thank all those who have helped me in finding relevant readings, clarifying my hypotheses and articulating my ideas. Of utmost aid in this regard has been my advisor, Shizhe Huang. Besides guiding me along this particular journey and serving as a consultant for Chinese data, she has sparked my enthusiasm for linguistics in general and semantics in particular.

Also helpful to the creation of this paper have been my second faculty reader, Anisa Schardl, and my student readers, Gregory Nisbet and Chaney Harter. Thanks are due to Haverford College and the entire Tri-College Department of Linguistics for providing the framework for this intellectual pursuit. In his role as research librarian, Jeremiah Mercurio has been of service in locating relevant scholarship.

Melis Cin, a fellow student at Haverford College, has been indispensable in teaching me the nuances of the Turkish sentences that appear in this paper, considering both the syntax and the pragmatics of many such sentences.

Finally, my thanks (and apologies!) are due to the countless family members, friends and acquaintances whom I have endlessly bombarded with linguistic analyses, and whose speech I have overzealously scrutinized for data.

Glossing and notational conventions

In many data sentences, a constituent has been set in bold (for data sentences) or italics (for translations) to draw attention to the words or phrases relevant to the discussion at hand. The orthographic and glossing conventions of some data from other sources has been regularized.

The asterisk (*) marks ungrammatical sentences. The dagger (†) marks sentences that are ungrammatical with respect to the reading given, but grammatical with a different reading.

In my semantic interpretations of Turkish, I have opted to use English glosses rather than Turkish words. Predicates are given with the first letter capitalized (Pred), while kinds and truth values are in all capitals (KIND).

The following is a list of symbols and abbreviations used in the paper.

\forall	‘for all’ (universal quantifier)
\exists	‘there exists’ (existential quantifier)
\in	is an element of
\wedge	logical ‘and’
\rightarrow	logically implies
\cap	‘cap’ (operator converting a predicate into its equivalent kind)
\cup	‘cup’ (operator converting a kind into its equivalent predicate)
ι	‘iota’ (operator selecting an individual from a predicate)
\downarrow	singular level-shifting (operator selecting an atomic individual from a kind)
\Downarrow	plural level-shifting (operator selecting a plural individual from a kind)
1	first person
ACC	accusative case
AOR	aorist tense
[\pm arg]	parameter determining whether a language has (uncountable) nouns of type e
COND	conditional mood
[\pm count]	parameter determining whether a language has countable nouns of type e
DAT	dative case
e	entity (type)
$\langle e, t \rangle$	predicate (type)
PL	plural
[\pm pred]	parameter determining whether a language has (countable) nouns of type $\langle e, t \rangle$
PROG	progressive aspect
SG	singular
t	truth value (type)

1 Introduction

1.1 Overview

Turkish is an agglutinating, predominantly SOV language (Göksel & Kerslake 49; Kornfilt 9). Among its syntactic features is its use of several kinds of noun phrases: noun phrases both with and without an article can occur as the argument of a verb. Morphologically, too, noun phrases in Turkish are interesting: the suffix *-lar* seems to indicate plurality, but it has a different distribution from English *-s*.

I will begin by illustrating the usage of these various syntactic forms of the noun phrase. In Section 2.1, I will introduce Chierchia's typology of noun phrases as a system for determining the intrinsic types of bare nouns and their associated properties. I will present an analysis of Chinese and English according to this typology; these languages contrast with Turkish, and their analysis sheds light on the questions posed above. Next, in Section 3, I will point out the problems that arise when one attempts to apply this typology to Turkish, and suggest a possible extension of the typology to account for the Turkish data. Finally, in Section 4, I propose one possible semantic analysis of Turkish noun phrases that accounts for the behavior of Turkish noted.

1.2 Bare nouns in Turkish

A Turkish noun phrase may consist of a single bare noun. This construction can represent multiple meanings: it may make a generic statement about a kind; it may make an existential statement about one or more individuals of the kind; or it may reference a specific singular individual. An example of each of these usages appears below.

1.2.1 Bare nouns denoting kinds

A bare noun in Turkish may be used to make a generic statement about individuals belonging to the kind it denotes. See the following sentence:

- (1) **Kuş** uç-ar.
bird fly-PRES

‘*Birds fly/A bird flies.*’

(Adapted from Göksel & Kerslake 380.)

Sentence (1) makes a generic statement about birds. The statement is true of birds in general; it is not limited to a specific bird. This contrasts with the following sentence, which has an existential meaning. The structure and intrinsic meaning of the subject is the same, but because of the nature of the predicate, the sentence has an existential meaning.

- (2) **Kuş** öt-üyor.
bird sing-PROG

‘*A bird/birds is/are singing.*’

(Dede 153)

I will make use of Carlson’s system of level (proposed in Carlson 110–118) in describing both noun phrases and predicates. According to this system, the referent of a noun phrase can belong to one of three *levels*: the general *kind* denoted by the noun; *objects* belonging to the kind; or instantiations of the kind in a particular time and place, known as *stages*. A given predicate may apply to any one of these levels; the verbal aspect may affect the reading of a sentence and force the predicate to apply to a particular level. Under this framework, the difference between the two sentences above is related to the level of the predicates: in sentence (1), the predicate is object-level, while in sentence (2) the predicate is stage-level.

Unlike sentence (1), the predicate in sentence (2) need not be true of “most” birds at any given time; it need only be true for at least one bird. There is a connection to the generic meaning, however, in that the subject does not reference a particular individual: according to Dede (153), the identity of the subject noun phrase in such sentences is “irrelevant.” In other words, the precise identity of the subject, other than the fact that it belongs to a particular kind, is not specified. Following Göksel & Kerslake (377), I will refer to sentences with a kind-level subject and an object-level predicate as *categorial*; I will examine the semantics of categorial sentences in Section 4.2.3.

Note that in sentences (1) and (2), neither a singular nor a plural meaning is indicated by the form of the noun. Following Göksel & Kerslake (169) I will use the term *transnumeral* to refer to nouns that are not defined for number. In this way they are similar to what are elsewhere called

“mass” nouns. However, I will generally avoid using the term *mass* for Turkish nouns generally: as I argue in Section 3.3, nouns in Turkish may be transnumeral as well as countable.

1.2.2 Bare nouns referencing a singular individual

In addition to its transnumeral usages, the bare noun can also be used in Turkish to reference a specific singular individual:

- (3) **Doktor** her hasta-y₁ muayene etti.
doctor every patient-ACC examined
'The doctor examined every patient.' (Enç 10)

As the translation of sentence (3) indicates, it is a previously-mentioned (or otherwise known) individual that the predicate of the sentence refers to. Further, the form of the noun communicates that the referent is a single doctor, and not a group of doctors. In this way, the usage of the bare noun in sentence (3) contrasts with the transnumeral uses of the bare noun as seen in sentences (1) and (2).

There is evidence that these two usages—transnumeral and singular definite—are different grammatically and not merely pragmatically: definite direct objects are marked with the accusative suffix *-i*,¹ while generic and categorial objects are unmarked. Contrast the following sentences:

- (4) Hasan **şiiir** yaz-ar.
Hasan poem write-AOR
'Hasan writes *poems* (*poetry*).' (Kornfilt 266)
- (5) Hasan **şiiir-i** yaz-dı.
Hasan poem-ACC write-PAST
'Hasan wrote *the poem*.'

In sentence (4), the noun *şiiir* (which has the basic meaning 'poem') has a transnumeral usage. It is not specifically stated that Hasan writes either a single poem or multiple poems (although

¹The accusative suffix may appear as either *-i* or *-ı* for phonological reasons; I will use *-i* to refer to it in isolation for the sake of convenience.

the latter can be inferred from context). Thus *şiiir* in sentence (4) means something like ‘poems’ or ‘poetry’, not ‘the poem’. In sentence (5), on the other hand, the object is marked with the accusative suffix. Since Turkish marks definite objects with the accusative suffix, but not categorial objects, *şiiir* in sentence (5) must be interpreted as ‘the poem’.

One might analyze the accusative marker itself as the operator giving the noun phrase a definite reading. However, such an analysis does not account for the semantic distinction in noun phrases that are not direct objects. Further evidence that the accusative is not itself responsible for the various meanings of the bare noun form is its co-occurrence with the indefinite article, demonstrated by the following sentence.

- (6) Ben **bir kitab-ı** oku-dum.
I a book-ACC read-1.SG.PAST
‘I read *a (certain) book.*’ (Adapted from Heusinger & Kornfilt 5)

In sentence (6), the noun phrase *bir kitabı* ‘a (certain) book’ does not have a definite reading similar to *şiiiri* ‘the poem’ in sentence (5), despite the fact that both sentences have the accusative marker. Therefore, the accusative marker and definite meaning do not appear to be correlated.

In order to account for the various usages of the bare noun in all sentence positions, and in order not to unnecessarily posit more than one semantic function for a single morpheme, the accusative is thus best analyzed as a secondary marker of “specific” noun phrases (Heusinger & Kornfilt 7) and not an operator that itself produces the definite reading. This analysis implies that the bare noun phrase in Turkish has multiple interpretations, independent of overt operators.

1.3 Indefinite noun phrases in Turkish

The word *bir* in Turkish marks a singular indefinite noun phrase.² This word distinguishes between an indefinite singular noun and a transnumeral noun. It also distinguishes between a referential (or

²The word *bir* doubles as the numeral ‘one’; the two meanings, however, occur in different syntactic contexts and thus appear to be distinct morphemes.

definite) singular noun and an indefinite singular noun. The following sentences illustrate these different usages:

(7) **Kuş** öt-üyor.

bird sing-PROG

a. ‘*A bird is singing/Birds are singing.*’

b. ‘*The bird is singing.*’

(Adapted from Dede 153)

(8) **Bir kuş** öt-üyor.

a bird sing-PROG

‘*A bird is singing.*’

Sentence (8) is much like sentence (7a) in that it is existential. The two sentences differ, however: in sentence (8), the number of the subject is specified. Furthermore, the identity of the bird becomes important; the noun phrase is not categorial, and it posits the existence of a specific bird.

Sentence (8) differs from sentence (7b) in that the former has an existential component. Both sentence (8) and the definite interpretation of (7b) indicate that the noun is singular.

1.4 Plural nouns in Turkish

The suffix *-lar* in Turkish is a morpheme indicating plurality.³ The form *-lar* may act as a verbal suffix as well as a nominal suffix; in this paper, I will analyze only the nominal usage.

Turkish plural nouns can both reference a specific plural individual and posit the existence of such an individual. The following sentence illustrates both meanings.

(9) **Kuş-lar** öt-üyor.

bird-PL sing-PROG

a. ‘*Birds are singing.*’

b. ‘*The birds are singing.*’

³The plural suffix may appear as either *-lar* or *-ler* for phonological reasons; I will use *-lar* to refer to it in isolation for the sake of convenience.

Sentence (8) and (9a) differ from (7a) in the same way: the noun is marked for number, and a specific referent is established. Note that it is incorrect to reference a plural individual without using *-lar*:

- (10) † **Kuş** öt-üyor.
bird sing-PROG
Intended reading: ‘The birds are singing.’

1.5 Nouns following numerals in Turkish

In Turkish, nouns following numerals may not be marked with *-lar*:

- (11) üç kuş
three bird
‘three birds’

- (12) * üç kuş-lar
three bird-PL
Intended reading: ‘three birds’

This behavior poses a problem: if *-lar* does indeed mark plurality in Turkish, one would expect it to be used following numerals greater than one. Appealing to avoidance of redundancy (as Balpınar 98) is not an attractive way of resolving this problem: redundancy is often a desirable property of languages, as it makes the task of comprehension easier (see Wit & Gillette). Instead, I will propose a semantic analysis of Turkish nouns that explains this construction.

1.6 Questions raised by Turkish noun phrases

The Turkish data given above raise a number of questions. First, what is the core semantic meaning of a noun in Turkish? Is it transnumeral, or is it singular? Why does the suffix *-lar* sometimes seem optional, sometimes mandatory and sometimes disallowed? Sentences (7a) and (9a) show that an indefinite can occur with or without *-lar*; sentences (9b) and (10) show that a definite plural meaning must be marked with *-lar*; and sentences (11) and (12) show that a plural meaning cannot be marked with *-lar* when following a numeral.

In answering these questions, I will need establish a framework for the semantic type of noun phrases; I will make use of Chierchia's theory of types (Chierchia, 1998). Using this analysis as a starting point, I will compare noun phrases in Turkish with those in Chinese and English.

2 Chierchia's typology of noun phrases

2.1 Overview of semantic types

Chierchia's analysis of noun phrases across languages is based on the concept of semantic *type*. Under this framework, the fundamental types are *truth values* and *entities*. Montague's notation uses the letter *e* to denote an entity and *t* to denote a truth value (Chierchia 342, note 4).

A truth value is the type of a complete proposition, or a declarative sentence. For example, the sentence *It is raining outside* has a truth value, either true or false.

An entity represents a specific individual in a world (either the real world or a hypothetical world). For example, *my pen* denotes a specific object in the real world. Other examples of entities in English are *my teapots* (a plural entity), *tea* (a mass entity) and *delight* (an abstract entity). Entities can appear in argument positions in a sentence.

Complex types are built out of entities and truth values. A *predicate* is an example of a complex type: when given an entity, it returns a truth value. For example, if given the entity *my pen*, the predicate *black* returns a proposition (in this case, *My pen is black*⁴). Following this definition, a predicate can also be seen as denoting a set: given an entity, it returns TRUE or FALSE depending on whether the entity is a member of the set that the predicate represents. In Montague's notation, a predicate takes something of type *e* and returns something of type *t*; this is written as $\langle e, t \rangle$.

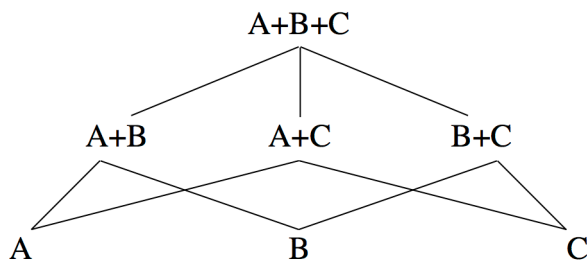
Semantic type, Chierchia argues, is independent from syntactic class (Chierchia, 1998): a noun in one language, for example, is not necessarily of the same type as a noun in another language, and these differences can also be represented in the lattice described above. Despite this variation,

⁴In this sentence, the copula *is* is required syntactically but has no semantic content.

however, there seem to be patterns in the semantic types that nouns represent. Chierchia proposes a division of languages into groups based on the types of their nouns.

Such a difference between noun types is also reflected in the *atomic join semilattice* (Link, 1983). According to this framework, the individuals denoted by nouns form a kind of lattice structure as depicted below:

(13)



(Bach 79)

In figure (13), A, B and C represent *atoms*, or the singular individuals belonging to a particular kind in a given world. The remaining nodes in the lattice represent plural individuals, formed by the joining (or union) of atomic individuals.

While such a lattice is a generally accepted model for count nouns (Chierchia 345), Chierchia further proposes that mass, or uncountable, nouns may be modelled using the same atomic structure. According to this hypothesis, individuals belonging to such a kind are still made up of atoms; the only difference is that the atoms are *vague*, or unspecified (Chierchia 346–348).

After proposing a division of nouns by types, as well as outlining the ways in which such a division might be reflected within the framework of an atomic join semilattice, Chierchia makes predictions about the nouns in each group. In Section 2.2, I will outline these predictions; afterwards, I will show how Chinese and English fit into the typology, and examine what place in the typology Turkish might occupy.

2.2 Two kinds of nouns

Chierchia, following the Principles and Parameters framework, proposes that languages can be classified into groups based on which kinds of nouns exist in the language. Languages that have

nouns representing *arguments* (that is, nouns of type e) are called [+arg]; languages lacking nouns of type e are [-arg]. Languages that have nouns representing predicates (that is, nouns of type $\langle e, t \rangle$) are called [+pred]; languages lacking nouns of type $\langle e, t \rangle$ are [-pred].

According to this analysis, and the data given in Section 2.3, Chinese is [+arg, -pred]: all nouns in the language are entities and represent kinds. English, on the other hand, is [+arg, +pred]: while some nouns (mass nouns) are entities and represent kinds, others (count nouns) are predicates. This division provides an elegant way of accounting for the range of differences between Chinese nouns and English mass nouns on the one hand, and English count nouns on the other: only two parameters are necessary to account for all the differences in usage.

Chierchia shows that English mass nouns and all Chinese nouns are of type e . These nouns share certain characteristics in common (Chierchia 354). Because they are of type e , they may serve as the argument of a predicate directly, without a determiner. Since they denote kinds, they are inherently transnumeral. Chierchia makes the claim that because they denote kinds, they must be uncountable; this implies that such nouns cannot be marked for plurality. Furthermore, in order to combine such nouns with a numeral, it would then be necessary to use a classifier, which in essence divides the otherwise uncountable noun into discrete portions. Chierchia (354) summarizes these expectations as follows:

(14) *NP[+arg, -pred] languages*

- i. Generalized bare arguments
- ii. The extension of all nouns is mass [that is, all nouns are transnumeral]
- iii. No PL [that is, nouns are not marked for plurality]
- iv. Generalized classifier system

English count nouns, on the other hand, are shown to be of type $\langle e, t \rangle$; in other words, they denote predicates. Predicates are equivalent to sets, and so type- $\langle e, t \rangle$ nouns can be thought of as sets of atoms. Because the atoms in such a set are well-defined, no classifier is necessary to count type- $\langle e, t \rangle$ nouns. Furthermore, since the elements of such a set are atoms, they don't denote plural individuals. To talk about plural individuals, then, such a set of plural individuals must be created;

this is what a plural morpheme (like *-s* in English) accomplishes.

In terms of the atomic join semilattice, English singular count nouns denote the set of atoms in the lattice; English plural count nouns denote the set of plural individuals in the lattice (Chierchia 346). Chinese nouns and English mass nouns, on the other hand, are of type *e*; their equivalent predicates denote the entire lattice, without regard for the singular–plural distinction (Chierchia 347). See the figure below:

(15)

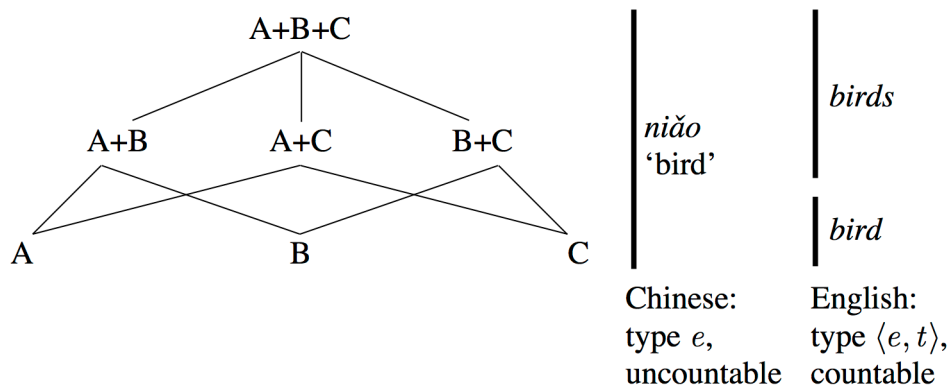


Figure (15) illustrates an important difference in English count nouns and Chinese nouns. The broken line for English indicates that the word *bird* has divided reference; in other words, atoms belonging to the BIRD kind are distinguished from plural individuals in the kind. The Chinese word *niǎo*, on the other hand, refers to both atoms and plural individuals, and in fact does not distinguish between the two. I will discuss divided reference further in Section 2.3.2.

I will next describe the semantics of Chinese and English nouns in detail within this framework of types.

2.3 Nouns in Chinese

2.3.1 Bare nouns

In Chinese, nouns are of type *e*: a verb phrase can be predicated of a bare noun. This behavior is illustrated by the following sentence, several possible readings of which are given below:

- (16) **Māo** pà gǒu.
 cat fear dog
 a. ‘Cats are afraid of dogs.’
 b. ‘The cat is afraid of the dog/The cats are afraid of the dog.’

In this sentence, *māo* ‘cat’ is of type e , saturating the predicate. As Chierchia (353) indicates, such constructions are evidence that Chinese nouns denote kinds.

Under Carlson’s theory, kinds are individuals (Carlson 101–116); they are not sets. As a result, they say nothing about the number—singular or plural—of the elements belonging to the kind. If one were to specify, however, exactly what it means for a given individual to belong to a kind, it would be possible to create a predicate out of a set.

Suppose all the individuals which belong to a given kind are collected. Then they form a set, containing both atoms and plural individuals, of everything belonging to that kind. This set is a predicate, equivalent to the kind; if an individual is a member of this set, it belongs to the kind.

The notation for this is as follows (Chierchia 349–351): if k represents a kind (of type e), then $\cup k$, ‘cup k ’, represents the property (of type $\langle e, t \rangle$) associated with the kind—that is, the set of individuals, whether atoms or plural individuals, belonging to the kind. Conversely, the kind associated with a predicate P (if such a kind exists) is represented by $\cap P$, ‘cap P ’.

Based on this understanding of kinds and their corresponding predicates, Chierchia (353–354) posits, nouns of type e must be number-neutral: the predicates equivalent to the kinds these nouns represent contain both singular and plural individuals. This is borne out by sentence (16): the bare noun *māo* refers to an individual belonging to the CAT kind, regardless of whether that individual is atomic or plural.

2.3.2 Numerals and classifiers

In the case of type- $\langle e, t \rangle$ nouns, atoms are clearly distinguishable from plural individuals: the bare form of the noun denotes the set of atoms only, while plural individuals are excluded. However, if the meaning of a word is derived from the kind and not the atom, atoms may not be distinguished from other individuals belonging to the kind; in other words, they may be vague.

Quine (91) uses the term *divided reference* to describe the difference between nouns whose atoms are vague and those whose atoms are distinguishable: “To learn ‘apple’ it is not sufficient to learn how much of what goes on counts as 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.” In other words, nouns with divided reference (like *apple*) provide information not only about the kind of their constituent individuals, but also about the quantity; their atoms are thus distinguishable, rather than vague. I will use the term *countable* to refer to nouns with divided reference, and *uncountable* to refer to those with no divided reference.

A *classifier* is a word that defines what the atoms of a given predicate are; classifiers are necessary to access atoms of nouns without divided reference. Chinese makes extensive use of classifiers; in order to combine with a numeral, a noun must be preceded by a classifier appropriate to the noun. The following data illustrate the mandatory use of classifiers:

(17) *sān zhī niǎo*
three CL bird
‘three birds’

(18) **sān niǎo*
three bird
Intended reading: ‘three birds’

The numeral *sān* ‘three’ cannot precede the uncountable noun *niǎo* ‘bird’ directly; a classifier is required since the noun itself does not have divided reference. A similar situation exists with all nouns in Chinese.

According to Chierchia, this property of Chinese follows from the fact that its nouns denote kinds. Because the property associated with a kind includes both atomic and plural individuals, he claims, “numerals will not be able to combine directly with nouns: a classifier will be necessary to individuate an appropriate counting level” (Chierchia 353–354). In other words, the fact that Chinese requires classifiers with nouns is derived from the fact that its nouns are of type *e*, and therefore any language with nouns of type *e* will require classifiers when using numerals with those nouns.

I will compare Turkish with Chinese with respect to classifiers in Section 3.1.2. Afterwards,

in Section 3.3, I will claim that, as evidenced by the Turkish data, such a relationship between kind-denoting nouns and mandatory classifiers does not necessarily hold.

2.4 Nouns in English

2.4.1 Count nouns

English count nouns greatly differ from Chinese nouns. In English, a bare count noun cannot appear in the argument position, as illustrated below:

(19) * **Bird** fly/flies.

As explained in Section 2.1, predicates are saturated by entities. In sentences such as (19), the predicate cannot be saturated with a bare noun; thus singular count nouns in English cannot be of type e . Rather, a bare count noun represents a predicate—specifically, the set of atoms having a given property. For example, *book* represents the set of atomic entities with the property of being a book. It is the definite article *the* which in English returns an entity given a predicate (Chierchia 346). Semantically, then, English bare count nouns are of type $\langle e, t \rangle$.

Because count nouns denote sets of atoms, they inherently have divided reference; this fact becomes relevant in the context of English mass nouns and plural nouns.

2.4.2 Mass nouns

Unlike count nouns, mass nouns in English behave very similarly to Chinese nouns: they can stand alone as the subject of a predicate; they cannot normally be marked for plurality; and they require classifiers if they are to be counted. I will look at each of these features in turn.

First of all, bare English mass nouns can function as the subject of a predicate:

(20) **Furniture** is useful.

In sentence (20), the predicate *is useful* is saturated by the bare mass noun *furniture*. This usage is grammatical for mass nouns, while (as shown in Section 2.4.1) it is ungrammatical for count nouns.

Second, English mass nouns cannot be marked for plurality; in fact, they are transnumeral. See the following data:

(21) There's **furniture** in the kitchen, but not in the parlor.

(22) * There are **furnitures** in the kitchen, but not in the parlor.

Sentence (21) is true regardless of the number of pieces of furniture in the kitchen: the statement is true for a single piece of furniture as well as for multiple pieces. Furthermore, (22) illustrates that it is indeed ungrammatical to specify mass nouns for number.⁵

Related to this is the fact that English mass nouns, generally speaking, cannot be directly counted, as the following data illustrate.

(23) * There were **three furniture(s)** in the kitchen.

(24) There were **three pieces of furniture** in the kitchen.

Sentence (23) attempts to apply the numeral *three* directly to the noun. However, such a construction is ungrammatical, implying that the noun *furniture* does not have divided reference. Sentence (24) fixes this problem by providing an appropriate counting level with a classifier. These data illustrate that English mass nouns, like Chinese nouns, must be preceded by a classifier (in this case *piece*) in order to be enumerated.

An analysis of English mass nouns as type-*e* accounts for these observations, just as it accounts for similar usage in Chinese. Thus English appears to have two different kinds of nouns—one of type $\langle e, t \rangle$ (count nouns), and the other of type *e* (mass nouns).

I will next examine plural nouns in English, examining the ways in which they are similar both to bare count nouns and to mass nouns.

⁵It is possible to convert a mass noun into a count noun in some instances, leading to (for example) *a beer* for 'a glass of beer', or *many inks* for 'many kinds of ink'. Nevertheless, such usage seems to impose a counting level on the noun based on context, rather than resulting from divided reference intrinsic to the noun itself.

2.4.3 Plural nouns

Under Carlson's framework (Carlson 95–110), further developed by Chierchia (363–365), bare plural nouns are interpreted as referential in the same way as mass nouns: both appear to denote kinds. Modifying sentence (19) to make the subject plural creates a grammatical sentence, with the bare plural *birds* referring to the BIRD kind:

(19) * **Bird** fly/flies.

(25) **Birds** fly.

Since they are derived from bare count nouns, however, English plurals have divided reference. The following data illustrate this:

(23) * There were **three furniture(s)** in the kitchen.

(26) There were **three birds** in the kitchen.

In (23), the mass noun *furniture* does not have divided reference; it cannot be directly combined with a numeral. In sentence (26), on the other hand, the numeral can be combined with the plural noun. These data illustrate that plural nouns behave distinctly from mass nouns in English, though both seem to be of type *e*.

This analysis of English plurals becomes important in relation to Turkish: both Turkish bare nouns and English plural nouns are referential with respect to the kind, and hence behave similarly in certain respects. In addition, both appear to have divided reference. These similarities will be apparent throughout my analysis of Turkish noun phrases, particularly in the context of generic and categorial noun phrases (Sections 4.2.2 and 4.2.3).

2.5 Analyzing the type of Turkish nouns

While this analysis may elegantly account for English and Chinese, it poses problems for nouns in Turkish, which do not easily fit either of these types. In Section 3, I will look in detail at how Turkish nouns cannot easily be classified with either Chinese nouns or English count nouns. I will show that

the problem centers around the claim that transnumeral nouns by definition are not countable. In Section 3.3, I will challenge this statement: I will propose that while Turkish nouns may be “mass” in the sense that they represent kinds and are transnumeral, their corresponding atoms of some such nouns are not vague and are therefore countable.

3 Problems with possible analyses of Turkish nouns

3.1 Turkish nouns compared with Chinese nouns

Turkish nouns share similarities with Chinese nouns. The transnumeral usage of nouns in Turkish, illustrated in Section 1.2, is evidence that these nouns might be of type *e* and denote kinds; this would make Turkish nouns similar to Chinese. However, Turkish usage fails to align with Chinese in two main ways: lack of consistent number-neutrality, and lack of consistent use of classifiers. Thus, Turkish does not follow all the characteristics expected of [+arg, –pred] languages that are given in (14). I will examine these two differences in turn.

3.1.1 Number-neutrality in Turkish and Chinese

First, Turkish nouns are not always number-neutral. As I pointed out in Section 1.6, when referring to a specific individual, Turkish nouns must be marked for number. Compare the following sentences:

- (27) **Kuş** öt-üyor.
bird sing-PROG
a. ‘*The bird* is singing.’
b. † ‘*The birds* are singing.’
- (28) **Kuş-lar** öt-üyor.
bird-PL sing-PROG
‘*The birds* are singing.’

Sentence (27) illustrates that a bare noun, when referring to a specific individual, necessarily denotes an atomic individual (as opposed to a plural individual). To refer to a plural individual, the suffix *-lar* is required, as in sentence (28).

This usage contrasts with Chinese, in which referential as well as indefinite and generic statements all use the bare noun form with a number-neutral meaning:

- (29) **Xiǎo niǎo** zài gēchàng.
(small) bird PROG sing
a. ‘A *bird* is singing/*Birds* are singing.’
b. ‘*The bird* is singing/*The birds* are singing.’⁶

In sentence (29b), the subject is referential, and is not specific for number. A plural suffix is not required to reference a plural individual.

The data above demonstrate that Turkish and Chinese are not alike with respect to number-neutral usage.

3.1.2 Classifiers in Turkish and Chinese

Turkish nouns further diverge from Chinese nouns in that they do not require a classifier after a numeral. Compare the following phrase in Turkish and Chinese:

- (11) üç kuş
three bird
‘three birds’

(17) sān zhī niǎo
three CL bird
‘three birds’

As stated in Section 2.3.2, nouns in Chinese do not have divided reference; this accounts for the mandatory presence of a classifier between a numeral and a noun. In Turkish, on the other hand, no

⁶The word *xiǎo* ‘small’ is necessary for language-specific reasons not affecting the semantic issues discussed here.

such classifier is necessary. This implies that, unlike Chinese nouns, Turkish nouns have divided reference; the atoms belonging to the kind denoted by a noun are well-defined.

The difference between Turkish and Chinese with respect to numeral constructions thus provides more evidence that the nouns in the two languages are not alike.

3.2 Turkish nouns compared with English count nouns

Turkish nouns share similarities with English count nouns. First, they may take a suffix (*-lar*) which indicates plurality; English count nouns are also marked when plural. Because of this singular–plural distinction that seems to exist in Turkish, it might seem that Turkish nouns are predicates—type $\langle e, t \rangle$ nouns that represent sets of atoms. However, some of the data from Section 1 make this interpretation of Turkish nouns problematic. Two main aspects of Turkish noun phrases contradict such an interpretation: the existence of the transnumeral usage, and the absence of plural marking after numerals. I will examine each of these aspects in turn.

3.2.1 Number-neutrality in Turkish and English

Unlike English count nouns, Turkish nouns can be used with a transnumeral meaning. This statement applies to all nouns in the language. It is not that Turkish has one class of nouns that is used with a transnumeral meaning, and another class that is always number-specific; rather, the same noun regularly is used with both meanings. Compare the two possible translations of the following sentence:

- (7) **Kuş** öt-üyor.
bird sing-PROG
a. ‘A *bird* is singing/*Birds* are singing.’
b. ‘*The bird* is singing.’

In (7a), *kuş* ‘bird’ has a transnumeral meaning; it is not specified with respect to number. In sentence (7b), on the other hand, *kuş* is specified for number; it necessarily denotes a single bird.

The transnumeral usage of *kuş* in sentence (7a) must be warranted by an appropriate pragmatic context; for example, it might occur after the question ‘*What* is singing?’ or in the context of a generic statement such as ‘Every time I go outside’. However, if the speaker is making reference to a particular bird or group of birds, a number-specific indefinite form—*bir kuş* ‘a bird’ or *kuşlar* ‘birds’—is more likely. It is the context, not the lexical item itself, which determines whether its usage is transnumeral or number-specific.

The fact that each noun in Turkish can be used with a transnumeral meaning is compelling evidence that Turkish nouns are of type *e*, and thus represent kinds—unlike English count nouns.

3.2.2 Plural marking in Turkish and English

Turkish nouns, when preceded by a numeral, do not take the “plural” suffix *-lar*; instead, they remain in the bare form. The following data from Section 1 illustrate this:

(11) üç kuş
three bird
‘three birds’

(12) * üç kuş-lar
three bird-PL
Intended reading: ‘three birds’

If *kuş* ‘bird’ were a predicate representing a set of singular individuals, it would not contain a plural individual with three atoms. In this case, a plural morpheme similar to English *-s* would be necessary to give a set of plural individuals. Thus, data such as (11) and (12) provide further evidence that Turkish nouns are of type *e* and not of type $\langle e, t \rangle$.

3.3 Allowing for transnumeral countable nouns

The preceding sections demonstrate that Turkish nouns cannot easily be classified typologically either like English count nouns or like Chinese nouns. In essence, what sets Turkish nouns apart is that they may have a transnumeral meaning, but at the same time they are countable—the atoms

belonging to the kind are well-defined. The following table illustrates the properties of Turkish nouns as compared with Chinese nouns and English count nouns.

	Chinese nouns	English count nouns	Turkish nouns
Can have transnumeral meaning	✓		✓
Can be specified for number		✓	✓
Require classifiers with numerals	✓		
Use plural form after numerals		✓	

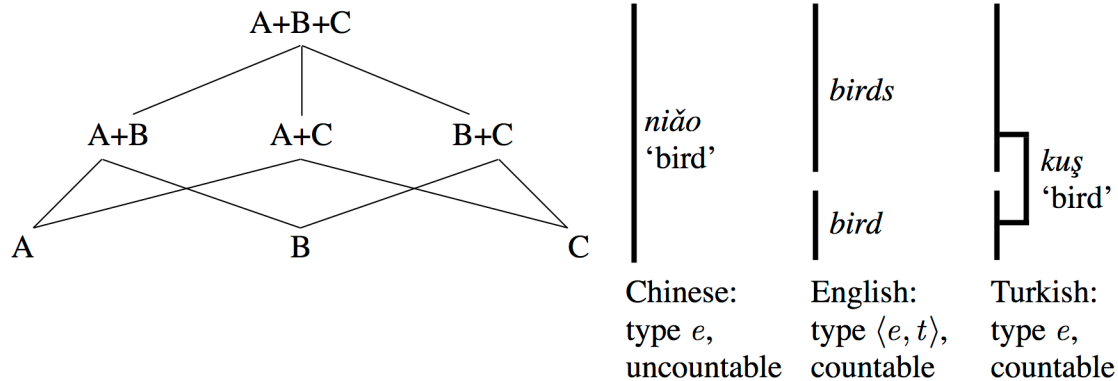
In Sections 2.2 and 2.3.2, I pointed out an assumption inherent in Chierchia’s typology that poses problems for Turkish: namely, that all nouns of type *e* require classifiers for counting. The Turkish and Chinese data from Section 3.1, however, seem to contradict this assumption. All nouns in both Turkish and Chinese can be used with a transnumeral meaning; this implies that all nouns in both languages will be of type *e* and will denote kinds. Now Chinese nouns appear not to have divided reference: in order to count a given noun, a classifier must appear between the numeral and the noun, as in sentence (17). Turkish, on the other hand, allows a numeral to appear directly next to the noun, as in sentence (11). This implies that Turkish has kind-denoting nouns whose minimal parts are not “vague” (Chierchia 347).

A comparison of Turkish and Chinese, then, indicates that nouns denoting kinds—which Chierchia calls “mass nouns”—are not necessarily uncountable. The predicates corresponding to mass nouns do indeed denote a set containing both singular and plural individuals; they are transnumeral. However, Turkish and Chinese differ with respect to countability. Chinese nouns do not have well-defined atomic units; the language makes use of classifiers if nouns are to be enumerated. Turkish, on the other hand, has count nouns with well-defined atoms; these nouns are both transnumeral and countable.

This is an important point: the fact that a noun is transnumeral does not imply that that noun is uncountable. That is, a noun may denote a kind and at the same time have divided reference. This is where the distinction between Turkish and Chinese appears to lie.

The ways in which Turkish nouns differ both from Chinese nouns and English count nouns can be illustrated in terms of a lattice:

(30)



The broken line in the representation of the Turkish noun in figure (30) indicates that the noun has divided reference; atoms and plural individuals are distinguished in the lexical item. However, the noun is still transnumeral, as the same word includes both atoms and plural individuals.

It is possible to formally extend Chierchia's typology in order to take this observation into account. In addition to the two parameters previously proposed, namely $[\pm\text{arg}]$ and $[\pm\text{pred}]$, there might be a third parameter which determines whether the language contains type-*e* nouns with divided reference. Such a parameter might be labeled $[\pm\text{count}]$, since nouns with divided reference are countable. Turkish would be distinguished from Chinese by this parameter: Chinese would be $[-\text{count}]$, and Turkish $[\text{count}]$. (Note that all type- $\langle e, t \rangle$ nouns have divided reference by definition: such nouns inherently represent sets of atomic individuals. Thus $[\pm\text{count}]$ is relevant only for nouns denoting kinds.)

In Section 4, I will formalize this understanding of Turkish nouns; I will propose one possible semantic analysis that appears to account for the differences between Chinese and Turkish nouns, and to resolve some of the questions raised in Section 1.6. This proposal, which relies on the extended typology of noun phrases just described, posits that the Turkish suffix *-lar* has a function quite different from *-s* in English.

4 A semantic account of Turkish noun phrases

4.1 The intrinsic type status of Turkish nouns

As stated in Section 3, Turkish nouns are not clearly akin either to the type- e nouns of Chinese or the type- $\langle e, t \rangle$ nouns of English. Thus it is impossible to use Chierchia's full set of diagnostics, as given in (14), to determine which type Turkish nouns belong to: the data are aligned partly with [-pred] languages like Chinese, and partly with [+pred] languages like English.

The most important feature that all type- e nouns must share by definition is that they can appear by themselves as the argument of a predicate. Turkish nouns do fulfill this condition; this is evidenced by the many sentences in Section 1.2, one of which is reprinted below.

- (3) **Doktor** her hasta-y1 muayene etti.
doctor every patient-ACC examined
'The doctor examined every patient.' (Enç 10)

Here, the bare noun *doktor* 'doctor' functions as the subject of the sentence. If being able to appear by itself as the argument of a predicate is a sufficient criterion for determining semantic type, *doktor* must be of type e .

This test, however, is not foolproof: there are [+pred] languages without overt determiners. Type- $\langle e, t \rangle$ nouns in these languages seem to be quantified by a null determiner, allowing such nouns to ostensibly appear in the argument position. Chierchia (361) mentions Russian as an example of such a language, and illustrates this behavior with the following sentence:

- (31) V **komnate** byli **malčik** i **devočka**.
in [the] room were [a] boy and [a] girl
'There were *a boy* and *a girl* in the room.' (Adapted from Chierchia 361)

In sentence (31), the three noun phrases in bold (and whose translations appear in italics) are all in the argument position. This behavior is expected, as Russian has no overt determiners. However, the possibility of null determiners complicates the problem of distinguishing between nouns of type $\langle e, t \rangle$ and nouns of type e : if either type can appear in the argument position, how can we determine

that some languages (such as Russian) have count nouns of type $\langle e, t \rangle$, while others (such as Turkish and Chinese) have nouns of type e ? In other words, the ability to stand as an argument of a verb is a necessary, but not sufficient, condition for being of type e ; a way of unambiguously determining that a noun is of type e is necessary.

A noun's ability to be transnumeral solves the problem, serving as a diagnostic of type- e nouns: if type- $\langle e, t \rangle$ nouns do indeed denote sets of atomic individuals (see Section 2.2), then such nouns cannot have a transnumeral meaning. Therefore, if there are instances of a noun occurring with a transnumeral meaning, the noun must be of type e .

This is a key difference between Russian and Turkish nouns. Both Russian and Turkish mark plural nouns in some way. Turkish, however, is unlike Russian in that it allows the bare noun to have a transnumeral meaning if it has “generic or categorial status” (Göksel & Kerslake 169). As shown in 3.2.1, this usage is not dependent on a distinction between mass and count nouns: the same noun may function both in a transnumeral and in a number-marked context. This observation supports an analysis of Turkish nouns as of type e .

In subsequent sections, I will analyze the semantic interpretation of the various noun phrase types in Turkish based on this understanding. Throughout, I will compare these semantic interpretations with analyses of English.

4.2 Bare nouns denoting kinds

4.2.1 Bare nouns with kind-level predicates

Perhaps the most straightforward sentence type in a [+arg] language, semantically speaking, is one consisting of a subject of type e and a kind-level predicate. Since the subject is of type e , it is able to saturate the predicate directly, without a need for type-shifting. Furthermore, because the subject denotes a kind and the predicate makes a statement about a kind, there is no level mismatch; hence, no shifting (such as that seen in Section 4.2.3 with categorial nouns) is necessary.

- (32) **Su** mavi-dir.
water blue-COP

‘*Water* is blue.’

Blue(WATER)

In the semantic interpretation of this sentence, WATER represents a kind—of type e —while Blue represents a predicate, namely the set of things with the property Blue. The semantic analysis of this sentence is the same as the analysis of its English equivalent, as *water*, being a mass noun, similarly denotes a kind.

Not every sentence with a kind-level subject, however, has a kind-level predicate as well. Often, a sentence has a subject which is the name of a kind, but a predicate which is at the object or stage level. I will cover these types of sentences next.

4.2.2 Generic usage: Bare nouns with object-level predicates

Kind-denoting subjects often appear with a predicate at the object level. These sentences are termed *generic* because they make a statement what is generically true for individuals in that kind. Since such sentences make a statement about each individual in the kind, they acquire a kind of universal reading.

As seen in Section 2.4.3, under Carlson’s analysis plural nouns in English function as kinds. For example, the word *birds* in a sentence represents the BIRD kind (and is of type e). The word *birds* itself, however, is derived from the bare singular *bird*, which is a predicate denoting the set of entities with the Bird property. If the purpose of the suffix *-s* is to return the corresponding set of plural individuals, *birds* intrinsically is also a predicate, representing the Birds property. To get the “kind” reading in a sentence, the \cap (kind-producing) operator must be at play. Thus *birds* in a sentence is represented by \cap Birds.

I said above that a generic sentence (one having a kind-level subject and an object-level predicate) makes a statement about each individual in a kind. Such a statement is equally true for atomic individuals as it is for plural individuals; thus the set quantified must contain both atoms and plural individuals. Take the following sentence as an example:

(33) **Birds** fly.

$$\forall x[\cup^{\cap}\text{Birds}(x) \rightarrow \text{Fly}(x)]^7$$

(The semantic representation of (33) can be paraphrased as ‘For any individual, if that individual belongs to the BIRD kind—whether it is an atomic individual or a plural individual—it has the Fly property’.)

In sentence (33), $\cap\text{Birds}$ is a kind; therefore, it is transnumeral. The generic sentence makes a statement about each individual belonging to the kind, whether it is an atomic individual or a plural individual: the statement is true of both single birds and groups of birds. In other words, the corresponding predicate of the kind $\cap\text{Birds}$, represented by $\cup^{\cap}\text{Birds}$, contains both atomic individuals and plural individuals. More generally, the \cup (predicate-producing) operator applied to a kind returns a set of entities containing both atoms and plural individuals.

The Turkish equivalent of this sentence is syntactically different, since the word denoting the BIRD kind, *kuş*, is not formed from a word denoting a set of atoms. Semantically, however, the two sentences are similar: *birds* and *kuş* both denote kinds in the context of a sentence. Compare the analysis of the following sentence in Turkish with (33):

(34) **Kuş** uç-ar.

bird fly-PRES

‘*Birds* fly/*A bird* flies.’

$$\forall x[\cup^{\cup}\text{BIRD}(x) \rightarrow \text{Fly}(x)]$$

(Adapted from Göksel & Kerslake 380)

The structure of (33) and (34) is the same; the only difference is that the two languages have nouns of different intrinsic types. Since *kuş* intrinsically denotes a kind, rather than being converted from a word denoting a set of plural individuals, the \cap (kind-producing) operator is not used in Turkish. The \cup (predicate-producing) operator is still present: because the sentence is generic, it quantifies

⁷It is true that in (33), *Birds fly* is not truly a universally applicable sentence, but merely generically applicable; it “normally” applies in “relevant” situations. Chierchia uses operators such as Gn (the generic operator) in order to nuance the semantic interpretation; I am setting these questions aside for simplicity and clarity.

across the members belonging to the kind, and a predicate is required for the quantification.

The quantificational operation described above is an attractive hypothesis for explaining the meaning of generic sentences. It is not necessary to posit the existence of covert morphemes that produce the different semantic readings; rather the appropriate operators are invoked by the mismatch in level. Because the relevant conditions occur in the context of a sentence and not in the context of the noun phrase itself, the noun phrase does not need to be treated as ambiguous.

4.2.3 Categorical usage: Bare nouns with stage-level predicates

When the subject of a sentence denotes a kind and the predicate is stage-level, a different kind of quantification is necessary: rather than a universal quantifier, an existential quantifier gives the sentence the appropriate meaning. See the following sentence:

(35) **Birds** are singing.

$$\exists x[\cup^{\cap} \text{Birds}(x) \wedge \text{Sing}(x)] \quad (\text{Adapted from Chierchia 364})$$

As with (33), *birds* in sentence (35) denotes a kind, represented by $\cap \text{Birds}$. The meaning of (35) may be paraphrased as ‘There exists some individual that belongs to the BIRD kind and which has the Sing property’.

Chierchia (364) calls the existential quantification necessary in sentences such as (35) *Derived Kind Predication*. As with generic sentences, this kind of existential quantification comes about simply as a result of the level mismatch in the sentence; it does not rely on any ambiguity in nouns themselves. The universal, or generic, reading of (33) is chosen because the predicate is object-level; the existential reading of (35) is chosen because the predicate is stage-level.

Derived Kind Predication can be applied to noun phrases in Turkish as well; Göksel & Kerslake (377) refer to such noun phrases in Turkish as *categorical noun phrases*. As with generic sentences, the semantic interpretation of the equivalent sentences in English and Turkish is almost identical, though syntactically the nouns acquire their reading as kinds differently. See the following Turkish sentence similar to (35) and its analysis:

- (36) **Kuş** öt-üyor.
bird sing-PROG
'A *bird/birds* is/are singing.'

$\exists x[\cup\text{BIRD}(x) \wedge \text{Sing}(x)]$

(Adapted from Dede 153)

When applying Derived Kind Predication to categorial noun phrases in Turkish, the only difference from application to English plural nouns is the fundamental type of the noun: the \cap operator is not required to get the kind reading of the Turkish noun.

4.3 Definite singulars and “level-shifting”

In Section 1.2.2, I described the usage of a bare noun in Turkish to reference a specific singular individual, as in the following:

- (3) **Doktor** her hasta-y1 muayene etti.
doctor every patient-ACC examined
'The *doctor* examined every patient.'

If Turkish nouns intrinsically denote kinds, as I argued in Section 4.1, then the question of how such a definite reading arises needs to be answered.

A common interpretation of the function of the definite article *the* in English is the Frege–Russell definition, conventionally represented by ι (iota):

- (37) a. ιX = the largest member of X if there is one (else, undefined)
b. the dogs = ι Dogs = the largest plurality of dogs
c. the dog = ι Dog = the only dog (if there is one) (Chierchia 346)

According to this definition, ι can return either an atomic individual or a plural individual, depending on the predicate it operates on. The operator ι returns the “largest” member of its argument, whether it is singular or plural; however, when returning a singular individual, that individual can be considered the “largest” only if it is the only one in the world under consideration (Chierchia 346).

Chierchia (353) accounts for the definite reading of noun phrases in [+arg, –pred] languages simply by positing the existence of operators that take kinds, rather than predicates, as their arguments. This is a sensible analysis; if all the nouns in the language are of type e , then of course operators taking arguments of that type are needed. Instead of using ιX , where X is a predicate, a [+arg, –pred] language might use $\iota' k$, where k is a kind, to reference an individual. The new operator ι' would have a definition identical to ι , except that it would take an argument of type e instead of an argument of type $\langle e, t \rangle$:

(38) $\iota' k =$ the largest member of $\cup k$ if there is one (else, undefined)

Since $\cup k$ is a set containing both atomic and plural individuals (see Section 4.2.2), ι' returns either an atomic individual or a plural individual, depending on what is in the relevant world.

This operation fits the Chinese data: ι' accounts for both singular and plural readings of nouns, exactly as predicted.

- (29) **Xiǎo niǎo** zài gēchàng.
 (small) bird PROG sing
 a. ‘A *bird* is singing/*Birds* are singing.’
 b. ‘*The bird* is singing/*The birds* are singing.’

We will examine the definite reading in (29b). The subject of this sentence denotes the BIRD kind, and is thus transnumeral; its corresponding predicate, \cup BIRD, contains both atomic and plural individuals. If the relevant world contains more than one individual belonging to the BIRD kind, the sentence will have the plural reading ‘The birds are singing’; if the world contains only one, atomic, individual, the sentence will have the singular reading ‘The bird is singing’.

In the case of Turkish, however, the operator ι' does not account for the data. Consider the following sentence, the subject of which references a singular individual:

- (39) **Doktor** her hasta-yı muayene etti.
 doctor every patient-ACC examined
 a. ‘*The doctor* examined every patient.’
 b. † ‘*The doctors* examined every patient.’

The plural reading of a bare noun, which is allowed in Chinese, is not possible in Turkish. If it were true that Turkish uses ι' in sentences such as (39), then for worlds containing more than one doctor, the noun phrase will refer to the largest plural individual of doctors. However, as (39b) indicates, it is ungrammatical in Turkish for *doktor* to more than one doctor; if it is referential, its reference must be an atom. (To refer to a plural individual, *-lar* is required; I will cover such plural nouns in Section 4.6.)

Turkish, then, must use an operator other than ι' . This operator must be of type $\langle e, e \rangle$; it will take the name of a kind and return a reference to an atomic individual. Since this operator in effect shifts an entity “down” from the kind level to reference a singular individual, I will call it *singular level-shifting* and represent it by \downarrow . A possible definition of this operator is as follows:

(40) *Singular level-shifting*

Suppose k denotes a kind. Then let $\downarrow k$ denote the only atomic individual x such that $x \in \cup k$, if there is one (else, undefined).

The function of \downarrow , then, is to reference an atomic individual that belongs to a given kind. In essence, this operator is identical to ι' , except that it can only reference atoms and not plural individuals as well. Of course, in order to provide such a reference to an atomic individual, this operator needs to “know” which individuals are atomic and which are not—in other words, it requires that its argument have divided reference. Though this would not be possible in a [–count] language like Chinese, in a language like Turkish, which does have divided reference even on type- e nouns (as seen in Section 3.1.2), such an operation is entirely possible.

4.4 Singular indefinite noun phrases

As shown in Section 4.2.3, bare nouns can acquire an existential reading. The individuals whose existence is posited by such expressions are undefined with respect to number; they may be either atomic or plural. However, these individuals cannot serve as antecedents—they cannot establish reference for future pronouns. The following data demonstrate this property of transnumeral nouns

in contrast to nouns that do establish reference to individuals within a kind:

- (41) Ne zaman dışarı çık-sam **kuş-lar** var ve ben onları besle-rim.
what time outside exit-1.SG.COND bird-PL there.is/are and I them feed-1.SG.AOR
'Every time I go outside, there are *birds*, and I feed them.'
- (42) *Ne zaman dışarı çık-sam **kuş** var ve ben onları besle-rim.
what time outside exit-1.SG.COND bird there.is/are and I them feed-1.SG.AOR
Intended reading: 'Every time I go outside, there are *birds*, and I feed them.'

In sentence (41), the indefinite plural noun *kuşlar* 'birds' serves as the antecedent for *onları* 'them'. In (42), on the other hand, the transnumeral *kuş* does not establish a reference to an individual, either singular or plural; hence, it cannot serve as an antecedent for a following pronoun. Thus (42) is ungrammatical.

Further corroboration that transnumeral existentials cannot serve as antecedents is the fact that definite expressions must be unambiguous with regard to number (see Section 4.3). Because transnumeral existential expressions cannot serve as antecedents, the language must allow number-specific existential constructions. Data confirm this expectation of a two-way number distinction in existential expressions (in addition to the transnumeral noun phrase discussed in Section 4.2.3):

- (43) Dayım bize **hediye** getirmişti.
my uncle us.DAT present had.brought
'My uncle had brought us *a present/presents*.' [transnumeral]
- (44) Dayım bize **bir hediye** getirmişti.
my uncle us.DAT a present had.brought
'My uncle had brought us *a present*.' [singular indefinite]
- (45) Dayım bize **hediye-ler** getirmişti.
my uncle us.DAT present-PL had.brought
'My uncle had brought us *presents*.' [plural indefinite]

(Adapted from Göksel & Kerslake 380)

Each of these sentences is existential, but each represents number in a different way: (43) is transnumeral; (44) is singular; and (45) is plural.

Sentence (44) indicates that the singular indefinite consists of *bir* followed by a bare noun. Data thus indicate that the existence of an atomic individual is marked with an overt determiner. One possibility for how *bir* gives this meaning to the noun phrase is as follows. Given a noun denoting a kind k , the following operations are present:

- (46) a. Due to the context of the sentence, the existence of an individual belonging to the kind is posited: $\exists x[x \in {}^u k]$.
- b. The determiner *bir* indicates that the individual must be an atom. This is possible because nouns in Turkish have divided reference. This can be represented as $\text{Atom}(x)$ within the existential quantification of (46a).
- c. Through singular level-shifting, as defined in (40), the only atomic individual belonging to k in the relevant world is picked out as an argument in the sentence.

Such an operation allows for the establishment of a number-specific referent, allowing the individual to serve as an antecedent for definite expressions.

4.5 Nouns following numerals

I mentioned in Section 4.3 that definite noun phrases referring to a plural individual must be marked with the suffix *-lar*. The distribution of this morpheme, however, is distinctly different from English *-s*: nouns with *-lar* may not occur after numerals. See the following data from Section 1.5:

(11) üç kuş
three bird
'three birds'

(12) * üç kuş-lar
three bird-PL
Intended reading: 'three birds'

This fact implies the following: regardless of the meaning we attribute to *-lar*, it cannot be the case that *-lar* returns a set of plural individuals. The reasoning behind this observation is this: if the

plural marking were of type $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$ (as *-s* in English could be analyzed), then the predicate denoted by a numeral could be intersected with such a form just as easily as with the bare form. In other words, there is no semantic reason why *üç kuşlar* ‘three bird-PL’ should not be possible if *kuşlar* represents a predicate. Furthermore, *kuşlar* cannot represent a kind: then *kuşlar* could be converted into a kind via the \cap (kind-producing) operator *kind*, just as *kuş* is converted into a predicate in generic and categorial contexts (see Sections 4.2.2 and 4.2.3).

Thus, the suffix *-lar* must return an individual. In the next sections, I suggest a possible semantic interpretation of *-lar* based on this constraint.

4.6 Plural level-shifting

The preceding section states that there a morpheme, *-lar*, with an unclear meaning. There is also a semantic operation left unaccounted for: plural level-shifting. In (40), I defined an operation, singular level-shifting, which references an atomic individual; this corresponds to the singular component to the definition of the ι operator. However, I did not define an equivalent plural operation.

It is possible, then, that “plural level-shifting” is indeed the function of the suffix *-lar*—the analogue to the plural component of the definition of the ι operator. I will represent this function by \Downarrow and define it as follows:

(47) *Plural level-shifting*

Suppose k denotes a kind. Then let $\Downarrow k$ denote the largest plural individual x such that $x \in \cup k$, if there is one (else, undefined).

The function of \Downarrow , then, is to reference a specific plural individual belonging to a kind; its function is similar to the plural component of ι' , just as \downarrow corresponds to the singular component of ι' . As with singular level-shifting, divided reference is necessary to distinguish between atoms and plural individuals, and so this operation is only possible in a [+count] language.

The following table illustrates the correspondence of \downarrow and \Downarrow with respect to the two functions of ι' as given in (37). Each of these two functions is handled by a single level-shifting operator;

ι' , on the other hand, accomplishes both. As mentioned above, the only difference between ι and ι' is that the latter operates on a kind, while the former operates on a predicate.

the largest salient plurality belonging to k	$\iota' k$	$\Downarrow k$
the only salient atom belonging to k		$\downarrow k$

Since \Downarrow does not create a set of plural individuals, this analysis accounts for the fact that the plural-marked form cannot co-occur with numerals: if \Downarrow references a specific individual and does not create a set, it is impossible to intersect the predicate denoted by the numeral with the plural expression.

4.7 Plural indefinite noun phrases

As singular indefinite expressions are necessary to provide antecedents for singular definite expressions (Section 4.4), plural indefinite expressions are also necessary. The form of the plural indefinite is identical to that of the plural definite, consisting of a noun with the suffix *-lar*:

- (48) **Kuş-lar** öt-üyor.
 bird-PL sing-PRES
 a. ‘*Birds* are singing.’
 b. ‘*The birds* are singing.’

One possible semantic interpretation of plural indefinite nouns is as follows. Given a noun denoting a kind k inflected with with the suffix *-lar*, the following operations are present:

- (49) a. Due to the context of the sentence, the existence of an individual belonging to the kind is posited: $\exists x[x \in \cup k]$.
 b. Through plural level-shifting, as defined in (47), the largest plural individual belonging to k in the relevant world is picked out as an argument in the sentence.

In the case of singular indefinite noun phrases, it was necessary to overtly indicate that the individual x was atomic; this was stated in (46b). In the case of plural indefinites, however, no such overt predicate is necessary: plural level-shifting itself specifies the number of the individual as plural.

5 Conclusions and opportunities for further study

5.1 Summary of ideas presented

In this paper, I have proposed a semantic analysis of Turkish, given a theory of semantic types and a typology of language based on the type of their noun phrases. I proposed that dividing nouns solely by semantic type (using the parameters [\pm arg] and [\pm pred]) does not account for the full variation in usage across English, Chinese and Turkish, since Turkish, while being [+arg, –pred] like Chinese, has countable nouns like English.

It is possible to extend Chierchia’s typology by adding a third parameter, [\pm count], that is relevant for [–pred] languages: languages with no countable nouns, like Chinese, would be [–count], while languages that have type-*e* nouns with divided reference, such as Turkish, would be [+count]. I have shown that such an analysis accounts for the Turkish data described in Section 1, and answers the two main puzzles resulting from those data—namely, why a single noun can have both a transnumeral and a number-specific meaning, and why the bare form (and not the plural form) appears after numerals.

5.2 Possibilities for further study

5.2.1 Quantifiers

I have looked at the distribution of *-lar* in both definite and indefinite noun phrases, as well as with numerals. Further work in the semantics of Turkish noun phrases might be done in studying the occurrence of quantifiers with both bare and plural-marked nouns: many quantifiers require a bare noun to follow, others require a noun with *-lar*, and still others allow both forms (Göksel & Kerslake 165–166). The following data illustrate this:

- (50) a. birçok kuş
many bird
‘many *birds*’

- b. her **kuş**
every bird
'every *bird*'
- (51) a. bazı **kuş-lar**
some bird-PL
'some *birds*'
- b. tüm **kuş-lar**
all bird-PL
'all *birds*'

Such constructions may have bearing on the semantics of noun phrases in Turkish.

5.2.2 Nouns without divided reference

I have focused my attention on Turkish nouns which seem to correspond in meaning to English count nouns—that is, those that most clearly have divided reference. Further work could analyze words like *çay* 'tea' (that is, those that correspond to mass nouns in English) to determine whether they are countable or uncountable. I have shown that Turkish has countable nouns of type *e*; I have not made any predictions about the potential existence of uncountable type-*e* nouns as well. My proposed extension of the typological framework of nouns allows for either possibility.

Appendix: Pronunciation of Turkish

Below is a brief overview of Turkish orthography and phonetics, intended merely to aid in reading the data sentences. Kornfilt (483–515) was used as a reference.

Turkish has eight vowels, divided symmetrically by three parameters: back vs. non-back, high vs. non-high, round vs. non-round. The letters **a e i o u** are pronounced approximately as their IPA equivalents; **ö ü ı** represent [ø] [y] [u], respectively. Note the distinction between **ı** and **i**; the distinction is retained in the capital forms, which are **I** and **İ**, respectively.

Written Turkish consonants are pronounced roughly as their IPA equivalents imply. There are a few exceptions: the **c ç** represent the affricates [dʒ] [tʃ], respectively, and **j ş** represent the fricatives [ʒ] [ʃ]. The letter **y** represents the palatal glide [j].

Stress in Turkish words is generally word-final (Kornfilt 504).

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