

İmparator Çizelgesi vs. İmparatorlar Çizelgesi: On the (Non)-Use of Plural Non-Head Nouns in Turkish Nominal Compounding

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Özet: Çeşitli dillerde gerçekleştirilen (ruh)dilbilimsel çalışmalarda, katılımcıların ad tamlamalarında düzenli çoğul adları tamlayan olarak kullanmaktan kaçındıkları, ancak düzensiz adları gerek tekil gerekse çoğul halde tamlayan olarak kullandıkları tespit edilmiştir. “Sözcükler ve Kurallar” kuramının savunucularına göre bu bulgu öne sürdükleri düzenli-düzensiz ayrımının net bir yansımasıdır ve varsaydıkları zihinsel modelin açık bir ifadesidir. Türkçede düzensiz çoğullaştırılan ad bulunmadığından, Türkçe “Sözcükler ve Kurallar” kuramı için özel bir durum teşkil etmektedir. Bu çalışmada, söz konusu modelin Türkçe için geçerliliğini denetlemek amacıyla Türkçe anadil konuşucularının ad tamlamalarında çoğul tamlayan kullanıp kullanmadıkları incelenmektedir. Derlem incelemesinden ve deneysel bir çalışmadan elde edilen sonuçlar bire bir örtüşmezken, genel olarak Türkçe anadil konuşucularının daha önce incelenmiş olan başka dillerin (İngilizce, Almanca gibi) anadil konuşucuları gibi, ad tamlamalarında çoğul adları tamlayan olarak daha az kullandıkları ortaya çıkmıştır.

Anahtar Sözcükler: *Sözcükler ve Kurallar kuramı, ad tamlamaları, ruhdilbilim, biçimbilimsel işleme*

Abstract: (Psycho)linguistic studies conducted in various languages have shown that participants refrain from using regular plural nouns as non-head nouns within nominal compounds but do make use of singular as well as plural irregular nouns as non-heads. According to proponents of the “Words-and-Rules” theory, this finding is an unambiguous reflection of the regular-irregular distinction that they presume and clear evidence for the mental model that they support. Since irregular nouns do not exist in Turkish, the language constitutes a special case for the “Words-and-Rules” theory. In this study, it has been investigated whether native speakers of Turkish employ plural nouns as non-heads within noun-noun compounds to examine the validity of the “Words-and-Rules” theory for Turkish. In spite of the fact that the results obtained from a corpus-analysis and a paper and pencil experiment yielded findings that did not perfectly overlap, it was found that Turkish native speakers, like native speakers of other languages investigated before (such as English and German), overall preferred plural nouns to a lesser extent than they did singular nouns as non-heads in nominal compounds.

1. Introduction

A longstanding and still highly active point of discussion in psycholinguistics, theoretical linguistics and cognitive science relates to the exact architecture of the human language faculty – the way linguistic knowledge is acquired, stored, and employed in language production and comprehension, and the role of grammatical rules and symbolic representations in the above-mentioned processes. The basic question around which the debate revolves is whether combinatorial rules that are presumed to operate on symbolic representations of assumed lexical categories such as nouns, verbs, adjectives and adverbs are psychologically real or are rather purely descriptive tools that have no mental counterparts. Of particular importance within this debate is the traditionally assumed distinction between regular and irregular inflectional forms and especially the psychological reality of regular morphological rules such as the rule in English to form regular plural nouns, which very simplistically speaking reads as *add the suffix -s to the noun stem*.

From the perspective of proponents of connectionist models (e.g., Rumelhart & McClelland, 1986; Elman, Bates, Johnson, Karmiloff-Smith, Parisi, & Plunkett, 1996), linguistic knowledge is learned and implemented through a single associative learning mechanism (an associative memory) that is responsive to the properties of stimuli such as frequency of occurrence and phonological similarity. Hence, no distinction is assumed between a grammar and a lexicon, there is no categorical distinction between morphologically simplex and complex word forms and there are no distinct systems to process rules, which are rather regarded as descriptive tools that have no representations in the human mind. Instead, the entire statistical structure of a language is gradually learned by the language mechanism through exposure to the language, without having to employ any kind of rules (Ullman, 2001). Thus, grammatical operations over variables are eliminated and both regular and irregular word forms are generated through the association of the phonological features of a stem with the phonological features of its inflected form (Berent & Pinker, 2007). In other words, from this perspective a regular-irregular distinction does not in fact exist in language and combinatorial rules like the above-mentioned rule in English to produce regular plural nouns are nothing more than descriptive tools that bear no reality in any way.

The words-and-rules theory of Pinker and his collaborators (also known as the dual-mechanism model; e.g., Pinker, 1991, 1999), on the other hand, argues that not only the traditional regular/irregular distinction but also combinatorial symbol-manipulating rules are psychologically real. According to the theory, regular forms are predominantly computed by means of productive rules in the mental grammar, while irregular forms are stored in and accessed over a mental lexicon that bears associative features similar, but not necessarily identical, to those of connectionist models. In other words, irregularly inflected word forms (e.g., *children, taught*) are listed in the associative memory just like

any other morphologically simplex word form in an undecomposed fashion. Regularly inflected word forms (e.g., *trees*, *walked*), on the other hand, are not normally stored as wholes but are products of the concatenation of an affix to a stem that is stored in memory. It should be noted, however, that the theory does not completely rule out the possibility of regularly inflected forms' being stored undecomposed in the memory. Considering that the associative memory bears no constraints as to the quality and quantity of items it can store and may even store very large linguistic units like idioms, poems or songs, it is theoretically possible for a regularly inflected form to be stored as a whole on condition that it is encountered frequently enough in the linguistic input. It has been found that the likelihood of a regular form's storage in memory increases as a function of its frequency; that is, the more frequently a regular form is computed, the easier it becomes for the associative memory to store it undecomposed (Gordon & Alegre, 1999).

The words-and-rules theory has received considerable support from studies with healthy and impaired subjects, in which it has been possible to observe dissociations between the treatment of regular and irregular forms as expected by the theory. Studies with child and adult L1 speakers of various languages like English, German, Spanish, Hebrew and Italian (Clahsen, 2006) and with L2 learners of English (e.g., Kırkıcı, 2007), for example, have demonstrated that healthy L1 and L2 users clearly treat regular and irregular forms differently in psycholinguistic experiments of various kinds. Similarly, neurolinguistic and neuropsychological studies focusing on patients suffering from a variety of disorders like brain lesions, neurodegenerative diseases (e.g., Alzheimer's Disease, Parkinson's Disease), and developmental disorders (e.g., Specific Language Impairment, Williams Syndrome) have shown that selective impairments of either regulars or irregulars are observable in such subjects depending on the affected brain area (Pinker & Ullman, 2002; Ullman, 2001). For impaired subjects, double-dissociations of this kind are expected from the perspective of the words-and-rules theory since "damage to the neural substrate for lexical memory should cause a greater impairment of irregular forms [and] damage to the substrate for grammatical combinations should cause a greater impairment for the rule in regular forms" (Pinker & Ullman, *ibid.*: p. 460).

1.1. Mice eaters vs. *rats eaters: The English lexical compounding argument

A morphological process that has enjoyed a considerable amount of prominence within the framework of the above-mentioned debate in the past few years is that of English lexical compounding. In lexical compounding, two highly productive processes, pluralization and compounding, interact to form compound word forms such as *stamp-collector*, *student union* or *whale observer*, with the head element (*collector*, *union*, *observer*) in final position, preceded by the modifying non-head element (*stamp*,

student, whale). English lexical compounding has been important in the ongoing debate due to the fact that it embodies a widely accepted dissociation between the use of regular and irregular inflection. While irregular plural nouns may occur as non-head elements within noun-noun compounds (e.g., *mice-eater*), regular plurals are generally not preferred as non-head elements (e.g., **rats-eater*). This has been observed to be a highly robust tendency that appears to be valid even in circumstances in which the non-head refers to a semantically plural entity as Pinker (1999: p. 178) vibrantly summarizes: “we speak of anteaters, birdwatchers, Beatle records, Yankee fans [...], even though it’s ants that are eaten, birds that are watched, all four Beatles that played on Sgt. Pepper’s and the white album, and so on.”

This tendency to avoid regular plural nouns as non-head elements within noun-noun compounds has received statistical confirmation by Haskell, MacDonald & Seidenberg (2003), who as a result of their quantitative analyses of the Brown Corpus (Francis, 1964) found that regular plural modifiers are highly dispreferred in comparison to irregular plurals. Similarly, in psycholinguistic experiments with adult and child native speakers of English it has been observed that compounds with regular plural non-head nouns are judged as worse than compounds with irregular plural non-head nouns (Senghas, Kim & Pinker, 2005) and that more irregular than regular plural nouns are included in production tasks (Gordon, 1985; Murphy, 2000; Kırkıcı, 2007).

From a words-and-rules theory perspective, this observed dissociation between regular and irregular plural nouns in noun-noun compound production “is significant because it exemplifies a qualitative difference between the psychological processes that generate regular and irregular forms” (Berent & Pinker, 2007: p. 131). According to the theory, it is possible to feed irregular plural nouns into compounds because irregulars are stored inflected in and are directly accessed from the mental lexicon where compounds are created as well. This, on the other hand, is not normally the case for regular plural nouns since they are regarded as “complex products of a rule, formed outside of the mental dictionary, too late in the chain of processes for inclusion in the compounding operation” (Marcus, Brinkmann, Clahsen, Wiese & Pinker, 1995: p.208). In this sense, the words-and-rules theory reflects an important amount of similarity to Kiparsky’s (1982) approach to the observed restrictions in compounding, who attempted to explain this phenomenon based on the notion of level-ordering. Very simplistically speaking, the conventional level-ordering theory makes the assumption that word-formation rules are organized at three different levels of representation that operate in top-down fashion. It is proposed that irregular word forms, together with morphemes whose affixation to a stem causes changes in the stem phonology, are generated at Level 1, compounds at Level 2 and regular forms at Level 3. Thus, since irregulars are formed at Level 1, it is possible to feed them into the compounding process, which takes place at Level 2. Regulars, however, are generated too late (Level 3) and can therefore not take place in compounds (Gordon, 1985).

1.2 Noun-noun compounding in Turkish

Though, as mentioned above, a number of languages have been investigated as part of the connectionism vs. words-and-rules theory debate, the bulk of the studies conducted have so far largely revolved around typologically similar and well-researched languages like English, German, Spanish and Italian. Crucially, what these languages have in common is the presence of a regular-irregular distinction in their morphologies. Turkish, on the other hand, has the potential to play a distinct and significant role within this debate since Turkish inflectional morphology is almost completely regular. In this sense, Turkish poses an interesting challenge to theories in which the regular-irregular distinction constitutes an important element of their argumentation since in the case of Turkish this distinction can hardly serve as the basis for either descriptive or explanatory investigations.

Turkish noun-noun compounds represent a telling example. Just like in many other languages, lexical compounding in Turkish is a highly productive process in which two or more lexical items are joined to form a new lexical item, the linguistic information of which may completely differ from the information conveyed by its constituent lexemes (Juhasz, Starr, Inhoff & Placke, 2003). Among the different types of Turkish lexical compounds¹, noun-noun compounds constitute one of the most productive compound types (Aslan & Altan, 2006) and can be formed in two different ways:

- (1) a. resim çerçeve-si
 picture frame-CM
 ‘picture frame’
 b. domates çorba
 tomato soup
 ‘tomato-soup’ (in Özsoy, 2004)

As displayed in (1a), one way of producing Turkish noun-noun compounds is through the concatenation of the compound marker *-s(I)*² to the head noun, which appears in final position, to form what is referred to as “compounds with CM (compound marker)” (Aslan & Altan, 2006) or “-(s)I compounds” (Göksel & Kerslake, 2005). A second alternative is the simple juxtaposition of two bare nouns with no specific suffixation as in (1b) to form what is called “bare compounds.”

Özsoy (2004) draws attention to the fact that bare compounds often represent forms which have been produced through the dropping of the compound marker on the head noun of an “-(s)I compound”, without a change in meaning. Özsoy reports that these morphologically simplified versions are increasingly being used in written as well as spoken Turkish and that this is particularly the case for food and place names, despite the fact that their “-(s)I compound” counterparts actually continue to exist in the language as shown in (2a-c).

- (2)
- a. yoğurt çorba-sı / yoğurt çorba
yogurt soup(-CM)
'yogurt soup'
 - b. patates kızartma-sı / patates kızartma
potato fry(-CM)
'potato fries' (in Özsoy, 2004)
 - c. Bulvar Otel-i / Bulvar Otel
Boulevard Hotel(-CM)
'Hotel Boulevard' (in Özsoy, 2004)

However, not all bare noun-noun compounds have such “-(s)I compound” counterparts as in the above examples. In some instances, attaching the -(s)I compound marker to the head noun may lead to a complete change in meaning as in (2d) or even to an ungrammatical form as in (2e) below.

- d. kadın doktor / kadın doktor-u
woman doctor(-CM)
'female doctor' / 'gynecologist'
- e. avukat kadın / *avukat kadın-ı
woman lawyer(-CM)
'woman who is a lawyer'

(based on Göksel & Kerslake, 2005)

Noun-noun compounds in which the suffix -(s)I is attached to the head noun (“-(s)I compounds”) constitute the more frequent pattern in the formation of Turkish noun-noun compounds (Göksel & Kerslake, 2005). These can be used in a number of different ways, referring to different varieties of a certain kind as in (3a) and (3b) or geographical locations as in (3c) and (3d), or denoting entities peculiar to a specific nation or city as in (3e), to name a few of their possible functions (Aslan & Altan, 2006).

- (3)
- a. yemek masa-sı
food table-CM
'dining table'
 - b. macera film-i
adventure movie-CM
'adventure movie'
 - c. Yenişehir Göl-ü
Yenişehir Lake-CM
'Lake Yenişehir'

- d. Nemrut Dağ-ı
Nemrut Mountain-CM
'Mount Nemrut'
- e. Gaziantep baklava-sı
Gaziantep baklava-CM
'baklava produced in Gaziantep'

What is important to the present discussion, however, is the distribution of the non-head elements within Turkish nominal compounds. It should be remembered that from a words-and-rules theory perspective normally only irregular plural nouns but not regular plural nouns are permitted to enter the compounding process. Taking into consideration that irregular nouns do not exist in modern Turkish, it is under this view expected that plural nouns should be entirely or predominantly non-existent within Turkish noun-noun compounds of either type discussed above. In other words, under a strong words-and-rules theory view, speakers of Turkish are expected to refrain from using plural nouns as non-head elements within noun-noun compounds altogether and use exclusively singular nouns instead. This, however, does not appear to always be the case as the examples in (4) clearly display:

- (4) a. bakan-lar kurul-u
minister-PLU council-CM
'council of ministers'
- b. öğretmen-ler gün-ü
teacher-PLU day-CM
'teachers day'
- c. peygamber-ler kent-i
prophet-PLU city-CM
'city of prophets'
- d. Kumru-lar Sokak
turtle-dove-PLU street
'Kumrular Street' (a specific street in Ankara)

Thus, at first glance, the above examples appear to be clear violations of the constraints underscored by the words-and-rules theory. Crucially, however, Turkish nominal compounds with plural non-head nouns such as those presented under (4) possibly constitute examples of lexicalized compounds; that is, compounds that are memorized as a single constituent and commonly used in speech as such. These do not normally undergo changes in their constituent structure and it is therefore often accepted that they are stored and accessed as full-forms (Schreuder & Baayen, 1997). Importantly, some of such compound forms are listed in dictionaries as such, which

also provides further support for the view that they have become lexicalized, frozen forms.³ Thus, it would probably be rather awkward, if not completely unacceptable for many speakers, to produce one of the compounds in (4) using the non-head noun in its singular form (i.e., */?bakan kurulu, */?öğretmen günü, */?peygamber kenti, */?Kumru Sokak). In this sense, the above-mentioned examples can probably not be taken as direct, clear-cut evidence against the theoretical tenets of the words-and-rules theory since, as mentioned above, the theory does not rule out the option that larger linguistic units maybe stored and accessed in the associative memory in an undecomposed fashion.

In sum, it appears to be a fruitful path to consider the compounding behaviors of Turkish native speakers since, as mentioned above, Turkish represents an interesting case of absolute regularity in nominal inflection for number. Hence, should the theoretical tenets of the words-and-rules theory be correct, Turkish native speakers are expected to refrain from using plural nouns as non-head nouns within lexical compounds. In addition, the very fact that lexical compounding in Turkish has unfortunately been almost completely neglected in the psycholinguistic literature makes its analysis a worthwhile endeavor that has the potential to illuminate new paths of further investigations of less-commonly researched languages. The present study thus set out to investigate whether native speakers of Turkish use plural non-head nouns within lexical compounds and to analyze to what extent the identified behaviors would fit into the theoretical framework drawn by the words-and-rules theory.

To this end, two types of data were collected. First, corpus data were analyzed to identify the extent to which plural nouns are used as non-head modifiers within nominal compounds in written Turkish. Then, the preferences of native Turkish speakers with regard to the use of singular or plural nouns within Turkish noun-noun compounds were elicited by means of a forced choice paper and pencil experiment.

12. Corpus Data

The first step was to establish a quantitative measure of how often regular plural nouns are used as non-head elements within Turkish noun-noun compounds in naturally occurring instances (i.e., non-elicited instances). Unfortunately, there is no existing evidence in the relevant literature as to how often plural nouns are used as such and even prescriptive accounts of Turkish grammar provide little or no information concerning whether, according to their views, plural modifiers should or should not be used within compounds. Instead, the issue is either left untouched altogether or is mentioned *en passant* with rather vague statements expressing the view that *in general* the head in Turkish nominal compounds cannot be modified directly and that non-heads lose referential and other syntactic properties (Birtürk & Fong, 2001).

To see to what extent head nouns in noun-noun compounds are actually modified by

plural non-head elements in naturally occurring language, the METU-Sabancı Turkish Treebank (Ofłazer, Say, Hakkani-Tür & Tür, 2003), which is a sub-corpus of the METU Turkish Corpus (Say, Zeyrek, Ofłazer & Özge, 2002), was used. The METU Turkish Corpus is a 2-million-word corpus of post-1990 written Turkish texts by various authors and of various genres such as news items, novels, articles, short stories and interviews. The METU-Sabancı Turkish Treebank, on the other hand, is a morphologically and syntactically annotated treebank corpus containing around 7250 grammatical sentences taken from the METU Turkish corpus without changing the ratio of the various genres in the main corpus.

The manual analysis of the METU-Sabancı Treebank revealed that the Treebank included a total of 1413 noun-noun compounds. Out of these, only about 0.85% (12 tokens, 7 types) constituted compounds with a plural non-head, listed under (5) below.

- (5)
- a. tedbir-ler paket-i
precaution-PLU package-CM
 - b. kanal-lar kıyı-sı
canal-PLU shore-CM
 - c. hayvan-lar alem-i
animal-PLU world-CM
 - d. olay-lar dizi-si
event-PLU sequence-CM
 - e. kanal-lar kent-i
canal-PLU city-CM
 - d. algı-lar bütün-ü
sense-PLU entirety-CM
 - e. bakan-lar kurul-u
minister-PLU council-CM

As such, the data obtained speak for a very strong bias, but apparently not an absolute prohibition, against the use of plural non-head nouns within Turkish noun-noun compounds. This finding is very much in line with the morphological accounts provided in the framework of the words-and-rules theory and level ordering, which, as mentioned above, make the prediction that (regular) plurals should not be used as non-heads in compounds *at all*. Despite the fact that the results from the corpus analysis do not reflect this *absolute* dispreference, a ratio of only 0.85% plural non-head use is clearly far from being a strong argument against the words-and-rules/level ordering accounts and one might even speculate that the identified compounds carrying plural non-head nouns need to be evaluated as rote-memorized, lexicalized forms rather than creative forms that are produced by the on-line concatenation of the plural suffix (-lAr) to the non-head noun.

However, the above results need to be treated with great caution since the analyzed corpus data were all based on samples of written Turkish alone and without examining a corpus of spoken Turkish as well, it would be hard to make explicit generalizations concerning the exact preferences of speakers of Turkish. Additionally, it is well known that corpus data of any type are limited by the language samples that constitute the corpus (Haskell et al., 2003), which needs to be taken as a possible further limitation to the results reported above. It was therefore critical to obtain further data on the preferences of Turkish native speakers, which was done by means of a paper-and-pencil test the results of which are reported below.

3. Experimental Data

To test how native speakers of Turkish would treat nominal compounds in an experimental condition, a forced choice questionnaire was administered in which participants were to choose between noun-noun compounds with singular and plural non-heads after having read a brief context story into which the compounds were incorporated.

3.1 Participants

37 students of Bařkent University in Ankara who were native speakers of Turkish took part in this study on a voluntary basis. Among these, 33 (89%) were female and 4 (11%) were male. All of the participants were naıve as regarded the purpose of the study and reported to have normal or corrected-to-normal vision.

3.2 Materials

8 pairs of noun-noun compounds were formed. The members of each pair were identical, with the exception that in one noun-noun compound the non-head was singular whereas in the other it was plural as in pairs listed under (6) below. The non-heads used in each pair were chosen from nouns whose singular and plural frequencies were comparable so that the frequency of each individual item would not be a confounding factor. Special care was observed to make use of compounds that are normally not used or very rare in daily life so that participants would not judge the experimental items on the basis of forms already established in their memories.

- (6) a. ağaç katalogu
tree catalogue-CM
b. ağaçlar katalogu
tree-PLU catalogue-CM

Each compound pair was presented to the participants in a printed booklet following a brief context story as in (7) and (8) below, in which the target noun was introduced in its plural form⁴ (for a full list of experimental items and preceding context stories, see Appendix A). The participants were expected to choose between the two available choices to fill in the blank that was left in the context story. In order to prevent the participants from developing response strategies, the presentation order of singular and plural non-head nouns was counter-balanced across the questions. Thus, in half of the questions a plural noun was presented as choice (a) and in the other half as choice (b).

(7)

Son yıllarda görülen orman yangınları ve kuraklıkla birlikte Gaziantep ilimizin çeşitli türdeki ağaçları gittikçe azalmaktadır. Bizim Çevre Koruma Vakfı olarak bu çalışmayla amacımız, ağaçların denetimini ve takibini kolaylaştıracak, gelecek nesillere bırakabileceğimiz, içinde Gaziantep'te bulunan tüm ağaçların dökümünün bulunduğu renkli, fotoğraflı bir _____ hazırlamaktır.

- a) ağaçlar katalogu
b) ağaç katalogu

(8)

Almanya'nın güneyindeki Kempten şehrinde genç bir girişimci, son yıllarda Almanya'da giderek daha fazla evcilleştirilip beslenen timsahlara yönelik beş yıldızlı bir tesis kurdu. Timsahların gönüllerince eğlenebildiği ve her türlü bakımdan geçtiği bu tesiste, tatlı su timsahlarından deniz timsahlarına kadar tüm timsahlara hizmet veren bir _____ bile mevcut.

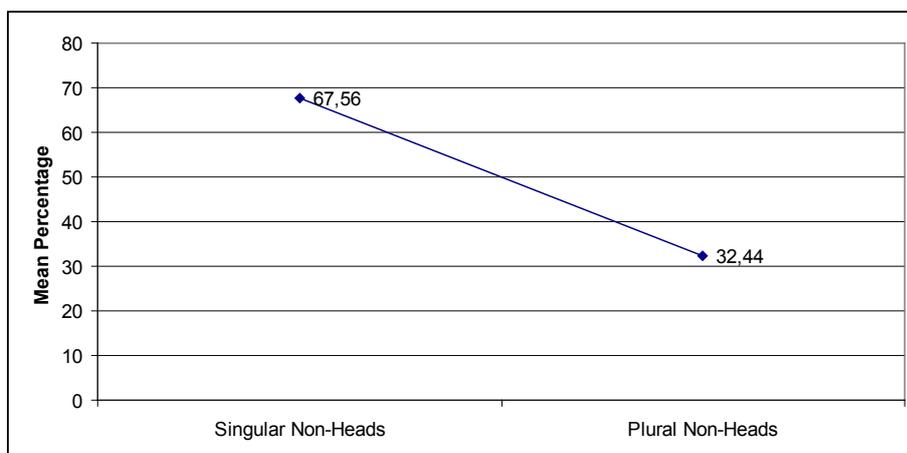
- a) timsah kuaförü
b) timsahlar kuaförü

Apart from the 8 experimental items, the questionnaire further included 7 filler items that also incorporated short context stories followed by two choices which were comprised of various grammatical structures including phrasal compounds and noun-verb compounds.

3.3 Results

As can be seen in Figure 1, the results revealed that participants chose to make use of a singular non-head noun in about 67.6% of cases, whereas plural non-head nouns were used in only about 32.4% of cases (SD=29.25). A paired samples t-test showed that this difference was statistically significant by subjects ($t(1,36)=5.157, p<.0001$). In other words, in spite of the fact that the participants preferred to use singular to plural non-head nouns within noun-noun compounds, this preference was not an absolute one as predicted by the words-and-rules theory and level ordering. An important point that should not go unnoticed is the fact that the rate of compound-internal plural nouns in the experimental data (32.4%) was huge when compared to the 0.85% occurrence rate of plural non-head nouns obtained in the analysis of corpus data reported above, which clearly displays that experimentally and naturally obtained data may lead to distinct results.

Figure 1: Mean response rates for plural and singular non-head nouns in compounds



An analysis of the results by items showed that the participants treated experimental items differently and were more ready to accept some non-head nouns in their plural forms within compounds. Thus, it was found that two of the eight experimental compounds were overwhelmingly preferred with a plural non-head noun: *imparatorlar çizelgesi* (78.4% of responses) and *bayanlar otobüsü* (70.3% of responses). For the remaining experimental items, on the other hand, the preference rates for plural non-head

nouns ranged between 2.7% (*balonlar vitrini*) and 46% (*davetliler dosyası*), yielding a dispreference of plural non-heads. This finding inevitably leads to the question whether morphological information alone (the absence/presence of the plural suffix on the non-head noun) as put forward by the words-and-rules theory is sufficient to explain the preferences of Turkish native speakers in the production of noun-noun compounds, or whether other aspects such as semantic and/or phonological factors might also play an important role in the preference of native Turkish speakers to use nouns in their plural forms within compounds or not. This issue will be discussed below.

4. Discussion and Conclusion

The aim of this study was to identify whether adult native speakers of Turkish disprefer using plural nouns as non-heads within noun-noun compounds as predicted by the words-and-rules theory and level ordering and as attested for speakers many languages through various psycholinguistic studies. While the analysis of corpus data of written Turkish revealed that compound-internal plural non-head nouns are indeed the exception rather than a prevalent phenomenon, the results of an offline experimental paper and pencil task showed that the participants preferred some compounds with plural non-head nouns to very high degrees (70.3%-78.4%). Other compounds, on the other hand, were almost exclusively preferred with singular non-head nouns. Thus, as mentioned above, the question arises whether this divergence in the participants' preferences might be taken as speaking for the possibility that morphology-based explanations alone might not suffice to explain the whole picture and that possibly semantic and/or phonological features might play a more important role in the processing of compounds as suggested by Haskell et al. (2003) and Libben, Gibson, Yoon and Sandra (2003).

Particularly Haskell et al. (2003) have fiercely challenged the assumptions of the words-and-rules theory and, on the basis of English compounding data, have claimed that speakers' tendency not to prefer regular plural nouns within compounds can be explained by their histories of exposure to nominal modifiers, which differ from regular plurals phonologically as well as semantically. In other words, Haskell et al. embrace the connectionist view that language ability is based upon sensitivity to the phonological and semantic features of words while morphological structure and combinatorial operations are redundant (Berent & Pinker, 2008).

However, Berent & Pinker (2007) have shown in a number of experiments that the dislike of regular plurals as non-head nouns in compounds is not a result of the phonological or semantic properties of non-head nouns alone. Significant to the discussion at hand, it was found that participants in Berent & Pinker (2007) did not rate compounds containing singular non-heads which were phonologically identical to

regular plurals (e.g., *hose-collector*; *tax-collector*; *phase-classifier*) as less acceptable than phonological controls (e.g., *hoses-collector*) and semantic controls (e.g., *pipe-collector*). In other words, it was not the fact that a potential non-head *sounded* plural but the fact that a word actually *was* plural that led participants to reject a potential non-head noun. In further experiments with nonce words, it was shown that even in cases where the semantic and phonology of irregular and regular nonce words were identical (e.g., ‘irregular’ *gleex-container* vs. ‘regular’ *gleeks-container*), participants still rated compounds with regular plural non-heads as worse. As such, Berent & Pinker’s results indicate that the dislike of regular plurals within compounds can not be accounted for through exclusively semantic and/or phonological (connectionist) explanations that simply ignore the role of morphology.

Thus, in relation to the results obtained in the present study, the general tendency to use plural nouns to a lesser extent than singular nouns within compounds as displayed in Figure 1, clearly speaks for the words-and-rules theory. However, the results obtained do by no means support a strong version of the words-and-rules theory in which plural forms that are formed through the concatenation of a plural suffix to the verb stem (cf. *regular* plurals) are not licensed at all. Nevertheless, the fact that noun plurals were preferred as non-head nouns in almost one third (32.4%) of cases and that some nouns were overwhelmingly preferred in their plural forms as non-head nouns (e.g., *imparatorlar çizelgesi* and *bayanlar otobüsü*) in contrast to others that were hardly ever used in their plural forms (e.g., *balon* -2.7% plural) indicates that there might be more than just morphological structure that plays a role.

Needless to say, were it not for the rather convincing results of Berent & Pinker (2007) mentioned above, a potential speculation in relation to this pattern of results would certainly be based on semantic and/or phonological aspects of the nominal prompts that created such differences in the responses. Thus, a likely approach to find possible explanations for the obtained results would have been couched in an account that speculates on the computation of semantic number on the basis, or in the absence, of morphological information à la Berent, Pinker, Tzelgov, Bibi & Goldfarb (2005), hypothesizing whether a singular-marked non-head noun in a compound like *dükkan haritası* (‘shop-map’) actually refers to a *single individual* or to a *kind*. As is well known, the semantic number of singular nouns is ambiguous; that is, without lexical or conceptual information the grammar can assign semantic number only to plurals; singulars, on the other hand, may remain unspecified for semantic number (Corbett, 2000; Berent et al., 2005). Therefore a noun-noun compound like *dükkan haritası* carries the potential to be understood as semantically singular or plural, referring to a map that belongs to a particular shop or a kind of map that is used for shops in general. However, given the fact that studies experimentally investigating “plurality” in Turkish from various perspectives have, to my knowledge, not been conducted yet, such speculations will not be attempted in the present study.

In conclusion, the results of this first step into the analysis of the processing of Turkish noun-noun compounds are very far from being conclusive and provide an (as yet) incomplete picture, though a weak version of the words-and-rules theory appears to point in the right direction. However, much more experimental data concerning the processing of Turkish compounds and related structures like *number* is absolutely necessary to arrive at sound results. It is therefore crucial that further studies on the processing of Turkish compounds be conducted that employ various psycholinguistic methodologies.

Notes

¹ Since the great bulk of the discussions in the relevant literature on the (non)use of plural forms within compounds and the experimental analyses to be reported in the remainder of the article focus on noun-noun compounds, only noun-noun compound forms will be discussed in this section. A detailed discussion of all the possible Turkish lexical compound forms, which are various in number, form and productivity, would be much beyond the scope of the present paper. Readers interested in other Turkish compound forms are referred to Kornfilt (1997), which contains a detailed description of Turkish compound morphology.

² It should be noted that the classification of the suffix -s(I) is rather vague in the relevant literature. While it is classified as the 3rd person possessive suffix by some scholars (e.g., Göksel & Kerslake, 2005; Underhill, 1976), others (e.g., Kornfilt, 1997) define it as a compound marker. However, in both cases it is accepted that the -s(I) suffix serves as a morphological marker for compounding in the illustrated instances; i.e., it “serves as a grammatical indicator of the compounding of the noun to which it is affixed with the immediately preceding noun” (Göksel & Kerslake, *ibid.*).

³ I would like to thank an anonymous *Dilbilim Araştırmaları* reviewer for pointing this out.

⁴ One reviewer suggests that potential priming effects should have been avoided by using both singular and plural forms of the target non-head nouns within the context stories. The presentation of plural prompts in compounding-experiments has become an almost standard procedure that has been employed in many psycholinguistic studies (e.g., Gordon, 1985; Lardiere, 1995; Murphy, 2000; Berent & Pinker, 2007). Since this procedure has not been reported to act as a confounding factor in these studies and for purposes of comparability, the prompts in the present study were provided in their plural forms as well.

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Appendix: List of Experimental Items and Context Stories

1) Sedat, řu sıralar düđünü için çağıracağı davetlileri düşünüyor. Görev icabı ülkenin her köşesinde görev yapan genç doktor, bir düđünde en önemli ayrıntının davetlilerin zamanında haberdar edilmesi ve birbirleriyle anlaşabilen davetlilerin aynı masaya oturtulması olduğunu düşünüyor. Düđün telaşı içinde hiç kimseyi unutmamak için, yakın arkadaşı Ođuz'la birlikte bilgisayarda bir _____ oluşturuyorlar.

- a) davetli dosyası
- b) davetliler dosyası

2) Erol'un en büyük zevki renk renk, biçim biçim şişirilmemiş balonlar toplamaktır. Evindeki balonların sayısı şimdiden neredeyse 650'yi buldu bile. Balonlarını düzene sokmak ve renklerine göre ayırabilmek için işyerinin arka tarafında bir _____ hazırlamaya karar verdi.

- a) balonlar vitrini
- b) balon vitrini

3) Marmaris'te görev yapan askerler, zor koşullar altında görev yaptıklarından ve buna rağmen kullanabilecekleri bir havuzun olmayışından şikayet etmekte. Sayın belediye başkanımızdan beklentimiz, sadece askerlerin kullanımına açık bir _____ için gereken çalışmaların başlatılmasıdır.

- a) asker havuzu
- b) askerler havuzu

4) Son yıllarda görülen orman yangınları ve kuraklıkla birlikte Gaziantep ilimizin çeşitli türdeki ağaçları gittikçe azalmaktadır. Bizim Çevre Koruma Vakfı olarak bu çalışmayla amacımız, ağaçların denetimini ve takibini kolaylaştıracak ve gelecek nesillere bırakabileceğimiz, içinde Gaziantep'te bulunan tüm ağaçların dökümünün bulunduğu renkli, fotoğraflı bir _____ hazırlamaktır.

- a) ağaçlar katalogu
- b) ağaç katalogu

5) Ankara İtfaiye Müdürlüğü sözcüsü Rasim Alyanak, Ulus yakınlarında bulunan tarihi semtlerde çıkan yangınlarda en büyük sıkıntının dar sokaklarda bulunan dükkanlara müdahale etmenin olduğunu dile getirdi. Yeni geliřtirdikleri yangın müdahale ve önleme sisteminin azami ölçüde faydalı olabilmesi için, bu semtlerde bulunan küçük-büyük tüm dükkanların dahil olduđu, üç boyutlu bir _____ oluşturmaya karar vermişler.

- a) dükkan haritası
- b) dükkanlar haritası

6) İran'ın başkenti Tahran'da bayanlara karşı uygulanan sözlü ve fiziksel tacizlerde son aylarda gözle görülür bir artış yaşanmakta. Tahranlı bayanlar bu tür tacizlerin çoğunlukla geç saatlerde toplu taşıma araçlarında ve karanlık sokaklarda gerçekleştiğini dile getirdi ve yetkilileri bayanların

bu sıkıntısına çare bulmaya davet etti. Bunun ardından, Tahran Belediye Encümeninin en yaşlı üyesi Abdelgani el-Tahhan'ın önerisi üzerine, bu sorunu çözmek için sadece bayanların kullanımına açık bir _____ devreye sokuldu.

- a) bayanlar otobüsü
- b) bayan otobüsü

7)Almanya'nın güneyindeki Kempten şehrinde genç bir girişimci, son yıllarda Almanya'da giderek daha fazla evcilleştirilip beslenen timsahlara yönelik beş yıldızlı bir tesis kurdu. Timsahların gönüllerince eğlenebildiği ve her türlü bakımdan geçtiği bu tesiste, tatlı su timsahlarından deniz timsahlarına kadar tüm timsahlara hizmet veren bir _____ bile mevcut.

- a) timsah kuaförü
- b) timsahlar kuaförü

8) Bilindiği gibi, tarih öğrencilerinin en büyük derdi eski Roma İmparatorluğunun o bitmek bilmeyen imparatorlarının isimlerini hafızalarında tutmaktır. Roma'nın imparatorları sayısal olarak hafızaya yük oldukları kadar, yaptıkları ilginç mi ilginç icraatlarıyla da tarih öğrencilerinin başlarının belası. Roma İmparatorluğu konusunda ülkemizin önde gelen uzmanlarından olan Doç. Dr. Dilek Yıldız, kronolojik olarak hazırlanan bir _____ ile bu tür sıkıntıların rahatlıkla aşılabileceğinin altını çizdi.

- a) imparatorlar çizelgesi
- b) imparator çizelgesi

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