

The acceptability of regular plurals in compounds

Elisa Sneed
Northwestern University

1 Introduction

There has been a sizable amount of research done on the topic of compounding in English. The result of this work is that many generalizations have been drawn about this process of word formation including where compounds are formed (in the syntax or in the lexicon), what is and what is not an acceptable compound and how a given compound can possibly be interpreted. Two claims about compounding that are particularly important to my research are the following:

- (1) Irregular plurals may appear inside compounds
 - a. teeth marks
 - b. mice eater
- (2) Regular plurals may not appear inside compounds
 - a. ??claws marks
 - b. ??rats eater

This difference in acceptability of irregular and regular plural nouns in the non-head position of noun - noun compounds has long been noted in the literature. However, as many researchers (Kiparsky 1982; Selkirk 1982; Gordon 1985; Alegre & Gordon 1996, ms; Senghas, Pinker & Kim ms.) have noted, this restriction is not absolute. Some regular plurals, both semantic and morphological, *are* licensed as non-heads in N-N compounds.

- (3) That news emerged from a City Council hearing in which Mayor Rudolph Giuliani's two-term **parks commissioner**, Henry Stern, was quizzed.
Newsday (New York, NY), January 24, 2001
- (4) A new **assists king** reigns in Major League Soccer. Tampa Bay midfielder, Carlos Valderrama broke the season **assists record** by notching his 20th in Saturday's 2-0 win against Los Angeles.
USA TODAY, July 24, 2000
- (5) Mrs. Dailey had worked in the **admissions department** of the Owings Mills school from 1956 until she retired in 1985.
The Baltimore Sun, September 30, 2000

In fact, there are many examples of compounds that occur with regular plural non heads, some, such as *admissions department* and *parks commissioner*, are actually quite robust in the language. These findings are revealed by the corpus compiled in this study based on searches of the General News category in the Lexis-Nexis Academic Universe for specific compound types. This set of data contains examples from US newspapers only and contains no duplicate hits

over a six-month period. It shows that the list of attested compounds containing regular plurals in non-head position consists of 140 compound types from previous literature with 83 attested compound types in the database and 691 tokens of compounds (in the six-month period). This is not to say that plural non-heads are globally just as common as singular non-heads, simply that they aren't exactly the anomaly that the claim in (2) suggests.

This paper is organized in several sections. First I give an overview of the types of compounds that exist in English so that the reader can familiarize herself with the basic terminology used throughout the paper. Second, I present a review of previous analyses of compounding, focusing on the level-ordering hypothesis. I present the level-ordering hypothesis as it was originally proposed, followed by arguments for and against semantic and pragmatic factors that contribute to the acceptability of plurals in compounds. Finally, I present my proposal, which, while not a proper "account," provides a more thorough description of compounding that occurs in English.

2 Types of compounds

There are four main classes of compounds: exocentric (sometimes called bahuvrihi compounds, such as *pickpocket*), appositional (such as *gentleman-farmer*), dvandva (sometimes called copulative compounds in English, such as *Austria-Hungary*) and endocentric (examples 1 – 5), which are by far the most common type of compound found in English, and the only type I will discuss in this paper. In this type of compound, one of the elements in the compound acts as a modifier, attributing a certain property to the other member, or head, of the compound. The compound, therefore, is a hyponym of the head because the modifying element has limited the category referred to by the head. In English, the left-hand member of the compound is the non-head, and the right-hand member is the head.

- (6) camera + case = camera case
 non-head head compound
 a *camera case* is a type of case
- (7) truck + driver = truck driver
 non-head head compound
 a *truck driver* is a type of driver, namely, one who drives trucks
- (8) teeth + marks = teeth-marks
 non-head head compound
 teeth-marks are a type of marks

The reader should note that endocentric compounds follow a number of orthographic conventions. Some endocentric compounds are written as one word (as in example (6)), others can be written as two separate words, and still others are hyphenated. In fact, the compound in example (8) appears hyphenated in Spencer (1991), *teeth-marks*; as two separate orthographic words in Alegre &

Gordon (AG) (1996, ms), *teeth marks*; and as one orthographic word in Senghas et al. (ms), *teethmarks*. These conventions do not reliably indicate anything about the status of two words as a compound; rather they seem to reflect the preferences of the writer.

3 Level ordering

There are some accounts of compounding in English that are not based on level-ordering. These accounts view compounding and much of word-formation as a syntactic processes (Fabb, 1984; Sproat, 1985; Roeper, 1988). The most widely accepted view currently, however, (or at least the view that has been most written about in recent accounts) is a lexicalist approach based on Kiparsky (1982)'s three-leveled account of the theory of "level-ordering." For this reason, I will not discuss these other accounts here. The reader is directed to the original sources, or to Spencer (1991) for a summary of these syntactic accounts.

3.1 Three levels

The original ordering hypothesis was proposed by Siegel in her 1974 dissertation, *Topics in English Morphology*¹, based on the morphological properties of various English affixes. She divided English affixes into two classes ("primary," associated with morpheme boundaries and "secondary," associated with word boundaries) depending on whether or not they induce or undergo phonological changes (such as a stress shift, trisyllabic laxing or nasal assimilation) when they are attached. It was Allen (1978), however, who first extended Siegel's original proposal beyond affixes to other word-formation processes like compounding. In so doing, Allen introduces the term "level" to reflect the way "...that the morphology is partitioned into blocks of rules, each block having different morphological characteristics..." that can be organized into different levels. These levels are motivated on basically the same grounds as Siegel's classes. Then, to account for various restrictions we see in word formation, Allen proposes the following ordering, allowing her model to reflect word-formation in English, including compounding²:

- (9) Level I (+ affixation)
 Level II (# affixation)
 Level III (morphological processes, including compounding)

Allen's theory stipulates these levels, in this order. Thus the output of rule application from Level I may serve as the input to Level II or Level III, but the output of a higher level cannot serve as input to a lower level. Allen's basic

¹ This dissertation was published in 1979 under the same title. It will be referred to in this paper as Siegel 1979, but it should be noted that Allen 1978 cites the earlier version.

² For Allen, regular inflection is a post-lexical process, which would presumably take place in the syntax. Allen (1978) doesn't say anything about a level that would contain inflection, however, as she only looks at derivational morphology.

schema was adopted and refined by Kiparsky (1982), conflating Allen's Level II and Level III into his Level 2, and introducing regular inflection at Level 3. Level-ordering accounts of compounding in the recent literature have generally assumed Kiparsky's three-leveled schema, summarized in the following table from Gordon (1985).

Table 1 *Examples and properties of level-ordered rules*

	Examples	Properties
Level 1	+ion, +ous, +th, in+, mice, oxen, clothes	Derivational, irregular, semantically idiosyncratic, host deforming, stress shift, vowel reduction
Level 2	#ness, #ism, #er, #ist, un#, compounding	Derivational, non-deforming, (more) semantically predictable, productive
Level 3	#s, #ed, #ing	Regular inflections, non-deforming, semantically predictable
SYNTAX		

(Gordon 1985: 75)

Where affixation is concerned, this schema makes the same predictions as Seigel's Class affixation. If rules are applied in order from Level 1 to Level 3, and not in reverse, Level 1 affixes are applied before Level 2 affixes yielding the same sorts of outputs as Seigel's and Allen's models (see Seigel 1979 and Allen 1978 for more detailed explanations).

- (10) Darwin +ian → Darwinian #ism → Darwinianism
 Darwin #ism → Darwinism +ian → *Darwinismian

3.2 Level-ordering and compounds

The same ordered progression of word formation applies to compound nouns as well. The level at which lexical items are subject to different morphological processes becomes particularly important when we consider this type of word formation. The following table illustrates in parallel the formation of compounds both with irregular and regular non-heads. The depiction of the level-ordering mechanism is, again, adapted from Gordon (1985).

Table 2 *Level-ordering for noun-noun compounds*

	Irregular nouns and pluralia tantum	Regular nouns
Level 1	mouse, mice, clothes	rat
	↓	↓
Level 2	compounding ↓ mouse eater, mice eater, clothes basket	compounding ↓ rat eater
	↓	↓
Level 3	-s ↓ mouse eaters, mice eaters, clothes baskets	-s ↓ rat eaters

In Table 2, the reader can see that irregular nouns are already stored in their plural form at Level 1, along with pluralia tantum. They are thus available for all Level 2 processes. Regular nouns are also available for Level 2 processes, however, only in their singular form because only that is available at Level 1. This correctly predicts that regular plurals cannot appear in compounds, but irregular plurals and pluralia tantum are optionally allowed.

(11) *rat eater* ??*rats eater*³ *mouse eater* *mice eater* *clothes basket*

There seems to be no semantic reason why *rats* should be prohibited as an internal noun if *mice* is allowed. This in itself is support for the level-ordering position: a clear distinction exists that is based on how the elements in the system function, not necessarily what they mean.

3.3 Support for level ordering

A good deal of support is given to the level-ordering argument by the results of Gordon (1985), which showed that despite very little evidence that irregular plurals are possible in compounds, and some evidence that they are not (the compounds containing irregular nouns that children are likely to hear, such as *toothbrush*, *toothpaste*, *mousetrap*, *man-eater*, all appear with the singular form of the noun), as soon as children are able to correctly use the irregular plural form of a noun they prefer it as the internal noun of compounds with irregular nouns. They do not, however, allow regular nouns to appear in their plural form within compounds. Interestingly, even children who did not yet use irregular plurals for all the irregular nouns in the experiment, but overgeneralized the regular plural for the irregular forms (e.g. *mouse*, *mouses* instead of *mouse*, *mice*) only used this overgeneralized plural in one (1) out of 88 compounds. These results seem to indicate that children are organizing language based on certain structural constraints, such as the morphological differences between regular and irregular plurals. (See Gordon 1985 for a full description of the study, including experimental biases, and see Clark, Hecht and Mulford 1986 for data that call into question Gordon's compounding results).

Gordon's results are also in line with the general intuitions of most adults that *mice eater* is better than ??*rats eater* (Senghas, Pinker and Kim, ms; Pinker, 1999; AG, ms), suggesting that the same types of structure that exist in adult language formation are developing in children as they learn the language. Crucially though, none of this is an actual argument in favor of level ordering. In fact, the results of Gordon (1985) would also be consistent with a much more general claim that there are grammatical constraints involved in compounding that rule out regular plurals from appearing in non-head position. It wouldn't

³ For reasons that will be explained in greater detail later, I will not be referring to unacceptable compounds as ungrammatical (*). Rather than use the traditional symbol for semantic anomaly (#), which is used to indicate Class II affixes in the (level) ordering mechanism, I will use '??'.

necessarily have to be level-ordering that did this. When we look more carefully at naturally occurring data showing, first, that there is actually quite a large number of attested regular plurals and second, that adults may often judge irregular plurals to be unacceptable, this unambiguous distinction between regular and irregular plurals starts to get fuzzier.

4 Problems for level-ordering

As Kiparsky (1982) and subsequent researchers (Selkirk 1982; Gordon 1985; AG 1996; Senghas, et al., ms) have noted, the restriction on regular plural non-heads predicted by the level-ordering hypothesis is not absolute. Regular plurals do in fact appear as non-heads of compounds.

- (12) a. Human Services Administration (Kiparsky 1982)
 b. Drinks Cabinet
 c. Parks Commissioner (Selkirk 1982)
 d. Events Coordinator

The compounds in (12) (as well as those in (3) - (5)) should be disallowed based on the level-ordering mechanism, which the reader will recall allows rules to be applied in order from level 1 to level 3, and not in reverse. The existence of compounds like those in (12) would thus seem to present a counter-argument to the level-ordering hypothesis. However, proponents of level-ordering have an explanation: recursivity.

The basic idea behind recursivity is that the pluralization of the internal noun happens as one would expect it to based on level-ordering: it is subjected to regular inflection at Level 3 (represented by the double arrows in Table 3, below). As stated above, the rules of level ordering dictate that the pluralized noun cannot go backward to Level 2 for compounding, but there is an alternative explanation. The pluralized constituent could leave the level-ordering mechanism as its output and be subjected to all the levels again on a second pass through the level-ordering mechanism as an already pluralized entity (Kiparsky 1982). Note the path represented by the single arrows in Table 3 below.

Table 3 *Recursivity*

	Examples	← — ← — ←	←
Level 1	mice, basket, clothes, mouse, rat	↓	↑
Level 2	compounding	↓	↑
Level 3	-s	↓	↑
		OUTPUT	↑
		↓	↑
		→ — → — →	

This represents a major weakness to the theory, because it fails to differentiate these types of acceptable examples from *??rats eater*, which is clearly

unacceptable. Even if we could limit which constituents were allowed to return to the mechanism, how would we limit what processes happen to them on their second pass through? If, as the claim goes, the pluralized constituent is truly returned to the top of the mechanism then it should be subject to processes at all levels of the mechanism – not just to compounding alone. In particular, it should be subject to affixation at levels one and two but this does not appear to be the case. Consider the example of the derivation of *productiveness*:

(13) *próduct* +ive → *prodúctive* #ness → *prodúctiveness*

In example (13), the suffix *-ive*, which changes certain nouns to adjectives, has been affixed noun *product*, yielding *productive* at Level 1. Then, at Level 2, the suffix *-ness*, which changes adjectives to nouns has been affixed to *productive* yielding *productiveness*. Let us imagine that things proceeded a little differently and that *product* passed through the mechanism, not undergoing any affixation until it was pluralized at Level 3. If this pluralized constituent, now *products*, could return to the top of the level-ordering mechanism, it should then be subject to derivational morphology at Levels 1 and 2.

(14) *próducts* +ive → **prodúctive*

We saw before that a Level 1 suffix like *-ive* is affixed to a word at Level 1, however, example (14) reveals that a pluralized constituent is no longer available to such affixation. We might expect, since compounding occurs at Level 2, that Level 2 affixation can apply to pluralized constituents, but this does not seem to be the case⁴. Note the following example where a Level 2 suffix is affixed to a pluralized constituent. Despite the fact that at least one Level 2 process can apply to regular plurals after they have passed through the mechanism, any affixation is unacceptable.

(15) a. *sister* #hood → *sisterhood*
 b. *sisters* #hood → **sistershood*

5 Licensing, not grammaticality

If we allow one term to be analyzed recursively, we basically allow anything: level-ordering is still left with the task of describing why some plurals are allowed to undergo a second pass through the mechanism and others are not. In recent years, two notable studies (Senghas et al. ms; AG ms) have tried to explain what factors allow a second pass through the level ordering mechanism using semantic

⁴ We might also expect that the plural would be subject to repluralization when it arrived at Level 3. It seems likely that Kiparsky would rule out repluralization the same way he rules out regular pluralization of irregular plurals when they arrive at Level 3: blocking. Presumably a similar sort of mechanism would block regular plurals from being re-pluralized, unless they had undergone compounding and the compound as a whole were pluralized (e.g. *parks commissioners*).

and pragmatic restrictions. Some of the features they have looked at are compound type, collectivity, compositionality, heterogeneity and abstractness, but always within a level-ordering framework.

So we have the morphological component of the grammar generating words and outputting them to the syntax, then the semantics steps in and tells the morphology that only some words can return to the morphology to undergo further word-formation processes before they re-enter the syntax. This picture of word formation looks quite complicated, but there is a way to streamline this account: we can say that any compound is possible. *Rats eater, mice eater, assists king* and *admissions department* aren't differentiated, at least not initially. It is *after* compounds are formed that the semantics steps in and determines what is, and what is not, an acceptable compound. Thus all compounds are "grammatical" in the sense that they can be generated, but only some compounds are "licensed," or allowed to appear. Licensing is restricted by the semantic factors characterizing the relationship between the non-head and head noun. The two factors that best describe the data are abstractness and heterogeneity, which were proposed by Alegre and Gordon (ms).

5.1 Abstractness

AG believed, based on previous research, that certain heads are "overrepresented" in compounds with a regular plural and that these heads are ones that promote a many types, rather than many tokens interpretation of the non-head. Nevertheless, they noted that not all non-heads sound good as plurals within compounds, even forcing a heterogeneous interpretation. They maintain, citing *compounds research, qualifications report* and *injuries report*, that the non-head nouns that are allowed to appear as plurals within a compound are abstract in nature. Nouns denoting plants and animals are therefore disallowed as plural non-heads because they are concrete.

- | | | | |
|------|-----------------------|------|---------------------------|
| (16) | concrete non-heads | (17) | abstract non-heads |
| | a. *animals research | | a. compounds research |
| | b. ?flowers catalogue | | b. publications catalogue |

However, in formulating their proposal, AG (ms) don't define precisely what they mean by abstractness. Rather, they point out that abstractness is a difficult concept to define. With the exception of two attested compounds (*morals question* and *values clarification*), the nouns that appear in compounds are not highly abstract in the way nouns like *love* and *truth* are so we therefore need to define what it means to be abstract with respect to a compound. For the purposes of the current paper, the definition of abstractness/concreteness will be as follows in example (18):

- (18) Something not easily imagable, such as a process (*admissions*), an action (*assists*), a thing (*benefits*), or something that is otherwise complex (*dissertations*) is abstract; something easily imagable, and simple conceptually, such as *pencils* or *flowers*, is concrete.

This claim leads to a number of expectations. First, abstract nouns should be more acceptable non-heads and abstract nouns should appear more often in compounds; second, modified non-heads should be highly acceptable; third, irregular plural non-heads should be relatively rare. All three of these predictions are borne out by the naturally occurring data.

First let us examine frequency. Consider a non-head like *admissions*, which is far more abstract than a non-head like *spoons*, and more acceptable as a non-head. It is also the most common non-head in the database (in types, not number of tokens), appearing in six different compounds.

Table 4

NON-HEAD	HEAD	Plural	Singular	Total	Ratio
admissions	committee	4	0	4	16
admissions	department	7	0	7	49
admissions	officer	19	2	21	357
admissions	policy	22	15	37	259
admissions	procedure	3	5	8	-16
admissions	requirements	6	11	17	-85

The numbers in each column represent (L-R) the number of tokens of each compound with a plural non-head, a singular non-heads, total number of tokens and a “ratio” of plurals to singulars derived by subtracting the number of tokens with the singular non-head from the number of tokens with the plural and multiplying this by the total number of tokens. Positive values in the ratio column show that plural non-heads were more common than singular; the magnitude indicates compound frequency.

Additionally, certain nouns denoting plants and animals are acceptable as plural non-heads because they are more abstract under our current definition that appeals to imaginability. The nouns in (19) and (20) are far less imaginable to the average person and thus more acceptable as compounds.

- (19) a. mammals research
b. primates expert
- (20) a. annuals specialist
b. perennials catalogue

The second point of interest is that modified non-heads are almost universally accepted. One possible explanation for this is that the modification of the non-head makes it more abstract than the “kind” reading we get for the unmodified plural.

- (21) red rats eater
(22) new tastes menu (McDonald’s)

A third prediction worth mentioning is in regard to the acceptability of irregular plurals. While level-ordering accounts predict that irregular plurals are perfectly acceptable and available for compounding, this is not reflected in their actual use in adult language (Gordon 1985, corpus data). There are very few irregular plurals in English and those that do exist (*feet, geese, mice, oxen, teeth*) are highly concrete under our definition. As we have seen, highly concrete nouns are dispreferred as non-heads. I maintain that irregulars are no exception, and for this reason are used as plural non-heads only rarely in adult language. The database obtained in the current study revealed only three tokens of *mice droppings* but 18 tokens of *mouse droppings*, and zero tokens of *feet doctor* but 15 tokens of *foot doctor*.

- (23) An inner city grocery store that got in trouble for repeated instances of **mouse droppings** and spoiled...

Milwaukee Journal Sentinel, October 9, 2000

- (24) Walk into Compton and meet the **foot doctor** who believes he can heal the city's wounds.

The Los Angeles Times, December 26, 2000

5.2 Heterogeneity

As stated before, AG (ms) believed, based on previous research, that certain heads are “overrepresented” in compounds with a regular plural and that these heads are ones that promote a many types, rather than many tokens interpretation of the non-head. In fact, my corpus contains more types of heads (75) than types of non-heads (67), suggesting that the heads aren't really overrepresented. Additionally, certain head nouns like *leader* in *assists leader* don't promote a many types interpretation, rather they promote a many individuated, or isolable, tokens interpretation. At the same time, heterogeneity is significant.

If we create a novel compound with a concrete regular plural non-head (*spoons*) and a head noun that promotes heterogeneity (*analyst*), we get an interpretation in which the head noun emphasizes diversity among the entities denoted by the internal noun. On the other hand, a head that highlights homogeneity, such as *pile*, is unacceptable with a concrete non-head.

- (25) spoons analyst

- (26) #spoons pile

Consider the example in (25), *spoons analyst*. This makes an unlikely compound because we don't normally think of spoons being analyzed. However, consider the following scenario where Ed works at a silverware company making sure all the spoons (from different flatware patterns) pass the company standard:

- (27) Ed works in Oneida's quality control department as a **spoons analyst**.

- (28) Ed works in Oneida's quality control department as a **spoon analyst**.

This compound is admittedly a little strange, but the only possible interpretation is one that highlights the diversity of the spoons and analyzing them for their potential differences (in this scenario, inconsistencies). Moreover, the compound with a plural internal noun is far better than the same compound with a singular non-head, *spoon analyst*.

5.3 Interaction of abstractness and heterogeneity

Alegre and Gordon (ms) treated their constraints as binary (+/- abstract, +/- heterogeneous), yielding the following four possible categories of compounds:

Heterogeneous – Abstract

(29) records department

Non-heterogeneous – Abstract

(31) parks commissioner

Heterogeneous – Concrete

(30) animals research

Non-heterogeneous – Concrete

(32) toys basket

They found that only compounds rated as both abstract and heterogeneous received ratings within the range of acceptability of compounds containing a singular non-head. Their conclusion was that only compounds that are +abs, +het are allowed to contain regular plurals. In other words, these are the properties that allow something a second pass through the mechanism. This conclusion seems to imply that there is a neat division between compounds that are good and those that are bad. Such a conclusion appears to be false from corpus data and seems to be contradicted when we look at naturally occurring compounds such as *parks commissioner*, which is predicted to be unacceptable by its classification in AG's schema. In fact, *parks commissioner* is the most robust compound in the corpus occurring 68 times, only nine of which were with a singular non-head.

A second problem with AG's conclusion is that it doesn't account for variability. Recall Table 4, repeated here. These data show us not only that *admissions* is not fossilized as a plural in the lexicon, but also that it occurs with different frequencies in its plural and singular forms. The plural is actually preferred in some compounds (*admissions committee /department/ officer/ policy*) just as the singular is preferred in others (*admissions procedure/ requirements*).

Table 4

NON-HEAD	HEAD	Plural	Singular	Total	Ratio
admissions	committee	4	0	4	16
admissions	department	7	0	7	49
admissions	officer	19	2	21	357
admissions	policy	22	15	37	259
admissions	procedure	3	5	8	-16
admissions	requirements	6	11	17	-85

6 A continuum of acceptability

If we compare abstract non-heads (*admissions*) with concrete non-heads (*spoons*) we see a clear contrast, as did AG, but we end up polarizing the semantics of the noun in question: we fail to include the middle ground. Non-heads such as *antiques*, in the attested compounds *antiques collector* and *antiques fair*, for example, are good examples of the middle ground because they are more imagable than such abstract non-heads as *admissions* in *admissions department*, but more abstract than non-heads like *spoons*. Without a middle ground, we don't have an appropriate place to situate these internal nouns within the model.

One way to capture this area between non-heads that are highly abstract and those that are highly concrete is to treat the middle ground as unspecified for abstractness, as in the following schematization in (33). Ultimately, we don't want to say that there are three distinct categories as depicted below, but this is a way to be precise here. In reality, we'd want to develop a real continuum of abstractness that would better capture the subtleties of plural-containing compounds that are overlooked by a theory with distinct categories of compounds.

(33) Model of abstractness of the non-head

[+abstract]	[\emptyset -abstract]	[- abstract]
admissions	antiques	pencils
assists	parks	animals

If we look more carefully at the corpus data, we can see that this middle ground is necessary for the head too. Some nouns do promote a heterogeneous interpretation of the non-head, but others promote an anti-heterogeneous interpretation, and still others depend on the non-head they occur with. In order to find this intermediate area, we need to choose internal nouns like *antiques* and *parks* which fall within the intermediate area on the abstractness scale. If a head noun is at least consistent with a heterogeneous interpretation, the presence of a somewhat abstract non-head should be enough to make the compound acceptable. This prediction is borne out: head nouns like *pile* and *box* are still highly unacceptable with plural non-heads that are only somewhat abstract, *collector*, as in *antiques collector* isn't exactly good, but none the less a more natural sounding compound than *collector* with a highly concrete head (e.g. *stamps*, *pins*, *pens*, *books*).

- (34) a. ??antiques pile
 b. antiques collector
 c. ??stamps/pins/pens/books collector

This is borne out in the corpus data as well, where we see that with *collector*, *antique* not *antiques* is the preferred non-head.

Table 5

NON-HEAD	HEAD	Plural	Singular	Total	Ratio
antiques	collector	2	14	16	-192
antiques	show	16	7	23	207*
antiques	dealer	10	5	15	75*

* This sample was taken from the first 25 tokens of *antiques show* and *antiques dealer*.

We can capture the middle ground on the heterogeneity scale much as we did on the abstractness scale. We can say that the area between nouns that are +het and those that are -het is unspecified for heterogeneity. Again we run into the same limitations for this categorization schema that we did for the abstractness schema in (33), but the reader is asked to keep in mind that this is just shorthand for what we would really want.

(35) Model of heterogeneity of the head

[+heterogenous]	[∅ - heterogenous]	[-heterogenous]
department	commission	pile
analyst	manager	collector

6.1 Are plurals in compounds “good” and “bad,” or “better” and “worse”?

The acceptability of a compound with a plural non-head is determined by a ranking of the feature pairings. These pairs must form a scale of acceptability where the prototypical compound with a plural non-head is one that is both highly abstract and heterogeneous, whereas the highly unacceptable compound with a plural non-head is one that is concrete and anti-heterogeneous. A tentative scale of acceptability of these feature pairings is as follows in Table 6: compounds that are [+abs, +het] are the best, compounds that are [-abs, -het] are the worst and compounds with + values and no – values are better than compounds with – values and no + values.

Table 6 *Scale of acceptability of compound categories*

+abs	+abs	∅-abs	∅-abs	-abs	+abs	∅-abs	-abs	-abs
+het	∅-het	+het	∅-het	+het	-het	-het	∅-het	-het
1	2	3	4	5	6	7	8	9

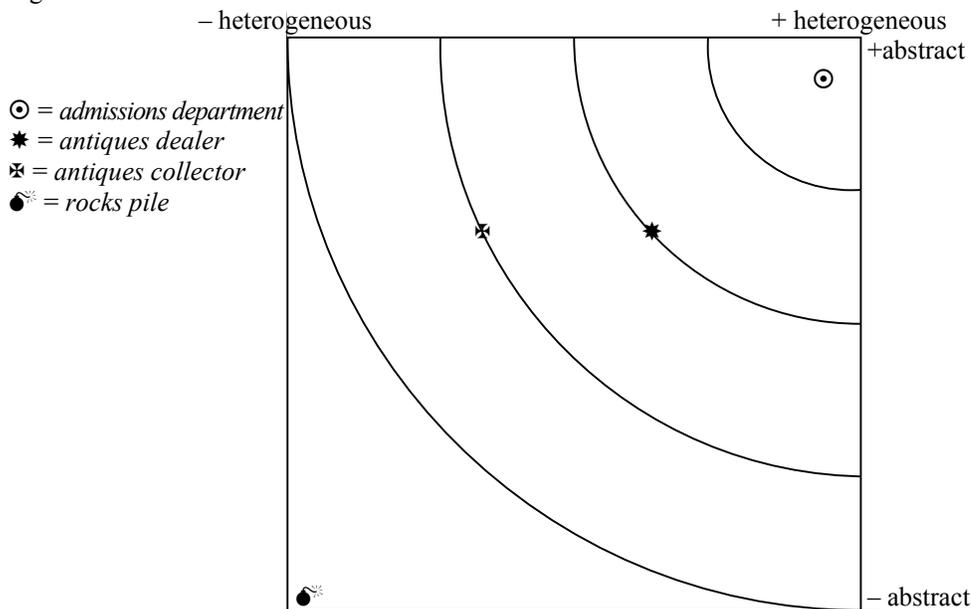
- | | | |
|--------------------------|------------------------|-----------------------|
| 1) admissions department | 4) parks commissioner | 7) antiques collector |
| 2) admissions officer | 5) pets department | 8) animals manager |
| 3) antiques dealer | 6) dissertations shelf | 9) rocks pile |

Compounds that are highly abstract, such as *admissions department*, tend to occur more frequently with plural non-heads than singular non-heads, while compounds that are at the opposite end of each scale, such as *rocks pile*, are not attested. Compounds that have non-heads that are less abstract than *admissions* but more

abstract than *rocks*, such as *antiques*, have an unspecified value that interacts with the heterogeneity of the head. Unspecified non-heads occur more often as plurals when the head is [+ het], such as in *antiques dealer*, than when the head is [- het], as in *antiques collector*. The same is true for unspecified heads: they occur more often with plural non-heads when the non-head is abstract, than when it is concrete. compare the attested *admissions officer* [+abs, Øhet] to the unattested *animals manager* [-abs, Øhet].

An ideal schematization is one that captures the gradient nature possibly something like the following iso-acceptability schemata in Figure 1 below:

Figure 1



Compounds that most closely meet the requirements for abstractness and heterogeneity will be perfectly acceptable, like *admissions department*. However, as we move away from the ideal in either dimension, the compound becomes less acceptable. This is illustrated by the difference between *antiques dealer* and *antiques collector* in the iso-acceptability diagram, where the latter is farther from the ideal.

6.2 Why abstractness and heterogeneity?

With a plural we get a kind interpretation. In Carlson (1977a), a kind is defined not as an example of an individual, but as an abstract group of individuals seen as an unanalyzable whole. It seems plausible that the plural non-head gives us this interpretation of an unanalyzed group. Nouns that are already abstract (under our definition, those that are not easily imaginable, where relevant differences between individuals are not apparent) are easier to see as unanalyzable wholes. Pairing

this with a head noun that promotes a heterogeneous interpretation allows us to distinguish individuals in the group. Pairing an abstract non-head with a non-heterogeneous head allows us to distinguish individuals, but in a different way: by number, not variability.

7 Conclusions

In this paper I have presented arguments in favor of adopting a theory of compounding that does not limit what the morphology generates. I believe that this paper has provided a much more thorough description of compounding as it occurs in US English. Any and all compounds are grammatical, but it is the semantics that rules out a compound when it does not meet certain requirements, namely abstractness of the non-head and the ability of the head to promote a heterogeneous interpretation of the non-head. This in itself is similar to AG (ms)'s account, however, my description is more fine-grained. Rather than treat the factors of abstractness and heterogeneity as binary, yielding four possible categories of compounds, I have proposed a continuum from abstract to concrete and a continuum from heterogeneous to non-heterogeneous. This allows us to have a gradient scale of acceptability of compounds that vary in much more subtle ways with respect to abstractness and heterogeneity. In this way we can better describe the naturally occurring data and account for individual variability.

References

- Alegre, Maria and Peter Gordon. Unpublished manuscript. Why compounds researchers aren't rats eaters: semantic constraints on regular plurals inside compounds.
- Alegre, Maria and Peter Gordon. 1996. Red rats eater exposes recursion in children's word formation. *Cognition* 60/65-82.
- Allen, Margaret. 1978. *Morphological Investigations*. PhD dissertation, The University of Connecticut.
- Carlson, Greg. 1977. *Reference to Kinds in English*. PhD dissertation, University of Massachusetts at Amherst.
- Clark, Eve V., Barbara Frant Hecht, and Randa C. Mulford. 1986. Coining complex compounds in English: affixes and word order in acquisition. *Linguistics* 24/7 - 29.
- Fabb, Nigel. 1984. *Syntactic Affixation*. PhD dissertation, MIT.
- Gordon, Peter. 1985. Level-ordering in lexical development. *Cognition* 21/73 - 93.
- Kiparsky, Paul. 1982. From cyclic phonology to lexical phonology. *The Structure of Phonological Representations*, ed. by H. van der Hulst and N. Smith, 131 - 75. Dordrecht: Foris.
- Roeper, Thomas. 1988. Compound syntax and head movement. *Yearbook of Morphology* 1/187-228.
- Selkirk, Elizabeth. 1982. *The Syntax of Words*. Cambridge: MIT Press.
- Senghas, Ann, John J. Kim, and Steven Pinker. Unpublished manuscript. Plurals-inside-compounds: morphological constraints and their implications for acquisition.
- Siegel, Dorothy. 1979. *Topics in English Morphology*. New York: Garland.
- Spencer, Andrew. 1991. *Morphological Theory*. Cambridge: Blackwell Publishers Ltd.
- Sproat, Richard. 1985. *On Deriving the Lexicon*. PhD dissertation, MIT.

