

# The meaning link in nominal compounds

Laurie Bauer and Elizaveta Tarasova

*This paper considers the meaning relationships holding between the elements of endocentric nominal compounds in English, and argues that the same relationships are found in a number of different constructions in which a noun is modified by another noun. That being the case, the relationships are not specific to compounding, and must arise from the nature of the modification. It may thus be that the relationships could be captured by a single relationship which is suitably underspecified. Evidence against such a position is also considered, and a solution is proposed which allows the benefits of both a single relationship and multiple relationships to be captured.*

**Keywords:** nominal compounds, meaning, underspecification, semantic relationships

## 1. Introduction

This paper<sup>1</sup> deals with the meaning relationship that holds between the elements of English noun compounds made up of a sequence of two nouns. Moreover, it is concerned exclusively with endocentric compounds of this form, ones which are hyponyms of their righthand element. That is we are dealing with compounds like *house mouse*, *thought police* and *library book*, but not with so-called exocentric compounds like *hatchback* or co-compounds like *singer-songwriter*. Equally, we are not dealing with compounds such as *blackbird*, *trickle-irrigate*, *grass green* in which the elements are not both nouns or where the whole compound is not a noun. In this paper we argue that the meaning relationships which can be found in compounds of this type can also be found in a range of other constructions in which a noun modifies another noun.

One of the features of these endocentric compounds that has caused an immense amount of discussion in the literature is their superficial neutralization of a large number of semantic relationships (see e.g. Jespersen 1942, Lees 1960, Brekle 1976, Levi 1978, Ryder 1994, Scalise & Vogel 2010). A sleeping pill is supposed to encourage sleeping, while a sea-sickness pill is not supposed to encourage sea-sickness (and an anti-histamine pill is different again) (Bauer 1979). Similarly, *firehouse*, *framehouse*, *glasshouse*, *henhouse*, *townhouse* all show different relations between the first element of the compound and the *house* element. For linguists the question has been whether or how this apparent plethora of meanings can be tamed: is there a small number of fundamental semantic relations which link the elements of nominal compounds, or is there as much of a free-for-all as there appears to be at first sight?

Consider an example like *library book*. We can view this in the light of the statement from Guevara & Scalise (2009: 108) that a compound is defined as being of the structure in (1) where X, Y and Z are labels for major syntactic categories and  $\mathfrak{R}$  represents an implicit relationship:

$$(1) \quad [X \mathfrak{R} Y]Z^2$$

If that is true, then in order to interpret any compound, we need to establish the nature of  $\mathfrak{R}$  for that particular compound. Since  $\mathfrak{R}$  is not overt, we need to reconstruct this missing information in order to interpret any given compound, so we have to reconstruct, perhaps,

*library* CONTAIN *book* in order to interpret *library book*. This reconstruction might require the information in *library* and *book*, but also requires the information from  $\mathfrak{R}$ , which is generally taken to be either a single relation or, more often, one of a small set of generalizable meanings. Even such a reconstruction underspecifies the actual meaning of *library book*, since it is concerned purely with a semantic structure and not all the details of library books (such as having barcodes or library accession codes) which might be viewed as belonging to the conceptual structure of the combination of two elements. The view which sees a single semantic relationship in  $\mathfrak{R}$  (e.g. Bauer 1979) is that the relationship between the two elements in the compound is not a matter of grammar, but a matter of pragmatics, and thus that all we need to know about *library book* grammatically, in order to interpret it, is what is available in the two lexemes *library* and *book* and the morphosyntactic structure in which they occur. The morphosyntactic structure provides minimal semantic information (compatible with all compounds); most information on interpretation comes from the context of use. Most scholars (as will be shown below) take the view that some more specific meaning must be assigned to  $\mathfrak{R}$  to account for the various interpretations of compounds that can be attested.

This issue is often discussed in the literature under the label of ‘compositionality’. In a view like that of Guevara & Scalise (2009), no compound is compositional, because they all require further explicit linguistic material in order to be interpreted. In a view of that like Bauer (1979) all compounds are compositional, because all the linguistic information required for interpretation is present in the compound. There are also alternative positions. Ackema & Neelman (2004: 81), for example claim that compounds are non-compositional despite relying on pragmatic information. Their conclusion may arise because they implicitly adhere to the view espoused by Jespersen (1942: 137) and others, that only constructions whose semantics is unpredictable may be included as compounds. While we do not support this point of view, which seems to view compounds as a sub-type of idiom, we note the strand in the literature which takes this viewpoint. For us, a compound is defined by its form; the relevant compounds for this study are defined by their endocentric NN structure (see also Bell 2011 for justification).

We believe that any discussion of this phenomenon in terms of compositionality is premature. It is less a question of whether compounds are or are not compositional, as that a preliminary theoretical stance needs to be taken on how compounds are to be viewed grammatically, and what information in them is part of the linguistic structure; only once this decision has been taken does it make sense to ask whether compounds are or are not compositional.

Although we will, in this paper, approach a solution to this problem, for the sake of the argument we need to make the assumption that there is a set of relations which holds between the elements of compounds, and that this set is finite. This is overtly assumed by scholars working within frameworks which specify the possible semantic relationships holding within compounds, such as Levi (1978: 6), who calls these relationships “the only semantic relations which can underlie [compounds]”. There have been innumerable attempts to systematize these links over the years. Some have related them to the meanings of prepositions (Žepić 1970), some to syntactic paraphrases (Lees 1963), some to underlying cases (Bauer 1978); some have considered that there might be very few such semantic relations (Granville Hatcher 1960 has four), others that there might be very many (Brekle 1976 has over a hundred). Most have some moderate number intermediate between these extremes. The view that there is no limit at all on the meanings for the relationships between

compound elements (see discussion in Adams 2001: 82-8, Jackendoff 2009) does not allow for the construction of a suitable argument of parallel meanings, which will be the focus of this paper. One proposal that has been extremely influential is that of Levi (1978), who proposes a set of nine fundamental relationships, three of which are bidirectional.<sup>3</sup> Thus, we might say, she operates with a dozen meaning relationships. This gives a manageable number of relationships for the researcher to work with, so making it feasible to show how these relationships are exploited elsewhere, which is our aim here.

Levi's categories are exemplified in (4), with examples of each type taken from Levi (1978). We adopt Levi's list because it is relatively well-known, because it has been shown to provide good coverage of the data (see, for instance, the evaluation in Kunter 2011: 153), and because it provides an independent list of semantic relationships for us to work with. We should emphasize, however, that our use of this set of categories does not indicate any commitment on our part to the particular set that Levi provides; Levi's set of categories is merely a convenient list and our decision to use this classification over the others is dictated by operational needs. One of the possible reasons that this classification is so popular is that it provides an adequate degree of generalization. For example, as pointed out in Gagné (2000: 366) the relation "head noun LOCATED modifier" serves as the basis for understanding a range of combinations like *mountain laurel*, *desert rat* and *urban park*. Although the qualities of the locative relations differ, i.e. *mountain laurel* uses GROW-IN, *desert rat* uses INHABIT, and *urban park* uses FOUND-IN (see Levi 1978), they all share a common general LOCATED relation. At the same time, despite the benefits that it offers, it also has a number of drawbacks, some of which we discuss immediately below.

It is not always clear that Levi's list captures the best semantic generalizations. 'N2 MAKE N1' (*court order*) and 'N2 FROM N1' (*business profit*) might be brought together under the label 'source' or 'ablative'; 'N1 HAVE N2' (*school gate*) and 'N2 IN N1' (*field mouse*) might be viewed as variants of a 'locative' relation. While we do not wish to argue for the benefits of one of these solutions over the other, we note that there is no evidence of which we are aware that clearly shows one to be superior to the other.

The categories that Levi provides are not always clearly distinct in practice. In our work we have found that 'N1 HAVE N2' and 'N2 FOR N1' can be extremely difficult to distinguish: *police-dog* might fit under either classification, for example. We have attempted to assign words to what we consider to be the 'best' category, but there is always room for argument about which category a particular compound belongs in, and such arguments appear not to be particularly fruitful. Some of the problem arises here because, in principle, any compound can have any one of a number of readings, particularly out of context; most of the examples we cite here are established and/or contextualized, and much of the potential variability has been removed by the process of institutionalization. Nevertheless, there is often some vagueness as to which of Levi's readings applies in a particular case. Thus, if a reader disagrees with our category-assignments, we may not have any defense in the individual instance. We do not, however, believe that this invalidates our argument, unless it is the case that our conclusions are unwittingly systematically biased.

Levi's (1978) BE relationship does provide some difficulties, and we retain it so as to remain faithful to Levi's exposition. In some cases it may overlap with coordinative compounds, so that a *fighter-bomber* may be seen as being simultaneously a fighter and a bomber (coordinative reading) or a bomber which also acts as a fighter (subordinative BE reading). The BE reading is perhaps most clearly available in instances of metaphor (*soldier ant* in (1) below), but this does not strictly solve the problem. One way to distinguish

between coordinative compounds and those with a BE relationship may be to change of the order of the constituents in NN sequences: in coordinative compounds, swapping the elements does not result in the change of the quality of the connection between the elements. For example, both *poet-doctor* and *doctor-poet* are coordinative, even though the change of the position of the elements shifts the semantic focus of the combination, i.e. ‘a doctor who is also a poet’ vs. ‘a poet who is also a doctor’. However, the same operation results in more dramatic changes of meaning of subordinative sequences, e.g. *dream holiday* vs. *holiday dream*, *building business* vs. *business building*, *waste water* vs. *?water waste*; *ghost community* vs. *?community ghost*.

The BE relationship can also be bidirectional, although the distinction in the direction of the relation seems to be quite subtle and can be distinguished based on the following principle: N1 BE N2 – ‘every N1 is N2’ or N1 (in general) is N2, e.g. *mansion house*; N2 BE N1 – N2 which is N1, e.g. *tower house*. Looking at the examples like *mansion house* vs. *tower house*, we can see that although every mansion is a house, this does not seem to be the case for every tower. Still, this principle cannot be considered universal and in cases like *city state*, *island continent*, we can see that it is neither true that every city is a state, and that every island is a continent, nor the converse.

It has not been shown – and possibly cannot be shown – that a particular set of semantic relationships gives a better overall coverage of the data provided by English compounds than another. The ideal set of relationships would probably have to be motivated independently of the patterns existing in compounds. Some attempts have been made in this direction (see e.g. the discussion in Jackendoff 2009), but we remain agnostic as to the success of such attempts.

Despite these problems, which would be problems with any alternative set of semantic relationship labels we might adopt, we will use Levi’s set as illustrated in (2) to make our point in this paper.

(2)

N1 CAUSE N2	sex scandal, withdrawal symptom
N2 CAUSE N1	tear gas, shock news
N1 HAVE N2	lemon peel, school gate
N2 HAVE N1	camera phone, picture book,
N1 MAKE N2	court order, snowball
N2 MAKE N1	computer industry, silk worm
N2 USE N1	steam iron, wind farm
N2 BE N1	island state, soldier ant
N2 IN N1	field mouse, letter bomb
N2 FOR N1	arms budget, steak knife
N2 FROM N1	business profit, olive oil
N2 ABOUT N1	tax law, love letter

The argument in this paper will take the following form. In section 2, we show that the relationships introduced by Levi hold not only in NN compounds, but in the full range of constructions in which one noun modifies another. This is the core of our paper, and its major contribution, and from it we will conclude that the relationships that are analyzed in NN compounds are not peculiar to the process of compounding, but are more general. In section 3 we will consider some objections to the position we outline in section 2,

objections which focus on the idea that speakers make use of the specific semantic relationships in the way they use compounds in English. Section 4 provides an overall conclusion, with a solution which allows both (apparently contradictory) points of view.

## 2. Extending the range of constructions

Levi (1978) doesn't see the meaning links mentioned above as being simply the relationships which hold in nominal compounds. She points out that the same relations hold between what she terms 'non-predicative' adjectives and their head nouns. 'Non-predicative' adjectives are adjectives like *atomic*, which she claims cannot occur in predicative position: *An atomic bomb*; \**This bomb is atomic*. The same set of adjectives (not usually defined by their positional potential, which is variable) has been given various labels in the literature (see Levi 1978: 2). Giegerich (2005, 2009) terms them 'associative adjectives', and we will use that term. Some examples (from Levi) of associative adjectives showing the same semantic relationships to their head nouns that the modifying noun in a compound shows to its head noun are given in (3).

- (3)
- |             |                      |
|-------------|----------------------|
| N1 CAUSE N2 | viral infection      |
| N2 CAUSE N1 | malarial mosquitoes  |
| N1 HAVE N2  | feminine intuition   |
| N2 HAVE N1  | industrial area      |
| N1 MAKE N2  | molecular chain      |
| N2 MAKE N1  | musical clock        |
| N2 USE N1   | manual labour        |
| N2 BE N1    | professorial friends |
| N2 IN N1    | autumnal rain        |
| N2 FOR N1   | avian sanctuary      |
| N2 FROM N1  | solar energy         |
| N2 ABOUT N1 | criminal policy      |

The importance of this observation may need some stressing. The semantic relations between the elements in compounds are not specific to compounds, but are also found in the case of combinations of associative adjectives and nouns. Associative adjectives are largely derived from nouns, and so the semantic match may not seem all that surprising. But it does imply that there is not a specific set of relationships which hold only in compounds, and it is this insight we wish to explore further.

There has been some discussion as to whether  $N_1N_2$  and  $A_{\text{assoc}}N$  are, in some sense, the 'same' construction. Levi (1978) implies that they are the same at some level, and calls them 'complex nominals'. Giegerich (2009) and Bell (2011) also discuss the problem. If they are the same construction, the semantic similarity between the two types of realization is only to be expected, but the question is controversial. Shore (2010), for example, finds the analysis of associative adjectives as 'noun-like adjectives' somewhat problematic. One of the reasons he gives is that there does not seem to be any systematic relationship between an associative adjective and a 'semantically-similar' noun (e.g. *dental* and *tooth*) and we cannot always replace one with another. For example, the associative adjective in *dental decay* can be

replaced with a corresponding noun to produce *tooth decay* in a less formal/non-medical discourse; however, it is impossible to replace *dental student* with *tooth student* or *tooth fairy* with *dental fairy*. Both Quirk et al. (1985) and Payne & Huddleston (2002), from different theoretical backgrounds and for different reasons, treat sequences of associative adjective and noun as separate from compounds.

In any case, there are other constructions which are not generally seen as versions of the same construction which still show similar semantic similarities with compounds. We now turn to those.

Another way of putting two nouns together is by using a possessive construction. The ambiguity of the semantics of the possessive is well known, and there are as many analyses of the semantics of the genitive as there are of the semantics of compounds (see e.g. Shumaker 1975, Taylor 1989, 1994a, 1994b, 1996, Rosenbach 2003). But what does not appear to have been commented on<sup>4</sup> is the degree of overlap between the semantic relationships holding in compounds and in possessive + noun constructions (whether these are marked with the prenominal <'s> construction or the post-modifying *of*-construction – though, of course, where we have post-modifying possessor, the N1 follows the N2). Examples are given in (4).

(4)

N1 CAUSE N2	nature's bounty	smell of bourbon
N2 CAUSE N1	Israel's creation	creation of Israel
N1 HAVE N2	dog's breakfast	cost of the flight
N2 HAVE N1	ladies' man <sup>5</sup>	owner of the cafe
N1 MAKE N2	Kellogg's cornflakes	Odyssey of Homer
N2 MAKE N1	letter's author	writer of thrillers
N2 USE N1	car's driver	driver of the car
N2 BE N1	Dublin's fair city	sign of the cross
N2 IN N1	Thursday's lunch	people of the forest
N2 FOR N1	wolf's bane	day of rest
N2 FROM N1	New Zealand's wines	heat of the sun
N2 ABOUT N1	university's statutes	Book of British Birds

As well as the meanings which clearly fit into Levi's framework, as shown in (6), there are some meanings which are regularly reported in discussions of the semantics of genitive constructions but not specifically mentioned in Levi's discussion of compound semantics. This raises the question of whether we need some extra meaning relationships to cope with the extra construction. We discuss just three here.

Consider the construction illustrated by *ten day's absence* (where the entire absence is ten days long), as an example. There is an equivalent compound construction, illustrated by *a ten-day holiday*. Thus there is no new meaning introduced by the genitives: even this meaning is shared with NN compounds. The same is true of the relationship illustrated by *Krohn's disease*. Again the meaning 'named after' is also found in NN constructions like *Pullman car*. The terms *Down syndrome* and *Down's syndrome* are now dialectal or free variants, which points to the synonymy of the two constructions.<sup>6</sup> Finally, there is the partitive construction illustrated by *a pound of butter* (where the pound is not the entirety of the butter but some part of it), which is often cited as a genitive, even if it is not an <'s> genitive. It is more difficult to find a compound

equivalent here. The BNC, however, gives the example in (5), where the phrase *West Sussex portion* seems to be semantically equivalent but with compound form.

- (5) County Council had agreed a line erm for a by-pass through the West Sussex portion (BNC)

The next pattern to consider is that presented by neo-classical compounds. We might expect neo-classical compounds and native compounds to show similar semantic relationships between the elements, though the proportions in the various categories might be different. Although the meaning relationships are, in some sense, shown here to exist in the glosses of the neoclassical elements, rather than in the elements themselves, this probably reflects actual speaker techniques of creation in modern times and, where the elements are nouns in the original language, seems justifiable anyway. Some examples are given in (6).

(6)

Relation	example(s)	Element-glosses
N1 CAUSE N2	hydrarthrosis,	water-joint-disease
	necrophobia	death-fear
N2 CAUSE N1	cinematograph,	motion-representation
	oncogene	cancer-gene
N1 HAVE N2	neuroglia,	nerve-glue
	ophthalmia	eye-condition
N2 HAVE N1	liriodendron,	lily-tree
	odontocete	tooth-whale
N1 MAKE N2	electromagnetism	electricity-magnetism
N2 MAKE N1	phonorganon,	sound-organ
N2 USE N1	electrocardiograph,	electricity-heart-representation
	hydromancy	water-divination
N2 BE N1	cryptonym	secret-name
N2 IN N1	nephralgia,	kidney-pain
N2 FOR N1	speedometer	speed-meter
N2 FROM N1	otorrhoea	ear-flow
N2 ABOUT N1	ethnography,	race-representation
	hydrograph	water-representation

There are many coordinative compounds in the set of neo-classical compounds (e.g. *cardiopulmonary*, *cupronickel*, *hydromel*) but these are irrelevant for our purposes, since we are not considering such compounds here.

Another case where we find nouns modifying other nouns is in the case of blends. Blends come in two fundamental types: coordinative blends like *smog* are equivalent to coordinative compounds, and are irrelevant here; determinative blends, like *motel*, on the other hand, are right-headed, and have the possibility of showing the same kind of semantic relationship that has been illustrated in the other constructions we have considered. As might be expected, by this point, these blends show precisely the same set of meanings as the other constructions, as illustrated in (7).

(7)

Relation	Example(s)	Source words for examples
N1 CAUSE N2	contrail,	condensation trail
N2 CAUSE N1	parascending	parachute ascending
N1 HAVE N2	slimnastics,	slim gymnastics
N2 HAVE N1	chunnel,	Channel tunnel
	parawing	parachute wing
	cinplex,	cinema complex
	dinoseum	dinosaur museum
N1 MAKE N2	cremains,	cremate remains
	glassphalt	glass asphalt
N2 MAKE N1	Motown	motor town
N2 USE N1	jazzercise,	jazz exercise
	paratroops	parachute troops
N2 BE N1	thuggon, <sup>7</sup>	thug moron
	foolosopher	fool philosopher
N2 IN N1	Californication,	California fornication
	airmada	air armada
N2 FOR N1	Identikit,	identity kit
	palimony	pal alimony
N2 FROM N1	Chicagorilla,	Chicago gorilla
	anecdota	anecdote data
N2 ABOUT N1	sexploitation,	sex(ual) exploitation
	snoblem	snob problem

We should note here precisely what we wish to claim about all these constructions. All these constructions show the same set of semantic relationships. We have chosen to illustrate this by using Levi's categories for the semantic relationships, though we do not believe that the choice of Levi's categories, as opposed to the many others suggested in the literature, is criterial. Importantly, we do not believe that all these constructions use these meanings equally. As was briefly noted in Note 5, the prototypical reading for  $X$ 's  $Y$  is that 'X has/owns Y', while that is not the prototypical reading for  $XY$  or for  $X_{A(ASSOC)}Y_N$ . So not all of these readings are equally common with all of these constructions. In a corpus of compounds collected by one of the authors, two-thirds of the compounds used just three of the twelve relationships given by Levi (Tarasova 2013); this means that some of the relationships are likely to be rare for any of these constructions. While each construction type may have its own prototypical semantics, we believe that all of the relationships in Levi's set are compatible with all of these constructions (even where our examples may not be particularly convincing).

To the extent that these various types of construction exploit the same semantic relations (though some may prefer different patterns), it appears that there is not a set of semantic relationships which applies to each of these constructions, but rather that the semantic relations are simply those that by their very nature arise when a noun (or something derived from a noun) is used to modify another noun. At one level, therefore, we do not need to know the specific semantic relation which holds in a particular case, it is simply that the relationship between noun head and noun modifier, in whatever



construction, brings with it a certain range of semantics. To be precise we should call these relationships ones that occur in adnominal nominal modification; we will abbreviate this to ‘adnominal modification’ with the understanding that it is a noun which is adnominal.

This set of relationships is, moreover, strictly adnominal. They are not relationships which are introduced by the compounding process for all types of compound. Where we have ad-verbal relationships in compounds, these are largely viewed as being arguments or adverbial modifiers of the verb (for instance, *bell-pull*, *callgirl*, *contact lens*, *flashlight*, *glow-worm*, *hire-car*, *nosebleed*, *slide-rule*, *workman*, etc. – see Lees 1963 and Adams 1973 for glosses of this type). Likewise ad-adjectival nouns do not show the same range of meaning relationships in instances like *blue-collar*, *colour-fast*, *foot-sore*, *hard-liner*, *sky-blue*, *tight-rope*, *warm-hearted*, etc.). The label ‘ad-nominal’ is justified here.

What is not clear from our presentation, of course, is whether there are semantic relations that hold for only one of the various constructions considered. It is notoriously impossible to prove a negative, and so we cannot prove that no such cases exist. Where, in the case of genitives, we found some extra meanings discussed in the literature for genitives but not, in our main source, for compounds, it turns out that these meanings apply both to genitives and to compounds (see above). That is, either Levi’s list of relationships needs to be expanded, or these meanings fit in somewhere in Levi’s set of relationships as marginal members of the set. We have been unable to find any cases where there is a meaning attached to just one of the constructions.

However, if this conclusion is correct, we might prefer to say that rather than there being a set of adnominal relationships, there is just one, the adnominal nominal relationship itself. Such a relationship would have to be described in semantically very imprecise terms, since it covers such a wide range of territory (as illustrated in the Tables above), but the point would be that its range is predetermined by the nature of the constructions involved (noun modifying noun) rather than by anything specifically semantic. Such a proposal is not new, but it is controversial, as was made clear in section 1 above.

### **3. Arguments for more specific relationships**

However, this is not the end of the story. Despite what we have just argued, it turns out that there are reasons to believe that speakers and listeners exploit more specific semantic relationships than just ‘adnominal’ in these cases. We will consider three potential sources of information here: psycholinguistic, prosodic and grammatical.

The first piece of evidence comes from work by Gagné and her colleagues. The CARIN (Competition Among Relations In Nominals) model offered by Gagné & Shoben (1997) deals with the way relational representations in NN compounds influence the ways in which patterns of nominal constructions are processed. The key idea of the CARIN theory is that the knowledge that people possess about relations most commonly used with the modifier strongly influences the ease with which a relation can be selected in the process of decoding the meaning of a compound. This knowledge is argued to depend on the frequency of a relation associated with a given concept (a linguistic frequency related to the chances of meeting relevant stimuli in the real world). Gagné & Shoben (1997) base their argument on the assumption that certain relations are more commonly used with particular modifiers than are other relations. The example they discuss is *mountain* used as a modifier. As they suggest,

the relation that is used to interpret a *mountain* + *N* combination is most often the LOCATION relation (e.g., *mountain cloud*, *mountain stream*). *Mountain* is rarely used with the TOPIC relation (e.g., *mountain magazine*). Therefore, in the process of interpreting a *mountain* + *N* combination various relations become activated and compete with one another for selection and relations that are highly available are easier to select than less available relations (Gagné & Shoben 1997). The results of a number of experimental studies on processing the meaning of novel compounds (Gagné 2000, 2001; Gagné & Shoben 1997; Gagné & Spalding 2004, 2009, Gagné et al. 2005) indicate that in the course of understanding the meaning we are reliant on the information that is in some way linked to (and activated by) the modifier concept (see also Fernández-Domínguez 2010 for support on this notion).

Further studies in this area (Estes 2003, Estes & Jones 2006) suggest that information about the relationship between the elements of compounds may even be independently stored. These authors point out that any noun can potentially realize any relation when combined with some other noun: e.g. *bear paw* (PART/WHOLE), *bear scare* (CAUSE), *bear season* (TIME), *bear cub* (SUBTYPE), *bear family* (OF), *bear toy* (POSSESSION), *bear tracks* (FROM), *bear cave* (HABITAT), *bear playground* (FOR) etc. (examples and relationships from Estes & Jones 2006: 90). It therefore seems highly unlikely, they say, that the information about what relation can be realized in what combination should be bound to the content of the constituent concept as this makes the noun concepts overloaded with the semantic information. Besides, since the same relations seem to re-occur with different concepts; e.g. *future strategy*, *direction sign*, *energy department*, *science centre*, *community service*, *charity work*, *business computer*, *family holiday* (all based on the relation of PURPOSE), keeping the same information as bound to every single concept would make any model aimed at representing the processing of compounds redundant. Thirdly, Estes & Jones (2006) find in their experimental study that, despite the findings of Gagné et al. (2005) reported above, there is a relation priming effect in the absence of lexical repetition; i.e. responses to a target combination *chocolate cake* were faster when preceded by a prime using the same relation, *gravel road*, than by a prime using a different relation, *city riots*.

Experimental evidence of this type strongly suggests that there is a range of different semantic relationships that are available to the speaker-listener, and not just the one that we proposed above.

The second piece of information comes from experiments carried out by Plag and his colleagues, but foreshadowed in the descriptive grammatical tradition. It seems that there is a certain correlation between the detailed semantic reading of a compound and the stress pattern<sup>8</sup> it takes (Plag 2006, Plag et al. 2008). The relationship between the semantic relation and the stress pattern is not direct, but is probabilistic; nevertheless, it would seem that speakers must make use of the nature of the semantic link as one of the factors they employ in predicting where to put the stress in a given novel NN construction.

The grammatical information comes from coordination, and is rather more speculative. Coordination in compounds is not straightforward in English, and, indeed, there are those who claim that it does not exist (Payne & Huddleston 2002). However, it appears that there are semantic restrictions on where you can coordinate in NN constructions. Consider the well-known examples listed in (8).

(8)

windmill  
watermill  
flour mill  
pepper mill  
coffee mill  
steel mill  
cotton mill

It seems that not all of these combinations allow coordination. So while *wind- and watermills* seems possible, *wind- and flour mills* does not. *Pepper- and coffee mills* is probably allowable, but *water- and coffee mills* is odd. For coordination to be possible, not only does there have to be a good pragmatic reason for wishing to coordinate (*Our kitchen shop has a nice range of pepper- and coffee mills*), but also the semantic relationship linking the elements has to be the same.

We tried to test this hypothesis using corpus data. Care is needed, however, since the forms *N N and N* or *N and N N* have several interpretations, as illustrated by the examples in (9).

(9)

- (a) [art gallery] and [museum], [navy] and [air force]
- (b) [lemon and vanilla] ice-cream, [steak and kidney] pie
- (c) school [librarians and teachers], [hip and thigh] diet

Only in the examples in (c) can we say that *school* modifies both the heads or that *diet* has coordinated nouns which independently modify the head. We found 120 examples like (c) in the BNC, and all of them confirmed our expectations. Some examples, again fitted to Levi's categories, are presented in (10).

(10)

N1 CAUSE N2	food allergy and intolerance
N2 CAUSE N1	measles and influenza virus
N1 HAVE N2	plant and animal life
N2 HAVE N1	oil and gas fields
N1 MAKE N2	plastic and paper products
N2 MAKE N1	semiconductor and computer industries
N2 USE N1	bus and train services
N2 BE N1	plant and animal species
N2 IN N1	school librarians and teachers
N2 FOR N1	gas and electricity bills
N2 FROM N1	fruit trees and bushes
N2 ABOUT N1	science and technology policy

Even though it may not be the case that the existence of a parallel relationship is an absolute requirement for coordination (consider *police officers and cars*) it certainly seems to facilitate it, and so it seems that semantic information at this detailed level might be accessed in coordination between NN constructions.

#### 4. Conclusion

Our major conclusion is that nouns that modify other nouns can be seen to have a single meaning relationship with their heads – one which we can gloss as ‘adnominal’. We suggest this term ‘adnominal’ to describe the ability of a noun to be modified by another noun in a nominal construction whatever the construction may be (with the proviso that we have considered only endocentric constructions, and that other construction types may be subject to different constraints). So, by its nature, this relation is connected with the lexical-grammatical characteristics of nouns and it seems to be recurrent in a variety of nominal constructions. At the same time this relation is connected to the semantics of the construction at just one level, i.e. it only points to the fact that the elements in a given nominal construction are ‘related somehow’. The exact nature of modification is unimportant at this level of analysis and the influence of such factors like type of the construction (NN, N’s N, N of N, A<sub>assoc</sub>N, etc.), the semantics of the constituents, pragmatics, discourse, experience and others is peripheral. Its main purpose is to point to the fact of existence of a semantic relationship but it does not provide any clues about what the exact relation is in any given compounded structure.

Precisely how this adnominal relationship is interpreted may be subject to pragmatic interpretation – and, indeed, there is plenty of evidence to suggest that the individual nouns involved or their semantic components may play a large role in determining the more precise relationship that is attributed to a given compound (or, a fortiori, to any of the constructions that have been considered here) (see e.g. Lees 1970, Ryder 1994, Pustejovsky 1995, Johnston & Busa 1996, Jackendoff 2009 for the view that the individual nouns determine the interpretation of compounds). At the same time, we have suggested that there is some evidence that speakers use the more specific relationships in ways that appear to be grammatical, and that certain kinds of relationships occur more often with some constructions but not others. Superficially, this seems to defeat our earlier claim; we believe that there is a coherent solution that allows both sets of findings to stand.

Our overall conclusion here is that in order to account for the semantics of compounds properly, it seems likely that we need at least<sup>9</sup> a two-level semantics. At the more abstract of these two levels, there is just one semantic link between the elements of compounds (the adnominal relationship), which is therefore predictable.

At the less abstract level, the level which makes appeal to pragmatic factors and where the nature of the denotata of the elements of the compound affect the interpretation of the compound, more specific semantic information may be part of the construction. Speakers may use both levels, and so both may appear to provide ‘grammatical information’ in one way or another. If this is true, it goes some way to explaining why there has been so much controversy about the ‘compositionality’ of compounds. Analysts who view compounds at the most abstract level will believe them to be compositional constructions; those who view them at the less abstract level will be obliged to reach the opposite conclusion. If both levels are required, both sides are right.

Our more important finding here, though, is that the same questions of interpretation apply to other constructions involving two nouns (or an equivalent) and not just to compounds. Not only do these other types of construction include other types of word-formation, they involve constructions that might be considered syntactic (adjective + noun, genitive + noun). The problems of interpretation which have been so much discussed for compounds are thus not restricted to the morphological component.

## Notes

- 1 This paper was first presented at the conference ‘Approaches to the lexicon’ held at the Copenhagen Business School on 8-10 December 2010. We should like to thank that audience for its feedback, and various colleagues for theirs.
- 2 The display in (3) is a direct representation of the original; it would probably be more easily understood if formatted as [ X  $\Re$  Y ]<sub>Z</sub> so that it is clear that Z is the word-class of the XY construction.
- 3 The notion of bidirectionality of the relations can be argued to be more widespread across the categories, including at least LOCATION (*office building* vs. *garden buildings*), SOURCE (*photon energy* vs. *life energy*), TIME (*crisis year* vs. *crisis decisions*), INSTRUMENT (*farm machinery* vs. *wind farm*). However, as stated below, we simply want a set of relationships that we can work with; our task here is not to provide an in-depth criticism of the actual relationships proposed by Levi (1978) or by others.
- 4 At least, not recently. Cobbett (1818) notes that, “Sometimes the sign of the possessive case is left out.... [W]ords, conjoined in this manner, are called a *compound* noun.” Whether Cobbett’s claim is equivalent to ours is not clear, but the comment is interesting.
- 5 This example may not be a particularly clear one. However, the prototypical reading for *X’s Y* is that ‘X has/owns a Y’, and finding no clear example of *X’s Y* meaning ‘Y has/owns an X’ is not surprising. Whether or not *a ladies’ man* is ‘a man who has ladies’, it is clearly not ‘a man whom ladies have’.
- 6 Some websites suggest that *Down’s syndrome* is the preferred British but not American terminology, others suggest a difference of political correctness. We do not have sufficient evidence to support either view. *The Oxford English Dictionary* notes that *Down’s syndrome* was introduced in 1961, and cites *Down syndrome* from 2001. Such variation is not exceptional. The BNC has both *St Cecilia day* and *St Cecilia’s day*, and has *St Vincent day* but *St Valentine’s day*.
- 7 The examples here could be interpreted as coordinative blends. See the earlier discussion.
- 8 The implication that a particular compound ‘has’ or ‘takes’ a particular stress pattern may not be particularly controversial, despite the amount of variation that is heard in individual compounds. We do not comment further here, but it may be that even the pattern on individual item-familiar compounds is influenced by probabilistic factors.
- 9 The words ‘at least’ are inserted here to take into account the basic assumption of cognitivists who claim that linguistic analysis requires taking into account three layers: the linguistic level proper, the level of conceptualization or conceptual structure, and the experiential level on which conceptualization applies (Bundgaard et al. 2006, Talmy 2000). We have provided no evidence for a third level here, but what we say appears compatible with such proposals.

## References

- ACKEMA, Peter, NEELEMAN, Ad. 2004. *Beyond morphology: Interface conditions on word formation*. Oxford: Oxford University Press, 2004.

- ADAMS, Valerie. 1973. *An introduction to modern English word-formation*. London: Longman, 1973.
- ADAMS, Valerie 2001. *Complex words in English*. Harlow: Longman, 2001.
- BAUER, Laurie. 1978. *The grammar of nominal compounding*. Odense: Odense University Press, 1978.
- BAUER, Laurie. 1979. On the need for pragmatics in the study of nominal compounding. In *Journal of Pragmatics* 3, pp. 45-50.
- BELL, Melanie. 2011. At the boundary of morphology and syntax: Noun noun constructions in English. In GALANI, A., HICKS, G., TSOULOS, G. (eds.), *Morphology and its interfaces*. Amsterdam and Philadelphia: John Benjamins, 2011, pp. 137-168.
- BREKLE, Herbert E. 1976. *Generative Satzsemantik im System der englischen Nominalkomposition*. München: Fink, 1976.
- BUNDGAARD, Peer F., ØSTERGAARD, Svend, STJERNFELT, Frederik. 2006. Waterproof fire stations? Conceptual schemata and cognitive operations in compound constructions. In *Semiotica*, 2006, vol. 161, pp. 363–393.
- COBBETT, William 1818. Syntax as relating to nouns. Reprinted in BOLTON, W.F. (ed.), *The English language: Essays by English and American men of letters 1490-1839*. Cambridge: Cambridge University Press, 1966, pp. 180-184.
- ESTES, Zachary. 2003. Attributive and relational processes in nominal combination. In *Journal of Memory and Language*, 2003, vol. 48, no. 2, pp. 304–319.
- ESTES, Zachary, JONES, Lara L. 2006. Priming via relational similarity: A COPPER HORSE is faster when seen through a GLASS EYE. In *Journal of Memory and Language*, 2006, vol. 55, no. 1, pp. 89–101.
- FERNÁNDEZ-DOMÍNGUEZ, Jesús. 2010. N+N compounding in English: Semantic categories and the weight of modifiers. In *Brno Studies in English*, 2010, vol. 36, pp. 47–76.
- GAGNÉ, Christina L. 2000. Relation-based combinations versus property based combinations: A test of the CARIN theory and dual process theory of conceptual combination. In *Journal of Memory and Language*, 2000, vol. 42, pp. 365-389.
- GAGNÉ, Christina L. 2001. Relational and lexical priming during the interpretation of noun–noun combinations. In *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 2001, vol. 27, pp. 236–254.
- GAGNÉ, Christina L., SHOBEN, Edward J. 1997. Influence of thematic relations on the comprehension of modifier-noun combinations. In *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 1997, vol. 23, pp. 71–87.

- GAGNÉ, Christina L., SPALDING, Thomas L. 2009. Constituent integration during the processing of compound words: Does it involve the use of relational structures? In *Journal of Memory and Language*, 2009, vol. 60, pp. 20–35.
- GAGNÉ, Christina L., SPALDING, Thomas L., JI, Hongbo. 2005. Re-examining evidence for the use of independent relational representations during conceptual combination. In *Journal of Memory and Language*, 2005, vol. 53, no. 445–455.
- GIEGERICH, Heinz. 2005. Associative adjectives in English and the lexicon-syntax interface. In *Journal of Linguistics*, 2005, vol. 41, 571-591.
- GIEGERICH, Heinz. 2009. The English compound stress myth. *Word Structure*, 2009, vol. 2, pp. 1-17.
- GRANVILLE HATCHER, Anna. 1960. An introduction to the analysis of English noun compounds. In *Word*, 1960, vol. 16, pp. 356-373.
- GUEVARA, Emiliano, SCALISE, Sergio. 2009. Searching for universals in compounding. In Sergio SCALISE, S., MAGNI, E., BISETTO, A (eds), *Universals of language today*. Berlin: Springer, 2009, pp. 101-128.
- JACKENDOFF, Ray. 2009. Compounding in the Parallel Architecture and Conceptual Semantics. In LIEBER, R., ŠTEKAUER, P. (eds), *Handbook of compounding*. Oxford: Oxford University Press, 2009, pp. 105-128.
- JESPERSEN, Otto. 1942. *A modern English grammar on historical principles. Part VI: morphology*. London: Allen & Unwin and Copenhagen: Munksgaard, 1942.
- JOHNSTON, Michael, BUSA, Federica. 1996. Qualia structure and the compositional interpretation of compounds. In *Proceedings of the ACL SIGLEX workshop on breadth and depth of semantic lexicons*. <http://wing.comp.nus.edu.sg/~antho/W/W96/W96-0309.pdf>
- KUNTER, Gero 2011. *Compound stress in English: The phonetics and phonology of prosodic prominence*. Berlin: de Gruyter, 2011.
- LEES, Robert B. 1960. *The grammar of English nominalizations*. Bloomington: Indiana University and The Hague: Mouton, 1960.
- LEES, Robert B. 1970. Problems in the grammatical analysis of English nominal compounds. In BIERWISCH, M., HEIDOLPH, K.E. (eds), *Progress in linguistics*. The Hague: Mouton, 1970, pp. 174-186.
- LEVI, Judith N. 1978. *The syntax and semantics of complex nominals*. New York: Academic Press, 1978.
- LIEBER, Rochelle 2009. A lexical semantic approach to compounding. In LIEBER, R., ŠTEKAUER, P. (eds), *The Oxford handbook of compounding*. Oxford: Oxford University Press, 2009, pp. 78-104.

- PAYNE, John, HUDDLESTON, Rodney. 2002. Nouns and noun phrases. In HUDDLESTON, R., PULLUM, G.K. (eds), *The Cambridge grammar of the English language*. Cambridge: Cambridge University Press, 2002, pp. 323-523.
- PLAG, Ingo. 2006. The variability of compound stress in English: structural, semantic and analogical factors. In *English Language and Linguistics*, 2006, vol. 10, pp. 143-172.
- PLAG, Ingo, KUNTER, Gero, LAPPE, Sabine, BRAUN, Maria. 2008. The role of semantics, argument structure, and lexicalization in compound stress assignment in English. In *Language*, 2008, vol. 84, pp. 760-794.
- PUSTEJOVSKY, James. 1995. *The generative lexicon*. Massachusetts. Cambridge: MIT Press, 1995.
- QUIRK, Randolph, GREENBAUM, Sidney, LEECH, Geoffrey, SVARTVIK, Jan. 1985. *A comprehensive grammar of the English language*. London and New York: Longman, 1985.
- ROSENBACH, Annette. 2003. Aspects of iconicity and economy in the choice between the s-genitive and the of-genitive in English. In ROHDENBURG, G., MOHNDORF, B. (eds), *Determinants of grammatical variation in English*. Berlin and New York: Mouton de Gruyter, 2003, pp. 379-411.
- RYDER, Mary Ellen 1994. *Ordered chaos*. Berkeley: University of California Press, 1994.
- SCALISE, Sergio, VOGEL, Irene 2010. Why compounding? In SCALISE, S., VOGEL, I. (eds), *Cross-disciplinary issues in compounding*. Amsterdam and Philadelphia: John Benjamins, 2010, pp. 1-18.
- SHORE, Todd. 2010. Making sense of adjectives: Association vs. ascription in a family-resemblance model of semantic inheritance. In *SKASE Journal of Theoretical Linguistics*, 2010, vol. 7, no. 3, pp. 2-18.
- SHUMAKER, Nancy W. 1975. The semantics of the English genitive. In *American Speech*, 1975, vol. 50, pp. 70-86.
- SPELLMAN, Barbara A., HOLYOAK, Keith J., MORRISON, Robert G.. 2001. Analogical priming via semantic relations. In *Memory and Cognition*, 2001, vol. 29, pp. 383-393.
- TALMY, Leonard. 2000. *Toward a Cognitive Semantics*, Vol I. Cambridge, Mass. and London: MIT Press, 2000.
- TARASOVA, Elizaveta. 2013. *Some new insights into the semantics of English N+N compounds*. Unpublished PhD thesis, Victoria University of Wellington, 2013.
- TAYLOR, John R. 1989. Possessive genitives in English. In *Linguistics*, 1989, vol. 27, pp. 663-686.
- TAYLOR, John R. . 1994a. Possessives and Topicality. In *Functions of Language*, 1994, vol. 1, no. 1, pp. 67-94.
- TAYLOR, John R. 1994b. 'Subjective' and 'objective' readings of possessor nominals. In *Cognitive Linguistics*, 1994, vol. 5, pp. 201-242.



TAYLOR, John R. 1996. *Possessives in English: An exploration in Cognitive Grammar*. Oxford: Clarendon Press, 1996.

ŽEPIĆ, Stanko. 1970. *Morphologie und Semantik der deutschen Nominalkomposita*. Zagreb: Philosophischen Fakultät der Universität Zagreb, 1970.

*Laurie Bauer and Elizaveta Tarasova*  
*Victoria University of Wellington*  
*PO Box 600*  
*Wellington 6140*  
*New Zealand*  
*laurie.bauer@vuw.ac.nz*  
*liza.tarasova@vuw.ac.nz*

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