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REVIEW ARTICLE

What's in a compound?[1]

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Rochelle Lieber & Pavol Štekauer (eds.), *The Oxford handbook of compounding* (Oxford Handbooks of Linguistics). Oxford: Oxford University Press, 2009. Pp. xx + 691.

The Oxford Handbook of Compounding surveys a variety of theoretical and descriptive issues, presenting overviews of compounding in a number of frameworks and sketches of compounding in a number of languages. Much of the book deals with Germanic noun–noun compounding. I take up some of the theoretical questions raised surrounding such constructions, in particular, the notion of attributive modification in noun-headed compounds. I focus on two issues. The first is the semantic relation between the head noun and its nominal modifier. Several authors repeat the argument that there is a small(-ish) fixed number of general semantic relations in noun–noun compounds ('Lees's solution'), but I argue that the correct way to look at such compounds is what I call 'Downing's solution', in which we assume that the relation is specified pragmatically, and hence could be any relation at all. The second issue is the way that adjectives modify nouns inside compounds. Although there are languages in which compounded adjectives modify just as they do in phrases (Chukchee, Arleplog Swedish), in general the adjective has a classifier role and not that of a compositional attributive modifier. Thus, even if an English (or German) adjective–noun compound looks compositional, it isn't.

1. Introduction

The Oxford Handbook of Compounding is a contribution to the Oxford series of handbooks dealing with specific linguistic phenomena. The volume consists of two parts: Part I, dealing with theoretical issues, and Part II, which offers a series of descriptive sketches of compounding in specific languages. I shall briefly summarize the overall structure of the book (Section 2) before surveying some of the more important issues that arise from the descriptive

[1] I am grateful to two *JL* referees for their careful reading and for helpful comments.

sketches in Part II, paying particular attention to the question of attributive modification in compounding (Section 3). I will then selectively discuss some of the theoretical claims made by the contributors to Part I (Section 4). Finally, I present my own views on these and related matters, paying particular attention to the distinction between lexicalized and 'online' compounds, and to the notion of 'modification' within compounds, especially adjective–noun compounds.

2. Summary of the book

Part I consists of an introduction by the editors and fifteen other chapters on theoretical issues, while Part II contains a typological overview (Laurie Bauer, 'Typology of compounds') and seventeen surveys of compounding in specific languages: English, Dutch, German, Danish, French, Spanish, Modern Greek, Polish, Mandarin Chinese, (Modern) Hebrew, Japanese, Hungarian, Slave, Mohawk, Maipure-Yavitero, Mapudungun and Warlpiri. There is a list of contributors and abbreviations, a consolidated list of references and a single consolidated index. On the whole, the handbook represents a valuable contribution to debate on compounding, and nearly all the individual chapters are well-written and contain useful information.[2]

Bauer's chapter, which could equally have appeared in Part I, is something of a model handbook contribution, presenting all the crucial issues in simple, straightforward terms and with clear and fully referenced examples. Disappointingly, hardly any of the issues raised in Bauer's chapter are taken up by the authors of Part I. The detailed language sketches in Part II concentrate on those phenomena which are salient in the compounding system of the language under discussion. Although most of those contributions eagerly address topical theoretical questions, they tend not to address more general typological issues (Rochelle Lieber's piece 'IE Germanic: English' being a self-conscious exception). It is interesting to compare the handbook's table of contents with that of Scalise & Vogel (2010), which appeared the following year. Surprisingly, the two volumes complement each other. For instance, the handbook lacks discussion of compounding vs. derivation,

[2] I noted the following typos which might cause confusion:

p. 467: STA·RY·DRUK→STA·ry DRUK
p. 499: A typesetting error caused the spacing of example (27c) to go awry. It should read as below (or better still, it should have been re-set altogether):

*beyt	(ha)zxuxiot	kir	(ha)levenim	mic	(ha)tapuzim
house	(the-)glasses	wall	(the-)bricks	juice	(the-)oranges
*'(the-) (multiple) glasses' house'			'(the) brick wall'		'(the) orange juice'

p. 503: In example (35a) 'the-natural' should be 'natural'
p. 628: Bonami and Boyé (2003) was published in the French journal *Langages*, not *Language*.
p. 646: KURYØOWICZ is, of course, KURYŁOWICZ

phonology in compounding, the use of corpus techniques or compounding in Natural Language Processing, all of which are the subject of chapters in the Scalise & Vogel volume.

The choice of languages in Part II allows micro-comparisons across Germanic as well as a survey of typologically varied systems (including one language group that has virtually no compounding according to Raoul Zamponi, viz. 'Arawakan: Maipure-Tavitero'). The list of topics covered is not exhaustive: a reader interested in a typologically wider search should investigate languages such as Vietnamese (with its rich set of reduplicating compounds, not to mention the difficulty of distinguishing compounds from phrases); Celtic or Nivkh (for compounding and consonant mutation); a Turkic language (say, Turkish) for the complex relationship between compounding and 'possessor' constructions such as izafet, and likewise an Iranian language for the relation between compounds and the ezafe class of constructions; almost any New Guinean language for the complex relation between compounding and serial verb constructions (or the South American isolate Wari', as Bauer points out); an Indo-Aryan language such as Hindi-Urdu for the relation between compounds, light verb constructions and aspectual verb–verb constructions; almost any Oceanic language (or, indeed, Zuñi) for 'pseudo-incorporation' or noun-stripping; Chukotkan for widespread compounding, including incorporation of not only complements but also adjuncts into finite verbs, and also incorporation of adjectives, determiners, quantifiers and so on into nouns, all within a single vowel harmony domain (unlike compounding in Uralic or Turkic).[3]

Turning to Part I, the editors, Rochelle Lieber & Pavol Štekauer, set the scene in Chapter 1, 'Introduction: Status and definition of compounding', presenting a useful summary of the major issues. Some of the chapters survey the recent literature on some important aspect, in the manner of a canonical handbook article, but most present a summary of the author's own recently published claims. Pius Ten Hacken's 'Early generative approaches' is an informative and readable account of early generative approaches to compounding, from Lees's (1960) famous study to Roeper & Siegel (1978). Dieter Kastovsky's 'Diachronic perspectives' is a survey of recent views on compounding in early Indo-European, especially Sanskrit. Ruth Berman's 'Children's acquisition of compound constructions' summarizes English-, Hebrew- and Swedish-based research.[4] Christina Gagné ('Psycholinguistic perspectives') presents a useful overview of the mini-industry that has grown

[3] I found no mention of sign languages. For these the reader can now turn to Meir et al. (2010).

[4] A small point is that Berman's article, on compounding in child language, discusses the acquisition of Hebrew a good deal, but without any reference to Hagit Borer's chapter 'Afro-Asiatic, Semitic: Hebrew'. Berman speaks of a 'genitive' relationship where Borer talks about the more traditional notion of the construct (STATUS CONSTRUCTUS). Modern Hebrew, of course, has nothing resembling a 'genitive case', as such.

up in psycholinguistic experiments on compounding processing (though it is a pity that she does not mention, except in passing occasionally, that most of this research focusses on processing of WRITTEN stimuli by skilled readers; the connection between such work and any linguistic enterprise is far from direct). Pavol Štekauer's chapter, 'Meaning predictability of novel context-free compounds', asks to what extent the meaning(s) of a novel compound presented without any context (hence, 'context-free') can be predicted in terms of the favoured responses given by subjects in a psycholinguistic test. I confess I was unaware that this was a live research question.

There is a heavy emphasis in Part I on English, specifically on noun–noun compounds, so that a number of interesting issues are largely left out of discussion. One topic I would like to have seen addressed is the formation of numerals, which in most languages take the form of compounds and which often have typologically unusual characteristics. The main serious omission was the near complete lack of any discussion of noun incorporation (NI), or any other type of incorporation for that matter.[5]

It is beyond my competence to discuss some of the models presented so unfortunately I can do little more than mention them. In 'Why are compounds a part of human language? A view from Asymmetry Theory', Anna Maria di Sciullo summarizes her claim that compounding is effected by means of a functional head 'F' and a recursive syntax that does not make use of Internal Merge (or Head Movement). Liesbet Heyvaert's 'Compounding in Cognitive Linguistics' discusses the nature of compounding from a theoretical perspective under which compounds are essentially to be interpreted in terms of metaphor and metonymy. The onomasiological tradition of lexicology, which investigates, inter alia, the way that morphologically complex words come to name concepts, is represented by Joachim Grzega's chapter, 'Compounding from an onomasiological perspective', and to some extent by Pavol Štekauer's chapter on the meaning predictability of novel compounds. The onomasiological approach is also related to the idiomatological approach (Stanislav Kavka, 'Compounding and idiomatology'). As far as I can tell the idiomatological tradition simply confuses two distinct notions of 'idiom' and 'compound'. Interestingly, Hagit Borer, in her contribution on 'Afro-Asiatic, Semitic: Hebrew', defines Hebrew compounds as almost entirely homologous to a syntactic construction (the Semitic 'construct') and also as necessarily non-compositional (hence, in one sense 'idiomatic') but points out that they cannot be regarded as just idioms, precisely because they have specific structural properties, whereas idioms are just lexicalized (partial) phrases (508). As far as I can see, Kavka's approach

[5] Bauer's chapter on compounding typology is an honourable exception, in that it includes mention of incorporation in connection with Ainu. On the other hand, Štekauer, in a reference missing from the index, makes the palpably false claim that English verbs such as *vacuum-clean* are instances of noun incorporation (288).

would not be able to draw such distinctions (though this could well just reflect ignorance on my part of idiomatology).

3. Part II: Descriptive sketches

I shall divide the discussion very broadly into those chapters which report interesting observations and those which discuss issues raised in Part I.

Rochelle Lieber's chapter 'IE, Germanic: English' stands out as unusual in that it explicitly takes the typology proposed in the chapter by Sergio Scalise & Antonietta Bisetto, 'The classification of compounds', and applies it systematically to English. I have reservations about the Scalise/Bisetto typology (see Section 4 below), but Lieber does a good job of showing how the system is supposed to work on the basis of very well-known data.

Several of the remaining chapters raise important theoretical or conceptual issues which are not properly dealt with in Part I. In the main these chapters reprise discussion which is familiar from the earlier literature, and authors naturally summarize their own research in many cases.

The chapters by Jan Don, 'IE, Germanic: Dutch', Martin Neef, 'IE, Germanic: German', and Laurie Bauer, 'IE, Germanic: Danish', deal in different degrees with the standard phenomena of interest in these languages: the variety of 'intermorphs' and why they look similar to inflections; the possibility of including phrases inside a compound; the possibility of modifying a compounded noun non-head, as in Dutch *oude munten-verzameling* 'old coin-collection' (372) or Danish *kold smørrebrød-s-jomfru* 'cold sandwich-shop assistant' (408).[6] The latter two phenomena bear directly on the syntax–morphology interface, of course, though only the question of compound-internal phrases receives detailed discussion in Part I. Conceivably they are aspects of the same phenomenon.

Bogdan Szymanek provides a very clear survey of the Polish compounding system, typical of Slavic and very similar to that described for Greek by Angela Ralli, which combines word stems with an interfix or intermorph, *-o-* after nouns and *-i-* after verbs. Such compounding is not recursive, and so is more clearly a morphological process than, say, English compounding. In addition, some compounds require additional suffixation, as in the case of *nos-o-roż-ec* 'rhinoceros', from *nos* 'nose', *-o-* 'intermorph', *róg* 'horn' and *-ec* 'noun-forming suffix'.

Antonella Ceccagno & Bianca Basciano ('Sino-Tibetan: Mandarin Chinese') discuss a process of 'metacompounding' in Mandarin Chinese. The compound *wèishì* 'satellite TV' is derived not directly from *wèi* 'defend' and *shì* 'look at' but by truncation from the existing compounds *wèixīng* 'defend + star = satellite' *diànshi* 'electricity + look at = TV'. This is a little

[6] Don could also have mentioned that the Dutch construction has been discussed in some detail by Ackema & Neeleman (2004).

reminiscent of the truncating type of personal noun in English such as *electrical engineer*, derived semantically from *electrical engineering*. Such formations are possible only if the base expression (*electrical engineering*) is perceived as lexicalized in some sense, which may also be true of the metacompounds (see also Ceccagno & Basciano 2007).

Ferenc Kiefer's 'Uralic, Finno-Ugric: Hungarian' describes an interesting pattern of compounding with deverbal nominalizations in Hungarian. As in many languages, such a nominal can form a compound with a noun as its dependent denoting the (transitive) verb's object. However, unlike English, nominals derived from certain intransitive verbs also form compounds with noun dependents, denoting either the actor or the theme/patient of the verb: *nyávogás* 'mewing', *macska nyávogás* 'cat's mewing'; *érés* 'ripening', *gyumolcs érés* 'ripening of fruit' (532).

Mark C. Baker & Carlos A. Fasola's 'Araucanian: Mapudungun' reprises the claims of Baker, Aranovich & Golluscio (2005) about Mapudungun having a unique type of noun incorporation process, in which the incorporated noun stem appears to the right of the incorporating verb stem. Marianne Mithun's description of noun incorporation in the chapter 'Iroquoian: Mohawk' is a meticulous and limpid explanation of the issues and is an object lesson in how to present such material. She shows that for Mohawk at least there is no convincing syntactic analysis possible of noun incorporation. Jane Simpson's 'Pama-Nyungan: Warlpiri' describes how that language has a paucity of noun-headed endocentric compounds, and points to the difficulty of distinguishing compounds from lexicalized phrases, especially in the case of complex predicates where preverbs ('converbs') combine with a finite verbal element. It remains unclear, therefore, how such constructions relate typologically to, say, noun incorporation constructions. This is the kind of issue that could have been profitably discussed in a chapter on verb-headed compounding in Part I.

Taro Kageyama's 'Isolate: Japanese' provides a detailed description of compounding in Japanese, including its rich array of verb–verb compounds and two closely related construction types which he has discussed in detail elsewhere, the 'Word Plus' (W^+) construction (Kageyama 2001) and 'post-syntactic' compounds (Shibatani & Kageyama 1988). As Montermini (2010: 91) points out, these constructions perhaps call for Construction Grammar treatment. In 'Athapaskan: Slave', Keren Rice describes an interesting subtype of compound construction with a very specific semantic interpretation, which she has called the 'composed of' compounds. They have the general meaning 'N2 made of N1', and are identified morphophonologically by the failure of their second component to undergo fricative voicing. This looks like another good candidate for Construction Grammar.[7]

[7] Rice's chapter also tackles head-on the related and very tricky questions of compounds vs. lexicalized phrases, and compounds and the notion of wordhood in Slave.

Borer's sketch of Hebrew compounding discusses three closely related types of construction, which she calls compounds, M-constructs and R-constructs. They are illustrated in (1) (where *beyt* is in the 'construct form'):

(1) *Compound(-like) constructions in Hebrew*

COMPOUND	M-CONSTRUCT	R-CONSTRUCT
beyt (ha)-sefer	beyt (ha)-'ec	beyt (ha)-mora
house (the)-book	house (the)-wood	house (the)-teacher
'(the) school'	'(the) wooden house'	'(the) teacher's house'

The internal structure of compounds is not available to syntax, but the two constructs show no such restrictions. Borer sketches an analysis in terms of the syntactically-based model of morphology that she has been developing in recent years. Since she dutifully keeps to her word limits, this sketch is tantalizingly brief, but she raises a number of important questions about the syntax–morphology relation. The non-head in R-constructs is referential, while in M-constructs it is non-referential and purely attributive, another example of the theme of 'modification-by-noun' that runs through a number of the chapters in the handbook.

There are two chapters on Romance compounding. Bernard Fradin's 'IE, Romance: French' offers a very clear and convincing summary and critique of analyses of French (more generally, perhaps, Romance) verb–noun compounds of the type *porte-parole* 'spokesman', arguing convincingly that the verbal element is a bound stem. Laura Malena Kornfeld's contribution, 'IE, Romance: Spanish', discusses the almost identical compounding system of Spanish. It is a pity that Kornfeld did not, apparently, read Fradin's excellent contribution. She observes that compounding is in some ways a little reminiscent of syntax and from this jumps to the conclusion that compounding should be handled by syntactic principles. I was far from convinced by this chapter. In connection with the theoretical difficulties of characterizing attributive modification-by-noun, it is interesting that Kornfeld cites Spanish examples like *ciudad dormitório* 'town-dormitory = dormitory town' and *perro policía* 'dog-police = police dog' (441) and then (footnote 6) says of examples such as *viaje relámpago* 'trip-lightning = flying/lightning trip' and *periodista estrella* 'journalist-star = star journalist' that perhaps elements such as *relámpago* and *estrella* in such constructions have been reanalyzed as an adjective (following Val Álvero 1999). But why not say that the modifying noun in all such cases has been converted to a (relational) adjective? This is one way of interpreting the notion of 'composite nominal construction' found in Payne & Huddleston (2002: 448–451; see also Bauer 1998). The composite nominal is an expression such as *London bus*, which would normally be treated as a common or garden noun–noun compound, but which behaves in a whole host of respects more like a syntactic combination of adjective phrase and noun. For example, in English it is perfectly possibly to coordinate an attributively used noun with a

relational adjective: [*county*, *municipal*, *and borough*] *officials*, [*tribal and clan*] *allegiances*, and so on. The same analysis could be applied to compounds of the type *accès pompiers* 'firemen's entrance' cited by Fradin.

4. Part I: Theoretical perspectives

The chapters of Part I not mentioned in Section 2 above deal with the ways in which compounding is handled in a variety of linguistic models. Some of these contributions raise problems of a general nature, particularly concerning the syntax–morphology interface and the characterization of wordhood, but I will focus my discussion on a phenomenon that is brought to the fore in discussion of Germanic-type endocentric noun-headed compounding, namely the nature of attributive modification in compounds, and especially the phenomenon of modification-by-noun. Before looking at the problem of modification in compounds, however, I shall present a critical summary of Heidi Harley's chapter, 'Compounding in Distributed Morphology'. In effect she develops a Distributed Morphology analysis of compounding from scratch, and so her chapter deserves special discussion.

Harley restricts herself entirely to English. She argues from *one*-replacement facts that some noun roots can take complements, e.g. $\sqrt{}$STUD, the root of *student*. The root $\sqrt{}$STUD then raises to an n° head to form an nP of the form [nP [n° student] [$\sqrt{}$P[$\sqrt{}$STUD(of) stud [$_{DP}$ chemistry]]]]. The preposition *of* is inserted by some process I could not understand. Harley assumes that *one* can take as its antecedent only an nP, but *student* is of the category n° and so we cannot have expressions such as **the one of chemistry* meaning 'the student of chemistry'. I think the *one*-replacement facts fail to make the necessary point. First, according to Stirling & Huddleston in their chapter in Huddleston & Pullum (2002: 1516), we can have sentences such as *This proof of Taylor's theorem is better than the one of Parzival's inequality*, where it seems that *proof* is an n° category formed from the root $\sqrt{}$PROVE. Second, Stirling & Huddleston note that the *one* proform is not possible with role nouns (*king-of*), meronyms (*leg-of*) or kin terms (*mother-of*), e.g. **The mother of twins is no less stressed than one of triplets*. This would seem to imply that *the mother of twins* has to be derived from a $\sqrt{}$P of the form [$\sqrt{}$MOTH(of) [$_{DP}$ twins]]. In addition (not mentioned in Stirling & Huddleston's chapter), when an *of*-phrase is used as an adjunct, not a complement, it still resists *one*-pronominalization: **The man of honour proved more reliable than the one of wealth* (contrasted with the grammatical *The man with a reputation proved more reliable than the one with a lot of money*). I can see no non-circular way of accounting for these facts under Harley's assumptions.[8]

[8] Another, perhaps less serious problem with the *one*-argument is found when we consider the corresponding compound cases: **not a physics student but a chemistry one*. Given what

From her analysis of *one*-anaphora Harley concludes that the complement noun in a synthetic compound such as *truck driver* must merge with the root √DRIVE before that root merges with the n° head to give [n° [√DRIVE drive] [n° er]], in effect recapitulating the analysis under which *truck driver* is derived from a hypothetical noun-incorporating verb, *truck drive*.[9] But**truck drive* cannot emerge as a true verb because the movement into the v° head that is required to form the verb imposes a restriction (in English): 'English v° … cannot host internally complex heads containing more than one Root element' (141). However, we can get synthetic compounds with *-ing* which are adjectives (such as *quick-acting*). So the constraint has to make reference to 'a v° *in its base position*' (142; emphasis in the original); if the roots concerned move on to another head such as a° then the prohibition does not stand. This, however, has to be true of the *-ing* participle in progressive aspect forms, since a synthetic compound is possible with examples like *Tom has been truck-driving again* (vs. **Tom truck-drove again yesterday*). I do not see how Harley can accommodate this observation, nor do I see how her proposal is anything other than a description of the problem. Consequently, although I think she has made a bold attempt to make sense of compounding within Distributed Morphology, her chapter is unlikely to convert skeptics to the model.

I now turn to the problem of attributive modification within compounds, part of a much wider question, namely, what does it mean to say that a word modifies a noun? Even for adjective phrases in syntactic constructions, this is an elusive notion, but the notion of modification-by-noun, in compounding or syntax, is even more problematical. Semantically, the whole notion of attributive modification of a noun head is odd because in most logical form representations an attributive adjective, as in *tall tree*, would be represented as a predicate conjoined with a common noun predicate (λx.tall(x) $\wedge$ tree(x)), yet in syntactic representations the adjective is a subordinate category, a dependent of the noun head that it modifies. Therefore, some way has to be found of ensuring that the implied dependencies are reversed in the mapping between the different levels of representation (see Beck 2002). With modification-by-noun, the problem is compounded (so to speak). With appositional compounds (or *karmadhāraya*) we do indeed get a representation

Harley says about synthetic compounds like *truck driver*, the non-heads *physics*/*chemistry* can be at most nPs, not DPs, but *chemistry* is analysed as a DP in *student of chemistry* (presumably to justify the mysterious *of*-insertion transformation and also to permit expressions such as *student of the chemistry of complex molecules*). But there may well be some simple technical solution to this glitch.

[9] I do not understand on this analysis what permits the acategorial root √DRIVE to incorporate into the head n° *-er*, when other acategorial roots which are going to end up as nouns or adjectives are unable to do that.

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in terms of addition; e.g. *woman doctor* = λx.woman(x) ∧ doctor(x).[10] But most modification-by-noun does not work this way.

There are essentially two approaches to the modification problem in noun-headed compounding. The first is to treat the modification relationship as arising from the semantics of the head noun and its dependent/modifier – 'Lees's solution' (after Lees 1960). The second is to say that there is some arbitrary, pragmatically or contextually determined relation ℜ (or 'R' after Allen 1978), which may well amount to some kind of semantically definable relationship (such as 'N1 is the location of N2') but which need not necessarily involve any semantic predicate associated with either lexeme – 'Downing's solution' (after Downing 1977). In a Lees's solution approach, we need to enumerate a set of semantic properties associated with the head noun and find some appropriate corresponding property in the non-head and then construct a paraphrase which defines the compound. The set of semantic properties is supposedly finite, including broad-based categories like 'cause', 'location', and so on. Thus *tree house* is possible because a house has to have a location and this could well be in a tree.

In a Downing's solution approach, we simply note that on a given occasion of use the hearer is expected to construct some plausible (though not necessarily unique or determinate) relation between the modifier and the head. Thus, *bike girl* denotes a girl with some relation to the notion 'bike' (e.g. she rides to work on a bike, she mends them for a hobby, she has just left hers in the driveway or whatever), and *pea princess* can likewise be given any number of interpretations, limited only by artistic imagination. Clearly, the set of accessible interpretations will properly include those postulated in a Lees's solution account.

In part, the controversy over interpretation is due to a difference in empirical focus: Downing's solution tends to work well for nonce creations, while Lees's solution tends to be an attractive way of analysing fully lexicalized expressions. This may well simply mean that we should look more carefully at productive processes rather than fossilized ones (as Ricca (2010: 249–253) observes in the context of a corpus-based analysis of Italian verb–noun compounds). But I would argue that hunting for a finite list of semantic relations is hopelessly misguided.

The Lees class of solutions has a certain attraction because the majority of conventionalized (lexicalized) compounds can indeed be paraphrased with a smallish set of concepts. That solution is particularly attractive in cases in which it seems that a subcategorized complement or argument of a predicate is obligatorily denoted by a non-head, especially in cases like English synthetic compounding (or noun incorporation in other language groups).

[10] It is not clear how best to represent other types of coordinative compounds, such as *parent–teacher* (*association*) or *Austria-Hungary*.

Thus, the *taxi* in *taxi driver* seems to be interpretable only as the argument of *drive* in (*x*) *drives a taxi*. The obligatory argument satisfaction in synthetic compounds and their kin is almost always to be linked to the fact that an argument is obligatory for the verb base and so the question is not really one of compound interpretation; rather, the question is why should a verb preserve its obligatory argument structure even when it has undergone derivation to a subject nominal (or whatever other category). Note that *drive* can be used intransitively as an activity verb, in which case it can compound easily with an adjunct non-head, e.g. *Sunday driver*. There is, of course, a sizeable literature on 'argument inheritance' in such constructions, though most of the discussion in this handbook does not refer to that literature (Geert Booij's 'Compounding and Construction Morphology' is an exception here). But we find other instances of semantically restricted compounds which are not linked to verbal semantics, as in the Slave 'composed-of' compounds. However, when extended to ordinary modification-by-noun of the English type, the Lees's solution approach breaks down.

The clearest way we can see this is with compounds interpreted in terms of the predicate 'for' (which has been popular in such approaches since at least Levi 1978). The 'for' predicate tells us that the meanings of such compounds are intensional, in the sense that we have to know what the purpose of the referent is. Many nonce formations are like this: if I am arranging the tables for a reception in the Village Hall I might designate one of them for serving the coffee and another for serving the soft drinks. These would be *coffee table* and *soft drinks table*, respectively, though the coffee table might bear no resemblance to the article of furniture of the same name in my living room, tastefully adorned with coffee table books. The point of the nonce formation is that the intention of the speaker should be apparent. But plenty of fixed compounds are like this, too: a birthday cake can take almost any form, provided it fulfils a specific role in the birthday party ritual. On the other hand, Christmas cake remains the same even if eaten at Easter. The problem is that we cannot legislate for intensionality; a thing can be 'for' any purpose whatever. An elephant gun is a gun for shooting elephants, but where does the predicate 'shooting' come from? Worse, suppose I own a gun for defending myself in the event of a burglary and I call this my *burglary gun*. Where do we get the predicate 'defend oneself in the event of...' from? My favourite example of an established compound that cannot sensibly be analysed in terms of semantic primitives is *speed camera* 'roadside photographic device for automatically making images of vehicles exceeding the speed limit'. If anything, the problem is more acute with fossilized examples. The British English compound *penknife* ('pocket knife') originally denoted a small, sharp blade used for cutting quill pens. The form and the use have changed, but not the name. However, if we are free to use vague predicates such as 'for', then there is nothing to stop us from claiming that the 'conceptual structure' of *penknife* is something along the lines

'*knife* formerly FOR cutting quill *pens*, though now retaining only the properties of smallness and portability'.

The typological study by Scalise & Bisetto ('The classification of compounds') addresses the modification problem directly in their typology of structure–function relations designed to account for compounding constructions in any language.[11] They argue that there are three semantico-syntactic types of compound, each type representing 'a grammatical relation that is not overtly expressed' (44): subordinate, attributive and coordinate. Each can be either exocentric or endocentric. Subordinative constructions are essentially head–complement constructions, typical examples being (endocentric) English synthetic compounds like *taxi driver* and (exocentric) compounds like *pickpocket* (and their Italian equivalents).[12] Attributive compounds consist of a noun head modified either by an adjective or by a non-head noun whose 'attributive value is associated with a metaphorical interpretation, as in *snail mail* and *key word*' (45). Coordinative compounds have constituents connected by 'and'.

The authors interpret their typology in terms of Lieber's (2004) approach to lexical semantics (though not in the same way as Lieber herself). Subordinative (head–complement) compounds express a kind of subsumption relation between the encyclopaedic content of the head and non-head. Thus, *apple cake* is possible because *apple* has an encyclopaedic entry ⟨can be an ingredient⟩ while *cake* has an entry ⟨made with ingredients⟩ and these can be matched (in some way not explained).[13] Moreover, the rest of the encyclopaedic entry should contain no mismatches, so that what appears in an apple cake is real apples (in some form), and hence, the term *apple* denotes 'apple' in a more-or-less compositional fashion. For attributive compounds, what is crucial is that just one encyclopaedic entry of the non-head matches an encyclopaedic entry of the head, with the other entries being irrelevant. Thus, in *snail mail* we match the ⟨very slow⟩ property of *snail* with the ⟨takes time⟩ property of *mail* and arrive at our metaphorical interpretation.

However, Scalise & Bisetto then propose an elaboration of their original model. They split subordinative compounds into what they call 'ground' compounds and 'verbal nexus' compounds (50). In the latter, the head noun is derived from a verb and the non-head satisfies an argument of that verb.

[11] Although Scalise & Bisetto note that a language may, of course, form compounds from any major word class, they almost exclusively restrict themselves to endo-or exocentric noun compounds. It is therefore rather unclear how their proposals are supposed to generalize to other types.

[12] The complement–adjunct distinction is notoriously difficult to draw. Scalise & Bisetto's example of *apron string* illustrates this. For them, *string* is a head taking *apron* as a complement (they 'have a strong "*of* relation"', 45). I, like Lieber, am less than convinced by that claim.

[13] I correct a slight slip of the pen by the authors here.

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The 'ground' compounds are essentially the old class of root/primary compounds, related by Allen's 'R' relation, which they say can be defined in terms of qualia structure. They then elaborate the attributive type into an attributive–appositive type (ATAP). 'Appositive' does not mean co-ordinative here. The new attributive subgroup consists of compounds whose non-head is a verb or adjective denoting a property (or quality) of the head and includes the examples *high school*, *blue-eyed* (endocentric) and *redskin* (exocentric). The new appositive group includes the examples *snail mail*, *swordfish*, *mushroom cloud* (endocentric; Scalise & Bisetto have not found exocentric examples of this sort). Their key feature is that they are nouns which express a property. Being a noun, the non-head has to be taken as in apposition to the head, but since it expresses a property of the head, it must be an attribute.

An important question here is what constitutes a property and what constitutes attributive modification. It seems to me that two distinct notions are being conflated here. Attributive modification is best treated as a grammatical relation, expressed in various ways in the morphosyntax of different languages. But the notion of 'property' (or 'quality') is a semantic notion, and ascription or attribution of a property is a semantic relation. Endocentric noun–noun compounds in English (and many other languages) covertly denote a relationship between the head and dependent noun which in the limit can only be defined in terms of pragmatics. At the level of semantics, then, we need to appeal to our pragmatically defined relation, ℜ, such that ℜ (N1, N2). This relation need not have a direct relationship to the meanings of the two nouns. It is the ℜ relationship that serves to characterize a property, namely, the property N2 has of standing in some kind of relationship to N1. The attributive grammatical relation comes about from the grammar of the language that permits noun–noun compounding structures to be mapped to such a semantic representation.

It is highly misleading to describe the non-head noun as being 'in apposition to' the head noun in such structures. For Scalise & Bisetto the only difference, in practice, between a root ('ground' subordinative) compound and an 'appositive' compound is that in the root compound the non-head picks up some quale of the head noun. Thus, if *apple cake* means 'cake made using apples/apple-derived products as an ingredient', then it is a ground compound, while if it means 'cake (e.g. chocolate cake) baked into the shape of an apple' or 'fruit cake intended to be served with an apple sauce' or whatever, then it is an attributive compound. Consider the 'shaped-like-an-apple' reading. A cake has to have some shape, so shape is part of its qualia structure (indeed, the second item in the body of the representation of 'cake' given by Scalise & Bisetto is ⟨shape⟩; 48). Likewise, ⟨shape⟩ is part of the qualia structure of 'apple'. So what is to stop us from analysing that interpretation of *apple cake* as a subordinative compound? The intuition seems to be that 'shaped-like-an-apple' somehow does not commit the cake

to having a proper relationship to apples, but the reason for this is that it is a similitudinal relationship, and by definition a similitudinal relationship will be metaphorical. But isolating the covert similitudinal predicate and basing an entire typology on it seems perverse. It is also ultimately incoherent if subordinative compounding is supposed to be cashed out in terms of qualia structure. The fatal class of counterexamples is illustrated by the compound *apple taste* 'taste like that of an apple' as in *This pear/wine/…/cake has an apple taste*. Is this similitudinal compound a subordinative compound or an attributive compound?

Fortunately, we do not have far to look for an answer to this problem. Lieber's own contribution in Part I, 'A lexical semantic approach to compounding', takes a similar tack to Scalise & Bisetto's, explicitly adopting their (earlier) typology, and applies her model of skeleton/body lexical semantics (Lieber 2004) to the question of compounds.[14] Unlike most of the other contributors, she also discusses verb–verb compounds (mainly in Japanese), but most of her discussion is devoted to noun–head compounding in English. Lieber makes explicit an important assumption that is not actually expressed in Scalise & Bisetto's account. She considers cases like *tea merchant* or *table leg* and points out that the head nouns *merchant* and *leg* imply a second argument: *merchant-of x*, *leg-of x*. In the case of *leg*, we can say that the noun denotes an inalienably possessed entity. In the case of *merchant*, there is an implied event or situation that involves an entity sold (merchandise), much as in the case of a deverbal noun such as *seller*. Such cases are therefore on a par with verbal nexus or synthetic compounds in which the argument of a verb or other predicate has to be discharged by the non-head.

Lieber departs significantly from the proposals of Scalise & Bisetto in her treatment of 'subordinative' compounds. She adopts what we can think of as an argument structure approach, in which the structure of the compound is defined in terms of what she calls the skeleton of the lexeme. This is a set of binary features that characterize grammaticalized properties of the word. The crucial skeleton features for compounds are [material] and [dynamic], which in essence are grammaticalizations of the ontological categories of Thing and Event. These features are functions which take indexed arguments. In *truck driver*, we have a structure of the form in (2),

(2) *truck driver*

truck	-er	drive
[+material ([$_j$])]	[+material, dynamic ([$_i$],	[+dynamic ([$_i$], [$_j$])])]

[14] Rather oddly, although Lieber refers to Bisetto & Scalise's original (2005) paper on compound typology, and although Scalise & Bisetto's chapter makes appeal to Lieber's (2004) monograph, neither chapter actually refers to the other. And a copy editor, at least, should have noticed that the diagram cited by Lieber (her example (12) on page 87) from Bisetto & Scalise (2005) is reproduced in Scalise & Bisetto's own chapter (example (3) on page 45).

The head *driver* is a deverbal noun whose highest (actually, sole, 'R') argument ([$_i$]) is co-indexed with the subject argument of the verb. A Principle of Coindexation then allows the variable in the skeleton of *truck* to be co-indexed with the unbound variable in the representation of *driver*, effectively satisfying the object role of the base verb.[15] What about attributive compounds, such as *dog bed* (whatever that means)? An argument of *bed* has to be co-indexed with an argument of *dog*. But the body components of the nouns are incommensurate, so the denotation of the compound cannot be copulative (an entity which is both a dog and a bed).[16] Moreover, there is no additional argument position in *bed* to co-index with *dog* (unlike the situation with *dog leg* which can denote 'leg-of dog'). In fact the two nouns have just one argument each, the 'R' argument, and these have to be co-indexed, in simplified terms, *dog*$\langle R_i \rangle$*bed*$\langle R_i \rangle$. The semantic relationship between the two is indeterminate, defined by our general pragmatic/contextual relation. This is the correct way to treat compounds of this sort and it's the analysis that Scalise & Bisetto should have provided.

Much of Heinz Giegerich's chapter, 'Compounding and lexicalism', is devoted to the issue of how modification takes place in noun-headed compounds, and the author provides a subtle and nuanced perspective on the problem. Unlike most of the contributors, he sets his discussion against the background of the interpretation of relational adjectives. Giegerich distinguishes between ascriptive and associative attribution. Ascriptive modifiers ascribe a property, prototypically as gradable (scalar) property adjectives. Nouns can fulfil this function in one of two ways, as copulative compounds such as *boy actor* and *fighter-bomber*, or as compounds such as *metal bridge* and *olive oil*, in most of which the non-head denotes a material. The notoriously unreliable diagnostic of stress can even distinguish some associative compounds from ascriptive ones. Thus, with end-stress, *toy fáctory* is

[15] An interesting question arises with cases like *truck driving* interpreted as an action nominal. Here the *-ing* suffix seems to be coindexed with the Event role of the verb, which doesn't seem to be expressed in Lieber's notation. This should leave the subject argument as the highest unbound argument of *drive*(*ing*). But that would imply that a compound such as *girl driving* would be fine (meaning 'driving performed by girls') and that *truck driving* (meaning 'the driving of trucks') should be ill-formed. In her discussion of compounds based on nominalizations in *-ment*, *-al*, *ance* and *–ation*, Lieber (2004: 56) skirts this problem by an analysis in which the nominal affix has a single variable: [–material, dynamic ([$_i$])] and this variable is coindexed with the argument of the verb. Hence, *meat preparation* denotes an event of preparing meat. But this makes it very difficult to understand the semantics of action nominals: if the affix coindexes the subject argument, why does *meat preparation* not mean 'one who prepares meat'? In earlier literature (e.g. Zubizarreta 1987, Grimshaw 1990) this problem has prompted suggestions that the nominalization process involves a kind of passive alternation in which the subject role is demoted to an 'argument-adjunct' which can be expressed with a *by*-phrase, hence, 'meat preparation by unqualified staff'. Perhaps some similar solution could be found within Lieber's framework.

[16] Actually, such an interpretation is available with enough imagination, but this just goes to prove Lieber's point.

ascriptive and means 'a factory which is a toy', while with fore-stress, *tóy factory* is associative and means 'factory for the manufacture of toys' (as far as I can tell, this distinction cannot be drawn in Scalise & Bisetto's typology).

The analogy with adjectives is tricky, however. With syncategorematic adjectives we do not (necessarily) obtain a set-intersection reading, of course. A beautiful dancer may not actually be a member of the set of beautiful people. Giegerich appeals to a distinction between lexically defined relations, which can be idiosyncratic and non-compositional, and non-lexical relations, which are typical of syntax (phrasal constructions) and which are compositional. The subsective (non-intersective, syncategorematic) reading of *beautiful dancer* is non-lexical (because it is compositionally related to *dances beautifully*). However, the relation between head and non-head in synthetic compounds such as *taxi driver* is also subsective, suggesting a phrasal structure.

The primary meaning of associative modification is just 'associated with, pertaining to' as in *tooth decay* or *bird flu*. This is also the meaning of relational (associative) adjectives, which retain their essential meaning of referring to an object, like a noun, but have the morphosyntax of an adjective, e.g. *dental decay*, *avian influenza*. Some of the associative types of relational adjective involve what appear to be predicate–argument relations, e.g. *Papal murder*, *Papal visit*. In *Papal murder*, the Pope has an object role (presumably) and in *Papal visit* he has a subject role (presumably).[17] However, both of these interpretations are really just defaults determined by real-world knowledge. Giegerich cites the nice examples of *symphonic overture* and *operatic overture*. The first is an overture in the form of a symphony (hence, a similitudinal construction) while in the second *overture* is essentially a meronym of *opera* (and hence a kind of argument, at least at the level of qualia structure).

Although the syntax–lexicon distinction plays a very important role in Giegerich's discussion, he is at pains to point out that this does not mean that we can easily find syntactic diagnostics for syntactic or lexical behaviour. For instance, coordination is a poor test of lexicality/wordhood, since parts of words can easily be coordinated (e.g. *pre- and post-war*), and yet we would not necessarily want to say that *pre-war* was a compound noun. In a lexical construction we do not expect a modifying noun to be modifiable itself; for example, *remote village shop* has to mean a remote shop in a village, not a shop in a remote village, but Giegerich claims that in appositional compounds (his ascriptive compounds) an adjective can modify either the first noun or the whole compound: *young boy actor* (I find the interpretation [[young boy] actor] very odd myself, however.) Another problem is that we can have lexical [[adjective–noun] noun] compounds such as *small arms fire*

[17] These correspond to what Scalise & Bisetto would call subordinative compounds, of course.

and many others, and we have to have some way of guaranteeing that the [adjective–noun] component is itself lexical and not syntactic (for instance, we could coin a new compound such as *pirated video problem* meaning 'the problem posed by pirated videos'). The third test, *one*-pronominalization, likewise seems to place the lexicon–syntax divide between sets of compounds and does not provide a neat break. Combining these tests with phonologically-based tests only exacerbates the difficulty of drawing the dividing line.

One response to Giegerich's difficulty in establishing a syntax–lexicon divide is to deny that such a divide exists. This is the path taken by proponents of (various types of) Construction Grammar, including, in this volume, Ray Jackendoff ('Compounding in the Parallel Architecture and Conceptual Semantics') and Geert Booij ('Compounding and Construction Morphology'). Jackendoff presents his view of English compounding (again, mainly noun–noun compounds) in the context of his Parallel Architecture model, which incorporates a kind of Construction Grammar approach to syntax. His main concern is the interpretation of English noun–noun compounds and here he makes a number of intriguing suggestions which I find somewhat implausible.

The first of these concerns indeterminacy in interpretation (as in Lees's original conundrum with *pontoon bridge*). A compound such as *boxcar* could have a variety of interpretations in practice (car carrying boxes, car resembling a box, car serving as a box, and so on), but the compound with a given interpretation/usage is neither ambiguous nor vague. Jackendoff proposes that it has the property of 'promiscuity', that is, it has all these possible interpretations simultaneously. This is because 'a word meaning is an entity in a brain, not in a logical system' and brains, apparently, are prone to 'arrive at multiple solutions to the same result' (117). No doubt, but the poor brain in this case has to accommodate an infinite number of such semantic 'entities' because there is no way of restricting the set of contextually mandated paraphrases that could serve to describe *boxcar*.

Jackendoff goes on to propose some specific ways of analysing compound meanings. One construction type of interest is that in which two nouns, one of which is associated with a verb meaning, can be reversed to give different types of interpretation. For instance, *helicopter attack* means 'an attack on something by helicopter(s)', while *attack helicopter* means 'a helicopter whose proper function is to attack things'. Here, the notion 'proper function' is a useful one, taken from Ruth Millikan, designating what we may think of as the 'default' intended function of something (whether or not it actually gets round to performing that function). In *helicopter attack*, we have another instance of the subordinative function, in which the head noun has an implied argument position that has to be satisfied by the non-head.[18]

[18] I can interpret that argument as an object, so that a helicopter attack could well be an attack on a helicopter base, say, by intercontinental missiles.

However, that argument position is actually optional. As a result, *helicopter attack* could mean pretty well any kind of attack that could be associated with helicopters, for instance, an infantry attack in which the soldiers are brought to the battle field by (unarmed) helicopter. And an attack helicopter could be the carefully concealed aircraft that you use to escape if your unit gets attacked. However, Jackendoff does not note any such alternatives. Instead he provides another example of Lees's solution, listing two pages' worth of semantic predicates that express the relation between head and non-head in (mainly lexicalized) compounds. The list is very thorough. However, there is one interesting omission: there is no FOR predicate in his list. The intensional component of compound meaning is served by the 'proper function' default in most cases, and in others Jackendoff uses hyponymous predicates, viz. SERVES-AS and PROTECTS-FROM. But even this amount of semantic machinery is insufficient to capture the real meanings of compounds. Jackendoff could probably analyse *elephant gun* as 'gun whose proper function is shooting elephants', though I fail to see how he could account for *burglary gun* and he definitely fails on *speed camera*. But actually, he fails on certain of his own examples. For example, *piano bench* is analysed in terms of a temporal relation of WHILE: it is a bench, hence, its proper function is 'for sitting on'; it is to do with a piano, whose proper function is 'for playing', so a piano bench is a bench for sitting on while playing a piano. This, however, fails to capture the fact that the 'proper function' of the piano bench is that it is SPECIFICALLY INTENDED for sitting on to enable the sitter to play the piano (and it retains this meaning whatever purpose it is used for). In your garage jam sessions you can say *This old tea chest is my piano bench*, without committing yourself to the claim that the tea chest is a piano bench in the established sense, and similarly we can say without inconsistency *We got rid of the piano and now the piano bench is our coffee table*. I cannot see how Jackendoff's system can capture these distinctions in intensionality.

Finally, Booij presents a summary of his recent proposals for integrating some of the architecture of Construction Grammar into the analysis of compounds and related puzzles like 'affixoids' or 'semi-affixes'. The basic idea is that there is a construction type of a very general kind which defines endocentric compounds in English or Dutch and which is inherited by all instances of compounds:

(3) *Compound template*
$[[a]_X[b]_{Y_i}]_Y$ 'Y_i with relation R to X'

The meaning relation 'R' of the compound is defined pragmatically, in accordance with Downing's solution. In some cases, a lexically idiosyncratic compound will add further information to that inherited from the template. The template can serve as a kind of 'redundancy rule', defining the structure of a properly constituted conventionalized

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compound and can also serve for the creation of online compounds (nonce compounds).

A nice aspect of Booij's proposal is that we can pre-specify some of the template. For instance, Dutch has a large number of compounds beginning with *hoofd* 'head', meaning 'main, principal X', e.g. *hoofdingang* 'main entrance', *hoofdbezwaar* 'main objection', and so on. Although this is a very regular template it is strictly speaking non-compositional because *hoofd* on its own means 'head' (with similar polysemy to that of its English counterpart). Therefore, Booij argues that Dutch contains a specific instantiation of the template of the form in (4).[19]

(4) hoofd-*template*
[[hoofd]$_N$ [x]$_N$]$_N$ 'main [x]$_N$'

This approach very neatly allows us to capture the fact that *hoofd*-expressions look rather like compounds and yet the *hoofd* element behaves a bit like a prefix. Although Booij does not mention this explicitly, it is a solution that could well be extended to cases such as the 'lexical suffixes' of a number of North Western American languages as described by Gerdts (1998: 94f.). These are suffixes that appear to have well-defined (if sometimes rather general) lexical meanings but do not correspond in form to free-standing words of the same or similar meaning. They often behave like incorporated words, for instance, satisfying the argument structure of a verb, and yet in form they are affixes. Similarly, Booij's template solution would probably work for the denominal verb bases of the Eskimo languages (see Gerdts 1998: 97f. for discussion).

There is just one aspect of Booij's analysis that I find slightly unconvincing. Booij discusses what he calls 'bound compounds'. By this he means the Dutch equivalent of synthetic compounds in English, such as *kinder-verzorg-ster* 'children's care worker (children-care-STER)' or *vlaggen-mak-erij* 'flag making (flags-make-ERIJ)'. Booij proposes that such constructions result from template conflation. Thus, there is an affix template which suffixes *-ster*, *-erij*, and so on to verbs. Additionally, there is a 'noun incorporation' template which creates [NV]$_V$ verb-headed compounds in which the noun realizes the object of the verb. The affixation template is productive, but the [NV] template is not. However, the unification of the affixation and [NV] templates is productive and hence synthetic compounding is productive. This analysis neatly describes the situation, of course, but we still lack a principled way of saying that a template is unproductive. Ultimately, Booij's account suffers the same problems, I think, that Harley's account (and pretty well

[19] Booij provides *hoofd* with a category label here though there is no obvious reason, beyond the etymology, for providing any label at all. This is an important point, which will be taken up in connection with A + N compounds such as *blackbird* and *Rotwein*.

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everyone else's account) suffers from: the difficulty of ruling out productive noun incorporation in languages like English and (Standard) Dutch.

5. Discussion: Attributive modification in compounds

I now address a number of issues which arise from reading the handbook, which, to my mind, are related.

First of these is the question: What constitutes modification in a noun-headed compound? I focus on two aspects: (i) What is modification-by-noun? and (ii) How do adjectives modify nouns in compounds? The second question is: How does a compound differ from a syntactic phrase in its meaning/use? Although the first of these questions (modification-by-noun) is dealt with in some detail by a number of contributions, it remains a somewhat slippery concept. The question of the role of adjectives in adjective–noun compounds is barely touched upon in the handbook (though most of the contributions to Schlücker & Hünning (2009) do address that topic). I shall propose what is effectively an onomasiological answer to the third question (echoing Carstairs-McCarthy 2010, and following Booij 2010).

In Section 4 of this article, I pointed to two approaches to analysing noun–noun compounding, viz. Lees's solution and Downing's solution. In practice, authors tend to apply Downing's solution to nonce formations, stressing the dependency on pragmatic context, while those studying lexicalized expression often adopt Lees's solution, offering a checklist of fixed meanings. In his discussion of a corpus-based study of verb–noun compounds in Italian, Ricca (2010: 249–253) makes the interesting point that we are more likely to find a smallish fixed set of meaning relations in lexicalized examples and that the examples provided by corpus searches tend not to be amenable to a Lees's solution approach. He argues that we should trust the corpora and the nonce formations as indicative of how the system actually works and I concur in that. In fact, we should go further: languages such as English have a variety of ways of modifying a noun with a noun, including possessive expressions such as *the girl's book*. In some cases, the semantics of the 'possessor' relation is clear because it is defined by the head noun. Kin terms and nouns denoting composite objects imply an argument structure, inducing an inalienable possession reading, e.g. *the girl's mother*, *the dog's leg* (see Barker 1995 for detailed discussion). But with ordinary 'intransitive' nouns the 'possessor' relation can be cashed out in just as many ways as in noun–noun compounds. Thus, *the girl's book* could refer to a book she owns, a book she has borrowed, a book she is illustrating, a book containing her life story, and so on.

The reason why fixed expressions tend to exhibit a small fixed number of semantic relations in contrast to those created on-the-fly is because a compound is essentially a name (Booij 2009), as stressed in the onomasiological tradition (but dismissed rather summarily by the editors in their

introduction, 7). Mithun points out that this is also true of the noun incorporation process of Mohawk (see also Mithun 2000: 924). To some extent this is even true of highly productive and regular compounding in Chukchee. Dunn (1999: 168) makes the following interesting observation about compounds formed from three or more components, which are regarded as noteworthy and often amusing:

> When a French nurse from the organisation *Médecins du Monde* arrived in Anadyr' the brother-in-law of one of my consultants remarked that this was ANOTHER *kawrajelʏəmelʏətanŋən* 'twisted-tongue match stranger', i.e. a European outsider who speaks a language other than Russian. This term was spontaneously formed and people were very amused by it, passing it back and forth around the village for several days.

Names can be created for the moment, undergoing 'temporary lexicalization' (Dahl 2004: 256), but names which persist and get embedded in the mental lexica of speakers are likely to be those which denote recurrent semantic relations such as cause, location, and the other members of a Lees's solution checklist. But this tells us nothing about the underlying semantics of the construction-qua-construction.

The property of 'nameworthiness' (Dahl 2004: 252) applies equally to German adjective–noun compounds such as *Rot-wein* 'red wine'.[20] As Bauer (403) points out, the adjective component has a classifying function, not the function of a genuine attributive modifier, and hence *Rotwein* is the name of a kind of wine, whatever its colour. Similar English adjective–noun compounds as exemplified by *blackbird* differ in that the English construction is non-productive. But for both languages we have to conclude that the adjective–noun compounds are semantically opaque. What this means is that *Rotwein* does not actually contain the lexeme ROT in the strict sense, because it does not contain its meaning. For English *blackbird* this ought to be self-evident, just from the fact that 'X is a blackbird' does not entail that X is a black bird. For the German compounds, however, this conclusion has recently been challenged (implicitly) by Bücking (2009). He considers a fictitious adjective–noun compound *Blautee* 'bluetea' (chosen to avoid unwanted effects of lexicalization) and compares its semantics with that of the syntactic expression *blauer Tee* 'blue tea'. He argues that the underlying logical forms are identical, namely:

(5) λBLUE λTEA λx[TEA(x) $\wedge$ $\Re$(x,v) $\wedge$ BLUE(v)]

For the normal syntactic expression, the $\Re$ predicate is just identity, so that the expression in (5) reduces to λx[TEA(x) $\wedge$ BLUE(x)]. For the compound,

[20] I take 'nameworthiness' to be the essential import of the Principle of Ontological Coherence referred to by Bücking: 'A complex concept as the denotation of a morphological object picks out a coherent individual from one of the domains of individuals' (Bücking 2009: 192, citing Olsen 2004).

however, ℜ is interpreted to mean PART-OF, so that *Blautee* means (crudely) 'some x, tea, and some blue entity, v, such that v is "PART-OF" x'. By deploying a 'PART-OF' interpretation, Bücking can account for why an expression such as (6) is not incoherent:

(6) Dies ist ein roter Blautee.
this is a red Bluetea
'This is a red bluetea.' (cf. 'This is a white blackbird.')

This analysis appears to allow us to say that the adjective–noun compound is compositional. However, Bücking concedes that the PART-OF relation has to be interpreted very broadly. He considers a scenario in which one kind of tea is kept in a yellow box while another kind is kept in a blue box. It would then be possible to refer to the two kinds of tea as *Gelbtee* 'yellowtea' and *Blautee* 'bluetea'.

This is precisely the kind of scenario that is appealed to by proponents of Downing's solution to noun–noun compounding. It shows that there is no purely semantico-logical way of restricting the conceptual relation between the head and the adjective modifier in adjective–noun compounds. We must therefore accept the conclusion that the adjective is a classifier, not a true modifier. However, when we drew a similar conclusion with respect to noun–noun compounds we were able to maintain the claim that the compound itself was compositional: the pragmatically specified ℜ relation relates (the denotations of) two lexemes.[21] The situation with adjective–noun compounds is subtly different, however. We have just seen that, if we wish to fix the denotation of the lexeme ROTWEIN (or the nonce formation BLAUTEE for that matter), we cannot appeal to some pragmatically determined relation holding (compositionally!) between the denotations of the lexemes ROT and WEIN. As an attributive modifier, it is the function of the adjective itself to express such a relation, but it cannot do that if it has a classifier function. Therefore, all adjective–noun compounds with classifier function are non-compositional (even if some of them are semantically transparent for a given occasion of use). This is not because such compounds have a naming function (noun–noun compounds also have a naming function), it is because the adjective component has been deprived of its normal function, so that all that is left of it is a meaningless 'tag'.

[21] Ackema & Neeleman (2004: 8of.) claim that this means that noun–noun compounds are necessarily non-compositional. However, they seem to be using 'non-compositional' as a lazy synonym for 'semantically indeterminate'. Freely created noun–noun compounds are extremely 'compositional': they would be unusable if they did not relate canonical or easily accessed meanings of each component noun. It is just that you cannot tell exactly what the semantic relation is OUT OF CONTEXT. But to say that such compounds are 'non-compositional' is like saying that the sentence *I like ice-cream* is non-compositional because we cannot tell just by looking at it who the speaker is.

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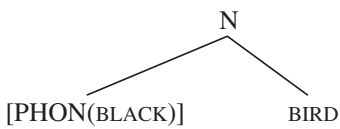
We should not conclude, however, that all expressions which have the formal properties of compounds are equally word-like and hence function equally as typical naming expressions. Mithun (2010) presents a very nice contrast between the highly productive and in many ways syntactic noun incorporation construction of Kapampangan and the much more lexicalized process in Mohawk. For adjective–noun compounding a perhaps starker contrast can be found when we compare the Germanic adjective–noun compounding process with, say, the completely productive incorporation process in Chukchee (as described in Spencer 1995, for instance; see also Muravjova 1998: 527f.; Dunn 1999: 168f.). Unless they are focussed, adjectives are freely incorporated into the nouns they modify; indeed, incorporation seems to be obligatory if the modifier is not in focus. If the noun head is an argument in any morphological case other than the absolutive then incorporation really is obligatory. Crucially, the incorporated adjective has exactly the same effect on the modified noun as a non-incorporated adjective. A typical scalar or intersective adjective delimits the denotation of the head noun: a compound of, say, 'large' and 'whale' is a whale that is large (for a whale). Dahl (2004: 225–246) discusses a number of other languages in which adjectives can or sometimes must be incorporated into their head nouns (see also Dahl 2007: 119–126). Particularly interesting is the case of northern dialects of Mainland Scandinavian. In the Elfdalian dialect of Swedish adjectives are regularly incorporated into definite nouns, and in the (more northerly) Arjeplog dialect it is possible to incorporate two adjectives, much as in Chukchee:

(7) *Arjeplog dialect* (Dahl 2004: 235)
Lill-vit-katt-n sprang in i sto-rö-hus-e.
little-white-cat-DEF run.PST in in big-red-house-DEF
'The little white cat ran into the big red house.'

Such cases show that the morphosyntactic property of being a compound is independent of the semantic function of naming. The Chukchee and Arjeplog compounds express common or garden attributive modification.

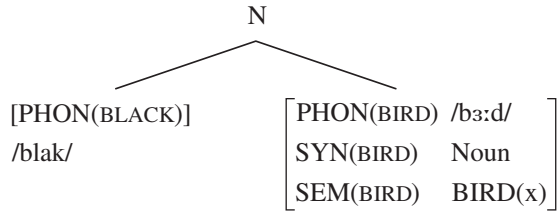
How do we represent the variety of such adjective–noun compounds, from idiosyncratic and frozen formations in English to the adjective-incorporation structures of Arjeplog? For English cases, it is easy to see what we must do: *blackbird* consists of the lexeme BIRD concatenated with the phonological form of (the root of) the lexeme BLACK, PHON(BLACK), as shown in (8).

(8) *Structure of* blackbird*: outline*



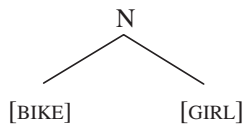
In (8), BIRD serves as a cover term for the complete lexical entry. A more elaborated representation is shown in (9).

(9) *Structure of* blackbird*: detailed representation*



This means that the compound inherits no syntax or semantics from BLACK, which is therefore effectively a cranberry morph. Exactly the same type of representation suffices for German ROTWEIN. Moreover, this is also the structure of lexicalized noun–noun compounds such as TEXTBOOK or COFFEE TABLE. However, where we have a non-lexicalized noun–noun compound, we concatenate two complete lexemes, as in (10).

(10) *Compositional, non-lexicalized noun–noun compound*



The noun–noun construction schema then interprets this compound using the ℜ relation.

The difference between German and English adjective–noun compounds is, then, that German retains a constructional schema (in Booij's sense) for the online construction of adjective–noun compounds. That schema has to specify that the phonological string that serves as a classifier can have one of two lexical sources, noun or adjective:

(11) *Constructional schema for noun-headed compounds*
Given a lexeme L_{head} and a lexeme L_{mod},
where $SYN(L_{head}) = Noun$ and $SYN(L_{mod}) = \{Noun \vee Adjective\}$,
construct a lexeme headed by L_{head} of the form $[PHON(L_{mod}) \oplus L_{head}]$.

It might be objected that this approach to productive (or semi-productive) adjective–noun compounding 'misses the generalization' that such compounds are not formed by selecting any arbitrary adjective, but rather one which is somehow contextually appropriate. But that is a fact about the formation of complex names of this sort and is equally true of those languages in which proper names are constructed out of phrases or sentences. It is not a fact about the constructional schema which licenses the structures themselves.

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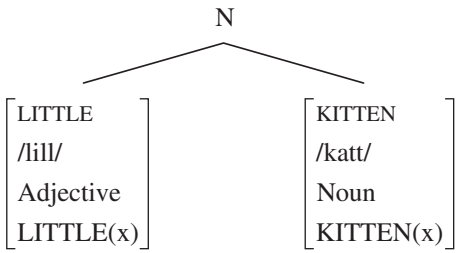
For languages such as the Älvdal/Arjeplog varieties of Swedish, Chukchee and others, in which the compounded adjective functions as a genuine modifier, we need to permit compounding of full lexemes, as in (12).

(12) *Structure for compositionally incorporated adjective*



Provided the grammar can recognize the adjective as a category that modifies a head noun (for instance, by virtue of MOD ⟨[HEAD *noun*]⟩ feature specification, as proposed in Sag, Wasow & Bender (2003: 244), or by virtue of the lexical representations suggested in Spencer (1999), it will be possible to write a straightforward interpretive rule which will provide the same semantics for (12) as it would provide for an ordinary noun phrase with unincorporated adjective.

To summarize the discussion, I have limited myself to endocentric noun-headed compounding (excluding synthetic compounding) where the non-head is a noun or adjective. Even this very limited empirical domain poses important problems. Compounds are fundamentally naming expressions and therefore they tend to denote things which are culturally and institutionally recognizable. I have argued that we should treat the basic modification-by-noun construction as a semantically compositional but indeterminate relation between two noun lexemes mediated by the pragmatically determined ℜ relation. This creates a kind of 'temporary name'. The relation is of necessity compositional. In the Village Hall scenario, the only reason for labelling a table (of whatever shape) the 'coffee table' is because it has some pragmatically accessible relation to coffee. Lexicalized noun–noun compounds will generally fix some more specific institutionalized conceptual relation. In many cases, there is the illusion of semantic relatedness but this is because such compounds are effectively (semi-)transparent idioms. Where the idiom is relatively transparent (as with, say, *piano bench*), we have the impression that the compound contains the full lexeme PIANO, including its meaning, but this is probably misguided. Actually, *piano bench* is non-compositional, and that is why you can use one for playing the organ, the clavichord or even a desktop computer connected to a MIDI output without linguistic contradiction. In other cases, it is obvious that the idiom is completely opaque (*penknife*), but how opaque a compound is depends more on one's knowledge of the world and of etymology, than on one's lexicon. What this means is that linguistic theory needs to countenance constructional

schemata (in the manner of Booij) which can define a compound such as *piano bench* as 'lexeme headed by BENCH whose phonological form is the phonological form of some noun lexeme (namely, PIANO) left-appended to the phonological form of the head (BENCH)'.

For English adjective–noun compounds (e.g. *blackbird*), the schema in (9) the only possible analysis. Despite initial appearances, German adjective–noun compounds, too, have to be treated as non-compositional and idiomatic. Thus, *Rotwein* consists of the phonological form /ro:t/ appended to the (phonology of the) lexeme WEIN. But there is more scope for constructing new expressions of this form, so that the schema for German compounds allows the phonological left element to be that of an adjective lexeme as well as a noun lexeme. For the Northern Scandinavian dialects, Chukchee and other languages with productive adjective incorporation, the construction combines the two complete lexemes. The default syntax/semantics of an attributive adjective then guarantees that the expression is interpreted as a synonym of a phrasal construction (with language-specific additional subtleties of interpretation).

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