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Compound or phrase? English noun-plus-noun constructions and the stress criterion[1]

HEINZ J. GIEGERICH
University of Edinburgh
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This article argues that English noun-plus-noun constructions ('NNs') originate both in the lexicon and in the syntax. It distinguishes between complement–head and attribute–head NNs, as well as between fore-stressed and end-stressed NNs. It argues that complement-head NNs are fore-stressed and originate in the lexicon while attribute–head NNs typically have end-stress and syntactic provenance. The latter are, however, potentially subject to diachronic lexicalization, which may moreover involve the adoption of fore-stress. Hence, lexical NNs may be fore-stressed or end-stressed while phrasal NNs must be end-stressed. Although further potential sources of irregularity are identified, it is demonstrated that the model's predictive power is fairly robust and that, where it fails to predict firm stress patterns, it predicts their variability.

1 Introduction

Linguists continue to argue about the place in the grammar in which English noun-plus-noun constructions (henceforth 'NNs') are assembled. The traditional view – from Bloomfield (1933) via Lees (1963) and Marchand (1969) to, most recently, Payne & Huddleston (2002) – has been that some NNs, such as *steel bridge*, are phrases, originating in the syntax, while constructions such as *watch-maker* are compound words, produced – in terms of current understanding of the architecture of the grammar – in the lexicon by the derivational morphology. Levi (1978), Selkirk (1982), and Di Sciullo & Williams (1987), on the other hand, argue that all such constructions originate in the lexicon. Liberman & Sproat (1992) take the view that of the two examples given above, representing N^1 and N^0 constructions respectively, the former must be generated in the syntax; but for the latter they find no evidence suggesting a different, i.e. lexical, provenance. Finally, Bauer (1998) finds that the various criteria invoked by others to motivate a syntax–lexicon split for NNs fail to correlate with each other; and he concludes that there is therefore no evidence to support any assumption of different grammatical modules being involved in the generation of NNs.

The criterion invoked most frequently by those arguing for split sites has been stress. NN compounds are said to have fore-stress, NN phrases end-stress.[2] The most radical

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[2] I use the terms 'fore-stress' and 'end-stress' throughout, synonymously with what many analysts used to call 'single stress' versus 'double stress' or 'level stress'. I do not believe that a systematic difference between

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proponent of this position was probably Bloomfield (1933: 228), who argued that *ice cream*, with a variable stress pattern, was a phrase for some speakers and a compound for others 'although there is no denotative difference of meaning'. Lees and Marchand also draw the category distinction along stress lines, although the latter's very detailed analysis admits of other criteria for certain compound types (1969: 20ff.). But Lees' (1963: 120) observations whereby *Madison* ˈ*Avenue*, *apple* ˈ*pie*, etc. vs. ˈ*Madison Street*, ˈ*apple cake* display a robust stress contrast without differing in any other aspect of behaviour have served to discredit the stress criterion in much of the more recent work. The formal phonological literature (e.g. Halle & Keyser, 1971: 21; Liberman & Prince, 1977; Giegerich, 1992: 257f.) has tended simply to note that certain compounds are haphazardly (and exceptionally) stressed like phrases – a position not very helpful to the morphosyntactic analysis of such constructions – and Schmerling (1971) finds stress in such constructions essentially unpredictable. This is then also the position held by Bauer (1978: 89ff.; 1998: 70ff.).

I want to argue in this article in favour of the traditional position whereby NNs are generated on split sites: in the syntax as well as in the lexicon. I will do so by invoking in the first instance the stress criterion (although not in the same way as Bloomfield and Lees did); and I shall demonstrate that my version of that criterion correlates rather well with the other structural and behavioural characteristics associated with the syntax and the lexicon respectively. Viewed the other way round, the split-site model is capable of correctly predicting a firm stress pattern for some NNs and a variable one for a distinct class of others. And while not eliminating irregularity altogether, it will go some way towards identifying it, and towards explaining its existence.

2 NN stress: known generalizations and tendencies

The stress patterns of NNs are in reality far less chaotic than Schmerling (1971) and the formal phonological literature suggest: some important regularities have long been known.

Kingdon (1958: 149ff.) distinguishes between (1) NNs where 'both components are ordinary nouns', (2) NNs where 'the second noun is a *nomen agentis*', and (3) NNs where 'the second component is a gerund'.[3] For category (1), of which *steel bridge* would be a member, he claims that 88 per cent of his data (whose origin is unclear) have end-stress, noting however that many nonce formations come into this category, and that 'a compound needs to become established before it tends to develop single stress [= fore-stress. HG]' (1958: 150). For (2), of which *watch-maker* would be an example, he finds invariably fore-stress except where the first component is not the object of the second (*town* ˈ*crier*). And for (3) he again has fore-stress in 88 per cent of all cases (e.g.

end-stress and 'level stress' exists (cf. Faiß, 1981: 132); and I find the dichotomy of 'single stress' versus 'double stress' misleading. Both *watch-maker* and *metal bridge* have two stresses, contrasting with *postman* and *St Paul* respectively, which do have single stresses and reduced unstressed vowels.

[3] Kingdon's fourth category is one where 'the first component is a noun in the possessive'. Such constructions are only briefly discussed below.

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ˈ*fox-hunting*), the exceptions being items where 'the first component has an attributive function towards the gerund' (1958: 153): *lead* ˈ*poisoning*, *mass* ˈ*meeting*, etc.

Kingdon's statistics are clearly not very meaningful. More importantly, his reliance on 'established' compounds (and his implicit rejection of nonce formations as distortions of the picture) puts an undesirable bias on listed forms. Much of the literature before Downing (1977), notably Marchand (1969), is in fact guilty of this disregard for the productive aspect of compounding, focusing instead on the taxonomy of unproductive patterns like *birdbrain* and *pickpocket*. Nevertheless, Kingdon's categorization reveals some very clear tendencies towards regularity: in particular, I shall return to the idea that 'established' (lexicalized) NNs may develop fore-stress, as well as to the notion of 'attributive' – as opposed to complement – function.

Fudge (1984: 144ff.), slightly simplified here, observes that end-stress among NNs is likely to occur in the following categories: (a) where N_1 is a location or a time (*kitchen* ˈ*sink, night* ˈ*watchman*), and (b) where N_1 is a material N_2 is made of (*cotton* ˈ*dress, meat* ˈ*pie*). Further categories attracting end-stress include *Ilkley Moor*, *William Smith*, *pound note*, etc. What is important to note here is that both Kingdon and Fudge identify NNs whose N_1 has some sort of attributive function as potential and perhaps likely cases of end-stress, while on the other hand items such as *watch-maker*, where N_1 is the 'object' of N_2 rather than its attribute, have fore-stress for Kingdon and are similarly not among the potential-end-stress categories for Fudge. These are fairly robust generalizations, which also shed light on the stressing of well-known doublets such as *glass* ˈ*case* vs. ˈ*glass case*, *steel* ˈ*warehouse* vs. ˈ*steel warehouse*, where stress differences correlate very clearly with meaning differences (Faiß, 1981; Ladd, 1984; Bauer, 1998; Carstairs-McCarthy, 2002: chapter 6).

There is, then, rather more pattern and less chaos among NN stress than has been assumed in the phonological literature. But in the rule formalisms of Generative and Metrical Phonology, statements like Kingdon's and Fudge's would have been inexpressible, and would have been noted as 'informal generalizations' at best. I hope to show below that the generalizations at stake in this particular instance are in reality far from 'informal'; meanwhile one wonders whether such constraints on the form of generalizations haven't been responsible for the lack of progress in the metrical phonology of NN stress.

3 Assuming split sites: predictions for NN constructions

Let us hypothesize in the following sections that English NNs are capable of originating both in the syntax and in the lexicon. Such a hypothesis is not unreasonable: Bisetto & Scalise (1999) have fruitfully pursued it for Italian; and it constitutes a fairly traditional position among Anglists. It amounts to saying, roughly, that *steel bridge* is a phrase (N^1), rather than a compound word (N^0) that happens to be stressed like a phrase, and that conversely *watch-maker* is a compound word. There is actually not much doubt in the literature regarding the accuracy of the latter; but recall that Liberman & Sproat (1992) failed to find the evidence needed to establish N^0 constructions of the form

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NN in the lexicon. We will have to find this evidence. Before turning to *steel bridge* and *watch-maker*, I briefly review the properties associated with complex N^1s and N^0s that are already attested in the syntax and the lexicon respectively. This will enable us to have specific expectations regarding the behaviour of phrasal and lexical NNs – assuming both types exist.

3.1 Expected behaviour of phrasal NNs

If NNs can be phrasal then they are expected to conform with the behaviour of other syntactic constructions whose heads are nouns and which have pre-head dependents. Here is a summary of the behaviour of such constructions.

First, the normal stress pattern of such phrases – in fact of all phrases – would be one of end-stress according to (1) below. Fore-stress does not occur among syntactic constructions in rhetorically stress-neutral situations.[4]

(1) In any pair of sister nodes $[AB]_X$, where X is a phrasal category, B is strong. (Liberman & Prince, 1977: 257)

Second, any syntactic construction would be expected to be fully productive as well as semantically fully transparent. Failure to be either or both would make it lexical.

Third, if we draw the standard distinction among the dependents of a head between complements and modifiers then the pre-head dependent of a noun, in a syntactic construction, must be a modifier ('attribute'):

(2) *Attributes* recursively expand N^1 into N^1. *Complements* expand N^0 into N^1. (Radford, 1988: 197)

Hence, Radford argues, the irreversible order of dependents in constructions such as *a Cambridge physics student*, where *Cambridge* is attribute and *physics* complement. The same view is taken, and illustrated in detail, by Payne & Huddleston (2002: 444f., 448ff.): it seems safe to conclude that in the syntax, any pre-head dependent where the head is a noun must be an attribute.

The attribute function is commonly associated with adjective phrases: *large dog, very large dog, boring article, excruciatingly boring article*, etc. If we allow the existence of phrasal NNs then nouns must be allowed to be attributes. There seem to be no syntactic arguments against this[5] – see again Payne & Huddleston (2002), as well as Radford (1988) and indeed most of the current introductory syntax texts.[6]

[4] See Schmerling (1976) on the problems associated with the notion of 'normal stress', and Ladd (1984) on de-accenting as in *the* ˈ*Pope died*. I share Liberman & Sproat's (1992) view, contra e.g. Ladd (1984) and Bolinger (1972), whereby the difference between compound and phrasal stress is not fundamentally – although perhaps in highly restricted circumstances: see fn. 20 below – due to 'FCA effects' (focus, contrast, anaphora). See Liberman & Sproat (1992) for discussion.

[5] **A Cambridge tall student* is not a matter of a complement occurring outside a modifier: see Payne & Huddleston (2002: 452f.).

[6] But see Burton-Roberts (1997: 163), who calls such constructions compounds, without however arguing for this position.

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In semantic terms, attribute–head constructions of the kind *Cambridge student*, *large dog* display no internal argument structure: both elements are arguments of an external, inferred predicate: a student who *lives/studies at* Cambridge, a dog that *is* large. Liberman & Sproat (1992) refer to NNs of this kind as Argument–Argument constructions, in contrast to the *watch-maker* class, where N_1, complement of N_2, is an argument of the predicate *make* embedded in N_2. They call this type of construction Argument–Predicate. These terms, and especially the distinction they denote, will be useful below.

I will argue in section 3.3 below that NNs such as *steel bridge* are generated in the syntax.

3.2 Expected behaviour of lexical NNs

If English has lexical NNs – NN compounds – then their behaviour must conform with that associated with other, perhaps morphologically complex, nouns. Here again is a summary of such behaviour.

First, through mechanisms in the lexicon not relevant here (see e.g. Kiparsky, 1982; Giegerich, 1999: chapter 3), morphologically complex words may be subject to listing – e.g. *warmth, fraternity* – or they may be the outputs of fully productive morphological processes (*goodness*, and for other lexical categories e.g. *homeless, nicely*). Therefore, if there are lexical NNs then these may be listed – for their idiosyncratic meanings and/or their irregular forms – or they may be instances of productive and transparent patterns.

Second, like most complex words they will be expected to be right-headed (Lieber, 1992); and, if the *non-* in *non-event* is a modifier and the *kind* in *kindness* a complement, then lexical NNs may be either attribute–head ('Argument–Argument') or complement–head ('Argument–Predicate') constructions.

Third, as Bauer (1998) discusses in detail, the lexicalist hypothesis whereby individual elements of words are unavailable to the syntax should apply to lexical NNs. This hypothesis gives rise to a number of tests for wordhood, and hence also compoundhood, not all of which are unproblematic. Thus, the first element of an NN should not be pluralizable just as **eventsful* is ill-formed.[7] Neither element should be allowed to be deleted in coordination – compare phrasal *two red and four yellow roses*, and lexical **quick- and thoroughly*. Further, the elements of NNs should not permit independent anaphora, or replacement with *one* (**a bus-driver and a truck one*); nor should they be independently modifiable.[8] I return to these tests for compoundhood below.

And finally, the stress pattern. One of the more startling generalizations brought to light by Metrical Phonology (Liberman & Prince, 1977) was that the prominence

[7] But see Bauer (1998: 73f.) for discussion.

[8] On this see again Bauer (1998: 73f.), and on constructions such as *ingrown toenail treatment*, *severe weather allowance*, Carstairs-McCarthy (2002: 81ff.) and especially Lieber (1992).

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relations within noncompound nouns are identical to those that hold among the elements of compound nouns:

(3) In any pair of sister nodes $[AB]_L$, where L is a lexical category, B is strong if it branches. (Liberman & Prince, 1977: 257)

This generalization accounts for the stress patterns of noncompound nouns such as *ˌintroˈduction*, *senˌsatioˈnality* (with branching right feet) vs. *ˈproˌtest*, *ˈconˌquest* (with nonbranching right feet); and it equally handles compounds: right-branching structures such as [[*ˌArts faculty*] [*ˈentrance test*]], [*government* [*ˈworking party*]] vs. non-right-branching structures such as [[*ˈgreen-house*] *effect*] and, of course, [*ˈwatch-maker*]. Fore-stress among two-component compounds is hence predicted by (3), the lexicon's main mechanism that governs complex prominence contours.

There is however among English nouns a subclass whose members have final stress. Some examples are given in (4):

(4) (a) Juˈly caˈnal (b) ˌponˈtoon ˌchamˈpagne (c) ˌfricasˈsee ˌmagaˈzine

This class is fairly small (Fudge, 1984: 34ff.), certainly in Southern British and non-British English; it is moreover unstable both synchronically and diachronically. Synchronically, eligible nouns of this class are prone to undergo Iambic Reversal: *ˈcham ˌpagne* ''*breakfast*, etc.; and polysyllabic items such as those in (4c) are now frequently fore-stressed: *ˈmaga ˌzine*. And diachronically, this class has massively declined: French loans such as *virtue*, *pardon*, *avenue*, and countless more had end-stress when they were first borrowed and lost it gradually during the second half of the millennium. Clearly this class is best accounted for in the synchronic phonology by regarding it as exceptional (Giegerich, 1992: 183ff.; Hayes, 1982). But its existence is highly significant for the present study in that it establishes a precedent for end-stressed nouns in the lexicon. The behaviour of non-compound nouns therefore predicts for compound nouns – lexical NNs – that they will have fore-stress or, exceptionally, end-stress. End-stress does not, as Liberman & Sproat (1992) claim, necessarily identify a given NN as being of syntactic provenance.

I will show in section 3.3.2 below that *watch-maker* is a lexical NN.

3.3 Two prototypes: steel bridge *and* watch-maker

I want to show in this section that *steel bridge* and *watch-maker* are unequivocally phrasal and lexical respectively. My argumentation will follow Occam's Razor in the familiar sense that, if locating a given construction in one of the two modules of the grammar would force us to introduce mechanisms there that are already present in the other module, then this constitutes evidence that the construction originates in the other module.

Establishing the two prototypes will facilitate a more informed subsequent discussion of the less clear-cut and possibly borderline cases; and it will of course confirm this

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article's main hypothesis whereby both the syntax and the lexicon are potential sources of NNs. The method pursued here has thus not much in common with that of Bauer (1998), who denies the existence of separate NN sources as long as a borderline area, rather than a sharp divide, exists in which the distinction may be blurred or even nonexistent. Unlike Bauer, but with Payne & Huddleston (2002) on this particular issue, I will 'take the view, here as in so many other areas of grammar, that the existence of borderline cases does not provide a reason for abandoning a distinction that can be recognised in a great range of clear cases' (Payne & Huddleston, 2002: 450). Indeed I hope to show below that the divide between the syntax and the lexicon must be expected to be blurred, and that it must therefore be modelled as such, in order to facilitate the movement of constructions from the former into the latter through time ('lexicalization').

3.3.1 The phrasal nature of steel bridge

Steel bridge, prototype here of the attribute–head NNs, is an instance of the class of NNs for which Fudge (1984: 144f.) predicts end-stress: N_1 denotes the material N_2 is made of. In semantic terms, N_1 clearly plays the same role as a descriptive adjective modifying *bridge* might; but note that no synonymous adjective is available to replace *steel*. Such an adjective, denoting material, would have to be denominal if it were derived, like *wooden*. However, not only is *-en* the only English suffix denoting 'made of', it is also fossilized and now confined to four adjectives – according to Marchand (1969: 270) – and several decades after Marchand perhaps more realistically to two: *birchen* (?), *earthen* (?), *wooden, woollen*. A few more – *golden, leaden, silken*, etc. – are now used only metaphorically (*golden wedding* vs. **golden watch*). This means that for the vast majority of nouns denoting the material out of which something may be made, no derived adjectives are available in English. And it follows that, if *wooden bridge* is a phrase, then so is *steel bridge*. There simply is no adjective–noun contrast for 'material' in this context.

Note that *steel bridge* also follows Bauer's (1998) criteria for phrasal status. First, the semantics of *steel bridge* is entirely transparent, and the pattern is fully productive: there is no reason to treat this construction as listed. Here are some more examples, some of them probably novel:

(5) silk shirt
stone wall
aluminium roof
plastic lawn
chocolate fence
rubber radio

Second, both elements are amenable to modification; they are not syntactically isolated. *Steel suspension bridge, stainless steel bridge*, etc. are perfectly possible without in the latter case denoting that it is the bridge that is stainless. Third, co-ordination is possible, even across the adjective–noun divide: *steel and aluminium bridges*, *steel and wooden bridges*. And finally, the head of the construction can be

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replaced by *one*: *a wooden bridge and a steel one*. Note also that nouns denoting material can be used predicatively, probably by most speakers, like their adjectival counterparts: *this bridge is steel/wooden*.

Recall that, as we saw in section 3.2 above, neither the stress pattern nor the attribute–head structure bar *steel bridge* from the lexicon in principle; nor does the fact that this pattern is fully productive and semantically transparent. All these features are known to occur among complex nouns. It is the absence of a truly adjectival morphological alternative that clinches the argument here: if *wooden bridge* were phrasal and *steel bridge* lexical, then the syntax – supposed to be fully productive – would have an unexplained gap denoting bridges made of steel, and the lexicon (less problematically: lexical gaps are not unusual) would have one denoting bridges made of wood. Such constructions, then, must originate on a single site. By Bauer's (1998) criteria, this site is the syntax – see also again Radford (1988: §4.7) and Payne & Huddleston (2002: §14.4). Any argument to the contrary would have to be circular ('because nouns can't modify nouns in N^1').

3.3.2 The compound nature of watch-maker

Perhaps the most obvious prototypes of lexical NNs would be items such as *red-shank* or *silverfish*, much discussed and taxonomized in the literature (e.g. Jespersen, 1942; Marchand, 1969; Adams, 1973, 2001): there is no productive morphological process in Modern English that generates exocentric ('bahuvrihi') constructions like the former, which denotes a bird while the latter is an insect, not a fish. So, for different reasons both examples must be listed and hence lexical. And note that both have fore-stress, available only in the lexicon.

The case of *watch-maker* is more interesting, an example of a 'secondary compound'. Here are some more examples, some of them probably novel:

(6) coach-driver
soap dispenser
hedge inspector
raspberry cook
syntax provider
poetry generator

This is a construction where the first element is an argument – usually an object – of the predicate embedded in the deverbal head noun. The head noun may be an agent or device noun (like those in (6)), or a gerund (as in *story-telling*), or some other deverbal noun (*syntax provision*, *haircut*). These Argument–Predicate constructions have received much attention (e.g. Roeper & Siegel, 1978; Selkirk, 1982; Lieber, 1983; Levin & Rappaport, 1992), as they form a class that is not only very large but also highly homogeneous in behaviour. Clearly, productive processes are involved in the generation of such forms. But the technical nature of the processes, which is what much of the debate has been about, is of no concern here; what is of concern is the much less contentious assumption that they are located in the lexicon.

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First, as I discussed in section 3.2 above, the syntax of English is not otherwise known to generate NNs (or indeed any other N^1 constructions containing pre-head dependents) where the dependent is a complement. Despite the productivity of the process and the semantic transparency of its outputs – features which, as I noted above, are by no means alien to lexical processes – there is no Occam's-Razor argument in favour of syntactic status for these constructions.

Second, most of the tests arising from the lexicalist hypothesis, invoked by Bauer (1998), support a lexical analysis inasmuch as they are not in themselves problematic. For example, *waterproof watch-maker* does not seem to permit an interpretation whereby *waterproof* modifies merely *watch*. **Watchesmaker* is ill-formed. And replacing the head with *one* is clearly ruled out: **a watch-maker and a cabinet one*.

However, co-ordinated constructions such as *clock and watch-maker*, *watch-maker and repairer* do not seem in any way ungrammatical – for example above a shop window[9] – despite the fact that the lexicalist hypothesis supposedly outlaws them. Bauer (1998: 74ff.) discusses several cases where this alleged test for the syntactic or lexical status of a given construction fails to work – always, it seems, in such a way that an otherwise clearly lexical construction is nevertheless amenable to co-ordination, never the other way round. (See also Bisetto & Scalise, 1999.)

It is by no means clear, however, whether this deletion of identical elements in co-ordination is a syntactic process at all. Booij (1985) and Wiese (1996: 69ff.) have argued – compellingly, I think – that it is a phonological operation involving the deletion of identical phonological material, minimally of phonological-word size, that is repeated later in the phrase in parallel position. Thus, in German (where the process appears to be stylistically more common than in English), not only the elements of compounds freely delete but also roots after prefixes, or suffixes after roots:

(7) Tief- oder Hochebenen ('low plains or high plains')
Ur- oder Ururoma ('great- or great-great-grandmother')
mütter- und väterlich ('motherly and fatherly')
*winz- oder riesig ('tiny or huge')

(Examples from Wiese, 1996: 70)

-ig, in the last example, fails for independent reasons to qualify for phonological-word status; all other deleted elements here, occurring in what clearly are lexical constructions, are phonological words. There is no reason not to adopt such an analysis for English; limitations on the actual application of the process within its formal domain may well be controlled by pragmatics, such that e.g. *kind-* and *happiness* (where *-ness* is by all accounts a phonological word) would be avoided perhaps because of parsing difficulties: *kind* can be mistaken for an independent word. If this alternative analysis of co-ordination deletion is accepted for English, then applicability of the phenomenon ceases to be a possible test for lexical status.

[9] I have recently seen *coal and fuel merchants* and *pallet and timber-merchants* on the sides of Edinburgh vans.

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And finally, the stress pattern. Like all other secondary compounds, *watch-maker* has fore-stress (recall Kingdon, 1958, discussed in section 2 above). This means not only that Occam's Razor enforces lexical status for such NNs – as we saw above, this stress pattern is the unmarked one for nouns while at the same time being unattested in the syntax. Moreover, recall that end-stress is also possible in the lexicon – precedented by an exceptional class of nouns such as *champagne* and *bamboo*. There would be an inconsistency in the stress system if a fully productive lexical process produced forms which have an exceptional stress pattern. It is therefore reassuring for our analysis that secondary compounds invariably have fore-stress.

4 Primary compound NNs: complement or attribute?

We have established that NNs are assembled in the syntax as well as in the lexicon. Secondary compounds (*watch-maker*) are unequivocally lexical. *Steel bridge* (and all other NNs behaving in the same way) has been shown to be phrasal. The central differences between these two prototypical constructions are, as we have seen, their internal structure as well as their stress patterns.

In what follows I will further investigate, and substantiate, the claim whereby all fore-stressed NNs must be lexical. But I will also show that constructions similar in internal structure and even stress to *steel bridge* are capable of occurring in the lexicon, possibly moved there from the syntax through the diachronic process of lexicalization, and that in the lexicon they may then adopt fore-stress. Perhaps Bloomfield's (1933: 228) example of *ice cream*, with variable stress, is an instance of this. I hope to pin down variable stress patterns, of the *ˈMadison Street – Madison ˈAvenue* type which have so upset phonologists in the past, to the one class of NNs which have an attribute–head structure, and I shall associate the phenomenon with lexicalization. This will both delimit quite substantially, and explain, what variability there is in NN stress patterns.

Note first that the distinction implied here between secondary and primary compounds is not entirely clear-cut (Allen, 1979). There are, for example, forms which share the behaviour and semantic structure of *watch-maker* without containing morphologically deverbal heads: *ballistics expert*, *soccer fan*, *music critic* (Liberman & Sproat, 1992: 140). And it should also be noted that in the discussion that follows, the distinction drawn between attribute–head and complement–head (= argument–predicate) constructions is not always as clear as it is in *steel bridge* vs. *watch-maker*. I will however suggest a heuristic for this.

4.1 Complement–head NNs

There is a substantial class of NNs which have the regular dependent-plus-head structure but where the semantic relationship between the two elements is not predictable. These are exemplified in (8) below.

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(8)

battlefield	seat-belt
fruit-market	windscreen
glass case	fog horn
hand cream	hair net
milk-bottle	tea spoon
tear gas	mosquito-net
toothpaste	shoe-horn
toy factory	hair oil
sparrow-hawk	brick-yard

The semantic relationships occurring in such NNs have been painstakingly classified by Adams (1973: 60ff.; 2001: 82ff.); it would seem that in most cases the paraphrase 'N for N' (*milk-bottle* 'bottle for milk') is about right (although not very illuminating, as we will see below). Note however that such interpretations are only possible when the construction is fore-stressed. Under end-stress entirely different meanings, attested or hypothetical, arise:

(9)

sparrow hawk	'hawk that is a sparrow'[10]
toy factory	'factory that is a toy'
milk bottle	'bottle made of milk'
glass case	'case made of glass'
tooth paste	'paste made of teeth'
hair oil	'oil made of hair'
hair net	'net made of hair'
tear gas	'gas made of tears'
brick yard	'yard made of bricks'

I suggest the difference between (8) and (9) lies in the distinction between complement and attribute dependents in NNs: in (9), the dependent has an attributive interpretation while in (8) it is a complement. I deal with such structures in more detail in section 4.2 below. What is important here is that, for an interpretation other than that in (9) to be achieved for such an item, it has to have fore-stress. Fore-stress is of course only available in the lexicon. So is the complement–head structure for NNs.

This suggests that NNs with semantic interpretations other than those associated with attribute–head constructions ((9) above) must be lexical. We have already found this to be the case for secondary compounds (*watch-maker*) and their relatives of the *music critic* type. Secondary compounds are produced by fully productive lexical derivations whose outputs are semantically transparent. In contrast, the NNs in (8) are not (Downing, 1977; Dowty, 1979; Carstairs-McCarthy, 1992: 109). Their precise meanings depend on real-world criteria that cannot be associated with processes governing linguistic form. A mosquito-net might be used for the capture of mosquitoes (like a butterfly net – example from Carstairs-McCarthy, 1992: 109), and it is not clear

[10] Dvandvas – to be precise: Kharmadarayas (Laurie Bauer: pers. comm.) – like this hypothetical one, as well as *gentleman officer*, are under this analysis merely extreme cases of attribute–head constructions whose relationship is 'is a', and where inverting the order of constituents would yield semantically similar results. *Toy soldier* is less obvious (perhaps because a toy soldier is not actually a soldier in the real sense).

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whether in its real sense it serves to keep mosquitoes in or out. Even with fore-stress, a fog-horn might be a horn that produces or contains fog, or a tool to manipulate fog with, or something that occurs in fog. And compare *milk-bottle*, *milk tooth*, *milkman*, *milk-weed*, and *milk-fever*, probably none of which have an attribute–head relationship (Lass, 1987: 200). None of this uncertainty occurs with either secondary compounds or attribute–head NNs, to be discussed below. This means that NNs such as those in (8) must be listed at least for their specific meanings. An extreme case of such meaning-driven listing is of course *silverfish*, mentioned above, which shares with the NNs discussed here a regular form. And recall also that items such as *red-shank*, *pickpocket* must be listed for their irregular form. All these have fore-stress.

I turn briefly to the tests for lexical status arising from the lexicalist hypothesis. I believe that those confirm the distinction here drawn. For lexical ˈ*hair-net* ('net for hair') vs. phrasal *hair* ˈ*net* ('net made of hair'), compare **a hair-net and a mosquito one* vs. *a hair net and a string one*. Note also that e.g. in *curly hair net*, as far as I can see, *curly* modifies *hair-net* or *hair*, but the latter only if the net is made of curly hair, i.e. if the construction is phrasal. It is of course difficult to disregard stress and spelling differences in the second, independent-modification test.[11] And more importantly, all NNs under discussion here would have to be subjected to these tests to obtain reliable results.

4.2 Attribute–head NNs

Recall that *steel bridge* was identified in section 3.3.1 above as the prototypical attribute–head NN, formed in the syntax. We also saw in section 4.1 that NNs onto which end-stress is forced will acquire semantic interpretations consistent with the attribute–head form.

The problem with invoking the stress criterion in this distinction between attribute and complement constructions is that even with what seem to be the core meanings of attribute constructions, namely the 'made of' relationship exemplified by *steel bridge*, as well as more generally the 'belonging to' or 'associated with' relationship, fore-stress is very common. Consider (10), mostly from Liberman & Sproat (1992: 142):

(10)	(a)	fruit juice	rock dust	(b)	rose petal	mountain peak
		orange juice	rock wool		pine cone	door knob
		vegetable oil	bread crumb		river water	fence post
		fish oil	horse hair		oak leaf	shirt sleeve
		whale oil	grain alcohol		peanut shell	table leg

The examples in (10a) exemplify 'made of', those in (10b) 'belonging to' or 'associated with'. All are likely to have fore-stress in Standard English. Nevertheless they are of the same internal structure as *steel bridge*.

[11] Note that the co-ordination test is once again too permissive to confirm the distinction. Both *hair and mosquito-nets* (lexical) and *hair and string nets* (phrasal) are fine.

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I argued in section 3.3.1 that in *steel bridge*, the noun *steel* stands in for a nonexistent adjective – recall the extreme unproductivity of adjective-forming *-en*. I believe the same to be the case not only in (10a), where again attributive nouns stand in where fossilized *-en* has left the language with massive vocabulary gaps, but also in (10b). An attribute denoting 'associated with X' would be expected to be expressed by an adjective derived from a noun denoting X. But in English, all such adjective-forming suffixes are Latinate, able to attach therefore only to Latinate nouns and proper names – for example *-al*: *paternal*, *accidental*; *-ic*: *atomic*, *totemic*; *-ian*: *Jonesian*; *-esque*: *Andersonesque*. Germanic nouns such as those in (10b) would require equivalent Germanic suffixes (Saciuk, 1969; Giegerich, 1999: chapter 3); but English lacks those entirely.[12]

There is however a class of adjectives that stand in a suppletive rather than derived relationship with corresponding nouns and which denote precisely what is needed here: 'associated with'. These are the 'collateral' adjectives (Koshiishi, 2002):

(11) (a) cow – bovine
cat – feline
seal – phocine
dog – canine
fish – piscine

(b) spring – vernal
sea – marine
earth – global
arm – brachial
foot – pedal

Koshiishi (2002) lists an astonishing number of such adjectives. Many of these are unknown outwith specialized jargons; all of them are Latinate. Most are only available for attributive use: those in (11a), if used predicatively, have metaphorical meanings: *his calm was bovine*. And some are subject to further restrictions so as to occur only before specific nouns – hence *spring equinox*, *vernal equinox*, *spring cabbage* but not **vernal cabbage*.

Note now that for all the examples in (10) above, collateral adjectives might conceivably exist – most of those adjectives are in any case unknown to the average speaker. Similarly for (9) one might imagine such adjectives, or of course invoke imaginary *-en* forms such as *milken*, *hairen*, etc. The point is that there cannot be derived or collateral adjectives to replace the initial nouns in (6) or (8) above, secondary and other complement–head compounds. This, I believe, is a reliable test – albeit one that requires some imagination! – for the attribute status of a noun.

I turn now to the stress behaviour of attribute–head NNs. Those listed in (10) are likely to have fore-stress for most speakers. According to Fudge (1984: 145) the following have variable stress (in Standard English, presumably RP):

(12) ice cream
arm-chair
orange squash
bargain basement
stage manager

[12] For e.g. *river water*, note the ill-formedness or nonsynonymity of relevant Germanic affixations: **rivery water*, **riverish water*, *river-like water*.

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End-stress in *steel bridge*, variable stress in *orange squash* and fore-stress in *orange juice* are probably due to different degrees or diachronic stages of lexicalization.

Lexicalization is the change from phrasal to lexical category status with concomitant loss of internal – morphological, phonological, semantic – structure. As Lipka (1977, 1994) notes, this change in status and indeed the whole process is strictly diachronic in nature, and driven by nonstructural criteria such as frequency of usage, etc.[13] This means that it must be possible for a phrase – perhaps a frequently used one – to enter the lexicon unnoticed, as it were, without openly and immediately displaying any changes to its form or meaning. Recall that exactly this facility exists, in the present model of the behaviour of NNs, for end-stressed phrasal NNs. They can become lexical and still have end-stress. However, recall from section 3.2 above that end-stress among nouns, while well-attested, is exceptional in Standard English, and that this is a declining class. It is plausible therefore to expect a phrase that has entered the lexicon, say *ice*ˈ*cream*, in time – for some speakers perhaps faster than for others – to lose its exception feature and become ˈ*ice-cream*.

This is not to say that every fore-stressed attribute–head NN must have individually undergone the diachronic process of lexicalization in order to get there. Given the existence of (listed) lexical NNs of that kind, originally through lexicalization, others can be coined via analogy. Examples of this are perhaps ˈ*thistle oil* and more recently *avo*ˈ*cado oil*, which as far as I am aware had fore-stress from the moment the respective products appeared on the culinary scene. They were probably formed in analogy to existing fore-stressed oils (*peanut oil*, *corn oil*, etc.). And this kind of analogy may then well be responsible for the emergence of small generalizations over clusters of vocabulary, such that all NNs ending in *Street* have fore-stress, all ending in *Avenue* or *Road* have end-stress, all in *cake* fore-stress etc. I return to such cases in section 4.6.2 below.

The process of lexicalization should be accompanied by the gradual loss of characteristics that identify a given NN as a phrase – particularly its components' availability for independent modification, its head's replaceability by *one*, etc. Indeed, *a bread-crumb and a dust one*, *a table leg and a chair one* are more odd than, for example, *a steel bridge and a stone one*. On the other hand, it would be unrealistic to expect a given phrase to abandon all its phrasal behaviour overnight as it enters the lexicon. NNs that are the outcomes of lexicalization or their analogues may well be expected to retain some phrasal behaviour, thus violating the predictions made by the lexicalist hypothesis, for as long as speakers recognize their individual components.

[13] Lipka's definition is actually more narrow than mine: for him, lexicalization is a process undergone by 'complex lexemes', which appears to imply that an item that is subject to lexicalization must already be in what we here call the lexicon. In Lexical Morphology this would be expressed as a lexeme's move from stratum 2 to stratum 1. An example of this would be the change from trisyllabic to bisyllabic *kindling*, which then denotes 'small sticks to light a fire' – note the loss of compositional semantics. Note also that the same syllabicity loss can affect other lexemes without any accompanying semantic obscuration: e.g. bisyllabic *smuggler*. See Giegerich (1999: §2.4) for discussion; and see Kastovsky (1982) for a definition of lexicalization closer to what is here so-called, as well as Liberman & Sproat (1992: 150) and Lipka (2002: 110ff.).

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At any rate, grammaticality judgements in connection with such constructions are not binary, and certainly vary from speaker to speaker. And the sharp divide between lexicon and syntax, sought in vain by Bauer (1998), cannot really be expected to exist. There is almost certainly substantial overlap, with a cline between the extremes of attribute–head NNs such as *steel bridge* at the syntax end and deeply lexicalized *silverfish*.

4.3 Excursus 1: NN stress in Scots

I turn here briefly to the stressing of NNs in Scots, for reasons that will become self-evident presently. We will see here, I believe, a much tidier picture but one that is at the same time very closely related to that of the Southern British variety described elsewhere in this article. Consider the following data – NNs in (13a) have end-stress, those in (13b) fore-stress.[14]

(13) (a) horse shoe
Mars bar
post office
bread roll
dough nut
motor bike
road end
salt water
sea water

(b) bread shop
paper shop
iron-monger
swimming-pool

It is quite clear even from this small sample that all NNs in (13a) are of the attribute–head type, where the attribute has the quasi-adjectival function similar to that in *steel bridge* above. Indeed, one can imagine in all these cases a paraphrase using a real or imaginary adjective: *equine shoe, postal office*, *breaden roll*, *motorized bike*, *saline/marine water*, etc. Note however that *horse shoe* and *motor bike* do not contain the 'made of' relation seen elsewhere, but the 'associated with' relation: end-stress for this speaker appears to cover the whole range of NNs containing attributes. Imposing end-stress on the examples in (13b) would, on the other hand, result in unacceptable interpretations such as 'a shop made of bread/paper', 'a pool that is afloat', etc. These items do not contain attributes, and adjective-plus-noun paraphrases seem inconceivable.

It would be tempting to conclude here that in (this variety of) Scots, all attribute–head NNs must be phrasal, possibly without exception, while in Southern British English the cases in (13a) would be lexicalized, as evidenced by their fore-stress. But this would beg the question of why Scots should systematically fail to lexicalize such obvious

[14] The data presented here come from a single, male speaker aged 65 from the Scottish Borders. They were noted down by me after informal conversations. Of course this does not amount to a serious survey of stress in Scots; but what is said here – although subject to confirmation through a serious study – is reliable enough for present purposes. Phil Carr (pers. comm.) confirms that older speakers (in his case in Edinburgh) would be likely to have such stress patterns.

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candidates while other varieties of English do lexicalize them; and at any rate such a conclusion would probably be wrong. Data such as these have to be seen in the context of a more general tendency towards end-stress in the same, Scottish Borders and Lothian, area. The following place names from this area, all end-stressed by natives, are likely to be fore-stressed by Southern English speakers:

(14) Bonnyrigg Loanhead
Caddonfoot Gorebridge
Clovenfords Lasswade
Newtongrange Rosewell
Walkerburn Pathhead

. . . and many more, as well as of course *New'castle*[15] – like so many 'Scots' phenomena, this may well be one associated more generally with certain Northern British varieties of English.

While probably all of the place names in (14) are historically compounds, they are of course by definition entirely lexicalized. Examples such as these suggest two things. Firstly, the class of end-stressed nouns in (Borders and Lothian) Scots is much larger than its Standard English equivalent; indeed, whether this class is exceptional at all, as it is in Standard English, must be determined by systematic research into the Scots stress system, none of which has ever been done.[16] And secondly, lexicalization in Scots does not necessarily induce fore-stress among NNs in the way it tends to in Standard English. Indeed, if end-stress is not of exceptional status in Scots nouns then there is no pressure at all on lexicalized NNs to change their stress. There is therefore no reason to believe that the NNs in (13a) above were not lexicalized for that speaker. What is notable, though, is that this particular speaker appeared to express the complement–head vs. attribute–head distinction reliably in terms of stress.

4.4 Excursus 2: Adjective-plus-Noun constructions

The analysis presented here, which treats attribute–head NNs as equivalent to adjective-plus-noun constructions, makes certain predictions for the behaviour of the latter. In particular, if this account is correct for NNs then 'AdjNs' should be end-stressed and phrasal if they are fully transparent, but they should be seen to be capable of lexicalization and then be able to adopt fore-stress.[17]

The extreme points of this scale are easily established for AdjNs: *black'board* is clearly phrasal, as nobody would doubt, while *'black-board*, with specialized meaning

[15] But note Newcastle's *'Haymarket* vs. Edinburgh's *Hay'market.*

[16] Jones (1997: 333) reports evidence that eighteenth-century Scots speakers commonly used end-stress in nouns. See also Grant & Main Dixon (1921).

[17] For possessive constructions, equally attribute–head in nature, Liberman & Sproat (1992: 154) argue that fore-stressed specimens are at N^0 level – e.g. *'mare's milk* – and end-stressed ones, such as *Sam's 'car*, N^1. This fails to account for lexicalized items which have retained their end-stress, e.g. bird names such as *Bewick's Swan*, *Bonelli's Eagle, Brünnich's Guillemot*, *Bullwer's Petrel*, etc. The behaviour of such constructions is thus exactly parallel to that of the other attribute–head NNs discussed above.

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and fore-stress, is lexical. It is also plausible to assume that this lexeme is the product of lexicalization, such that when the device was first used it was phrasal and had end-stress – 'Write it on that black board there.' From *black-board* was coined *white-board*, by analogy. There is no reason to assume that this lexeme entered the lexicon from the syntax. And for *black-bird*, entry from the syntax via lexicalization is downright implausible. If this species of thrush had once simply been called *black*ˈ*bird* then speakers at that time would have had to be unaware of the existence of crows and ravens, for example. So, it is likely that AdjNs, like attribute–head NNs, are capable of arising in the lexicon through analogy.

The next question is whether it is possible for end-stressed AdjNs to occur in the lexicon, as end-stressed NNs can. In fact this has been affirmed far more extensively than it has for attribute–head NNs, on which more research is in order. Levi's (1978) work on complex nominals containing nonpredicative adjectives has probably settled the question, in that constructions such as those in (16) below would now be regarded as lexical:

(15) rural policeman
musical criticism
electrical engineer
logical fallacy

If it is the case that items such as these are lexical, largely on the strength of corresponding predicate constructions being ungrammatical (**This policeman is rural*) then, interestingly, we may have a new test for phrasal status: phrasal AdjNs and NNs must allow corresponding predicate constructions. This test is passed, as I have in fact noted before, by *steel bridge*. (*This bridge is wooden and that one is steel*.) But it is failed by *town policeman*, parallel to *rural policeman*, above. The test is also failed by most of the collateral-adjectives listed in (11) above, as was noted there. This would mean that, certainly, those collateral-adjective constructions are lexical where the adjective collocates with a single noun only (*vernal equinox*). But it is another question whether it makes sense to regard most collateral-adjective constructions as lexical, on the strength of the nonpredicate nature of these adjectives. See here Koshiishi (2002) for further discussion.

4.5 Pattern stability in ˈtoy factory *vs.* toy ˈfactory

We have seen, then, that complement–head NNs, ranging from secondary compounds to primary compounds with listed semantics, are predicted to have fore-stress while attribute–head NNs are prototypically end-stressed phrases but may lexicalize and in that process acquire fore-stress.

This raises two mutually related questions. Can this model of NN behaviour explain why ˈ*hair oil* is not oil made from hair (Liberman & Sproat, 1992: 141ff.) while ˈ*peanut oil*, with fore-stress, is still interpreted as oil made from, rather than used to lubricate, peanuts? ˈ*Hair oil* might after all be a lexicalized attribute–head NN, while ˈ*peanut oil*,

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which *is* a lexicalized attribute–head NN, might instead be a complement–head NN with the semantic structure that ˈ*hair oil* actually has. The second question is, why are doublets such as ˈ*glass case* vs. *glass* ˈ*case*, ˈ*toy factory* vs. *toy* ˈ*factory*, and several more observed in the literature (Faiß, 1981; Ladd, 1984; Bauer, 1998; Carstairs-McCarthy, 2002: chapter 6), so stable in terms of both stress pattern and meaning?

A simpler way of putting both questions is, perhaps, why do attribute–head and complement–head NNs never coalesce so as to become ambiguous NNs with fore-stress? A model such as this one, positing as it does an optional process of absolute neutralization, is surely exposed to the question of why this seems to be inhibited exactly where the distinction matters – that is, where the coalescence would cause semantic interpretation problems.

This phenomenon suggests the involvement of the Blocking Effect (Kiparsky, 1982; Aronoff, 1994; Giegerich, 2001), as Bauer (1998) seems to suggest for the *toy factory* cases, whereby the existence of a listed item prevents a synonym being formed by a productive process. What seems to be happening in this particular area is that, given the full productivity of the syntax and therefore the unlimited availability of attribute–head NNs there, no lexically listed NN can be synonymous with one available in the syntax. Hence ˈ*glass case*, listed with the meaning 'case for glass(es)', blocks the alternative meaning 'case made of glass' associated with the fully productive attribute–head construction for which fore-stress would be available via lexicalization.[18] On the other hand, ˈ*peanut oil* is allowed to have the meaning associated with attributive *peanut*, because there is no listed item denoting a lubricant for peanuts that might block it. This is like *warmth* blocking synonymous **warmness*, except that the blocked item in the relationship may be a syntactic unit. Precedents for this phenomenon of blocking across the lexicon–syntax divide have been discussed by Poser (1992); so this phenomenon is perhaps not new.

But that is not the full story. The synonymy blocking account offered above explains why no interpretation problems arise where otherwise they might. It does not explain why fore-stress may arise for attribute–head NNs under lexicalization (ˈ*peanut oil*), but only where there is not already a homophonous NN of complement–head structure. So, why does *glass* ˈ*case* not lexicalize into ˈ*glass case*? This appears to be homophony blocking, the form side of the Blocking Effect as opposed to the meaning side, synonymy blocking, but caused in the same way by the Elsewhere Condition (Giegerich, 2001). Precedents for this are, in the morphology, the existence of monomorphemic (hence listed) *bullet*, *toilet* preventing a homophone-producing process from applying, namely the attachment of diminutive *-let* to *bull* and *toy*. If that is correct then the (listed) existence of ˈ*glass case* will block the homophone-producing process that shifts the stress forward in *glass* ˈ*case*. All this is predicted automatically, without the requirement

[18] Interestingly, this would probably imply that the lexicalization and subsequent adoption of fore-stress by such attribute–head NNs – e.g. through analogy: section 4.6.2 below – would themselves be regarded as productive processes at least in the sense of the Blocking Effect. As elsewhere in this article, the mechanisms for the generation of lexical attribute–head NNs turn out to be unclear.

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of new mechanisms. Despite complex semantic relationships, neither synonymies nor homophonies arise.

4.6 Two problems

4.6.1 The Tory leader *phenomenon*

Complement–head NNs have fore-stress; attribute–head NNs have end-stress or, if lexicalized, possibly fore-stress. This is a model, then, that is open to falsification except in one (albeit major) area of overlap – fore-stress. In other words, the model makes one prediction point-blank: if a given NN has end-stress then it must be of the attribute–head kind. Unfortunately, even this seems not always to be the case. Some NNs that lend themselves to a complement–head interpretation may have end-stress. One example of this is *Tory leader*, a secondary compound like *watch-maker* denoting someone who leads the Tories. We would therefore expect fore-stress. Yet the BBC consistently gives it end-stress. What is more, the end-stress pattern seems to be shared by other political leaders:

(16) Tory leader
Labour leader
world leader
Conservative leader
Liberal leader
Nationalist leader
Republican leader
European leader

Why should this be the case? One striking fact about the examples in (16) is that, although they are semantically very similar, they are not all of the complement–head type as *Tory leader* supposedly is: some are attribute–head, the most obvious case of course being *European leader*, where the attribute is an adjective. Note also that *world leader*, apparently denoting someone who leads the world, in reality means 'leader of global rank', in fact *global leader*, to use the collateral adjective.

Under the present model of NN behaviour, under which complement–head NNs cannot regularly have end-stress, the *Tory leader* phenomenon must be due either to exceptional end-stress – not unprecedented among nouns, as we have seen – or to a reinterpretation of an argument–predicate relationship as an attribute–head relationship. The first explanation would have to invoke analogy to other NNs headed by *leader – European leader*, etc. – which are attribute–head and therefore have regular end-stress. This explanation is rather unconstrained, however, as one has to expect when analogy is invoked: it allows any complement–head NN to be end-stressed whenever the same head noun is also attested in attribute–head constructions. It is also somewhat implausible that an exceptional stress pattern, namely end-stress, should be adopted via analogy.

The second possible explanation seems far more interesting but needs further investigation: while the Tory leader is someone who leads the Tories, or tries to, it is

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also true that he *is* a Tory himself. So, the alternative attribute–head interpretation is not wrong, as it would be for *watch-maker*. This explanation predicts that the phenomenon of 'unexpected' end-stress is confined to NNs which permit reinterpretation. But if the phenomenon is indeed due to reinterpretation then the question arises as to why speakers should wish to do so. Again there seem to be two possible explanations.

Perhaps the 'is a' or 'is associated with' interpretation of the semantic relationship within attribute–head constructions is in cases like this in some way simpler than the alternative, perhaps more specific, object–agent relationship. Speakers would naturally opt for the simpler semantic interpretation whenever it is available. This raises the question, however, as to why *Scout leader*, which is exactly parallel to *Tory leader*, has fore-stress.

Perhaps, alternatively, the whole set of political leader terms is interpreted as attribute–head by analogy, so that the attribute merely signifies the institution relevant to someone's political leadership. In that case it would be the semantic relations of the set that would be levelled by analogy, and not primarily the stress patterns as in the first possible explanation offered above. Note that the fore-stress of *gang leader*, *ring-leader*, *camp-leader*, and again *Scout leader* is predicted by this explanation.

The *Tory leader* phenomenon clearly calls for further investigation – into the semantics of nominal attribution, into the possibility of analogical change in this context, and into a number of other avenues. As it stands, the *Tory leader* phenomenon presents an obstacle to the full formalization of this model.

4.6.2 The London Street *phenomenon*

I argued in section 4.3 that not all fore-stressed attribute–head NNs must themselves have undergone the diachronic chain of events here called 'lexicalization'. Recall *avo'cado oil*, probably fore-stressed for its users since its very first occurrence. Items like this, I argued, are formed in the lexicon in analogy to similar constructions denoting similar things. (Most names for oils have fore-stress.) This then gives rise to subgeneralizations such that street names ending in *Street* have fore-stress, those in *Road* and *Avenue* end-stress, etc.

The reluctance of *Road* NNs to adopt fore-stress is perhaps understandable: thoroughfares named e.g. *London Road* tend to be roads leading to London, and the names tend to retain some phrasal characteristics: *He lives on the London Road*. The same can not be said for *Streets* (which are arbitrarily named after things, persons, places, etc.: compare **he lives on the 'London Street*),[19] but also not for (end-stressed) *Avenues*, which are as just as resistant to fore-stress as *Roads* are.

But this raises issues that go beyond the availability of small generalizations of this kind. One issue concerns again the status of analogy: if it is the case that fore-stress on *oils*, *cakes* and *Streets* is due to formations analogous to existing lexemes, then it is not clear what the difference is between this and a fully productive process. I suggest there is none. Given that probably there is not a single *Street* in the anglophone world

[19] But compare nonlexicalized *the London 'streets.*

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that does not have fore-stress, it is hard to see how any morphological process could be more regular and productive.

So, there are productive NN-forming processes in the lexicon that produce fore-stressed attribute–head constructions. The second issue is, then, that of predicting the circumstances in which such processes apply, or diachronically develop. In the case of Kingdon's (1958) and Fudge's (1984) observed tendencies towards end-stress, which generalized over the semantics of the dependent N, a formal generalization emerged. The Kingdon/Fudge cases of end-stress turned out to be prototypical examples of the attribute–head relationship among NNs. The tendencies towards fore-stress under lexicalization that we have observed here seem to resemble the Kingdon/Fudge generalizations in some respects, except that they centre on the head N while Kingdon/Fudge's concerned the dependent N – and, it would appear, except that it is impossible to formulate a generalization over a set of head nouns triggering fore-stress and ranging from *Street* to *cake* and beyond. The model of NN behaviour presented here predicts a tendency for attribute–head NNs to adopt fore-stress through lexicalization, as we have seen: this is due to the exceptional nature of end-stress among nouns. But the haphazard occurrence of fore-stress in such constructions, as well as the emergence of clusters of identical behaviour – the *London Street* phenomenon[20] – clearly presents another obstacle to robust generalizations.

5 Conclusion

Essentially like Bloomfield (1933), for whom ˈ*ice-cream* was a compound and *ice* ˈ*cream* a phrase,[21] Liberman & Sproat (1992) drew the N^0/N^1 distinction strictly along stress lines. They established that N^1 constructions arise in the syntax and have end-stress. But then they failed to find evidence supporting the other half of the hypothesis, whereby N^0 constructions, which they crucially (and wrongly) assumed uniformly to have fore-stress, systematically arise in the lexicon. The reason for this failure, as we can now see, was that N^0 constructions with end-stress are not only possible but actually very common: these are the lexicalized attribute–head NNs that much of the foregoing discussion was about. As long as all end-stressed constructions are systematically relegated to the syntax – to N^1 – then of course NNs with lexical characteristics will occur not only on level N^0 but on both levels, as will attribute–head constructions. And

[20] The *London Street* phenomenon is probably best explained by Ladd's (1984) account of fore-stress via de-accenting. While clearly not all fore-stressed NNs (including *watch-maker*, etc.) are plausibly amenable to that explanation – this was probably the main weakness of Ladd's account – the restricted interpretation of de-accenting that is possible here is much more appealing: here, de-accenting would have to be invoked only in attribute–head cases where the stress actually shifts from end to front. Most of Ladd's examples are of this kind.

[21] I believe the distribution of orthographic variants of NNs is similar to that of stress. Syntactic constructions are not hyphenated or written as one word, just as they are not fore-stressed. Lexical constructions may be hyphenated or written in one word; and of course they may have either stress pattern. This would predict *girl friend* to have end-stress while for *girl-friend* and *girlfriend* fore-stress is possible.

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this analysis then leaves N^0 constructions with characteristics that are not unique to that level in that they may also occur on N^1.

Bauer's (1998) analysis essentially faces the same problems. Moreover, he demands that there should be a sharp divide between the syntax and the lexicon, and that this divide should materialize in the data if NNs are to be assigned to both modules. Especially in the case of lexicalized – or lexicalizing – attribute–head NNs, which are the main culprits in those analyses, I have argued against the assumption of a neat partition between the two modules.

I expect arguments of two kinds to be levelled against the account presented here. Firstly, we *still* do not have a clear structural characterization of the term 'compound': as we have seen, NNs coming under N^0 are a rather heterogeneous set. Some N^0s are listed, some are not. Some are attribute–head, some are not. Some are fore-stressed, some are not. But, as I have shown, that is simply what the lexicon of English nouns is like. There is no reason why lexical NNs should be better behaved than other nouns. Perhaps, as Bauer (1998: 84) points out, the use of the term itself is misguided. (But note that not all NNs – *nomine nominando* – are N^1s either, as he suggests.)

Secondly, and perhaps more seriously, facts such as those discussed in section 4.6 – the *Tory leader* and *London Street* phenomena – will be regarded as seriously undermining the falsifiability of the account presented here. Not only can attribute–head constructions have fore-stress or end-stress; complement–head constructions such as *Tory leader* may have end-stress or fore-stress. Note, however, that in both cases we have – albeit tentatively – identified specific conditions that must be in place for the irregularity to have potential of occurring. In any case, that's a natural language for you.

Author's address:
School of Philosophy, Psychology and Language Sciences
University of Edinburgh
14 Buccleuch Place
Edinburgh EH8 9LN
Heinz.Giegerich@ed.ac.uk

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