

**Structural analogy in language, and its limits**

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## 0 Preface

Much of the history of phonological studies is characterised by failures to follow through the consequences of the assumptions made in these studies.\* The fossilisation that we can associate with ‘structuralist phonemics’ is one instance of this. Recognition of the notion of contrast at this point in the development of phonological ideas did not lead to any thorough investigation of **contrastivity** by the major proponents of ‘phoneme theory’ - outside the Prague tradition, at least. The pursuit of contrastivity was side-tracked by, for instance, the application of principles which are not phonologically motivated but which reflect extra-phonological concerns. Thus the neutralisations evidenced in the onset of *spree*, compared with, say, *see* and *pea*, are typically obscured by phonemic representations that are dictated by symbol economy, typified by Bloch (1941). As acknowledged in the subtitle to Pike’s *Phonemics* (1947) – *A technique for reducing languages to writing* – such concerns as symbol economy reflect non-phonological aims; compare Firth (1948: 134) on theories built on the ‘phonetic hypostatization of roman letters’. And trying to fulfil these aims restricts the identification of where contrastivity lies and does not lie. One of the virtues of the ‘Firthian’ tradition has been to highlight this failure to appropriately locate contrastivity by ‘phonemic’ representations which were determined by principles distorted by the prism of alphabetic orthography. In this respect ‘phonemics’ was ‘faint-hearted’: it failed to fully implement the principle of contrastivity. The phoneme is not a relevant concept in any phonology that seeks to fully express what is contrastive and what not. Interestingly, Schane’s (1971) reconsideration of the ‘phoneme’ was a defence of ‘surface contrasts’, not of the ‘structuralist phoneme’.<sup>1</sup>

Such has been apparent for some time, I think. But there are yet other aspects of phonological structure that are non-contrastive, but which most frameworks of phonological representation fail to recognise as such. As Anderson (1987, 1994) argued, much of **linearity** is not contrastive but predictable from other properties, and this is not represented as such in most accounts of phonology – even, ironically, in so-called ‘non-linear’ approaches, which are more appropriately to be referred to as ‘multi-linear’. Typically, the latter provide parallel linearisations connected by principles of association between elements in the sequences. Of course, some sequencings are irreducible, contrastive, such as syllable-sequence. But in many other cases linearisation is derived from other properties that have a contrastive role. In §1 I look at the status of some of these other aspects of representation. Partly, this in order to establish the contrastive status of various properties; but also I want to use their role in contrastivity to establish at least a partial set of properties that are in this respect fundamental to phonology, particularly where these properties are not what I shall call **interface** properties, i.e. properties, like sequencing, that correlate directly with phonetic exponence, and derive their motivation (also) from this. Overall §1 seeks to establish some of the fundamental properties of phonology and their role, if any, in contrast.

This discussion leads on to §2, which considers to what extent these properties, interface and non-interface, or formal, are replicated in the syntax, and tries to identify structural discrepancies between phonology and syntax. My interest here is to evaluate the extent to which the picture we find is consonant with a certain hypothesis concerning possible differences between the two domains, or planes, in the sense of Anderson (1992a): this hypothesis is termed there **the structural analogy assumption**, whereby one expects structural parallelism between the two planes of phonology and syntax, where this is not frustrated by the demands of their respective interfaces. More of that in §2, which tries to establish some analogies of structure between the phonology and the syntax. §3 then con-

fronts apparent discrepancies in structure and tries to formulate a principled basis for them, and thus to sketch out some of the main limits to structural analogy.

The concerns of §1 leave aside the question of the desirability or otherwise of such a radical attitude to contrastivity. Is it desirable to view phonological representations in this way? – as fundamentally organised in terms of the contrastive *vs.* the redundant? Such an approach is called into question by, for instance, Steriade's (1995: 166) doubts concerning the principle of 'lexical minimality': 'underlying representations must reduce to some minimum the phonological information needed to distinguish lexical items' (1995: 114). However, she misleadingly associates the principle with 'derivationality'. Her own 'non-derivational' account alludes, for instance, to whether or not 'nasality ... is allowed to associate underlyingly to Guaraní continuants' (1995: 158); while the underspecified accounts invoked in what follows here involve 'derivations' only in the sense that some aspects of structure are predictable from others (which latter are 'underlying' in this sense), they are predictable. Moreover, if the contents of lexical entries do not maximise contrastivity, how is their content determined? How are they different from parts of utterances? I shall, however, make no attempt to address this issue here. What one can say of the envisaged programme of this paper is that it at least attempts not to be faint-hearted in pursuing what is contrastive.

## 1 Identifying contrastivity

Let me begin by recalling the main point of Anderson (1987, 1994), the redundancy of many stipulations of linearity. This will lead us into a consideration of other aspects of phonological representation and their contrastive status.

### 1.1 *The limits of linearity: sonority, markedness and beyond*

It is apparent that many of the linearity relations within syllables are not contrastive. This follows from the familiar fact that typically placement of segments is in accord with relative **sonority**, perceived inherent salience. Typically, salience within syllables declines from the **centre** towards the margins, with the centre being characterised by the presence of the most sonorous segment type, prototypically a vowel (cf. e.g. Blevins 1995: §2). In this way, once we know whether a consonantal segment precedes or follows the centre, we know what position it typically will occupy relative to other segments. In the unmarked case, relative sonority determines placement relative to the centre, as illustrated by the English monosyllable in (1):

(1)            clamp

Linear placement in (1) is in accordance with some such partial hierarchy as (2):

(2)            *sonority hierarchy I*

a.	vowel	<	sonorant consonant	<	obstruent
b.	{ V }		{V;C}		all others (wherein <b>V</b> is not more prominent than <b>C</b> )

'<' in (2.a) indicates 'is more sonorous than'. (2.b) embodies the kind of representation advocated in Anderson & Ewen (1987), which I shall take as my startingpoint throughout this discussion: **V** and **C** are **simplex features** characterised by Anderson & Ewen (1987: 151) as respectively 'relatively periodic' and involving 'periodic energy reduction'. They distinguish the 'major classes', or **primary categories**, such that vowels are characterised

as ‘having only **V**’ (that is the sense of the notation with verticals); and ‘;’ means ‘is more prominent than’, so that sonorant consonants contain a lesser proportion of **C** than **V**; but they contain a greater proportion of **C** than vowels. Each categorial representation is enclosed within curly brackets. Anderson & Ewen (1987) also interpret relative prominence as a (intra-segmental) manifestation of the dependency, or head-modifier, relation. (We return to this in §1.3.) The proportion of **V** vs. **C** present reflects relative sonority. I come back below (again in §1.3) to spell out the metric involved more precisely: in (2) it is rather transparent, given that with no other segment types than sonorants is **V** more prominent than **C**. Sequencing is based on primary categories, and simply reflects relative sonority plus orientation towards the centre. Let me try to spell this out a little more explicitly.<sup>2</sup>

Firstly, however, it is important to emphasise that the contrastive representations proposed here are **system-dependent**: the representations reflect the dimensionality of the system. Representations for one system that are minimal in embodying only what is contrastive in that system will not suffice for a system with more oppositions. This means that sounds in different systems that are phonetically similar may have different representations in these different systems. The ‘same sound’ also may have different contrastive representations in different circumstances, given that, in the interests of maximising the expression of contrastivity, the description is **polysystemic**. This will become apparent as we proceed.

The sequencing stipulations that have to be attributed in the lexicon to the segments in (1) reduce at most to those in (3.b); only they are contrastive:

- (3) a. a, k, l  
b. a + m, a + p

‘+’ indicates ‘precedes’, not necessarily strictly. The centre of the syllable is identified as the most sonorous element, /a/. If we assume that C(onsonant) + V(owel) is the unmarked sequence, we need to stipulate lexically only the marked sequencings, as in (3.b). The linearity relationships between /a/ and /k/ and /l/ – i.e. those in (3.a) – follow from (4):

- (4) *unmarked syllable structure*  
 $\{C\} + \{|V|\}$

So, from invocation of (4) we get (5.a):

- (5) a. k + a, l + a  
b. k + l (+ a), (a +) m + p  
c. k + l + a + m + p

(4) thus determines the basic sequence in syllables. The linearisation relative to each other of the consonants in both pre- and post-centre position is given by sonority: the less sonorous segment is further from the centre; we get both sets of orderings in (5.b) from sonority sequencing, in accordance with (2). (5.c) expresses the overall linearity relations, most of which are derivative of unmarked syllable structure and sonority: cf. (3).

Such an approach to intrasyllabic linearity as I have outlined is discussed in Anderson (1994: §2). Let us refer to it as the **partial non-sequencing** approach to intrasyllabic lexical content. Anderson (1987: 212-8), however, suggests a still more radical approach to this linearity (see too Anderson et al. 1985: 213-4), which eliminates it entirely from

contrastive status. There it is suggested that syllables are represented lexically as bundles of unlinearised elements, with an interior bundle corresponding to the contents of the rhyme, which belongs within a more inclusive bundle corresponding to the contents of syllable: we thus have an inner and an outer domain within the syllable. Linearisation follows from the subsetting relation between the bundles, the relative closeness of association of the consonants with the syllable centre. I shall refer to this as a proposal for **total non-sequencing** at the lexical level of the elements of the syllable.

We can express this (total non-sequencing) proposal as in (6), where (a) gives the lexical representation for *clamp* (where I have arbitrarily ordered the elements external to and internal to the inner bundle in terms of relative sonority), and where (6.b) gives the rule deriving linearity:

- (6) a. k,l(p,m,a)
- b. *linearisation with respect to the syllable centre*
- i.  $C(V) \Rightarrow C + (V)$
- ii.  $C,V \Rightarrow V + C$

(6.b.i) gives the linearisations provided by invocation of (4) on the previous account, i.e. those in (5.a); and (6.b.ii) linearises with respect to the centre the elements whose sequencing had to be stipulated on that account, i.e. those in (3.b).

(6) thus substitutes in the lexical entry the less specific, or complex, subsetting relation, involving relative closeness of association, for linearisation stipulations, and permits us to drop reference to (4). We return in the following subsection to motivations for the proposed subsetting relation. If something like what is embodied in (6.b) is appropriate, then contrastive linearity is restricted to the sequencing of syllable bundles. In vocation of sequencing of syllables should also remind us that we must indeed give some consideration to what happens at syllable margins, when syllables ‘collide’. But I delay consideration of this until §3, where are considered some limitations on syntax/phonology analogies; and in the course of that, as well as in the discussion in the following subsection, we shall find other roles for (4).

What emerges from the present subsection is that the interface property of linearity is often not contrastive. It frequently follows in particular from relative sonority, involving contrastive categories. Sonority involves perceived inherent salience, and it is thus itself in principle another interface property, though there is some controversy over its phonetic exponence. However, there are indications in English (and more strikingly in some other languages, such as Polish) that this direct mapping from relative sonority (plus orientation towards the centre) to linearisation is insufficient as an account of syllable structure. Further structural properties are involved, further properties that partially determine linearity, and are not obviously interface properties. Let us consider these.

### ***1.2 The limits of linearity: transitivity and adjunction***

We can observe firstly that the centre of the syllable qualifies as **head** of the syntagm, in so far as it is both necessary to and distinctive of – i.e. characteristic of – the syllable: no centre, no syllable. Headhood, in this case, correlates with the sonority peak: the centre of the syllable is associated with both properties. Headhood itself is a formal rather than an interface property; but here this formal property correlates with an interface property, the sonority peak. The centre nevertheless shows further properties we can associate with headhood rather than sonority as such – i.e. with the formal rather than the interface property.

Thus, some centres in English require to be **complemented**; there are no lexical monosyllabic items in English of the character of (7.a):

- (7) a. \*/ba/, \*/be/  
 b. bad, bed  
 c. /bi:/ 'bee', /bei/ 'bay'  
 d. neon, chaos

Compare the well-formed (7.b), where the centres are complemented by a consonant, and the centres illustrated by (7.c) which do not require a complement. In (7.d) the vowels of (c) are in pre-hiatus position; there are no words showing vowels of (7.b) in accented pre-hiatus position. We can distinguish, then, between **transitive centres** and **intransitive**, and represent this structural characteristic of the former as in (8.a):

- (8) a. /a/, /e/ = {|V|/|C|}  
 b. /i:/, /ei/ = {|V|}

'/' indicates 'is complemented by'. This is further behaviour we would expect of a head: potentially to be subcategorised for a complement.

And the head and its complement can be interpreted as instantiating a **dependency** relation, which here correlates with relative sonority. We can represent this structural relationship in graph form, as in (9):

- (9)       {|V|}  
           :  
           :     |  
           :     {C}  
           :  
           :  
           :  
           :  
           e + d

Linearity here correlates with both relative sonority and dependency. However, we do not seem to need to invoke dependency in relation to the determination of sequencing as such here, given that the latter follows from relative sonority anyway, and sonority is apparently relevant elsewhere – as in the specifying of sequence between the members of consonant clusters. Thus, while complementation necessarily invokes headhood/dependency, linearity itself can be seen as following from sonority (plus orientation with respect to the centre, or subsetting).

However, there are apparent anomalies in an account of syllable sequencing based on sonority alone. I am not alluding here to instances of what one can regard as 'fine tuning' of what is allowed by relative sonority. With respect to any language there are very many possibilities of consonant combinations which conform to the requirements of sonority sequencing but which are non-occurrent in that language. This is illustrated, as is familiar, by the English (10):

- (10)       \*/kn-/, \*pf-/, \*/-zd/, \*/-fp/

Such stipulations supplement but do not violate sonority sequencing requirements; they add further constraining factors. Real anomalies do arise, however, in a couple of areas in English, for example.

As is again familiar, some pre-centre *s*-initial clusters cannot be reconciled with sonority sequencing requirements, as illustrated in (11.a):

- (11) a. sport, strip, squeeze  
 b. slow, snow  
 c. cusp, disk, pest  
 d. chasm, prism

The clusters in (11.b) conform with sonority sequencing, as do the post-centre clusters in (11.c); whereas that in (11.d), /-zm/, doesn't. The initial two elements in (11.a) are both obstruents, therefore remain unsequenced by hierarchy 1 in (2). If we extend (2) as in (12), sonority-based sequencing can be seen to be in accord with what we find in the clusters in (11.b/c):

- (12) *sonority hierarchy 2*  
 a. vowel < sonorant consonant < fricative < plosive  
 b. {V|}            {V;C}            {V.C}    {C;}

(12.b) introduces the specification for plosives, with dominant **C**, which includes voiceless, {C|}, and voiced, {C;V}, and for fricatives, which involves **contrastive non-dependency**, represented by '|': the **V** and **C** in the representation of fricatives does not involve dependency, thus contrasting in this respect with sonorant consonants, {V;C} and voiced plosives, {C;V}, whose representations involve contrary dependencies. Fricatives are characterised by being in opposition with segment-types whose representations involve the same elements in a dependency relation: the representation for fricatives involves contrastive non-dependency.<sup>3</sup> All the clusters we have considered so far are compatible with (12) except for those in (11.a/d). (11.d) may simply constitute an isolated exception (and there is a tendency to syllabify the sonorant – though I return to them later, in §1.3. But (11.a) represent a well-integrated part of the phonology of English – and other languages.

A second familiar area of discrepancy with respect to the requirements of sonority sequencing is illustrated in (13):

- (13) a. sex, apse, bits  
 b. seeks, creeps, beats  
 c. logs, jobs, adze  
 d. leagues, vibes, weeds  
 e. act, apt  
 f. creaked, steeped  
 g. dragged, bobbed  
 h. plagued, daubed  
 i. width, depth

In the first four sets in (13) the final fricative is preceded by a plosive, contrary to application of hierarchy (12). In the next four – (e) to (h) – the final cluster consists of two plosives, which cannot be sequenced by (12). The final set again involve a (voiceless) fricative further from the centre than a plosive, which latter can be either voiced or voiceless. Every second set in (13) involves an intransitive vowel; but there is no such set corresponding to the transitive (13.i). These forms with an intransitive vowel are almost always morphologically complex. This also applies to voiced final clusters: (13.c) and (d), and



(13.g) and (h). So too the examples with mixed voicing in (13.i). The possibilities involving items with transitive vowel and final voiceless cluster – i.e. those exemplified by (13.a) and (13.e) – seem to be the most fully integrated into the phonology of English.

Let's start by looking at the structures involved with the kinds of items illustrated in (13). The final segments in (13), which are all coronal obstruents, are often described as 'appendixes' or 'extra-metrical'. They extend our usual expectations concerning the dimensions of the syllable. And they do this not merely by allowing a final segment which violates the requirements of sonority sequencing but also in some cases by allowing more segments than are normally associated with the post-centre cluster.

Normally, an intransitive centre in English is followed by only one segment, and so is a transitive centre and its complement.<sup>4</sup> Thus we do not find the possibilities in (14.a):

- (14) a. \*helmp, \*creamp  
 b. helm, help  
 c. cream, creep

These forms all conform to the requirements of sonority sequencing – though the first example in (14.b) illustrates an extension to the hierarchy as given so far, an extension which is embodied in (15):

- (15) *sonority hierarchy 3*  
 a. vowel < liquid < nasal consonant < fricative < plosive  
 b. { |V| } { V;C } { (V;C),C } { V.C } { C; }

(Sonority can no longer be read off readily from the representations in (15): I take this up below, and propose a simple metric based on these representations in §1.3.) Nasal sonorant consonants are represented as more complex than other sonorants by virtue of an additional C, related to the V;C in non-contrastive non-dependency, a simple combination. That is, there are no contrastive segment types in English in whose representation C and V;C are in a dependency relation; this is the significance of the ',' notation (for non-contrastive non-dependency), compared with the '.' (for contrastive non-dependency) in the representation of fricatives in (12) (a significance again to be pursued below). It is only the co-presence of the two elements joined by ',' that is contrastive, not the relation between them.

Before returning to the coronal obstruents appendix, I want to consider how we are to capture the restriction on the dimensions of post-centre clusters which do not include such an appendix, i.e. the restriction that the latter apparently violates. The final consonants in (14.b) and (c) are extensions to the core of the syllable represented by the centre ( $\pm$  its complement). We can formulate this structural relationship as in (16):

- (16) *consonant adjunction*  
 $\{C\} \Rightarrow \{ \backslash |V| \}$

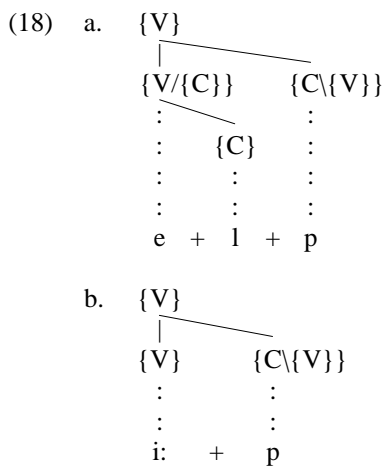
(16) states that there is available to consonants the possibility of modifying the maximal obligatory construction headed by a vowel (so both transitive and intransitive projections in this case). To the left of the backward slash in (16) is specified the category that the consonant seeks to modify. Maximality is guaranteed by the head convention, a notion famil-

iar from studies on dependency grammar; the version given here is as formulated in Anderson (1986a: 70):

(17) *head convention*

A regularity that mentions the head of a construction is interpreted as invoking the construction as a whole unless a subordinate of the head is mentioned by the same instance of that regularity

This means that we can attribute to the relevant segments in *help* the structure in (18.a) which differentiates in a familiar way between complement and **adjunct**, while (18.b) illustrates the structure for an intransitive centre with an adjunct, such as that in *keep*:



(Henceforth in such graphs, I shall suppress the verticals around V, in the cause of simplicity of presentation.) /p/ might be said to involve what we might refer to as ‘retro-complementation’, and as such instantiates an adjunct rather than a complement. It introduces a node of the same category as specified to the left of ‘\’ in its representation, above the original node. In this way we recognise that the head determines the basic syntax of the construction; it is another property of heads to accept adjuncts (as well as to require complements, and to characterise the construction). Syllables containing such adjuncts are referred to by Hall (2001) as ‘superheavy syllables’, with a distribution that is more restricted than that associated with adjunct-free syllables (provided one syllabifies onset-maximally).

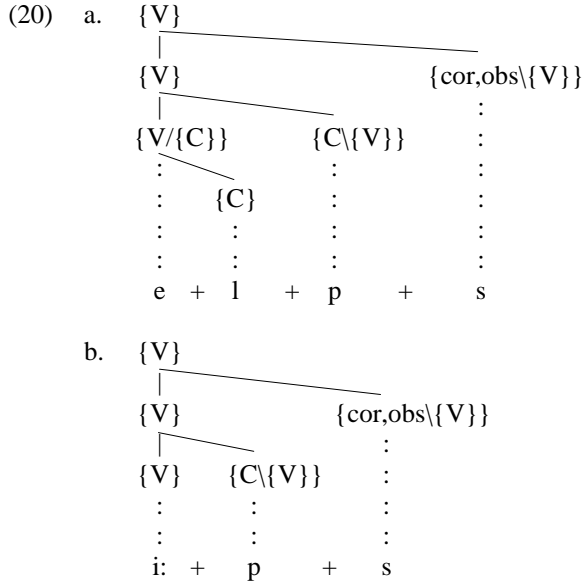
These clusters of course are regulated also by sonority sequencing, and this limits the possible combinations. In addition, /ŋ/ is an exception to (16), as formulated in (19.b):

- (19) a. \*/VCŋ/, \*/V:ŋ/  
b. /ŋ/ ⇒ ~ (16)

/ŋ/ is always a complement in English. Thus the distribution of /ŋ/ reflects the complement/adjunct distinction, which is a formal rather than an interface property.

Let us return to the ‘appendices’ illustrated by (13). These are not sequenced in accordance with sonority. But they seem to represent a higher-level adjunct of a rather spe-

cific category, namely ‘coronal obstruent’. They introduce the extra structure in (20), compared with (18):



(I am not concerned with the characterisation of ‘coronal obstruent’, which labelling here has simply the status of a cover term. It involves a specification which is a combination of primary and secondary category) Here, however, the sequencing with respect to the other consonants is, of course, not accorded in conformity with relative sonority, and the ‘appendix’ is sequenced by relative sonority only with respect to the vowel, as in the lexical representation for *clamps* in (21), involving partial non-sequencing (recall (3)):

- (21) a. a, k, l  
b. a + m, a + p, a + s

or as in (21)’, with total non-sequencing (recall (6)):

- (21)’ k, l (p, s, m, a)

Linearisation of the ‘appendix’ with respect to the other consonants must apparently be part of the specification of the adjunction itself, as given, in a provisional form, in (22):

- (22)  $\{\text{cor,obs}\} \Rightarrow + \{ \backslash\{V\} \}^*$ , in environment  $\{C\}$

This is what the ‘+s’ notation in (20) is intended to express. We should note finally here that the asterisk in (22) indicates that (22) is recursive, allowing for examples like (23):

- (23) a. acts, widths, sixth, text  
b. sixths, texts

Recursion seems to be restricted to adjunction of the voiceless coronal obstruents, a restriction I have not built in. But I am principally interested here in the characterisation in prin-

ciple of such ‘extrametricality’. Again, we have here a formal determination of sequence, involving the relationship of adjunction.

I assume that the more specific adjunction of (22) applies after (16), resulting in representations like those in (20). In what the elderly or literate reader might see a curious reversal in some cases of application of the rule-ordering principle known as ‘Proper Inclusion Precedence’ (see e.g. Koutsoudas et al 1974, and contributions to Koutsoudas 1975), I am suggesting that the order of adjunction of elements within a domain is determined by the relative simplicity of the primary categorisation (including ‘retro-complementation’), with the simpler taking precedence over the less so. But this relative simplicity does seem to correlate with the relative integration of the element in the construction. It is also necessary to appeal to (22) only word-finally. Moreover, from a ‘top-down’ perspective, ‘Proper Inclusion Precedence’ is indeed ensured.

Now, if order of application and relative closeness to the centre are determined in this way, it is unnecessary, after all, to include linearisation as part of (22), since it follows from **projectivity** (‘no-tangling’) requirements. ‘Tangling’ involves the crossing of lines (dependency arcs or association lines) in the graph,. Projectivity is preserved in the present case only if the coronal obstruent, which is attached last, also comes in final position, as can be verified by inverting any of the non-vocalic elements in (20). The order of application determines the sequencing, which need not be stipulated, so that we can substitute (22)’ for (22):

(22)’  $\{\text{cor,obs}\} \Rightarrow \{\backslash\{|V|\}\}^*$ , in environment  $\{C\}$

dropping the linearisation symbol.

A return to the sonority sequencing discrepancy illustrated by (11.a), repeated here as a reminder:

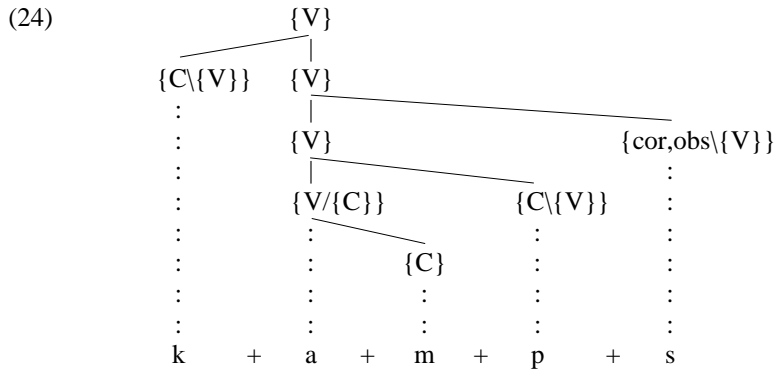
(11) a. sport, strip, squeeze

brings us to a consideration of the possibilities at the pre-centre position. Let us look first at such of these as do not present a problem with respect to sonority sequencing requirements.

In accordance with the account suggested by Anderson (1994), involving lexical partial non-sequencing within the syllable, a consonant in a monosyllable whose sequencing with regard to the vowel is not lexically stipulated will be sequenced before that vowel. Again, in English, such a consonant is clearly an adjunct to the vowel; it seeks a vowel to modify, as represented in (16), again repeated here:

(16) *consonant adjunction*  
 $\{C\} \Rightarrow \{\backslash\{|V|\}\}$

If, in terms of (3), with partial non-sequencing, segments lexically linearised with respect to the centre are adjoined before the lexically unlinearised, this will give us structures like (24), for *camps*:



We can say that the onset is the highest adjunct of the centre, {V}; the rhyme is everything else subordinate to a {V}. /ŋ/ is exceptional with regard to both applications of (16). We can generalise over the two exceptions as in (25):

(25)            /ŋ/ ≠ {C\{V}}

/ŋ/ is never an adjunct. For /h/, on the other hand, (16) is obligatory, and, moreover, its serialisation is never stipulated lexically (Anderson 1986b, 2001a), so that it is limited to onsets. Both these exceptional constraints on linearisation thus reflect a formal property, the complement/adjunct distinction.

If we adopt the more ‘radical’ approach to sequencing proposed by Anderson (1987), i.e. total non-sequencing, then the order of the applications of (16) follows from the closeness of association between the consonant and the centre, as reflected in representations such as (6.a):

(6.a)            k,l(p,m,a)

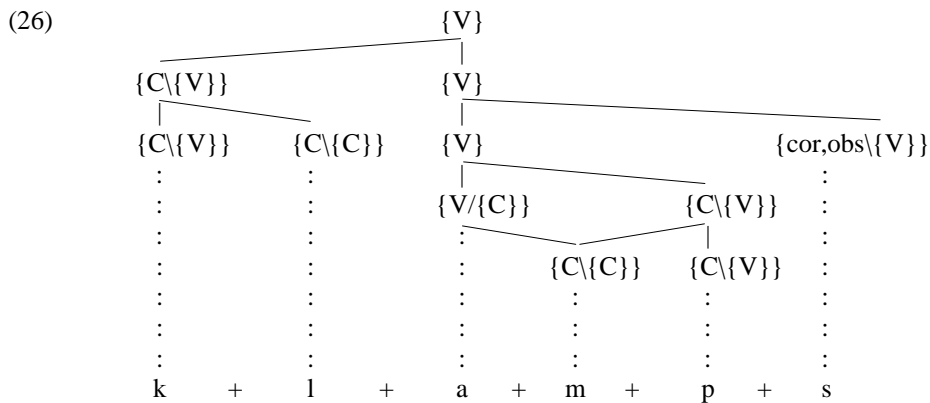
The most closely associated consonants, co-members of the inner subset, the inner domain, i.e. those in the rhyme, are adjoined first. This is consistent with the notion that order of adjunction reflects degree of integration of the dependent with the head.

Consider now sonority-respecting two-consonant onsets. Much work on dependencies in phonology assumes that dependency follows sonority (cf. e.g. Anderson & Ewen 1987): of two elements joined by a dependency arc, the more sonorous will be the governor. This is embodied in (24) in the dependency relations that hold between the centre of the syllable and consonantal elements. Anderson (1986a: §6) argues, however, that consonant-to-consonant dependencies reverse this relationship: in the case of two consonants linked by a dependency arc, the less sonorous governs the more. Just as the optimal position for a consonant is before the vocalic centre, so the optimal consonant is the one furthest in sonority from the vowel: the optimal syllable contains a plosive, and specifically voiceless, onset (cf. e.g. Cairns & Feinstein 1982). The unmarked syllable structure should thus be expressed as (4)’ rather than (4):

(4)’            *unmarked syllable structure*  
                   {[C]} + {[V]}

I adopt this suggestion concerning dependency in onsets here; namely, that it is based on **anti-sonority** – though the head in this case satisfies the formal criteria for headhood only rather weakly: any consonant, not just voiceless plosives, can constitute an onset; we are merely claiming that non-plosives are onsets *faute de mieux*, as it were. The prototypical onset is a voiceless plosive, and so the consonant closest to a voiceless plosive in sonority is head in an onset cluster. It is only in this weak sense that the less sonorous consonant can be said to be characteristic of the onset. (But motivations for headhood in consonant clusters which are based simply on relative sonority are even weaker.)

I thus interpret the second consonant in *clamps* as an adjunct to the first, with a structure as shown in (26):

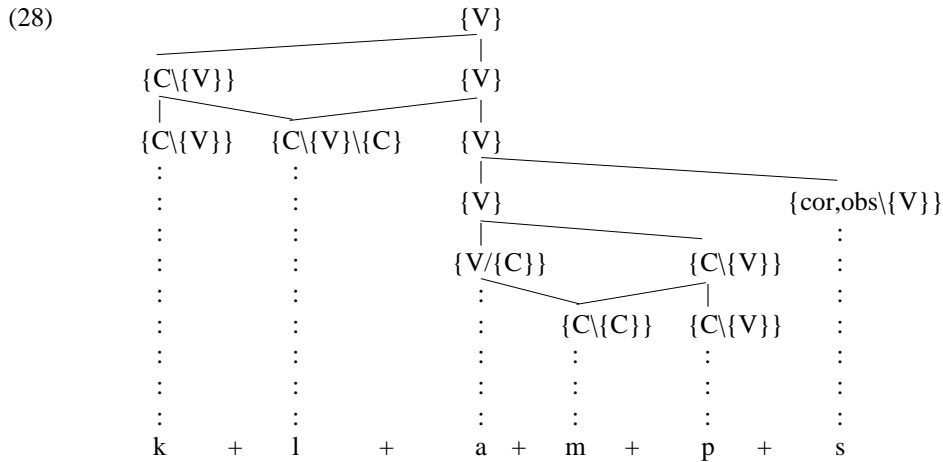


The appropriate subconfiguration is allowed for by (27):

(27) *cluster headship*  
 $\{C_i\} \Rightarrow \{\setminus\{C_j\}\}, \text{ iff } \{C_j\} < \{C_i\}$

(27) will also apply to the /m/, which, as shown in (26), is thereby adjoined to the /p/. The dependency created is the vehicle for the agreement in articulation between these two elements, which is a property of the construction that together they constitute.<sup>5</sup>

Application of (27) thus results in a subconfiguration in which an element, /m/, is dependent on two others. Notice too that the /l/ is also susceptible to (16), so that we should substitute (28) for (26):



This again results in double-motherhood, or **ambidependency**, of the /l/ in this case. We return to the significance of this ‘maximisation’ of dependencies in §1.4.

We can now finally return to the sonority sequencing discrepancies illustrated by (11.a), which are not restricted to English, but recur in different forms in sundry languages – frequently involving a /s/-type consonant:

- (11) a. sport, strip, squeeze

The second two examples in (11.a) show an extra segment to the left compared with what we have considered so far, which have all involved two-member onsets. The /s/ therein and in the first example also does not satisfy sonority sequencing requirements and cannot be serialised thereby. Moreover, not only is the /s/ the only segment-type that can occur in this position, but also the set of consonants that can occur in the position following it is restricted to the minimal obstruents, representing neutralisations of /p/ ≠ /b/ etc – if we leave aside here the /sf/ sequence found in loan words like *sphere* and *sphincter*.

I suggest that /s/ is another adjunct, but of a specific type. This emerges from the formulation in (29.a):

- (29) a. *empty segment adjunction*

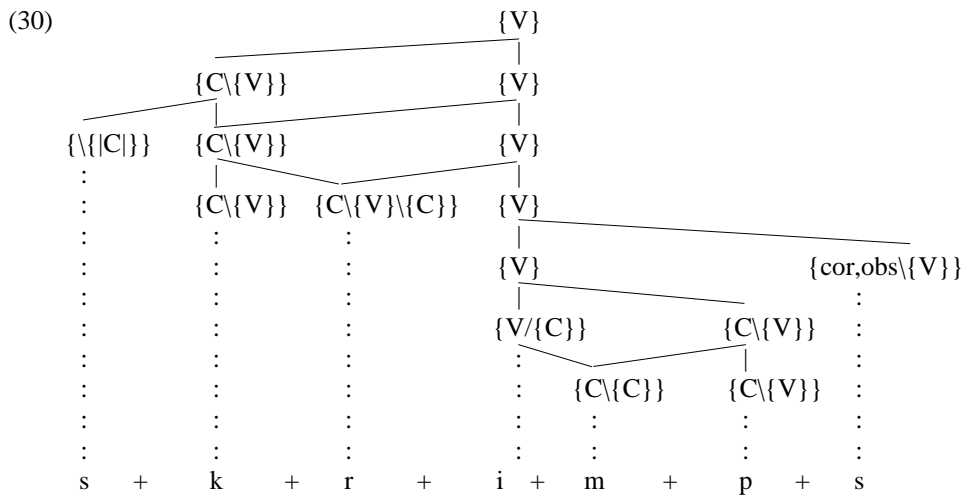
{ }, { { p/t/k } } < { { l/r } } > ⇒ { s }, { |C| { p/t/k } } < { V; C { l/r } } >, &  
 { s } ⇒ { \ |C| }, both in the environment \_\_\_ ( { |V| }

- b. { }, { { p/t/k } }  
 c. { }, { { p/t/k } }, { { l/r } }  
 d. { s }, { |C| { p/t/k } }  
 e. { s }, { |C| { p/t/k } }, { V; C { l/r } }

(29.b) and (c) give the contrastive, lexical specification for such two- and three-member onset combinations; And (29.d) and (e) fill in the redundant specifications in accordance with the first part of (29.a), ‘<>’ signals the **optional** presence of the liquids. In these representations, ‘s’ abbreviates the specification for /s/, ‘p/t/k’, within the inner brackets, abbreviates the secondary categorisation of /p/, /t/ and /k/, and ‘l/r’ abbreviates the secondary categorisation of /l/ and /r/. In the latter two instances, (29.d) and (e) fill in only the pri-

mary categorisation, in accordance with the first part of (19.a); in the case of ‘{s}’, the full specification is redundant, given its co-occupation of an onset with another segment differentiated by place of articulation, so that it is represented as an empty segment lexically, as in (29.b/c).<sup>6</sup>

The {C} and {V;C} segments are sequenced in accordance with relative sonority. The sequencing of /s/ follows from the fact that the very specific adjunction of (29.a) will apply after (16) and (27), which respectively adjoin /l, r/ and /p, t, k/ to the vowel and adjoin /l, r/ to /p, t, k/. The adjunction which applies to only a subset of potential heads, as in (29.a), is attached last. To preserve projectivity, /s/ must be sequenced in front of the plosives. This allows for the relevant parts of the representation in (30):



The initial category realised as /s/ identifies a following plosive as a minimal plosive, one that neutralises the distinction between /p/ and /b/, /t/ and /d/, /k/ and /g/. I shall refer to this kind of adjunct as a **specifier**, here the minimal-plosive specifier. This seems to be another fundamental formal possibility – though the recurrence of /s/-type segments in this kind of sonority violation may reflect a substantive characteristic. The label ‘specifier’, as with ‘complement’ and ‘adjunct’ is chosen here advisedly, as discussed in §2. These categorisations render many linearity stipulations redundant.<sup>7</sup>

This subsection has established as fundamental to the phonology, in determining sequencing, such formal distinctions as are embodied in the terms complement, adjunct and specifier. We must add these formal notions to the fundamental interface properties already discussed in §1.1, linearity and sonority.

### 1.3 Transitivity, sonority and weight

Let turn now to the character of the syllabic centre and to linearisation therein. This introduces another property whose contrastive status must be examined.

I have distinguished between transitive and intransitive syllable centres, corresponding to the traditional distinction between ‘checked’ and ‘free’ vowels. Intransitive, ‘free’ centres in English typically have more **weight** than the corresponding transitive; they are in particular longer than a transitive of the same ‘height’ or sonority in the same environment. In the case of vowels of the same weight, sonority correlates with vowel height as indicated in (31):

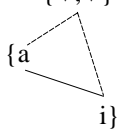


- (31) *vowel sonority*  
 LOW < MID < HIGH

But, in the same environments, /i/ in English is longer than /ɪ/, despite being higher. We have here another interface property, associated in English with transitivity. Some of the intransitives are also clearly complex: they constitute diphthongs. I represent the weight by a doubling of the V element, and the complexity by the presence of two secondary (articulatory) categories, as in (32):

- (32) a. /i:/ = {V, V{i}}  
 b. /aɪ/ = {V, V{a, i}}

The elements within the inner brackets in (32) again represent secondary categories, in this case associated with placement on the vowel dimensions. Sequence of the two elements of the diphthong need not be stipulated lexically; it follows from relative sonority, with the more sonorous element coming first, as in (33.a):

- (33) a. {V, V{a + i}}  
 b. {V, V}
- 

Only exceptions to this need be marked lexically. It is doubtful that one needs to attribute more structure, such as dependency relations, to monophthongal centres and to some diphthongs: see Lass (1987). But there are motivations for suggesting that in prototypical diphthongs the more sonorous vowel governs (Anderson & Ewen 1987: §3.6.2), as in (33.b); though it would again be a rather ‘weak’ head, in simply reflecting relative sonority, except in so far as we can say that the more sonorous the vowel the more prototypical.

In the most familiar varieties of English, light vowels map onto transitive, or ‘checked’, and heavy vowels map onto intransitive, or ‘free’, as in (34.a-b), so that we can formulate a redundancy (34.c), which makes all but transitive vowels heavy:

- (34) *transitivity and weight in English*
- a. { |V } ⇔ { V / { C } }
- b. { V, V } ⇔ { V }
- c. { |V } ⇒ { , V }, except in environment / { C }

The verticals in (34.a/c) indicate (as elsewhere) that nothing other than one V is present. However, this correlation is not universal in English, and the difference in the systems involved suggests that transitivity is primary, i.e. lexical, contrastive, and weight is derived. In Scottish English and Scots the weight of an intransitive vowel depends in a rather drastic way on environment: weight is assigned only if the vowel appears finally or before a tautosyllabic /r/ or before a tautosyllabic voiced fricative; elsewhere intransitive, ‘free’ vowels have the kind of weight associated with transitive, ‘checked’ vowels:<sup>8</sup>

- (35) *Scottish vowel length*
- a. HEAVY: *tie, tyre, rise, live* (adj.)
  - b. LIGHT: *tile, rice, life, ride, write*
  - c. CHECKED (so LIGHT): *pit, pet, putt, live* (verb), *fir*
  - d.  $\{ |V| \} \Rightarrow \{ ,V \}$ , except in environments  $/\{C\}$  and (35.b)

The vowels exemplified by (35.a-b) have been described as ‘vowels of variable quantity’ (Wettsten 1942, Zai 1942). Thus, whereas (34.c) is generally the case in English, so that all intransitive vowels are heavy, in these Scottish and some other varieties we also find the additional requirement of (35.d), which restricts heaviness of intransitives to a certain environment. Weight is rendered uniformly non-contrastive in either case.<sup>9</sup> And if something like this is appropriate, then it illustrates the fundamental status of transitivity in the phonology of English, and the derivative status of weight.

We find a rather different illustration of the fundamental character of transitivity in Midi French. The non-nasal vowel system (excluding schwa) falls into three sets. There is a set of vowels that are transitive (36.a), another that are intransitive (b) and a set which can be either (c):

- (36) a. [e] *inquiet, tournee, tournait, pecheur, pecheur*  
 [ø] *jeux, jeunet, creux*  
 [o] *au, beaute, botte, rhinoceros*
- b. [ɛ] *colere, infect, prefecture*  
 [œ] *jeue, jeune, creue*  
 [ɔ] *roc, rauque, rhinoceros*
- c. [i], [y], [u], [a]

(examples from Aurnague & Durand forthcoming: §3; see too Durand 1976, 1990: particularly §6.1.9). These vowels are categorised, respectively, as in (37):

- (37) a.  $\{V\}$   
 b.  $\{V/\{C\}\}$   
 c.  $\{V</\{C\}>\}$

They are thus the respective phonological analogues of such verbs as *die* (intransitive), *kill* (transitive) and *starve* (either). And the association of ‘high-mid’ realisation with intransitivity and ‘low-mid’ with transitivity is not uncommon.<sup>10</sup>

These phenomena illustrate another respect in which ‘phoneme theory’ fails with respect to contrastivity. Aurnague & Durand (forthcoming: §3), observing the lack of ‘oppositions d’aperture moyenne /e/ ~ /ɛ/’ etc., which seem to be established in Standard French, argue appropriately that in Midi French ‘le système ne comporte donc que sept phonemes vocaliques’ (apart from schwa). But this should lead us to register that the contrastivity in this case lies elsewhere: the ‘environment’ is contrastive. Contrastivity lies not merely in substantive oppositions but also in the phonotactics of phonological units – in this instance their (in)transitivity. The vocalic system of Midi French illustrates this rather transparently.

Transitivity is often basic, then; and the interface properties of weight and ‘aperture’ may be secondary to it. On the other hand, it seems clear that in other systems weight (as well as ‘aperture’, of course) has a contrastive status; so it is another interface property

that is phonologically fundamental. Consider e.g. the Winnebago forms reproduced in (38) from Miner (1979: 28-9):

- (38) a. waarúč ‘table’, maḡcáire ‘they cut a piece off’  
 b. hipirák ‘belt’, haračábra ‘the taste’

The syllable centre(s) in a pre-accentual sequence in what Miner calls ‘regular words’ in Winnebago (the significance of which we shall return to in the subsection that follows) consists maximally of a heavy vowel, as in (38.a), or a sequence of two lights, as in (38.b). In this context, occurrence of heavy or light is independently contrastive. Similarly, in Finnish, for instance, weight is contrastive independently of transitivity. We have seen, however, that the formulation in (35.d), appropriate for Scottish English, prescribes a derivative status for weight in this case, determined by either transitivity or segmental context. Weight, an interface property, can be determined by transitivity, as can ‘vowel-height’.

Finally in this subsection I return to the environments in (35), relating to the ‘Scottish vowel-length rule’. In the first place we must determine whether the distinction between (35.a) and (b) may relate to the measurement of relative sonority, the role of the V/C notation in which needs to be explicated anyway; also, the concepts introduced thereby will be relevant to the concerns of the following section, specifically timing. Let me begin by formulating the relative sonority metric (based on Anderson (1990, 1991, 1992a: ch.6, 1993); applying (39.a) to various representations we get the measures in (b):

- (39) a. *sonority metric*  
 i. {X} = 4X:0C  
 ii. {X;Y} = 3X:1Y  
 iii. {X.Y} = 2X:2Y

where X,Y range over V,C and combinations thereof

- b.i. vowels { |V| } = 4V:0C  
 ii. sonorant consonants { V;C } = 3V:1C  
 iii. fricatives { V.C } = 2V:2C = 1V:1C  
 iv. voiced plosives { C;V } = 1V:3C  
 v. voiceless plosives { |C| } = 0V:4C

This merely makes a little more explicit the notion of preponderance: the greater the proportion of V the more sonorous the segment.

So far we have not included in the measurement of relative sonority categorisations involving non-contrastive non-dependency, simple combination, as with the categorisation proposed for nasal consonants, {(V;C),C}. The metric given in (39) not applicable. I suggest instead a metric based on complexity of the components of the combination. We can say, simplistically, that V;C, which in itself has preponderance of V, contains 3 elements (one for each of the features and one for the dependency relation), but C only one. Thus the nasal representation has the measure in (40):

- (40) nasal Cs { (V;C),C } = 3(3V:1C):1C = (9V:3C):1C = 9V:7C

Nasal consonants come, in terms of the metric, between liquids, now distinguished as  $\{V;C\}$ , and fricatives.  $\{V.C\}$ , in terms of relative sonority. And this seems to be appropriate.

But we have still to characterise voiced fricatives, which contrast with voiceless in English. I propose that these again involve, in English, a simple combination, of the (voiceless) fricative specification and V, introducing the harmonic source, as shown in (41.a), where the relative sonority is also computed:

$$(41) \quad \begin{array}{ll} \text{a.} & \text{voiced fricatives} \quad \{(V.C),V\} = 3(2V:2C):1V = (6V:6C):1V = 7V:6C \\ \text{b.} & \text{voiceless frics} \quad \{V.C\} = 1V:1C \end{array}$$

The voiceless fricatives are distinguished as showing only V.C, as in (41.b). This appropriately marks the voiced fricatives as being more sonorous than the voiceless, and makes them very close in sonority to the nasal consonants.

Indeed, it might seem that the voiced fricatives are ranked by various phenomena in English as slightly more sonorous than the nasal consonants. This of course runs counter to most accounts of sonority rankings. But this ranking would render the English codas in (11.d) unexceptionable in terms of sonority sequencing:

$$(11) \quad \text{d.} \quad \text{chasm, prism}$$

Though in partial compensation, this adds to the set of ‘anomalous’ clusters with initial /s-/ (witness *snow*, *smell*), we can still say that /s/ specifies the class of consonants in which there is a C that bears no dependency relation:  $\{C\}$  and  $\{(V;C),C\}$ . And a lower ranking of nasals might seem to be appropriate in relation to the ‘Scottish vowel-length rule’. Recall the informal statement of the environment for heavy realisation of intransitive vowels in the relevant varieties (whatever they might be): weight is assigned only if the vowel appears finally or before formative-final /r/ or before a formative-final voiced fricative; elsewhere intransitive, ‘free’ vowels have the kind of weight associated with transitive, ‘checked’ vowels. The heavy variant does not appear before voiceless fricatives and stops, oral or nasal; it takes adjuncts higher on the ‘English-specific’ sonority hierarchy, including (on the interpretation under consideration) voiced fricatives.

Problematical here, however, is the failure with many speakers of the heavy realisation to appear also before /l/, which outranks both the nasals and the voiced fricatives. So it may be that the environment does not indeed involve simply sonority but rather a grouping of voiced fricatives and rhotics, as envisaged by Anderson & Ewen (1987: §4.1.3), for instance. How can we characterise this grouping, in terms of the present proposals? We can differentiate between rhotics and laterals as in (42):<sup>11</sup>

$$(42) \quad \begin{array}{ll} \text{a.} & \text{rhotics} \quad \{(V;C),V\} = 3(3V:1C):1V = 9V,3C,1V = 10V:3C \\ \text{b.} & \text{laterals} \quad \{V;C\} = 3V:1C \end{array}$$

With respect to the metric, laterals come appropriately, with respect to sonority, between rhotics and nasals. Notice that in terms of the present proposals rhotics and voiced fricatives are not merely highly sonorous but are also the only contrastive segment types in that environment to contain two occurrences of V, one of them in simple combination with the rest of the specification, so that they form the sub-class of consonants  $\{(V),V\}$ . We can associate this with their role in the ‘Scottish vowel-length rule’.

The representations for nasals and voiced fricatives also share the property of involving components in a relation of non-contrastive non-dependency – components that are

simply combined, and do not involve reference to dependency. We have in this sense two relatively independent components. I suggest this reflects their perceptual and articulatory complexity: voiced fricatives involve two different sound sources – a harmonic and a noisy one; and nasals involve two resonators coupled in parallel. This will assume some significance in the discussion of timing in the next subsection.<sup>12</sup>

#### 1.4 Dependency and timing

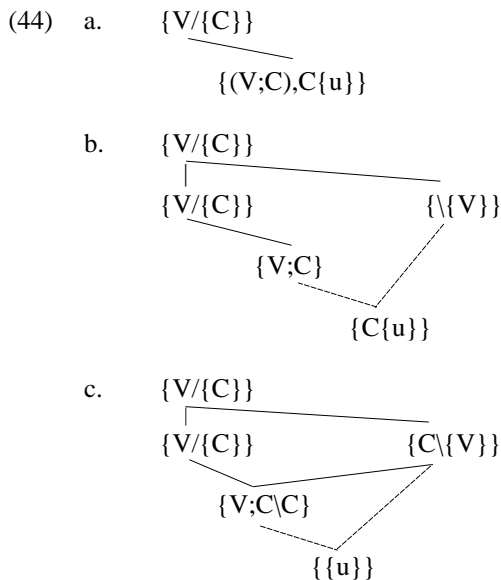
Another interface property characteristic of phonological representations is **timing**, of segments relative to each other, and of components of segments relative to each other, as well as extra-segmental, or prosodic components relative to each other and the segments. I am going to suggest that relative timing, or coordination of elements is guaranteed by dependency.

Consider, for instance, the not uncommon kind of historical development exemplified by the spellings in (43) from English:

- (43) a. emetig(e) ⇒ emti ⇒ empty  
 b. demester ⇒ demster ⇒ dempster ‘judge’/name

I am not concerned here with the loss of the unstressed vowel suggested in each case by the first two successive spellings (though that would form part of the ‘whole story’). What concerns us is that the final Modern English phonological form represented here results from Middle English epenthesis of a plosive between a nasal and a following obstruent. This, I suggest, is facilitated by the absence of a dependency relation, and thus full coordination in timing, between the two components of the representation of the nasal – {(V;C),C} – so that the sonorant/ nasal-cavity component (V;C) can terminate before the closure (C), and the latter part of the closure emerges as the homorganic minimal plosive.

We can represent the development graphically in terms of the successive stages in (44):



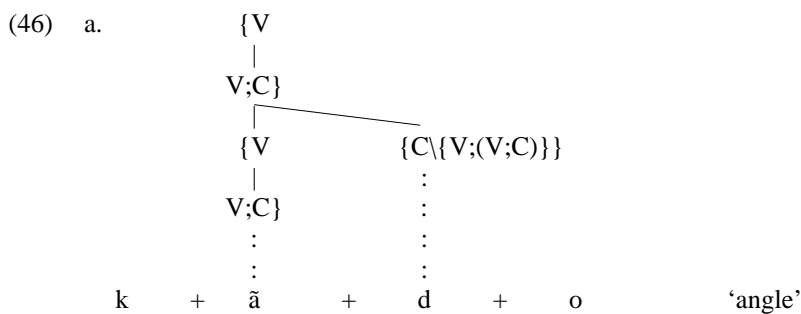
(44.b) represents an intermediate stage after the de-coordination of the sonorant and stop components results in the differentiation of an adjunct distinct from the complement, but sharing the stop property, the closure, as indicated there by the association of {C} with two nodes in the tree. {u} is the secondary category, gravity, associated with the closure. (44.c) differs in showing the application of (27), cluster headship, establishing a dependency relation between the nasal and the non-nasal, and thus coordination in timing. I offer this as a preferable representation of nasal plus plosive clusters to that in (26/28) – as, in the spirit of the Firthian enterprise, more accurately identifying the locale of contrast.<sup>13</sup>

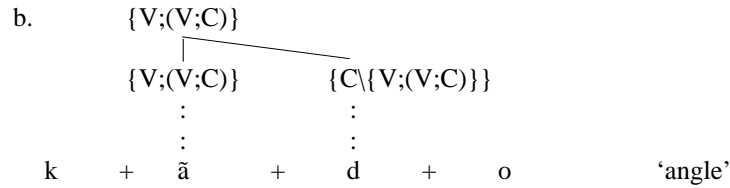
We also find attested the reverse development. This is exemplified by the Scots (and other dialect) pronunciations of *handle*, *candle* etc., without a medial plosive. I suggest that the first stage in such developments is the loss of the dependency relation (equivalent to that in (44.c)) between the nasal and obstruent which guarantees coordination.

Peng (1985) also reconstructs an analogous but slightly different development for the early history of Japanese. He suggests the etymologies in (45):

- (45) a. ntama ⇒ tama ‘ball’  
 b. \*ndori ⇒ tori ‘bird’  
 c. \*-mbu ⇒ -bu ‘sheet’  
 d. \*tambi ⇒ tabi ‘every time’  
 e. \*tombi ⇒ tobi ‘jumping, flying’  
 f. \*tongaru ⇒ togaru ‘to taper’

Here the nasal rather than the plosive is lost. The plosive emerges as voiceless initially and voiced between voiced sounds. However, some dialects apparently show nasality of a vowel preceding obstruents (Peng cites Ogura 1932: 27). This would make a plausible intermediate stage in the development in medial position in (45), and one that we might associate, once more, with loss of the dependency relation guaranteeing relative timing of the nasal and obstruent, as in (44.b). If the nasal and obstruent are independently timed with respect to the vowel, then the nasal component can be incorporated into the vowel, maintaining the dependency relation, as in (46.a), or, more compactly, using the ‘;’ notation for dependency/relative prominence throughout, (46.b):





A nasal vowel is a vowel, {V}, with a secondary resonator, the latter represented V;C. The internal structure of the vowel representation preserves the dependency relation between the vowel and the nasal components. This kind of thing is part of the evidence for suggesting that the dependency relation is in common between syntagmatic structure and intra-segmental structure (Anderson & Ewen 1987: §3.6.2). Of course, in the absence of a contrast among syllabics of the character of nasal vowel *vs.* lateral *vs.* rhotic, this representation can be simplified contrastively as simply {V,{V;C}}, again revealing the system-dependency of contrastive representations. Indeed, it may be that the representation remains over-specified; but I shall not pursue this here.

All the preceding examples relate to the complex character of nasal stops and the absence of a dependency relation between the major components of their representation. But there are also phenomena associated with voiced fricatives that can be interpreted as reflecting their similar complexity. Suggestive at least is the alternation in the pronunciation of the second cluster in Greek  $\mu\pi\rho\iota <\tau> \zeta\acute{o}\lambda\epsilon\varsigma$  ‘(pork) chops’: [brizoles  $\approx$  bridzoles  $\approx$  britsoles]. The linearly realised complexity of the affricates alternates with the double-sound-source complexity of the corresponding voiced fricative.

We can perhaps associate loss of dependency and thus of guarantee of relative timing, with yet another variety of phenomenon, illustrated by the operation of Dorsey’s Law in Winnebago. Dorsey’s Law consists basically in the observation that a number of CVCV sequences in some Siouan languages correspond to CCV sequences in other, closely related ones. Much recent discussion has focused on Winnebago (*vs.* particularly Chiwere) in this respect (e.g. Miner 1979, Hale & White Eagle 1980, Halle & Vergnaud 1987: 31-4, Steriade 1990, Hind 1997: §5.2); and it is on the former language that I shall concentrate here, where it has been claimed that Dorsey’s Law has synchronic status. I shall argue however, that this status is rather different from that proposed by Hale & White Eagle (1980) and Halle & Vergnaud (1989).

Miner (1979: 27) cites such cognate pairs as those in (47):

(47)	<i>Winnebago</i>	<i>Chiwere</i>
	a. hoikéwe	ugwé
	b. pàrás	bláθge, bláhge

and correspondences elicited from Robinson (1972) such as are shown in (48):

(48)	a. -kere-	-gle-
	b. -kiri-	-gli-
	c. -sɯŋɯ-	-θlɯ-
	d. -paŋa-	-blɔ-

And he comments: ‘Dorsey’s Law clearly represents a “vowel copy” process which broke up obstruent-sonorant clusters in Winnebago’ (1979: 27).

Miner calls these sequences in Winnebago ‘fast sequences’, and attributes to them the properties in (49):

- (49)            *Winnebago ‘fast sequences’*  
                   Using the formula ‘ $C_1V_1C_2V_2$ ’ for the ‘fast sequences’:
- a.     $C_1$  is a voiceless obstruent (/p k č s š x/);
  - b.     $C_2$  is a sonorant (/m n r w y/);
  - c.     $V_1 = V_2$ ;
  - d.    the sequences are spoken (and apparently sung) faster than other CVCV sequences;
  - e.    the sequences may be reduplicated just as CV sequences may, and are the only CVCV sequences which may reduplicate.

Properties (49.d) and (e) suggest that these sequences are monosyllabic, despite the appearance of two vowel segments, and that (c) is the case suggests there is in some sense only one vowel present.

Miner points to other phenomena that appear to point in the same direction, and to support a synchronic status for Dorsey’s Law. Thus, instead of the stem-final *-e* in (50.a) we in (b) an *-a* before the suffix *-ire*:

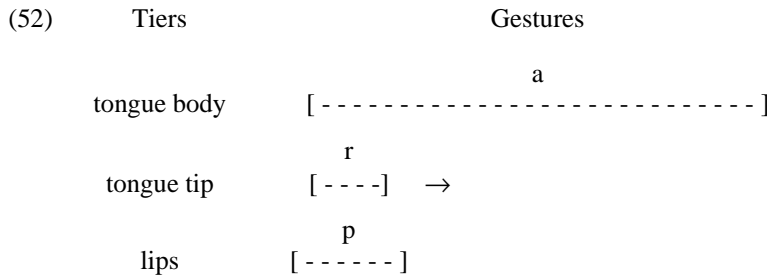
- (50) a.    maꞗčé ‘he cut a piece off’  
        b.    maꞗčáire ‘they cut a piece off’

A stem-final ‘fast sequence’ behaves like a single vowel in this respect:

- (51) a.    kèré ‘he departed returning’  
        b.    kàráire ‘they departed returning’

(I return shortly to the question of accent placement, marked by the acutes and graves in (50/51).) The conjunction of properties in (49) and (50/51) has led to analyses seeking to account for Dorsey’s Law in terms of timing.

Thus, in Steriade’s (1990: 391) formulation: ‘from an input syllable beginning with two consonantal gestures overlapping in duration with each other, a delay in the onset of the liquid can create a sequence in which the vowel gesture begins to “show” between the consonant gestures’. This is illustrated in (52) (her (12)):



And she concludes: ‘since Dorsey’s Law creates a sequence in which a consonant gesture has come to be nonperipherally superimposed on a vowel gesture, it automatically turns a monosyllable into a disyllable’ (Steriade 1990: 391).



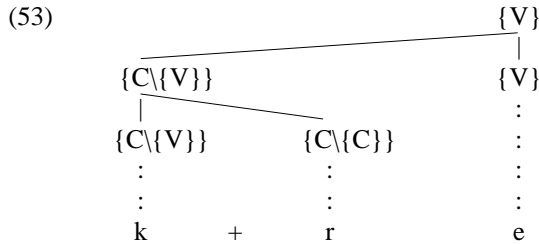
However, this conclusion is difficult to reconcile with the properties we have just looked at which suggest that monosyllabicity is retained under Dorsey's Law. The assignment of disyllabicity doesn't indeed seem to be an automatic consequence of rightward drift of the sonorant articulation to reveal part of the vowel gesture. Nevertheless, an account in terms of timing has considerable plausibility. And I shall try here to formulate the basis for the change in timing (without necessarily acquisition of disyllabicity) in terms of the framework I have been presenting in what precedes. My startingpoint is a suggestion of Hind's (1997: 295-6) – though he, indeed, fails to recognise his account as incompatible with Steriade's assumption of automatic assignment of disyllabicity.<sup>14</sup>

In terms of a framework that unites 'articulatory phonology' with aspects of 'government phonology', Hind associates the loss of coordination between the two consonants in the clusters manifested in 'fast sequences' with 'failure of indirect government' of them by the syllable centre ((1997: 296). In terms of the structures assumed here, I interpret this as involving failure of (16) to apply to the second consonant in 'fast sequences'. (16) is repeated here for convenience of reference:

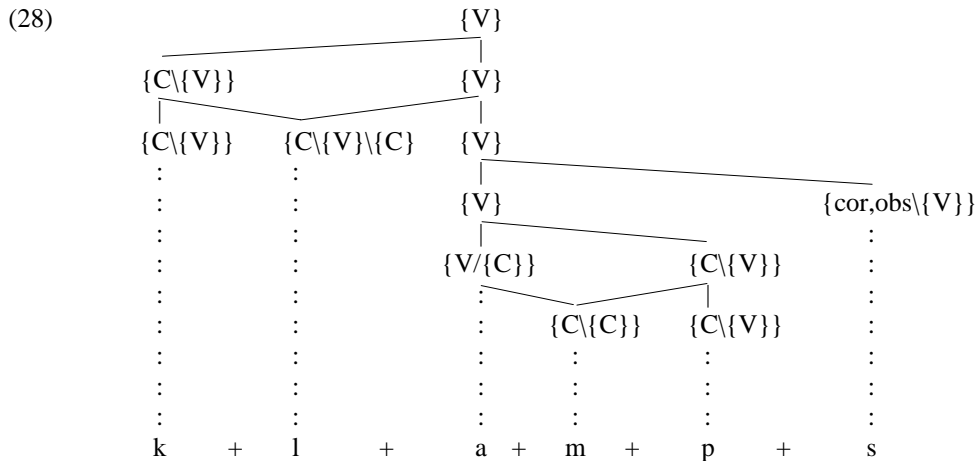
(16) *consonant adjunction*

$$\{C\} \Rightarrow \{\backslash\{V\}\}$$

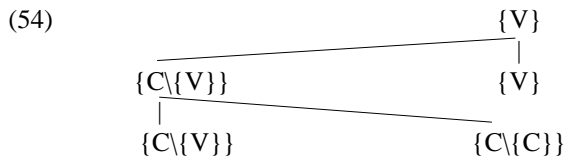
Failure of (16) reduces the onset dependencies in a form like *k(e)re* 'return' to those in (53):



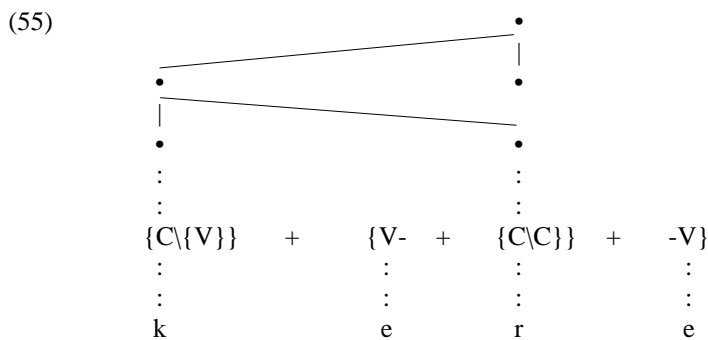
Consonant adjunction is not available in Winnebago to sonorants dependent on the onset head. Compare the initial cluster in the English form in (28):



(28) shows the ‘maximisation’ of dependencies alluded to in §1.2. I am now saying that this ‘maximisation’ is what ensures coordination of segments. In (53) the second consonant is dependent on the first and coordinated with it, so that a portion of the sonorant articulation can be perceived after the plosive has been released. But the sonorant is not dependent on the centre of the syllable (though it is subordinate to it, via the obstruent), so its sequencing is not coordinated with it, as it is in, say, (28); but it is free to ‘slide rightwards’, so that we have (54):



The articulatory expanse of the centre, which, given the status of the centre as head of the syllable, is co-terminous with the syllable (cf. e.g. Coleman 1992: §6), is heard on both sides of the sonorant, reflected in the perceived sequencing of (55):



In (55) I revert to a notation (cf. Anderson 1986) which separates the categorial specifications, which are lexical, from the derived dependency tree, thus clarifying graphically their relations to each other and to the sequencing. It is easy to see how this could lead to disyllabicity, i.e. re-interpretation of each of the two perceptible exponents of V as a centre; but the observations in (49) and (50/51) seem to support a monosyllabic analysis, along the lines of (55), of the ‘fast sequences’ of Winnebago.

I thus interpret Dorsey’s Law synchronically not as some kind of structure-changing rule that leads to restructuring of the forms in which it applicable (as in Hale & White Eagle 1980 and Halle & Vergnaud 1982), but rather as the timing that results from the absence in Winnebago of the potential for undergoing (16) of onset sonorants preceded by a voiceless obstruent of the set given in (49.a). The structure in (55) does indeed interact in an intricate way with the rules for accent placement in Winnebago, but not so as to call into question the monosyllabic status of these sequences. Rather, at most the singular/plural ambivalence of the V becomes evident therein. Let us look at the operation of the accent rules, firstly in forms lacking ‘fast sequences’, in what Miner calls ‘regular words’ (1979: 28).

Placement of the word, or primary, accent is formulated by Miner (1979: 28); I paraphrase in terms compatible with our ongoing discussion as in (56):

(56) *Winnebago word accent*

Accent the syllable containing the third **V** from the left;  
 If the form contains fewer than 2 **Vs**, accent the syllable containing the second **V** from the left

- a. hipirák ‘belt’
- b. haračábra ‘the taste’
- c. waarúč ‘table’
- d. maqáčáire ‘they cut a piece off’
- e. wasgé ‘dish, plate’
- f. xée ‘dig, hill’

(56) also gives some examples, again from Miner (1979: 28-9), wherein location of the word accent is indicated by the acute. (56.a-d) illustrate application of the first clause in the accent rule: the accent on (a) and (b) is on the third syllable, which contains the third **V**; that in (c) and (d) is on the second syllable, containing the third **V**, since the first syllable contains two **Vs**. (56.e) illustrates placement on the second syllable, containing the second and last **V**; and in (56.f) the accent is on the first (and only syllable), which contains the second **V**.<sup>15</sup>

There is some disagreement over the placement of accents other than that allowed for by (56). Miner suggests (1979: 28) that further accents are added to longer forms by iteration to the right from the end of the accented syllable of (his equivalent of) (56). These further accents show down-stepping from the primary one, and I shall follow Hale & White Eagle (1980), and depart from Miner’s practice, in marking them as secondary accents, with a grave. Miner’s account would assign accents as in (57) – i.e. on the third vowel following the primary accent, otherwise on the second if there is one:

- (57) a. hiižúgokirúsge ‘double-barrelled shotgun’
- b. wiirágúšgerà ‘the stars’
- c. waipérasgà ‘linen’

And this is how he marks these forms (apart from my substitution of the grave for acute). According to Hale & White Eagle (1980), however, the post-primary accent pattern is alternating: accent occurs on every second **V**, as they are marked in the form in (58), which they invoke as an example of ‘regular’ stress (though we might note that it does end in a ‘fast sequence’):<sup>16</sup>

- (58) haakítujìkšàṅà ‘I pull it taut (declarative)’

Hale & White Eagle (1980: 117, fn.3) disagree on the placing of the accent in (57.b), which they hear as having a penultimate secondary (in accordance with their expectations). And they analyse (57.a) as a compound with two word accents. (57.c) is neutral between the two accounts.

In what follows I shall adopt Hale & White Eagle’s (1980) view that (in the terms adopted here, every second **V** after the word accent bears a secondary. Firstly, however, I want to focus on the accentual behaviour of ‘fast sequences’ in the left margin, before the word stress, of which Hale & White Eagle (1980) offer no account. What follows immediately, then, relies entirely on Miner (1979). It has seemed to me unnecessary, given the present focus of our interests, to formalise the representation of accent in Winnebago. And

in any case the derivational machinery invoked by Hale & White Eagle (1980) and Halle & Vergnaud (1989) seems to be quite unnecessary.

In the pre-word-accent zone, according to the marking of accents in Miner's examples (1979: 30), 'fast sequences' can be said to behave as follows:

(59) *pre-accentual 'fast sequences' in Winnebago*

they count as two successive Vs, as illustrated by (60.a), unless they are preceded by a vowel, in which case they count as one V, as in (59.b), unless the sequence is final in a di- or mono-syllable, and so must bear the word accent, in which case it behaves as two Vs, as in (59.c); in short, count so as to maximise the pre-accentual domain, consistent with (56):

- a. *kèrekéreš* 'colourful'  
*kèrejűsep* 'Black Hawk'
- b. *hikòrohó* 'prepare'  
*wikìripáras* 'cockroach'
- c. *hokèwé* 'enter'
- d. *pàras* 'flat'

In all these cases Miner marks the first occurrence of the V in the 'fast sequence' (which are italicised in the forms in (60)) as bearing a secondary accent; and this he does even when the 'fast sequence' constitutes the only V component of the word, as in (60.d). These phenomena seem to me to illustrate rather forcibly the ambivalence of the 'fast sequence' – one or two Vs? On this assumption, accentuation in the forms in (60) is much more regular than in their presentation by Miner, who apparently abandons an attempt at a synchronic formulation (1979: 30).

As concerns word-accent and post-primary-accent, 'fast sequences' behave as follows:

(60) *post-accentual 'fast sequences' in Winnebago*

Fast sequences count as one V unless final or accented:

- a. *harakíšurujikšqñà* 'you are sick'
- b. *hirakórohò* 'he gets ready'
- c. *wakiripóropòro* 'spherical bug'
- d. *hirat'át'ašqñàšqñà* 'you are talking'

The unaccented medial 'fast sequence' in (60.a) counts as one V if it is to conform to Hale & White Eagle's (1980) alternating stress rule, but the final 'fast sequence' therein counts as two and receives secondary accent on the second part, as would a separate V. The accented 'fast sequence' in (60.b) behaves like two Vs, permitting the final secondary in accordance with alternating stress. The accented 'fast sequences' in (60.c) also behave like two Vs. Seemingly problematical is (60.d), where one would expect a secondary accent on the first 'fast sequence' as well as the second (unless the preceding apparent reduplication offers a clue here).

However that may be, I think that the present account leaves fewer loose ends than Miner's or Hale & White Eagles. And, overall, we have further evidence of the segmental ambivalence of 'fast sequences' in Winnebago. We certainly don't seem to have evidence of 'automatic' disyllabification. I suggest that an account involving a dislocation in timing

(without disyllabification) fits best with the evidence. I am suggesting here that this reflects loss of the dependency relation that guarantees coordination of timing.

This concludes my discussion of the role of dependency in coordinating the timing of elements in the representation. This I have illustrated by both segmental representations, especially the internal structure of nasal consonants, and suprasegmental, the representation of ‘fast sequences’. Both kinds of phenomena discussed are not uncommon. As Steriade (1990: §27.2.6) observes, phenomena of the character of Dorsey’s Law are not limited to Winnebago. Miner (1979: §1.1) notes that in Winnebago one can also observe the intervention ‘of a slight schwa (or more precisely, a barely audible intrusive vowel having more or less the quality of a short version of the following full vowel)’ between and obstruent and sonorant at morphological boundaries. He is careful to differentiate between this phenomenon (also found in other Mississippi Valley Siouan languages) and the behaviour of ‘fast sequences’; but it is clearly a minor instantiation of dislocation in coordination.<sup>17</sup> Complete dislocation occurs in a language when the sonorant overlaps only the final portion of the centre, and we have metathesis, involving a different kind of (diachronic) restructuring from that involved with the development of disyllabicity. What I am suggesting here is that it may be that dislocation of timing in general follows from lack of regulation by the dependency relation, whereas coordination of two elements follows from the existence of a dependency relation between them. If this is so, then timing is an interface property that is not contrastive.

## 2 Structural analogy, and some (more) analogies

I have used throughout the discussion in §1 some terms which are more familiar from the syntax, namely the head-based terms complement and transitivity, adjunct, and specifier. As indicated, these are used advisedly, for this seems to me to be appropriate; and I have alluded to syntactic analogues already in what precedes. For, apart from the configurational parallelism with the equivalents in syntax which we can associate with the preceding representations, and which I shall illustrate (for the syntax) in a moment, these terms have the same content in both domains: a transitive element is a head that takes an obligatory complement; an adjunct is an optional modifier of a head. The specifier is perhaps the most contentious identification, but this is largely due to the lack of clarity on what constitutes a specifier in syntax. However, well-established and lexically categorised syntactic specifiers like that preceding the adjective in (61) shares various properties with what I have designated a phonological specifier:

(61)           very difficult

It is an adjunct, so optional, as is initial pre-plosive /s/; it belongs to a small class, as does /s/, in that case a class of one; it selects only some of the primary class that it is adjoined to, in that it occurs only with gradable adjectives, just as /s/ selects the minimal plosives, the neutralisations of /p/ ≠ /b/ etc. As a result of this, the specifier is an indicator of that subclass.<sup>18</sup>

Anderson (in press a) regards the appropriateness of these concepts in both syntax and phonology as an illustration of the viability of the structural analogy assumption, given in (62) (from Anderson 1992a: 2; see Anderson in press a, for references to other discussions of structural analogy):

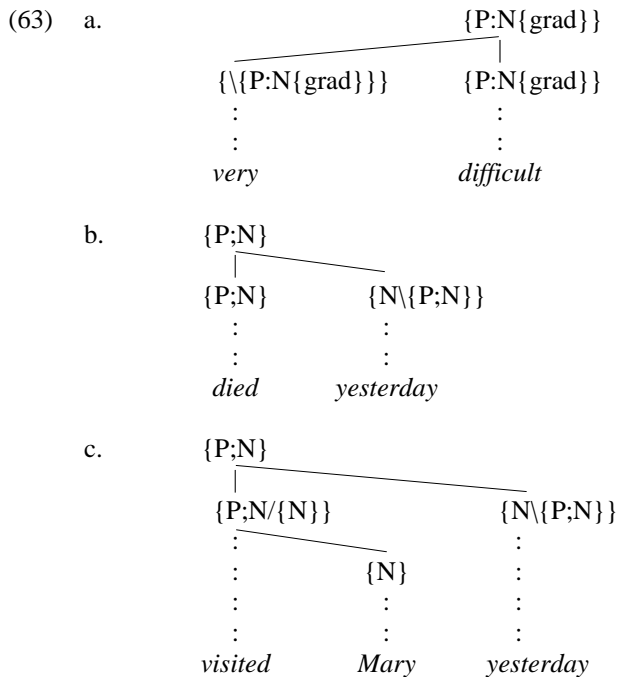
(62) *structural analogy assumption*

Minimise (more strongly, eliminate) differences between levels that do not follow from a difference in alphabet or from the nature of the relationship between the levels concerned

Phonology and syntax are different (sets of) levels: this is ensured merely by the difference in alphabet, where the alphabet of a level is the basic set of categories out of which representation are constructed. Levels differing in alphabet can be said to belong to different planes. And the planes of syntax and phonology are related in a particular way: typically, phonology is seen as interpretative of syntax. Golston formulates the relationship as ‘syntax outranks phonology’ (1995: title). What I want to go on and examine here is some of the ways in which the different characters of the alphabets limit the scope for analogy. We shall find that closeness of analogy between syntax and phonology reflects distance of a property from a purely interface orientation.

**2.1 Transitivity and ambidependents**

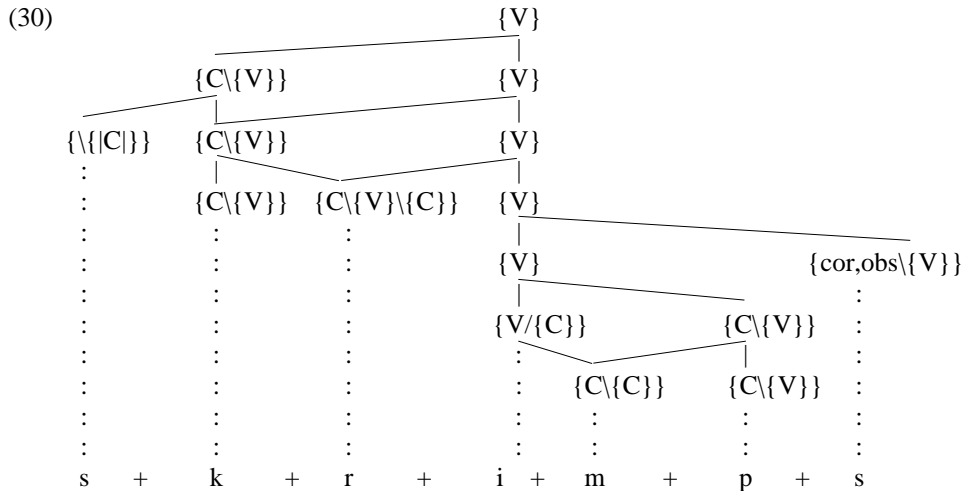
I have just suggested that there are in the syntax analogues to the head-based concepts – complement, adjunct, specifier – deployed in §1 in relation to the phonology. (63) illustrates the categorial and structural parallelisms involved:



(63.a) contains a specifier, (b) an adjunct and (c) a complement and adjunct – all of them rather uncontroversially claimed here to be such. In the primary-categorial representations given here, **P** is a notional feature of ‘predicability’, **N** of naming or ‘referentiability’; names (and pronouns), which are non-predicable (so that *James* in *That is James* is equative not predicative), are characterised by **N** alone, the lexical verb has a preponderance of **P**, and with the adjective we have mutual preponderance of **P** and **N**, indicated by ‘:’. I return to the primary-categorial characterisations, including this new possibility in-

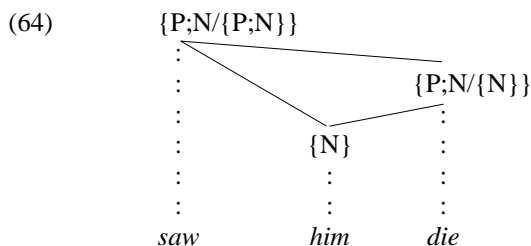
volving ‘:’, in (63) in a moment. *Very* in (63.a) is specified as selecting the grad(able) secondary category of adjective.

What I want to illustrate at this point is that the structures in (63) involve the same structural relations as we found in our discussion of phonological representation; recall the representation in (30):



*/i/* in (30) shows the complement and adjunct relations associated with *visited* in (63.c), whereas *died* in (63.b) is intransitive, like a vowel such as */i:/*. The specifier *very* in (63.a) is paralleled by the */s/* in (30). Actually, (30) simplifies somewhat in a way so far not unacknowledged: just as *very* selects only gradable adjectives, so the */s/* in (30) and the like selects specifically unaspirated (as well as unvoiced) plosives to modify.

(30) also shows double-motherhood, or ambidependency, as with */r/* and */m/*. There are motivations for recognising this as appropriate in the syntax also, as in a structure such as (64):



In (64), *die* selects for a particular kind of  $\{N\}$ , but the morphology of the  $\{N\}$  in (64) reveals that this complement is also a dependent of *saw*, with the verbal configuration imposing objective case, even though *saw* is not subcategorised for *him*, but rather simply for a verbal construction in this case. A fuller explication of the syntax involved here (including e.g. some explication of the treatment of the  $\{N\}$  as a complement of *die*) will require some further elaboration of the content of syntactic structure, some of which elaboration goes beyond what we have found in the phonology. §3 argues that these ‘elaborations’ are motivated by the character of the alphabet of syntax. At this point I merely want to record in a preliminary fashion that double-motherhood is not necessarily limited to phonology. I

shall indeed be arguing that double-motherhood is pervasive in syntactic structure, but for rather different reasons than those associated with the phonology, where dependency guarantees coordination of segments in time, an interface property not applicable as such to the syntax.

## 2.2 *The structure of the basic unit*

The word classes, or primary categories, distinguished by combinations of **P** and **N** are analogous to the major classes, or primary categories, of the phonology, distinguished by combinations of **V** and **C**: these categories determine the basic order of elements in both cases. The secondary categories, involving e.g. place of articulation in phonology, and gender in syntax, provide only ‘fine tuning’ of the basic possibilities. The primary/secondary distinction among categories is a further inter-planar analogy. And the primary categories are in each case distinguished in terms of varying preponderances of the substantive features.<sup>19</sup> Again the analogy is limited by the need for further elaboration in the syntax, elaboration once more required by the nature of the alphabet, which involves semanticity rather than being simply perceptually based. And again we pursue this in §3. However, we can observe the similarity of basic pattern between (39), repeated here, and (65):

(39)	a.	vowels	{ V }	=	4V:0C
	b.	sonorant consonants	{V;C}	=	3V:1C
	c.	fricatives	{V.C}	=	2V:2C = 1V:1C
	d.	voiced plosives	{C;V}	=	1V:3C
	e.	voiceless plosives	{ C }	=	0V:4C
(65)	a.	finites:	{ P }	=	4P:0N
	b.	non-finite verbs	{P;N}	=	3P:1N
	c.	adjectives	{P;N}	=	2P:2N = 1P:1N
	d.	nouns	{P;N}	=	1P:3N
	e.	determinatives	{ N }	=	0P:4N

(65.c) introduces a new relation (though already deployed, in passing, in (63.a)), represented by the colon, signalling that **P** and **N** are mutually dependent. The reason for this is the increased complexity of the representations necessary to the characterisation of syntactic primary categories, a consideration of which will, as indicated, occupy us in §3.

The measures in (39) define the sonority hierarchy. Syntax displays a similar **hierarchy** characterised by the parallel measures in (65). Manifestations of the hierarchy (and its elaborations, involving further, more complex categories, as discussed in §3) have been described by Ross (1973), for instance, in terms of a dimension of ‘nouniness’, such that less ‘nouny’ constructions are less accessible to certain syntactic phenomena. Thus, though there is an analogy here in the need and the capacity of segmental representations to define hierarchies, the manifestations of the hierarchies in respectively syntax and phonology are rather different. And this can be associated with the domain of their respective alphabets: in phonology we are concerned with relative inherent perceptual prominence and the constraints this imposes on syllable structure; in syntax we are involved with relative access to the semantic capacity to head a fully-formed predication. Nouns, with low capacity (associated with predominance of the **N** feature), are prototypically not complement-taking (as I shall argue in a moment), and prototypically do not constitute the head of an independent predication; more adjectives than nouns are complemented (not just deverbal ones: *aware of*, *close to*, *near (to)*, *like*, etc.), though perhaps not prototypical ones (*small*,



*old*, etc.), and in many languages adjectives share ‘verbal’ properties; verbs show a fully fledged system of complementation, but only finite ones can head an unmarked independent predication.

It emerges from these last remarks and comparison of the discussion of phonological transitivity and adjunction in §1.2 that also analogous in phonology and syntax is the unevenness of the distribution of complementation, adjunction and specification through the set of primary categories. Just as only vowels in English take complements, there is no complementation of prototypical nouns, with ‘nominal’ complements being restricted to deverbal nouns (such as *disappearance*, *destruction*, *student*, etc) and a small number of ‘inherently relational’ nouns (such as *mother*, *side*, etc.).

Anderson (in press a: §4) thus argues that the high degree of parallelism attributed to the expansions of the primary categories by X-bar syntax is fallacious. By virtue of their cognitive content nouns and verbs, for instance, enter into different kinds of relationships within the expansions of the basic category: nouns allow **attributive** adjuncts (*blonde men*, *men from Iceland*, etc.), which permit further classification and identification, while verbs, as prototypically relational, require complements and permit **circumstantial** adjuncts (*sang beautifully*, *sang at the Met*, etc.). Both attributive and circumstantial adjuncts can occur with deverbal nouns, but in a certain order, as illustrated by (66):

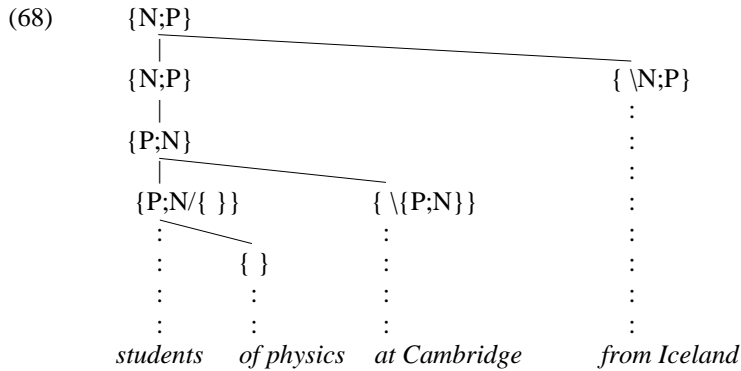
- (66) a. students of physics at Cambridge from Iceland  
 b. \* students of physics from Iceland at Cambridge  
 c. \* students at Cambridge of physics from Iceland  
 d. \* students from Iceland of physics at Cambridge

(66.a) shows a post-nominal complement, an attributive and a circumstantial. The attributive does not normally precede the circumstantial (66.b), nor can either of them precede the complement, as shown by (66c/d). Deverbal nouns may also be associated with an ambiguous adjunct:

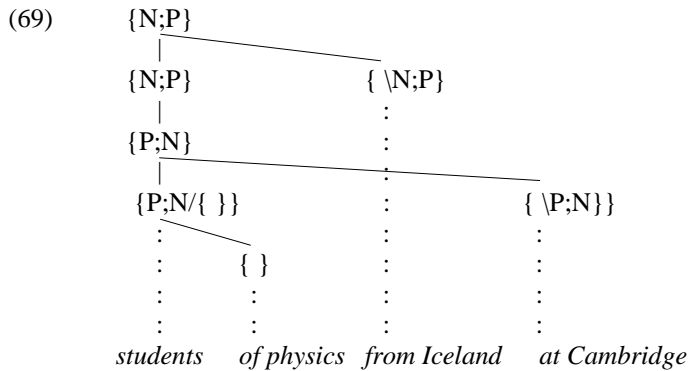
- (67) a beautiful singer

The pre-nominal adjunct in (67) may be either a circumstantial (cf. the verbal circumstantial in *she dances beautifully*) or attributive (where the beauty is independent of the singing).<sup>20</sup>

If we associate complements and circumstantial adjuncts with verbs and attributive adjuncts with prototypical nouns, then we can allow for the occurrence of all of these with deverbal nouns in terms of their complex internal structure:



Recall that  $\{N;P\}$  is the representation for nouns, and that  $\{P;N\}$  represents lexical verbs (cf. (65)). The higher, attributive adjunct is associated with the  $\{N;P\}$ , and the others with the  $\{P;N\}$ ; and the linear order is in conformity with height and thus projectivity-preserving: there is no interruption of constructions by elements from outside the construction. Cf. e.g. (69):



I have suppressed much of the category information in (68) and (69) (as well as the internal structure of the post-nominal phrases). This is because this would involve categorial elaborations which we shall be looking at in the following section on possibly non-analogous aspects of syntax.<sup>21</sup>

The representations in (39) and (65) also provide an inherent measure of **markedness** (as well as sonority/'nouniness') in terms, in this case, of their relative simplicity (Anderson & Ewen 1987: §1.3.2, Anderson 1997: §2.4). Thus, for instance, adjectives emerge as rather complex, in involving two features in a double dependency, a relation of mutual preponderance. Anderson (1997: 62) suggests the metric in (70), based on complexity of feature combination.:

- (70) *markedness metric*
- 0
  - , = 1
  - ; = 2
  - : = 3

This seems to be in accord with their non-universality and late acquisition as a distinct class (Anderson 2001b: 176). The particular complexity – {P:N} = {P;N},{N;P} – also correlates well with the fact that in adjective-less languages items that would be adjectives in other languages are either verbs – {P;N} – or nouns – {N;P} (Dixon 1982: ch.1). In some languages (such as Cherokee – Lindsay & Scancarelli 1985) all adjectives are derived from either verbs or adjectives. Most relevantly, however, complexity correlates here with markedness.

Similarly, a language may lack fricatives (= 2, by (70), if we equate ‘.’ with ‘;’, the former not being included in Anderson’s formulation of the metric) but not oral stops (= 0) and a language is unlikely to have fewer stops than fricatives (and fewer voiceless stops than voiced (= 2)) – see e.g. Nartey (1979). Although, as e.g. Menn & Stoel-Gammon (1995: 348) and Heijkoop (1998) observe, there is much individual variation in order of acquisition of categories, the primacy of stops clearly emerges in studies of phonological acquisition and loss (cf. e.g. Menn & Stoel-Gammon 1995: 348, Dinnsen et al 1990).

Other factors are involved, though. In, for instance, the data studied by Heijkoop (1998: part II, §3), a nasal stop, with a typical adult specification involving simple combination, of a sonorant and a stop specification, {(V;C),V}, is often the first realisation in acquisition combining a vowel representation with a consonantal, {V,C} (cf. too again Dinnsen et al 1990) – though in other cases a fricative occupies this position. Fricatives, in adult language typically {V.C}, make a plausible first combination of V and C. Nasals, however, are not the simplest of categories. But they may represent the simplest way in terms of performance to combine a vowel-like and a consonantal articulation, a notion consistent with their frequency (particularly that of [m] – Locke 1983) in babbling. (For an attempt to formulate a hierarchy of opposition acquisition that would accommodate this and other aspects of categorial representation see Anderson 1997b.)

In the two planes, markedness clearly relates to interface properties to do with maximisation of perceptual and cognitive differentiation, so that verb and noun and vowel and consonant, respectively, are maximally opposed. But this interface-based distinction yields in both cases to the same kind of formal characterisation, as embodied in (39) and (65).

I have tried in what precedes to illustrate some of the detailed formal analogies that have been attributed to the two planes of syntax and phonology. I have not belaboured here manifestations of obvious properties such as the crucial part played not just by the dependency relation itself but by this relation’s being deployed as part of (directed connected) trees in both planes – although I did point to the sharing by syntax and phonology of the availability of double-motherhood (recall (30) and (64) above). The analogies we have considered involve aspects of structure that are relatively independent of the substance of the respective categorial alphabets and thus of properties that are purely interface. In so far as linearity correlates with substance, ultimately time, it is perhaps exceptional here in pervading both phonology and syntax. As we have observed, however, it is only marginally contrastive in the phonology; and with respect to the syntax it is not a lexical property, but is derivative of other aspects of syntax (argument structure, weight, pragmatic considerations such as empathy, textual considerations such as focus, etc.). Though linearity is crucial to expression and perception, its independence of other aspects of language structure is marginal.

### ***2.3 Extrasegmentals: harmony, underspecification and opacity***

The linearity analogy, however, can be argued to extend, more interestingly, to the ‘multilinearity’ associated with many current approaches to phonology: syntax is ‘autosegmen-

tal'. But again much of the linearity associated with so-called 'non-linear' representations is redundant. And this brings us to the contemplation of perhaps less obvious analogies.

Consider, in outline, how many systems of **vowel harmony** work. Let us focus, for present purposes on so-called 'stem-controlled' harmony. On the one hand, in terms of this, all the vowels within a lexical formative are required to share lexically the presence or absence of some secondary property (in terms of simplex features). This property is then a property of the lexical item rather than of individual vowels (unless there is some motivation for selecting a specific vowel as the source of the harmony). On the other hand, the property in question spreads to at least some affixes.

This can be illustrated from the well-known Finnish system (the complexities of which I do not pursue here – see e.g. Skousen 1970, Anderson 1975, Ringen 1975; the following examples are drawn from van der Hulst & van de Weijer 1995). Finnish is generally analysed as showing 'palatal harmony' or 'backness harmony': lexical items are either 'front words' or 'back words', as respectively illustrated by (71.a) and (b):

- (71) a. pöytä 'table', käyrä 'curve', tyhmä 'stupid'  
 b. pouta 'fine weather', kaura 'oats', tuhma 'naughty'  
 c. värttinä 'spinning-wheel', kesy 'tame'  
 d. palttina 'linen cloth', verho 'curtain'

There are two **neutral** vowels, spelled *i* and *e*, which, though themselves categorisable in traditional terms as 'front', can appear in either type of item, 'front' or 'back', as illustrated in (71.c-d) respectively. Let us consider how this might be represented phonologically.

Firstly let me spell out appropriate representations for the vowels, without reference to the 'harmony' phenomena. The fully specified vowel system of Finnish is patently asymmetrical, as shown in (72):

(72) *the fully specified Finnish vowel system*

<i>acute</i>	<i>acute + grave</i>	<i>non-acute</i>
{i} 'i'	{u,i} 'y'	{u} 'u'
{i;a} 'e'		
	{u,a,i} 'ö'	{u,a} 'o'
{a;i} 'ä'		
	<i>non-acute non-grave</i>	
	{a} 'a'	

(72) gives only the specification of the secondary categories; the segments are all vowels. {a}, {u} and {i} are the vowels containing respectively only the compactness/lowness, grave/round and acute/palatal feature (Anderson & Ewen 1987: §6.1).

However, contrastivity again demands that we reject as lexical representations such over-specified conjunctions of secondary features as we find in (72). Moreover, if we follow Anderson & Durand (1988a,b 1993) in associating such **asymmetry** as we see here with the presence of **non-specification**, we can posit a lexical system which is less redundant, which is symmetrical, and which makes transparent the nature of the harmony and 'neutrality' to it, if we propose for Finnish the system of (73):

(73) *the minimally specified Finnish vowel system*

<i>acute</i>	<i>non-acute</i>
{u,i} ‘y’	{u} ‘u’
{u,a,i} ‘ö’	{u,a} ‘o’
{a,i} ‘ä’	{a} ‘a’
<i>underspecified</i>	
{ } ‘i’	
{ , } ‘e’	

(73) contains two vowels with no substantive specification, one simplex, corresponding to *i*, the other complex, indicated by the comma in the representation, corresponding to *e*. They are realised as in (74), which statements can be thought of as redundancies applicable to the vowels of Finnish:

- (74) a.  $\{V\{, \}\} = \{V\{,a\}\}$   
 b.  $\{V\{ \}\} = \{V\{i\}\}$

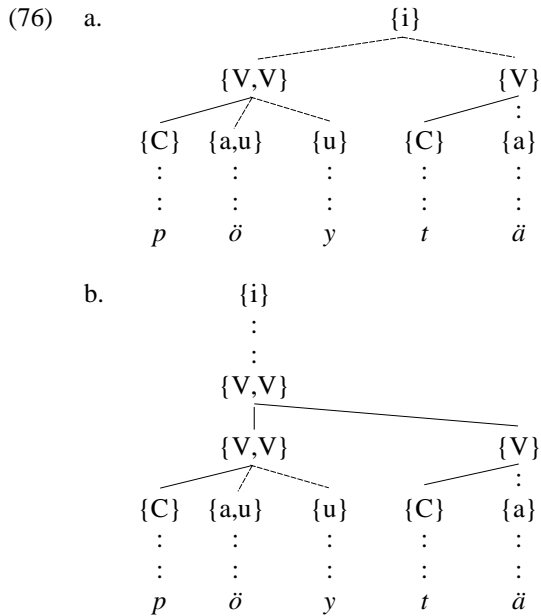
By virtue of application of both of (74.a) and (b), { , } comes to be {i,a}. How then is what is spelled *e* distinguished from what is spelled *ä* (cf. (73))? The answer to this lies in the characterisation of harmony.

In terms of (73), the formatives in (70) are respectively ‘acute +’ vs. ‘non-acute’ items, i.e. associated with presence vs. absence of the acuteness/palatality feature *i*. The ‘neutral’ vowels, which are neither ‘acute +’ nor ‘non-acute’, can appear in both ‘acute +’ and ‘non-acute’ words, as in (71). We can represent ‘acute +’ and ‘non-acute’ words respectively as in (75):

- (75) a.  $\{i\}((p,\{u\},\{a,u\}) + (t,\{a\})) = p\ddot{ö}yt\ddot{ä}$   
 b.  $(p,\{u\},\{a,u\}) + (t,\{a\}) = pouta$

The items respectively contain a non-linearised, or **extrasegmental**, ‘{i}’, indicated in (75.a) by placement outside the sequence of syllables (included within the outer round brackets), or they lack it. (I have not given representations for the consonants, which are not pertinent here.) Lexically, there seem to be no motivations for assigning a linear position to the extrasegmental, or attributing to it an association beyond being a property of the lexical item.

The extrasegmental element is perhaps derivatively associated with the vowels as in (76.a) – or, in this case at least, and following Anderson (1987: §1), the extrasegmental is associated with the accented vowel, specifically with the accent node in the suprasegmental representation of the lexical item, as in (76.b):



The extrasegmental is manifested by any eligible segment within its domain, defined in terms of (76.b) by the construction subordinate to the accent.

The neutral vowels are apparently indifferent to the presence/absence of the extrasegmental element. This is because presence or absence of the extrasegmental {i} does not affect their realisation, but merely ensures surface contrast between *e* and *ä*, as shown by comparison of the representations in (77), which shows the results of (74), where applicable:

- (77) a.  $i = \langle \{i\} \dots \{i\} \rangle$   
 b.  $e = \langle \{i\} \dots \{i,a\} \rangle$   
 c.  $\ddot{a} = \{i\} \dots \{a\}$

*i* and *e* are optionally associated with a harmonic {i}, specified in angles in (77a-b); *ä* is always associated with harmonic {i}: cf. (77.c). *e* and *ä* are thus in contrast only in 'acute +' words, wherein the former contains a higher proportion of **i** than the latter, and they are thus perceived as differing as respectively {i;a} vs. {a;i}, as in (72).

We thus might say that the contrastive vowel system of Finnish is as in (78), given that the other vowels – {u,i}, {u,a,i} and {a,i} – are products of harmony, the presence of the extrasegmental {i}:

- (78) *the lexical vowel system of Finnish*
- {u}
  - {u,a}
  - {a}
  - unspecified*
  - { } 'i'
  - { , } 'e'

*extrasegmental*  
{i}

We have a linear system, as far as substantively specified segments are concerned.

But the system in (78) is still overspecified; minimal specification results in (79), which is symmetrical about { }:

(79) *the lexical vowel system of Finnish*  
 { }                    {u, }                    {u}  
                           { ,a}  
                               {a}  
*extrasegmental*  
 {i}

That is, *o* is conceived as spelling an underspecified vowel, represented {u, } rather than the fully specified {u,a}. The full specification results from application of (74.a). In ‘acute +’ words, the corresponding vowel, spelled *ö*, is specified as {i}.....{u, }, with the *a* again being added by (74.a).

As observed, the proposal of a minimally specified system is also motivated by the pursuit of contrastivity: the fully specified system of (72) preserves redundancies eliminated in (73) – and (78) and (79). Minimal specification is also, perhaps, not for the faint-hearted. But it is a consequence of the application of contrastivity to substantive representations as well as to the other aspects of phonological structure.

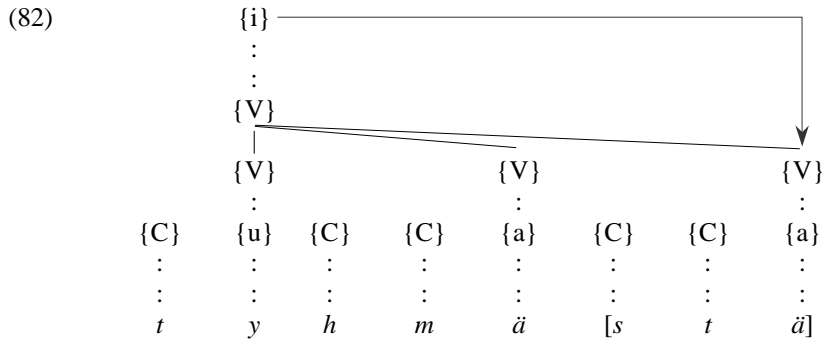
Suffixes in Finnish agree with their base/stem in presence versus absence of {i}. Thus, the suffix in (80.a) is manifested as in (b) or (c):

(80) a. *-st{a} illative*  
 b. *tyhmä-stä ‘stupid’ illative*  
 c. *tuhma ‘naughty’ illative*

The extrasegmental thus ‘spreads’ to suffixes. This of course is not affected by whether or not the base/stem or an intervening affix contains an under-specified vowel, as in (81.a); and, of course, these latter have no acuteness to ‘spread’ in the absence of the extrasegmental, as in (81.b):

(81) a. *lyö-dä-kse-ni-kö ‘for me to hit’*  
 b. *tuoli-lla ‘on the chair’, luo-da-kse-ni-ko ‘for me to create’*

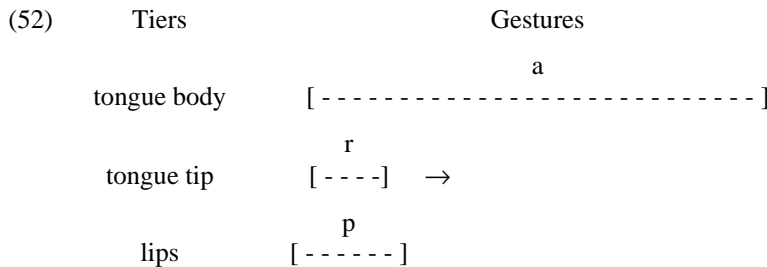
Thus, if we assume base configurations like (77), further suffixes, as further dependents of the accented {V}, simply come within the domain of the extrasegmental associated with the accent, and it is unnecessary to think of this as ‘spreading’; the ‘spreading’ in (82) is simply a consequence of the suffix vowel being included in the **accentual domain**:



This, of course, greatly simplifies the treatment of Finnish accent placement; (82) also omits the dependencies involving consonants, which are not our concern here.

This ‘spreading’ of an extrasegmental element to affixes is not something demanded directly by interface considerations. It is therefore to be expected that there are syntactic analogies to such phenomena, unless they are inhibited by properties of the syntactic interface. Before turning to consider this, however, I need to comment on another aspect of extrasegmentals.

In terms of exponence different extrasegmental elements are localised with varying specificity, and varyingly perceived as localised. Thus extrasegmental vowel elements such as that we have been looking at are generally invasive, given the extended exponence of vowels – as recognised in for instance Steriade’s diagram of (52), repeated here, and as highlighted by a range of discussions by proponents of articulatory phonology (such as Browman & Goldstein 1986, 1988, 1992):



Thus, for instance, Riialand and Djamouri (1984: §2) observe concerning the {i} extrasegmental in Khalkha Mongolian that its effects can be perceived in intervening consonants in words with which the harmonic element is associated. Other extrasegmentals are expounded rather more locally. Here I shall recall a case where an element that comes itself to occupy a segmental position is nevertheless contrastively associated only with the lexical item as a whole, or some systematic part of it; and it is not linearised by any of the regular rules for sequencing that we have considered.

Anderson (1986b, 2001a) argues that /h/ in English is lexically extrasegmental, in that its location in the word can be predicted from the rest of the structure of the word concerned. Thus, lexically in words like *hiatus* or *Ahab*, /h/ is outside the syllabic sequence, as represented in (83) (which appeals to the conventions of (75)):

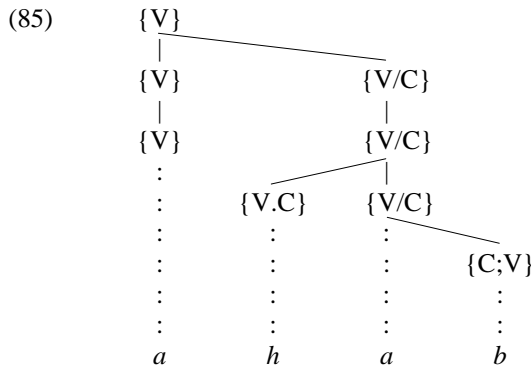


- (83) a. h ((i) + (a) + (t(us)))  
 b. h ((a) + (ab))

Anderson (2001a: 205) formulates the regularity as follows as in (84):

- (84) *h-sequencing in English*  
 Serialise /h/ in an empty onset in accordance with the hierarchy:  
 a) in a syllable bearing secondary stress (*hiatus, Ahab*)  
 b) in an accented syllable (*Hyams, ahoy, jojoba*)  
 c) in a word-initial syllable (*hysterical, jojoba*)

The example in common between (84.b) and (c) here illustrates that more than one instance of the extrasegmental may be associated with a single formative.<sup>22</sup> But the point of this is simply to illustrate an extrasegmental that comes, by rule, to occupy and be expounded at a specific single linear position in a word, as illustrated in (85):



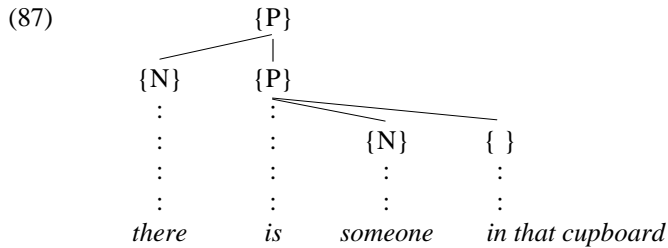
The configuration associated with /h/ is predictable.

Again, the detailed positioning of /h/ in English does not seem to be driven directly by interface considerations. It is plausible, in terms of the structural analogy assumption, to expect a syntactic analogy. And such there seems to be. Consider the alternative constructions in (86), for instance:

- (86) a. Someone is in that cupboard  
 b. There is someone in that cupboard  
 c. Is there someone in that cupboard?  
 d. There are people in that cupboard

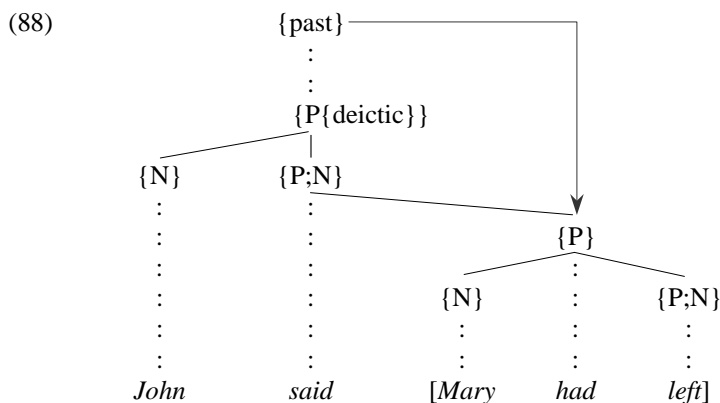
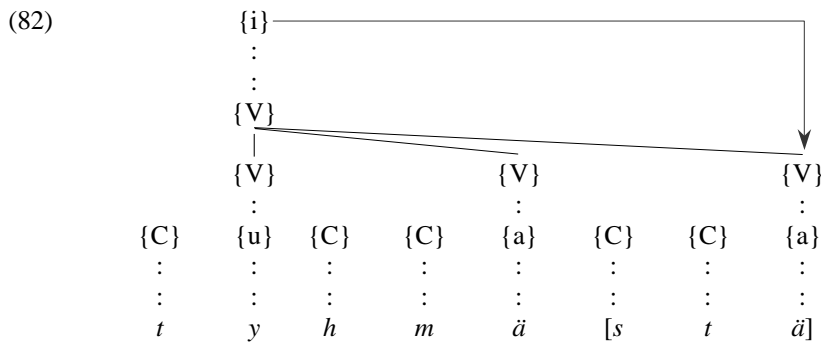
(86.b) is the so-called ‘existential’ construction, with ‘expletive’ syntactic subject *there*, which, as such, may be ‘inverted’, as in (86.c), whereas the post-nominal morphosyntactic subject controls concord, as shown by (86.d), compared with (86.a). Anderson (1986c: 113, 1988c: §5, 1992a: 101-2, 1997a: 119), for example, argues that regular syntactic subject-formation, which selects an argument of the predicator and places it in subject position (and to which we return below), has failed to apply in (86.b).<sup>23</sup> I suggest that *there* is the equivalent of an extrasegmental element: associated with the clause, but not part of the argument structure of the clause or, indeed, even a circumstantial in it, and thus not sequenced by any of the regular rules determining dependencies and word order in the clause.

In clauses like (86.b), in which regular syntactic subject-formation has failed, what I shall refer to as the ‘clausal’ element *there* occupies the empty subject position, as in (87):



Such an analysis does not, of course, commit us to the view that *there* is necessarily contentless, i.e. a ‘true expletive’. (See further §3.3.)

Likewise, we find an analogy to the harmonic ‘spreading’ of a secondary category exemplified by (82) in syntactic phenomena like ‘sequence of tenses’ (see e.g. Chung & Timberlake 1985: 212-3). Compare with (82), repeated here, the representation in (88) showing ‘sequence of tense’ in English:



*Said* realises a complex category, with the specification for a lexical verb subordinate to the finiteness category; we return to this in §3. {past}, like {i} in (82), is a secondary category that is not a property of a particular element in the clause, and it is associated derivatively with the finiteness element expounded as *said*, and reflected in its morphology, as {i}

is associated with the accent in (82). In (88), the dependent finite is within the domain of the **clausal** {past}, which is thus ‘spread’ to that dependent, if, as here, it is attached initially to an appropriate predicator.

The {P} associated with *said* is deictic; it bears by default the secondary feature {deictic}: the {past} constitutes an **absolute tense**, identified directly with respect to the moment of speaking. For the {past} feature to ‘spread’, any {P} within its domain that is to be susceptible to it must not be deictic. Thus, the {P}s in (89.a) are deictic:

- (89) a. John said that Mary will come/is coming/has come/likes the picture  
 b. John said that Mary liked the picture

They are oriented with respect to the moment of speech, and reject the superordinate clausal {past}. The lower {P} in (88) is non-deictic (on the relevant interpretation), but the clause bears itself a {past} feature, and so is oriented in the past with respect to the deictic past of the main verb: it is a **relative tense**. The lower clause in (89.b) (on the relevant interpretation) bears no {past} feature itself, and so is oriented as non-past with respect to the (past) tense of the main verb: it too is relative. (See here particularly Declerck 1988, who argues persuasively against the traditional ‘formal’, or morphosyntactic view of ‘sequence of tenses’ adopted by Comrie 1986, and who also shows that such phenomena are not limited to classic ‘sequence of tenses’ circumstances.) As with a harmonic element, the clausal past is manifested in any eligible item within its domain.

Thus, further evidence for the clausal status of ‘non-inherent’ tense, analogous to the phenomenon of vowel harmony, derives from its interpretative manifestation throughout the clause. It is not just that inherently tensed temporals such as that in (90.a) must agree with the clause’s tense, but also that other temporals not specified for tense are interpreted in accordance with the clausal element, as in (90.b):

- (90) a. She left last Tuesday  
 b. She left on Tuesday

Vowels within a harmonic item manifest the extra-segmental element; temporal elements throughout the clause are interpreted in accordance with the clausal tense element. The difference has to do with the nature of the two substances at the respective interfaces. But this does not obscure the analogy.<sup>24</sup>

Each deictic tense introduces a new deictic domain, and blocks the ‘spread’ of a clausal tense feature. Thus, the final past in (91) is itself deictic and does not represent the spread of the initial {past}:

- (91) John said that Bill thinks that Mary liked the picture

In the terms used with respect to the phonology of harmony, {deictic} is an opaque feature with respect to ‘spread’ of {past}. The phonological analogy here is clear. Consider, for instance, the role of {a} in Turkish vowel harmony, in blocking, in particular ‘roundness harmony’.

Presence/absence of roundness, or gravity, is exhibited in each eligible vowel in simplex forms in Turkish, as illustrated in (92.a):

- (92) a. demir ‘anchor’,  
 b. somun ‘loaf’, havruz ‘pot’  
 c. son-un ‘end’ *gen.*, kız-ın ‘girl’ *gen.*

- d. kurd-lar ‘worm’ *pl.*  
 e. son-lar-in ‘end’ *pl. gen.*

(See e.g. Goldsmith 1990 and Carr 1993, for further exemplification, discussion and references.) I interpret {u} as an extrasegmental feature that comes to be associated with the accented vowel, generally the final one (Poser 1984: 128, cited in Halle & Vergnaud 1987: 53), but is manifested throughout the form. In initial syllables we have a contrast between [a] and [o], however, as illustrated in (92.b), in which both forms also seem to show the {u} extrasegmental. I take {a} to be opaque with respect to {u}, as is also evident in affixed forms such as the plural in (92.d) compared with the first genitive in (c). And the genitive plural in (92.e) shows that {a} blocks the further ‘spread’ of the extrasegmental. Since the accent in Turkish is specifically word-final, the domain for the ‘spread’ of the {u} feature is presumably morphologically rather than accentually determined, as ‘moving’ rightwards through the affixes in a word, where not blocked by an opaque vowel.

Turkish also exhibits acuteness harmony, which again ‘moves’ rightwards from the base, as illustrated by the possessed forms in (93.a) and the plurals in (93.b), compared with the possessed forms in (93.c) and plurals in (93.d), which lack the acuteness extrasegmental:

- (93) a. iz-i ‘his footprint’, demir-i ‘his anchor’, gyl-y ‘his rose’, çöl-i ‘his desert’  
 b. iz-ler ‘footprints’, gyl-ler ‘roses’  
 c. baş-i ‘his head’, kiç-i ‘his rump’, kurd-u ‘his worm’  
 d. baş-lar ‘heads’, kiç-lar ‘rumps’, kurd-lar ‘worms’

So that the set of lexical segmental vowels is small. Indeed, it is limited to that in (94.a), where, as indicated in (94.c), {a} is manifested as [a] and (with acuteness extrasegmental of (94.b)) [e]; the partially specified vowel {a, } realised as [o] (with gravity extrasegmental) or [ø] (with both); and the unspecified vowel { } is manifested as the rest of the possibilities – [i] (without extrasegmental), [u] (with gravity only), [i] (with acuteness only) and [y] (with both):

- (94) a. *lexical segmental vowels of Turkish*

{a}            {a, }            { }

- b. *Turkish extrasegmentals*

{i}            {u}

- c. *Turkish extrasegmental associations and realisations*

<i>segment</i>	<i>extra</i>	<i>realisation</i>	<i>example</i>
o = {a, }	{u}	{u,a}	son ‘end’
u = { }	{u}	{u}	kurd ‘worm’
e = {a}	{i}	{i,a}	sebeb ‘reason’
i = { }	{i}	{i}	is ‘footprint’
ø = {a, }	{i,u}	{i,u,a}	çöl ‘desert’
y = { }	{i,u}	{i,u}	gyl ‘rose’
a = {a}		{a}	baş ‘head’
i = { }		{ }	kiç ‘rump’

All of the vowels which are associated with extrasegmentals are manifestly incomplete, and it is addition of the extrasegmentals that renders them realisable, as shown again in (94.c). Only the colourless vowel [i], with no associated extrasegmental, emerges as incomplete, as a default vowel.<sup>25</sup>

Parallel to {i}, which is extrasegmental in the preceding examples, the secondary category {past}, as well as being clausal, can also occur ‘non-clausally’, the equivalent of ‘intra-segmentally’. For instance, one can interpret in such terms the proposal that central instances of the ‘perfect *have*’ construction involve an ‘embedded past’ (e.g. Poutsma 1926: 209, Jespersen 1931: §4.1, Huddleston 1969: §4, McCawley 1971, Anderson 1972: §XVI, 1973, 1976). So that *had* + ‘past participle’ in (88) or (95.a) involves both a clausal {past}, as has just been suggested, and an ‘inherent’ one, whereas *has/have* + ‘past participle’ in (95.b-c) contain only an **inherent** one:

- (95) a. She had left  
 b. She has left (\*last Tuesday)  
 c. She may have left (last Tuesday)

A finite like that in (95.b) is interpreted as having clausal non-past reference in the absence of the {past} feature; hence (95.b) has ‘present relevance’ (as its sometimes put) as well as past time reference for the event itself. However, the non-finite in (95.c) may or may not be interpreted in this way. Hence, as is familiar, there is a reading for (95.c) on which it is compatible with definite past time reference (as indicated by the acceptability of the bracketed temporal. The unacceptability of the corresponding temporal in (95.b) illustrates the usual incompatibility of the finite perfect with such time reference.

The inherent {past} of ‘perfect *have*’ may nevertheless be deictic; and it may ‘spread’. So that it can establish a new domain, as illustrated by (96.a), where the form *was* reflects the inherent {past} of the *has* construction (cf. again Declerck 1988):

- (96) a. John has never said that Mary was stupid  
 b. John has never said that Mary is stupid

In (96.b), on the other hand, *is* is deictic, and is not part of the domain of the clausal deictic. In so far as there is in the phonology spreading of ‘inherent’ (segmental) features, this would constitute an analogy to the inherent {past} of English *have* + ‘past participle’ construction.

Other items in English with inherent past time reference are *former* and *last* and *ex-*. Other items involve an inherent past-time existential, as *late* in *late President* and the like. In some languages nouns can be marked as involving past possession by someone, as in Kwakw’ala (97.a) vs. (b):

- (97) a. xən x<sup>w</sup>ak<sup>w</sup>ənxda ‘my past canoe’  
 b. xən x<sup>w</sup>ak<sup>w</sup>əna ‘my canoe’

(Anderson 1985: 179). These all involve inherent rather than clausal {past}.

The ‘sequence of tense’ phenomenon provides a rather striking analogy to harmony processes in phonology, an analogy which only the separateness of the too-infrequently-interacting traditions of syntactic and phonological investigations has rendered opaque.

**2.4 Extrasegmentals: umlaut**

And we find that **umlaut** processes in phonology also have a plausible syntactic analogy. I choose to illustrate umlaut from the pre-history of Old English (henceforth OE), despite the increase in speculation necessitated by the use of reconstructed forms, because the historical phenomena involved will lead on rather directly to a final remark on analogies. But, for instance, similar phenomena are discussed in relation to Djingili by van der Hulst & Smith (1985). Indeed, what follows is partly based on suggestions made there, particularly in their §4, where they suggest that umlaut in Djingili involves the spread of a feature associated lexically with a suffix. In Djingili, an extrasegmental **i** feature associated with a suffix spreads to unspecified vowel positions, as (schematically) in (98.a), as well as being realised in the suffix itself; (98.a) shows the effect of adding the stative singular suffix to the (unspecified) stem which otherwise (in the absence of an extrasegmental {i}) appears as *galal*:

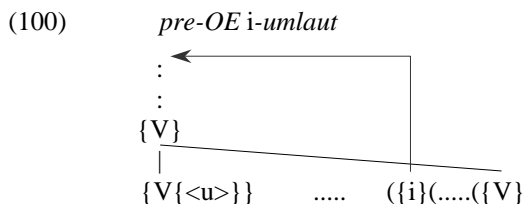
- (98) a. *Umlaut in Djingili*  
 galal ‘branch’ *sg* + *stative sg ji* ⇒ *giliji*  
 $\{C\}\{V\}\{C\}\{V\}\{C\}$        $\{C\}\{V\}\{C\}\{V\}\{C\} - \{i\}(\{C\}\{V\})$   
  
 b.  $\{V\} \Rightarrow \{V\{a\}\}$

It may be that this proceeds, as with Finnish harmony, via the accentual head. Vowels that are not filled in by an extrasegmental, undergo the default (98.b). With *i*-umlaut in Germanic not all the umlauted vowels are unspecified; in this respect the process is more like canonical harmony (as described above).

We can illustrate the effects of *i*-umlaut in OE in the second forms in each of (99) compared with the first:<sup>26</sup>

- (99) a. *burg* ‘city’ – *byrig* ‘city’ *dative sg*  
 b. *ofost* ‘haste’ – *efstan* ‘hasten’  
 c. *cwæl* ‘died’ – *cwellan* ‘to-kill’  
 d. *faran* ‘go’ – *færþ* ‘goes’

All of these are reconstructed as having a suffix containing {i} which ‘triggered’ the umlaut reflected in these spellings; I interpret the {i} as extrasegmental. The {i} is ‘spread’ to the root vowel, which I take to involve, as in Finnish harmony, its being associated with the accented (and in these particular cases, transitive) vowel, as in (100):



The extrasegmentality of {i} is again indicated by its placement outside the brackets in (100). Derivatively, the suffixal {i} is apparently associated within the suffix itself with

either an unspecified vowel position (as in e.g. (99.a)) or an empty onset (as in e.g. the source of (99.d), \*[kwæljən]).

The ‘effect’ of (100) is to attach the extrasegmental {i} of the suffix to the accentual head, so that it is manifested in any base/stem vowel (any vowel within the accentual domain) that contains either **u** or is substantively unspecified (as again indicated by the angles of optionality around the **u**); combination of the extrasegmental with segmental vowels is expounded either by ‘fronting’ (99.a-c) or ‘raising’ (99.d) one step towards {i}. Forms like *gædeling* ‘companion’ that are reconstructed as having a back round vowel in the unstressed syllable preceding the **i**-bearing suffix (cf. Old Saxon *gaduling*) are usually interpreted as having undergone ‘double umlaut’ (e.g. Campbell 1959: §203), though the apparently reduced second vowel comes to be spelled *e* in OE. This follows from the formulation in (100): the vowel in question falls within the accentual domain, and thus will manifest (if eligible) the extrasegmental (i).

The front rounded vowels that result from *i*-umlaut in the history of the forms on the right in (99.a-b) unrounded subsequently, rather early in the case of (99.b), as reflected in the typical spelling, rather later in the case of (99.a), where *y* spellings persist through much of OE. There do occur early spellings for the umlaut of the vowel of (99.b) with *oi* or *oe* (*Oidilualdo* (name), *doehter* ‘daughter’ *dative sg.*, for instance – see Campbell 1959: §196, Hogg 1992: §5.77), as well as *ui* for the high vowel (Campbell 1959: §199, Hogg 1992: §2.18), which are usually interpreted (see particularly Hogg 1992: §2.18) as evidence for the postulated original outputs of *i*-umlaut, i.e. respectively mid and high front rounded vowels.

I reconstruct the (underspecified) pre-*i*-umlaut pre-OE vowel system as in (101.a), which also indicates the usual spellings of un-umlauted descendants of the vowels in the system:

(101) *pre-umlaut pre-OE system of short monophthongs*

a.	{i} ‘i’		{u} ‘u’
	{i, } ‘e’		{u, } ‘o’
		{ , } ‘æ’	
		{ } ‘a’	
b.	{i} ‘i’		{u} ‘u’
	{i;a} ‘e’		{u,a} ‘o’
	{a;i} ‘æ’		
		{ a } ‘a’	

The asymmetrical fully-specified system is given as (101.b). In one respect, the asymmetry of (101.b) is evident from inspection of the system itself: there is no grave partner to {a;i}, given that realisationally (u,a) pairs with {i;a} – it is redundantly {u;a}. But the system is also asymmetrical with respect to the corresponding long/intransitive system which lacks a congener of short {a}, as argued in Colman (2003) and Anderson (forthcoming), which present detailed analyses of *i*-umlaut as it effects the various vowel subsystems in Old English (long/short/pre-nasal, diphthongal).<sup>27</sup> I again follow Anderson & Durand (1988a,b, 1993) in associating these asymmetries with non-specification, in this case of two (short) vowels, one simplex the other involving a combination. The contrast between the unspecified (compound and simplex) vowels, represented by ‘æ’/‘a’, is marginal, being

based on loss in a few items of the environment (associated with the traditional ‘sound-change’ of ‘first fronting’) that conditions their relative distribution (Colman 1983). But the vowel spelled *æ* when un-umlauted is usually reconstructed as providing a distinct input to *i*-umlaut in forms like (99.c) (Hogg 1992: §5.80).

The underspecified representations of (101.a) are filled out by the redundancies of (102):

- (102) a.  $\{V\{i/u, \}\} \Rightarrow \{V\{i/u; \}\}$   
 b.  $\{V\{ , \}\} \Rightarrow \{V\{ ;i\}\}$   
 c.  $\{V\{ \}\} \Rightarrow \{V\{a\}\}$

Application of (102), intrinsically ordered in terms of increasing generality, so that (102.c) fills in any underspecification left by (102.a-b), gives us the specifications in (103):

- (103) a.  $\{i, \} \Rightarrow \{i; \} \Rightarrow \{i;a\}$  ‘e’  
 b.  $\{u, \} \Rightarrow \{u; \} \Rightarrow \{u;a\}$  ‘o’  
 c.  $\{ , \} \Rightarrow \{ ;i\} \Rightarrow \{a;i\}$  ‘æ’  
 d.  $\{ \} \Rightarrow \{a\}$  ‘a’

This fills out all the values for the pre-umlaut system of (101).

Application of (100) gives (104) as representations:

- (104) a.  $\{i\} \dots \{u\}$ , spelled ‘y’  
 b.  $\{i\} \dots \{u, \} \Rightarrow \{u,a\}$  (by (99.d)) – i.e.  $\{i\} \dots \{u,a\}$ , ‘oe’/‘e’  
 c.  $\{i\} \dots \{ \} \Rightarrow \{a\}$  (by (99.d)) – i.e.  $\{i\} \dots \{a\}$ , ‘æ’  
 d.  $\{i\} \dots \{ , \} \Rightarrow \{ ;i\}$  (by (99.b))  $\Rightarrow \{a;i\}$  (by (99.d)) – i.e.  $\{i\} \dots \{a;i\}$ , ‘e’

Interpretation and exponence of (104.a-b) are straightforward, conventionally representable as [y] and [ø] respectively; cf. e.g. the grave + acute vowels in (73). (104.d) has somewhat more **i** than (c); so that, in terms of proportions of **i** and **a**, we can say:

- (105) (100.d) : (100.c) :: (99.b) : (99.a)

Thus, both (104.d) and (103.b) are spelled *e*, and (104.c) and (103.a) are spelled *æ*:

- (106) a. cwellan ‘to-kill’ (104.d); cweþan ‘to-say’ (103.b)  
 b. færp ‘goes’ (104.c); sæt ‘sat’ (103.a)

Such would be an interpretation of the usual assumptions about the (short-monophthong) inputs and outputs to *i*-umlaut. I have ignored various complexities of interpretation, however, even as regards the ‘short’ vowel system (for some discussion and references see Anderson forthcoming). But the general shape of this is not unfamiliar in phonology.

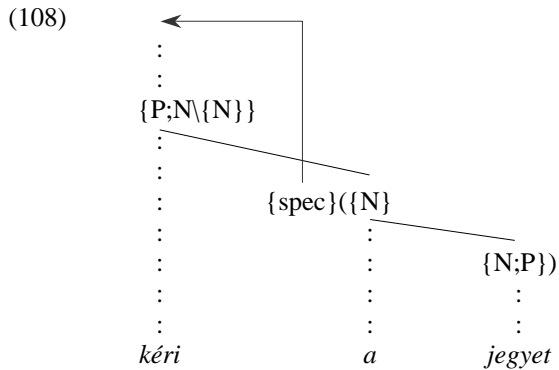
Analogous phenomena in syntax are not difficult to find. The same pattern characterises **agreement** phenomena, a simple instance of which is provided by Hungarian specificity agreement, whereby the specificity of the ‘direct object’ is reflected in the shape of the verb, as exemplified by (107):

- (107) a. Kér jegyet  
 He-is-asking-for (a) ticket



- b. Kéri a jegyet  
He-is-asking-for the ticket

The verb form in (107.b) agrees with the specificity of the complement, as formulated in (108):



{spec} is a (N)-phrasal feature that comes to be associated with the verbal head. Of course, many agreement systems involve more dimensions than this (person, number, gender etc. – see again Anderson 1985: §2.2.3), but the same kind of configuration is involved in the ‘spreading’.

### 2.5 Underspecification and polysystemicity

The notion of underspecification invoked in the preceding illustrations may itself introduce another set of analogies. We have appealed to **system-dependent underspecification** with respect to the representation of both primary and secondary categories, so that, for instance onset-*s* in English is unspecified in both respects (recall §1.3), and this is system-dependent. And there seems to be great variation in the character of the non-specification to be attributed to different vowel-systems. It may be too that there are **system-independent non-specifications** of secondary categories, though the identification of these is controversial. It has been suggested, for instance, that non-specification of coronal among consonants may be general (see e.g. the contribution to Paradis & Prunet 1991).<sup>28</sup> On the other hand, it has been argued elsewhere (e.g. in Lass 1976: ch.6, 1984: §8.3.1) that glottal consonants may be generally unspecified as to (in our terms) secondary category, and this has some basis in exponence. There remain unresolved issues in this area. Nevertheless, it is possible that the secondary categories of the phonology manifest both system-dependent and general non-specification.

We find parallels to both of these in the representation of secondary syntactic categories. This may be illustrated by a comparison of (the interpretation of) the Greek sentences in (109) with their English glosses; we are concerned with the representation of **aspectual** distinctions, particularly as expressed by the underlined verb forms:

- (109) a. Otan imun stin Aθina evlepa sixna tin Eleni  
when I-was in-the Athens I-saw often the Eleni
- b. Milusa sto Niko otan akuse to kuδuni na xtipai  
I-was-speaking to-the Nick when he-heard the door-ball that it-rings

- c. Iða to Giorgio ke tu milisa ÷ia sena  
I-saw the George and to-him I-talked about you

(examples from Holton et al 1997: 224-5). Let us look first of all at the English glosses.

When the English past is used habitually, as in the gloss to the underlined form in (109.a), ‘saw’, it is not necessarily specified as such, though it may be differentiated by the periphrasis *used to* or, indirectly, by an adverbial (as here). The unmarked interpretation of the simple past is, however, universally **perfective**, as exemplified here by the most obvious interpretation of the gloss to the second underlined form in (109.b), ‘he-heard’. The **progressive** in English is specified, as in the case of the gloss of the first verb in (109.b). We have in English the expressed contrasts in (110):

- (110) a. {past}  
: :  
: :  
{P/{P;N{prog}}}  
: :  
: : {P;N{prog}}  
: :  
: :  
: :  
was speaking
- b. {past}  
: :  
: :  
{P}  
|  
{P;N}  
: :  
: :  
saw, talked, heard

I interpret the periphrastic *be* as subcategorised for a progressive verb form, thereby allowing to occur in finite contexts (see further note 39). Only this partially non-morphological (periphrastic) representation is lexically specified for aspect. Whether the verb is (110.b) is interpreted as **habitual** or not is determined by the context. *Often* in the gloss to (109.a) triggers habitual; in the absence of such a trigger, the normal interpretation is perfective. The unmarked interpretation for prototypical (dynamic, non-durative) past verbs, perfective, is cognitively natural. Thus, in languages that lack tense markers a perfective verb is interpreted as having past-time reference, unless this is overridden by the context (cf. e.g. Comrie 1976: 82-3). A combination of habitual with progressive can also be forced by the context, as in *I was reading lots of novels at the time*. Expression of progressive and non-expression of habitual are system-dependent; non-expression of perfective with prototypical verbs is putatively universal.

All the corresponding Greek expressions involve a morphologically-expressed {P}. But what is more relevant to our present concern is that it is not progressive that is expressed overtly but **imperfective**, a more inclusive category which comprises both progressive and habitual. The underlined form in (109.a), *evlepa*, is imperfective; so is the first underlined verb in (109.b), *milusa*. But the first of these is distinguished by the context as habitual, and the second as progressive. The non-imperfectives in (109.b) and (c), respec-

tively *akuse* vs. *ida* and *milisa*, are perfective by default. We might thus represent the various forms as in (111):

- (111) a.     {past}  
               :  
               :  
               {P}  
               |  
               {P;N{impf}}  
               :  
               :  
               *milusa, evlepa*
- b.     {past}  
           :  
           :  
           {P}  
           |  
           {P;N}  
           :  
           :  
           *akuse, ida, milisa*

We thus have system-dependent non-specification of progressive, while non-specification of perfective with prototypical past verbs is general.

It seems likely, then, that secondary categories in both phonology and syntax show both system-dependent and system-independent non-specification. A preliminary investigation of systems of primary categories, however, suggests that in the case of the phonology we find only system-dependent non-specification, as with the *s*-onsets of English discussed in §1.3, whereas in syntax the character of non-specification of primary categories is universal. I shall suggest at the beginning of §3 that this particular apparent discrepancy is motivated by interface factors. Nevertheless, presence of both system-dependent and system-independent non-specification seems to be another syntax-phonology analogy.

However, we have not quite finished with the area of aspect, which yields another kind of analogy to familiar phonological phenomena. With non-past verbs (in contrast with simple non-pasts) imperfective, and particularly habitual, seems to be unmarked. Thus, in languages without tense markers, just as a perfective verb is normally interpreted past (unless overridden by the context), so an imperfective verb is interpreted as non-past. The following Yoruba examples from Welmers (1973) are cited by Comrie (1976: 83):

- (112) a.     ó n̄ ʃiʃé  
               he *impf.* work  
               ('He is working, he works continuously')
- b.     ó wá  
           he came

In English non-pasts, progressive is again specified, and the non-progressive is only interpreted as perfective in specific well-known environments – as in sports commentaries (*He passes the ball to Smyth*) or newspaper headlines (*Bush resigns*), though the latter may rep-

resent some kind of ‘historic present’; habitual is the unmarked interpretation. In Greek non-pasts, nothing is specified and habitual, perfective and progressive interpretations depend on context, though the former two, the imperfectives, are unmarked, with the perfective again being limited to very specific environments (see e.g. Anderson 2001c: §3.2).<sup>29</sup>

These aspectual asymmetries thus illustrate **polysystemicity** in these language systems. For instance, as we have seen, the Greek simple non-past, unlike the past, does not show a formal contrast between imperfective and perfective in unmarked declarative sentences, and its range of interpretations (habitual/progressive/perfective) is greater than those of the (past) imperfect, which cannot normally be interpreted perfectly. This is analogous to what we often find with vowel systems, where different subsystems of contrast are associated with different contexts. In particular, under low stress or in nasal environments the system may be much reduced compared with the ‘major’ system. We can illustrate this again from Old English.

Anderson (forthcoming) observes that in the pre-umlaut short vowel system there are contrasts before nasals only among three vowels, {i}, {u} and {a} – whatever variation there may have been in the realisation of these vowels. This is illustrated by the paradigm for the strong verb *bindan* ‘bind’: Ist and IIIrd singular preterite indicative *band*, second participle *bunden*. We have the basic triangular system of (113) (Lass & Anderson 1975: ch.II, §5, Anderson 1988d: §§2-3):

- (113)            {i} *bindan*                    {u} *bunden*  
     {a} *band*

Moreover, there are difficulties in straightforwardly identifying these with members of the ‘major’ system – at least in the case of the vowel I have represented ‘{a}’.

Early spellings of the umlaut of this vowel show *æ*, as we might expect, in forms with historical /a/ + nasal associated with an *i*-umlaut environment such as those in (114.a) and these persist in some texts, overwhelmingly the unlauded form of this etymological class is spelled *e*, as in (114.b):

- (114) a.        *aenid* ‘duck’, *cændæ* ‘he begot’  
                b.        *ened* ‘duck’, *fremman* ‘do/perform’

*Æ* represents the normal umlaut of /a/; *e*, however, if it reflects simply the effects of umlaut, suggests a reinterpretation of /a/ as /o/, i.e. {u,a}. This would not be an unnatural reinterpretation, given the emphasis on the lower end of the spectrum (gravity) projected by nasals; in this context the vowel may indeed have been nasalised. However, for the most part, this vowel does not fall together with ‘major’-system /o/, to judge from subsequent developments. The exponents of the pre-nasal vowel was probably distinct in quality from both the {u,a} and the {a} of the ‘major’ system (cf. e.g. Hogg 1992: §5.8). The ambivalence suggested by the persistent alternation between *a* and *o* spellings, exemplified in (115), may reflect possibly co-existing alternative interpretations of the specification of the vowel or attempts to recognise the realisational distinctiveness of the pre-nasal vowel:

- (115)            *nama/noma* ‘name’, *mann/monn* ‘man’

The pre-nasal system may not be a simple subset of the ‘major’ one.

However that may be, polysystemicity seems to be a characteristic of both phonology and syntax. In the phonology its prevalence has once again been obscured by (explicit

or implicit) adoption of the principles of ‘phoneme theory’, with its typical insistence on monosystemicity. Anderson (forthcoming) argues that the prevalence of monosystemic viewpoints in historical phonology (encouraged by much of the evidence for earlier stages of languages being recorded in alphabetic writing-systems, which tend to be monosystemic) has distorted the kinds of reconstructions that have been attributed to these earlier stages.

### 2.6 Grammaticalisation

It is time that I turned from illustrating these various analogies to exemplifying the limits on analogy imposed by interfacing. Let us note finally here, however, a pervasive analogy I have neglected so far. Both syntax and phonology are subject to **grammaticalisation**, in the sense of the loosening of interface associations on the regularities in the respective domains. We should perhaps more correctly talk about ‘further grammaticalisation’: linguistic structure, though based on them, is not determined by the nature of the cognitive and perceptual domains that it relates and gives structure to, given the inter-interface, or internal, requirements of a communication system capable of expressing and signalling a complex message amid much noise. This is of course not to endorse the ‘strongly innate’ view of universal grammar argued against in Anderson (in press a): I assume that the requirements of the inter-interface link that is the domain of grammar are resolved by the application of general cognitive principles, and acquired on the basis of these.

However that may be, given the diversity of ways in which the term ‘grammaticalisation’ has been used and the vagueness of attempts to characterise it (cf. e.g. Hopper & Traugott 1993: ch.1), it behoves me to spell out a little more what I have in mind here. Under grammaticalisation I include, for present purposes, two inter-related ways in which regularities can be relatively disassociated from the interface: firstly, a regularity can become intrinsically **de-naturalised**, in that the substantive basis (in phonetic exponence and semantico-pragmatic interpretation) is less transparent; secondly, a regularity may in addition be **displaced** from direct connexion with substance. Both of these may be illustrated from the subsequent history of *i*-umlaut in OE.

The unrounding of the vowels of (104.a), spelled *y*, and (104.b), spelled *oe*, results in some de-naturalisation; the ‘results’ of *i*-umlaut are no longer a transparent outcome of ‘spreading’ of {*i*}: **u** is also suppressed relative to the vowels which are the historical sources of these umlaut vowels, and they collapse with other vowels spelled respectively *i* and *e*. De-naturalisation can be associated also with the loss of the extrasegmental {*i*} in many cases, as in most of the examples in (99). And this also results in displacement, in that synchronically *i*-umlaut is interpreted as morphophonological: it is no longer a general phonological regularity, but is a set of alternations triggered by various morphological factors. I list the alternations in (116):

- (116) a. {u} ~ {i}  
 b. {u,a} ~ {i;a}  
 c. {a;i} ~ {i;a}  
 d. {a} ~ {a;i}  
 e. {a} ~ {i;a}

(116.a-d) are illustrated by the respective forms in (99); (116.e) occurs in a nasal environment, such as that in *mann/menn*, involving complications I have just gone into.

We find similar denaturalisations in syntax. Thus, the ‘topic/focus’ marker of Tagalog illustrated in (i.b) in note 23, repeated here as (117), does not necessarily mark an element that is topical or in focus – as is implied by the scare quotes used here:

- (117) Dadalhin ni Rosa ang pera kay Juan  
Will-take by Rosa T/F money to John

(see on this Schachter 1976: 496-7). Whatever the historical source of this construction, it is relatively denaturalised. The same can be said of subjecthood, which Anderson (1997a: §3.3.2) groups with the ‘topic/focus’ as a (distinct) **grammatical** rather than a semantically-based relation. Subjects are primarily marked by an affix or a position that has no obvious semantic function, but whose deployment is conventional, whatever might be the (natural) source of such constructions.

We can discern both denaturalisation and displacement in those systems where grammatical gender is primarily signalled not on the noun but on associated words, such as in German. Consider, too, as a further instance of displacement the Basque constructions in (118):

- (118)a. Lorea        aitari        eman                    diot  
flower-the    father-to    give:*past participle*    it-[to-him]-[by-me]  
(‘I gave the flower to father’)
- b. Lorea        aitari        eman                    diozu  
flower-the    father-to    give:*past participle*    it-[to-him]-[by-you]  
(‘You gave the flower to father’)
- c. Loreak        aitari        eman                    diozkat  
flowers-the    father-to    give:*past participle*    them-[to-him]-[by-me]  
(‘I gave the flower to father’)

The verb *eman* ‘give’ takes three participant arguments whose person-number-function is agreed with. But agreement with these arguments is displaced onto the clause-final finiteness element rather than being marked on the participle whose valency determines the range of agreement. Compare the ‘non-periphrastic’ imperative in (119), where agreement is marked on the *eman* verb itself:

- (119) Emazkiok!  
‘Give them to him’

In comparison with (119), (118) thus shows a displacement of the agreement markers away from the verb whose valency they expound.

This is a rather different kind of ‘displacement’ than we associated with the development of *i*-umlaut in Old English, which involved morphologisation of the conditions determining the occurrence of the umlauted vowels. But they share the notion of movement towards less direct reflexion of the interface, phonetic or semantic: displacement from the interface. I shall suggest in §3 that such displacement in the syntax as is illustrated by (118) may be related to a distinction between syntax and phonology associated with differences in the demands of the interfaces.

### 3 Demands of the interfaces, or why phonology (or syntax) is different

I look here at how the different demands of the interfaces limit the scope for analogy. For it is not difficult to think of apparent discrepancies in the structural properties of the two planes; indeed, we have already encountered some. And this applies to formal properties, not merely those that directly reflect the interfaces. It seems to be the case that in general syntax displays possibilities not paralleled in the phonology. On the one hand, the substan-

tive basis for phonology restricts possibilities that are more fully exploited in the syntax; and, on the other, the requirements of the more complex cognitive domain inhabited by the syntax leads to developments that are simply unnecessary in phonology. In what follows I shall focus in the first instance on the operation of the second factor, though the two are usually intimately intertwined, which means that in considering varying properties we shall find ourselves having to take account of both the **demands of semanticity** and **restrictions by phoneticity**.

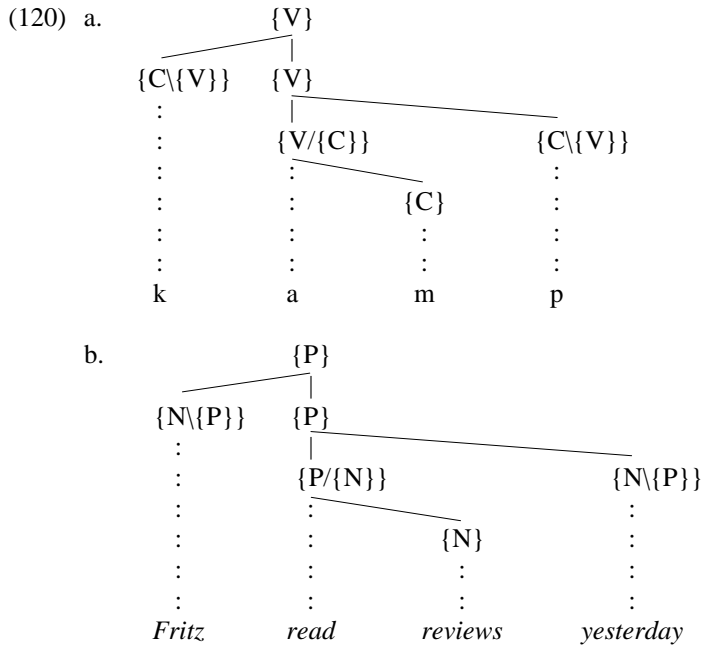
Powerful distinctive demands on the syntax are imposed by its semanticity; the complexities of the domain that is interfaced with demand elaborations that are not required in the phonology. Semanticity requires a more complex articulation of various structural properties, notably the system of categories and the range of manners in which categories can be related. In particular, the representation of perceived 'scenes' requires, in the first place, an elaboration of the notion of transitivity: we need in the syntax to be able to express the possible participation of a range of complements and adjuncts in the 'scene' whose event-type is expressed by the predicator. This involves a system of semantic relations, 'labelled transitivity', not obviously necessary in the phonology. We need the syntax to provide, as well, for the representation of 'scenes' within 'scenes'. This involves much more extensive and distinctive embedding compared with what is necessitated by the phonology. We also need to be able to provide for the different modes in which a 'scene' might be viewed: 'scenes' which are elsewhere represented as events may be presented as entities or as characterising entities. This may be provided for by alternative lexicalisations (say, *brush*, noun, vs. *sweep*, verb), but also involves, for greater lexical economy, the provision of devices which mark some items as expressing complex categories wherein one category subsumes another (*sweeper* vs. *sweep*) and, with varying commonness in languages, which allow for recategorisation without overt marking (*brush*, noun, vs. *brush*, verb). 'Category change' and the derivation of one category from another are unnecessary synchronically in the phonology; indeed, the notion is incompatible with the fixed phonetic basis for the phonetic categories, however much their precise realisation may be system-dependent. Let us look more carefully at these particular aspects of semanticity before proceeding to others, some of which will emerge in the course of the discussion.

However, we should also acknowledge, before doing so, a limitation imposed by semanticity. It is incompatible with semanticity for there to be system-dependent – i.e. cross-linguistically variable - non-specifications. The lexicon is a crucial point of access to semantics. In so far as the basic semantic distinctions ('entity', 'event', 'scene' etc.) that are relevant to primary categorisation are universal, this precludes system-dependent non-specification. The contrastive phonological representations that are deposited in the lexicon are, on the other hand, not directly accessed by the phonetics; in this case system-dependent non-specification is eliminated by the redundancies that 'feed' the interface. This difference follows from the different orientations of the two planes towards the lexicon. The lexicon is semantically but not phonetically oriented.

### 3.1 Functional categories

I have highlighted some rather obvious similarities between syntactic and phonological structure in the area of transitivity, and I exemplified in (63) of §2.1 the structures in the syntax that correspond to the phonological structures examined in the previous section. Let us return to and extend that discussion.

If we consider the representations for the fuller syllable and clause structures in (120), where the former is a simplification of (24), the parallels seem to be even more pervasive:



In (120.b) **P** is the predicability feature whose unique presence we might take to characterise verbals, ‘event-types’, while **N** is the feature of referentiability, whose presence characterises nominals, ‘entity-types’ – as already invoked in §2.1. At this point, I have backtracked a little from the assumptions concerning syntactic structure already made in the discussion in §2, particularly as concerns the representation of verbs and nouns, in order to lay out the motivations for these latter in a more systematic way. This will also highlight exactly where the analogy breaks down. But at this point I continue with formulating it in its strongest form.

Like consonants, nominals may be adjuncts (*yesterday*), as well as complements (*reviews*); and it is traditional to distinguish between the more closely bound adjunct exemplified by *yesterday* and the ‘predicate-external’ *Fritz*. Observation of such parallelism is not new (cf. e.g., in the not too distant past, Pike 1967). More recently, it underlies Carstairs-McCarthy’s (1998, 1999) argument that syntactic structure evolved as an exaptation of phonological.<sup>30</sup> However that may be, there are places where the parallelism rather clearly breaks down.

One obvious problem, even if we restrict our attention to English, is that *yesterday* is not a typical adjunct. More often they are prepositional, as in (121); they introduce a category which intervenes between the verb and the nominal:

(121) Fritz read reviews on Tuesday

It is not, clearly, that this is criterial for the complement/adjunct distinction, or that such a preference is necessarily to be attributed to other languages, given that there are some, like Japanese or Lake Miwok or Lak, in which both complements and adjuncts (as well as ‘subjects’) are typically marked uniformly by presence of a ‘particle’ which is a postposition or ‘enclitic’ or inflexion. Rather, we seem to have introduced a category which is not paralleled in the phonology. Let us approach the question of the motivations for such a category – as well as for the apparent categorial difference between the adjuncts in (120.b) and



(121) – indirectly, via some other observable discrepancies introduced by a comparison of (120.a) and (b).

It is also, for instance, rather obvious that not all languages share the SVO clause pattern exemplified in (120.b): the widely testified SOV and VSO types would then represent syntactic variation that does not seem to be paralleled in the phonology: we have **cross-linguistic variation in linearity**.<sup>31</sup> However, if we abstract away linearity, we might at least claim that configurationally and in categorial structure, the parallelism is more widely attested than simply in SVO languages. The attestation is weakened to the extent that there are languages that lack a ‘VP’ constituent, i.e. the construction headed by the lowest {P} in (120.b) (with the middle {P} allowing optional expansion of that): so-called ‘non-configurational’ languages (e.g. Hale 1983, Farkas 1986). Even in such cases the (non-)status of ‘VP’ remains controversial, however.

Also, although, as recognised by the ‘maximal onset principle’, whereby onsets are maximised at the expense of codas, and as embodied in (4), there is a strong tendency towards the filling of onsets, the extent to which this is analogous to the status of ‘subjects’ is unclear:

- (4) *unmarked syllable structure*  
 {C} + {|V|}

Pressure to fill the onset in English connected speech is manifested by the ‘capturing’ by vowel-initial syllables of consonants from a preceding onset (‘liaison’) or, as in South African English, by insertion of an ‘expletive’ glottal stop (e.g. Giegerich 1992: §9.3.1), as is also well attested in German. Cross-linguistically, some languages lack codas, while languages lacking onsets completely seem to be almost non-existent (though see Breen & Pensalfini 1999, on Arrernte). However, it is often proposed that ‘subject’ – traditionally, the position in structure that is manifested as *Fritz* in (112.b) – is an absolute universal, not merely preferred, and that in a ‘full clause’ ‘[Spec,IP] is obligatory’ (Chomsky 1995: 55), where ‘[Spec,IP]’ is an interpretation of the traditional ‘subject’ relation, though it may be filled only by an expletive (*It is raining*) or an ‘empty’ element.<sup>32</sup> But this depends on affording some latitude to the notion ‘subject’, as well as the invoking of a battery of ‘empty’ elements. Thus, the absence of a strict analogue to the traditional notion of ‘subject’ in languages with ‘ergative’ syntax and in many ‘topic-prominent’ languages, as well as in the type illustrated above (in note 23 and (117)) by Tagalog, is ignored at the expense of misrepresenting the syntactic differences between these language types (see Anderson 1977: §3.5, 1997: §3.1). And I assume here a properly restrictive view of syntax which eschews empty elements.

What is more problematical is that, whether, given its position, one regards *Fritz* in (120.b) as specifically a specifier or simply an adjunct, non-expletive occupants of the position are semantically essential to a clause containing the particular verb on which it depends. Semantically, *Fritz* is as much of a ‘complement’ as *reviews*: both of them represent **participants** (to adopt something like Halliday’s (1985) terminology) in the scene labelled by that verb, rather than a circumstance, as does the adjunct *yesterday/on Tuesday* in (120.b/121). One problem, obviously, is that *Fritz* doesn’t appear in what we have been regarding as a complement position. I return to this below, in §3.3. But also, ignoring this for the moment, we are now in the position of associating with a verb more than one ‘complement’. Now, these particular ‘complements’ can be distinguished configurationally – though, as we’ve observed, this differentiation is itself problematical. But we also find verbs that take three participants, as in (122):

- (122) a. Fritz received reviews from Millie (yesterday/on Tuesday)  
 b. Reviews ranged from good to indifferent

Do we have to allow for clauses with more than one (post-verbal) complement? And why?

The answer to the former question is ‘yes’, I suggest, and that to the latter question is that we need to be able to differentiate among the roles of the participants in the scene whose type is labelled by the verb. The two post-verbal participants/complements in (122.a) can be differentiated as non-prepositional vs. prepositional. But those in (122.b) are both prepositional (whatever one makes of the categorial status of the items they introduce). What distinguishes these latter is the prepositions, and these prepositions reflect the participant types – or **semantic relations** – that are demanded by the verb. Even where there is no overt differentiator the participants satisfy different participant-demands of the predicator. And we can rank these participant-types in terms of their eligibility for lacking a preposition and for subject-position. So the animate goal in (122.a) outranks the others for the subject slot. And what for the moment one might call the neutral relation, associated with *reviews*, like the animate goal usually lacks prepositional marking; and, even when outranked for subject-position, as in (122.a), it occurs closer to the verb, while in (122.b), in the absence of an outranking type, it occupies subject position. The structure in (120.b) that is analogous to phonological structure is determined by the array of participant types associated with particular verbs, and constitutes a grammaticalisation of it.

The need for more-than-unary complementation reflects interface requirements: specifically, provision of the capacity to represent complex scenes with multiple participants as well as (potentially) multiple circumstantials. But this also involves the articulation of means of differentiating between different participant-types as well as circumstance-types. The major means is a category type absent from the phonology. This is a type that may be realised in various ways, as has already begun to emerge from discussion of (122). It may be represented in a pure form (or **periphrastically**), as in (123.a); or it may be realised along with, **cumulated** with other semantic categories, as in (b); or it may be ‘absorbed’ into another category, and be expressed **morphologically**, as in (c); or it may be reflected only **positionally**, as in (d):

- (123) a. Fritz lives at home/Fritz went to Rome  
 b. Fritz lives there/below us  
 c. Fredericus Romam iit  
 F. to-Rome went  
 d. Fritz read reviews

I associate (123.a) with the configuration in (124.a) (continuing to leave aside subjects for the moment), which continues to use the notation of Anderson (1997), in particular:

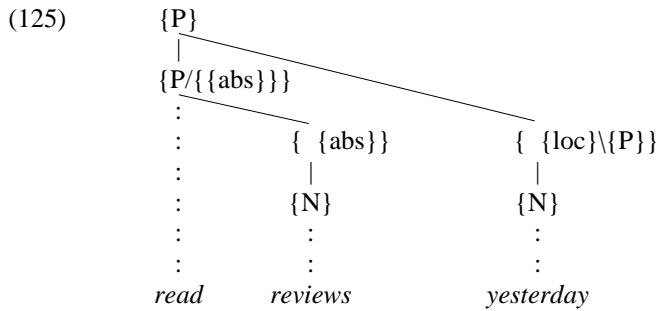
- (124) a.  $\{P/\{\{loc\}\}\}$   
 $\vdots$   
 $\vdots$       $\{ \{loc\} \}$   
 $\vdots$       $\vdots$   
 $\vdots$       $\vdots$       $\{N\}$   
 $\vdots$       $\vdots$       $\vdots$   
 $\vdots$       $\vdots$       $\vdots$   
*lives*    *at*    *home*  
*went*    *to*    *Rome*
- b.  $\{P/\{\{loc\}\}\}$   
 $\vdots$   
 $\vdots$       $\{ \{loc\} \}$   
 $\vdots$       $\vdots$   
 $\vdots$       $\{N\}/\{N/\{\{loc\}\}\}$   
 $\vdots$       $\vdots$   
 $\vdots$       $\vdots$       $\{ \{loc\} \}$   
 $\vdots$       $\vdots$       $\vdots$   
 $\vdots$       $\vdots$       $\{N\}$   
 $\vdots$       $\vdots$       $\vdots$   
 $\vdots$       $\vdots$       $\vdots$   
*lives*    *there/below*    *us*
- c.  $\{P/\{\{loc\}\}\}$   
 $\vdots$   
 $\{ \{loc\} \}$      $\vdots$   
 $\vdots$       $\vdots$   
 $\{N\}$       $\vdots$   
 $\vdots$       $\vdots$   
 $\vdots$       $\vdots$   
*Romam*    *iit*
- d.  $\{P/\{\{abs\}\}\}$   
 $\vdots$   
 $\vdots$       $\{ \{abs\} \}$   
 $\vdots$       $\vdots$   
 $\vdots$       $\{N\}$   
 $\vdots$       $\vdots$   
 $\vdots$       $\vdots$   
*read*    *reviews*

$\{loc(ative)\}$  is a secondary category of the category in question, the latter being named **functor** by Anderson (1997). The primary category itself is left here unspecified; and this is not by oversight, or a temporary measure: it is the category that is neither predicable nor referentiable, so it lacks both **P** and **N**. The functor links the predicator to its arguments, and its secondary categories label the relations that hold between them.

The verb in (124.a) is subcategorised for a locative complement; and this is satisfied by the locative functor. Functors in general are subcategorised for a nominal complement, and, since this is redundant, it has been left out of the representations. The goal relation of *to Rome* is a variant of  $\{loc\}$  associated with directional verbs.

In (124.b) we have a complex category involving a functor that incorporates a simple deictic element (*there*) or an orientational element that is itself complement-taking (*below*) – I have assumed here a locative complement. The former is an adverb, the latter typical of many prepositions. In (124.c) the functor again heads a complex categorisation, but in this case it is itself given morphological expression in the form of the inflexion: *Romam* is the singular accusative whose citation (nominative) form is *Roma*. In (124.a) the functor has independent lexical status; in (124.b) and (c) it is lexically part of a complex. The functor in (124.d) is not given any lexical expression: there and in e.g. (122.a) the {abs(olutive)} (neutral) required by the subcategorisation of the verb is identified by its location immediately to the right of the verb.

The adjuncts of (120.b), (121) and (122.a), *yesterday* and *on Tuesday*, are similarly introduced by functors, specifically the {loc} functor, which in conjunction with the temporal nominals specifies the temporal location of the scene; these are **circumstantial** arguments. In this case, of course, their presence is not required by the subcategorisation of the verb, but they are themselves characterised as seeking a verb to modify, as in (125):



(where again I lay aside consideration of the status of the subject).

I am suggesting that (125) is a more adequate representation than (the relevant part of) (120.b). It differs in incorporating what we might refer to as the **functional argument structure** of this part of the clause. This elaboration compared with the phonology is necessitated by the demands of the interface for an adequate representation of conceptual scenes. These functional argument structures involve crucially a category of a type absent from the phonology. It universally lacks a substantive primary categorisation. It may be manifested in various ways, as I have just been illustrating. It is the paradigm example of a **functional category**.

The presence of a functional/lexical distinction involves a specialisation of a set of primary categories which articulate the functional structure of the scene being represented in the syntax. The functors, in particular, enable expression of argument structure. I can envisage, together with functors the other possible functional categories in (126.a):

- (126) a. *functional categories*
- |         |        |              |            |
|---------|--------|--------------|------------|
| { }     | {P}    | {N}          | {P.N}      |
| functor | finite | individuator | comparator |

- b. *lexical categories*
- |       |       |           |
|-------|-------|-----------|
| {P;N} | {N;P} | {P;N}     |
| verb  | noun  | adjective |

(126.b) gives the specifications for lexical categories we assumed in §2. The functional categories involve only simple combination of the features **P** and **N**, including absence of either or both. The lexical categories involve dependency relations, with adjectives, the most complex invoking mutual dependency (rather than co-occurrence – as with the comparator).

We have already encountered the **finiteness** category, in the representations in (87) and (88) and (110) and (111). I reproduce (110) here:

- (110) a. {past}  
 :  
 :  
 {P/{P;N{prog}}}  
 :  
 :                    {P;N{prog}}  
 :                    :  
 :                    :  
 was                speaking

- b. {past}  
 :  
 :  
 {P}  
 |  
 {P;N}  
 :  
 :  
 saw, talked, heard

(110.a) illustrates ‘pure’ (periphrastic) expression of the finiteness element; in (110.b) it is incorporated lexically in the verb. To the extent that in English morphological tense, and person/number outside nominals, are associated with finiteness, it may be said to be expressed morphologically.

It can be argued that finiteness may also be expressed purely syntactically. Thus, Anderson (1997: §3.6.4, 2001: §2) suggests that the final position of the verb in (126.a) marks it as non-finite, the position of the finite being in second position in the clause, as in the main clause in (126.a), and as in (126.b):

- (126) a. Er fragte mich, ob ich ihn verstanden hätte  
 he asked me if I him understood had
- b. Ich habe ihn verstanden  
 I have him understood

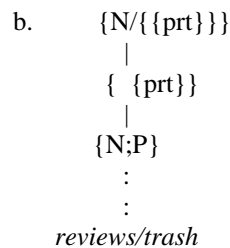
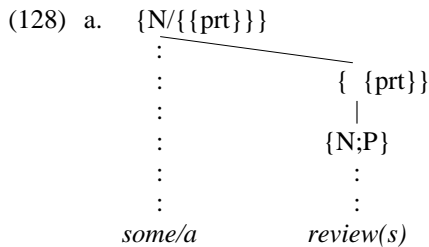
This is, of course, counter to the usual assignments of finiteness in sentences like (126.a), although the uncontroversial non-finite in (126.b) is in final position. Anderson (ibid.) makes a distinction between syntactic and morphological finiteness: **syntactic finiteness** is

the ability to license an unmarked independent predication; **morphological finiteness**, which is associated with non-reduction in marking for tense and person/number and/or absence of overt marking as syntactically non-finite (such as we find in *verstanden*), may or may not be associated with morphological finiteness, though it tends to be (thus justifying the same labelling, as involving ‘finiteness’). The forms *fragte* in (126.a) and *habe* in (b) are both syntactically and morphologically finite, and in particular they occupy the appropriate position for a syntactically finite form. The form *hätte* in (126.a) is morphologically finite but it is not syntactically finite: such a form cannot license an independent predication while occupying final position.

The functional role of (syntactic) finiteness is thus to licence independent predication: the presence of the finiteness element guarantees the independent predicational status of the construction (other things being equal). The role of the **individuator** is to provide a potential referent for the arguments in the functional argument structure. Just as verbs, which label predication-types, combine with finiteness to provide independent predications, so nouns, which label entity-types, combine with an individuator to constitute a referentiable argument of a participant or circumstantial relation. This is exemplified by the nominal phrases in (127):

- (127) a. Fritz read some reviews  
 b. Fritz read a review  
 c. Fritz read reviews  
 d. Fritz read trash

*Some* and *a* are individuators: they take as a complement a partitive noun, i.e. a noun in a partitive (functor) relation to them. I represent this as in (128.a):



(I ignore the differences due to the presence *vs.* absence of plurality/singularity.)  
 Elsewhere, the p(a)rt(itive) functor has overt expression:

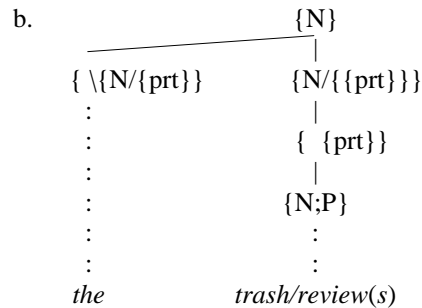
- (129) Fritz read one/some of the reviews

In (127.c/d) the individuator is not expressed by a separate item (periphrastically), but the whole configuration in (128.b) is expressed by a single item.

These quantifiers are ‘transitive’ individuators, they take a partitive complement. There is also a sub-class of **intransitive individuators**, including (proper) **names** and **pronouns**. They constitute complete referent arguments by themselves: pronouns either incorporate a partitive (*someone*) or are heavily context-dependent (via deixis or anaphora – *I, you, (s)he*); the name is the prototypical individuator, as argued in Anderson (in press b, in preparation).

Covert individuators – in English, partitive individuators – may take a specifier, as in (130.a), represented in (130.b):

(130) a. Fritz read the trash/review(s)



As in (128.b), the individuator in (130) is not given independent expression.

The specifier *the* is definite; it embodies the speaker’s assumption that the hearer can identify the referent. Definiteness is a phrasal feature of individuator phrases which is associated with the specifier of the individuator, if present – i.e. (for the moment) if the individuator is partitive.

In English, names do not normally take a specifier (as embodied in the representation for *the* in (130.b), which requires a partitive individuator), so definiteness is associated with them, unless they are not arguments and reject definiteness – as in (131):

(131) a. He is called John  
b. (Come on,) John

(see Anderson in press b, in preparation). In Greek, for instance, names that are arguments take the (definite) specifier, as shown in (132):

(132) o γiánis éfiye  
the John left

But the specifier is, of course, absent when the name is not an argument:

(133) a. onomázete γiánis  
he-is-called John  
b. (éla,) γiáni  
(come,) John

(The name form in (133.b) is vocative.)<sup>33</sup>

The individuator may or may not be **specific** – i.e. associated with assumption of the existence of a particular referent. Presence of such an assumption may be overtly signalled, as in (134.b):

- (134) a. Some people insulted Fritz  
 b. There were some people (who) insulted Fritz

In so-called ‘opaque’ contexts there is no such assumption, but simply individuation:

- (135) Fritz wants some people to insult

Definite individuators may also be either specific or not – i.e. specifically identified or only by description. Thus the referent of the subject in Donnellan’s famous example (1966) may or may not be known independently of the description given there:

- (136) Smith’s murderer is insane

Canonical **generics** are non-specific, and non-partitive except in singulatives like (137.a):

- (137) a. A lion has four legs and a tail  
 b. \* A lion is extinct

The partitive is excluded on the collective interpretation required by (137.b). Generic individuators are complemented by a noun. Plural and non-count generics in English are also inherently definite (138.a), whereas in other languages, such as Greek or French, they require a specifier (b):

- (138) a. Lions are ferocious  
 b. Les lions sont féroces  
 c. The lions are ferocious  
 d. Le brontosaurus était un animal énorme  
 e. The brontosaurus was an enormous animal

(138.c), on the other hand, is partitive, non-generic. Singular non-partitive generics require a specifier in both English and French, as in (138.d-e). (See further Anderson in preparation.)

We can sum up the requirements of the individuator specifier (instantiated by *the* in English) in the languages alluded to here in the representations in (139):

- (139) a. *English:*     $\{\{N/\{\text{prt}/\text{sg}\}\}\}$   
 b. *French:*      $\{\{N/\}\}$   
 c. *Greek:*       $\{\{N\}\}$

In English, the specifier can occur with (covert) partitives or singular generics. In French, the specifier can occur with any covert individuator that is transitive, that is, either partitive or generic, thus excluding names and pronouns. In Greek, names are not excluded in this way – recall (132): the individuator doesn’t have to be transitive, it selects  $\{N\}$  in general. (The specifier does not occur with definite ‘pronouns’ in Greek, which are optional emphatics, and are inherently definite.)



The **comparator** is the functional category associated with adjectives. Like adjectives (Anderson 1997: §2.4), the comparator seems to be less prevalent than the other primary categories. In English it may be expressed independently (periphrastically) or morphologically, or possibly in cumulation, as respectively in (140):

- (140) a. Bob is more energetic than John  
 b. Bob is stronger than John  
 c. Bob is different than John

Functors articulate the functional argument structure, allowing predicators to be linked to arguments which have referentiability. Finiteness enhances the predicational character of verbs, allowing them to occur in independent predications. An individuator enhances the referential capacity of nouns, enabling them to be associated with referents and constitute arguments. The comparator enhances the gradient character of core (that is, intensity of quality) adjectives (cf. e.g. Bolinger's view of 'the adjective as the basic intensifiable' (1972: 168-72), enabling them, via the functional structure it brings along, to relate the relative properties of entities.<sup>34</sup> Anderson (1997: 128) concludes: 'each of the simple, functional classes {N}, {P} and {P.N} is, then, a closed class specialisation of the corresponding open class, with members that are denotatively desemanticised, more "abstract", less specific concerning entity/event/quality type'. This specialisation is dictated by the needs of the semantic interface. As a consequence, the structure of the syllable is closer to the traditional representation of the clause embodied in (120.b) than that of the clause is on the interpretation I have just offered. However, the basic dependency-based analogies remain apparent.

Of course, there are phonologies in which the transitivity system is much reduced, minimal or even absent: there are languages in which there are no phonological complements, others in which there are not even adjuncts to constitute a coda. An example of a system reduced in a slightly different way is provided by the phonology of Kabardian. It can be argued that Kabardian lacks contrastive vowels; vowels need not be specified as such in the lexicon. This is essentially the position of Kuipers (1960), whose analysis is reformulated in the sort of terms I have been working with here – and defended from the criticisms of Halle (1970) by Anderson (1991). Here I offer an interpretation of the proposals made in this last in terms of extrasegmentality.

The quality distinctions that come to be associated with vowels are, with a few exceptions, also associated with their onsets, so can readily be regarded as extrasegmental. Exceptional is the distinction between the vowels in (141):

- (141) zə 'one' vs. na 'eye'

The vowels in (142) can be seen as variants of those in (141) that are associated with different extrasegmentals:

- (142) a. ji 'eight' vs. px'enz 'twisted'  
 b. pq'y 'bone' vs. jelirq'as 'crawfish'  
 c. wups 'plane!' vs. k'o 'go'

The superscripting in [px'] indicates palatalisation, in [pq'] a glottalic/ejective, and in [k'o] a labialised glottalic. Thus the acute/palatal vowels in (141.b) are associated with a preceding palatalised consonant or [j]; the vowel symbols in (c) are Kuipers' representation for discoloured, 'back unrounded' vowels, and they appear after uvulars, pharyngals and

laryngals, which all involve a retracted tongue root; the vowels in (d) are grave after labialised consonants and [w].

Vowels other than in (141) with the extrasegmentals in the schemas of (143):

- (143) a. (i(C(V  
       b. (ə(C(V  
       c. (u(C(V

Extrasegmental **i** is manifested as palatalisation of the onset or as onset [j], and as acute versions of the vowels otherwise realised as in (141). The acute versions are [i] and [e]; this immediately suggests that the first of these is unspecified, and that their secondary categorisations are represented lexically as in (144):

- (144) { } {a}

So that the phonetic value of the vowel in the first word in (141) is filled in as a default. We are not warranted in invoking a substantive contrast, merely one between **a** and its absence. We return in a moment to the consequence of this.

[j] is also presumably an unspecified onset, with its colour being due to the extrasegmental, as is that of [w], in its case due to the **u** extrasegmental. The vowels of (143.c) again reflect a combination of **u** with the contents of (144), [u] and [o].

Likewise, if we associate **ə** with suppression of vowel qualities, the contents of (144) combine with it to give ‘back unrounded’ secondary categorisations. The laryngeal fricatives, [h] and its glottalic equivalent, I take to be again empty onsets, their quality being given by the extrasegmental **ə**. Kuipers groups [h], [j] (for which he offers the alternative representation [h<sup>ˈ</sup>] and [w] (= [h<sup>˚</sup>]) as respectively the plain, palatalised and labialised laryngals; and he notes that [h] in Kabardian is usually voiced. However, while [ə] is one possibility for the unspecified vowel following pharyngals, i.e. of a quality identical to that of the vowel when there is no extrasegmental present, as in (141), more commonly we find a vowel which is more retracted, and given a distinct symbol by Kuipers, as in (142.b): [y] and [ɔ] are back unrounded, [ə] and [a] are ‘central’. And it is this ‘back unrounded’ vowel that we find after uvulars and pharyngals. This suggests that there applies a redundancy of the form (145):

- (145) {ə} ⇒ {ə,u}

optionally if a laryngeal precedes. If we associate uvulars and pharyngals with the respective secondary categorisations in (146) (cf. Anderson 1991: 25), then perhaps (145) originated as a spreading of the **u** that we find there:

- (146) {ə,u} {ə,u,a}

That is, the distribution of the distinctive ‘back unrounded’ vowels which would naturally reflect the same qualities as uvulars and velars (given the representations of these latter in (146)) has been slightly denaturalised by being extended to pre-pharyngeal position, where a simple {ə} rather than {ə,u} would be warranted (and does occur as an alternative). However that may be, there is no motivation for attributing contrastiveness to the vowel qualities in (142.b) qua vowel qualities, any more than those in (142a/c).

The only contrast in vowel quality in Kabardian is apparently between **a** and its absence. This is reminiscent of the situation with English [h], discussed in §2.3: it too is in contrast only with its absence. But also it, too, as argued there, is not contrastively positioned, and was thus analysed as an extrasegmental property of the syllable. The position of vowels is not contrastive. If the **a** of the {a} vowel in Kabardian is also extrasegmental, there is nothing to occupy the vowel position in syllables and this need not be indicated lexically. The lexical phonological representations of items in Kabardian is a string of syllables, some of them amplified by extrasegmentals (**i**, **ə**, or **u** with or without **a**) but all of them lacking vowels. The vowel positions are added derivatively to carry the manifestation of the extrasegmentals or the **ə** introduced in default of extrasegmentals.

Kabardian phonology thus displays a radical reduction at a lexical level of any indication of clause-like structure. However, as in other languages, a pattern of onsets, nuclei and codas does emerge derivatively, redundantly.<sup>35</sup> The lexical syllable structure of Kabardian is none the less minimal, in contrast with the enrichments of clause structure that I have argued for in this subsection. These enrichments are motivated by the need to represent ‘scenes’ of a relatively complex character.

There is a further non-parallel which also reflects this need on the part of syntax – as well as interface constraints on phonology. As well as cross-linguistic variation in serialisation (SOV *vs.* VSO etc.), we also find not just intra-linguistic signalling of semantic or grammatical relations by position, as with subject and non-subject in English (recall (123.d)), but also ‘word-order variation’ that signals topicality and the like. This moves us into referential rather than predicational aspects of functional structure, however. And I shall pursue this in a distinct subsection, §3.3. In the immediately following subsection I turn to a discussion ‘bridging’ between the two areas, concerned with ‘scenes within entities’ as well as ‘scenes within scenes’.

Finally here let me return to the kind of displacement illustrated by the Basque verbal forms of (118), repeated here for reference:

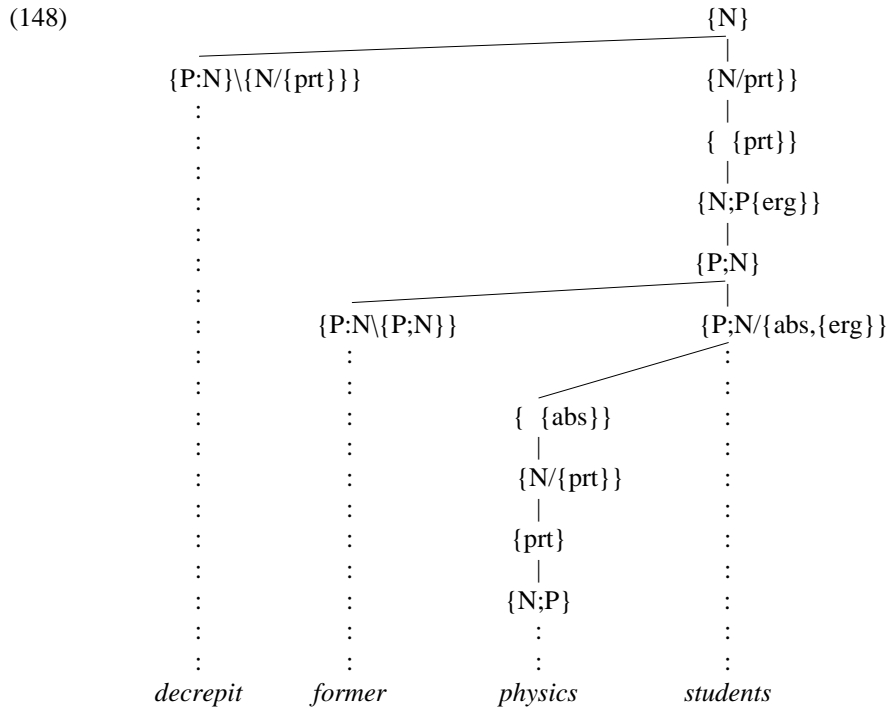
- |         |                                   |           |                              |                       |
|---------|-----------------------------------|-----------|------------------------------|-----------------------|
| (118)a. | Lorea                             | aitari    | eman                         | diot                  |
|         | flower-the                        | father-to | give: <i>past participle</i> | it-[to-him]-[by-me]   |
|         | ('I gave the flower to father')   |           |                              |                       |
| b.      | Lorea                             | aitari    | eman                         | diozu                 |
|         | flower-the                        | father-to | give: <i>past participle</i> | it-[to-him]-[by-you]  |
|         | ('You gave the flower to father') |           |                              |                       |
| c.      | Loreak                            | aitari    | eman                         | diozkat               |
|         | flowers-the                       | father-to | give: <i>past participle</i> | them-[to-him]-[by-me] |
|         | ('I gave the flower to father')   |           |                              |                       |

Here the elements in concord with the arguments required by the lexical verb are attached to the operative auxiliary in final position in each clause. This reflects one effect of the grammaticalisation of the functional/lexical distinction. Secondary categories, particularly relational ones, as here, that are associated with lexical categories tend to percolate to a governing functional one, in this case the primary category bearing finiteness, the relational centre of the clause.

I have devoted a lot of attention in this subsection to the nature and individual characters of functional categories. This is partly because presence *vs.* absence of this distinction underlies perhaps the most important differences between syntactic and phonological structure. These involve not just the elaborations of clausal and phrasal structure, compared with syllables and clusters, commented on in this subsection. Functional categories also play an important role in the distinctive syntactic phenomena to be looked at in the fol-







The circumstantial adjective in (148) corresponds to the adverb in (149):

(149) They were formerly students

As observed above, again in §2.2, the adjective in (67) is ambiguous between an attributive interpretation and a circumstantial/adjunct one:

(67) a beautiful singer

Such derivational relationships have important consequences for the syntax.

The categorial incorporations involved are again a response to interface requirements, in this case the need to be able to provide an economical label for an entity in terms of a characteristic and relevant activity. This is one manifestation of the metonymic basis for many derivational relationships. It is also manifested in the verb-to-noun conversions sampled in (150) (ultimately from Clark & Clark 1979):

(150) *Some verb-to-noun conversions in English*

<i>type</i>	<i>examples</i>
<i>agentive</i>	cook, spy
<i>resultative</i>	win, guess
<i>goal</i>	drop, dump
<i>patient</i>	smoke, drink
<i>actional</i>	run, climb, smoke

In each of these ‘the label for an event is used for an entity which plays one of a set of roles in the event’ (Colman & Anderson in press). They also illustrate the importance of the functional category of functors for the description of derivational relationships. (The labels for the semantic relations involved are illustrative only, and do not embody claims about the theory of functoral secondary categories.) I do not pursue this here, however (but see e.g. Colman & Anderson in press, and references therein). But we can see the same impulse and the same semantic relations at work in the formation of denominal verbs in (151):

(151) *Some noun-to-verb conversions in English*

<i>type</i>	<i>examples</i>
<i>locatum-based</i>	newspaper the shelves, rouge the cheeks
<i>goal-based</i>	pot the begonias, table, garage, field, ground, seat, can
<i>duration-based</i>	winter in California, overnight at the White House
<i>agent-based</i>	police the park, clown, soldier, butcher
<i>translative-based</i>	cripple the man, crumb the bread; the trail forked
<i>instrument-based</i>	bicycle, nail, knife

In this case, ‘the label for an entity is used for an event in which the entity plays one of a set of semantic roles’ (Colman & Anderson in press). Such derivational relationships accommodate concepts to different ‘modes of signifying’.

This rich patterning of derivational relationships is thus motivated by the requirements of the semantic interface, and is not manifested in the phonology, where there are no such requirements, and the invocation of derivational relationships between different phonological categories would indeed make nonsense of the perceptual basis of the categorial features. For the phonology such relationships are both unnecessary and not possible.

Other derivational relationships can be seen as allowing for compact expression of complex scenes, scenes which contain other scenes as part of their structure. This is well illustrated by causative constructions such as that in (152.b), from Turkish, which is based derivationally on the intransitive in (a):

- (152) a. Hasan öl-dü  
Hasan die-*past* (‘Hasan died’)
- b. Ali Hasan-ı öl-dür-dü  
Ali Hasan-*acc* die-*cause-past* (‘Ali killed Hasan’)
- c. Kasap et-i kes-ti  
butcher meat-*acc* cut-*past*  
(‘The butcher cut the meat’)
- d. Hasan kasab-a et-i kes-tir-di  
Hasan butcher-*dat* meat-*acc* cut-*cause-past*  
(‘Hasan had the butcher cut the meat’)
- e. Ahmet Hasan-a et-i piş-ir-t-ti  
Ahmet Hasan-*dat* meat-*acc* cook-*cause-cause-past*  
(‘Ahmet made Hasan cook the meat’)

(examples from Aissen 1979, Comrie 1985). (152.c) shows the causative of a transitive, (b); and (152.e) shows a causative of a causative (*acc* = accusative; *dat* = dative). No such representational requirements as are served by these derivational structures are evident

in the phonology. And though one might want to say that in a specific morphophonological relationship or other, such as that involved in *divine/divinity* and the like, a particular intransitive vowel ‘corresponds to’ a particular transitive, in no sense can one be said to ‘incorporate’ the other.

Relationships of the character of (152) are of interest here for a further reason. They can be used to illustrate the limits of morphological expression of complex scenes, the problems attendant on extension of such structural relationships to accommodate increasingly complex scenes. These are already suggested by what we can observe concerning the forms in (152). The argument in (152.b) which corresponds to the subject of (152.a) is marked by an oblique case, the accusative; in order to cater for the causative of the transitive in (152.c), which already has an accusative argument, the argument corresponding to its subject is dative in (152.d). These observations raise the questions: how many arguments can be ‘assimilated’ by a verb, and how are they to be distinguished consistently?

The ditransitive in (153.a) (in which the verb is an irregular causative, though I haven’t marked it as such) already contains a dative argument, and here the causative in (b) resorts to marking of the argument corresponding to the subject of (153.a) by an adposition otherwise used with ‘passive agents’:

- (153) a. Müdür Hasan-a mektub-u göster-di  
 director Hasan-dat letter-acc show-past  
 (‘The director showed the letter to Hasan’)
- b. Dişçi Hasan-a mektub-u müdür tarafından göster-t-ti  
 dentist Hasan-dat letter-acc director by show-cause-past  
 (‘The dentist made the director show the letter to Hasan’)
- c. Dişçi müdür-e mektub-u Hasan-a göster-t-ti  
 dentist director-dat letter-acc Hasan-dat show-cause-past  
 (‘The dentist made the director show the letter to Hasan’)

(Comrie 1985: 340). Only some speakers are happy with the doubling of the dative in (153.c) (Zimmer 1976: 409-12). Zimmer observes further that some speakers of Turkish are not just unhappy with sentences like (153.c), where we have causativisation of a ditransitive (or causative of a transitive verb), but they also tend to reject causativisation of the causative of intransitive bases whose one argument is an agent. Thus, whereas (152.e), involving causativisation of the causative of a non-agentive intransitive is quite acceptable, (154) is for such speakers ‘very awkward at best’ (Zimmer 1976: 409):

- (154) Ahmet Hasan-a biz-i çalış-tıt-tı  
 Ahmet Hasan-dat we-acc work-cause-cause-past  
 (‘Ahmet made Hasan make us work’)

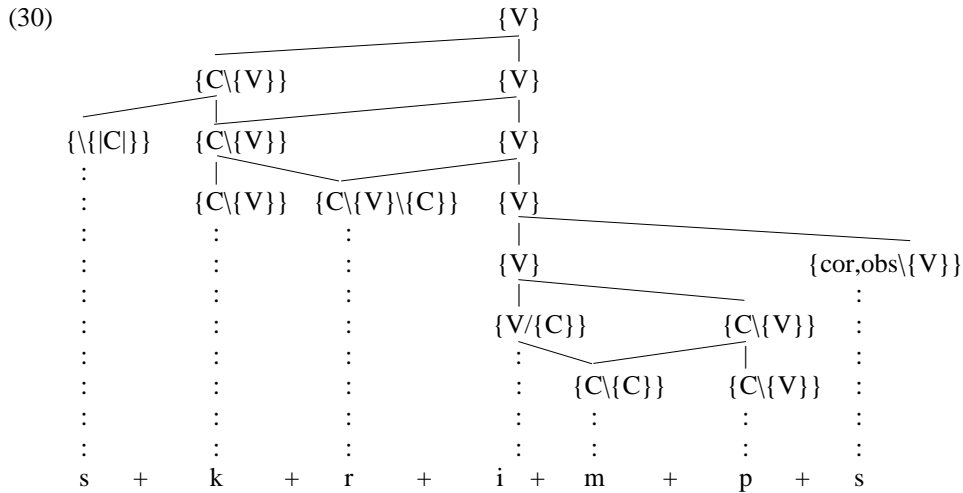
Conceptual requirements are straining at the limits of derivational capacity.

Of course, such complex conceptual structures can be associated with non-derived items. Witness the English gloss to the verb in (152.b), which is not morphologically related to the verbal gloss in (152.a); or English *show*, which unlike the verb in (153), is not even an irregular causative. Lexical items can indeed subtend very complex and subtle semantic properties. But non-derived forms have the same limitations as derived on how much argument structure they can support. Moreover, signalling by individual lexical items systematically more complex structures which speakers may have only peripheral use for is uneconomic at best. Enter syntax, and the facility for embedding. Embedding is of-



ten cited as a crucial property of syntax. But let us firstly look at its role, if any, in phonology – as well as try to clarify what is involved in such a concept.

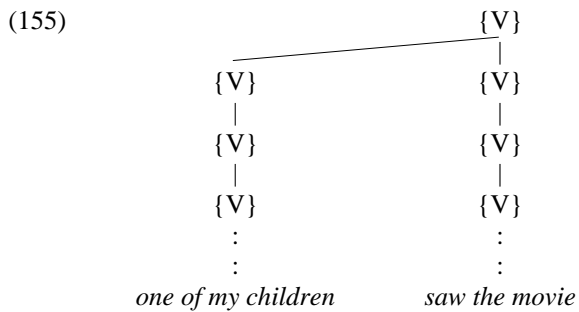
We can associate embedding, in a rather trivial sense, with structures such as (30), repeated here for convenience:



A series of {V}s and a couple of series of {C}s in subjunction are embedded one in another, and thus recursively. This property, shared with syntax, is not my current interest, nor is it what grammarians generally have in mind when they talk of 'embedding'. Let us accordingly limit our attention to what we might call adjunctive embedding, where the elements involved in the embedding are distinct in precedence.

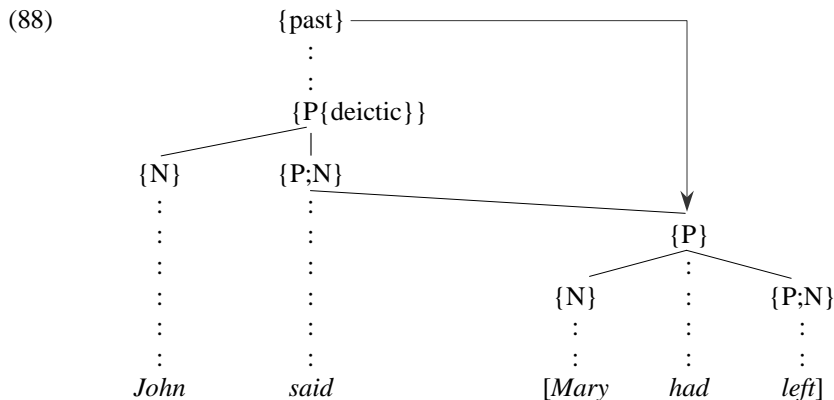
A trivial manifestation of such embedding is any (adjunctive) dependency relation. The only interest for us of this – what we might call simple embedding – lies in its limitation in the phonology, in the unmarked case, to unilateral categorial differentiation: thus while consonants depend on vowels, as again illustrated by (30), the converse is not the case; and more sonorous consonants depend on less sonorous. These limitations are clearly related to the physical limitations on syllable structure which underlie sonority.

It has been argued, however, that recursive embedding may be exhibited by tone units. Thus, for instance, Anderson (1986a: §17) analyses an utterance like that in (155) as involving the head of a tone group (a tonic) dependent on another such head, as indicated roughly in that representation, where the lowest-level {V}s are syllable heads, the next are heads of feet (ictus), the next tone group heads and the highest is a tonic that takes another adjoined to it to the left:

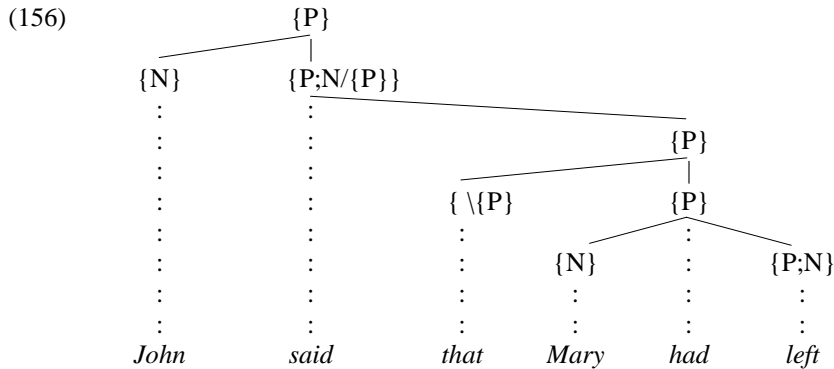


(cf. too e.g. Crystal 1969: §5.10.2, Ladd 1986).<sup>36</sup> Thus, if we want to generalise over simple and recursive embedding in the phonology, the limitation on the embedding of {V} and consonants is that {V} cannot be embedded under a consonant. The force of what, on the basis of this, we can conclude about recursion in the phonology depends upon the appropriateness of this kind of analysis of intonation, however. And even if it is appropriate, it introduces only a very shallow depth of recursion. And there are other types of recursion in syntax than the direct {V}-to-{V} type we find in (155).

On the other hand, direct recursion tends to be avoided in the syntax. And this seems to be largely due to the intervention of functional categories, as well as the absence of restrictions parallel to the failure of consonants to govern vowels. Even such a representation as (88) involves a {P:N} intervening between the two {P} nodes:

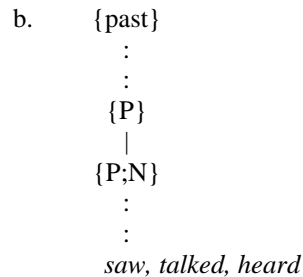
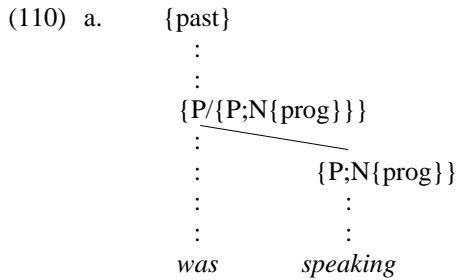


So too if we include a complementiser, as in (156), wherein I have removed ‘{past}’ (as not relevant at this point), but included the subcategorisation of *say* as predication-taking verb, but not functor nodes (as again not relevant, yet):

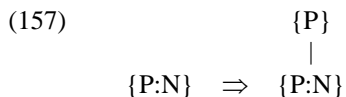


That {P;N} is both dependent on and complemented by {P} is nevertheless closer to direct recursion than we tend to find elsewhere.<sup>37</sup>

However, the most direct recursion is illustrated by those verbal elements that can never be in finite position. Verbs in English (and many languages) can incorporate lexically a finiteness element; they can thus occur in either kind of configuration that we find in (110):



The configuration in (110.b) is made available by a redundancy of the form of (157):



Some verb forms reflect failure of (157): these are morphologically non-finite forms. These are forms which are marked lexically as exceptions to (157), {P;N,\*(157)}; I shall abbreviate this as {\*P}. Since such forms cannot normally form independent predications, they figure as arguments in the predications headed by other predicators, including other

verbal forms, either via a functor, as in (158) and (159), or directly as dependents of a verbal, as in (160):

- (158) a. Betsy is pleased at [John('s) knowing the truth]  
 b. Betsy is pleased [for John to know the truth]  
 (159) a. [John('s) knowing the truth] pleased Betsy  
 b. [For John to know the truth] pleased Betsy  
 (160) John seems [to know that]

The {\*P} forms are underlined: in one case they are incorporated (*-ing*), in the other periphrastic; the functor is not overt with the argument in (158.b), as well as in subject position in both of (159), which is general. Given this role as an argument serving a semantic function, it is not surprising that such forms are typically nominalisations in origin; and, indeed, the incorporated {\*P} form of the (a) examples in (158-9) is still paralleled by nominalisations, as in (161):

- (161) a. John('s) painting the wall was a disaster  
 b. John's painting of the wall was a disaster

In (161.b), which is ambiguous between an 'event' (or action) reading of the *-ing*-form and an 'entity' (or concrete) reading, the nominal structure is signalled very overtly.

Anderson (1997: §3.6) argues that the subordinate verb form in (160), as well as the finite in (162), however, depends directly on the main verb; their relationship is unmediated, as he puts it, by a semantic relation:

- (162) It seems that John knows the truth

Thus, the subordinate clause in (162), lacking a semantic relation, cannot occupy subject position:

- (163) \* That John knows the truth seems

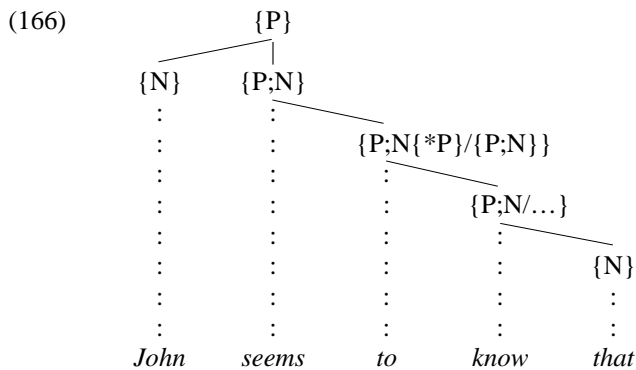
*Seem* is subcategorised for predicators of various sorts, as illustrated by (160), (162) and (164):

- (164) a. John seems very nice  
 b. John seems a nice man

Predicators do not occupy subject position. On the other hand, the mediated subordinates in (159) can occupy subject position in 'passives' and the like:

- (165) a. Betsy was pleased by/at John('s) knowing the truth  
 b. Betsy was pleased for John to know the truth

If this analysis is appropriate, then (160) shows direct embedding, as represented in (166), where I have omitted the functor categories, as well as any representation of *that*, as not relevant at this point:



I have represented *to* as a periphrastic morphological non-finite that takes a verbal as its complement. I return to this and other aspects of the syntax of (160/166) in §3.3.

The *-ing*-form can also be directly embedded, as in (167.a), as can the  $\{*P\}$  form whose historical source is a deverbal adjective, as in (167.b):

- (167) a. Betsy saw John painting the wall  
 b. Betsy had John fired

But I do not pursue this here, nor in any detail the (related) role of these forms in forming periphrases, as exemplified in (110.a). But an attempt at some clarifications is in order.

'Auxiliaries' have been identified in two different ways that do not coincide in their consequences, in particular the classification that results. One sense applies to those elements which in some languages are independent words that realise the finiteness category and have a syntax distinct from lexical verbs; above I called these operatives. But another (and venerable) tradition applies the term in an etymologically appropriate way to words that help lexical verbs to express categories that otherwise might be expressed purely morphologically. Thus, for instance, in Latin perfect and passive are expressed morphologically in (168):

- (168) a. Monevit 's/he-(has)-warned'  
 b. Monetur 's/he is warned'

But in order to express both at once recourse has to be had to a periphrastic formation, involving an 'auxiliary' in the second sense, what one might call a **periphrast**:

- (169) Monetis est 's/he has been/was warned'

Periphrasts and operatives need not coincide: English *get* is arguably a periphrast for passive (*It got lost*), but it is not an operative (*\*Got it lost?*, *Did it get lost?*); and *dare*, though for some speakers it is a marginal operative (*Dare I leave?*), is not obviously a periphrast.

However that may be, what is important here is that English periphrasts that may also function as operatives (for instance) allow for rather obvious direct recursion. This may be illustrated with respect to (170):

- (170) It may have been being repaired



other consonants or of consonants on vowels, as well as other physically based limitations, limits the scope for recursion. In the syntax adjectives, in particular, as well as the functors in (147) (for instance) may be categorised as ‘\’, and allow for both **circumstantialisation**, as in (125) and (149), and **attributivisation**, which I shall now exemplify in a little more detail. Together, these are the major instantiation of modification.

(172) gives a small sample of circumstantial types from English:

- (172) a. on the day before his birthday  
 b. on leaving for his villa in Spain  
 c. as frequently as possible  
 d. when he left for his villa in Spain

All of these except *frequently* are obviously based on functor phrases, with the initial form in (172.e) being a cumulation of functor and *wh*-form (the character of which we return to in the following subsection). And they all to varying degrees allow for further embedding.

In the case of attributivisation, both adjectives and verbs, and finite clauses, may function as attributives like the {abl} phrase in (147) and (173.a):

- (173) a. students from the working-class/working class students  
 b. students living in college/visiting students  
 c. students aware of the possibilities/serious students  
 d. students who live in college  
 e. students who(m) they taught

These attributives are all ‘\{N/{prt}\}’, whatever their primary category. The first (or only) phrase in each of (173) contains an attributive element that is overtly complemented, and appears to the right of the modified noun; such is regular in English with noun-modifiers that have complements or adjuncts.<sup>39</sup> Pre-nominal noun modifiers such as that in (173.a) are typically covert functor phrases, as suggested by the overt post-nominal equivalent. The last two examples in (173), involving attributive finite clauses, introduce another respect in which syntax requires formal properties that do not seem to be characteristic of the phonology.

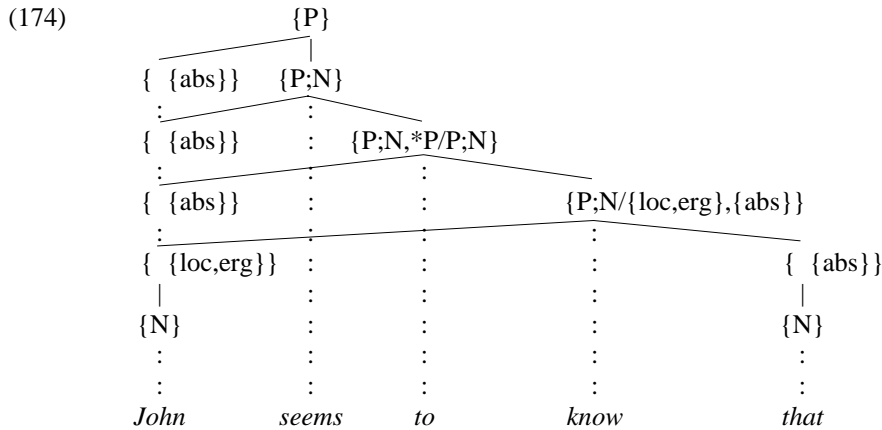
(173.e), in particular, contains a structure in which we have what we might call an **ectopic** element, namely *who(m)*: this element appears to be a non-subject complement of *taught*, as well as being coreferential with *students*, but it does not occur in a position we otherwise expect of a complement of a verb in English. This is another circumstance, other than subjecthood, in which we find a misplaced complement, so that (173.e) contains two ectopic elements. In the next subsection I look at the characterisation of such elements and at the motivations for ectopicity. This moves us away from just the predicational aspect of the semantics of syntax towards the referential.

### 3.3 Ectopicity and referentiality

A further striking difference between syntax and phonology is the prevalence of ‘displacements’ of elements from their accustomed positions – what I am referring to as ectopicity. It is not just that, as observed above, syntactic elements may vary in their relative positions both cross-linguistically (SVO, VSO, etc.) and intralinguistically (as, in a minor way, with the adverb positions in English); but in certain circumstances particular elements may be

‘displaced’ to positions which reflect neither their immediate dependency nor their usual or expected positioning.

One of the most generally recognised manifestations of ectopicity is that exemplified by (160/166) above. What is involved here is clarified if we now include the functors excluded from (166):



The verb *know* has two arguments, the absolutive *that* and the {loc,erg} *John*. The latter, compound relation is that of the ‘experiencer’, the location of the experience – but this is not important here. What is important is that *John* is an argument of the lowest verbal in (174); and this is indicated there by the dependency arc which links the ‘experiencer’ with the *know* verb. It is also the argument that we would expect to be the subject of *know*, and as such it is available for **argument-sharing**. This occurs when the upper predication contains an absolutive that is not subcategorised-for, that is not part of the valency of the predicator. Both *to* and *seem* lack {abs} in their subcategorisation. Therefore an un-subcategorised-for {abs} – what I have called elsewhere a **free abs** – is introduced. This is to satisfy the requirement that every predication must contain an { {abs} } (Anderson 1997: 166-7). This is a manifestation of the special status of **abs** among the semantic relations: it is the non-specific relation whose content depends on the kind of predicator (which in turn largely depends on the other semantic relations involved); it may occur twice in a predication unaccompanied by another relation (i.e. uncompounded), to form equatives, such as *John is the one with red hair/The one with red hair is James*. If a predication lacks a subcategorised-for { {abs} }, then a free abs is introduced in default. The free abs, like any other functor, takes a {N} as a complement. This requirement may be satisfied by an expletive, as in (162), repeated here:

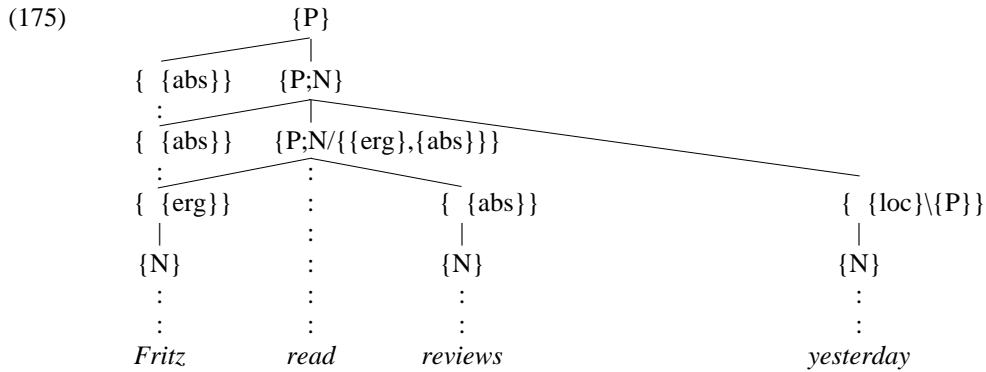
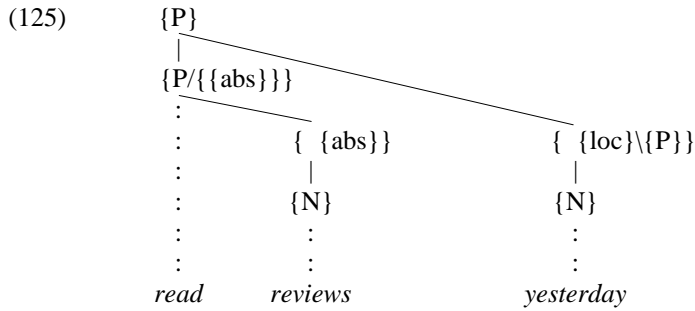
(162) It seems that John knows the truth

Or it may be satisfied by argument-sharing, specifically with the argument of a predicator dependent on the *seem* verb that would be its subject. This is what happens, successively, with the free abs in both the *to* and the *seem* predications. The position of the shared argument is determined by the uppermost predicator, here the finiteness element associated with *seems*, to whose left the shared argument is placed.

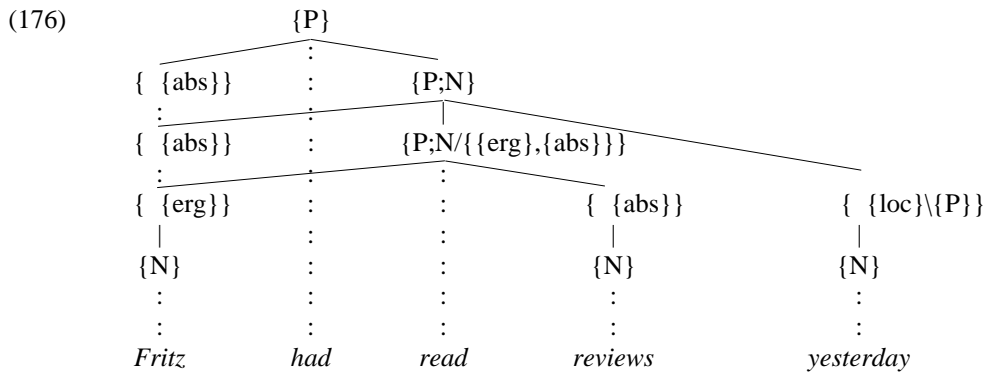
The topmost { {abs} } in (174) is the free abs associated with the finiteness element which has all the rest of the sentence subordinate to it. Though it is not an intrinsic specifier, the free abs is serialised in specifier position, unlike regular (subcategorised-for) ar-



guments. This illustrates how in general the ectopicity of subjects in English is provided for. This behaviour of subjects can be exemplified more transparently if we substitute for (174) an example without the other various instances of free abs, by now completing (125), wherein we left the status of subjects aside, as in (175) – thus completing the original replacement of (120.b) with a representation showing functional categories:

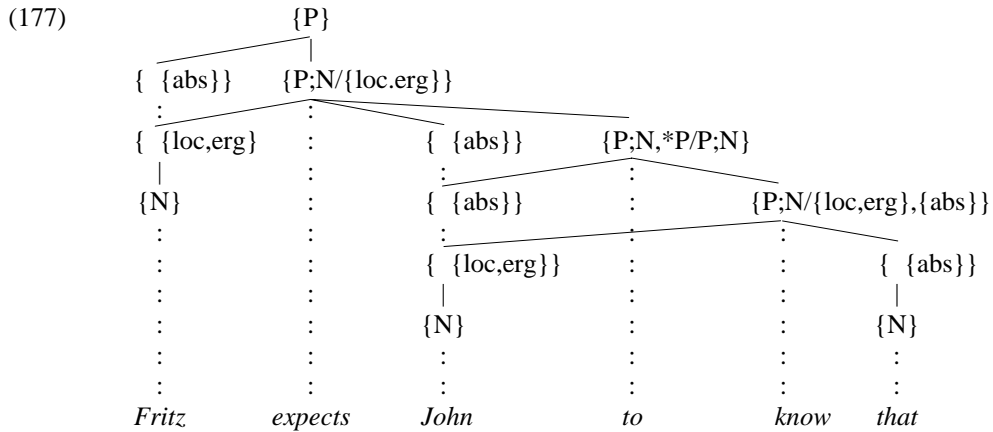


(175) differentiates between ‘{P;N}’ and the finiteness element ‘{P}’, and completes the subcategorisation of *read*, which involves two participants, one of them the subject; and the subject ({ {erg}}) argument is shared ultimately with the free abs associated with the finiteness element {P}. In (176), the finiteness element is given independent expression as an operative, but the syntax is otherwise the same:



Argument-sharing collapses ‘raising’ and ‘subject-formation’.

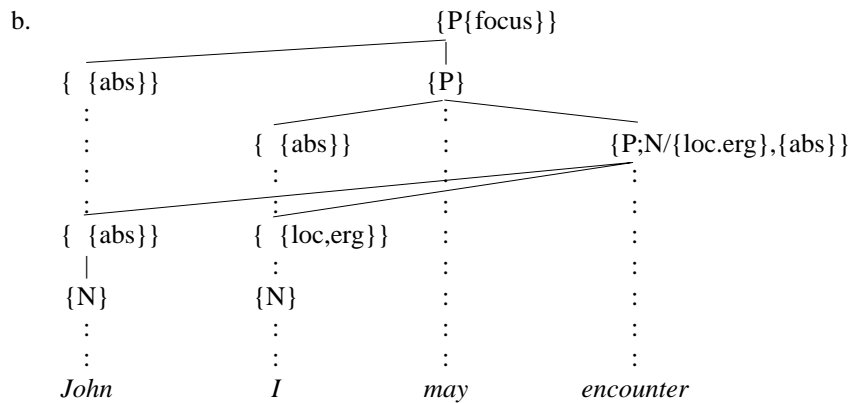
In (177), however, the free { {abs}} of *expect* is outranked as potential subject by its subcategorised-for { {loc,erg}} (‘experiencer’) argument:



And we have so-called ‘subject-to-object raising’.

I suggest that this argument-sharing, involving free abs, serves another interface function. It identifies a slot, iconically earlier than the one its contents would otherwise occupy, that is the unmarked location for **thematically significant referential material**. Here we might expect to find topical or empathetic material. The syntax of free abs is of course denaturalised, and may be overridden, by intonational means, or by a higher free abs. This is how we might interpret the syntax of (178.a), as represented in (b), ignoring the negation:

(178) a. John I may encounter



The free abs of the focus predicator need not be filled by the subject of the sentence, but can be shared with other arguments. Here the subject of stand shares its argument with the free abs of the modal, but it does not share with the { {abs}} of the focus predicator (which is available as an extension of the basoc {P}). The effect of (178) is to allow *John* to

‘usurp’ the thematically most significant slot. But it tends to confirm the suggestion that the basis of argument-sharing with free abs lies in thematic function.

This is not a function shared with the phonology, given its foundation in interface requirements. And, indeed, ectopicity would be incompatible with the nature of the phonological interface. It is the semanticity of syntax that enables us as users to reconcile the dislocation with the other structural properties of the displaced item, such as its satisfaction of the subcategorisation requirements of some predicator. This is not only lacking in phonology, but also the determination of linearity in phonology is associated with largely invariable interface properties to do with sonority.

A rather more drastic usurpation of this privileged ‘subject’ position is associated with some of those constructions in English which represent residues of the ‘V-2’ (‘verb-second’) syntax which at least partially (or as an option) characterised Old English main clauses. I return below to the significance of ‘V-2’; let us at this point look at the Present-day English situation.

There are four main ‘V-2 residuals’ in English, exemplified by (179):

- (179) a. Here comes Charley  
 b. Never had Eric eaten such a meal  
 c. What had Eric eaten?  
 d. There were bugs in the soup

The last one is distinguished from all the rest by the subject status of the initial element.

As already observed in relation to the discussion of (87), in sentences such as (179.d) the subject position seems to have been ‘usurped’ to the extent that it is filled by an expletive. The subcategorised-for post-verbal { {abs}} argument *bugs* retains the **morphosyntactic subject** property of controlling concord (cf. *There was a bug in the soup*), but the **syntactic subject** is *there*, which undergoes ‘raising’, for instance:

- (180) There seem to have been bugs in the soup

Concord appears on the most immediately superordinate finite. In (179.d) the potential subject *bugs* has failed to occupy specifier position, as it does in (181):

- (181) Bugs were in the soup

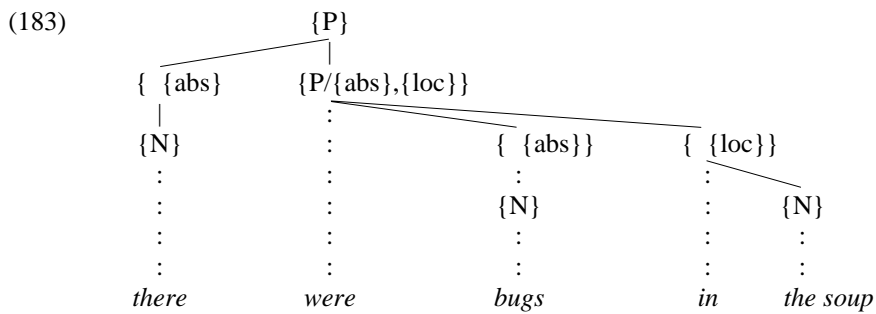
The motivation for this is clearly thematic: indefinites are disfavoured as utterance-introducers. ‘Main-verb’ uses of the operative auxiliaries – i.e. where they are subcategorised for more than a verb-form, which is what the subcategorisation of progressives etc. is limited to (recall (110.a)) – involve an analogue to the (157) redundancy, the redundancy that allows finiteness to lexical verbs:

- (157) 
$$\begin{array}{ccc} & & \{P\} \\ & & | \\ \{P:N\} & \Rightarrow & \{P:N\} \end{array}$$

That is, we have the option in (182):

$$(182) \quad \begin{array}{c} \{P\} \\ | \\ \{P/\{SR\}\} \Rightarrow \{P/\{SR\}\} \end{array}$$

(where ‘SR’ is any semantic relation, i.e. marks a ‘main-verb’ use). The finiteness element introduced by (182) takes a free abs, which is satisfied in this case, given the failure of the indefinite { {abs}} to ‘raise’, by the expletive *there*, which is devoted to the subject in a predication with just such a configuration as we have here. We thus have the structure outlined in (183):

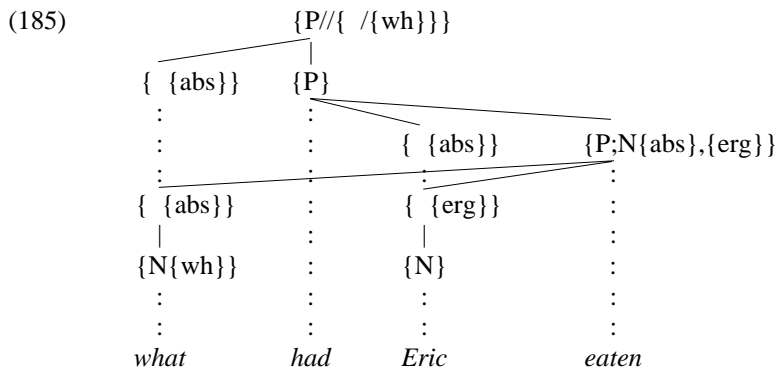


(which, though expanding on the kind of representation proposed in (87), continues to ignore the internal structure of the nominals).

*What* in (179.c) is not a subject, but *Eric* is. Thus we find the latter ‘raised’ in (184):

(184) What does Eric seem to have eaten?

But it does not occupy specifier position with respect to the finite verb in either sentence; this has been ‘usurped’ by *what*. I suggest the representation in (185):



In this case, even though *Eric* is shared with the free abs of the finiteness element realised as *had*, it fails to be realised in specifier position, which instead is occupied by the { {abs}} of the higher {P//{ /{wh}}}, which shares its argument with the *wh*-form. The *wh*-form is required indirectly (‘//’) by this predicator, to satisfy its valency. The word order is a residue of the ‘V-2’ constraint, in that, unlike in (178), the presence of the *wh*-form ‘displaces’ the subject from specifier position. The *Eric* argument continues to control con-

cord via its dependence on the free abs of the lower {P}. The upper {P} is introduced by the redundancy (186):

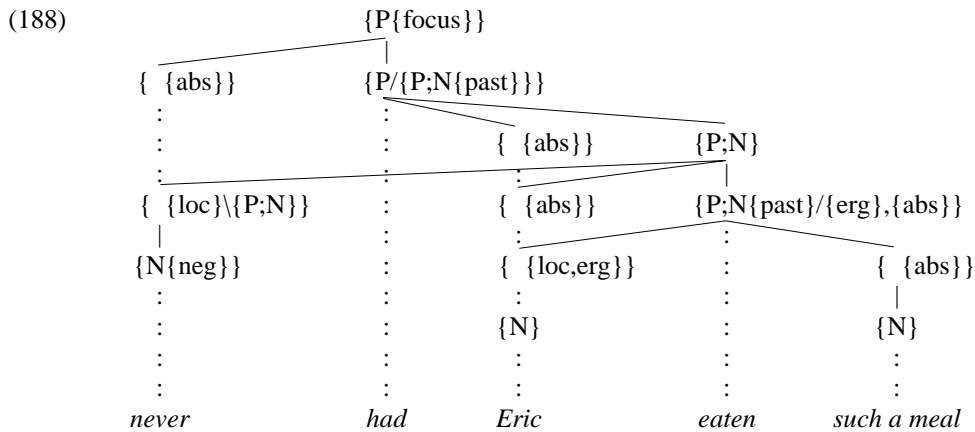
$$(186) \quad \begin{array}{ccc} & & \{P//\{ /{\text{wh}}\}\} \\ & & | \\ \{P\} & \Rightarrow & \{P\} \end{array}$$

This allows a higher ‘question’ predicator to govern any finiteness element. (I neglect here non-finite questions – and indeed subordinate questions in general.)

*Eric* in (179.b) is also a subject, though its subject behaviour is less well established – perhaps unsurprisingly, given the recessive status of the construction:

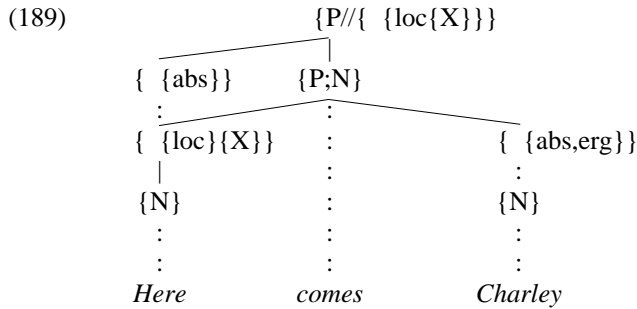
(187)        ?Never does Eric seem to have eaten such a meal

(179.b) involves a focus construction like that in (178), but in this case the negative focused adjunct ‘displaces’ the subject from specifier position; again we have the ‘V-2’ effect:



Both (179.b) and (179.c) display a considerably diluted form of ‘V-2’, in that only operatives are involved, while Old English ‘V-2’ involved all (finite) verbals. And also the morphosyntactic subjects in these constructions are also syntactic subjects.

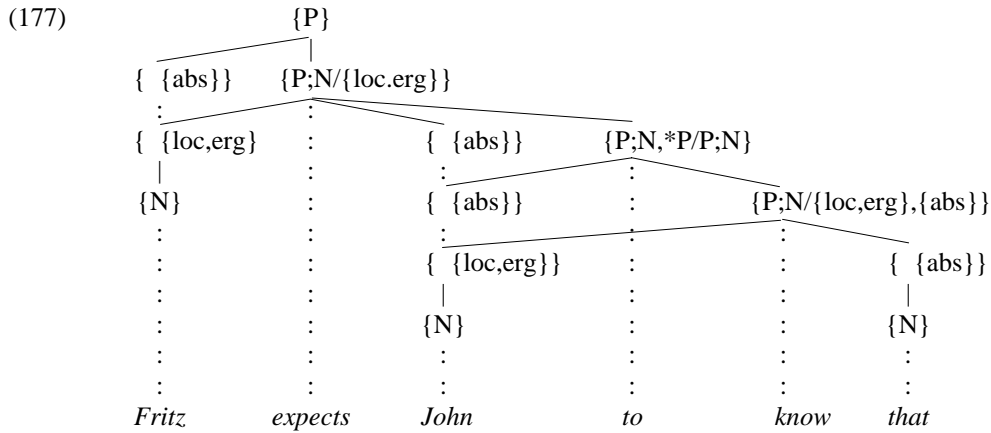
(179.a) is in some respects a more faithful reflection of ‘V-2’, though the sentence-initial item is restricted to a small set of pronominal (spatial and temporal) locatives. It involves lexical verbs – and its dynamic presentational character is indeed inimical to the use of auxiliaries. And the displaced ‘subject’, though retaining its morphosyntactic properties, does not seem to be a syntactic subject. This is characteristic of ‘full-blown V-2’, such as we find in German main clauses (Anderson 1997: 288-91). We can associate the structure in (189) with sentence (179.a):



The ‘X’ represents any of the eligible items. Here the upper {P} replaces the {P} introduced by (157); they are mutually exclusive. The sentence lacks a syntactic subject. Again concord is realised on the nearest superordinate finite.

The relevance of these various ectopic constructions to our ongoing discussion is that they all illustrate the role of thematic factors – topicality, contrast, focus, empathy – in accounting for ectopicity, even where the construction has been grammaticalised and/or lexicalised. The lack of phonological analogies to such ectopicities follows from their semantic motivation, i.e. interface requirements on the syntax which are absent from phonology, and from the problems that ectopicity would present for interface requirements on the phonology. Linearity within the syllable is almost entirely invariant, and determined largely by sonority plus primitive distinctions between complement, adjunct and specifier. Dependency relations in the phonology are reflected in relative timing, and there thus can be no argument-sharing between elements in different syllables, except at the boundary (ambisyllabicity). As observed in §1.2, it seems that we can require projectivity (‘no-tangling’) of phonological representations. This is ensured if ambidependency occurs only where syllables meet and not otherwise across boundaries, i.e. if it is limited to ambisyllabicity. Ambidependency in syntax is not limited in this way. (179.a-c) all involve ‘tangling’, induced by cross-clausal argument-sharing. The kind of more radical argument-sharing that we find in the syntax is allowed for by the development of functional categories, particularly functors. Functional categories, with their variant modes of realisation – as separate word, as affix, as lexically incorporated – are also inimical to the interface properties of the phonology.

Functional categories also constitute one element in the constraining of projectivity violations. In all the cases we have looked at the violation is associated with argument-sharing by functional categories. Such argument-sharing need not involve ‘tangling’, as can be seen in several of the structures we have been discussing. Thus, in (177) not all of the sharing of arguments involves violation of projectivity:



Indeed, only the arc linking the *know* verb with *John* introduces ‘tangling’. ‘Tangling’ is also restricted in all the cases we have looked at to circumstances where one of the sharing functors is a free *abs*, an  $\{ \{abs\} \}$  not included in the subcategorisation of the predicator it is dependent on but introduced by a universal requirement that every predicator contain an  $\{abs\}$  functor.

### Conclusion

I have sought here to identify various formal properties that are shared by phonology and syntax; their existence is consistent with the structural analogy assumption, which leads us to expect such property-sharing, except when this is frustrated by the different interface requirements on syntax and phonology and the relationship between the two planes. Some of these properties are associated with the notion ‘head’: crucially there are the distinctions between complement, adjunct and specifier. In §1 I tried to show that these are fundamental to the phonology in being potentially contrastive. The syntactic analogies to these head-based notions were explored in §2, as well as the analogical composition of categories on the two planes. These were supplemented in that section by further analogies, perhaps in this case more familiar in their phonological guise, involving extrasegmental/clausal elements, analogies to do with ‘harmony’, ‘umlaut’ and ‘polysystemicity’, in particular. A range of phenomena in a range of languages testifies to the appropriateness of analogous analyses in the two planes.

However, the nature of the respective interfaces of syntax and phonology limit the extent of analogical patterning. Crucially, the semanticity of syntax demands structural distinctions not required in the phonology. These elaborations are also incompatible with the restrictions imposed by the nature of the physical medium of transmission with which the phonology interfaces. §3 tried to illustrate both these aspects in relation to the development of functional and derivational categories and extended embedding as a response to the need for the syntax to express complex cognitive ‘scenes’, and in relation to the kind of ‘displacements’ that we can associate with *wh*-forms in English. These latter are associated with the referential aspect of syntactic representations and specifically with the expression of their thematic, or discursual structure.

## Notes

\* I gratefully acknowledge that much of what follows arose from interaction with some of my co-contributors to the *Lingua* special issue on ‘Linguistic knowledge: perspectives from phonology and from syntax’, particularly with Phil Carr (cf. Anderson in press a, Carr in press – and other contributions to the volume). Special thanks too, as ever, to Fran Colman, for the benefits derived from many discussions of much of what is discussed here.

1 Lyons (1962) is, in my view, too generous in according to ‘phoneme theory’ one end of a typological continuum (the ‘cardinally phonemic’ end) with ‘prosodic analysis’ at the other extreme (the ‘cardinally prosodic’ end): ‘... it may be suggested that the goodness of fit of one model of analysis rather than the other should be made a criterion in the typological classification of the phonology of languages’ (1962: 132). ‘Phoneme theory’ would be appropriate only to languages with no ‘prosodic’ phenomena whatsoever (apart, perhaps from things to do with accent and tone) and offering no evidence of polysystemicity; whereas all other languages would have to be accommodated by ‘prosodic analysis’, in which tradition it was never claimed, as far as I am aware, that a language could consist entirely of ‘prosodies’ – or even that there couldn’t be a language without such. It seems to me that Lyons is proposing here an interesting typological dimension, but it has to do with the relative ‘prosodicness’ of languages (what range of features is prosodicised in each), not with a distinction between ‘phoneme theory’ and ‘prosodic analysis’.

2 For expository reasons, I do not adopt here the suggestion (see e.g. Anderson 1994) that vowels are contrastively unspecified as to primary category, or ‘major class’, but this may be undesirable anyway. See further below, particularly §2.

3 In recognising here (as in the syntax – Anderson 1997a: §2.7.4) contrastive non-dependency, the interpretation of fricatives given here departs from that offered by Anderson & Ewen (1987: ch.4), which invokes mutual dependency. This is in accord with our goal of identifying the locus of contrast, as well as enhancing conceptual simplicity. We shall find similar reasons to modify the interpretation of nasal consonants and voiced fricatives suggested by Anderson & Ewen.

4 Exceptional here – as well as some of (13) – are such as *strange* and *lounge*, involving /n/ and the voiced affricate following an intransitive vowel, either /eɪ/ or /aʊ/. Affricates are often associated with exceptional distributional properties. See further note 7.

5 (27) will also apply to the clusters in *winter* and *whimper*, and *thunder* and *lumber*, where again the dependency relation is the channel for agreement. See further §1.4. Agreement between /p/ and /s/ in (26), on the other hand, is a requirement on any adjacent obstruents, whether or not directly linked by dependency.

6 The first part of (29.a) will also apply to *sm-*, *sn-* and *sl-* clusters, where again the /s/ may be left unspecified lexically. Before *-r-* the empty segment is of course filled out rather as /ʃ/, as in *shrew*. The second part will apply to these too if we substitute ‘C’ for ‘[C]’ therein. This might be appropriate, at least in the case of the nasals, given the restrictions on combination with other fricatives: \*/fm-, θm-, fn-, θn-/. The lesser degree of structural integration of /s/ that is apparent in the representation in (26) might be taken as a formal characterisation of ‘extrametrical’ or ‘appendix’ (in such cases, at least).

Notice that, if we assume, with e.g. Anderson (1994), that vowels are contrastively unspecified (recall note 2), then the ‘empty’ segment of (29) would have to be differentiated as {C}.



7 This may involve cases where we apparently have contrastive linearisation, as with the pair of Greek words in (i):

- (i) a. skílo ‘dog’  
b. ksílo ‘wood’

(where mis-linearisation, as may easily be perpetrated by non-Greek speakers, may result, for instance, in such foreigners insisting that they want the windows in their new house to be made of ‘dog’ – rather than, say, aluminium). We also have such pairs as (ii):

- (ii) a. spáθa ‘sabre’  
b. psáθa ‘straw-hat’

Initially in (i.b) and (ii.b) we have affricates, as reflected in the traditional spellings, involving a single letter, respectively ζ and ψ, while the clusters are spelled with two, σκ and σπ. (Traditionally, though, these are called ‘double letters’, along with ζ (representing [z]).) The affricate in (iii.b) is represented by a sequence of Greek letters, τσ; it is in contrast not just with the cluster of (iii.a), spelled στ, but also with the voiced affricate of (iii.c), spelled τζ:

- (iii) a. stíros ‘barren’  
b. tsíros ‘dried mackerel’  
c. dzíros ‘turnover’

Clusters do not occur word-finally in Greek, and these are avoided even in loanwords. In native words single final consonants are generally limited to those represented by ζ (transliterated as *s*) and ν (transliterated as *n*), and ρ (transliterated as *r*). But we do find a final ζ, representing an affricate, in the archaic survival of (iv):

- (iv) άπαξ ‘once’

Those mentioned exhaust the set of affricates, which do not cluster with other consonants initially; while the clusters of the (a) examples in (i)-(iii) may be extended as in (v.a) and also form part of the larger set of [s]-initial clusters given in (b):

- (v) a. spl-, spr-, str-, skl-, skr-, skn-  
b. sf-, sθ-, sx-, sfr-

(For exemplification see Holton et al. 1997: 10-2.) In Greek onsets, non-affricative [s] seems to be a specifier of voiceless obstruents in general rather than just plosives.

On the other hand, the fricative element of affricates, as well as, like the elements of clusters, being unsequenced lexically, also, unlike members of clusters, is marked lexically as exceptions to both sonority sequencing and empty segment adjunction (29.a), repeated here:

- (29) a. *empty segment adjunction*

$$\{ \}, \{ \{ \underline{p/t/k} \} \} \langle \{ \underline{l/r} \} \rangle \Rightarrow \{ \underline{s} \}, \{ \{ \underline{C} | \{ \underline{p/t/k} \} \} \} \langle \{ \underline{V}; \underline{C} | \underline{l/r} \} \rangle \}, \&$$

$$\{ \underline{s} \} \Rightarrow \{ \setminus \{ \underline{C} \} \}, \text{ both in the environment } \_ \_ ( \{ \underline{V} \} )$$

However, the elements of the affricate are, I assume, susceptible to cluster headship (27), also repeated here, which makes the fricative dependent on the stop:

$$(27) \quad \text{cluster headship} \\ \{C_i\} \Rightarrow \{\{C_j\}\}, \text{ iff } \{C_j\} < \{C_i\}$$

The elements of the affricate thus do not cluster with other onset consonants; and the sequencing relative to each other is not part of the system that forms intrasyllabic syllable linearisation. It is invariant, and may be anti-sonority, as in (iv), [-Vks], and more commonly in other languages.

8 I do not want here to get into extensive discussion of the environment for what's come to be known as 'Aitken's Law' (Lass 1974, Taylor 1974), which has usually been applied to the historical process(es), or the 'Scottish vowel length rule' (Aitken 1981), partly because this is not directly relevant and partly because there is variation among speakers in this regard: the formulation given below in the text reflects the most restrictive view of the environment. But I should acknowledge that for some speakers the distinction between the two variants of the [ai] diphthong illustrated in (35), at least, seems to be marginally contrastive (Noske et al. 1982, Wells 1982: §5.2.4). The 'finally' in the formulation given in the text remains rather vague, but it includes syllable-finally (the first vowel in *bias* is heavy) and formative-finally (so that *sighed*, unlike *side*, has a heavy vowel). On the environment see further Ewen (1977) and Anderson (1988a, 1993, 1994). And I return briefly to the topic below.

I also do not enter here into the controversies surrounding the prevalence of the 'Scottish vowel-length rule' (both among Scottish speakers and among potential victim vowels) or its Scottishness which were initiated in particular by Lodge (1984: ch.4) and Agutter (1988a,b). But see further e.g. McMahon (1989, 1991). See also Anderson (1988a) for a discussion of one of the apparent anomalies, the failure of /ɔ:/ to show a light variant, and Carr (1992) and Anderson (1994: §5) for a discussion of the status of other such vowels.

9 The formulations in (34) involve a re-interpretation of the distinction drawn by Anderson (1993, 1994) between 'inherent length' or 'tenseness' and 'prosodic length' as one involving (in)transitivity vs. length/weight. This makes it even clearer that synchronically the 'Scottish vowel-length rule' involves neither lengthening nor shortening (cf. Carr 1992) – unsurprisingly, given that length is not contrastive.

10 We also find the transitive vowels before a consonant or obstruent-sonorant cluster plus the minor-system vowel schwa (Durand 1976):

- (i) a. [ɛ] *guerre*, [œ] *pleure*, [ɔ] *rose*  
 b. [ɛ] *mettre*, [œ] *neutre*, [ɔ] *socle*

This makes sense if the schwa, belonging to the same foot as the preceding vowel and dependent on that vowel, shares its the consonant following that vowel with its governor, as [(gɛ(r)ə)], for instance (see Durand 1990: §6.1.9), so the first vowel is transitive. In French vowels other than schwa do not form a foot with a preceding syllable. (We return to ambisyllabicity in general in §§2.1&2.3.)

In Standard French all vowels are transitive or intransitive, thus indifferent to transitivity, and so perhaps interpretable as simply adjunct-taking. Transitivity ('la loi de position'), however, has a morphological role, as illustrated by pairs such as those in (ii):

- (ii) a. [e] *céder* (intransitive) vs. [ɛ] *cède* (transitive), *léger* (intrans) vs. *légère* (trans)  
 b. [ø] *peut* (intrans) vs. [œ] *peuvent* (trans), *veut* vs. *veulent*, *oeufs* vs. *oeuf*  
 c. [ɔ] *galop* (intrans) vs. [ɔ̃] *galope*, *sot* vs. *sotte*, *idiot* vs. *idiote*

(Aurnague & Durand forthcoming: §3).

11 I have assumed with Anderson (2001a) that the semi-vowels are variants of the corresponding vowels. If they were to be given a contrastive status, then second-order dependencies would have to be introduced, to allow discrimination among semi-vowels, laterals and rhotics. The metric carries over to such more complex categorisations, involving second-order dependencies, as exemplified by the first two of those in (i), which refine upon the class of liquids:

- (i) a. semi-vowels     $\{V;(V;C)\} = 3V:1(3V:1C) = 12V:4(3V:1C) = 15V:1C$   
 b. rhotics         $\{(V;C);V\} = 3(3V:1C):1V = (9V:3C):1V = 10V:3C$   
 c. laterals        $\{|V;C|\} = 3V:1C$

Semi-vowels, rhotics and laterals are ranked by the metric in order between vowels and fricatives.

In Anderson (1994: 12 (29)) /l/ is distinguished from the other sonorant consonants by the secondary (articulatory) feature of laterality. This seems to me an aberration, given, on the one hand, the limited currency of this feature and, on the other, the basic role of the categorial specification in determining sequence in the syllable. Likewise the categorisation for nasals given here obviates appeal to nasality as such.

12 The representation for rhotics also involves elements in simple combination  $\{(V;C),V\}$ . But, unlike with nasals and voiced fricatives, the same feature is dominant in both parts of the combination. Compare:

- (i) a. rhotics         $\{(V;C),V\}$   
 b. nasals         $\{(V;C),C\}$   
 c. v'd frics      $\{(V.C),V\}$

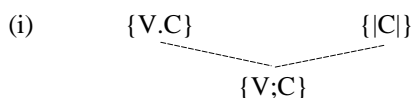
And rhotics thus involve a different kind of complexity, reflected perhaps in analyses of 'rhotic' varieties of English (such as that in Giegerich (1999: ch.7) whereby [r] and a vowel alternate as realisations of the same contrastive unit.

If we exchange the V and C tokens in (i.c) we get a suitable representation for voiceless affricates, that in (ii.a), with that in (b) for their voiced congeners:

- (ii) a. v'less affricates  $\{(V.C),C\}$   
 b. v'd affricates     $\{(V.C),C;V\}$

They combine stop and fricative specifications, which are necessarily sequenced segment-internally, with the simpler component, and presumably segment-internal head, first.

13 We might too interpret the spelling *stemfne* for *stefne* ‘voice’ (in a couple of Trinity College, Cambridge mss., M and 70) as an attempt to represent an intermediate stage in the assimilation manifested elsewhere as *stemne* (see e.g. Campbell 1959: §484), a stage at which the nasality component but not the stopness has spread to the preceding segment:



This again would reflect the relative independence of the two components of nasal stops, which are not connected by or in contrast with a dependency relation, and so may fail to coincide.

14 Hind interprets her account as leading to the conclusion that ‘fast sequences are in fact monosyllables’ (1997: 297); and he comments: ‘the fact that fast sequences are accented more like monosyllables than like bisyllables is not surprising if Steriade’s interpretation is correct, nor is the shorter duration of fast sequences compared to ordinary CVCV sequences’ (Hind 1997: 293). I return shortly to the question of accent.

15 The accent in diphthongs is realised on the more sonorous element, whether initial or final; thus (i):

- (i) a. hakeweákšə̀nə̀ ‘he is entering’  
b. hit’et’éire ‘they speak’

(Miner 1979: 29).

16 We also find, for instance, the contradictory accents (whatever else) respectively assigned in (i):

- (i) a. wikiripáras ‘cockroach’ (Miner)  
b. wakiriparàs ‘flat bug’ (Halle & Vergnaud)

But the latter seems to be simply a mistake. Some other discrepancies are acknowledged by Hale & White Eagle (1980: 117, fn.3); and on the same page they concede ‘our analysis must be taken as highly tentative, since there are residual problems’. What I say here is thus ‘tentative’ to a yet higher degree.

17 Hind (1997: §5.3), basing his account largely on some observations of Borgström (1941) and Oftedal (1956), suggests that at least in some dialects of Scottish Gaelic we find similar phenomena, but exhibited by non-initial clusters, as in (i):

- (i) a. borb ‘savage’ [bɔrɔb]  
b. arm ‘army’ [aram]  
c. dorcha ‘dark’ [dɔrɔxə]  
d. fearg ‘anger’ [fɛrag]

Often, the ‘second, epenthetic vowel’ is simply a ‘copy’ of the other, as in (i.a-c), and even when not, as in (d), such a ‘vowel’ is not restricted to the small set associated with unaccented vowels (like the last in (c)) in these dialects. Moreover, the tonal structure of such ‘epenthetic’ forms is unlike that of disyllabic items.

Jones (1989: §3.4.6) presents a range of Middle English spellings such as those in (ii) suggestive of similar developments:

- (ii) a. þuruh, þoruȝ ‘through’ (Old English *þurh*)
- b. arum, arome ‘arm’
- c. nyhyt ‘night’

In the case of *through* and some other forms this results in ‘metathesis’. Jones (1989: §4.3.1) points to the continuation of such developments into the modern period.

18 Anderson (in press a) also cites such pre-prepositionals as *right* in *right to the end* as what is called there ‘prototypical specifiers’. It too conforms to the requirements presented in the text: it belongs to a small class characteristic of the category that it adjoins to, and it selects only a subclass as viable heads. Roughly, *right* seems to be limited to semantically ‘dimensional’ prepositions, either because they describe a trajectory, as in (i.a), or they and their complements introduce a space, as in (i.b):

- (i) a. right from the start, right to the door
- b. right in the middle, right on the hour, right at the door

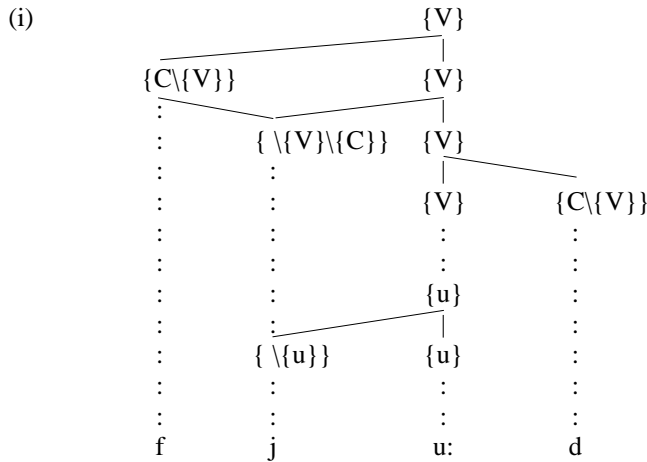
The ‘non-dimensional’ prepositions in (ii) reject *right*:

- (ii) \*right at Richmond, \*right at 5 (o’clock)

19 The secondary categories in the phonology can also be characterised in terms of varying preponderances of a set of features (cf. e.g. Anderson & Ewen 1987: ch.6). And Böhm (1993: §5.4, 1994) argues that the secondary features of the functor category in the syntax (which category is again discussed in §3 below) combine in such a way.

20 The distinction that I am terming ‘attributive’ versus ‘circumstantial’ has been discussed in a number of places under various guises (see e.g. Bolinger 1967, Kamp 1975 and Siegel 1980). My treatment of it here is necessarily rather brief (given the scope of the present discussion), but not inconsistent, I think, with what has emerged from the literature.

21 Anderson (in press a: §4) also suggests that a specifier may not be associated with all the primary syntactic categories. Above, we have also, in regard to the phonology of English, associated a specifier only with {|C|} (and not with, say, {|V|}). However, if we adopt a suggestion made in Anderson (1988b), partly based on some speech-error data, it may be that we should recognise for English at least a segment-internal specifier in the form of the /j/ in (i):



(I have omitted in (i) non-essential categorial information.) /j/ here is ambivalent: it is an adjunct as a primary category to /f/ and to the syllable centre, but as a secondary category it specifies /u:/. As a specifier, it selects to modify a vowel of a particular quality, of a particular secondary category, and as such it belongs to a small, indeed unique, class.

22 The discussion of *h*-sequencing here simplifies the situation somewhat: see again Anderson (1986a, 2001a) for a consideration of morphological and other complications ignored here

23 For reasons discussed by Anderson (1997a: §§3.3.2, 3.7.2), existentials commonly lack assignment of a grammatical relation. Note for instance the absence of the ‘topic/focus’ marker in the Tagalog existential in (i.a) vs. its presence in the ‘non-existential’(b):

- (i) a. May aksidente Kagabi  
there-was accident last-night
- b. Dadalhin ni Rosa ang pera kay Juan  
Will-take by Rosa T/F money to John
- (T/F = ‘topic/focus’.)

24 Also clausal are standard instances of interrogation and negation. This is particularly transparent in systems with ‘spreading’ or ‘multiple’ or ‘double’ negation (cf. e.g. Jespersen 1917, Austin 1984). Consider the well-known example from the Alfredian translation of (of the Orpheus and Euridice episode in) Boethius’s *De consolazione philosophiae* in (i):

- (i) Nan heort ne onscunode nænne leon ne nan hara nænne  
hund,  
no hart not feared no lion nor no hare no  
hound,  
ne nan neat nyste nænne andan ne nænne ege to oðrum  
nor no animal knew no malice nor no fear to other

(‘No hart was afraid of any lion nor any hare of any hound, nor did any animal know any malice or any fear for another.’)

The clausal negation feature is manifested as *ne* in Old English in the specifier position of the verb of the clause, but it may also be manifested in other eligible places, such as in noun phrases which are neither definite nor indefinite and in the alternative coordinator, as shown extensively in (i).

But in systems which reject ‘spreading’ negation the negative still licences the occurrence of ‘neither-definite-nor-indefinite’ determiners, such as the *any* in the glosses to (i), and they may act as alternative hosts for the manifestation of the extrasegmental negative feature, as illustrated by (ii.a) vs. (b):

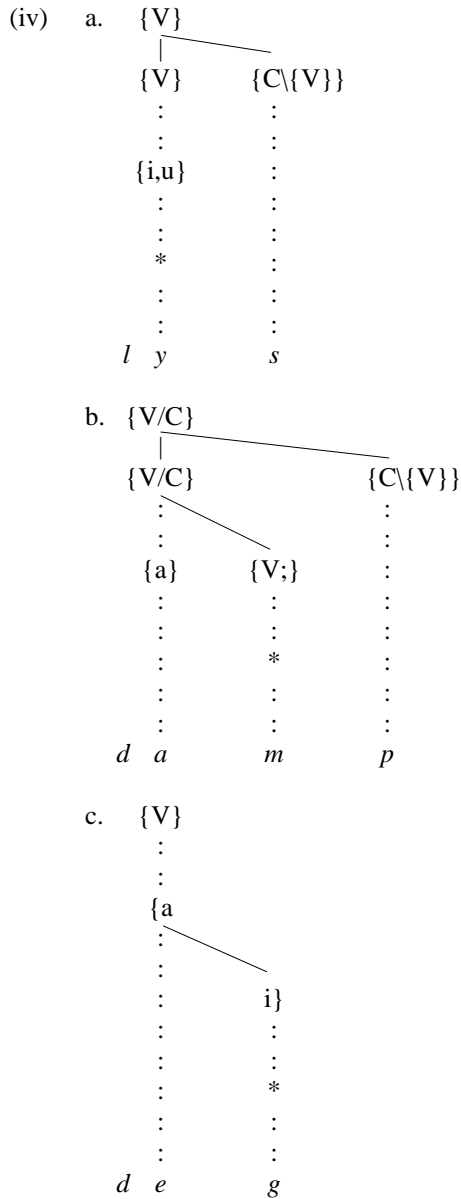
- (ii) a. Fred saw no-one  
 b. Fred didn’t see anyone  
 c. No-one saw Fred (= \*Anyone didn’t see Fred)

And there is no alternative manifestation equivalent to (ii.b) for (ii.c). And this phenomenon of alternative loci for the manifestation of an element again has an analogue in the phonology.

Consider, for example, the manifestation of the Danish ‘stød’. Stød is a property of certain words in Danish which is manifested as creaky voice. The location of stød is always within the rhyme of a stressed syllable, but its location in the rhyme depends on the structure of the rhyme. Thus we find the possibilities shown in (iii), where ‘\*’ marks the location of stød:

- (iii) a. lys ‘light’, kø ‘queue’  
           \*                                  \*  
 b. damp ‘steam’  
           \*  
 c. deg ‘day’  
           \*

In words whose stressed vowel is intransitive the stød coincides with that vowel, as in (iii.a); with transitive stressed vowels stød coincides with the complement, which must be sonorant (have a preponderance of **V**), as in (iii.b). So that we can say that stød coincides with either an intransitive vowel or a dependent sonorant. With diphthongs both conditions are fulfilled, as shown in (iv.c), with (iv.a) and (b) illustrating the other rhyme structures:



The diphthong in (iv.c) is intransitive, but it contains an element, **i**, associated with sonorance which is a complement of **a**: recall the discussion of (33) above. Some speakers also show further variation with words where the rhyme consists of two sonorant consonants, such as *jarl* ‘earl’, such that the *stød* may be associated with either sonorant, the complement or the adjunct. In this case *stød* may be said to be associated not just with a complement but any rhymal dependent of the stressed vowel. In general, we have, as with distribution of the negative feature, alternative loci for an extrasegmental/clausal element.

I do not attempt here to provide a categorial characterisation for *stød*, which is not germane to our present purposes. For more details on this and other aspects, see particularly Staun (1987), who also provides a review of other accounts, including (of most rele-



vance here) those in Clements & Keyser (1983), Anderson et al. (1985: §3) and Anderson (1987: §3). I differ from his account (and follow Anderson 1987) in not associating *stød* with particular segments lexically, the ‘*stød* basis’: this association is not contrastive, but reflects a phonological redundancy, and so should not be incorporated into lexical representations.

25 This brief account of an analysis of Turkish vowel harmony omits of course some important details. We should note, for instance, the existence of such a suffix as is illustrated by the progressive in (i), which is both not fully unspecified and which introduces a new roundness/gravity domain:

- (i) a. *isini-jorum* ‘warming-I am’  
 b. *soru-jorum* ‘asking-I am’  
 c. *geli-jorum* ‘coming-I am’  
 d. *gyly-jorum* ‘laughing-I am’

In (i.a) the base does not show gravity; it is a property of the affix, whose first vowel is, segmentally, {a, }. In (i.b) both the base and the affix show gravity, but presumably independently. (i.c-d) show that this affix blocks further ‘spread’ of the acuteness extrasegmental of the base; they differ in that the base in (d) is grave, while that in (c) is not. This affix thus introduces a new domain as far as both extrasegmentals are concerned.

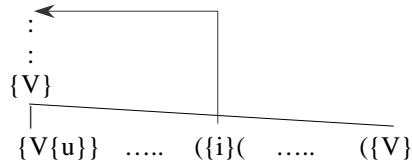
26 The examples in (95), which include only ‘short’ monophthongal vowels, are from Lass & Anderson (1975: ch.IV, §2) and Hogg (1992: ch.5, §VI; for more traditional accounts see Brunner (1965: 95-107), Campbell (1959: 190-204); for a succinct overview see Lass (1994: §3.8). I return to some questions raised by the ‘long’ monophthongs in note 27, as well as, in §2.5, to the pre-nasal short-vowel system.

27 Umlaut of the ‘long’ vowels differs in that the ‘long’ vowel which when unumlauted is spelled *æ* in West Saxon does not undergo it: West Saxon *dæd* ‘deed’, *mære* ‘famous’. This vowel seems to be absent from the inventory of the Anglian dialects, where West Saxon *dæd*, for instance, is spelled *ded*; the Anglian vowel contains {i, } contrastively, and also fails to undergo *i*-umlaut as a consequence of this. This anomaly can be resolved if we adopt Colman’s (2003) suggestion concerning the differences between the ‘long’ and ‘short’ vowel systems.

She argues that the ‘long’ low vowel equivalent to ‘short’ {a} has not developed as such as this point, but remains diphthongal (its ancestor is Germanic /ai/). In this case, the ‘long’ monophthong system is different from the ‘short’, in lacking the ‘long’ low vowel, as shown in (i.a), underspecified, and (b), fully specified.

- (i) a. {i} ‘i’                      {u} ‘u’  
       {i, } ‘e’                    {u, } ‘o’  
                                       { , } ‘æ’
- b. {i} ‘i’                      {u} ‘u’  
       {i;a} ‘e’                    {u;a} ‘o’  
       {a;i} ‘æ’

The system in (i.a) lacks a vowel with a. We can therefore simplify the requirements of *i*-umlaut, as formulated in (96), as in (ii):

(ii) *Pre-OE i-umlaut: Long monophthongs*

That is, we can restrict it to affecting just vowels with u; (96) applies only if the (under-specified) system shows a vowel containing a. In this way the vowel in West Saxon *daed* etc. will not be affected, but only {u} and {u, }. Otherwise, *i-umlaut* and the defaults in (98) apply as with the ‘short’ system.

28 The status of this particular proposed general non-specification remains doubtful. For instance, Heijkoop’s (1997) data from earlier acquirers of Dutch suggest that, in their case, at least, acquisition of ‘consonant place’ is not based on coronal underspecification.

29 However, non-pasts subordinate to predicators of volition/intention have imposed on them a future, or at least non-actual, interpretation, which is unmarkedly perfective, as with pasts. As with pasts, in English the progressive is overtly specified (*I want to be sitting on the beach*). In Greek it is again an imperfect that is specified, as in (i.a), which can be interpreted as habitual or progressive:

- |     |    |                                   |              |
|-----|----|-----------------------------------|--------------|
| (i) | a. | θelo na kaθome- <i>imp</i>        | stin paralia |
|     |    | I-want that I-sit                 | on-the beach |
|     | b. | θelo na kaθiso/katso- <i>perf</i> | stin paralia |
|     |    | I-want that I-sit                 | on-the beach |

(i.b) is interpreted as (the unmarked) punctual. We find the same contrast in Greek when the non-past verb is combined with the marker of futurity, *θα*.

The brief treatment of English and Greek given here ignores, of course, various aspectual distinctions found in these and other languages (as is evident from such surveys as Comrie 1976, Dahl 1985, Chung & Timberlake 1986: §2). But it seems to be generally applicable to shared sub-parts of these different systems.

30 I do not pursue here the debate aroused by Carstairs-McCarthy’s proposals. For one thing, I do not subscribe to the view espoused by both sides of the debate that it is desirable or necessary to envisage a formally detailed autonomous linguistic faculty whose evolution is the subject of dispute (cf. e.g. Anderson in press a). For some criticisms from a Chomskyan perspective, see Bickerton 2000, Newmeyer 2000, Tallerman (in press).

31 Of course, I do not entertain the suggestion that all languages have the same basic word order: this would entail massive structural mutilations as part of the description of particular languages, as well as being quite unmotivated.

32 One consequence of this stipulation concerning ‘[Spec,IP]’ is that a different conclusion from that she intends should be drawn from Tallerman’s (in press: §4) argument against treating onsets as parallel to specifiers, based on the statement that ‘the onsets of phrases in general are filled only optionally’. If this is the case, and if syllabic onsets are thereby excluded as specifiers, then so are subjects. This is unsurprising: the idea that

clauses and phrases are structurally analogous is fallacious, as I have argued elsewhere (Anderson in press a: §4).

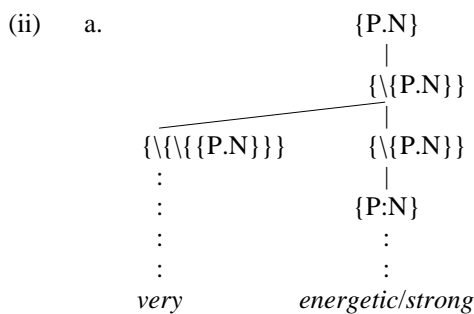
33 This account of the syntax of the definite article differs in one crucial respect from that suggested in Anderson (in press b, in preparation): there the definite article is analysed as a member of the class of determinatives, which also includes the elements that I have grouped here as individuators; the definite article takes other determinatives as its complement, on that analysis. I do not attempt here to provide a fully specified alternative to that analysis, but, given the incompleteness of the present discussion, and thus the possibility of misunderstanding, I go on to try to clarify here further points the two accounts have in common.

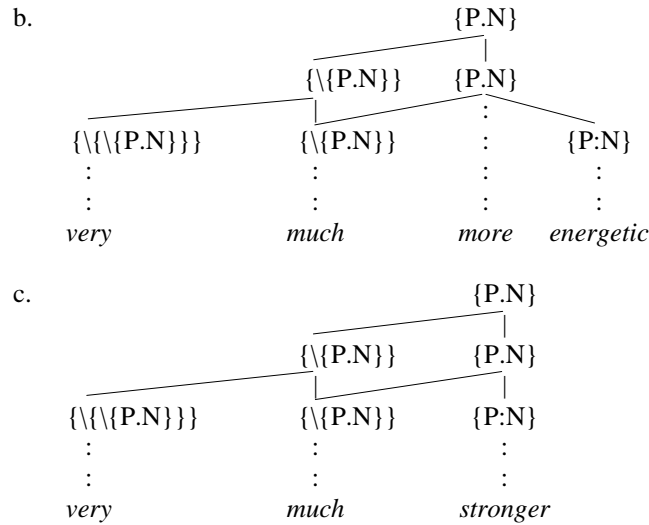
34 It differs from the adjective in its specifier, though its specifier may be specified by the adjectival specifier, it would appear from the examples in (i):

- (i) a. Bob is (very) energetic/strong  
 b. Bob is ((very) much) more energetic  
 c. Bob is ((very) much) stronger

The apparent presence of both an adjective and a comparator specifier, in English at least, raises some questions concerning the distribution of specifiers. For, though a case can be made for specification of functors, individuators and comparators, the only lexical category that seems to take a specifier in the restricted sense adopted here is the adjective. Let us therefore reconsider the status of *very*, often taken, as specifier of the adjective, as a paradigm case.

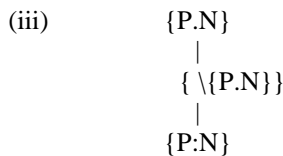
On the assumptions I have been making so far, *very* is both specifier of the adjective,  $\{\{P:N\}\}$ , as in (i.a), and specifier of the comparator specifier,  $\{\{\{\{P:N\}\}\}\}$ , as in (i.b). This is a rather curious distribution. Say we take the hint offered by the other lexical categories, and deny adjectival specifier status to *very*. *Very* is a specifier of a comparator specifier. This means that as well as specifying the specifier of an independent or morphologically-expressed comparator, as in (i.b/c), it must specify an incorporated specifier in (i.a). Gradable adjectives incorporate a specifier, of the character of *much*, so that we might represent (i) as in (ii):





This means that the positive degree of gradable adjectives incorporates a comparator and a specifier that is the equivalent of *much*: to be *energetic/strong* is to have ‘much energy/strength’ – or, more analytically still: to be *energetic/strong* is to have ‘much intensity of energy/strength’. The comparative degree does not incorporate *much*, though it can take it as an independent specifier. Both the comparative degree and the positive, as well as the comparative of equality (*Bob is as energetic/strong as John*), are then associated with a comparator, a marker of intensity, and the positive also incorporates a specifier of the comparator, which is what *very* specifies.

If indeed gradable adjectives are represented as in (iii), then there is no adjectival specifier as such, only specifiers of comparators or specifiers of specifiers:



In that case, perhaps there are no specifiers of lexical categories. And, if that is the case, the apparent absence of a specifier of finiteness may indicate, whatever else, a further analogy. I remarked in note 23 of the absence of a specifier for vowels; at most there is perhaps a segment-internal one. It is, then, perhaps significant that it is **P** and **V**, analogical features in terms of their relational centrality, that lack specification when they uniquely define a category

35 This brief account of the status of vowels in Kabardian, based on Kuipers (1960) and Anderson (1991), ignores various related factors discussed in some detail in these places, some of which are controversial, as I shall indicate in what follows. Other omissions are less important.

I have omitted consideration of the ‘half-rounded’ vowel variants found after unlabialised and before labialised consonants. Also, as well as there being a set of ‘plain’ uvulars, such as the voiceless plosive [q] (or the corresponding ejective in (142.b)), Kabardian also has a set of labialised congeners, such as [q<sup>o</sup>], whose role in the pattern of

vowel variation is unclear to me. More importantly, I have ignored the third vowel (to those in (141)) that is sometimes argued to be contrastive in Kabardian.

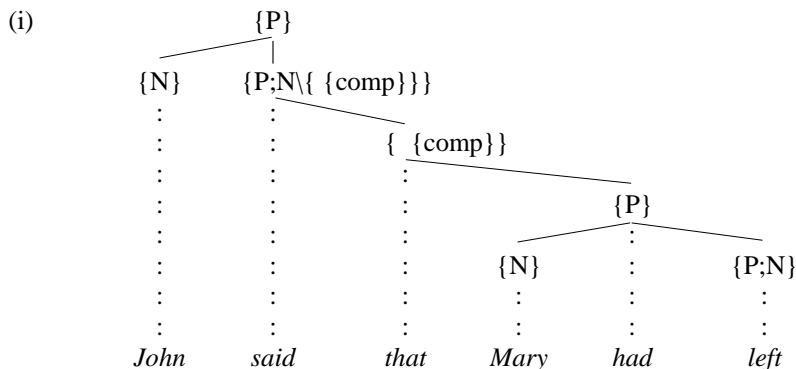
This vowel, along with other long vowel manifestations, is argued by both Kuipers (1960) and Halle (1970) to be a manifestation of a vowel (in the notation used here, { } or {a}) plus laryngal sequence. Thus, in the case of these other long vowels we find the alternations in (i):

- (i) [i:] ~ [əj], [e:] ~ [aj], [əw] ~ [u:], [o:] ~ [aw]

The long vowels manifest mutual contamination by the two elements in the other variant, though in the case of [əj] and [əw] the first element has no content with which to contaminate the other. Kuipers analyses [a:] as a variant of either [ah], parallel to what we find in (i) (except that [h] is neither acute nor grave, and therefore has no content with which to contaminate the other element) or [ha] (which occurs as such a sequence only post-accentually). I have presupposed some such analysis here – though the status of this last vowel, in particular, including its ‘length’, is a matter of dispute (see, on this and related controversies, e.g. Trubetzkoy 1925, Szereményi 1967, Kuipers 1968, Catford 1977, Comrie 1981: 206-7, Wood 1991).

36 This minor manifestation of recursion in the phonology intrudes exactly where the phonology is directly responsive to the requirements of the semantic interface, in the area of intonation, where the ‘double-articulation’ of language breaks down. The significance of this clearly deserves investigation.

37 If we analyse the complementiser as a kind of functional category, as has been common of late, then we move even further from direct recursion, as evidenced by (i):



In (i) I have analysed the complementiser as a kind of functor that takes a predicational argument. However, though a functoral analysis of subordinating conjunctions seems to me to be entirely appropriate, as is evident from what follows, sentential complementisers in English conform much more readily to the pattern of specifiers.

Unlike conjunctions, *that* does not participate in the argument structure of the clause it initiates. Compare the *when* in (ii) with the complementiser in (iii):

- (ii) a. I don't know when he arrived  
 b. When he arrived is a secret  
 c. When he arrived, Mary left

- (iii) a. I don't know (that) he arrived  
 b. That he arrived is a secret  
 c. \* That he arrived, Mary left

In all of (ii) *when* bears a circumstantial relation to the verb it precedes. Even the *wh*-form in the clausal question in (iv) forms part of the coordinative structure in which is involved the clause it begins:

- (iv) a. I don't know whether (or not) he arrived (or not)  
 b. Whether he arrived (or not) is a secret  
 c. Whether he arrived or not, Mary left

This of course merely supports differentiating between such *wh*-forms and complementisers. However, whereas the form in (ii/iv) can introduce a clause that is itself circumstantial, as exemplified by (c), (iii.c) is ungrammatical. *That* neither determines the function of an element within the clause it initiates or the function of that clause itself. In this latter respect comp is crucially unlike (other) functional categories.

Functional categories licence the occurrence of their complements: individuators licence nouns as arguments; functors licence arguments to perform particular semantic roles; the finiteness element licences a clause as an independent predication. *That* doesn't seem to licence a clause for anything. Rather it serves to mark a clause as not fulfilling the function of an independent predication; and it does that optionally. Thus the *that* in (iii.a) may simply be omitted. Other factors may supervene: for instance, the initial *that* in (iii.b) must be present for reasons of transparency of parsing: in the absence of *that* in (ii.b) *he arrived* leads us down a 'garden path'. This cognitively-based requirement has apparently been denaturalised (grammaticalised). It applies for some speakers also to finite clauses apposed to the subject, exemplified by (v.a):

- (v) a. The idea \*(that) Bill should resign is unappealing  
 b. Who made the suggestion?(that) Bill should resign

(v.b) seems to be a little more generally acceptable, though, like (ii.b), it also involves 'garden-pathing'.

In earlier English, conjunctions and complementisers could co-occur (*when that ...*, etc. – see e.g. Onions (1904: §47, Fischer 1992: §4.6.3), and a few fossils remain (*so that*, *in order that* – Poutsma 1926: ch.LXI, §6); and Radford (1988: §9.10), for instance, notes a few recent examples of *wh*-forms preceding *that*. But in general *that* is now used to mark a subordinate finite only in the absence of other markers, and often not even then (except in the interests of parsing efficiency). Such earlier constructions might, however, encourage the suggestion (along the lines of the familiar tradition described in e.g. Radford 1998: Haegeman & Guéron 1999: ch.2, §1.1.2) that (at least some) such subordinating conjunctions specify the functional category comp (or 'C'), if comp is indeed interpreted as such. These would constitute curious specifiers, however: they are not closed-class (*Whatever time of day he arrived, they were out*, etc.), and they now for the most part only specify comp when it is empty. These objections apply to such a treatment of *wh*-forms in general; and the first of them also applies to the treatment of subjects as specifiers: see further §3.3. The proposal emanating from Chomsky (1986: §2) that *wh*-phrases move to specifier-of-comp position destroys any coherence the notion specifier might have. I shall suggest in §3.3 an analysis which is more in line with the earlier notion that *wh*-forms occupy a position in a projection of {P} ('S-bar').

Advocates of the comp-as-functional-category approach make great play with the mutual incompatibility in pre-predicational position of comp and of the auxiliary in interrogative sentences and the like:

- (vi) a. Will Bill meet George?  
b. May says that Bill will meet George

The auxiliary is said to occupy an empty comp position. But the comp position is also empty in (vii):

- (vii) a. Bill will meet George  
b. May says Bill will meet George

Why can't or doesn't the auxiliary occupy this empty position here? The answer, according to Chomsky (1995: 289), lies in some mystical property of 'strength of features':

For English, Q [the feature associated with the comp of interrogative clauses] is strong. Therefore, when Q is introduced into the derivation, its strong feature must be eliminated by insertion of  $F_Q$  in its checking domain before Q is embedded in any distinct configuration ...  $F_Q$  may enter the checking domain by Merge or Move, by substitution or adjunction.

A rather less arcane scenario presents itself, however. *That* and 'inversion' are mutually exclusive because *that* is a specifier of subordinate finites (and so, of course, doesn't occur in main clauses) and 'inversion' in subordinate questions is unnecessary because the interrogative clause is governed by a predicator of interrogation or, more generally, incertitude, as well as by an initial interrogative form in all cases, and signalling its status by 'inversion' is unnecessary. Radford virtually concedes the first part of this when he admits that 'complementizers can't be used to fill COMP in main clauses' (1998: 219): this is because complementisers are specifiers of subordinate finites – and there is indeed no 'COMP' in main clauses.

This is not the place to pursue further problems raised by Chomsky's proposal, or the variant which invokes (possibly null) interrogative operators. I permit myself one final observation. Radford (1998: 295) points to the existence of familiar Shakespearean examples such as that in (viii), with initial *whether* in a main-clause question:

- (viii) Whether had you rather lead mine eyes or eye your master's heels?  
(*Merry Wives of Windsor*, III.ii)

And he goes on to suggest that 'given the null-operator analysis, we could posit that root yes-no have essentially the same syntax as in Early Modern English, save that they could be introduced by the overt operator *whether* in Early Modern English, but are introduced by a covert operator *Op* in present-day English'. This rather underlines the fact that, given the equivalence of *Op* and *whether*, we have the same set of initial operator elements in both main and subordinate questions (except that in subordinates we can have the 'complementiser' *if*, as an alternative to *whether* + comp). If both main and subordinate questions can be introduced by operator specifier + empty comp, why is there, after all, 'inversion' only in main clauses?

Invocation of earlier uses of *whether* also introduces a range of questions concerning its status and development, and those of 'inversion', none of which seem to have obvious

answers within the Chomskyan framework. Particularly, though we do find examples like (ix.a) in Old English, with initial *hwæðer* and ‘inversion’, parallel, apparently, to later (viii), this is exceptional, and normally there is no ‘inversion’ and the verb is subjunctive, as in (ix.b):

- (ix) a. Hweðer geleornodest þu, þe myd þam eagum, þe mid þam ingeþance?  
 Whether learned you either with the eyes or with the mind  
 (Did you learn with your eyes or with your mind?)  
 (*Soliloquies of Augustine*, 22.3)
- b. Hwæðer ic mote lybban oðpæt ic hine geseo?  
 Whether I am-allowed-*subj* to-live until I him see  
 (May I remain alive until I see him?)  
 (*Ælfric’s Homilies*, i.136.30)

(See Mitchell 1985: §§1873, 1656, for these and other examples.) The ‘inverted’ word order and declarativeness that we find with *hwæðer* in (ix.a), on the other hand, are usually associated with questioning of an argument rather than the clause, as illustrated in (x):

- (x) Hweðer ðincð þe þonne betre, þe ðæt soð þe seo soðfestnes?  
 Which think-*decl* you then better either the truth or the sincerity  
 (Which do you think better, truth or sincerity?)

(Mitchell 1985: §1662).

38 Though, as Noonan claims, ‘all languages have some sort of sentence-like complement type’ (1985: 49), the elements that introduce even ‘sentence-like’ complements, conventionally grouped as ‘complementisers’, ‘typically derive historically from pronouns, conjunctions, adpositions or case markers’ (Noonan 1985: 47), i.e. elements associated with nominal constructions. Could it be, after all, that the basic template for the clause resembles that for the syllable in at least this respect: the centre of the clause is ‘verbal’, as the centre of the syllable is vocalic; non-central elements are interpreted as non-verbal, just as non-central elements in the syllable are non-vocalic?

39 And this is consistent with the subject also being a complement, in that even when no (other) complement or adjunct is present, the finite clause is postposed:

- (i) students who work

It is unnecessary to invoke finiteness here as a separate factor determining modifier position.



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