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READINGS IN AXIOMATIC FUNCTIONALISM III

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CONTENTS

Issue Sixteen

http://www.phil.muni.cz/linguistica/art/issues/issue-016.pdf

James Dickins

On the non-necessity of levels in phonology, grammar and 'abstract semantics'

http://www.phil.muni.cz/linguistica/art/dickins/dic-002.pdf
previously unpublished

Paul Rastall

What does it mean to say an entity "has a function" and which entities have functions?

http://www.phil.muni.cz/linguistica/art/rastall/ras-005.pdf
previously unpublished

James Dickins

Associative meaning and scalar implicature: a linguistic-semiotic account

http://www.phil.muni.cz/linguistica/art/dickins/dic-003.pdf
previously unpublished

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ON THE NON-NECESSITY OF LEVELS IN PHONOLOGY, GRAMMAR AND 'ABSTRACT SEMANTICS'[1] [*]

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Abstract. This paper argues that the abstract levels which are typically recognised in linguistics – whether within phonology (e.g. the levels of distinctive features, phonemics/phonematics, and phonotactics), grammar (e.g. morphology and syntax), or 'abstract semantics' – are unnecessary. Although such levels correspond to an intuitively plausible model of natural languages, even natural languages are not fully constructed in the way these levels suggest, while other semiotic systems may be organisationally extremely different from the situation implied by these levels. In order to provide elegant (simple) and intuitively reasonable accounts of the relevant facts of language linguistic theories need to be significantly modified.

'Translating' into the specific technical terms of extended axiomatic functionnalism, the theory which is the focus of this paper, this means that the levels of ontidics (cenidics/phonidics, logidics/lexidics, delidics), ontematics (cenematics/phonematics, logematics/lexematics, delematics), and ontotactics (cenotactics/phonotactics, logotactics/lexotactics, delotactics) which are currently recognised in the system ontology of the theory are unnecessary. The entire theory of extended axiomatic functionalism, as well as the descriptions which it yields, can be simplified and made more coherent by removing these as separate theoretical levels, and recognising that their proper significance is as generalizing labels for describing how some kinds of semiotic systems – and particularly natural languages – are at least partially organised.

Key words: level; linguistics; phonology; grammar; semantics

1. Introduction

The question of how many different levels are necessary for linguistic theory (and resultant analyses/descriptions) is one which applies to almost all approaches to linguistics. Since the arguments raised in this paper therefore have general relevance to linguistics – and to linguists of different theoretical persuasions – I have tried to keep the discussion in the main body of the text as generally comprehensible and as applicable to different approaches to linguistics as possible – notwithstanding that the specific theory which I make use of is axiomatic functionalism, and more precisely extended axiomatic functionalism (henceforth EAF; e.g. Dickins 1998), rather than standard axiomatic functionalism (henceforth SAF; e.g. Mulder 1989). So as not to overburden the reader with a mass of technical

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notions relating to EAF which might be confusing to those not well versed in the theory, I have not included a detailed account of EAF in the main body of this paper. For readers who are interested in pursuing the argument in technical detail, I have provided a detailed account of the relevant issues in EAF (with some reference also to SAF) in Appendix A to this paper. I will refer to the account in the Appendix A at relevant points in this paper. In the body of the text, I have also largely confined myself to a discussion of EAF. For readers who are interested in SAF, and in the relationship of EAF notions to those of SAF, I have at a number of points provided SAF-specific information in endnotes.

2. Types of relations at the abstract linguistic levels (system ontology)

It is useful to distinguish between two aspects of linguistics: Aspect 1, which deals with the analysis of abstract entities; and Aspect 2, which connects these abstract entities to features of the real world. Aspect 1 – the analysis of abstract entities – covers the traditional areas within phonology of the combination of distinctive features into phonemes (phonemics/phonematics) and the combination of phonemes into phonotagms (phonotactics). Within grammar, Aspect 1 covers the traditional areas of the combination of morphemes into words (morphology) and the combination of words into syntactic 'phrases' (syntax). Aspect 1 thus treats the building up of more complex elements from simpler elements, and ultimately from the most simple elements of the same type. In EAF, Aspect 1 is termed the 'system ontology'.[2] Aspect 2 – the connection of abstract entities to the real world – involves, with respect to phonology, the way in which phonological entities (phonemes, etc.) are related to the real sounds of languages, as analysed by phonetics. With respect to grammar, Aspect 2 involves the way in which the abstractions of grammar are related to real language utterances, e.g. the fact that English has one sentence 'He might quit' (considered as a grammatical abstraction, and distinct from other sentences with which it contrasts in various ways, such as 'He must quit, or 'You might quit, or 'Might he quit?'), but that this one sentence can be uttered a potentially unlimited number of times. With respect to semantics, Aspect 2 relates to the fact that 'cardiologist' meaning 'one who specializes in the study or treatment of the heart and its diseases' (Oxford English Dictionary) involves a single sense, but that this sense may be applied to (i.e. refer to) a potentially unlimited number of cardiologists in the real world. In EAF, Aspect 2 is termed the signum ontology.[3, 4] This paper focuses on Aspect 1, the building up of more complex abstract elements from simpler elements, and ultimately from the most simple elements of the same type.

Basing itself on fundamental set-theoretical and logical notions, axiomatic functionalism recognises only two relationships in Aspect 1 (the system ontology; for discussion, see Appendix A): non-ordered (unordered/simultaneous) relations and ordered relations. Unordered relations are illustrated by relations between the phonids (distinctive features) which make up a phoneme, e.g. the unordered set /alveolar, stop, voiced, emphatic/ making up the Sudanese Arabic phoneme /ḍ/ (in the analysis of Dickins 2007: 64). Ordered relations are illustrated by the relationship between *bait-u* '(the) house' and *l-jār-i* 'the neighbour' in lexotactics (roughly 'syntax', in traditional linguistic terms) in *bait-u l-jār-i* 'the house of the neighbour' in Standard Arabic. Here *bait-u* '(the) house' is the nucleus ('head') and *l-jār-i* 'the neighbour' is the peripheral element ('modifier') (in the analysis of Dickins 2013). This can be represented visually as:

bait-u ← *l-jār-i*

The arrow ← points from the peripheral element ('modifier') *l-jār-i* 'the neighbour' to the nucleus ('head') *bait-u* '(the) house'. In an abstract 'logical' sense, the peripheral element ('modifier') *l-jār-i* implies the nucleus ('head') *bait-u*. This relationship is known as *subordination*, and can be represented generalistically as A←B, i.e. B implies A (*or* A is implied by B). In *bait-u l-jār-i* 'the house of the neighbour', *l-jār-i* is subordinate to *bait-u*. (This sense of *subordination* is, of course, quite different from the sense it has elsewhere in linguistics, e.g. in the term 'clausal subordination'.)

As Mulder points out (Mulder 1989: 288) subordination, i.e. A←B (B implies A *or* A is implied by B), is logically only one of three possible kinds of ordering relation. The other two logical possibilities are:

A ↔ B	i.e. A implies B, and B implies A. Mulder terms this 'interordination'.
A←/→ B	i.e. A does not imply B, and B does not imply A (neither A nor B imply one another). Mulder terms this 'coordination'. (This sense of *coordination* is quite different from the sense it has elsewhere in linguistics, e.g. in the term 'clausal coordination'.)

Interordination and *coordination* are intriguing and attractive notions, with an apparent logical coherence which demands their inclusion in axiomatic-functionalist theory. I will not, however, consider them further in this paper. Here, I want, rather, to consider another notion within EAF ontotactics – where ontotactics means roughly 'phonotactics' and 'syntax', in traditional linguistic terms. 'Syntax' here covers, as separate areas of analysis, both the syntax of grammatical elements with form and content ('connotative syntax'), and the syntax of purely meaningful elements abstracted from any associated form ('denotative syntax'). The notion within EAF ontotatics which I want to cover, and which is central to the current argument is what is known technically as the ontotheme (i.e. the cenotheme/phonotheme in cenology/phonology; the logotheme/lexotheme in logology/lexology; and the delotheme in delology). All these notions will be explained in subsequent discussion in this paper. (See also Appendix A for detailed technical discussion of these terms in EAF.) As noted in Appendix A, an ontotheme involves non-ordered relations between two entities in ontotactics. Thus in phonology, a phonotheme involves non-ordered relations in phonotactics.

Non-ordered relations does not necessarily mean lack of sequencing in the real world (this is a matter of Aspect 2 above). Rather, it means that sequencing (of the realisations, e.g. the phonetic realisations) does not play a role in the overall function of the element; if it does not play such a role, then this sequencing does not reflect abstract ordering (in Aspect 1 above). One way of testing whether sequencing of phonetic realisations reflects abstract (e.g. phonological) ordering is to ask whether there is a possibility of alternative (e.g. phonetic) sequencings or not. If there is no such possibility, the realisational (e.g. phonetic) sequencing is non-functional – i.e. it is purely a matter of the way in which the non-ordered abstract entity (e.g. phonological entity) is 'presented' (realised) in the real world. At the more abstract level (e.g. the phonological level) there is no choice between different possibilities – i.e. no structural difference to be taken account of.

A crucial issue in deciding whether something is an ontotheme (phonotheme, etc.) or not, therefore, is whether there is the possibility of different sequencing of the entities in-

volved. Non-possibility of different sequencing indicates an ontotheme, e.g. a phonotheme (see also Appendix A, for a more technical discussion of this). All initial phoneme clusters in English are phonothemes. As Heselwood points out, "the sequence of phonemes in English initial clusters, it has often been remarked, is structurally fixed" (Heselwood 2008: 1). Thus, English has initial clusters such as 'tr-' as in 'tree', (but not *'rt-'), 'sl-' as in 'slip' (but not *'ls-'), 'gr-' as in 'great' (but not *'rg-'), 'sk-' as in 'skill' (but not *'ks-'), 'skr' as in 'scrap' (but not *'ksr-', *'krs-', *'rks', *'rsk-', or *'srk-'). This lack of more than one sequencing – i.e. lack of choice, or function, or functionality in sequencing – is indicative of lack of ordering at the abstract (phonological, and specifically phonotactic) level, function being "the criterion of linguistic reality" (Martinet 1962: 5): i.e. no choice implies no function, implies no linguistic reality (at the abstract level), implies no ordering in phonotactics, where no ordering (= non-ordering) equals simultaneity (i.e. occupation of a single phonotactic position). As Heselwood puts it, "It is argued within an axiomatic-functionalist framework that the constituent phonemes [in an English initial cluster] are functionally simultaneous [unordered/non-ordered] and occupy a single phonotactic position in a phonotagm" (Heselwood 2008: 1).

An example of a delotheme, in delology (roughly 'abstract semantics'), might be the '*al- bait-u*' entity resulting from the relationship between *al-* 'the' and *bait-u* 'house' in *al-bait-u* 'the house' in Standard Arabic. Or, to be more precise and correct, it might be the entity resulting from the relationship between the sense expressed by *al-* 'the' and the sense expressed by *bait-u* 'house' in Standard Arabic (delology or 'abstract semantics', of which delothemes are a part, being the relationship between entities which are entirely divorced from considerations of form; see Appendix A for a technical discussion). (For further discussion of this possible analysis of *al-bait-u*, see Dickins 2013, Section 5.)

Logically, it is possible to have an ontotheme consisting of a relationship between the following (for simplicity's sake, I will here consider only ontothemes consisting of two entities; they may consist of any number of entities):

1. Two entities which are both simple (i.e. which cannot themselves be further analysed).
2. Two entities, one of which is simple (cannot be further analysed) and one of which is complex (can be further analysed).
3. Two entities, both of which are complex.

Situation 3 (to take the above in reverse order) is illustrated by a phonotheme such as initial /st/ in English. Both the phoneme /s/ and the phoneme /t/ (cf. the analysis of Mulder 1989: 222) can be further analysed into unordered sets of phonids (distinctive features) in phonematics (English phonidics, of course, just consists of the phonids / distinctive features of English).

Situation 2 is illustrated by the initial phonotheme (initial cluster) /sl/ in English. According to Mulder's analysis (Mulder 1989: 222), /s/ can be further analysed into an unordered set of phonids (distinctive features), but /l/ cannot. (/l/ can be termed a *monophonidic* phoneme, this being a phoneme which comprises only a single distinctive feature; while /s/ can be termed a *poly-phonidic* phoneme, i.e. a phoneme which comprises more than one distinctive feature; additional, and more specific, terms like *bi-phonidic*, *triphonidic*, etc. could, of course, also be used.)

Situation 1, as pointed out by Aleš Bičan (who I thank for this example), is illustrated by the final phonotheme (final cluster) /jl/ in Czech (e.g. in *koktejl* 'cocktail'). Bičan analyses both /j/ and /l/ as consisting of a single distinctive feature – 'approximant' and 'lateral' respectively (Bičan 2013: 88), i.e. both /j/ and /l/ are mono-phonidic phonemes. Bičan does not interpret /jl/ as a phonotheme because the notion of phonotheme does not form part of SAF (the version of axiomatic functionalism which he is using). However, as he points out, final Czech is in EAF terms a phonotheme because the sequence of the phonemes is fixed: /lj/ is not found phonotagm-finally in Czech (phonotagm-initially, by contrast, /lj/ is found, as in the female proper name *Ljuba* – a girl's name, but not /jl/).

EAF (as currently constituted) makes a distinction between phonidics, phonematics and phonotactics.[5] Phonemes (i.e. units in phonematics) are defined as unordered sets of phonids (distinctive features). Therefore, just as the phoneme /s/ in English can be defined as a set whose members are the distinctive features /fricative/, /unvoiced/, /hissing/ (Mulder 1989: 222), so the phoneme /l/ in English (as already discussed above) can be defined as a set of the sole distinctive feature /l-ness/; i.e. English /l/ as a phoneme is a set comprising a single member /l-ness/ (Mulder 1989: 222).

Set-theoretically, this is fine: the distinction between a member of a set (e.g. 'l-ness') and a set comprising only a single member (e.g. the phoneme /l/) is fully accepted, such a set being termed a singleton (e.g. Stoll 1961: 5–6). Thus, there is no problem set-theoretically distinguishing between the set of African-American US presidents consisting of one member (up till now), Barack Obama, and the sole member of that set, Barack Obama. However, it does introduce into axiomatic functionalism a distinction which seems slightly artificial. This is because it introduces a complexity which is necessary for descriptive coherence, but where this descriptive coherence is clearly a function of analytical categories imposed by the theory, and where a modified version of the theory can easily be envisaged which would allow for a simpler description by not imposing such theoretical complexity. At a number of other points in this paper, I will identify other distinctions as similarly 'artificial'. In all cases, I mean that they involve theory-derived descriptive complexity which would appear to be easily eliminable via a modification to the theory. I will consider this question in more detail later (Section 4).

Further interesting oddities are thrown up by EAF as currently constituted.[6] Mulder's original conception of phonology and plerology (grammar) for axiomatic functionalism seems fairly clear. At the basic level of phonematics (though more basically still what is known in EAF as 'phonidics' – this section, above; see also Appendix A), phonologies of natural languages involve simple entities (phonids / distinctive features). These combine to produce unordered sets, which are phonemes. Phonemes then combine in ordered relations to produce phonotagms ('strings' of phonemes). This presents a common-sense picture of natural language: it is how natural languages seem to be. However, as seen, the possibility of both mono-phonidic phonemes (phonemes with only a single distinctive feature), and phonothemics – unordered sets in the otherwise ordered domain of phonotactics – makes even this picture less clear than it initially seems to be.

In EAF logology (lexology / connotative grammar) and delology ('abstract semantics'),[7] the picture is even less clear. There is no obvious 'primitive' layer of unordered relations (sets) as there is in phonology, the traditional notion of morphology notwithstanding. In many languages at least, unordered combinations (sets) of lexids/morphemes in EAF[8] do not pattern out

across wide areas of grammar (i.e. EAF lexology / connotative grammar[9]) in consistent combinations, as do distinctive features (phonids in natural language in EAF) in phonology.

Thus (to take three English adjectives):

real, sad, happy

unreal, unhappy *(but not* *unsad)
reality *(but not* *sadity, *happity)
sadden *(but not* *realen, *happyen)
etc.

The possible forms are synchronically (rather) arbitrary, and unlike in phonology, where combinatory patterning exists, it is clearly very partial. While phoneme tables for natural languages look rather elegant, because of the large-scale consistency of combinations throughout the phonematic sub-system, a lexeme table for English (and probably for all languages) would look extremely messy, reflecting the arbitrary and partial nature of lexid (morpheme) combinations.

Worse still, what looks like a part of lexematics (= morphology, in the specific technical sense in which this term is used in EAF) is often revealed on closer inspection to be a part of lexotactics (connotative syntax; see also Appendix A). An example is the *-n* suffix, known as *tanwīn* or 'nunation' in Standard Arabic, which I have argued elsewhere variously has the sense 'absolute' (in some cases) or 'absolute and indefinite' (in others) (Dickins 2013). *Tanwīn* is suffixed only to individual words, e.g. *bait-u-**n*** 'a house', and as such looks like a prototypical morphological feature. However, as I have tried to show (Dickins 2013), *tanwīn* commutes with other elements – most obviously following genitive nouns / noun phrases, which clearly stand in a lexotactic ((connotative) syntactic), rather than lexematic (morphological) relationship to the noun *bait-u* 'house'). By analogy, the relationship between *tanwīn '-n'* and *bait-u* 'house' in *bait-u-n* 'a house' is also lexotactic ((connotative) syntactic) rather than morphological.

In fact, a huge proportion of what is traditionally regarded as morphological (lexematic) in English and Arabic (and I believe, many other languages) is, in terms of an EAF analysis, lexotactic ((connotative) syntactic), the only 'morphological-type' aspect of the relationship between the two elements (lexids/morphemes, etc.) being their realization as a single phonological unit. The combination of realisational phonological unity with syntactic status in grammar (i.e. EAF lexology / connotative grammar) is, of course, well known, and exemplified in English by the genitive 'apostrophe -s'. Thus, in 'the lady with the cat's sister' (meaning 'the sister of the lady with the cat'), /kats/ is a single phonological entity, but the relationship between 'the lady with the cat' and genitive 'apostrophe -s' is clearly syntactic (lexotactic). The ontematic vs. ontotactic distinction begins to look rather artificial.

3. Ontothemics without ontotactics proper

In this section, I will consider an aspect of a 'quasi-language' – or what Rastall (2013) terms a 'small model language'. By 'quasi-language', I mean a made-up semiotic system

(of which only a fragment is, in fact, presented for consideration, and of which only a fragment in practice really exists) which is like a natural-language in important respects – in the case of the 'quasi-language' in this section, in respect of its being realised phonetically as speech sounds. It is important to be careful about terminology here. As Aleš Bičan has pointed out to me, while 'language' is often used as in everyday speech as a synonym of 'natural language', in axiomatic functionalism, 'language' is formally defined in another, separate sense.

In EAF, a 'language' (in this other separate technical sense) is defined as a 'semiotic system […] with double articulation […] with respect to both morphontics […] and semantics […]' (Dickins 2009: Def. 3c1), where 'double articulation is defined as 'both logotactics [lexotactics / (connotative) syntax] and cenotactics [phonotactics], or both logotactics [lexotactics / (connotative) syntax] and delotactics [(denotative) syntax]' (Dickins 2009: Def. 3c2) – this being read to include the possibility of semiotic systems which have all three of a logotactics (lexotactics / (connotative) syntax), cenotactics (phonotactics), and delotactics ((denotative) syntax). What this means is that a 'language' in this technical sense is any semiotic system which has ordered relations in logology (in natural language, lexology / (connotative) grammar), plus ordered relations either in cenology (in natural language, phonology), or delology ('abstract semantics') – or both cenology and delology.
A 'proper language' in EAF is formally defined as a 'semiotic system […] with a cenology [phonology] containing both a cenematics [phonematics] and a cenotactics [phonotactics], a delology (Def. 2c1a) containing both a delematics […] and a delotactics […], and a logology [lexology] containing both a logematics [lexematics] and a logotactics [lexotactics]' (Dickins 2009: Def. 3c2).[10] That is to say, a proper language has unordered and ordered relations in logology (in natural language, lexology / (connotative) grammar), plus unordered and ordered relations either in cenology (in natural language, phonology), or delology ('abstract semantics') – or both cenology and delology.

This formal definition of 'language' and 'proper language' is intended to make it possible to define as 'languages', and particularly as 'proper languages', both natural languages and other semiotic systems whose general organisational structure (in terms of having a double articulation, etc.) is as complex as that of natural languages. The intuitive similarity of all semiotic systems of this kind is thus given formal analysis, and highlighted through terminological identity (as Aleš Bičan has pointed out to me). Thus, "All natural languages known to date are proper languages, but not necessarily vice versa" (Dickins 2009: footnote to Def. 3c2).[11] Given that 'language' is a technical notion/term in EAF, it is sensible – to avoid confusion – to use the term 'quasi-language' for what I am considering here, ignoring issues of whether this 'quasi-language' is also a 'language' in the formally defined technical sense in EAF.

Quasi-languages are valid objects of enquiry in axiomatic functionalism. As a general semiotic as well as linguistic theory, axiomatic functionalism has to be able to deal with artificial language-like semiotic systems (quasi-languages) as well as natural languages, and partial aspects of quasi-languages can legitimately be used to test and investigate the theory (cf. also the discussion in Rastall 2013). I will subsequently in this paper use the stems *phon* and *lex* to describe features of quasi-languages as well as natural languages (thus somewhat extending the standard uses of *phon* and *lex*). The quasi-language which I will consider in this section has only the following possibilities in relation to phonology:

Table 1

1. [bə], [pə], [və], [fə], [də], [tə], [sə], [zə]
2. [zbə], [zpə], [sbə], [zbə], [zdə], [ztə], [sdə], [ztə]

In this quasi-language we can reasonably establish the following phonology:

Phonidics (list of phonids/distinctive features)
/labial/, /alveolar/, /voiced/, /voiceless/, /stop/, /fricative/

Phonematics (unordered combinations of phonids/distinctive features, presented here in the form of a phoneme table)

Table 2

	stop		fricative	
	voiced	unvoiced	voiced	unvoiced
labial	b	p	v	f
alveolar	d	t	z	s

'ə' in this phonology is not a phoneme – in fact it does not figure in the phonology at all, since it is predictable in all environments in which it occurs, and is therefore non-functional - function being "the criterion of linguistic reality" (Martinet 1962: 5). This means that if something which might be regarded as an abstract entity (e.g. as a phoneme) on the basis of real-world phenomena (i.e. Aspect 2 above) – in this case the presence of a phonetic [ə] – does not have any function of its own (e.g. there is simply fully predictable phonetic 'noise' in all instances, as in this example), it should not be regarded as an abstract entity (in this case a phoneme) in the first place.

Thus a real-world 'something' which is fully predictable in all contexts (in this case 'phonetic noise'; cf. Aspect 2 above, also Appendix A), does not correspond to an abstract anything, i.e. it corresponds to an abstract nothing (in this case phonological nothing; cf. Aspect 1 above, also Appendix A). This is analogous to the claim that made above that fully predictable real-world sequencing (e.g. phonetic sequencing in the case of English initial consonant clusters) does not correspond to an abstract anything, i.e. it corresponds to abstract nothing (in the case of English consonant clusters nothing in terms of phonotactic ordering, i.e. phonotactic non-ordering/simultaneity, i.e. a phonotheme).

The full statement of the phonematics (phonemes, as unordered sets of phonids / distinctive features) is thus:

/b/ = /stop, voiced, labial/
/p/ = /stop, unvoiced, labial/
/v/ = /fricative, voiced, labial/
/f/ = /stop, unvoiced, labial/
/d/ = /stop, voiced, alveolar/

/t/ = /stop, unvoiced, alveolar/
/z/ = /fricative, voiced, alveolar/
/s/ = /fricative, unvoiced, alveolar/

Phonotactics (ordered and/or unordered combinations of phonemes)

Since 'ə' not a phoneme (in fact not anything in the phonology), an adequate analysis seems to be to say that [bə], [pə], [və], [fə], [də], [tə], [sə] and [zə] in line 1 of Table 1 are phonologically simply /b/, /p/, /v/, /f/, /d/, /t/, /s/, and /z/, i.e. that they realize these single phonemes respectively. What, however, is to be done about the realisations in Table 1, line 2: i.e. [zbə], [zpə], [sbə], [zbə], [zdə], [ztə], [sdə], [ztə]? One possibility, as Aleš Bičan has pointed out to me, might be to say that [zbə], [zpə], [sbə], [zbə], [zdə], [ztə], [sdə], [stə] also realise a single phoneme each. We might represent these putative phonemes in a variety of ways. Partly to highlight the relative strangeness of these putative phonemes, I will adopt the following notation:

$/^{z}_{b}/$	realised as [zbə]
$/^{z}_{p}/$	realised as [zpə]
$/^{s}_{b}/$	realised as [sbə]
$/^{s}_{p}/$	realised as [spə]
$/^{z}_{d}/$	realised as [zdə]
$/^{z}_{t}/$	realised as [ztə]
$/^{s}_{d}/$	realised as [sdə]
$/^{s}_{t}/$	realised as [stə]

Although this notation retains a degree of sequencing – the fricative element occurs slightly to the left of (as well as higher up than) the stop element, it is intended to suggest that such sequencing is not the fundamental issue, and particular to suggest that we are not simply considering a standard phonotactic structure (as would normally be implied by the more standard notation /zb/, /zp/, /sb/, etc.).

The reason why one might regard $/^{z}_{b}/$, etc. as single phonemes is that there is no possibility of changing the order of the sounds (realisations) in question. Thus, one can have [zbə] but not [bzə], for example, or [sdə] but not [dsə]. While all the forms are realisationally sequenced – [z] before [b] in [zbə], [z] before [p] in [zpə], [s] before [b] in [sbə], etc. – there is no functional ordering, i.e. no phonological ordering. Phonological ordering would require the possibility of the realisational sequencing being changeable (e.g. that one could have not only [zbə] but also [bzə], not only [zpə] but also [pzə]) and this change of order making a difference to grammatical identity (signum identity), which in this case can be equated with word identity. The fact that there is no possibility in this quasi-language of different realisational sequencing (let alone such a difference making a difference to word identity) means that there is no phonological ordering.

If $/^{z}_{b}/$, $/^{z}_{p}/$, $/^{s}_{b}/$, $/^{s}_{p}/$, $/^{z}_{d}/$, $/^{z}_{t}/$, $/^{s}_{d}/$ and $/^{s}_{t}/$ are also single phonemes, what are their constituent distinctive features? The obvious solution would be to be say that if /z/ is /fricative, voiced, alveolar/ and /b/ is /stop, voiced, labial/, then $/^{z}_{b}/$ (realised as [zbə]) is /fricative, voiced, alveolar, stop, labial/, with the first three of these distinctive features, or phonids (/fricative/, /voiced/ and /alveolar/) being realised particularly as the [z] element in [zbə]

and the second, fourth and fifth (/voiced/, /stop/ and /labial/) being realised particularly as the [b] element in [zbə]. (Since /fricative, voiced, alveolar, stop, labial/ is by definition, as a phoneme, an unordered set, it is impossible to have the same member appear in it more than once – this contradicting fundamental principles of set theory. Though the [z] element and the [b] element in [zbə] both have an independent voiced realization, it would be unacceptable in terms of set theory to claim that the /$^{z}_{b}$/ phoneme as a set has two /voiced/ distinctive features (phonids) among its members.)

The attempt to analyse /$^{z}_{b}$, /$^{z}_{p}$/, /$^{s}_{b}$/, /$^{s}_{p}$/, /$^{z}_{d}$/, /$^{z}_{t}$/, /$^{s}_{d}$/ and /$^{s}_{t}$/ as single phonemes breaks down, however, when we consider phonemes such as /$^{z}_{p}$/and /$^{s}_{b}$/. If /$^{z}_{b}$/ were /fricative, voiced, alveolar, stop, labial/, then /$^{z}_{p}$/ would be /fricative, voiced, alveolar, stop, unvoiced, labial/ – with /fricative/, /voiced/, and /alveolar/ being realised particularly as the /z/ element, and /stop/, /unvoiced/, and /labial/ being realised particularly as the [p] element. However /$^{s}_{b}$/ would also – and incoherently – have the same distinctive feature / phonid analysis (i.e. /fricative, voiced, alveolar, stop, unvoiced, labial/), but with /fricative/, /unvoiced/, and /alveolar/ being realised particularly as the /s/ element, and /stop/, /voiced/, and /labial/ being realised particularly as the [b] element. That is to say, the two phonemes /$^{z}_{p}$/ and /$^{s}_{b}$/ would consist of exactly the same set of unordered distinctive features / phonids. (It doesn't matter where in the listing we present any of the distinctive features / phonids in describing – i.e. analyzing – a phoneme: since a phoneme is by definition an unordered set, its members are all, properly speaking, in the same 'position'.)

We cannot then analyse /$^{z}_{b}$/, /$^{z}_{p}$/, /$^{s}_{b}$/, /$^{s}_{p}$/, /$^{z}_{d}$/, /$^{z}_{t}$/, /$^{s}_{d}$/ and /$^{s}_{t}$/ as each single phonemes consisting of a simple set of the members (i.e. distinctive features / phonids) identified above. Two available alternatives in EAF[12] are (i) to analyse /$^{z}_{b}$/, /$^{z}_{p}$/, /$^{s}_{b}$/, /$^{s}_{p}$/, /$^{z}_{d}$/, /$^{z}_{t}$/, /$^{s}_{d}$/ and /$^{s}_{t}$/ each as single phonemes consisting of other members (distinctive features) than those identified immediately above; or (ii) to analyse /$^{z}_{b}$/, /$^{z}_{p}$/, /$^{s}_{b}$/, /$^{s}_{p}$/, /$^{z}_{d}$/, /$^{z}_{t}$/, /$^{s}_{d}$/ and /$^{s}_{t}$/ as each single phonemes consisting of only a single member (distinctive feature) each. Putative solution (i) would be unacceptably problematic. There are no other obviously plausible distinctive features for /$^{s}_{p}$/ than /stop/, /fricative/, /voiced/, /unvoiced/, /labial/ and /alveolar/ identified in Table 2 above. To produce new distinctive features for /$^{z}_{b}$/, /$^{z}_{p}$/, /$^{s}_{b}$/, /$^{s}_{p}$/, /$^{z}_{d}$/, /$^{z}_{t}$/, /$^{s}_{d}$/ and /$^{s}_{t}$/ would render the overall analysis (description) very messy (i.e. complex). Putative solution (ii) is a counsel of despair – since it simply says that no analysis in terms of distinctive features is possible. It is, at the very least, highly unsatisfactory, failing adequately to account for the phonetic data – and particularly the obvious relationship between the phonetic realisations of /$^{z}_{b}$/, /$^{z}_{p}$/, /$^{s}_{b}$/, /$^{s}_{p}$/, /$^{z}_{d}$/, /$^{z}_{t}$/, /$^{s}_{d}$/ and /$^{s}_{t}$/ and those of the basic phonemes /b/, /p/, /d/, /t/, /s/, and /z/.

EAF offers another alternative,[13] which provides a far more reasonable solution than either (i) or (ii) above, involving the phonotheme. As discussed in Section 2, the phonotheme is not a set of simple members, but a set whose members are themselves sets. Thus, instead of analyzing /$^{z}_{b}$/ as /fricative, voiced, alveolar, stop, labial/, we analyse it at the first 'level' as an unordered set whose members are /z/ and /b/; and at the second 'level' we analyse the members of this first-level set /z/ and /b/ as /fricative, voiced, alveolar/ and /stop, voiced, labial/ respectively.

What are these 'levels'? The second 'level' is rather obviously phonematics, i.e. the analysis of /z/ and /b/ into simple sets of phonids (distinctive features), as already discussed. The second 'level' cannot be phonematics, because what are involved are not just

simple sets of members. Rather, as illustrated by English initial consonant clusters (Section 2), and argued in Heselwood (2007: 166–7; cf. also Dickins 2009: Def. 9a0c) – the second 'level' belongs to phonotactics, rather than phonematics.[14, 15]

In this phonological system, we thus have a phonematics which is unordered, plus a phonotactics which is unordered (see endnote 14 for a discussion of this). The distinction between the phonematics and the phonotactics of this quasi-language seems, however, quite arbitrary. If this distinction were not made, it would be possible simply to analyse everything in terms of phonematics, where the phonematics involved (i) initial combinations of phonids (distinctive features), yielding /b/, /p/, /v/, /f/, /d/, /t/, /s/, and /z/, and then (ii) secondary combinations of /b/, /p/, /v/, /f/, /d/, /t/, /s/, and /z/, yielding /z, b/, /z, p/, /s, b/, /z, b/, /z, d/, /z, t/, /s, d/, and /z, t/. In more general terms there seems to be no need to distinguish a phonematics from a phonotactics. The necessary distinctions simply emerge from the analysis – i.e. the initial analysis of sets whose members are simple (unanalyzable), giving /b/, /p/, /v/, etc., followed by a further analysis of sets whose members are complex (i.e. these members are themselves sets), giving /z, b/, /z, p/, /s, b/, /z, b/, etc. There seems to be no need to distinguish between phonematic and phonotactic levels in the theory itself.

4. Semiotic systems with language-unlike system ontologies

One can, in fact, conceive of semiotic situations which are far more at variance with the apparently natural-language based organization of axiomatic functionalism into levels. For example, it would be perfectly possible to have a system in which all the relations between the basic (simple, unanalyzable) entities were ordered, while all the relations between entities resulting from these ordered combinations were themselves unordered.[16]

As Aleš Bičan has pointed out to me (personal communication) one way of constructing a phonology of this type is to start with a system in which there is a phonotactics without a phonematics. To do this, one would only need a quasi-language in which all the 'phonemes' were unanalyzable into phonids (distinctive features) (like /l/ in Bičan's analysis of Czech; Bičan 2013: 88, and Section 2 of this paper). An example suggested by Bičan would be a phonology containing only /t/ realized as any voiceless stop, /s/ realized as any voiceless fricative, /ã/ realized as any nasalized vowel, and /a/ realized as any non-nasalized vowel. What distinguished these units from each other would be 'stop-ness', 'fricative-ness', 'nasalized-ness' and 'voiced-ness'. The distinction between a phoneme with just one phonid (distinctive feature) and the phonid (distinctive feature) itself would be more artificial here than it would be in phonidics (distinctive feature systems) where at least some phonemes have more than one phonid (distinctive feature). The phonological system would not have any unordered phonological sub-system. If there were, however, distinctions of the type /ta/ vs. /at/, then there would be an ordered phonological system (a phonotactics). Bičan suggests also a further development: although /ta/ would be different to /at/, /atta/ might be the same (in terms of grammatical/signum/word identity) as /taat/. In other, less formal terms, we might imagine a quasi-language where the sequence of segments within a syllable is distinctive, but the sequence of syllables within words is not. This would be as if /sori/ meant the same as /riso/ in English. Hence, ordered sets of phonemes would combine into unordered sets of larger units. Although this is not found in natural languages, such a quasi-language, as Bičan notes, can easily be constructed.

In technical EAF terms, a semiotic theory which was modeled on semiotic systems where relations between the basic entities (cenids, logids, delids) were ordered and those between secondary entities (resulting from these basic ordered relations) were unordered would have (i) a basic-level ontidics (cenidics, logidics, delidics, with entities: cenids, logids, delids), (ii) a second-level ontotactics (cenotactics, logotactics, delotactics, with entities: cenotagms, logotagms, delotagms) 'built' on this basic-level, and (iii) a third-level 'ontematics' ('cenematics', 'logematics', 'delematics', with entities: 'cenemes', 'logemes', 'delemes') 'built' on the secondary (ordered) level. Appendix A provides further definition and discussion of technical terms in this paragraph.

The conclusions to be drawn from this argument are that, as suggested earlier (Section 2), the system-ontological levels (i.e. abstract levels – levels of Aspect 1: Section 2)[17] are (i) modeled on natural language (at least on a view, in many ways false, of how natural languages are), and (ii) not, properly speaking, necessary.

5. Conclusions

If there is no need for the EAF ontidics, ontematics, ontotactics distinction (e.g. in phonology the distinction between (a) phonidics / the distinctive-feature level, (b) phonematics ('phonemics') and (c) phonotactics), this distinction being merely a reflection of how natural languages seem to be organized (probably, in fact, a false view of how natural languages are organized), then (i) what is left in EAF in order to do system ontological analyses, and (ii) is what is left sufficient to coherently do these analyses?

What is left to do system ontological analyses are two notions: 1. Lack of ordering (or *simultaneity*, yielding unordered sets), and 2. Ordering (yielding ordered sets). Lack of ordering (simultaneity) is alone sufficient to treat all unordered relations. It does not matter whether these obtain between (a) simple entities, e.g. the phonids (distinctive features) which typically constitute the phonemes of natural languages (but not, as seen, a phoneme such as /l/ in English; Section 2), or (b) complex entities such as poly-phonidic entities (i.e. phonemes) in an initial English consonant cluster such as /sp/ (a poly-phonidic entity being an entity, as noted in Section 2, which consists of more than one phonid / distinctive feature). Ordering is alone sufficient to deal with all ordered relations: one does not need a special level for ordering (an ontotactics; e.g. a phonotactics): indeed, as seen, within ontotactics (e.g. phonotactics), there is already provision for non-ordering relations (ontothemes; e.g. phonothemes).

In further support of this view, we may note that within EAF, Lamb has proposed (as in Dickins 2009) one 'level-skipping' notion. He thus differentiates between ontotactics with have a 'prior' ontematics, and those which do not. Where an ontotactics has such a 'prior' ontematics, it can be referred to as an 'ontemotactics' (Dickins 2009: Def. 3a1c2; i.e. an ontotactics whose basic 'input' entities are ontemes). Where it does not have a 'prior' ontematics, it can be referred to as an 'ontidotactics' (Dickins 2009; Def. 3a1c1, i.e. an ontotactics whose basic 'input' entities are ontids). This already begins to look very messy (i.e. unnecessarily complex) – and we easily imagine further terminology to account for further such 'level-skipping'. The current proposal eliminates this mess, by simply not having levels in the first place.

Mulder introduces as a para-theoretical notion (i.e. a notion which accompanies axiomatic-functionalist theory, but is not properly part of the theory) 'labels' (or *étiquettes*) (Mulder and Hervey, 1980: 7; cf. also Mulder 1989: 135–141). These are notions which can be 'attached' to analytical/descriptive entities, frequently derived from traditional grammar, or from the necessary ancillary sciences to linguistics, particularly (general) phonetics. Examples are notions such as 'consonant' or 'vowel'. Some labels are fairly generalizable across languages (though what they mean for particular languages will necessarily be different: identity of label in different languages does not mean precise identity of entity in different languages). 'Consonant' and 'vowel' are very good examples of significantly generalizable labels. Some other labels may be very language-specific: an example might be 'predicand', which has been used in relation to EAF analyses of Arabic (e.g. Dickins 2010), but does not easily correspond to anything similar which might reasonably be identically labeled in English.

Under the change which I am proposing here for EAF, terms such as 'ceneme' ('phoneme'), 'cenotagm' ('phonotagm'), 'logeme' ('lexeme'), 'logotagm' ('lexotagm'), 'deleme' and 'delotagm' could be retained – not as theoretical notions (notions in the theory itself), but as extremely generalizable labels which are conceptually very closely allied to the theory (much more closely than, for example, 'consonant' and 'vowel'). Some of these labels might indeed be coherently applicable to all natural languages, picking out genuine (i.e. cross-descriptive: cf. Dickins 1998: 32–34, 421) linguistic universals. In Appendix B, I consider in more detail revisions to EAF theory and terminology resulting from the arguments in this paper.

Appendices

Appendix A: Organisation of system ontology (systemology)

The system ontology in EAF (corresponding to the systemology in SAF), deals with the organisation of the fundamental purely abstract entities in semiotics (including linguistics) which form the basis for semiotic (including linguistic) analysis (description) (Aspect 1 in Section 2). Employing the terminology of EAF, in which *ont* is used as a generalising stem for '*log*, *cen*, or *del* (as stems) throughout' (Dickins 2009, Def. 0e; see below for discussion of *log*, *cen*, and *del*), the system ontology deals with the following in EAF: ontidics, ontematics, ontotactics, and para-ontotactics. These are further explainable as follows:

ontidics:	the level of basic (i.e. minimum or fundamental) entities, termed *ontids*.
ontematics:	the level of combination of ontids in unordered sets into *ontemes*.
ontotactics:	the level of combination of ontemes into ontotagms. (Ontotagms may involve ordering relations, or they may involve non-ordering/unordered sets, ontotagms involving unordered sets being termed *ontothemes*; cf. Section 2.)
para-ontotactics:	the level(s) of further structuring above that of ontotactics.

In natural language, the stem *phon* is used instead of the general semiotic stem *cen*, and the stem *lex* is used instead of the general semiotic stem *log*. I will subsequently use forms with *phon* and *lex* in addition to – or instead of – forms with *cen* and *log*, as appropriate. In EAF there are three distinct systems making up the overall system ontology: cenology (phonology), logology (lexology), and delology.

Cenology (phonology) involves the analysis of purely abstract entities which have a relationship (via their realisations in actual utterances) only to form (i.e. entities entirely abstracted from semantic considerations). Delology, by contrast, involves the analysis of purely abstract entities which have only a relationship to meaning (via their realisations in actual utterances). Logology (lexology; also termable *connotative grammar*), finally, involves the analysis of purely abstract entities which have a relationship to both form and meaning (via their realisations in actual utterances). (For further explanation, see Dickins 2007: 4–7.)

Cenology (phonology) consists of the following levels:

cenidics (phonidics):	the level of basic (i.e. minimum or fundamental) entities, termed cenids (phonids, or distinctive features)
cenematics (phonematics):	the level of combination of cenids (phonids, distinctive features) in unordered sets into cenemes (phonemes)
cenotactics (phonotactics):	the level of combination of cenemes (phonemes) into cenotagms (phonotagms). (Cenotagms / phonotgams may involve ordering relations, or they may involve non-ordering/unordered sets, cenotagms/phonotagms involving unordered sets being termed *cenothemes / phonothemes*; cf. Section 2)
para-cenotactics (para-phonotactics):	the level(s) of further structuring above that of cenotactics (phonotactics)

Logology (lexology *or* connotative grammar) consists of the following levels:

logidics (lexidics):	the level of basic (i.e. minimum or fundamental) entities, termed logids (lexids, or morphemes)
logematics (lexematics *or* morphology):	the level of combination of logids (lexids, morphemes) in unordered sets into logemes (lexemes)
logotactics (lexotactics *or* connotative syntax):	the level of combination of logemes (lexemes) into logotagms (lexotagms). (Logotagms / lexotagms may involve ordering relations, or they may involve non-ordering/unordered sets, logotagms/lexotagms involving unordered sets being termed *logothemes / lexothemes*; cf. Section 2)
para-logotactics (para-lexotactics):	the level(s) of further structuring above that of logotactics (lexotactics, connotative syntax)

Delology (*or* denotative grammar, *or*, more informally, 'abstract semantics', as used in the main body of the paper) consists of the following levels:

delidics:	the level of basic (i.e. minimum or fundamental) entities, termed delids
delematics:	the level of combination of delids in unordered sets into delemes
delotactics:	the level of combination of delemes into delotagms. (Delotagms may involve ordering relations, or they may involve non-ordering/unordered sets, delotagms involving unordered sets being termed *delothemes*; cf. Section 2)
para-delotactics:	the level(s) of further structuring above that of delotactics

In SAF, cenology (phonology) is essentially the same as in EAF, while the level corresponding roughly to a combination of EAF logology (lexology *or* connotative grammar) and delology (*or* denotative grammar) is termed in SAF plerology (or 'grammar'). SAF cenology (phonology) consists of cenematics/phonematics (basic entity: distinctive feature – unit: ceneme/phoneme), and cenotactics/phonotactics (basic entity: ceneme/phoneme – unit: cenotagm/phonotagm), and para-cenotactics / para-phonotactics. SAF plerology (grammar) consists of plerematics (basic entity: moneme – unit: plereme), plerotactics *or* grammar (basic entity: plereme – unit: plerotagm, or syntagm), and para-plerotactics.

In this paper, the focus is on EAF. However, the arguments adduced here also apply, *mutatis mutandis*, to SAF. I have argued that the distinction between the levels *ontidics* (cenidics/phonidics, logidics/lexidics, delidics), *ontematics* (cenematics/phonematics, logematics/lexematics, delematics), and *ontotactics* (cenotactics/phonotactics, logotactics/lexotactics, delotactics) is unnecessary, and can be removed from axiomatic-functionalist theory, thus simplifying the theoretical model. I have not dealt in this paper with the distinction between ontotactics and para-ontotactics, which is, I believe, necessary for axiomatic-functionalist theory, at least for maximally simple and materially adequate descriptions (see also, in this regard, endnote 15). In Appendix B, however, I suggest a change in terminology from para-ontotactics (also para-cenotactics/para-phonotactics, para-logotactics/para-lexotactics, and para-delotactics), to para-ontoics (also para-cenoics/para-phonoics, para-logoics/para-lexoics, and para-deloics) for reasons which derive from the arguments in the body of this paper.

In order to make the relationships between the various entities and notions discussed so far easier to understand, they can be presented in diagrammatic form. EAF has two components, the system ontology (which is the subject of this paper) and the signum ontology (which relates the abstract analytical/descriptive entities of EAF to real-world utterances – thus ensuring that the theory has a coherent and direct relationship to the facts of language use; see Section 1).

The following symbols are used in Figure 1 and/or subsequent figures in the Appendices:

R	in relation to
&	a conjunction of
{ }	a set of
i…n	(a) certain (set of)
→	relation of implication
↔	relation of mutual implication

⟹	relation of transformation
d	distinctive function in cenolog/phonology
e	distinctive function in delology
e	distinctive function in logology/lexology
b	basic (minimum) system-ontological entity
UPPERCASE WORD	system or area of analysis
lowercase word	entity

For more detailed discussion of EAF, see Dickins (2009, 2013, and 2014: this last article discusses the notions of *unascribed cenetic-image (phonetic-image) correlate* and *unascribed semantic-image correlate* – this latter also termed a 'referent'). The system ontology of EAF, as currently constituted, as a semiotic theory can be represented as in Figure 1, and that of EAF linguistics as in Figure 2.

Figure 1
EAF semiotics (current version): system ontology

LEVEL unit feature base	**PARA-CENOTACTICS** para-cenotagm para-cenotactic feature cenotagm	**PARA-LOGOTACTICS** para-logotagm para-logotactic feature logotagm	**PARA-DELOTACTICS** para-delotagm para-delotactic feature delotagm
LEVEL unit basic entity	**CENOTACTICS** cenotagm ceneme	**LOGOTACTICS** logotagm logeme	**DELOTACTICS** delotagm deleme
LEVEL unit basic entity	**CENEMATICS** ceneme cenid	**LOGEMATICS** logeme logid	**DELEMATICS** deleme delid
LEVEL unit	**CENIDICS** cenid	**LOGIDICS** logid	**DELIDICS** delid
(SUB-)SYSTEM unit	**CENOLOGY** ceno	**LOGOLOGY** logo	**DELOLOGY** delo

Figure 2
EAF linguistics (current version): system ontology

LEVEL unit feature base	**PARA-PHONOTACTICS** para-phonotagm para-phonotactic feature phonotagm	**PARA-LEXOTACTICS** para-lexotagm para-lexotactic feature lexotagm	**PARA-DELOTACTICS** para-delotagm para-delotactic feature delotagm
LEVEL unit basic entity	**PHONOTACTICS** phonotagm phoneme	**LEXOTACTICS** lexotagm lexeme	**DELOTACTICS** delotagm deleme
LEVEL unit basic entity	**PHONEMATICS** phoneme phonid	**LEXEMATICS** lexeme lexid	**DELEMATICS** deleme delid
LEVEL unit	**PHONIDICS** phonid	**LEXIDICS** lexid	**DELIDICS** delid
(SUB-)SYSTEM unit	**PHONOLOGY** phono	**LEXOLOGY** lexo	**DELOLOGY** delo

Figure 1 and Figure 2 can both be reconfigured (without changing any of the information in them), in a shape which can be integrated into representations of the signum ontology of EAF for semiotics and linguistics, as in Figures 3 and 4, following. (Figures 5 and 6 further below provide an integrated overall representation of EAF semiotics and linguistics respectively, combining the two general components of EAF as a theory: the system ontology and the signum ontology.)

Figure 3
EAF semiotics (current version): system ontology, reconfigured to fit with subsequent representation of signum ontology (in Figure 5)

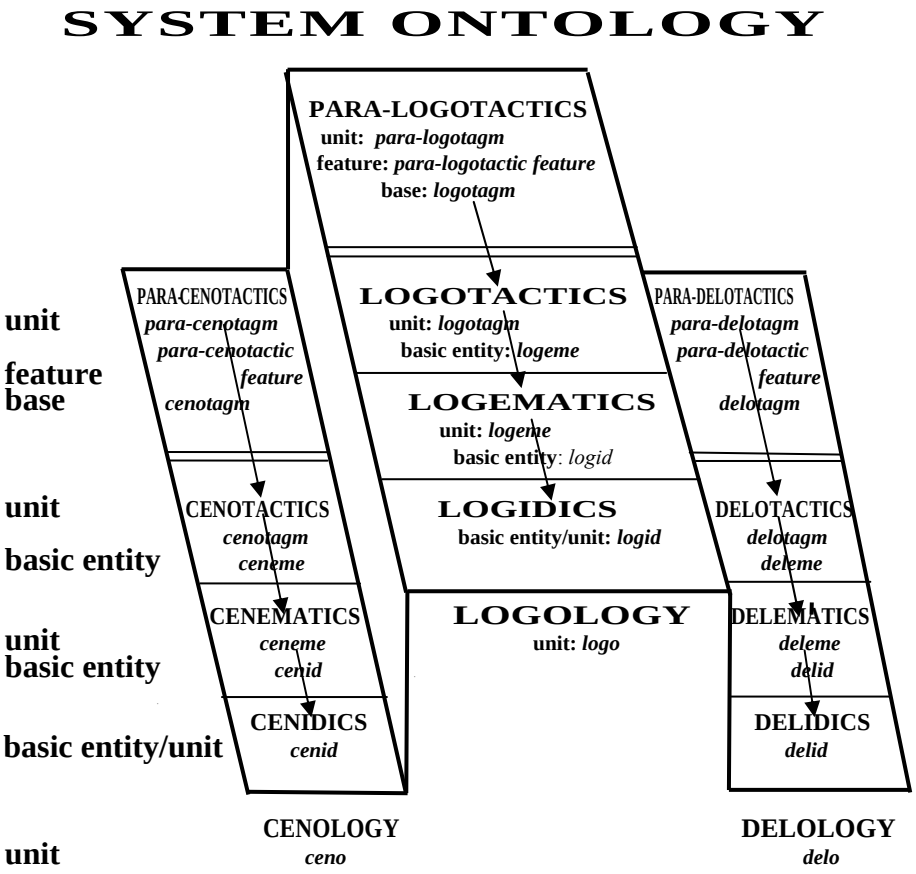
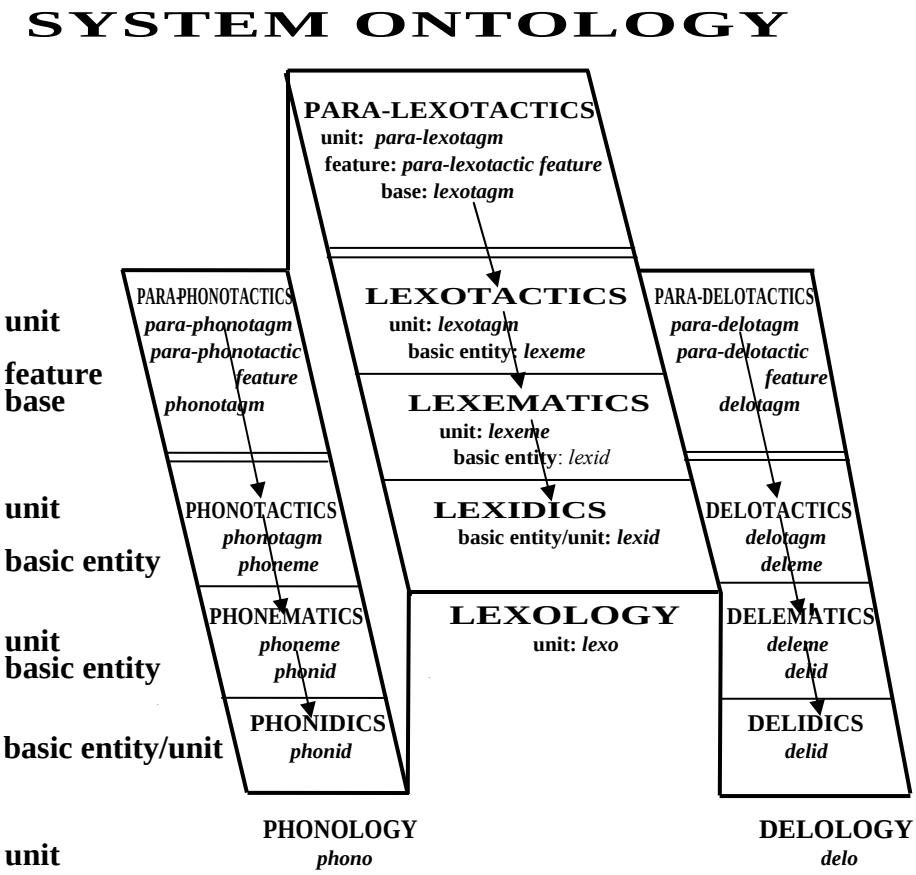


Figure 4
EAF linguistics (current version): system ontology, reconfigured to fit with subsequent representation of signum ontology (in Figure 6)



The overall model of EAF semiotics (comprising the system ontology and the signum ontology), as currently constituted, can be represented as in Figure 5, and the overall model of EAF linguistics as in Figure 6. For further discussion of the signum ontology and other aspects of the overall model of EAF not covered in this paper, see Dickins (1998, 2009, and 2014).

Figure 5
EAF semiotics (current version): overall model (system ontology and signum ontology)

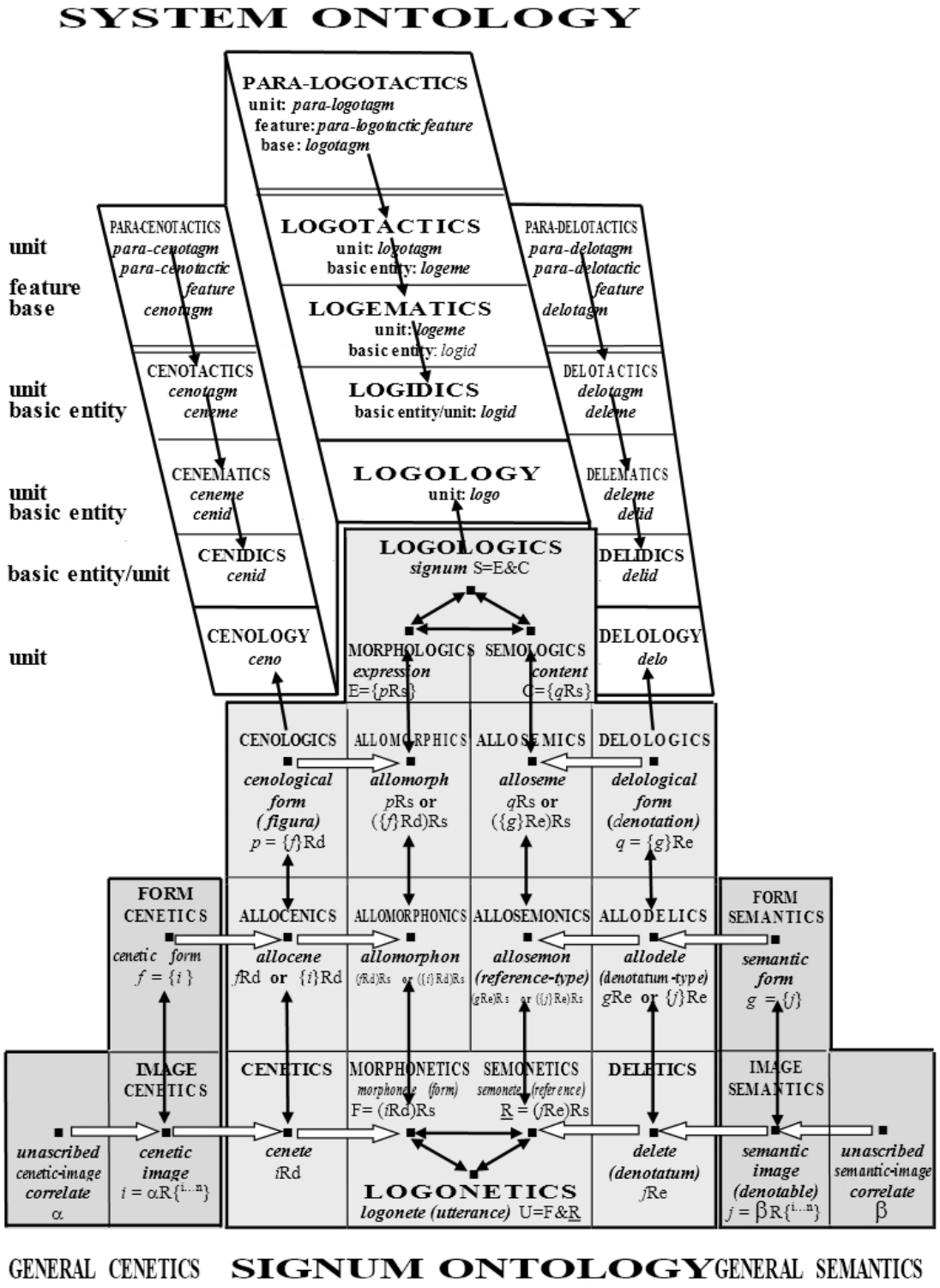
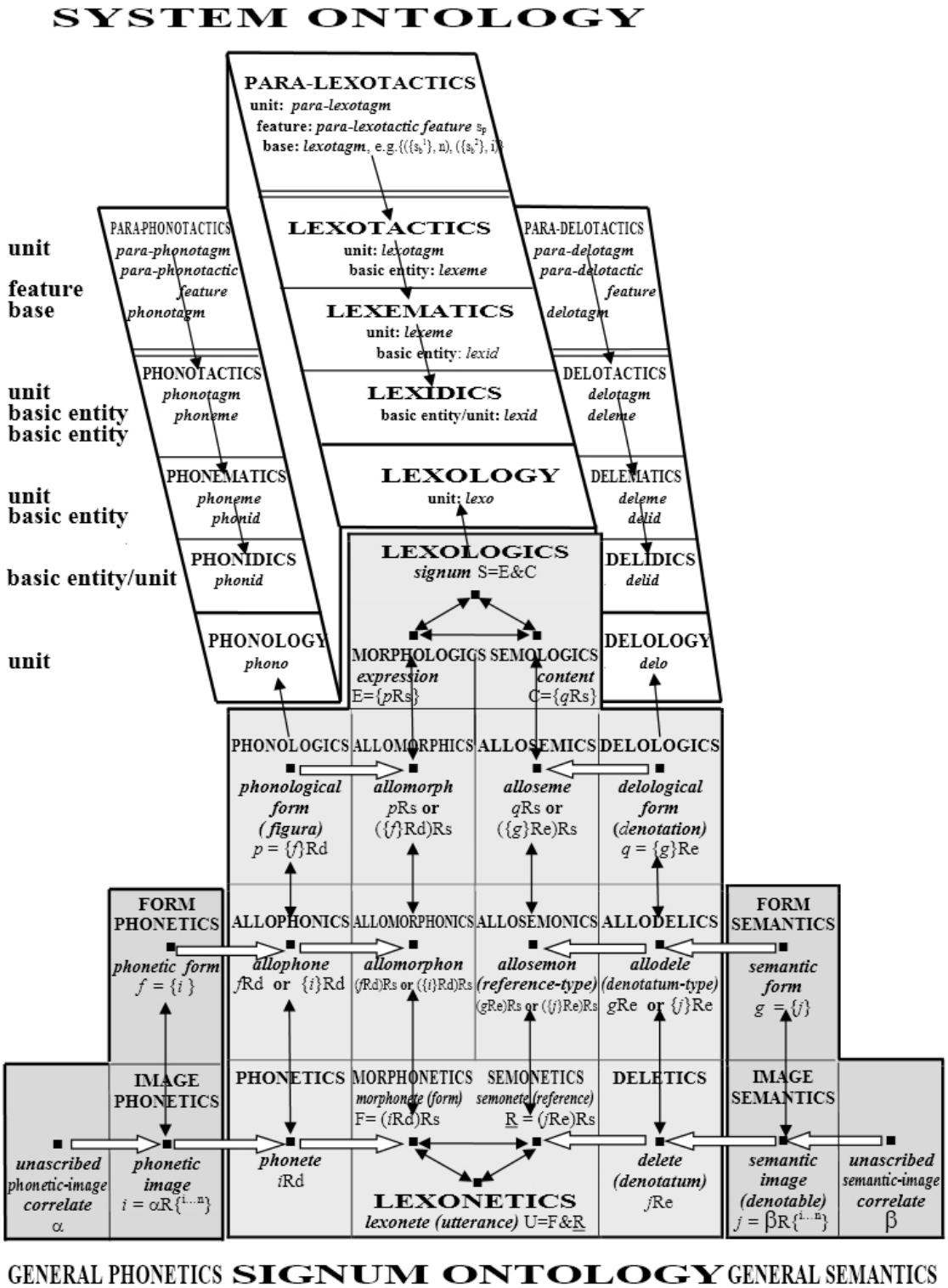


Figure 6
EAF linguistics (current version): overall model (system ontology and signum ontology)



Appendix B: Revised terminology for EAF

On the basis of the conclusions drawn in Section 6, the terminology of the system ontology of EAF can be extensively simplified. Up till now, EAF has had the sub-areas of (i) ontidics, (ii) ontematics, and (iii) ontotactics – deriving from which are (i) cenidics/phonidics, logidics/lexidics, and delidics, (ii) cenematics/phonematics, logematics/lexematics, and delematics, and (iii) cenotactics/phonotactics, logotactics/lexotactics, and delotactics) (see Appendix A for further discussion).

(i) Ontidics, (ii) ontematics, and (iii) ontotactics can now be replaced by a single term *ontoics* – deriving from which are cenoics/phonoics, logoics/lexoics, and deloics. Other terms, such as cenology/phonology, logology/lexology, delology, and onto (ceno/phono, logo/lexo, delo) remain unchanged. As noted in Section 5, terms such as 'ceneme' ('phoneme'), 'cenotagm' ('phonotagm'), 'logeme' ('lexeme'), 'logotagm' ('lexotagm'), 'deleme' and 'delotagm' can be retained as extremely generalizable labels.

Since the term ontotactics – and the related terms cenotactics (phonotactics), logotactics (lexotactics), and delotactics – are, according to the proposals in this paper, eliminated from EAF theory, the terms para-ontotactics – and the related terms para-cenotactics/para-phonotactics, para-logotactics/para-lexotactics, and para-delotactics – become anomalous. These are to be replaced by the terms para-ontoics – and the related terms para-cenoics/para-phonoics, para-logoics/para-lexoics, para-deloics), and para-deloics (mirroring the terms ontoics, cenoics/phonoics, logoics/lexoics, and deloics introduced in the previous paragraph). The base-element upon which the features and units of the para-ontoics (para-cenoics/para-phonoics, para-logoics/para-lexoics, para-deloics) are superimposed can be referred to as the 'base onto' (base ceno / base phono, base logo / base lexo, base delo).

The revised version of the system ontology of EAF semiotics proposed in this paper can be represented as in Figure 7, and that of EAF linguistics as in Figure 8. Figures 7 and 8 can be reconfigured, without changing any information, as in Figures 9 and 10, (so that the representation of the system ontology can be integrated with that of the system ontology, as in Figures 11 and 12 below, to give a complete representation of the proposed revised version of EAF theory).

Figure 7
EAF semiotics (revised version): system ontology

LEVEL	**PARA-CENOICS**	**PARA-LOGOICS**	**PARA-DELOICS**
unit	para-ceno	para-logo	para-delo
feature	para-cenoic feature	para-logoic feature	para-deloic feature
base	base ceno	base logo	base delo
LEVEL	**CENOICS**	**LOGOICS**	**DELOICS**
units (labels)	cenotagm cenotheme, ceneme, etc.	logotagm, logotheme, logeme, etc.	delotagm, delotheme, deleme, etc.
basic entity	cenid	logid	delid
(SUB-)SYSTEM	**CENOLOGY**	**LOGOLOGY**	**DELOLOGY**
unit	ceno	logo	delo

Figure 8
EAF linguistics (revised version): system ontology

LEVEL	**PARA-PHONOICS**	**PARA-LEXOICS**	**PARA-DELOICS**
unit	para-phono	para-lexo	para-delo
feature	para-phonoic feature	para-lexoic feature	para-deloic feature
base	base phono	base lexo	base delo
LEVEL	**PHONOICS**	**LEXOICS**	**DELOICS**
units (labels)	phonotagm, phonotheme, phoneme, etc.	lexotagm, lexotheme, lexeme, etc.	delotagm, delotheme, deleme, etc.
basic entity	phonid	lexid	delid
(SUB-)SYSTEM	**PHONOLOGY**	**LEXOLOGY**	**DELOLOGY**
unit	ceno	logo	delo

Figure 9
EAF semiotics (revised version): system ontology, reconfigured to fit with subsequent representation of signum ontology (in Figure 11)

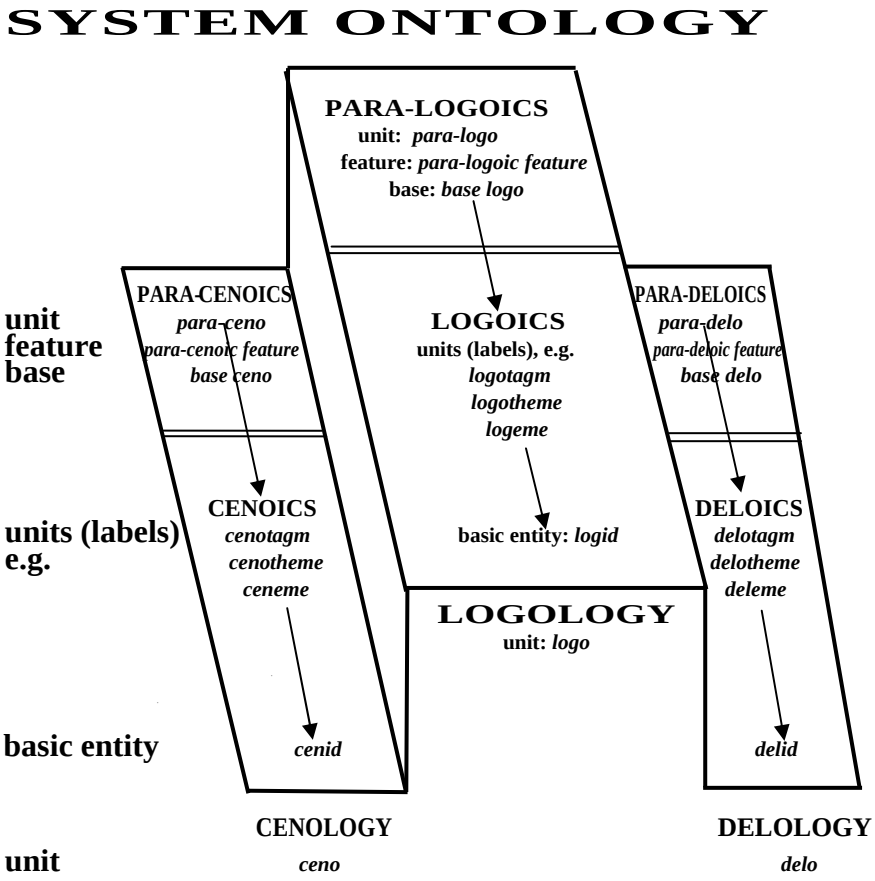
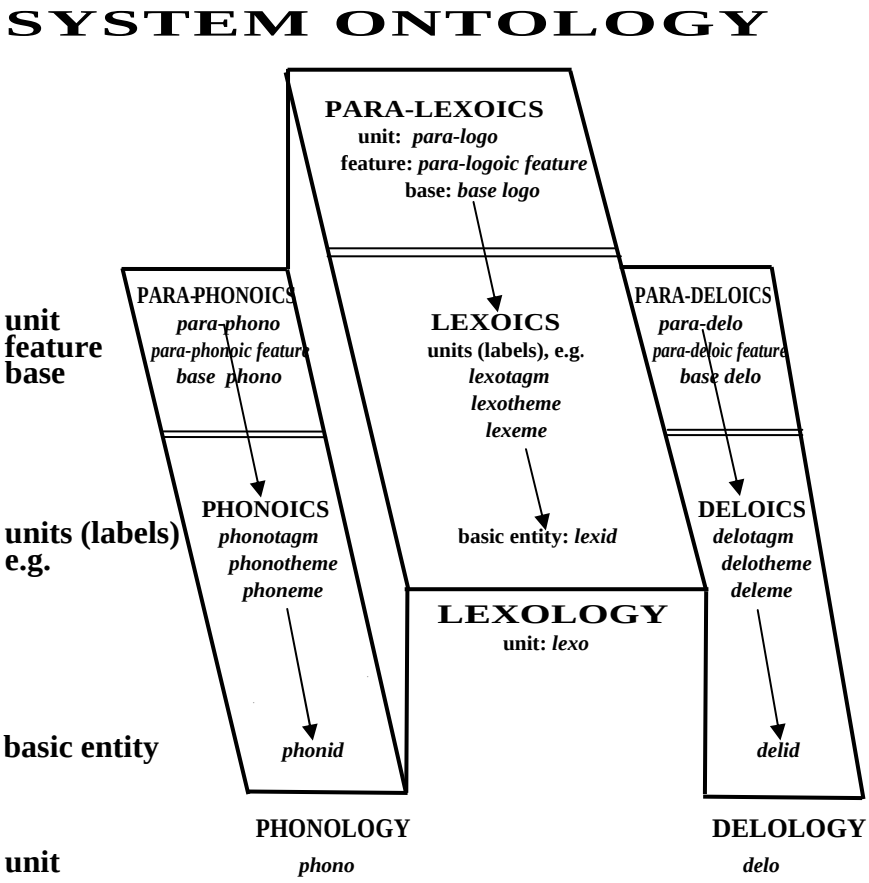


Figure 10
EAF linguistics (revised version): system ontology, reconfigured to fit with subsequent representation of signum ontology (in Figure 12)



The revised overall model of EAF semiotics (comprising the system ontology plus the signum ontology) can be represented as in Figure 11, and the revised overall model of EAF linguistics (comprising the system ontology plus the signum ontology) can be represented as in Figure 12.

Figure 11
EAF semiotics (revised version): overall model (system ontology and signum ontology)

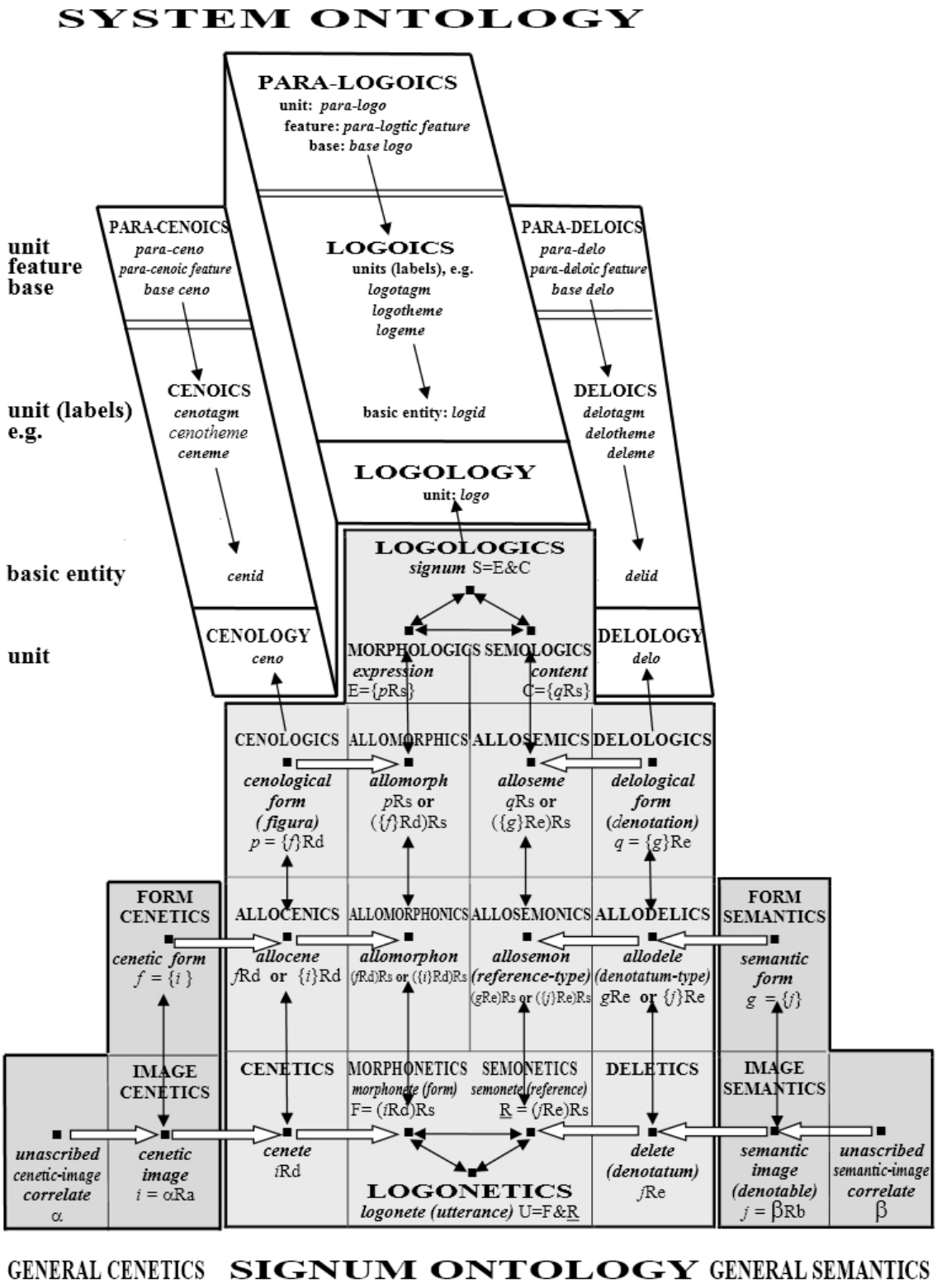
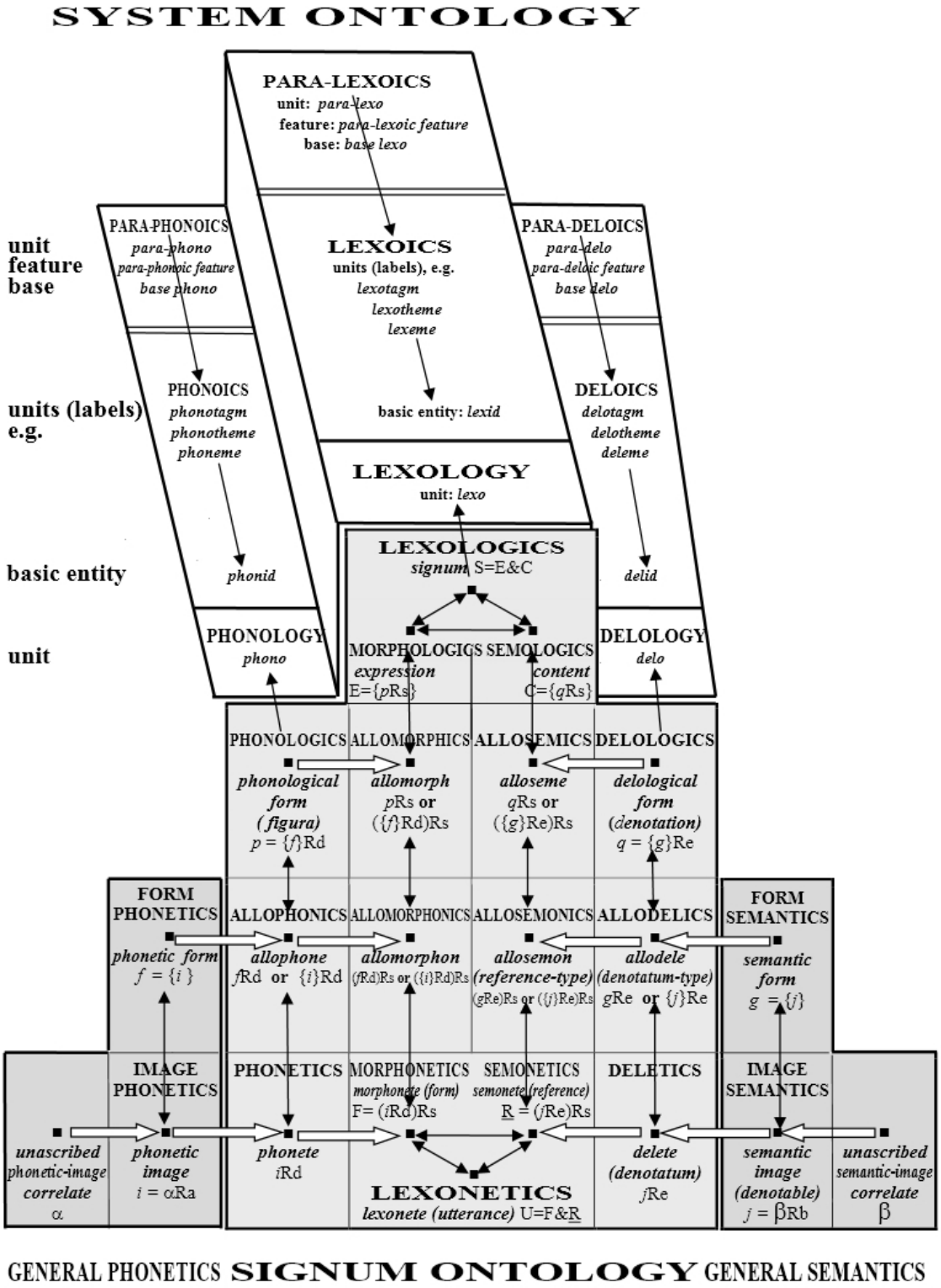


Figure 12
EAF linguistics (revised version): overall model (system ontology and signum ontology)



Endnotes

[1] I thank Aleš Bičan and Paul Rastall for reading draft versions of this article and for making extremely insightful criticisms, which I have tried to address in this version. I also thank Barry Heselwood for reading an earlier draft and making very useful comments.

[2] EAF 'system ontology' corresponds fairly closely to SAF 'systemology'.

[3] EAF 'signum ontology' corresponds fairly closely to what is also termed 'signum ontology' in SAF.

[4] 'System ontology' and 'signum ontology' are primarily just technical terms in EAF. The system ontology and signum ontology of EAF are, however, also both ontologies in the sense that the term 'ontology' is used in logic, i.e. 'set of entities presupposed by a theory' (Collins English Dictionary), and together constitute the overall ontology which is the theory. Mulder has pointed out that "the purpose of a linguistic theory is […] to render possible an unlimited number of good, i.e. consistent, adequate and simple – linguistic descriptions" (Mulder and Hervey 1980: 22). A linguistic theory, on this understanding, does not directly describe (analyse) language facts (speech phenomena), but only does so indirectly via the descriptions (analyses) of individual languages which it makes possible in 'confrontation' with the relevant speech phenomena. Since they are not directly about things which exist (speech phenomena), theoretical statements "make no existential claims, and […] there can be no question of subjecting theoretical claims to empirical refutation" (Mulder and Hervey 1980: 31).

The situation in linguistics can be contrasted with that in natural science, where, "Because any given natural science only deals with one universe, there is no overwhelming need to keep theory and description apart. Though, in the natural sciences, it is unnecessary to distinguish between theory and description, in linguistics it is imperative to do so. This is because linguistics is NOT concerned with the description of one universe – all speech phenomena (taken as a whole) – but with a virtually unlimited number of PARALLEL universes – the speech phenomena of French, Mandarin Chinese, of Glasgow Scottish English […]" (Mulder and Hervey 1980: 66–67).

The implications of the fact that linguistic theory (as conceived in axiomatic functionalism) "includes no existence postulate" (Hjelmslev 1953), however, go further than this. Linguistic descriptions (analyses) may be subject to attempted empirical refutation – and are thus scientific in the Popperian sense. However, these descriptions are necessarily made using a linguistic theory (in our case EAF), and are thus theory-dependent, 'inheriting' the non-empiricality of the theory. This is obvious from the fact that if we use a different theory we get different analyses of the same data. In relation to polysemy, for example, analyses made using EAF are very different from those using SAF (Dickins 1998: 183–185, 195–198, 247–251) – albeit that both theories allow for the production of descriptions which are at least relatively refutable.

The axiomatic-functionalist view of theory and description is thus that a linguistic theory is not 'real', i.e. it does not describe (analyse) speech phenomena at all, while a description is 'real', describing (analysing) speech phenomena – but only doing so in a way which is dependent on an 'unreal' theory. This contrasts with the fairly 'extreme-realist' stance taken by some approaches to linguistics, the most obvious example being Chomskyan linguistics, where the theory is said to directly describe mental reality (e.g. Chomsky 1986). Compared to Chomskyan linguistics, axiomatic functionalism, thus has a significantly "reduced existential commitment" (Mulder and Rastall 2005). The axiomatic-functionalist position is in important respects like that of the natural sciences. The 'proton', for example, in physics, as an 'organising' abstract notion, is not physically real. It does,

however, allow one to identify individual real physical things as 'protons'. To the extent that the 'organising' descriptive abstractions of axiomatic-functionalism (e.g. 'the phoneme /p/ in English') do the same, they are no more – or less – mysterious than the 'organising' abstractions of physics.

When one speaks about theoretical 'levels' in axiomatic functionalism, one is talking about 'unreal' abstractions which stand in a specified logical/set-theoretical relationship to one another. In EAF system ontology, for example, the phoneme stands in a *sethood* relationship to the phonid (distinctive feature): the phoneme is a set of phonids (distinctive features). The same holds true at the descriptive level – when, for instance, I describe the Sudanese Arabic phoneme /ḍ/ as an unordered set consisting of the phonids (distinctive features) /alveolar, stop, voiced, emphatic/, the relationship between the Sudanese Arabic phoneme /ḍ/ and its constituent phonids (distinctive features) is one of sethood. The issue in both these cases is one of ontological hierarchy and constructional complexity (as Paul Rastall has pointed out to me).

The situation is very different however, when one uses the term 'level', for example: (i) to categorise the difference *between* theory and description(s) made under that theory (e.g. EAF) – the theoretical 'level' and the descriptive 'level'; or (ii) to speculate about the relationship between a theory (e.g. EAF) and a possible independently existing reality to which that theory may correspond – the theoretical 'level' vs. the 'level' of abstract extra-theoretical reality; or (iii) to speculate about a linguistic description (e.g. the phonology of Sudanese Arabic) and a possible extra-descriptive reality to which that description may be said to correspond (whether perfectly or imperfectly) – the descriptive 'level' vs. the 'level' of 'organised extra-descriptive language reality'. In all these cases, (i)–(iii), the issue revolves round ontological commitment.

[5] By implication, SAF also makes a corresponding level-distinction to that made in EAF between phonidics, phonematics and phonotactics. In fact SAF does not in its postulates (the formal statement of the theory: Mulder and Hervey 2009) explicitly recognize a 'phonidics', i.e. a basic level of distinctive features, as a level separate from that of phonematics, i.e. the level at which distinctive features combine to form phonemes. Elsewhere, however, Mulder talks about the 'cenological inventory' (Mulder 1989: 105, 112) – corresponding in EAF to cenidics, and in natural language phonidics.

[6] These same oddities are by extension also thrown up for SAF.

[7] EAF logology (lexology) and delology correspond roughly to SAF plerology (grammar).

[8] Lexids (morphemes) in EAF bear a limited resemblance to monemes in SAF.

[9] EAF lexology / connotative grammar bears a limited resemblance to SAF plerology/grammar.

[10] The EAF definitions for 'language' and 'proper language' can be compared with those of SAF. In SAF a 'language' is a 'semiotic system with double articulation' (Mulder and Hervey 2009: Def. 3c1), where 'double articulation' is defined as 'cenotactics and plerotactics' (Mulder and Hervey 2009: Def. 3c), while a 'proper language' is a 'semiotic system with a cenology containing both a cenematics and a cenotactics, and a plerology (grammar) containing both a plerematics (morphology) and a plerotactics (syntax)' (Mulder and Hervey 2009: Def. 3c2).

[11] Dickins 2009: footnote to Def. 3c2 for EAF simply mirrors Mulder and Hervey for SAF (Mulder and Hervey 2009: footnote to Def. 3c2).

[12] Both of the alternatives described in this paragraph are, in fact, also available in SAF.

[13] The alternative described in this paragraph is not, in fact, allowed for theoretically by SAF, the SAF Postulates (Mulder and Hervey 2009) making no provision for phonothemes (or 'plerothemes').

[14] There is a problem here. Cenotactics (phonotactics) in EAF is defined as a 'complex […] ordered […] cenology [(phonology)]' (Dickins 2009: Def. 2b^{1c}). In the quasi-language which I have described, there is no ordering in the cenotactics – the unordered relationship between /z/ and /b/ in /$^{z}_{b}$/ (realised as [zbə]), for example, simply being analysed as part of the cenotactics on the grounds that cenematics is defined as involving simple sets only, and excludes sets of sets. The resolution of this problem would be to redefine cenotactics/phonotactics (also logotactics/lexotactics and delotactics) such that not all the elements in it need be ordered – and that cenothemes/phonothemes (also logothemes/lexothemes and delothemes) may occur in a cenotactics/phonotactics (also logotactics/lexotactics and delotactics) in which there is no ordering.

[15] The distinction between 'language' as a formal notion defined in both the SAF and EAF postulates (Section 3) and 'language' in a more general sense, as well as the fact that alternative possibilities exist in the analysis of the quasi-language phonology in Section 3 (with proposed phonemes /b, /p, /v/, /f/, /d/, /t/, /s/ and /z/, and proposed phonothemes /$^{z}_{b}$/, /$^{z}_{p}$/, /$^{s}_{b}$/, /$^{s}_{p}$/, /$^{z}_{d}$/, /$^{z}_{t}$/, /$^{s}_{d}$/ and /$^{s}_{t}$/) throws into relief a number of other issues. Aleš Bičan (personal communication) makes the following valid points in this regard, which it is worth quoting at length:

> Actually, the decision whether something is a language does not emerge only from the theory, but also from the way it is used, that is, from how phenomena are analyzed. It is perfectly possible to say that English does not have a phonematics if you decide to leave all phonemes analyzed into distinctive features. That is, you do not analyze /p/ as a bundle of /labial, stop, voiceless/, but say instead that it is 'p-ness' that distinguishes it from all other phonemes. If you do this with every phoneme, you won't have any unordered system of figura [i.e. phonological entities]. Such an analysis cannot be a priori ruled out because you do not discover distinctive features in the phonemes, you establish them through your analysis.
>
> You can go even further and claim that English is not a language (in axiomatic-functionalist terms) if you say that the sound shape of every word is phonologically a single unanalyzable entity (after all, speech is continuous and the very segmentation of speech signal to a sequence of vowels and consonants is arbitrary). That is, you say that the sound of *cat* is as a whole one single unanalyzable figura different to the sound of *pat*. In such an analysis there would only be simple figura without any ordering.
>
> Of course, both of these analyses would be arguably less simple than the traditional analysis, but I do not think there is anything in the theory to judge them inconsistent. They can only be evaluated on the grounds of simplicity and adequacy.
>
> Speaking of which, [it is stated, in Appendix A of this paper] that para-ontotactics is necessary for axiomatic-functionalist theory, but its necessity can be questioned at least in the case of phonology. Again, it depends on how you analyze the data. The inclusion of para-phonotactics in the theory has no doubt been motivated by the fact that certain properties of the speech signal are viewed as suprasegmental features whereas others pertain to speech sounds. However, it does not certainly mean that they must be analyzed as such. Take tones in tone languages like Chinese. Traditionally, it is said that one syllable (for example [ma]) can have four different tones there. But why should the tones be analyzed as distinctive para-phonotactic features instead of distinc-

> tive features of phonemes? I mean: why have four tones instead of four phonemes /a_1/, /a_2/, /a_3/, /a_4/? This analysis could perhaps be rejected on the grounds of adequacy, but certainly not on the grounds of consistency and simplicity (the number of phonological entities is the same).
>
> Something similar can be done for English and its distinctive placement of accent: the difference between [ímport] and [impórt] can be accounted for by introducing two sets of phonemes /i_1/, /o_1/ realized as stressed [i], [o], and /i_2/, /o_2/ realized as unstressed [i], [o]. Hence, the words would have these phonological forms: /i_1m$p o_2$rt/ × /i_2m$p o_1$rt/. You only have to introduce a simple distributional restriction: a word can only contain one phoneme from the first set (something similar to the situation in languages with vocal harmony). In such an analysis there would be hardly any need for para-phonotactics, and although it could be shown to be less simple than the traditional one, I do not think it can be rejected on the grounds of consistency.

[16] As Mulder points out, there are semiotic systems in which there are no unordered sets at the basic level, but only ordered relations. Mulder gives the example of number writing, which has, in SAF terms, a plerotactics (syntax) but no morphology (plerematics) (Mulder 1989: 100-102, 112).

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WHAT DOES IT MEAN TO SAY AN ENTITY "HAS A FUNCTION" AND WHICH ENTITIES HAVE FUNCTIONS?[*]

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Abstract: The paper considers the concepts "having a function" in linguistics, and especially, "having a distinctive function". It asks which entities have functions. There is an analysis and critique of mainstream views – particularly those of Martinet and Mulder, which represent opposed views of the notion of "having a function". Some alternative interpretations are offered.

Keywords: function/functional, distinctive function, linguistic units

Preliminary remarks – functionalist fundamentals

In all functionalist approaches, linguistic entities are identified by their possession of some particular function and they may have other functions according to the type of analysis offered. Linguistic entities are said to be "functional" or to "have a (certain) function". Functions are "communicational functions". Now, the term "function" can mean several different things. For discussions of this point, see Rastall (2008), and Costaouec (2009). This point has been well-known for a long time. See, for example, Jachnow (1981). There have, furthermore, been recent discussions on the nature of functionalism in linguistics (Feuillard 2009, Morais-Barbosa 2009). For mainstream functionalists, however, the possibilities are principally that function means:

- Distinctive function (or "pertinence" in French);
- Pragmatic value (representation of states of affairs outside the utterance or self-referential reference to the utterance or part of it considered as a reality separate from the utterance itself ("metalingual" or "self-referential" function); address to the receiver, expression of the attitude or emotional state of the sender; social or aesthetic value of the utterance or part utterance);
- Contrastive function concerned largely with the organisation of the utterance, or attitudinal orientation of participants in it, and including demarcative and culminative features;
- Syntactic or phonotactic function concerned with the combinatory role of components of the utterance in relation to others;
- Semantic function concerned with the utterance or its parts from the point of view of their qualitative information value. Textual functions concerned with the construction and coherence of texts, both intra- and inter-sentential.

[*] Previously unpublished. Peer-reviewed before publication. [Editor's note]

From other points of view, a construction can be viewed as a "function" of its components, or individual linguistic units of whatever complexity can be viewed as variables satisfying a "function"; for example, the phonemes, /p, b, m/ in English, are variables satisfying the function "labials" or the function "occupying the initial pre-nuclear position"; the phonotagm, /map/, can be seen as a "function" of its component phonemes and their constructional relations or distribution. Such views are consistent with, and can be incorporated into, mainstream functionalist views, so the remarks below apply to those approaches too. A clear statement of the mainstream functionalist view with an account of the main functions is given by Akamatsu (1992). In all of these possibilities, linguistic units are said to "have a function". While the discussion below refers mainly to distinctive function, the remarks apply also to any other case of "having a function", such as "has a contrastive function", "has a syntactic function", "has a textual function", etc.

The issue of what functions are and which entities have them is important for functional linguistics. Many linguists have pointed out not only the large number of possible meanings of the term "function", but also the vagueness of the term (e.g. Morin 1980; Altmann 1981). Alternative conceptions of linguistics, such as generative ones and generative phonology in particular, have no place for functional analysis and reject functional analysis as trivial or unnecessary (e.g. Vennemann 1980). It is not the purpose of this paper to consider that debate, but to investigate what "has a function" and what it is to "have a function". However, functionalists can respond to those who take a non-functional view by pointing out that the generative approach defines phonology in ways that they do not accept, and hence the generative critique misses the point. They can also reply that generative phonology has its own vagueness over the nature and identification of phonological, as opposed to phonetic units, and that generative phonology in effect relies on an unspoken functional principle, but in general that generative approaches, in working with purely formal constructs (rather than functional ones) divorce linguistic structure from non-linguistic experience and communicational purposes (as argued by Vachek 1980). Nevertheless, whatever one's view of those disputes, it is incumbent on functionalists to clarify their fundamental concepts.

The vagueness of the term "function" can be seen in various ways. One problem is that of allowing the term to cover too much ground. In Glossematics, a function is any dependency relation in an analysis (see Hjelmslev 1953, ch. 11). Similarly, in French, so-called "neo-Prague", approaches, such as that of Hagège (1980: 187), we read that a function is any

> […] correspondence that can be found between a material manifestation, whatever it may be, provided that it is recognized as belonging to a natural language, and a certain semantic content, whatever it may be.

In such approaches, the term "functional" does indeed seem to approach equivalence with "analytical", hence appear to be rather trivial. Furthermore, a given linguistic unit may have (and normally will have) more than one of these functions. In the expression, *in the garden*, the sign *the* has a distinctive function, because it is opposed in the same context to the signs, *a*, *my*, *this*, etc.; it has a contrastive function in signalling a nominal construction and that a noun will follow; it has a syntactic function as an article in construction with *garden*; and it has a semantic function. The semantic difference between *in the garden* and

in a garden, for example, must be due to the difference between the semantic contributions of *the* and *a*, so however difficult it may be to specify the semantic contribution of *the*, it clearly makes one. One can reasonably say that these are all different ways of looking at the same utterance. Martinet frequently supported the view that functionalism was a way of presenting a scientific view of language accounting for its communicational properties. Using distinctive function as the fundamental epistemological tool to determine linguistic units with separate identity, the other functions form a kind of hierarchy in analysis (e.g. Martinet 1975a: 98, Altmann 1981). Morais-Barbosa (2009: 78) restates that view:

> La linguistique fonctionnelle est avant tout un cadre épistémologique conçu pour la description des langues.[1]

However, what distinguishes mainstream functionalism is the view that linguistic identity is conferred in the first place by having a distinctive function. That is, by separately making a contribution to the structure, content, and transmission of the message. One could not reasonably speak of the other functions of *the,* unless one could say that *the* was a unit with its own distinct identity. In Martinet's dictum "function is the criterion of linguistic reality" (1962: 5). Nothing is considered a linguistic unit (i.e. one with separate identity) unless it alone makes a difference to communication. Distinctive units are thus distinguished from those whose role is not separate from that of others. Mulder's version of this is "all features in semiotic sets are functional", where "functional" means "separately relevant to the purport of the whole of which it is a part" (2011: 275). Mulder explains this in an early version of his theory (1968: 10), as follows:

> Nothing can be considered functional unless it is – in equivalent contexts – opposed to, i.e. distinctive, in respect to, something else, or to the absence of any member of the same class. Non-functional elements are not regarded as part of the system.

In this view, then, the identity of linguistic units is their distinctiveness at specified levels of analysis. *The* "has a distinctive function" separately as a form-meaning unit with a grammatical potential, whereas /p/ in English is a differential unit. In the case of phonemes, for example, but *mutatis mutandis* for other units, Mulder says (1968: 187):

> […] the essence of a phoneme is the distinctive relation in which it stands in relation with regard to all the phonemes with which it commutes.

These functionalist views have not changed in the intervening years. Thus, parasitic features in phonology, such as the aspiration of English voiceless stops in absolute initial position before the vowel, or the lengthening of vowels in the context of following voiced consonants in English, or the variation in the forms of concord in Slavonic languages do not have separate identity and are, therefore, not in the inventory of linguistic units in those languages. Naturally, one can say that parasitic features or concord variation contribute to the transmission of information as contrastive features, but they do so as variants of lin-

[1] "Functional Linguistics is first and foremost an epistemological approach conceived for the description of languages" [PR].

guistic features – their role presupposes features with separate identity. Thus, the allophone, [p^h] in English, performs its signalling function in the transmission of speech acts as a variant of the distinctive unit, /p/, and the forms, /-u/ in Russian /ruku/ ("hand") and /-a/ in /syna/ ("son"), are variants of a sign "accusative singular", not separately relevant features in the system, although they are clearly important for the transmission and recognition of the signs in question and for their syntactic roles as "concord" features. Functionalists would say that a hierarchy of functions allows us to specify the *nature* of the communicational contribution of observables. This view has a long history, dating back to at least the work of the Prague School, and Trubetzkoy (1939) in particular in an explicit form, and much earlier in more implicit expositions, such as that of Winteler (1876) or early functionalists such as the Poles Baudouin de Courtenay (1894) and Kruszewski (1881, repr. 1995).

One can note that the issue of identifying those entities which constitute the operative distinctions in the phonology or grammar of a language, viewed as a communication system, is central to functional linguistics and its methods, but – as noted above – it is not the only functional perspective. However, it is important to remember that vagueness enters through the term "communication", which has numerous parameters. Thus, as Hagège was pointing out (above), function must be correlated with specific communicational parameters or perspectives.

Another central point here is that functional analysis leads to an account of *communicational linguistic reality*, which differs from the account of the physical reality of the speech act. "Function" is a means of scientific analysis opposed to "nature" according to Martinet (1975a). By "function", he means either the connections in the speech act linking the communicational units used to convey non-linguistic experience, as when speaking of syntactic functions such as "subject" or "verb", *or* "pertinence" (separate relevance ensuring identity in the system). As Martinet often pointed out (e.g. 1962:14, or 1989: 61–63), the same physical features in speech can have quite different communicational functions. An example is the glottal stop, which is distinctive in Arabic, an allophonic variant in English, a contrastive feature in German, and a concomitant expressive feature in French. The physical occurrence of a feature, such as aspiration in English or concord variation in Russian, does not lead to the recognition of separate features in communication, but rather to a view of communication in those languages in which the operative distinctions are recognised as linguistic units and in which non-distinctive features are accounted for in relation to distinctive units. This use of "function" to identify the operative distinctions in communication and to separate them from physically present features, which are either merely concomitant or which play non-distinctive roles is one of the strengths of functionalism. Furthermore, the identification of functional units and roles is important in accounting for the conventional nature of verbal communication and the diversity of languages.

As functionalists of different persuasions have pointed out, this linguistic reality, focusing on those features which separately contribute to the transmission of information (are distinctive) and its organisation implies the recognition of relevant differences in verbal behaviour (Martinet 1949, 1956, 1989, Jakobson and Halle 1956, Malmberg 1972). As noted above, this view is obviously in the tradition of the Prague School. However, while the linkage of communication acts in functionalist approaches to non-linguistic experience and communicational needs serves to integrate the analysis of verbal behaviour with non-verbal reality, it has to be admitted that the analysis of functions does not lead to testable

implications for specific speech acts, and that the idea of communicational needs, though significant for the connection to non-linguistic experience, is a vague one (Altmann 1981). Communicational needs can only be recognised *a posteriori*. That is, we judge the speaker's needs from the speech act, and not independently prior to the act of speaking. Thus, if a speaker says *pass me the salt*, we judge that the speaker had a need for salt; even if we could identify the speaker's need for salt in advance, we could not predict the expression, *pass me the salt*, except as one of numerous possibilities – one of which is that no verbal act would occur at all – the speaker might simply pick up the salt. This is part of the vagueness inherent in the functional (and any other) approach.

Such issues, however, are removed from the business of identifying linguistic units and structures. It should be clear that the determination of linguistic units with separate identity is tested by the method of commutation, or (in America) the substitution test, and the descriptive usefulness of the method and the underlying concept have been amply demonstrated in many (often very revealing) linguistic analyses. The separate relevance, or distinctive function of a proposed analytical unit (phoneme, moneme, etc.), implies that the proposed unit must be replaceable by at least one other unit of the same type in defined contexts in such a way as to change or destroy the utterance, or that the absence of any unit of the same type in the same context will do the same (commutation with "zero"[2]). That is the point expressed by Mulder (above). This principle is clearly consistent with the view that the minimum communication system consists of at least two opposed possibilities ("choices" in the system) – Shannon and Weaver (1949) and Mulder and Hervey (1972). One should note, in view of what is to follow, that the establishment of a linguistic unit, such as a phoneme, i.e. the demonstration that it is functional, is not the same as calculating a value for that function.

Some questions

The usefulness of a functional approach is not in doubt. However, apart from the issues referred to above, there remains the issue of what it is "to have a function". If we say "X has a Y", as when we say "the phoneme /p/ has a distinctive function in English", then one would expect that there is a phoneme /p/, there is such a thing as "distinctive function in English", and that the two things are related by a relation of "having". Then, one can reasonably ask:

- *What* is it that "has a distinctive (or any other) function"?
- What is a distinctive function (in English or any other system)?
- And what is it to "have a distinctive function"?

However, other interpretations of the expression "having a function" are possible. These matters can be clarified by looking at ordinary usage. In ordinary English, one can say:

John has a car
John has a wife, etc.

[2] A procedure, which must be used with care – as is well-known.

In both of those cases, the sentence refers to an identifiable individual (John) named by the subject and an identifiable real-world individual named by the object (a car, a wife), and the sentence asserts an ordered relation between the individuals, i.e. this possibility corresponds to the interpretation of "x has a function" in which x and a function are separate real-world entities. The relation of "having" is clearly different in the two ordinary English sentences, and that is part of the general semantic indeterminacy of the word *have*. It ranges from possession (in the first case) to "strong association in time, place, or identity with", as also in:

London has many churches.

Whatever the semantic indeterminacy, the sentences are of the general form: ($\exists x$) & ($\exists y$) such that (x R y), where "R" is the relation of "having". Presumably, the interpretation of "having" in "having a function" would be more like that of "strong association" or "possession of a quality", rather than "ownership".

But what are we to say when we have such sentences as:

John has British citizenship
John has a confident personality
John has sensitivity
?

In such cases, the object does not refer to an identifiable entity in the real world separate from John, but rather to some quality which we attribute to John and which is, in some sense, inherent to him. That is we cannot say ($\exists x$) & ($\exists y$) such that (x R y), because there is no *real-world* extended object, "y", to satisfy the function[3]. Rather, we must look at alternative interpretations of "having". The sentences are instances of a general scheme: ($\exists x$) (Fx), where F is the function "having British citizenship", or "having a confident personality" or "having sensitivity".

A third possibility for interpreting "having a function" can be seen in sentences such as:

John has the function (job) of doorman.
The handle has the function of starting the engine.

Here "having a function" has the meaning "performing a role" in the case of John, the doorman, or "being used for the purpose of" in the case of the handle. These meanings are obviously close to those in the interpretation of function as pragmatic value, and – as we shall see – in the attribution of linguistic analyses to speakers.

So, when we say some linguistic unit, x, "has distinctive function", which of the three possibilities are meant? Essentially, this comes down to the questions:

- What is it that "has a linguistic function"?
- Are there identifiable linguistic entities that exist independently of distinctive functions?

[3] This is, of course, not to assert that British citizenship, confidence, sensitivity, etc. are not "realities" as concepts or constructs.

- Do distinctive functions exist separately from formally identifiable entities which "have" them?
- In what sense can entities "have" distinctive functions?
- Do linguistic entities perform actions and/or are they entities which are "used" for communication?

Some functionalist answers

The standard forms of functionalism are rather unclear on the above matters, but it is likely that functionalists in the Prague School tradition, including followers of Martinet's functionalism, would deny the existence of linguistic entities without distinctive function and *vice versa*. As noted above, there is a clear difference of view between those who regard (distinctive) function as an inherent property of linguistic entities and essential to analysis, and those (like Vennemann and Morin, above) who regard linguistic entities as purely formal entities. To some extent, the debate is a terminological one over what counts as a linguistic entity (but note the comments above). For functionalists, it is "function" which determines that an entity is part of a language and its position in the linguistic system. After all, for Martinet, having a distinctive function is the "criterion of linguistic reality", so it seems he sees distinctive function as an inherent component (property) of linguistic entities such as phonemes and monemes. The "possession" of distinctive function "creates" a linguistic reality. Standard functionalists would then deny that distinctive functions exist separately from the entities which "have" them. While *functional loads* might be quantified in terms of sets of oppositions of like entities in similar contexts, distinctive functions would be a property of entities. For standard functionalists, then, "having a distinctive function" is more like "having British citizenship" or "having confidence". It is a defining and necessary property of linguistic entities[4], but "standard" functionalism is unclear on the ontological status of those entities – are they real-world entities or entities which have reality in our conception of them in linguistic descriptions? Are linguistic realities determined by functional analysis *constructs of the linguist*? As I have argued elsewhere (Rastall, 2013), one cannot simply attribute the linguist's analysis to the brain or mind of the native speaker. The linguist's analysis is at most an account of the verbal behaviour of speakers seen from a coherent point of view showing how communication can take place. We return to this issue below.

Martinet, on the other hand, presents the linguist's analysis as an account of the behaviour of the speaker and hearer. He says (1975a: 96):

> Le principe de pertinence, emprunté par les premiers phonologues à Karl Bühler, se fonde sur l'observation que la réalité physique de la parole comporte, à chaque point, des éléments

[4] As noted above, this does not mean that other functions are unimportant. However, there is clearly a problem with communicationally relevant relations in phonology or syntax. Relations, such as subject – verb or prenuclear – nuclear (in phonology) are not "separately relevant" in the sense of being opposed to some other relation or their absence in the same context (see also Rastall 1993 on this point). Relations seem to be "functional" in the sense of "necessary for the communicational coherence of combinations". That obviously stretches the meaning of term "functional" in a way that needs to be addressed in any functionalist theory.

> d'information de nature différente que l'auditeur qui connaît la langue employée, est dressé à trier inconsciemment et à interpréter correctement. Seuls pertinents pour l'étude phonologique sont les traits de la parole correspondant aux choix faits par le locuteur […][5]

The linguistic system, for Martinet, is further identified with the communicational values of the community (1975a: 97). While Martinet's views have a plausible appeal, they are presented without evidence for a direct attribution of the linguist's analysis to individual speakers and without separate evidence of the communicational values of the speech community. Linked to Martinet's view that the linguistic description accounts for the behaviour of the speaker is the view of many functionalists (and others) that languages and their components are "instruments for communication" that are "used" by speakers. In extreme forms, as I have pointed out elsewhere (Rastall 2013), the view has been taken that linguistic units "do things", i.e. perform functions, as in the third interpretation of having a function (above). The idea of languages as instruments for communication is closer to the view that speakers "do things" with words (in Austin's formulation, 1962, followed by many speech act theorists).

It should be clear that words do not "do things" or "perform actions" (in the way that John performs the function of doorman in our example), and that it is, at best, a misleading shorthand to say, for example, that a nominative noun in Russian conveys the agent or that the English phoneme /p/ distinguishes /pat/ from /at/. One might reasonably say that people, in their verbal behaviour, "do things" or perform actions, when they speak, and our descriptions may be taken as accounts of speaker behaviour from a communicational point of view. However, that does not imply that speakers "use" a communication system as an instrument, in the way that a person might use a hammer. Such a view would require that the communicational instrument, in some sense, existed separately from the speaker, and that the speaker, in some sense, operated – consciously or unconsciously – "with" it. The vagueness of such a position is conveyed by the expression "in some sense", but the fundamental weaknesses of this approach are, firstly, that the language or instrument of communication is the product of linguistic analysis, and, secondly, that the approach implies a distinction between a rational mind and the linguistic system, such that the mind (in some sense) operates with that system. The first point implies an unjustified attribution of the linguist's analysis to speakers' brains, and the second point implies an unacceptable form of mind-brain (or mind-body) dualism.

In short, the third set of ordinary-language meanings for "having a function" (above) should be avoided. (Morais-Barbosa, in the above-mentioned article, reaches a similar conclusion.) Now, while Martinet's approach looks like the second ordinary-language interpretation (above), in Mulder's analysis, there appears to be the alternative (first) way of interpreting the relation of having a function.

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[5] "The principle of relevance, borrowed from Karl Bühler by the early phonologists, is based on the observation that the physical reality of speech contains, at each point, elements of information of different types which the hearer who knows the language being used has been trained to sort unconsciously and correctly. The only features of speech relevant for phonological study are those which correspond to the choices made by the speaker." [PR]

Mulder's position

In Mulder's axiomatic functionalism (the latest version of the theory is found in Bičan and Rastall 2011: 275ff), the first axiom states that "all features in semiotic sets are functional", and "functional" is defined as "separately relevant to the purport of the whole of which it is part" (def. 1a). While the axiom seems to allow for a range of different functions, and later on the non-distinctive function, "contrastive function" is allowed for (e.g. defs. 18a and 19a), the definition immediately following the axiom and referring to separate relevance clearly refers to distinctive function. Distinctive function is defined later as "the set of oppositions in which an entity may partake" (def. 7a3, 2011: 278). "Features" are also separately defined as, "elements, analytical properties of elements or relations between elements or analytical properties of elements". (See the above footnote 2 in this respect.)

At least on the surface, this looks as though Mulder is saying that one can identify semiotic features on the one hand and distinctive functions on the other, and that features and distinctive functions can be associated, where features "are functional" or "have a distinctive function", and distinctive function can be separately calculated for any feature (distinctive feature, phoneme, phonotagm, moneme, plereme, syntagm, para-phonotactic or para-syntactic feature).

That impression is certainly confirmed in the calculus of possibilities in Mulder's early work, *Sets and Relations in Phonology* (1968), where the distinctive functions of phonemes and distinctive features are calculated in terms of sets of oppositions (97ff and 187–8). The latest version of the theory, as noted has the same definition as in 1968 (def. 7a3, 2011: 278). Furthermore, Mulder's "signum theory", which (among other things) embodies the ontological framework of the theory, seems to confirm the view that Mulder's interpretation of "having a function" is more like that in *John has a car*. This ontological framework (presented, and going through different versions, in various publications, e.g. Mulder 1993 as an example of the latest stage in development), starts with the primitive idea of an "image" (*i*) of a phonetic event.

Now, axiomatic functionalism distinguishes clearly between real-world phenomena as that which is to be analysed and described, and the linguist's constructs which present the analysis.

We can think of the "image" as a phonetic construct of the (or perhaps better, *selected*) real-world physical properties of an utterance or part utterance. Later it is necessary to work with our construct of the information or message conveyed in a real-world utterance. An image seen in the perspective of its communicational value is a construct with both form and distinctive function (an "allophonon", *i* R *d*, where R *d* expresses the relation of "having a specific distinctive function" or "being functional"). For Mulder, a further application of distinctive function in grammar leads to the definition of the utterance[6], (*i* R *d*) R *d,* i.e. an utterance is a model with the distinctive function of an image and the distinctive function of an allophonon – a phonetic-grammatical entity. One can generalise, to define a phonetic form, *f*, as a class of images ($f = \{i\}$). [t^h] is a phonetic unit. A phonetic form with a distinctive function (*f* R *d*) is an allophone (e.g. [t^h] with its distinctive function in English) and a class of allophones is a phonological form ($p = \{f \text{ R } d\}$), e.g. the allophones [t],

[6] Other linguists have not followed Mulder in this, see Rastall (1993) and below for an alternative position, although that is irrelevant to the current argument.

[t^h], etc. representing the phoneme, /t/, i.e. class of allophones, each with a functionally non-different distinctive function. By adding a second level of distinctive function in grammar to the allophone ((*i* R *d*) R *d*), one arrives at the allomorphon (such as [ðə]/"the") and a phonological form with distinctive function in grammar (*p* R *d*) is an allomorph (/ðə/ – "the"). A class of allomorphs is a signum ($S = \{p \text{ R } d\}$), "the" = /ðə/, /ðij/, etc.. The approach allows one to distinguish models of particular utterances from more general models for classes of utterances – the universe of speech events under consideration in a given speech community.

The formulae of the type, *x* R *y*, plainly suggest that ($\exists x$) and ($\exists y$) such that *x* and *y* are separate entities linked by a relation, R (see below). I have criticised Mulder's presentation in two earlier publications (Rastall 1993 and 2011). The main criticisms are relevant to this discussion.

Firstly, Mulder's axiom ("all features in semiotic sets are functional") invites the question whether the copula "are" is to be interpreted as an equivalence (as in "all vipers are adders" and *vice versa*) or an implication, as in "all horses are four-legged animals" (whatever is a horse is four-legged animal, but not *vice versa*). Given Mulder's definition of "functional" above ("separately relevant to the purport of the whole of which is a part"), one must assume that the axiom cannot state an equivalence. Otherwise, one would have to conclude (absurdly) that the steering wheel of a car or a girder in a bridge are features in semiotic sets, since they are clearly "separately relevant to the purport of the wholes of which they are part".

Of course, one might object that the undefined term, "purport", should be understood to mean "meaning (of a text)", rather than "purpose or object" (of a totality). The lack of definition on that point is part of the vagueness referred to above. However, that narrower interpretation raises further difficulties, as including "meaning" would seem to restrict "functional" entities to semiotic ones, and make the axiom look tautologous. Alternatively, it would raise questions about what can be included in the already very elastic term "semiotic". Would a brushstroke in a painting or a single note of a songbird, for example, be a (separately relevant) semiotic feature? Is the curve of a car bonnet – an aerodynamic design feature – a "semiotic feature"?

If the axiom is read as an implication, however, one must be able to identify features in semiotic sets independently of function (and *vice versa*). If "function" or "functional" enters into the definition of features, then the axiom becomes an empty tautology ("all functional features in semiotic sets are functional"). Similarly, if "semiotic feature" is part of the definition of "functional", we arrive at "all features in semiotic sets are functional features in semiotic sets", and – even worse combining the two – "all functional features in semiotic sets are functional features in semiotic sets". That is, Mulder set up an axiomatic-deductive theory with definitions. When we substitute definitions for terms, the theory will only say something constructive, if it is not tautological, and that implies that the definitions of "features in semiotic sets" and "functional" are different[7]. It is difficult to follow the chain of definitions much further, but all of the "features" Mulder discusses clearly

[7] As I understand it, Mulder's axioms are not purely analytic (where the meaning of the predicate is contained in the meaning of the subject) or semantically empty, as in a formal axiomatic theory. They are a priori statements which can be interpreted as bringing together separate ideas to form meaningful propositions. In Kant's terms, they are "synthetic a priori" statements.

must possess distinctive function – distinctive features, phonemes, signa, etc. or cenemes, pleremes in non-linguistic semiotic systems, etc. In other words the axiom cannot be read as an implication either.

If we look at the formalism described above, which represents the series of definitions under axiom E of the theory (2011: 283) we run into other problems. The most obvious is that a phonetic form (*f*) is a class, and distinctive function is attributed to *f* to arrive at the allophone (*f* R *d*). Clearly, this cannot be right. One cannot attribute the properties of members to the class, and class characteristics, such as forming a power set, cannot be attributed to the members. A horse may have four legs and a tail, but a class of horses does not.

In the first place, it is not at all clear that an image, or its real-world correlate, is *opposed to* anything. The relation of "opposition" implies comparison with other entities. The "image" is simply a record of what is found in the phenomena. That is, the allophonon is already a product of linguistic analysis (comparison). One does not (additively) attribute some separately existing function to an image. The allophonon is the linguist's way of accounting for the communicational aspect of utterances or part utterances. The presentation of classes of classes in the model to provide an ontological framework is, therefore, rather misleading, if read in such a way that distinctive function is "added to" or somehow separate from otherwise identifiable "features".

More importantly, the *class* of images does not have a distinctive function. One might, however, define the allophone as a class of allophonons, i.e. $\{i^1 \text{ R } d, i^2 \text{ R } d, \ldots i^n \text{ R } d\}$, where all *i* are members of the class, *f*. Presumably, what Mulder wants to say is that a distinctive function is the defining property of the members of an allophone class, and *not* that the *class* has a distinctive function. It looks as though he is using a convenient, but misleading, shorthand in the formal expression of his theory. If that is correct, "distinctive function" is not a separate linguistic entity and one cannot see the allophonon as a combination of the phonetic feature and the distinctive function, i.e. as separate entities in a relation *i* R *d*. They are different, but simultaneous, aspects of the same construct.

One should note, furthermore, that in the case of a relation, R, between an entity, *x*, and a distinctive function, *d*, the entity, *x*, appears on **both** sides of the relation in Mulder's account, i.e. it is not the case that there are two separate entities, *x* and *d*. This is because *d* is the set of oppositions which *x* enters, i.e. $\{x \sim a, x \sim b, x \sim c, \ldots x \sim n\}$, where "~" means "is opposed to"; i.e. we get by substitution, $x \text{ R } \{x \sim a, x \sim b, x \sim c, \ldots x \sim n\}$. So, also from this point of view, a functional entity and its distinctive function are not separable. Indeed, on this view, an entity contracts a relation with its own opposition to other entities. It is as if we are saying that the identity of John is not his differences from all other people, but the relation of John to John's differences from other people. I am at a loss to understand what that could mean. One might speculate that Mulder was trying to find a formal way of expressing an entity in its functional aspect, but the formalisation is at best misleading.

However, that raises another wider problem. How can one attribute a distinctive function to a *construct*? Are we really to take the view that it is constructs, such as allophones or phonemes that "have distinctive function" and are separately relevant to the purport of the wholes of which they are part? Constructs would then be separately relevant to the *class* of constructs of which they are part. Rather, we should say that distinctive (or any other) function is part of the construct, and it helps us to understand the communicational value of real-world speech acts and their components.

Yet attributing a distinctive function to a construct seems to be exactly what Mulder is saying in the above quote when he says, "the essence of a phoneme is the distinctive relation in which it stands with regard to all the phonemes with which it commutes". Earlier, Mulder says (1968: 127):

> The essence of a phoneme, i.e. the very reason for its establishment, apart from its being the minimum *syntagmatic* unit in phonology, is the *distinctive relation* in which it stands with regard to all the other phonemes in the language. This is all I mean when I say a phoneme *has* distinctive function.

But, of course, that is not all Mulder means. He goes on to say (1968: 127–8):

> Once established as a distinctive item, its [the phoneme's, the linguistic unit's] exact distinctive function within the universe of discourse can be calculated (this is in theory even true for the distinctive function of entities in grammar) […]

and he proceeds to present a calculus for determining the distinctive function of phonological entities.

Mulder very clearly here seems to be saying that distinctive functions are separate from the entities (e.g. phonemes) that "have" distinctive function, but there seem to be some confusions here.

A phoneme is already by definition a linguistic entity with a distinctive function. It is a functional feature. As Mulder says, that is its essence. By defining distinctive function as a sum of oppositions between phonemes or other linguistic units, distinctive function becomes a function of already functional entities. (In x R d, then, d is already included in x, just as x is included in d – as we saw above.) That is, one should distinguish distinctive function *as a defining property of linguistic entities* – i.e. the assertion that x is a functional or distinctive entity – from *a calculus of functional value or load* – the sum of the oppositions a phoneme or other linguistic unit enters[8]. Differences of functional load account for the information value of linguistic units and for the observation that some linguistic units carry more information than others. Linguistic entities in closed inventories, such as articles or prepositions, enter fewer oppositions in the same context than nouns or verbs, and thus convey less information, as quantity of information is proportional to the number of "choices" in a system[9]. Similarly, some phonemes, such as /ð/ and /θ/ in English enter fewer oppositions than others in most contexts. That may well be associated with the absence of those phonemes in some varieties as features with a low functional load tend to lose their functions or to disappear. The great variability in prepositions is also very likely related to their low functional loads. (For an interesting early discussion with many diachronic examples, see Horn 1923.)

Now, I have used the words "appear" and "seem" above with regard to the interpretation of Mulder's presentation of his theory. This is because the issues discussed above arise

[8] One might reserve "functional load" for specific, or micro-, contexts, e.g. the functional load of /p/ in the context /ti-/ as opposed to the functional value of /p/ in the overall system of phonemes.

[9] It could be argued that Mulder's first axiom is not absolutely "primitive" since it is implied by ideas from communication theory, such as the necessity of having at least two "choices" in a system for information transfer. However, it might also be argued that the first axiom is Mulder's way of expressing those ideas.

from apparent interpretations of his theory as it is stated. In my view (although this is somewhat speculative), those are not, for the most part, interpretations that he intended. However, one can only address the theory as it is stated, and – as it stands – Mulder's version of Axiomatic functionalism presents a view of "having a function" (of whatever sort) in which semiotic features and functions (especially distinctive function) are presented as separate entities which are linked by a relation of "having", as in the ordinary English sentence *John has a car* (above). That view cannot be maintained. Mulder attempted to present a theory which was as explicit as possible, and he attempted to use an axiomatic-deductive framework with a formalism borrowing from set theory and relation theory. In my view, he was constrained by his own formalism, which did not say what was intended. That is, I believe Mulder's use of the axiomatic formalism and the set-theoretical notation did not correspond to his meaning. It is an old philosophical complaint that "language" is an inadequate vehicle for expressing thoughts. That is (ironically) one reason for the development of symbolic logic (Whitehead and Russell 1910: 1–3). Mulder would probably have denied that his first axiom was either an equivalence or an implication. It is a statement of the inherent nature of semiotic entities, and his axioms and definitions an analysis of fundamental concepts. Thus, he would have said that his formalism included an analysis of the idea of "having a distinctive function" and that his concept of distinctive function was a way of calculating the value of a distinctive function. As we have seen, some of Mulder's statements can be interpreted as taking the view that function is an inherent component of any semiotic entity. Nevertheless, the presentation is clearly misleading. One must distinguish "being functional" from "the value of a functional load", and re-work functional constructs in that light.

Some conclusions

I should like to propose the following. Linguists set up constructs to account for the communicational value of real-world utterances and part utterances from a variety of perspectives. That is a fundamental ontological distinction. Those constructs all consist of entities which are simultaneously, inherently, and indissolubly both formal and functional. Form and function are simply different ways of viewing the *same* entities. The expression "*x* has distinctive function" is therefore misleading. The construct, *x*, is an entity (such as a phoneme) established by the linguist in which the form accounts for physical aspects of verbal behaviour (to locate the reference of a construct in the speech event) and function accounts for its communicational value from a range of perspectives. "Having a function" is thus an inherent part of the essence of any linguistic entity. We should not say that a construct such as a phoneme or moneme has a distinctive (or other) function. Rather, the function is our analytical perspective in setting up the construct.

Distinctive function is the central perspective in determining the identity of linguistic units. We cannot say that real-world speech events "have distinctive function", as Trubetzkoy and Martinet appear to. Distinctive function is a way of accounting for communicationally relevant and observable differences in real-world speech behaviour. This view could be expressed as – "all semiotic features are form-function constructs accounting for the communicational value of real-world speech events or part events", where the copula

expresses an equivalence. The formulation is clearly similar to the view of the sign proposed by Saussure as simultaneously and inherently the signifier of a signified and a signified of the signifier, when he says that language, and hence its components, the signifier and the signified, are indissoluble aspects of the same thing, like the recto and verso of a sheet of paper (1972: 157ff). It is also similar to the tagmemic concept of the tagmeme as a form-function correlate (Cook 1969: 15ff).

It should be noted that the view presented here differs from that of Martinet, for whom linguistic analysis is the segmentation of the phonic substance or utterance (1975b: 17) through oppositions. Martinet was following Trubetzkoy, who also saw oppositions in the phonic substance, rather than in the constructs established by the linguist and justified through the comparison of speech events or part speech events. Trubetzkoy (1969: 3) says:

> Oppositions of sound capable of differentiating the lexical meaning of two words in a particular language are *phonological* or *phonologically distinctive* or *distinctive oppositions*. In contrast, those oppositions of sound that do not have this property are *phonologically irrelevant* or *non-distinctive*.

However, one cannot actually "interchange" sounds in real-world utterances. Commutations are thought experiments involving the comparison of selected (and usually generalised rather than particular or individual) sound features taken as representing real utterances or part-utterances[10]. So the relationship of our linguistic constructs and methods to real-world speech phenomena is not as simple as Trubetzkoy, Martinet, and others such as Jakobson suggest.

We have thus answered our questions. We have identified what "has" distinctive function and what it is to "have" distinctive function. Distinctive (and all other functions) are defining, component properties of linguistic constructs and they serve as ways of accounting for aspects of real-world communication. (A similar view of constructs is found in Lyons 1977: 233ff). To assert that *x* is a distinctive linguistic unit, or is functional, is to state that *x* is a construct which accounts for the separate communicational contribution of real-world speech events or part-events from a given perspective. The perspective will always involve the identity of the unit, and may involve other perspectives, such as the value of the unit in the transmission process of speech, or its value in combinatory relations, or its relation to non-linguistic experience, or its value as an index of social or varietal perceptions, or its role in a text, or its role in inter-personal relations (to name a few possibilities). "Functional" can be defined as the property of separate relevance to a specified parameter of communication. While "separate relevance" can be demonstrated through oppositions, the concept of "separate relevance" must be extended to allow for non-oppositional, but necessary, combinatory relations. Separate relevance in the case of relations can be seen as "necessary for the coherence of the construction of which it is a part". While all features in semiotic sets will be functional, and distinctiveness is essential for linguistic identity, it should be clear that all functional entities may enter non-distinctive functions, and that we need to reflect that hierarchy of functions in our thinking and presentation of the theory.

[10] Indeed, as Hervey (1990) says, one must distinguish linguistic data (which are themselves constructs involving comparisons, thought experiments, idealisations, etc.) from real-world phenomena with which they are connected.

The definition of "distinctive function" (in Mulder's theory) is in fact a definition of "functional value or load".

Real-world events are variables satisfying descriptive functions. Those descriptive functions depend on the analytical framework provided by the theory. The linguistic description provides a coherent account of verbal communication from a given point of view, but does not imply that the linguist's constructs are cognitive entities or indeed that there are naturally occurring real-world correlates of linguistic entities. Linguistic entities are ways of understanding the world we observe from a functional perspective.

In a sense, then, this approach agrees with Martinet's idea that functional analysis presents a linguistic reality. The hierarchy of functions is a "reality" in the sense that it is a way of understanding real-world verbal behaviour. (See also Jachnow 1981 on the hierarchy of functions.) This is similar to Martinet's view without the assumption that the linguist's analysis is the speaker or hearer's verbal behaviour or some supra-individual communication system of the community. It is, however, a way of accounting for the observable properties of communication in a community. Viewed in this light, Mulder's signum theory can be re-interpreted in such a way that we do not divorce form from function, and provided we treat the assignment of distinctive function to classes as merely a convenient, if rather misleading, shorthand. That is, when we speak of allophones or allomorphs as functional entities, it is for the purpose of generalisation over the members of the classes they name. Allophonons, allophones, phonological forms, allomorphons, allomorphs, and signa can be retained as form-function constructs in an ontological hierarchy of abstraction in the above sense, but the formalism – if retained (and I am doubtful whether an unambiguous formalism is achievable) – would have to be elucidated, and the axioms and definitions amended.

Post-script[11]

This is not the place to re-work Axiomatic Functionalism, and I have already expressed doubts about the axiomatic format of the theory. An axiomatic-deductive approach has advantages in transparency and the organisation of our ideas. It provides starting points for discussion, but as suggested above we must be careful not to allow a format to distort the message.

That said, axiomatic functionalism has provided a number of significant contributions to functionalist linguistics. We could offer the following, as an example of how a different view of axiomatic functionalist concepts might look, and be integrated with other functionalist approaches. In a number of ways, they would be closer to mainstream functionalism, in particular in making a fundamental distinction between constructs accounting for purely differential function from those accounting for constructs with both distinctive identity and semantic value, and in regarding the model of the utterance (the sentence) as the construct which brings together all communicative perspectives. This is similar to the position adopted by Hervey (1990).

[11] I have inserted this section at the suggestion of Aleš Bičan, who felt that some indication of how a reworking of axiomatic functionalist concepts might look would be useful. The suggestions below are entirely my own view, and not intended to be in any way representative of axiomatic functionalist thinking.

In such an approach, an allophonon would be a form-function construct accounting for a single speech act (event) or component of a speech act (event)[12] as a physical manifestation with a separate communicational value. The distinctiveness of a given allophonon – its place as a necessary unit in a description would be tested through commutation. I.e. hypotheses of phonological units would be tested as usual by commutation, seen as a thought experiment comparing allophonons.

An allophone would be a class of communicationally similar allophonons viewed extensionally, while the distinctive function would be the defining property of the class. A class of allophones with non-different functions would be a phonological form. Classes of entities are useful as generalisations – ways of understanding classes of speech acts or part speech acts of the same sort from selected perspectives.

As already indicated, I do not share Mulder's view of the *signum*. In my view, the allomorphon should be seen as a distinctive form-function unit bringing together an allophonon with a semantic function. Allomorphs would be classes of allomorphons, seen extensionally with a nexus of formal and semantic features defining the class, and a signum would be a class of functionally non-different allomorphs. Allomorphons, allomorphs, and signa are also distinctive entities from the point of view of their identity. Thus, they too can be viewed from the point of view of their functional value or load in a specific context. Grammatical entities, on this view, would be distinctive formal-semantic entities seen from the perspective of morphological or syntactic functions. This seems to me to be much closer to the normal understanding of the duality (or double articulation) principle, and builds in the connection between signa and non-linguistic experience that is central to functionalism.

Signa as formal-semantic entities could then also enter a range of other functions, when seen from different perspectives – e.g. associative, pragmatic or textual. The sentence would be a construct bringing together all the relevant communicational perspectives for an account of a real-world speech act or event. The model of a single speech act or event would be an "utterance" with the "sentence" as a class of utterances. Thus, an English signum, e.g. *later*, from a grammatical point of view consists of *late* + *positive comparative*, and enters a range of syntactic contexts as an adjective or adverbial. From a pragmatic point of view, an utterance of *later* can be seen as an address to the hearer to defer action, and from a textual point of view it may refer the receiver to a part of the text which is still to come. This is not exclusive. Clearly, the signum *later* can also enter a range of other functions (e.g. in combination with paratactic features) and might be seen in other functional perspectives (for example, in terms of its social and register value, as distinct from *not now*, *in due course*, *afterwards*, etc.). Following Saussure (1972: 175), one can also see *later* as entering a range of (paradigmatic) associative relations as a function of which *later* occupies a place in a kind of lexical "space" – *(lat)er ~ lighter ~ greater ~ …*; *lat(er) ~ delayed ~ postponed ~ …*

The above remarks are intended only as a way of indicating how Mulder's ideas might be re-interpreted, and made more consistent with other functionalist approaches. They are not intended to be exhaustive or exclusive. However, we have arrived at a position in which "having a function" is similar to Hjelmslev's notion (above) of being a component of an analysis, but where the central aim is to connect verbal behaviour to non-linguistic

[12] We can view the phenomena as either acts by a speaker or as observable events in time and space.

experience in a range of communicational parameters (as Hagège, above was clearly pointing to.) In this approach, "having a function" is inherent to our constructs as a way of understanding communicational reality from a range of specified perspectives.

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ASSOCIATIVE MEANING AND SCALAR IMPLICATURE: A LINGUISTIC-SEMIOTIC ACCOUNT[*]

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Abstract. This paper shows that three kinds of phenomena typically subject to disparate analyses are all forms of 'associative meaning': (i) extralinguistic-based, (ii) linguistic-based, and (iii) scalar implicature-based. It argues that scalar implicature in particular may be of three types: hyponymous, quasi-hyponymous, and pseudo-hyponymous. The paper begins with a basic definition of denotative and connotative meaning, and within connotative meaning of associative meaning. A formal model is provided for utterance-meaning, based around the notions of referent and ascription. This allows for a detailed formal analysis of extralinguistic- and linguistic-based associative meaning. The model is refined to address scalar implicature-based associative meaning, through a theory-based account of the distinction between ambiguity and indeterminacy, allowing for a formal analysis of 'some' and cardinal numbers. I also briefly consider a fourth type of associative meaning – contextually determined associative meaning – using Arabic examples, to illustrate the profound conventionality and language-specificity of the relevant aspects of meaning. Rather than providing a new account of how we understand the meaning of scalar implicatures, or other aspects of utterance-meaning, this paper adopts the standpoint that in order to understand *how* a hearer understands what an utterance means, we need to know first *what* it means; i.e. a coherent model of utterance-meaning is a sine qua non for the investigation of utterance cognition.

Key words: associative meaning; scalar implicature; semiotics; pragmatics; denotative meaning (denotation); connotative meaning (connotation); some; all; cardinal numbers

1. Introduction

This paper shows that three kinds of phenomena typically subject to disparate analyses are all forms of 'associative meaning': (i) extralinguistic-based (e.g. the meaning associations of 'nurse' in English with 'female nurse' rather than 'male nurse'), (ii) linguistic-based (e.g. the differing meaning tendencies of the synonyms *vernietigen* and *vernielen* 'to destroy' in nineteenth-century written Dutch, to be used to refer to different kinds of destruction); and (iii) scalar implicature-based (e.g. the tendency for 'some' to be interpreted as meaning 'not all'). It also argues that scalar implicature in particular may be of three types: hyponymous, quasi-hyponymous, and pseudo-hyponymous.

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Drawing on ideas developed within the semiotic and linguistic theory of axiomatic functionalism (e.g. Mulder 1989; Dickins 1998; and Dickins 2009, which includes formal definitions of the theoretical terms discussed here), this paper begins with a basic definition of denotative and connotative meaning (Section 2), and within connotative meaning of associative meaning (Section 2.1). It considers three types of associative meaning: extralinguistic-based, linguistic-based, and scalar implicature-based (Sections 3–3.3). A formal model is provided for utterance-meaning, based around the notions of referent and ascription (Section 4). This allows for a detailed formal analysis of extralinguistic- and linguistic-based associative meaning (Section 4.1). The model is refined to address scalar implicature-based associative meaning (Section 5), through a theory-based account of the distinction between ambiguity and indeterminacy (Section 5.1), allowing for a formal analysis of 'some' (Section 5.3.1) and cardinal numbers (Section 5.3.2). I briefly consider a fourth type of associative meaning – contextually determined associative meaning – using Arabic examples, to illustrate the profound conventionality and language-specificity of the relevant aspects of meaning (Section 6).

This paper does not attempt to provide a new account of how we understand the meaning of scalar implicatures, or other aspects of utterance-meaning, or consider in detail existing 'cognitive pragmatic' accounts of this nature. Rather, it adopts the standpoint that in order to understand *how* a hearer understands what an utterance means, we need to know first *what* it means; i.e. a coherent model of utterance-meaning is a sine qua non for the investigation of utterance cognition. This point is argued at various places in the paper, particularly in the conclusion (Section 7).

2. Denotative vs. connotative meaning

This paper operates with a basic distinction between denotative meaning and connotative meaning. Denotative meaning can be understood for current purposes as involving the overall range of a word[1] or multi-word unit or, by extension syntactic structure (including the words involved in that structure), in a particular sense: two words/multi-word units/syntactic structures in a particular sense which 'pick out' the same extensional range of entities in the world – or better, in all possible worlds, real and imaginable – have the same denotative meaning. The term 'entity' is used here in the broadest possible sense, to cover not only objects – physical and abstract – but also all sorts of other notions: e.g. qualities (as denoted by adjectives), processes (as denoted by verbs), relations (as denoted by prepositions), etc. (cf. also Mulder and Rastall 2005). This initial definition will be refined later in this paper (Sections 5–5.3.2). Denotative meaning is also known by other terms, e.g. denotational meaning, denotation, propositional meaning and cognitive meaning (e.g. Cruse 1986: 45, 271–277). Connotative meaning, or connotation, is defined here negatively as all kinds of meaning which are not denotative meaning.

Connotative meaning, as noted, is all kinds of meaning which are not denotative meaning, i.e. connotative meanings are those kinds of meanings which do not involve the exten-

[1] 'Word' is not, in fact, a technical term in extended axiomatic functionalism. I will, however, use the term 'word' in this paper as a synonym for a certain, albeit ill-defined, kind of grammatical entity / signum (for these terms, see Section 4).

sional range of a word/multi-word unit/syntactic structure. Connotative meaning is thus meaning minus denotative meaning. There are many kinds of connotative meaning (perhaps an endless number). For various lists of a type which are relatively consonant with the current approach, see Leech (1981), Hervey and Higgins (2002; also Dickins, Hervey and Higgins 2002), and Baker (1992; following Lyons 1977). In this paper, I will deal with only one kind of connotative meaning: what Hervey and Higgins (2002) call 'associative meaning'.

2.1 Associative meaning

Hervey and Higgins define associative meaning as "that part of the overall meaning of an expression which consists of expectations that are – rightly or wrongly – *associated with the referent* of the expression" (Hervey and Higgins 2002: 149–150). For reasons which will become apparent later in this paper (especially Section 4 onwards), we can rephrase this as "that part of the overall meaning of an expression which involves features typically ascribed *to the referent* of the expression". The word 'nurse' is a good example. Most people automatically associate 'nurse' with the idea of female gender, as if 'nurse' were synonymous with 'female who looks after the sick' – on the basis that in the real world (at least in Britain and other English-speaking countries at the start of the twenty-first century) nurses are typically female. "This unconscious association is so widespread that the term 'male nurse' has had to be coined to counteract its effect: 'he is a nurse' sounds semantically odd, even today" (Hervey and Higgins 2002: 150).

It is important to stress here that the oddity of 'he is a nurse' is not a matter of semantic contradiction – as would be 'he is an actress' (where 'he' and 'actress' involve semantic disjunction) – but merely of unusualness. A Google search for the string "he's a nurse" (29.5.2014) yielded 96,800 hits, while a search for "she's a nurse" yielded 922,000 hits (an example of 'he's a nurse' brought up by the Google search being "He's not a performer by profession, he's a nurse at Valley Hospital"). Associative meaning specifies a narrower typical 'denotative range' than that of the (full) denotative meaning of a word/multi-word unit/syntactic structure (in the relevant sense). The (full) denotative meaning of 'nurse' (in the relevant sense) thus encompasses both 'male nurse' and 'female nurse', the associative meaning 'female nurse' having a narrower 'denotative range' than the full denotative range of 'nurse'.

3. Three types of associative meaning

In this paper I will consider in detail three types of associative meaning: extralinguistic-based, of which 'nurse' is an example (Section 3.1), linguistic-based (Section 3.2) and scalar implicature-based (Section 3.3).

3.1 Extralinguistic-based associative meaning

Extralinguistic associative meanings are those associative meanings which are determined – or perhaps better, motivated – by the facts of the extralinguistic world. An example is the

fact that 'nurse' has associations of femaleness (Section 2). In Britain (and the West generally), the great majority of nurses are female. Accordingly, the word 'nurse' tends to be associated with females. The great majority of engineers, by contrast, are males. Accordingly, the word 'engineer' tends to be associated with males: it has the associative meaning 'male'.

3.2 Linguistic-based associative meaning

Linguistic associative meanings are those associative meanings which are linguistically determined, i.e. determined by the semantics of the language involved, rather than by features of the extralinguistic real world. Linguistic associative meanings are illustrated with particular clarity by certain cases of what is sometimes known as 'imperfect synonymy', i.e. pairs of words which have the same range of meanings (extension), and thus the same denotation, but tend to mean different things from one another. A good example is provided by the two verbs *vernietigen* and *vernielen* 'to destroy, bring to nought' in nineteenth-century written Dutch (see Geeraerts 1988; discussed in Dickins 1998: 118).

> The two words appear to have referred to exactly the same range of situations and exhibited identical selection restrictions, even in the writings of one and the same author. Were these two words, then, "perfect synonyms"? Geeraerts argues they were not. Differences emerged when the frequencies of different senses were compared, *vernietigen* being used predominantly in an abstract sense, while *vernielen* referred predominantly to an act of physical destruction. Remarks in contemporary handbooks of good usage also pointed to a difference in the conceptual centres of the two words (Taylor 1989: 56).

In 19th century written Dutch, *vernietigen* and *vernielen*, seem to have been denotatively identical ("The two words appear to have referred to exactly the same range of situations and exhibited identical selection restrictions"). They were, however, connotatively different – more specifically, different in terms of their associative meanings ("Differences emerged when the frequencies of different senses were compared, *vernietigen* being used predominantly in an abstract sense, while *vernielen* referred predominantly to an act of physical destruction"; as discussed in Section 4, these are described in the present paper as *sub-senses* rather than *senses (proper)*). The fact that *vernietigen* was used predominantly to refer to abstract destruction, while *vernielen* referred predominantly to an act of physical destruction had nothing to, however, do with the nature of the real world in nineteenth century Holland. Rather, it was a matter of the linguistic semantics of these two words (in the relevant sense).

3.3 Scalar implicature-based associative meaning

There is a third category of associative meaning which is neither extralinguistic (Section 3.1) nor linguistic (Section 3.2), i.e. it relates neither to features of the real world, nor to linguistic semantic conventions. Rather it is typically analysed as involving what Grice (1989) terms conversational implicature. This can be illustrated by the following example,

which involves scalar implicature (Grice 1989). If I say, "The house is big", I tend to mean that it is big, but not huge. This is despite the fact that in principle one can refer to a huge object by saying that it is 'big'. Usages such as "This house is big" to mean '[…] not huge' are frequently explained in terms of Grice's maxim of quantity, which requires the speaker to be just as informative as is required. If the speaker had been in a position to make the stronger statement "the house is huge", they would have done so. Since they did not, however, the hearer is expected to believe that the stronger statement is not true. 'Big' can be said to have the associative meaning of '[big but] not huge' (for a refinement of this, see Section 5.2.1.1).

In addition to the Gricean, there are numerous current alternative views about how we understand scalar implicature and related phenomena. Horn (1972 and 1989) provides a still popular account, based on pre-existing lexical scales (often referred to as Horn scales). Recent works include Schlenker (forthcoming) and Sauerland (2012), both of whom consider various approaches, Geurts (2009), who argues that the Gricean account needs to be supplemented by 'local pragmatics', and Breheny (2008), who offers a relevance theory account of numerically quantified noun phrases. There is also a large experimentally-based psycholinguistic literature on scalar implicature; e.g. Katsos and Breheny (2010), Tavano (2010). For a recent approach which partially rejects 'pragmatic' accounts see Boguslawski (2010).

It is not the purpose of this paper to consider the viability, or otherwise, of any of these approaches. The point here is simply to note that if the Gricean or another pragmatic account of such phenomena is true, scalar implicature-based associative meaning is rooted in universal human communicative behaviour.

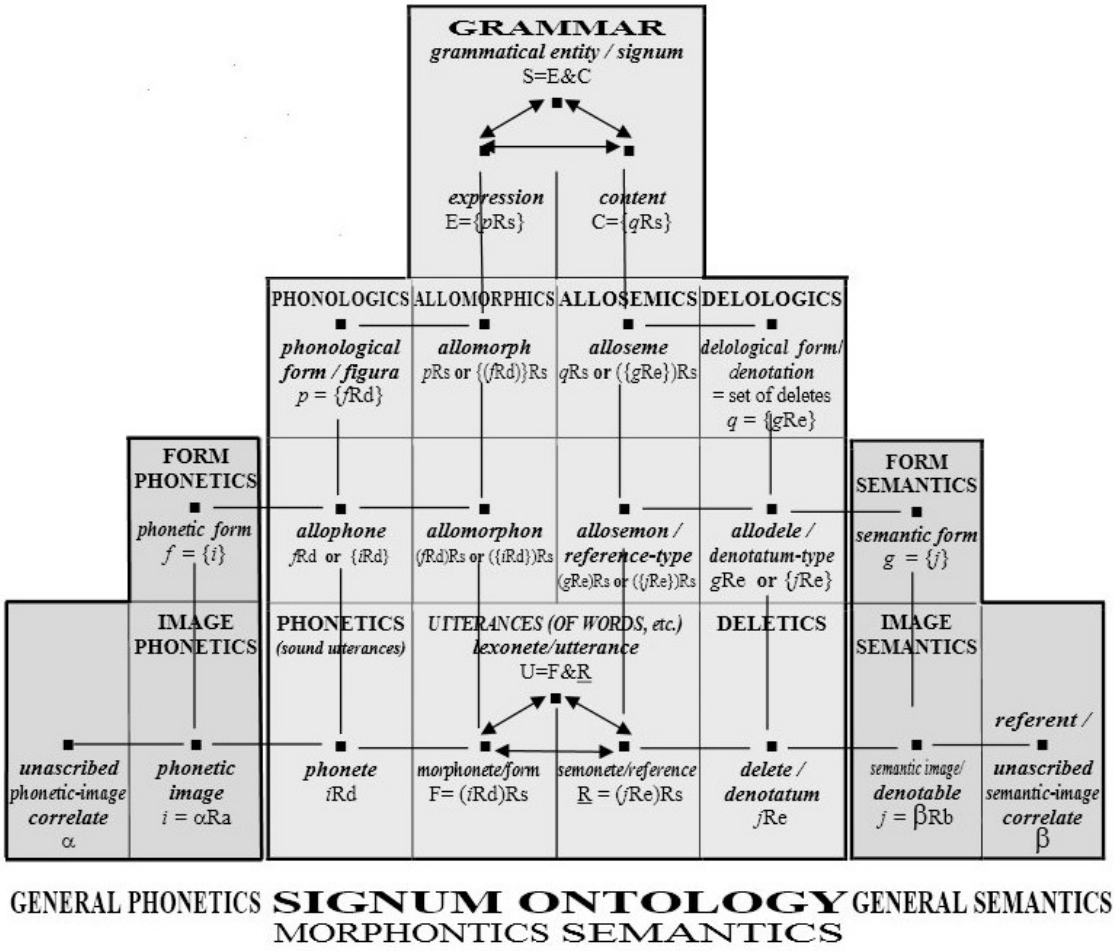
4. A formal model for associative meaning: signum ontology

Dickins (1998: 117–125) provides a formal model for the semantic analysis of associative meaning in terms of the general linguistic (and semiotic) theory of extended axiomatic functionalism – and specifically one of the two components of the theory, the signum ontology. A brief explanation of the signum ontology is necessary for an understanding of subsequent analyses in this paper (a more detailed explanation of the rationale for the signum ontology is provided in Dickins, *in prep.*). The signum ontology (plus the associated areas of general phonetics and general semantics) can be visualised as in Figure 1.

In explaining Figure 1, I will start with general phonetics and general semantics. These are ancillary areas of enquiry to the signum ontology, but necessary for it, as will be made clear later in this section.

General phonetics provides models for speech sounds. The most basic notion in relation to general phonetics is a pure sound event, i.e. a completely unanalysed 'thing'. This is a maximally minimal model, one so minimal that all it does it to 'register' the existence of the entity in question without analysing that entity in any way. We may call this 'thing' an *unascribed phonetic image-correlate* (the reasons why it is 'unascribed' will be made clear below), and we may symbolise it as α. There is, by definition, nothing which we can do merely using this *unascribed phonetic image-correlate* in terms of linguistic analysis, since all we have done is to characterise it as existing.

Figure 1
Signum ontology (plus general phonetics and general semantics)[2]



A phonetic image (symbolised as *i*) consists of an *unascribed phonetic image-correlate* (symbolised as α, as discussed above) brought into a relationship (symbolised as R) with a *set-forming criterion* (symbolised as a); i.e. it is an unascribed phonetic-image correlate which is ascribed to a particular set of unascribed phonetic-image correlates (for discussion of this, see Dickins *in prep.*). Thus, phonetic image can be defined as $i = \alpha Ra$. Phonetic image (as a notion) can also be symbolised as >α< (as an alternative to *i*).

An example of a phonetic image is $>p^h<$, i.e. a particular sound event characterised as belonging to a particular class (or set) of sound events all of whose members are conceived of belonging to a class 'aspirated *p*'. A phonetic image $>p^h<$ can thus be more fully symbolised as $\alpha^i R\{p^h\}$ (i.e. a particular phonetic image α^i, conceived as a token/member a type/class/set of phonetic images, i.e. $\{p^h\}$, deemed all to be the same except for their

[2] A few terminological points may be noted in relation to Figure 1. Extended axiomatic functionalism uses the suffix *-ete* consistently for all entities at the level of individual realisations (instantiations: Dickins 2009: Def. 22): i.e. the entities phonete, morphonete, semonete, and delete. The prefix *allo-* is similarly used consistently for all entities at the levels of generalised realisations (manifestations: Dickins 2009: Def. 26o): i.e. the entities allomorph, allomorphon, alloseme, allosemon, allocene, and allodele. The term 'phonete' is thus preferred to the equivalent term in Mulder 'allophonon' (Mulder 1989: 166), or in Bičan 'phonon' (Bičan 2008: 7). Other principles of consistency of terminology should be fairly evident from Figure 1.

time/space individuality). This relating to a particular type of what would otherwise merely be an *unascribed phonetic image-correlate* may be called its *ascription*: by *ascribing* the *unascribed phonetic image-correlate* to a particular type/class/set we are giving it a manipulable modelled identity.

The class (set) to which individual phonetic images belong is a phonetic form. This can be defined {*i*}, i.e. a class (set) of phonetic images (a phonetic image being *i*, as discussed above). Phonetic form is also symbolised in Figure 1 as *f*. Phonetic forms can be symbolised using reverse square brackets,] and [– for example]p^h[.

Phonetic image and phonetic form are models for sound events and generalisations (classes) of these sound events, regardless of the linguistic status of these sound events. We can, however, consider such sound events in relation to specific languages, and in particular in relation to the phonological entities of specific languages. When we do this, we are moving into the signum ontology (proper) of the theory.

A phonete is a phonetic image (*i*) brought into a relationship (R) with a particular phonological entity – phoneme, etc. (d). That is to say, it is a model for a specific speech sound (uttered at a specific time and place) in relation to a particular language (i.e. realising a phonological entity – phoneme, etc. – in a particular language). Phonete is symbolised as *i*Rd. Angle brackets can be used to signify phonetes, e.g. <p^h>.

An allophone is a phonetic form (*f*) brought into a relationship (R) with a particular phonological entity – phoneme, etc. (d). The English phoneme /p/ might be said to have the allophones [p] (unaspirated ‘p’), [p^h] (aspirated ‘p’), and [p¬] (unreleased ‘p’). Unlike phonetes, allophones are not individual space-time bound entities. We can, in fact, also define an allophone as a set of all the phonetes which have ever been and could ever be uttered belonging to the relevant class (for the phoneme /p/ in English there are three relevant classes [p], [p^h] and [p¬], assuming we analyse English /p/ as having three allophones [p], [p^h] and [p¬]). As a set of phonetes, we can thus symbolise an allophone as {*i*Rd}. What is meant by ‘allophone’ in extended axiomatic functionalism is roughly the same as what is meant by allophone in traditional linguistics. An allophone can be represented as in traditional linguistics, and as above.

A figura or phonological form (which for present purposes can be taken to be the same as a phonological entity) can be defined as a set of allophones belonging to the same phonological identity (the same d). Thus the English phoneme /p/ (as a phonological form/entity) can be defined as a set of allophones [p], [p^h] and [p¬]. Phonological form (entity) can be symbolised as *p*, and defined *p*={*f*Rd}. A phonological form in extended axiomatic functionalism is roughly the same as a phonological entity in traditional linguistics, and can be represented (like phonological entities in traditional linguistics) by slant brackets (as with /p/ above).

General semantics provides models for ‘(meanable) entities’ (with ‘entity’ understood in the broadest possible way to include not only concrete and abstract ‘things’, but also processes, relations, etc., and not only actually existing entities, but also potential and imaginary entities, etc.). The most basic notion in relation to general semantics is a pure ‘entity’, i.e. a completely unanalysed ‘thing’. We may call this ‘thing’ an *unascribed semantic image-correlate* or a *referent*, and we may symbolise it as β. There is, by definition, nothing which we can do merely using this *unascribed semantic image-correlate* or *referent* in terms of linguistic analysis, since all we have done is to characterise it as existing. (What I

have here termed above an *unascribed phonetic-image correlate* is termed an '(auditory) perceptual-object' in Heselwood 2013: 204. The notion of *unascribed phonetic/semantic image-correlate* also has strong similarities to Peirce's notion of a 'First'; e.g. Gorlée 2009.)

A semantic image or denotable (symbolised as *j*) consists of an *unascribed semantic image-correlate* or *referent* (symbolised as β, as discussed above) brought into a relationship (symbolised as R) with a particular *set-forming criterion* (symbolised as b); i.e. it is an unascribed semantage-image correlate / denotable which is ascribed to a particular set of unascribed semantic-image correlates / denotables (for discussion of this, see Dickins *in prep.*). Thus, semantic image can be defined as $j = \beta Rb$. Semantic image (as a notion) can also be symbolised as >β< (as an alternative to *i*).

An example of a semantic image is >*civil engineer*<, i.e. a particular entity characterised as belonging to a particular class (or set) of entities all of whose members are conceived of belonging to a class {*civil engineers*}. A semantic image >*civil engineer*< can thus be more fully symbolised as $\beta^{i}R${*civil engineers*} (i.e. a particular semantic image β^{i}, conceived as a member a set of semantic images, i.e. {*civil engineers*}, deemed all to be the same except for their time-space individuality). This relating to a particular type of what would otherwise merely be an *unascribed semantic image-correlate* or *referent* may be called its *ascription*: by *ascribing* the *unascribed semantic image-correlate* or *referent* to a particular type/class/set we are giving it a manipulable modelled identity. Semantic images can be represented (as with >*civil engineer*< above) by reverse angle brackets (paralleling the use of reverse angle brackets to represent phonetic images).

The class (set) to which individual semantic images belong is a semantic form. This can be defined as {*j*}, i.e. a class (set) of semantic images (a semantic image being *i*, as discussed above). Semantic form is also symbolised in Figure 1 as *g*.

Semantic image and semantic form are models for 'entities' and generalisations (classes) of these 'entities', regardless of the linguistic status of these entities. We can, however, consider such 'entities' in relation to specific languages, and in particular in relation to the abstract semantic entities – i.e. what are called in Figure 1 the delological forms or denotations of specific languages. When we do this, we are moving into the signum ontology (proper) of the theory. Semantic forms can be represented using reverse square brackets, e.g.]*engineer*[(paralleling the use of reverse square brackets to represent phonetic forms).

A delete or denotatum is a semantic image (*j*) brought into a relationship (R) with a particular delological form / denotation (d). That is to say, it is a model for a specific 'entity in relation to a particular language (i.e. realising a delological form / denotation in a particular language) Delete is symbolised as $_{j}$Re. For convenience, I will provide an example of a delete, after first providing an example of an allodele (below). Deletes/denotata can be represented using angle brackets, e.g. <*engineer*> (paralleling the use of angle brackets to represent phonetes).

An allodele is a semantic form (*g*) brought into a relationship (R) with a particular delological form / denotation (e). Let us, for the sake of argument, take it that the sense (delological form / denotation) conveyed by the word (signum) 'engineer' in English has three variant meanings 'civil engineer', 'electrical engineer', and 'chemical engineer'. Just as [p], [p^{h}] and [p¬] can be analysed as allophones of the phoneme /p/ in English, so [*civil engineer*], [*electrical engineer*] and [*chemical engineer*] can be analysed as *allodeles/denotatum-types* of the delological form / denotation /*engineer*/ in English. (Square

brackets can be used to represent allodeles/denotatum-types, paralleling the use of square brackets to represent allophones, while slant brackets can be used to to mark delological forms / denotations, paralleling the use of slant brackets to represent phonological forms / figura: thus /*engineer*/.) A delete is the individual-instance counterpart of an allodele. So, an individual realisation (an instantiation) of a delological form / denotation 'engineer' referring to a specific engineer (civil, electrical or chemical) is a delete. Unlike deletes, allodeles / denotatum-types are not individual entities. We can, in fact, also define an allodele as a set of all the deletes which have ever been and could ever be uttered belonging to the relevant class (for the delological form / denotation /*engineer*/ in English there are three relevant classes [*civil engineer*], [*electrical engineer*] and [*chemical engineer*], assuming we analyse English /*engineer*/ as having three allodeles [*civil engineer*], [*electrical engineer*] and [*chemical engineer*]). As a set of deletes, we can thus symbolise an allodele as {*j*Re}.

A delological form or denotation (which for present purposes can be taken to be the same as a delological entity) can be defined as a set of allodeles belonging to the same delological identiy (the same e). Thus the English delological form / denotation /*engineer*/ can be defined as a set of allodeles [*civil engineer*], [*electrical engineer*] and [*chemical engineer*]. Delological form / denotation can be symbolised as *q*, and defined *q*={gRe}.

Having considered entities and notions which are on the sound and meaning 'peripheries' of the signum ontology (including the ancillary entities of general phonetics and general semantics), it is appropriate now to consider the central notion of the theory, the signum or grammatical entity. The signum, symbolised S, is defined as a bi-unity of an expression (symbolised E) and a content (symbolised C), i.e. S = E&C. An alternative to the word 'signum' might be 'sign' (for the distinction between 'sign' and 'signum', see Dickins 2009: Def. 2a2). Examples of signa / grammatical entities in English are morphemes (e.g. the morphemes 'un', 'luck' and 'y' making up the word 'unlucky') words (e.g. the word 'unlucky') and grammatically 'coherent' phrases (e.g. 'the unlucky man', or 'the unlucky man needs friends') – these being understood as abstract entities, not as utterances (or models for utterances) which instantiate these signa. A content is the semantic aspect of a signum, while an expression is the 'formal' (non-semantic) aspect of a signum.

Signa are instantiated as lexonetes/utterances, symbolised as U, i.e. modelled speech events. The meaningful aspect of a lexonete/utterance is a semonete/reference, symbolised as R, and the 'formal' (non-meaning-related) aspect of a lexonete/utterance is a morphonete/form, symbolised as F. A lexonete/utterance is thus defined as U=F&R (paralleling the definition at the more abstract level of signum as S=E&C). The lexonete/utterance (with its form/morphonete and semonete/reference aspects) thus provides a model for an instantiation – i.e. an individual realisation at a particular time and place of occurrence – of a signum. Morphonetes/forms, lexonetes/utterances and semonetes/references all stand in relationship to the signum/grammatical entity (symbolised as S, as discussed above), i.e. they all have the characteristic Rs (where s stands for 'signum identity' / 'grammatical identity').

Morphonete/form, however, can also be related to phonete (discussed above): it is a phonete (symbolised *i*Rd, as discussed above), brought into a relationship with a grammatical identity (i.e. Rs, as discussed above); i.e. F=(*i*Rd)Rs. Similarly, semonete/reference can be related to delete/denotatum (discussed above): it is a delete/denotatum (symbolised *j*Re, as discussed above), brought into a relationship with a grammatical identity (i.e. Rs, as discussed above); i.e. R=(*j*Re)Rs.

Just as we can generalise away from individual sound events to classes of sound events deemed to be identical apart from their time-space specifities, i.e. just as we can generalise from a phonete to an allophone, so we can generalise from a morphonete/form to an allomorphon. An allomorphon can be conceived as a set of phonetes which are identical except for their time-space specificities, i.e. as ({*i*Rd})Rs. Or it can be conceived equivalently as an allophone (i.e. *f*Rd) brought into a relationship with a grammatical identity (i.e. Rs), giving the definition of allomorphon: (*f*Rd)Rs.

Correspondingly, just as we can generalise away from individual 'meaning events' to classes of 'meaning events' deemed to be identical apart from their time-space specifities, i.e. just as we can generalise from a delete/denotatum to an allodele/denotatum-type, so we can generalise from a semonete/reference to an allosemon/reference-type. An allosemon/reference-type can thus be conceived as a set of semonetes/references which are identical except for their time-space specificities, i.e. as ({*j*Re})Rs. Or it can be conceived equivalently as an allodele/denotatum-type (i.e. *g*Re) brought into a relationship with a grammatical identity (i.e. Rs), giving the definition of allosemon/reference-type: (*g*Re)Rs. An alternative term for an allosemon would be a sub-sense, or better 'signum-sub-sense' or 'sub-sense of a signum', since it is a notion which is in a direct relation to a signum / grammatical entity.

Allomorphons are related not only to grammatical identity (the Rs element in their definition: (*f*Rd)Rs), but also to phonological identity (the Rd element in their definition (*f*Rd)Rs). We can thus generalise from allomorphon to establish a set of all allomorphons which have the same phonological identity. A set of all allomorphons having the same phonological identity is an allomorph, defined as ({*f*Rd})Rs. Since an allomorph is, equivalently, a phonological form (*p*) brought into a relationship with a grammatical identity (s), allomorph can also be defined as *p*Rs. An allomorph in extended axiomatic functionalism is roughly the same as an allomorph in traditional linguistics. Examples of allomorphs in British English are /gærɑːʒ/ and /gærɪdʒ/ as phonological forms of (realising) the signum (word) 'garage' (assuming /gærɑːʒ/ and /gærɪdʒ/ to be valid phonological analyses).

Correspondingly, allosemons/reference-types are related not only to grammatical identity (the Rs element in their definition: (*g*Re)Rs), but also to delological (i.e. 'purely abstract' semantic) identity (the Re element in their definition (*g*Re)Rs). We can thus generalise from allosemon/reference-types to establish a set of all allosemons/reference-types which have the same delological ('purely abstract' semantic) identity. A set of all allosemons/reference-types having the same delological identity is an alloseme, defined as ({*g*Re})Rs. Since an alloseme is, equivalently, a delological form/denotation (*q*) brought into a relationship with a grammatical identity (s), alloseme can also be defined as *q*Rs. An alternative term for an alloseme would be a sense, or better 'signum-sense' or 'sense of a signum', since it is a notion which is in a direct relation to a signum / grammatical entity. An alloseme is roughly equivalent to the sense word or phrase (or even a morpheme) as understood pre-theoretically, e.g. in lexicography. Examples of allosemes in English (assuming the analyses to be valid) are the senses of 'garage': 1. "Building, either private or public, intended for the storage and shelter of motor vehicles while not in use"; 2. "Commercial establishment that sells petrol, oil, and similar products and freq. also undertakes the repair and servicing of motor vehicles" (definitions from Oxford English Dictionary).

It is possible to further generalise from an allomorph to expression (symbolised E), an expression being a set of allomorphs having the same grammatical identity, i.e. E={*p*Rs}. It is correspondingly possible to further generalise from an alloseme to content (symbolised C), a content being a set of allosemes having the same grammatical identity, i.e. C={*q*Rs}. As noted, above a sigum / grammatical entity (symbolised S) is a bi-unity of an expression and content, i.e. S=E&C.

In the remainder of this paper, I will in almost all cases make use of the terminologically integrated terms throughout: i.e. unascribed phonetic image correlate, unascribed semantic image correlate, phonetic image, phonetic form, semantic image, semantic form, phonete, allophone, phonological form, delete, allodele, delological form, mophonete, allomorphon, allomorph, semonete, allosemon, and alloseme – plus expression, content and signum. There are three reasons for this: (i) these terms express the relationships between the entities in the theory most clearly (more clearly than more ad-hoc terms such as 'denotable', 'denotatum', or 'reference'); (ii) other terms, such as 'denotable', 'denotatum' or 'reference' are used in other theories and other contexts with different meanings to those which they have in this paper, and their use here might therefore be confusing; (iii) use of multiple terms (e.g. 'allosemon/reference-type/sub-sense' would be long-winded and confusing, rather than helping to clarify what is meant); (iv) inconsistent use of terms (e.g. use of a terminologically integrated term, such as 'allosemon', followed closely by use of a terminologically non-integrated term with the same sense, such as 'reference-type') would be confusing.

4.1 Extralinguistic- and linguistic-based associative meaning revisited

Consider the following (in the following paragraphs, I will consider the word 'nurse', first discussed in Section 3.1; the same analytical principles, however, apply also to *vernietigen* and *vernielen*, discussed in Section 3.2):

(1) *My sister is a nurse.*

In 1, the unascribed semantic-image correlate (= referent) of 'nurse' is the same as that of 'sister' (they refer to the same entity). The ascription in the case of 'nurse' and 'sister' is, of course, different. Focusing on 'nurse' (though the same general arguments apply to 'sister'), we may regard the ascription as the type/class/set of nurses in the full extension of 'nurse' (in the relevant alloseme).

It needs to be noted that the number of allodeles we establish (e.g. for the English delological form 'nurse') is ultimately an ad hoc matter, depending on how many ascriptions we establish. This becomes more obvious when we consider the formal (non-meaning-related) analogue of the allodele, the allophone.

The number of allophones we establish (e.g. for the English phoneme /p/) is ultimately an ad hoc matter (i.e. it is ultimately conventional, and could have been done in another way – though it could not, of course, reasonably be done in *any* way one wanted: some ways of analysing phenomena are reasonable, while others definitely are not). Thus, the English phoneme /p/ might be said to have the allophones [p] (unaspirated 'p'), [p^h] (aspirated 'p'), and [p¬] (unreleased 'p'). However, if we were to adopt a more detailed (nar-

rower) phonetic analysis, we could establish many more allophones for English /p/ than this. Alternatively, if we had a less detailed (broader) phonetic analysis, we might say that English /p/ had only two allophones (e.g. [p] and [p^h]), or even just one allophone (which we might represent as [p]).

The allophone (also phonetic form, phonete, and phonetic image) is dependent on the notion of ascription: the number of allophones we deem a phoneme (or other phonological entity) to have depends on how many relevant ascriptions (ascriptional types/classes/sets) we establish. Thus if we establish three relevant ascriptions, R{p}, R{p^h} and R{p¬}, we have three allophones of /p/ in English: [p], [p^h] and [p¬]. If, however, we were to establish only one ascription R{p} (covering the full range of realisations of English /p/), we would have only one allophone [p].

Similarly, the number of allodeles we establish (e.g. for the English delological form 'nurse') is ultimately an ad hoc matter, depending on how many ascriptions we establish. Because it is easier to work in relation to signa (e.g. words) rather than in relation to pure delological forms, we can rephrase this to include relationship to signum (e.g. word). We can thus say that the number of allosemons we establish (e.g. for the relevant English signum 'nurse', in the relevant alloseme) is dependent on how many ascriptions we establish. We might, accordingly establish a single ascription for 'nurse' (in the relevant alloseme) R{*nurse*}, i.e. an ascription which covers the full extensional range of 'nurse' in the relevant sense. In this case, 'nurse' in the example 'My sister is a nurse' would have the ascription R{*nurse*} (as the only ascription available), and thus the delete <*nurse*>.

Alternatively, however, we could establish two different ascriptions: R{*male nurse*) and R{*female nurse*}. In this case, 'nurse' in the example 'My sister is a nurse' would have the ascription R{*female nurse*} and thus the delete <*female nurse*> (on the basis that the nurse in question, being my sister – and not, for instance, my brother – must be female). Alternatively again, we could establish four different ascriptions: R{*young male nurse*}, R{*young female nurse*}, R{*old male nurse*}, and R{*old female nurse*}. Assuming the nurse in question is young (as well as female), 'nurse' here would have the ascription R{*young female nurse*}, and thus the delete <*young female nurse*>.

One factor in how many ascriptions we decide to establish is what we are attempting to do in our analysis of the data – as is also the case with ascriptions in phonetic analysis relating to phonological analysis. Thus, if we are a phonetician wanting to investigate in great detail the relative frequencies of minutely different realisations of the phoneme /p/ in English, we will want to establish an extremely large number of different ascriptions – and thus different phonetic forms and allophones. Similarly, if we are a semanticist wanting to investigate in great detail the relative frequencies of different types of things (entities) which the signum 'nurse' (in the relevant alloseme) in English is used to refer to, we will want to establish a large number of ascriptions.

Extended axiomatic functionalism in fact provides a straightforward means of doing this kind of statistically based analysis. In the case of the relative frequencies of different realisations of phonological entities (phonemes, etc.), we (i) establish a large number (a corpus) of relevant speech events (utterances, in the general sense of the term), which we believe to be representative; (ii) establish a set of relevant ascriptions (e.g. for realisations of the phoneme /p/ in English), which we believe to be adequate for the phonetic detail which we require; (iii) apply the ascriptions which we have to the relevant aspects of the utterance-

set (corpus), to yield phonetes; and (iv) analyse the phonetes statistically (by counting them) according to the allophone which each belongs to.

We can correspondingly investigate the relative frequencies of different realisations of delological forms (i.e. to establish what a particular signum, such as a word, typically means in a particular alloseme). To do this, we (i) establish a large number (a corpus) of relevant speech events (utterances, in the general sense of the term), which we believe to be representative; (ii) establish a set of relevant ascriptions (e.g. for realisations of the delological form 'nurse' in English), which we believe to be adequate for the semantic detail which we require; (iii) apply the ascriptions which we have to the relevant aspects of the utterance-set (corpus), to yield deletes (and by extension semonetes); and (iv) analyse the deletes (by extension semonetes) statistically (by counting them) according to the allodele (by extension allosemon) to which each belongs.

Ascription for semantic analysis of the above kind is ultimately ad hoc; we can make use of as few or as many different types/classes/sets as we want. We can decide to operate with intuitively sensible ascriptions for 'nurse' (in the relevant alloseme), such as R{*female nurses*} and R{*male nurses*}. We could, however, also decide to operate with intuitively bizarre ascriptions, e.g. R{*nurses who regularly eat seaweed*} vs. R{*nurses who do not regularly eat seaweed*}.

This kind of deployment of ascription does not tell us anything about human communication – and in particular, it tells us nothing about the ways in which the possible range of meanings of a signum (word, etc.) are communicatively restricted in specific contexts. As the example 'My sister is a nurse' shows, it does not matter whether we consider the ascription to be R{*nurse*}, or R{*female nurse*}, or R{*old female nurse*} (provided these are all reasonable – true, or similar – in the context). Since this deployment of ascription provides no insights into human communication (and in particular into 'meaning-restriction'), we can refer to it as *non-communicative ascription*.

Non-communicative ascription can, however, be contrasted with *communicative ascription* – i.e. cases in which ascription does provide insights into human communication (meaning-restriction). Communicative ascription most obviously obtains where the ascription provides an allosemon – as intended by the speaker/writer – of the overall denotative range (expressed by the delological form) of a signum (e.g. word) in a particular alloseme. Particularly clear examples of this are found where an indefinite noun has a non-specific reference (cf. Lyons 1999), i.e. where what is being referred to is not something specific but some-or-other example of the relevant type. Consider the following example:

(2) *John wants a romantic relationship with a nurse.*

Under most circumstances, 'nurse' here would be taken to refer to – and 'actively mean' – a female nurse, rather than a male nurse. Here, we can only reasonably say that the ascription (i.e. communicative ascription) is R{*female nurse*} – ignoring the question of whether non-specificity (to be distinguished from indeterminacy: Section 5.1.1) is to be treated as a feature of the ascription or a feature of the unascribed semantic-image correlate.[3]

[3] The question of whether specificity and non-specificity are a feature of the ascription or the referent, raises challenges for the current approach. An attempt to deal with these, however, would go well beyond the scope of this paper.

Corresponding examples occur with non-nouns. A good example is the word (signum) 'do' in English (in the relevant alloseme). As discussed in Dickins (1998: 221–222), 'do' in 'I want to do my hair' can be used to mean, among other things, 'I want to wash my hair', or 'I want to dry my hair', or 'I want to comb my hair' – or all three at once, or many other things, or combinations of other things (examples adapted from Moore and Carling 1982: 131–132). It is also perfectly reasonable to say, 'When I said I wanted to do my hair, I meant I wanted to comb it, not to wash it'. Here we are dealing with ascriptions which are – in the local context at least – communicative and not simply ad hoc. The relevant ascriptions – R{*wash*}, R{*dry*}, R{*comb*}}, R{*wash, dry and comb*}, etc. – are intended by the speaker (as is clear from the reasonableness of 'When I said I wanted to do my hair, I meant I wanted to comb it, not to wash it').

Another clear example where the ascription is communicative is provided by the signum (word) 'like' (in the relevant alloseme). Consider the following:

(3) *The brain is like a computer.*

It is very unlikely that the speaker/writer means here that the brain is like a computer in that is made out of silicon, or that it is probably produced in East Asia, or that it involves solid-state circuitry; and much more likely that he or she means that the brain is like a computer in terms of its more abstract organisation. Here the ascription R{*like in terms of its abstract organisation*} or similar (and thus the corresponding allosemon) is imposed by considerations of plausibility (general and/or in the specific context), and other ascriptions (e.g. R{*like in that it is made out of silicon*} are specifically excluded.[4]

In the following sections, I will consider further examples of where the ascription and thus the allosemon is communicative, particularly in relation to cases where one allosemon is properly included within one another (as it is with the ascriptions of 'do', in the relevant alloseme, with the ascriptions R{*wash*} and R{*wash, dry and comb*} discussed above).

5. A formal analysis of scalar-implicature based associative meaning

In the following sections, 5.1–5.3.2, I will consider associative meaning in relation to scalar implicature. I will argue that there are three different kinds of phenomena involved – those which involve hyperonymy-hyponymy (Section 5.1), those which involve what I shall call 'quasi-hyponymy' (Section 5.2), and those which involve what I shall call 'pseudo-hyponymy' ('para-referentiality') (Section 5.3).

5.1 Scalar implicature and hyperonymy

I turn now to a formal analysis of scalar implicature-based associative meaning involving hyperonymy-hyponymy using relevant aspects of the model of extended axiomatic functionalism discussed in Sections 4–4.1).

[4] In traditional rhetoric, the element in addition to 'like' is known as the grounds (in fact, particularly in relation to metaphor, rather than simile). Thus, in R{*like in terms of its abstract organisation*}, the grounds is *in terms of its abstract organisation* (e.g. Dickins 2005).

Figure 2

	Hyperonymy-Hyponymy	**Semantic overlap**	**Semantic disjunction**
Ø	√It's a car, a hatchback √It's big, very big √It's a lorry, a juggernaut[5] √It's a jet, a jumbo (jet)	*It's big, useful	*?It's big, small
'and'	*It's a car and a hatchback *It's big and very big *It's a lorry and a juggernaut *It's a jet and a jumbo (jet)	√It's big and useful	*?It's big and small
'and not'	?It's a car and not a hatchback ?It's big and not very big ?It's a lorry and not a juggernaut ?It's a jet and not a jumbo (jet)	√?It's big and not useful	*It's big and not small
'but'	√?It's a car but a hatchback *It's big but very big *It's a lorry but a juggernaut √?It's a jet but a jumbo (jet)	√It's big but useful	*It's big but small
'not'	*It's a car, not a hatchback *?It's big, not very big *It's a lorry not a juggernaut *It's a jet not a jumbo (jet)	?It's big not useful	√It's big not small
'not'– with reversal of terms	*?It's a hatchback, not a car *?It's very big not big *?It's a juggernaut not a lorry *?It's a jumbo (jet) not a jet	?It's useful not big	√It's small not big
'but not'	√It's a car but not a hatchback √It's big but not very big √It's a lorry but not a juggernaut √It's a jet, but not a jumbo (jet)	√It's big but not useful	*It's big but not small
'in fact'	√It's a car, in fact a hatchback √It's big, in fact very big √It's a lorry, in fact a juggernaut √It's a jet, in fact a jumbo (jet)	*It's big , in fact useful	*It's big, in fact small
'not in fact'	*It's a car, not in fact a hatchback *It's big, not in fact very big *It's a lorry, not in fact a jugger-naut *It's a jet, not in fact a jumbo (jet)	*It's big, not in fact useful	√It's big, not in fact small
not just'	√?It's a hatchback, not just a car √?It's not just a car, it's a hatch-back √It's very big, not just big √It's not just big, it's very big √It's a juggernaut, not just a lorry	√It's useful, not just big √It's not just big, it's useful	*It's small, not just big *It's not just big, it's small

[5] 'Lorry' is British English for American 'truck'. A 'juggernaut' is a large lorry.

	√It's not just a lorry, it's a juggernaut √It's a jumbo (jet), not just a jet √It's not just a jet, it's a jumbo (jet)		

Although the examples used in Figure 2 (also Figures 8 and 11, below) are largely based on examples which are found elsewhere in the literature and are intended to point up the kind of semantic contrasts which are of interest to this paper, they have been chosen on a rather intuitive basis (something which is perhaps unavoidable, given the undeveloped nature of 'associative meaning' as an area of enquiry). The acceptability judgements for Figure 2 are largely my own (though I have informally tried some of them out on other people (including my wife). Use of a survey with multiple respondents would no doubt improve the reliability of the results. As Figure 2 shows, hyperonymy-hyponymy pairs, such as 'car-hatchback', 'big-very big', 'lorry-juggernaut', and 'jet-jumbo (jet)' function fairly similarly to one another, but rather differently from semantic overlap-pairs, such as 'big' and 'useful', and semantic disjunction-pairs, such as 'big' and 'small'.

'Hatchback' and 'car' are not related in scalar terms – the relationship between 'car' and 'hatchback' is not one of size. The other terms considered in the hyperonymy-hyponymy column do, however, stand in a scalar relationship to one another: a juggernaut is a very big lorry (and may have other features, apart from size, which distinguish it from a more standard kind of lorry), a jumbo / jumbo jet is a very big jet (though it also has other distinctive features such as shape, which distinguish it from a more standard kind of jet), and something which is very big is bigger than something which is (just) big. There also seems to be no doubt that all three cases involve hyperonymy-hyponymy: a juggernaut is a type of lorry, a jumbo (jet) is a type of jet, and something which is very big is also big (but not vice versa; i.e. *very bigness* is a type of *bigness*, if one likes).
Consider the following example:

(4) *The house is big.*[6]

Example 4 would in many contexts be taken to mean 'The house is big (but not very big)', i.e. 'big' here would be understood as meaning 'big but not very big'. (The specific issues are investigated in the following sections of this paper. For the moment, we may say that if, as a hearer/reader we are forced to choose, between a peripheral interpretation of what is meant by 'big' – e.g. 'very big' or 'big, but only a little bit big' – or a core interpretation – i.e. 'big in the middle of the scale of what counts as big' – we will normally chose the core interpretation.) In fact, the related claim typically made in the literature (e.g. Levinson 2000) is that in the 'The house is big', 'big' means 'big but not huge'. The interpretation 'big but not very big' is also valid, however, I believe. 'Big' will be discussed in relation to 'huge' in Sections 5.2–5.2.1.1.

[6] A significant shortcoming of the great majority of works on scalar implicature is that they fail to take intonation into account – or that they fail to take it into sufficient account. The current paper sadly perpetuates this shortcoming. Lack of sufficient context is a further problem. In this paper, I have tried to overcome this by providing detailed context where this seems necessary (though space restrictions preclude providing very detailed context for all examples).

Contrast this with the following example:

(5) *The house is big, in fact very big.*

Here 'big' cannot be understood to mean 'big but not very big'. Rather, for the following phrase 'in fact very big' to make sense, it has to be understood along the lines 'big including (the possibility of) very big'.

Going back to the *referent*-plus-*ascription* (*unascribed semantic-image correlate* plus *ascription*) model of meaning discussed in Section 4, we can say that 'big' (in the relevant alloseme) has two allosemons: 1. [*big excluding very big*] and 2. [*big including very big*] and therefore two ascriptions R{*big excluding very big*}, and R{*big including very big*}, both of which are communicative. In an utterance 'The house is big', we typically have the ascription R{*big excluding very big*}, but in an utterance 'The house is big, in fact very big', we have the ascription R{*big including very big*}.

In fact, if we are considering the word 'big' (and not simply an abstract semantic 'notion', i.e. allodele, such as [*big excluding very big*]), we are making reference at one and the same time to signum identity and semantic identity, i.e. we are bringing a particular allodele, *g*Re or {*j*}Re, into a relationship (R) with a signum (s); i.e. we are dealing not with an allodele, but with an allosemon (see Section 4): (*g*Re)Rs or ({*j*}Re)Rs, allosemons having the same nature as allodeles, because they incorporate (in their definition) allodeles. Thus, we may say that the signum (word) 'big' in English has (in the relevant alloseme; see Section 4), for the purposes relevant to thinking about scalar implicature, two communicative allosemons [*big excluding very big*] and [*big including very big*].

It is useful at this point to introduce the notion of canonicality. While canonicality is not strictly speaking part of extended axiomatic functionalism, it can be applied insightfully to all 'allo-notions' in extended axiomatic functionalism: allophone, allomorphon, allosemon, allodele, allomorph, and alloseme. Canonicality can be considered from a number of perspectives, and can also be related to other notions such as prototypicality (cf. Dickins 1998: 310–315). The simplest – though not the only – way of thinking of a canonical 'allo-form' (what is technically known in extended axiomatic functionalism as an *allont*: Dickins 1998: 137) is that it is that 'allo-form' which occurs most frequently (cf. Dickins 1998: 253–257). The canonical allosemon is thus that allosemon which occurs predominantly. Canonical allosemons can be investigated quantitatively, by analysing statistically a representative sample (corpus) of utterances (both in the general sense and the specific extended axiomatic-functionalist sense) (as discussed in Section 4.1). Thus in the case of the signum (word) 'big' in the alloseme 'large / not small' (etc.), we can investigate, by counting individual deletes relating to individual utterances, what proportion 'belong to' (realise) the allosemon 'big' [*big excluding very big*] (involving the ascription R{*big excluding very big*}), and what proportion 'belong to' (realise) the allosemon [*big including very big*] (involving the ascription R{*big including very big*}). In conducting this kind of analysis, one can make use of non-communicative ascriptions only, communicative ascriptions only, or both non-communicative and communicative ascriptions.

Canonical allosemon can in fact be identified with associative meaning. The word 'big' has the associative meaning – i.e. canonical allosemon – [*big excluding very big*] (i.e. the ascription R{*big excluding very big*}). In the case of the signum (word) 'nurse' (Section

4.1) (in the relevant alloseme) an obvious canonical allosemon to identify is [*female nurse*] involving the ascription R{*female nurse*}. Similarly, in the case of *vernietigen* we can identify a canonical allosemon [*destroy abstractly*] (and ascription R{*destroy abstractly*}), while in the case of *vernielen* we can identify a canonical allosemon [*destroy physically*] (and ascription R{*destroy physically*}; Section 3.2).

5.1.1 Interminacy of referent vs. indeterminacy of ascription

A distinction is frequently made in linguistics between ambiguity and indeterminacy. Ambiguity involves lack of clarity between what are in an extended axiomatic-functionalist analysis two allosemes, e.g. 'He's funny' meaning either 'He's amusing' or 'He's odd' (cf. also 'He's funny in both senses [of the word]'; Dickins 1998: 193–215; 202–219). Indeterminacy involves what are in an extended axiomatic-functionalist analysis two allosemons (e.g. whether 'do' in 'I want to do my hair' means 'wash' or 'dry', etc; Section 4.1; also Dickins 1998: 221–223; 269–274).

It has already been argued (Section 5.1) that 'big' can be taken to have two allosemons [*big including very big*] and [*big excluding very big*]. In an utterance 'The house is big', 'house' and 'big' have the same unascribed semantic-image correlate (referent). However, in using 'house' and 'big' we are ascribing the entity in question to two different classes (sets): the class of houses – the ascription being R{*houses*}, and the class which we may provisionally classify as that of 'big [entities]' (with the ascription R{*big [entities]*}. Consider now the following (with possible variants 'written in', as indicated by the forward slashes and square brackets):

(6) A. *The house is big. / Is the house big?*
B. *Yes, [in fact] it's very big. / No, [it's not big], it's very big.*

As speaker B's answers to speaker A's statement/question show, 'big' as used by speaker A is indeterminate between the allosemons [*big including very big*] and [*big excluding very big*]. That is to say, 'big' here indeterminately has the ascription R{*big including very big [entity]*} or the class R{*big excluding very big [entity]*}; and it is possible that this indeterminacy is radical, in that the speaker themselves intends it.[7]

[7] As well as indeterminacy of ascription (indeterminacy in the normal sense), it is also possible to have indeterminacy of referent (unascribed semantic-image correlate), particularly one which is indeterminate for (unclear to) the hearer/reader. This is brought out in exchanges of the following type: A. 'Can you see that bird?'; B. 'Which one?'. Non-universal quantifiers, such as 'some', 'many' and 'most' typically have indeterminate referents. If I show you a photo of a group of people, and say "[These are] some friends of mine", the referent is determinate: I am referring to the people in the photo, and no other people. If, however, someone says to me, "Do you know all the people in the room?", and I reply "[I know] some of them", my referent is likely to be indeterminate. I may well not have looked at everyone present to check whether I know them or not. All that's needed for 'some' to be reasonable here is for me to have checked that there are people in the room that I know (and also, in the context, that there is at least one person whom I don't know). Who exactly is being referred to by 'some' in this context is not entirely clear.

5.1.2 Allosemons compared to allophones

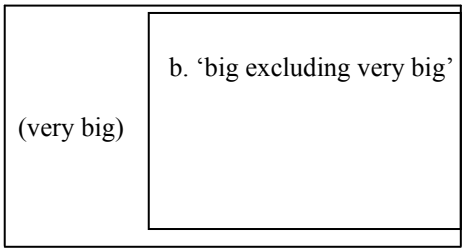
Semonetes and allosemons (and, by abstraction from grammatical identity, deletes and allodeles) present a number of interesting contrasts with phonetes and allophones (and, with inclusion of grammatical identity, morphonetes and allomorphons).

A delete may be indeterminate as to ascription; it may not be knowable which class (set) the entity in question is being ascribed to (cf. 'Is this house big?'). In the case of phonetes this kind of indeterminacy does not exist; once we have established an agreed set of phonetic forms for a particular description/analysis (e.g.]p[,]p^h[and]p¬[), we can ascribe each phonete to one of these sets as an instantiation of an allophone [p], [p^h] or [p¬].

There is a further significant feature of ascription (as an aspect) of allodeles and allosemons. Consider the previously discussed allosemons of 'big' in set-theoretical terms: a. 'big including very big', and b. 'big excluding very big' (Figure 3).

Figure 3

a. 'big including very big'



Allosemon b. [*big excluding very big*] is properly included within allosemon a. [*big including very big*]: all entities which are *big but not (= excluding) very big* are also *big including very big*, but not vice versa. Very big entities thus belong to class a. but not class b. The term autohyponymy is sometimes used to describe a situation in which one alloseme of a word (signum) is properly included (extensionally) within another (cf. Geeraerts 1993: 237); another term for this would be autohyposemy. Cruse (1986: 59) very elegantly shows that 'bitch' in English has distinct senses (allosemes, in terms of the current approach) 'canine' and 'female dog', the second of which is properly included within the first – i.e. that this is a case of autohyponymy (or autohyposemy) (cf. also Dickins 1998: 205–208).

'Big' (in the relevant alloseme/sense) having two allosemons 1. [*big excluding very big*] and 2. [*big including very big*] (the first being properly included within the second) is not a case of autohyponymy (autohyposemy), since only one alloseme is involved. Rather, since we are dealing with allosemons, this situation could be termed auto-hyposemony. The word (signum) 'big' (in the relevant alloseme) can be termed auto-hyposemonic (or auto-hyposemonous).

The first 'smaller' allosemon of 'big' (in the relevant alloseme) [*big excluding very big*] (properly included within the second 'larger' allosemon [*big including very big*]) we can refer to as the narrow allosemon, while the second 'larger' allosemon [*big including very big*] we can refer to as the broad allosemon.

This situation contrasts dramatically with that in phonetics/allophonics. Once we have established – for whatever purpose – a set of phonetic forms as the phonetic forms of a corresponding set of allophones, e.g. [p], [p^h] and [p¬] as the allophones of English /p/, there is no possibility – or virtue – in one of these allophones being properly included in another 'super-allophone', e.g. '[p]*plus*[p^h]'. We might, for example, imagine that we could in principle establish two different allophones for a particular phoneme (in a particular language), the extension of the first of which was properly included in the extension of the other. An example would be an allophone which we can call [Θ], and another allophone which we can call [Λ] of a phoneme which we can call /Π/ (in a particular language), such that the phonetic range of [Θ] was properly included within the phonetic range of [Λ]. (All occurrences of [Θ] would accordingly also be occurrences of [Λ], but not vice versa.) There would, however, be no virtue in practice of doing this because it would lead to ad hoc analyses: if we had a realisation of /Π/ which was analysable as the allophone [Θ], it would necessarily also be analysable as the allophone [Λ] – and there would be no particular reason to adopt one analysis rather than the other. In order to achieve non-ad-hoc analyses, allophones have to be conceived of as having non-overlapping extensions.

The fundamental reason for these discrepancies between morphontic/expression-side (form-related) and semantic/content-side (meaning-related) entities is that languages (like other semiotic systems) are 'encoded' immediately into physical phenomena (vocal sounds, marks on paper) but only 'point' mediately to the entities they mean: these entities are outside language itself.

5.2 Scalar implicature and quasi-hyponymy

In the following sections I will consider a form of scalar implicature which involves 'quasi-hyponymy' – i.e. a semantic relation which, although rather like a true hyperonymy-hyponymy relation, is in fact subtly different.

5.2.1 Realisational (concrete) overlap vs. abstract disjunction

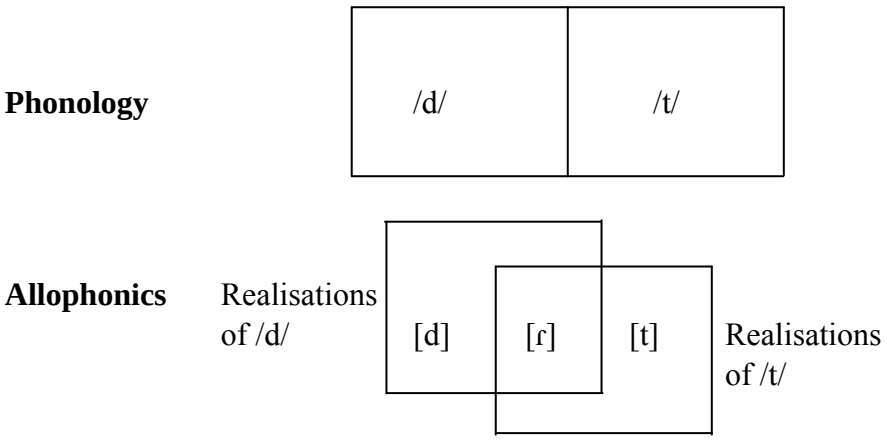
Labov (1972) showed that English speakers distinguish cups from mugs according to a variety of features including the shape of the vessel concerned. What are of interest here are not the focus or details of Labov's analysis, but the following facts: (i) there are numerous objects which a speaker might describe as a cup or a mug (and one might even say, for example, 'You could call that a cup or a mug'), and (ii) that 'cup' and 'mug' are not, apparently, examples of semantic overlap. In cases of semantic overlap, one can describe the entity (object, etc.) in question as '(both) X and Y', e.g. 'the box is (both) big and useful', or 'he's (both) a doctor and a magician'. One cannot say, however, of a particular relevant vessel, however, 'It's (both) a cup and a mug'. Conceptually (abstractly) cups and mugs are quite distinct, even though there is an overlap in the real-world objects which they may refer to.

The combination of abstract discreteness with real-world (realisational) overlap is well known in phonology. It is illustrated by *budding* and *butting* (and similar intervocalic 'd'-'t' pairs) in most dialects of American English. These are typically pronounced with an intervocalic medial flap (or *median tap* in the IPA system) [ɾ]. In careful speech, however, the first will have a [d] and the second a [t] (as noted in Port and O'Dell 1985: 465; cf. Shimizu and Lamb 1985: 109; also Dickins 1998: 91; Dickins 2007: 15).

Here, the phonological distinction (discreteness) between /d/ and /t/ is demonstrated by the fact that there are realisations (pronunciations) of 'budding' (those with a medial [d]), which cannot also be realisations of 'butting', and realisations of 'butting' (those with a medial [t]), which cannot also be realisations of 'budding'. Where there is a medial [ɾ], this may be a realisation either of /d/ or of /t/.

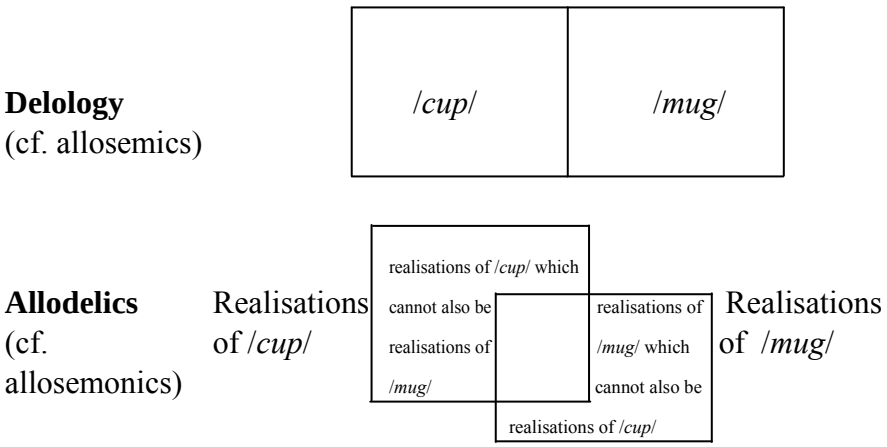
This situation of phonological discreteness vs. realisational (allophonic) overlap can be represented as in Figure 4:

Figure 4
Phonological discreteness vs. realisational overlap of /d/ and /t/ in American English



This same basic analysis can be applied to the semantics of 'cup' and 'mug', as in Figure 5:

Figure 5
Abstract discreteness vs. realisational overlap of 'cup' and 'mug' in English



5.2.1.1 Quasi-hyponymy: realisational overlap, abstract discreteness and scalar implicature

Having considered realisational overlap in relation to abstract discreteness (disjunction), I want now to consider a slightly different phenomenon: realisational proper inclusion in relation to abstract discreteness. In respect of phonology, an example is provided by Central Urban Sudanese Arabic, where final unstressed post-vocalic word-final /d/ may be realised as voiced [d] or voiceless [t], while unstressed post-vocalic word-final /t/ can only be realised as unvoiced [t] (cf. Mustapha 1982: 226; Dickins 2007: 16–18). Thus:

ba^{c}ad	'after, following'	realised as: [ba^{c}ad] or [ba^{c}at]
ba^{c}at	'he sent'	realised as: [ba^{c}at]

Here the realisations of *ba^{c}at* 'he sent' are, in set-theoretical terms, properly included within those of *ba^{c}ad* 'after, following'. This situation is distinct from that of *budding* vs. *butting* given above. In the case of *budding* vs. *butting*, while there is realisational overlap between the two words (in pronunciations involving [ɾ]), there are realisations of both words (with [d] and [t] respectively) which are unambiguously distinct from those of all realisations of the other word.

In the case of *ba^{c}ad* 'after, following' vs. *ba^{c}at* 'he sent', there are no realisations of *ba^{c}at* which are unambiguously distinct from those of *ba^{c}ad*, although there are realisations of *ba^{c}ad*, i.e. as [ba^{c}ad], which are unambiguously distinct from those of *ba^{c}at*.

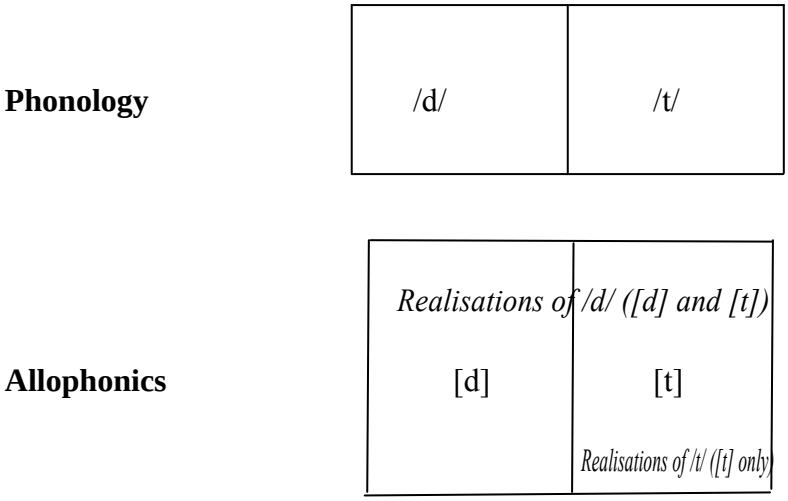
The case of *budding* vs. *butting* establishes the principle that realisational overlap – i.e. partial non-distinction at the allophonic level – is compatible with different phonemes – i.e. (full) phonological distinction – at the phonematic level. The application of this principle to the example of *ba^{c}ad* vs. *ba^{c}at* leads to the conclusion that realisations of *ba^{c}ad* as [ba^{c}at] involve realisations of the phoneme /d/ and not realisations of the phoneme /t/, while realisations of *ba^{c}at* as [ba^{c}at] involve realisations of the phoneme /t/: as in the case of *budding* vs. *butting*, phonetic identity does not necessarily imply phonological identity. (For further discussion in support of this conclusion, see Dickins 2007: 18–19.)

As is also pointed out in Dickins (2007: 18–19):

> In fact, in the case of *ba^{c}ad* vs. *ba^{c}at* there is also a common-sensical phonetic element to this interpretation. We do not really know what the extensional bounds are of realisations of /d/ or /t/ (or any other phoneme for that matter): all we can ultimately do is impose some reasonable, but inevitably arbitrary, limits. What I have analysed as realisations of /d/, in *ba^{c}ad* (and other words involving unstressed post-vocalic word-final /d/) may involve different degrees of devoicing (cf. Mustapha 1982: 226 […]). Since we can only determine the extensional bounds of realisations of /t/ on ultimately arbitrary (though reasonable) grounds, the point at which we determine realisations of /d/ (as [t]) to be indistinguishable from valid realisations (as opposed to unacceptable mispronunciations) of /t/ is also ultimately arbitrary.

This situation of phonological discreteness in combination with realisational overlap can be represented as in Figure 6:

Figure 6
Phonological discreteness vs. realisational proper inclusion of /d/ and /t/ in Central Urban Sudanese Arabic

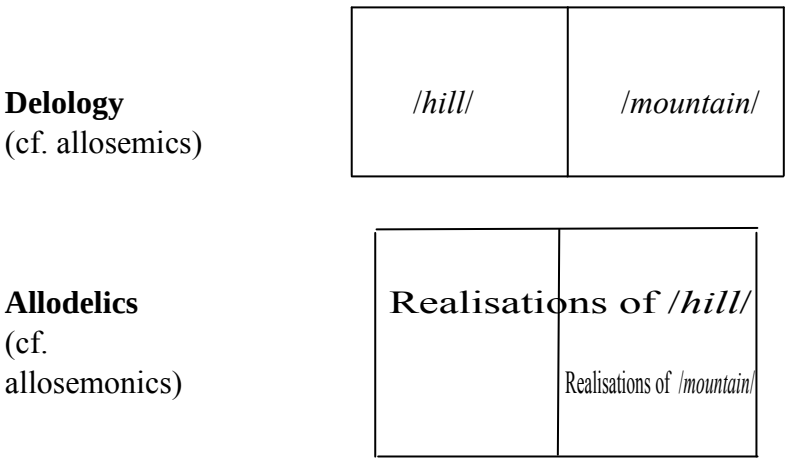


I will now turn to what I believe to be the corresponding situation to this in semantics. Consider the following:

(7) *A mountain is a very large hill.*
(8) *A mountain is larger than a hill.*

Both of these statements seem fairly reasonable (5 being perhaps more reasonable than 4). They also, however, seem to be mutually exclusive (contradictory). An analysis of abstract semantic (delological) discreteness vs. realisational (alodelic) proper inclusion, as represented in Figure 7, provides a possible answer to this conundrum.

Figure 7



As with the 'budding' / 'butting' example in relation to phonology and allophonics, what this analysis implies is that any entity which can be referred to as a mountain could, in extremis at least, be referred to as a hill (cf. 'Everest is a mighty hill!'), but not every entity which could be referred to as a hill can also be referred to as a mountain.[8] Properly speaking, we are talking here about words (signa) in particular senses (allosemes), rather than about abstract senses (delological forms): thus, it is more coherent to talk about allosemes and their allosemonic realisations than about delological forms and their allodelic realisations (cf. corresponding remarks made about 'cup' and 'mug'; Section 5.2.1, above).

While any entity which can be referred to as a mountain might also be referred to as a hill (but not the reverse), 'hill' and 'mountain' are as abstract delological/allosemic notions distinct, as are 'cup' and 'mug'. It is for this reason that we can say what clearly differentiates a mountain from a hill (e.g. 'a mountain is bigger than a hill'), just as we can say what clearly differentiates a cup from a mug (e.g. 'a cup is smaller than a mug and has a bottom which is smaller than its rim').

Consider now Figure 8, which introduces the relevance of this analysis to scalar implicature.

Figure 8

	Hyperonymy-hyponymy, and Quasi-hyponymy	**Semantic overlap**	**Semantic disjunction**
Ø	√It's big, very big *It's big, huge *It's warm, hot	*It's big, useful	*?It's big, small
'and'	*It's big and very big *It's big and huge *It's warm and hot	√It's big and useful	*?It's big and small
'and not'	?It's big and not very big ?It's big and not huge ?It's warm and not hot	√?It's big and not useful	*It's big and not small
'but'	?It's big but very big *It's big but huge *It's warm but hot	√It's big but useful	*It's big but small
'not'	*?It's big, not very big *?It's big, not huge √It's warm, not hot	?It's big not useful	√It's big not small

[8] As with phonemes (and phonological entities more generally; cf. the discussion of the realisations of /ba^{c}ad/ vs. /ba^{c}at/ in Section 5.2.1.1), we do not really know what the extensional bounds are of realisations of delological entities, and by extension allosemes. All we can ultimately do is impose some reasonable, but inevitably arbitrary, limits. Since we can only determine the extensional bounds of realisations of /*hill*/ and /*mountain*/ on ultimately arbitrary (though reasonable) grounds, the point at which we determine putative realisations of /*hill*/, for example, to be no longer valid, but misapplications of the notion 'hill' is also ultimately arbitrary.

'not'– with reversal of terms	*?It's very big not big *?It's huge not big *?It's hot, not warm	?It's useful not big	√It's small not big
'but not'	√It's big but not very big √It's big but not huge √It's warm but not hot	√It's big but not useful	*It's big but not small
'in fact'	√ It's big, in fact very big √It's big, in fact huge √It's warm, in fact hot	*It's big , in fact useful	*It's big in fact small
'not in fact'	*It's big, not in fact very big *It's big, not in fact huge *It's warm, not in fact hot	*It's big, not in fact useful	√It's big, not in fact small
not just'	√It's very big, not just big √It's not just big, it's very big √It's huge, not just big √It's not just big, it's huge √It's hot, not just warm √It's not just warm, it's hot	√It's useful, not just big √It's not just big, it's useful	*It's small, not just big *It's not just big, it's small

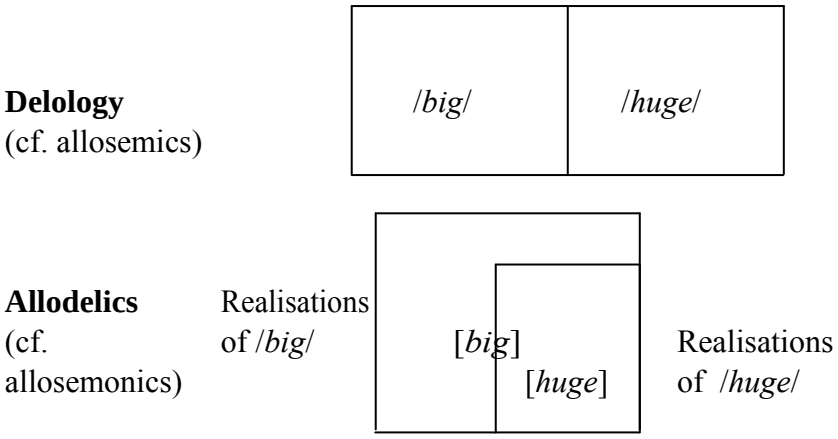
However, there is also one striking major difference, in the top row. 'It's big, very big' is fine – just as are other 'substitutive' examples involving hyperonymy-hyponymy, given in Figure 8: 'it's a lorry, a juggernaut' and 'it's a jet, a jumbo (jet)'. Examples such as 'it's big, huge', and 'it's warm, hot' seem very odd – suggesting that the relationship between 'big' and 'huge' or 'warm' and 'hot' is not one of hyperonymy-hyponymy (unlike that between 'big' and 'very big').

There is also further compelling evidence that the relationship between 'big' and 'huge' is not the same as that between 'big' and 'very big'. Consider the following:

(9) *It's not (just) very big, it's huge.*
(10) *It's not (just) very, very big, it's huge.*
(11) *It's not (just) very, very, very, very, very big, it's huge.*

No matter how extremely big an object is described as being – by the addition of more and more *very*s, its description as 'huge' seems to describe something bigger: i.e. 'huge' is in an abstract sense bigger than any degree of 'big' – i.e. 'huge' is abstractly (in terms of delological form, and by extension, allosemes) discrete from 'big', albeit that we could, I suspect, fairly reasonably refer to any 'huge' entity as 'big'. If this analysis is right, the relationship between 'big' and 'huge' is the same as that between 'hill' and 'mountain' – abstract (delological, hence also allosemic) discreteness vs. realisational (allodelic, hence also allosemonic) proper inclusion, as in Figure 9.

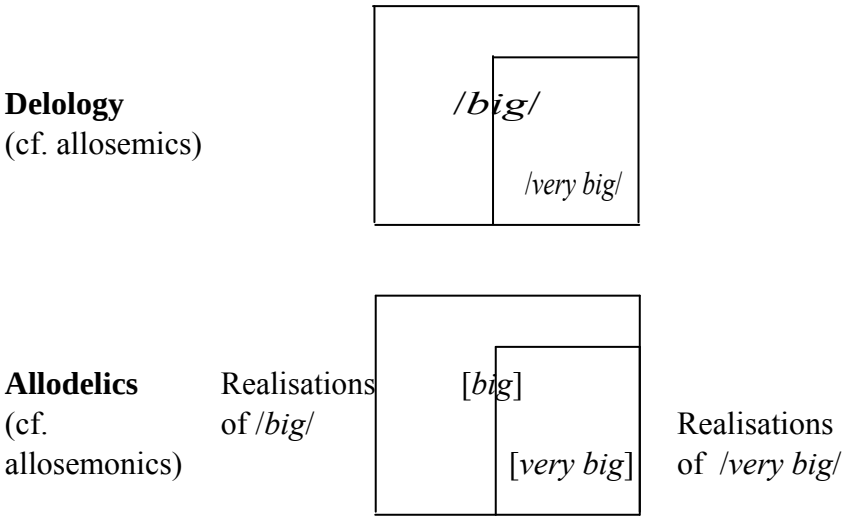
Figure 9



By contrast, 'very big' things are abstractly properly included within 'big' things: All 'very big' things are by definition – i.e. delologically, and hence allosemically – also 'big' things (but not vice versa). Realisationally – i.e. allodelically, and hence allosemonically – it also seems a reasonable claim that 'very big' is properly included within 'big': anything which can be reasonably described as 'very big' can also be reasonably described as 'big', but not vice versa. The relationship between 'big' and 'very big' can thus be diagrammed as in Figure 10 (next page).

The basic analysis in Figure 9 applies not only to the pair 'big'/'huge' but also the pair 'warm'/'hot'. Just as 'big'/'huge' (or 'huge'/'big') can be expanded by adding negative-type counterparts to give the series 'huge'/'big'/'small'/'tiny', so 'warm'/'hot' (= 'hot'/'warm') can be expanded to give the series 'hot'/'warm'/'cool'/'cold'.

Figure 10



There are two striking differences between these two series, however. Firstly, while the non-extreme terms 'big' and 'small' are the more basic terms in the series 'huge'/'big'/'small'/'tiny', the extreme terms 'hot' and 'cold' are the more basic terms in the series 'hot'/'warm'/'cool'/'cold'. An obvious partial reason why 'hot' and 'cold' are more basic than 'warm' and 'cool' is that entities – objects, etc. – are only 'warm' or 'cool' within very small tolerances (having to do with partly with the ability of human beings to handle them without causing themselves discomfort or injury). Entities can, however, be hot to an unlimited degree, and cold to an apparently unlimited degree (in fact limited by absolute zero).

A second, and perhaps related, difference between the series 'huge'/'big'/'small'/'tiny' and 'hot'/'warm'/'cool'/'cold' is that there seems to be a more significant conceptual gap between 'warm' or 'hot' and 'cool' and 'cold', than there does between 'big' and 'huge', or perhaps 'small' and 'tiny'. In abstract (delological, and hence allosemic) terms, 'warm' and 'hot' (also 'cool' and 'cold') seem to be discrete in the same way as are 'huge' and 'big' (also 'small' and 'tiny'). Realisationally (allodelically, and hence allosemonically), however, it seems less plausible to say that 'hot' is properly included within 'warm' (also that 'cold' is properly included within 'cool') in the same way that 'huge' is properly included within 'big' (cf. Figure 10). Not all hot things (in the real world) could reasonably be described as 'warm' (just as not all cold things in the real world could also reasonably be described as 'cool'). Some things are unambiguously hot and not even plausibly describable as warm (just as some things are unambiguously cold, and not even plausibly describable as cool). If this line of argument is correct, the relationship between 'hot' and 'warm' (also 'cold' and 'cool') is one of abstract (delological, hence also allosemic) discreteness, and realisational (allodelic, hence also allosemonic) overlap (rather than realisational proper inclusion, as in the case of 'big' and 'huge': Figure 9).

5.3 Scalar implicature and para-referentiality

I have so far considered cases of scalar implicature which involve hyperonymy-hyponymy (e.g. 'big' and 'very big') and cases which I have argued involve only quasi-hyponymy, i.e. where there are two discrete abstract (delological, hence also allosemic) entities but realisational (allodelic, hence also allosemonic) proper inclusion (e.g. 'big' and 'huge').
In the following sections, I will consider a third kind of scalar implicature which might be said to involve pseudo-hyperonymy. Scalar implicature of this third kind relies not on abstract (delological, hence also allosemic) proper inclusion or even realisational (allodelic, hence also allosemonic) proper inclusion, but a form of proper inclusion which emerges by consideration of what I will call here para-reference, rather than reference proper.

5.3.1 Reference and para-reference

Consider the following:

(12) *I'm going to buy bread.*

In referring to 'bread' here, the speaker has not said anything about whether they are going to buy bread only or bread and other things. The reference is simply to 'bread'.
Consider, now, however, the following:

(13) A. *What did you buy at the Co-op?*
B. *[I bought] bread.*

Here, speaker B's statement – whether in its full form 'I bought bread' or the conversationally more plausible 'bread' – is likely to be interpreted as meaning 'bread and nothing else'. However, in saying 'bread', the speaker has simply referred to 'bread'. The additional information 'and nothing else [of relevance in the context]' we can refer to as a 'para-reference'; it is not part of the reference of 'bread' but it can be regarded as an element of what is being referred to overall. This kind of para-reference which excludes other things we can refer to as an exclusive para-reference.

We can, for current purposes contrast exclusive para-reference with non-exclusive para-reference. Consider the following:

(14) *When you go to the shops buy [some] bread.*

The reference of 'bread' here is, as in the previous examples, to bread. However, the speaker in 14 is unlikely to be interpreted as in 13 to mean 'bread only'. Rather in this context, what is meant is 'bread – together (possibly) with other things'. This reference, which is additional to the basic reference 'bread', can be referred to as a non-exclusive para-reference.

5.3.1.1 Referential excluders (exclusives)

The analysis of examples such as 13 and 14 as involving what I have termed para-reference needs some justification. The most straightforward means of justification is to consider – and reject – the obvious alternatives. The first alternative is that there is no need to distinguish between reference and para-reference (with its exclusive, non-exclusive, and no doubt other sub-types): everything can be included within reference (proper).

This view leads to rapid and extreme complications. In the case of 'When you go to the shops buy [some] bread' we would have to say that the reference of 'bread' is something like 'bread and other things' or 'bread – not excluding other things', or similar. Given a rather crude version of this approach, we would have to say that the range of references of 'non-exclusive bread' is 'bread and everything else'. Similarly, the range of references of 'non-exclusive cheese' would be 'cheese and everything else'. The set 'bread and everything else' is the same extensionally as the set 'cheese and everything else' – they have the same members (bread, cheese, and everything else). It would thus, under this rather crude interpretation, be impossible to distinguish the delological form (viewed in extensional terms) of 'bread' from the delological form of 'cheese' – or of anything in fact.

A more sophisticated version of this approach might deal with some of these problems – but at the cost, I believe, of great complication in the analysis. Even with a sophisticated ver-

sion, however, such an approach would apparently yield two senses (allosemes) for words where there is, according to all other standard criteria, only one. Thus, we would, apparently, have to say that 'bread' (= 'food made from a dough of flour or meal, mixed with water or milk': Collins English Dictionary) is one alloseme when it has the meaning (or 'interpretation) 'bread only' ('exclusive bread') and another alloseme when it has the meaning ('interpretation') 'bread, not excluding other things' ('non-exclusive bread'). The attempt to include 'para-reference' within reference ('reference proper') thus appears to break down.

The second alternative to the *reference plus para-reference* analysis would be to accept the notion of reference, but to reject the notion of para-reference altogether – perhaps regarding 'para-reference' as merely a matter of pragmatic inference (just as one can infer from a statement 'It's hot in here' uttered in the right circumstances that the speaker wants the hearer to open a window in the room where they are both sitting). There are, however, fairly compelling reasons not to do this. Consider the following (for recent pragmatic analyses of 'only', see Abbott 2006; Beaver and Clark 2008: 248–279; Horn 2009):

(15) *When you go to the Co-Op buy bread only.*
(16) *When you go to the Co-Op buy bread.*

If we reject the notion of para-reference altogether, we would have to say that 15 and 16 uttered in the same (equivalent) circumstances mean the same thing: they have the same reference. However, not only do 15 and 16 mean different things, in an obvious pre-theoretical sense (16 meaning, normally, that the addressee should buy bread amongst other things, and 15 meaning, absolutely, that the addressee should buy nothing except bread). More than this, if we were to say that they have the same (equivalent) reference, we would have to say that 'only' does not have a reference, and therefore, by extension, that 'only' does not have a delological form. Yet, it seems intuitively obvious that 'only' (in the relevant sense, i.e. alloseme) does have a meaning (yielding a difference in standard meaning between 'When you go to the Co-Op buy bread' and 'When you go to the Co-Op buy bread only'), and that this meaning should be accounted for by an analysis in terms of denotation (and reference). The attempt to reject 'para-reference' altogether thus also seems to break down.

The above sketch of 'reference' vs. 'para-reference' is only exploratory. I have not, for example, considered how para-reference relates to more abstract semantic notions – delological form (and by extension alloseme). For a proper account these aspects would need to be coherently developed and justified. For present purposes, however, the notion of para-reference is sufficient.

5.3.2 Para-reference and scalar implicature

Having considered and attempted to justify the distinction between reference and para-reference, I turn now to the application of the notion of para-reference – involving pseudo-hyponymy – to scalar implicature, looking in particular at 'some' vs. 'all' and cardinal numbers (for recent pragmatic accounts of these, see Carston 1998, and Breheny 2008). Consider Figure 11:

Figure 11

	Hyperonymy-hyponymy, Quasi-hyponymy, and Pseudo-hyponymy	**Semantic overlap**	**Semantic disjunction**
Ø	√It's a car, a hatchback *?It's big, huge *I know some of them, all of them *I know 3 of them, 4 of them	*It's big, useful	*?It's big, small
'and'	*It's a car and a hatchback *It's big and huge *I know some of them and all of them * I know 3 of them and 4 of them	√It's big and useful	*?It's big and small
'and not'	?It's a car and not a hatchback ?It's big and not huge ?I know some of them and not all of them ?I know 3 of them and not 4 of them	√?It's big and not useful	*It's big and not small
'but'	√?It's a car, but a hatchback *It's big but huge *I know some of them but all of them *I know 3 of them but 4 of them	√It's big but useful	*It's big but small
'not'	*It's a car, not a hatchback ?It's big, not huge √?I know some of them not all of them √?I know 3 of them not 4 of them	?It's big not useful	√It's big not small
'not'– with reversal of terms	*?It's a hatchback, not a car *?It's very big not big √?I know all of them not some of them √I know 4 of them not 3 of them	?It's useful not big	√It's small not big
'but not'	√It's a car but not a hatchback √It's big but not very big √I know some of them, but not all of them √?I know 3 of them but not 4 of them	√It's big but not useful	*It's big but not small
'in fact'	√It's a car, in fact a hatchback √It's big, in fact very big √I know some of them, in fact all of them √? I know 3 of them, in fact 4 of them	*It's big, in fact useful	*It's big in fact small
'not in fact'	*It's a car, not in fact a hatchback *It's big, not in fact very big *I know some of them, not in fact all of them *I know 3 of them, not in fact 4 of them	*It's big, not in fact useful	√It's big, not in fact small

not just'	√?It's a hatchback, not just a car √?It's not just a car, it's a hatchback √It's very big, not just big √It's not just big, it's very big √I know all of them not just some of them √I know 4 of them not just 3 of them	√It's useful, not just big √It's not just big, it's useful	*It's small, not just big *It's not just big, it's small

As Figure 11 shows, just as quasi-hyponymy (Sections 5.2–5.2.1.1) patterns rather like hyperonymy-hyponymy, so scalar implicature involving para-reference – what I shall call 'pseudo-hyponymy' – patterns rather like (though not identically to) hyponymy and quasi-hyponymy.

I will consider cardinal numbers first, then go on to 'some' and 'all'. Given that cardinal numbers fit fairly well with hyperonymy-hyponymy in Figure 11 (and given that this is the simplest situation represented in that figure), the first question to ask is why cardinal numbers cannot simply be analysed in terms of hyperonymy-hyponymy. According to such an analysis, 'two' (and numbers above two) would be properly included within 'three', 'four' (and numbers above four) would be properly included within 'three', etc.

This analysis is intuitively rather bizarre, suggesting that 'four' is a type of 'three' (just as a hatchback is a type of car). It also seems intuitively impossible to fit with the fact that in mathematics 'four' is not a type of 'three', or 'three' a type of 'two'. In mathematics, 3+2=5. If 'four' was a type of 'three', and 'three' a type of 'two', there would be no obvious reason why 3+2 could not equal seven (interpreting 'three' as a type of 'four' and 'two' as a type of 'three') – or any other number (given that 'three', for example, would also be a type of 'five', or 'six' or 'seven', etc. etc.). This already seems too problematic to incorporate within a hyperonymy-hyponymy model.

Even worse, however, a form such as 'in fact' can co-occur not only with larger numbers, but also with smaller ones (cf. Carsten 1998). Thus:

(17) *Twelve men will be able to shift that rubble – in fact six.*

Or, rather better, but illustrating the same basic point:

(18) *A dozen men will be able to shift that rubble – in fact half a dozen.*

If we were to adopt a hyperonymy-hyponymy analysis for cardinal numbers, we would have to conclude that 'three' is properly included not only within 'four' and all other larger numbers, but also within 'two' and all other smaller numbers (including minus numbers?). Similarly 'four' would be properly included within 'five' and all other larger numbers, but also within 'three' and all other smaller numbers. By logical extension all cardinal numbers would be properly included within all other cardinal numbers – making them all synonyms, and thus destroying (by reductio ad absurdum) the analysis of proper inclusion (hyperonymy-hyponymy) altogether.

The second alternative analysis of cardinal numbers to consider is that of quasi-hyponymy, i.e. that 'three' for example is realisationally properly included within 'four',

but that 'three' and 'four' are abstractly (delologically) discrete. This proposed analysis also collapses because the realisations of 'four' (taking both larger-number and smaller-number 'extensions' into account) are no different from the realisations of 'three', or of any other number. This situation is not, therefore, like that of *ba^{c}ad* 'after, following' and *ba^{c}at* 'he sent' (Section 5.2.1.1), where there are no realisations of *ba^{c}at* which are unambiguously distinct from those of *ba^{c}ad*, although there are realisations of *ba^{c}ad*, i.e. as [ba-^{c}ad], which are unambiguously distinct from those of *ba^{c}at*. In the case of cardinal numbers, there would be no realisational distinctness whatsoever – dictating that all cardinal numbers were synonyms of one another.

In terms of the options established in this paper, this leaves only the choice that scalar implicature in relation to cardinal numbers is a function of para-reference (pseudo-hyponymy). In fact, this is a common-sense analysis. Consider the following:

(19) *I went to the cinema with John and Mary – not John, Mary and Paul.*
(20) *I went to the cinema with two of them – not three of them.*

In the case of 19, 'John and Mary' has an exclusive para-reference – i.e. 'John and Mary only', and one might say in this context 'John and Mary only' rather than just 'John and Mary'. Similarly, in the case of 20, 'two of them' has an exclusive para-reference, and one might say here 'two of them only' rather than just 'two of them'. Cardinal numbers thus function in the same kind of way as does the mentioning of individuals (or other entities), allowing for either the possibility of additional entities (non-exclusive para-reference) or, as here, for their exclusion (exclusive para-reference). In the case of cardinal numbers, there is a further 'dimension' of para-referentiality which is opened up. Thus, I can say 'I went to the cinema with two of them', while not excluding other groups of people with whom I also went to the cinema. This, however, is a further complication to the analysis rather than a refutation of it.

To recap and amplify, cardinal numbers have as their reference what seems to be their reference: 'two' refers to two, 'three' to three, 'four' to four, etc. In addition, however, they have para-references: exclusive or non-exclusive (amongst other types, probably). In most contexts, cardinal numbers have an exclusive para-reference, and always in a mathematical context. However, they may also have a non-exclusive para-reference:

(21) A. *I need a couple of quid.*
B. *It's okay. I've got two pounds on me.*

Here, speaker B is not saying that they have only two pounds on them. They are not using 'two' with an exclusive, but rather with a non-exclusive para-reference.

The same principles which apply to cardinal numbers also apply to 'some' and 'all'. I will not go through the full workings to show that the relationship between 'some' and 'all' involves para-reference (pseudo-hyponymy), rather than quasi-hyponymy, or hyperonymy-hyponymy. The parallelism between cardinal numbers and 'some' and 'all' seems sufficiently established by considering the fact that one can say not only 'I went to the cinema with John and Mary – not John, Mary and Paul' and 'I went to the cinema with two of them – not three of them', but also 'I went to the cinema with some of them – not all of them'.

Referential excluders (cf. Section 5.3.1.) are, of course, common with cardinal numbers, and may occur with 'some': thus, 'I know three of them, in fact four' (but not *'I know only three of them, in fact four'), 'I know some – in fact all – of them' (but not *'I know only some – in fact all – of them'). With cardinal numbers, 'exactly' is also used as a referential excluder (e.g. thus we cannot coherently say *'I know exactly three of them, in fact four').

Also common with cardinal numbers are referential non-excluders (i.e. the opposite of referential excluders), that is words and phrases whose meaning is not compatible with an exclusive para-reference, such as 'at least' and 'at most' (e.g. 'I know at least three of them, in fact four').

6. Contextually determined associative meaning: an example from Arabic

There is obviously a strong tradition from Grice onwards, that what is termed in this paper scalar implicature-based associative meaning has a pragmatic basis. It is, however, worth entertaining the possibility that even this type of associative meaning may not be entirely pragmatic, and may involve conventional elements which can vary in different languages.

Certainly, there are ways in which associative-type meaning can differ between languages which go beyond the fairly simple linguistic-semantic conventions illustrated by 19th century written Dutch *vernietigen* vs. *vernielen*. A good example is provided by Arabic. Consider example 22, from the short story *ᶜurs az-zain* ('The Wedding of Zein'; reproduced in Dickins, Hervey and Higgins 2002: 95), where the Arabic original is followed by a relatively literal English translation and then a relatively idiomatic English translation.

(22) ***Arabic original***
yataḥawwal al-mā' 'ilā mir'ā ḍaxma muḍī'a tataḥarrak fawq ṣafḥati-hā ḏ̣ilāl al-naxl wa-aġṣān al-šajar.

Relatively literal English translation
[…] the water is transformed into a giant shining mirror on whose surface move the shadows of the palms and the branches of the trees.

Relatively idiomatic English translation
[…] the water is transformed into a giant shining mirror on whose surface move the shadows of the palms and the branches of the other trees.

Here *šajar* 'trees', is a hyperonym/superordinate of *naxl* 'palms/palm-trees' In this context in Arabic, however, the meaning of *šajar* has to be taken to exclude that of *naxl* 'palms/palm-trees', i.e. in this particular context *šajar* (in the relevant alloseme) has to be interpreted as having the particular allosemon [*trees excluding palm-trees*] (i.e. the ascription R{*tree excluding palm-tree*}) – as reflected in the idiomatic English translation 'other trees').

Example 23 (from a short story by Anis Mansour entitled *ḥafnat turāb* 'A Handful of Dust', discussed in Dickins and Watson 1999: 550) illustrates the same general point.

(23) ***Arabic original***
wa-hum lā yataḥaddaṯūn ʻilā ʻaḥad min an-nās ... wa-lākinna-hum yudāᶜibūn al-bāᶜa wa-l-mutajawwilīn

Relatively literal English translation
They don't talk to anyone, but they joke with the sellers and the barrow-men.

Idiomatic translation:
They don't talk to anyone, but they joke with the shopkeepers and the barrow-men.

Here, *bāᶜa* 'sellers', is a hyperonym/superordinate of *mutajawwilīn* 'barrow-men' (literally 'travelling [people]'), but in this alloseme meaning people who sell goods from a barrow or handcart); all barrow-men are sellers but not all sellers are barrow-men. Here, the meaning of *bāᶜa* has to be taken to exclude that of *mutajawwilīn* 'barrow-men', i.e. in this particular context *bāᶜa* (in the relevant alloseme) has to be interpreted as having the particular allosemon [*sellers excluding barrow-men*] (i.e. the ascription R{*seller excluding barrow-man*}) – as reflected in the English idiomatic English translation 'shopkeepers').

Cases in which a hyperonym/superordinate is coordinated with a hyponym are relatively frequent in Arabic (cf. Dickins and Watson 1999: 550–555 for other examples). In all cases, the hyperonym/superordinate (necessarily in the relevant alloseme) is interpreted as having a communicative contextually determined allosemon whose ascription can be characterised as R{*'HYPERONYM EXCLUDING HYPONYM'*}. This interpretation derives from a convention of Arabic which does not obtain in English.

7. Conclusions

In this paper I have considered three types of associative meaning – extralinguistic-based, linguistic-based, and scalar implicature-based. I have also briefly considered a fourth type of 'sub-denotative' meaning from Arabic involving coordinated hyperonym-hyponym pairs. I have progressively developed a model for what is meant by associative meaning, via an exposition of relevant aspects of the theory of extended axiomatic functionalism. I have also developed a *referent*-plus-*ascription* (*unascribed semantic-image correlate* plus *ascription*) model of 'utterance-meaning' on the basis of ideas put forward in Dickins 1998 (though with a better integration of these ideas into the overall theoretical model of extended axiomatic functionalism than in Dickins 1998). I have tried to show that because of its precise and integrated approach, the current model is able, via notions such as auto-hyposemony (Section 5.2), to provide accounts of utterance-meaning which are specific, adequate to the facts, and coherent.

The current paper has not attempted to provide a new account – or even to consider in any detail – existing accounts of how we understand the meaning of scalar implicatures, or other aspects of utterance-meaning. However, it has attempted to produce what I believe is a sine qua non for such an undertaking – an account of what the utterance-meanings of the relevant phenomena are. In order to understand *how* a hearer understands what an utterance means, we need to know first *what* it means: that is to say, we have to have a coherent model of utterance-meaning – and the more coherent our model of utterance-meaning, the

more we are likely to be able to provide an adequate account of how speakers/hearers understand what utterances mean.

A coherent model of utterance meaning implies also (i) a coherent model of the more abstract elements on which utterance-meaning relies, and (ii) an account of what utterances of the type being investigated might mean – since actual meaning can only be properly understood against the backdrop of the range of things which an utterance of this type might mean. This is particularly clear in respect of areas of utterance meaning such as scalar implicature: the understanding of the meaning of 'some', for example, on a particular occurrence of use can be regarded as 'selected' from the range of possible meanings which 'some' might have across all similar, and different, types of possible occurrence. At its most basic, this implies a model which accounts for the full extensional range of utterances of the type being investigated.

To illustrate the principles laid out in the previous paragraph in practice, we may consider first cases of abstract disjunction plus realisational overlap (e.g. 'cup' vs. 'mug'; Section 5.21), as contrasted with cases of abstract overlap plus realisational overlap (e.g. 'surgeon' vs. 'goalkeeper'). If we were simply to consider the set of entities in all possible worlds which can be referred to as 'cups', as compared to those which can be referred to as 'mugs', we would conclude correctly that there are some entities which can be referred to equally as 'cups' or as 'mugs'. If we were similarly simply to consider the sets of entities in all possible worlds which can be referred to as 'surgeons', as compared to 'goalkeepers' we would also correctly conclude that there are some entities which can be referred to equally as 'surgeons' or 'goalkeepers'. A simple possible world-based comparison of this type would lead us to conclude, incorrectly, that the semantic relationship between 'cup' and 'mug' in English is the same as that between 'surgeon' and 'goalkeeper' – a view refuted by the fact that we can meaningfully say 'he is both a surgeon and a goalkeeper', but not 'it is both a cup and a mug'.

Conversely, if we were to adopt a purely abstract-based approach to utterance meaning, we would conclude that 'cup' and 'mug' are purely disjunct concepts, while 'surgeon' and 'goalkeeper' are overlapping concepts – a view refuted by the fact that there are entities in the world which can be referred to either as 'cup' or as 'mug'. What is needed is a combination of the abstract (delological, and by extension allosemic) and the concrete (or realisational, i.e. allodelic and deletic, and by extension allosemonic and semonetic). This allows us to understand semantic elements as being abstractly (delologically, and by extension allosemically) disjunct but concretely (realisationally, i.e. allodelically and deletically, and by extension allosemonically and semonetically) overlapping (as in the case of 'mug' and 'cup') as opposed to semantic elements, for example, such as 'surgeon' and 'goalkeeper', which are both abstractly (delologically, and by extension allosemically) and concretely (realisationally, allodelically and deletically, and by extension allosemonically and semonetically) overlapping. The double abstract-concrete/realisational model makes plain why pairs such as 'cup/mug' and 'surgeon/goalkeeper' behave similarly in language use in some respects but differently in others.

The same general principles apply to the different hyponymy-type relationships considered in this paper: hyperonymy-hyponymy (hyponymy proper), quasi-hyponymy, and pseudo-hyponymy (para-referentiality). The different possibilities for meaningful utterances which these display reflect both the abstract (delological, and by extension al-

losemic) and concrete (realisational – allodelic and deletic, and by extension allosemonic and semonetic) levels.

In the case of hyperonymy-hyponymy, or hyponymy proper (as in 'lorry'-'juggernaut'; Section 5.1), we cannot, for example, meaningfully (truthfully) say (a) "a juggernaut is larger than a lorry", but we can meaningfully say "a juggernaut is a very large lorry". This reflects the analysis that 'juggernaut' is properly included within 'lorry' at both the abstract and concrete levels.

By contrast, in the case of quasi-hyponymy (as in 'hill'-'mountain'), we can meaningfully say both (a) "a mountain is larger than a hill" (what I have suggested is an abstract-oriented utterance; Section 5.2.1.1), and (b) "a mountain is a very large hill" (a concrete/realisational-oriented utterance; Section 5.2.1.1). This reflects the analysis that 'mountain' is abstractly disjunct from 'hill', but concretely/realisationally properly included within it.

In the case of pseudo-hyponymy, involving para-reference (as in the case of 'three'-'four'; Section 5.3.2) we can meaningfully say (a) "four books is/are more than three books" (cf. Section 5.2.1.1), but we cannot meaningfully say (b) "four books is an extreme case of three books" (cf. Section 5.2.1.1 – one cannot, of course, meaningfully talk about "a very large three books"; I have therefore substituted the roughly corresponding "An extreme case of three books"). This patterning reflects the fact that 'four' is both abstractly and concretely/realisationally disjunct from 'three'.

The utterances discussed in the previous paragraph can be tabulated as in Figure 12.

Figure 12

	(a)-type: abstract-oriented utterance COMPARATIVE+*than*	**(b)-type: concrete/realisational-oriented utterance**
Hyperonymy-hyponymy: ***abstract and concrete /realisational proper inclusion***	**a juggernaut is larger than a lorry*	*a juggernaut is a very large lorry*
Quasi-hyponymy: ***abstract disjunction and concrete /realisational proper inclusion***	*a mountain is larger than a hill*	*a mountain is a very large hill*
Pseudo-hyponymy: ***abstract and concrete /realisational disjunction***	*four books is more than three books*	**four books is an extreme case of three books*

As can be seen from Figure 12, different configurations of proper inclusion and disjunction at the abstract and concrete/realisational levels are reflected in different utterance possibilities. In the case of hyperonymy-hyponymy (abstract and concrete/realisational proper inclusion) the (a)-type comparative structure is not meaningful (true), but the (b)-type 'very large' structure is. In the case of quasi-hyponymy (abstract disjunction with concrete/realisational proper inclusion) both the (a)-type comparative and the (b)-type 'very large' structures are meaningful. In the case of pseudo-hyponymy (abstract and concrete disjunction), the (a)-type comparative structure is meaningful, but the (b)-type 'extreme case of' (equivalent to 'very large') structure is not.

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