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*, *tri-phonidic*, etc. could, of course, also be used.)

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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]

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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

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⟹	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

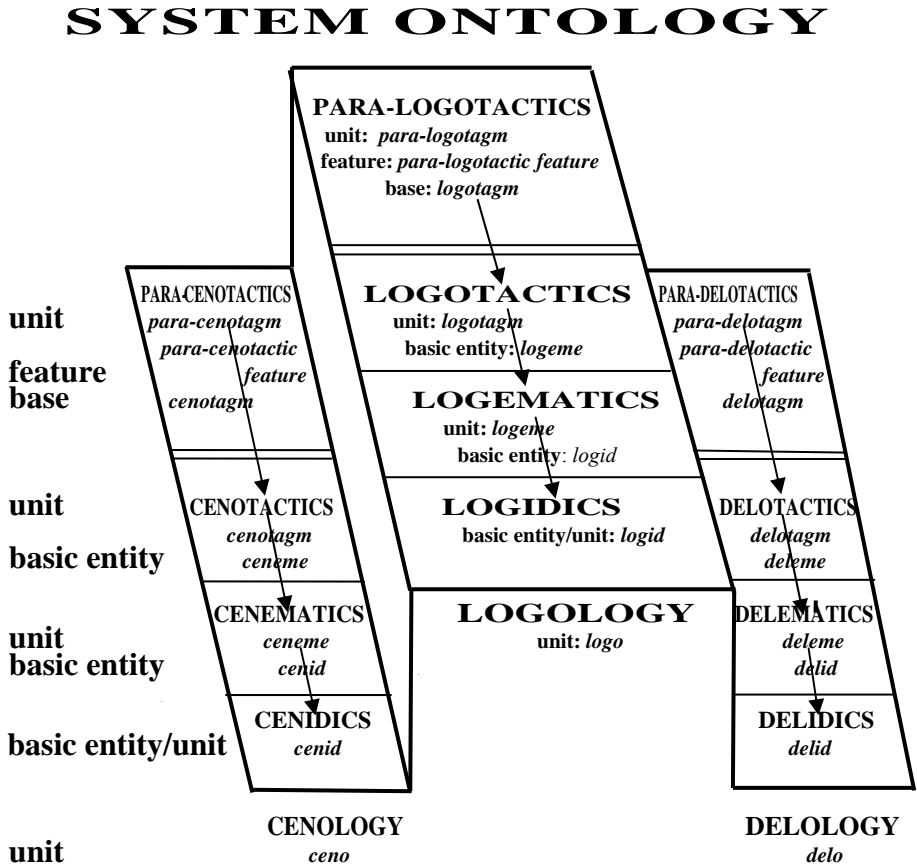| LEVEL unit feature base	PARA- CENOTACTICS para-cenotagm para-cenotactic feature cenotagm	PARA- LOGOTACTICS para-logotagm para-logotactic feature logotagm	PARA- DELOTACTICS para-delotagm para-delotactic feature delotagm
LEVEL unit basic entity	CENOTACTICS cenotagm ceneme	LOGOTACTICS logotagm logeme	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

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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.)

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

SYSTEM ONTOLOGY

PARA-LOGOTACTICS
unit: *para-logotagm*
feature: *para-logotactic feature*
base: *logotagm*

LOGOTACTICS
unit: *logotagm*
basic entity: *logeme*

LOGEMATICS
unit: *logeme*
basic entity: *logid*

LOGIDICS
basic entity/unit: *logid*

LOGOLOGY
unit: *logo*

PARA-CENOTACTICS
para-cenotagm
para-cenotactic feature
cenotagm

CENOTACTICS
cenotagm
ceneme

CENEMATICS
ceneme
cenid

CENIDICS
cenid

CENOLOGY
ceno

PARA-DELOTACTICS
para-delotagm
para-delotactic feature
delotagm

DELOTACTICS
delotagm
deleme

DELEMATICS
deleme
delid

DELIDICS
delid

DELOLOGY
delo

unit
feature
base

unit
basic entity

unit
basic entity

basic entity/unit

unit

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

SYSTEM ONTOLOGY

PARA-LEXOTACTICS
unit: *para-lexotagm*
feature: *para-lexotactic feature*
base: *lexotagm*

unit
feature
base

PARA-PHONOTACTICS
para-phonotagm
para-phonotactic feature
phonotagm

LEXOTACTICS
unit: *lexotagm*
basic entity: *lexeme*

PARA-DELOTACTICS
para-delotagm
para-delotactic feature
delotagm

LEXEMATICS
unit: *lexeme*
basic entity: *lexid*

unit
basic entity

PHONOTACTICS
phonotagm
phoneme

LEXIDICS
basic entity/unit: *lexid*

DELOTACTICS
delotagm
deleme

PHONEMATICS
phoneme
phonid

LEXOLOGY
unit: *lexo*

DELEMATICS
deleme
delid

unit
basic entity

basic entity/unit

PHONIDICS
phonid

DELIDICS
delid

PHONOLOGY
phono

DELOLOGY
delo

unit

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)
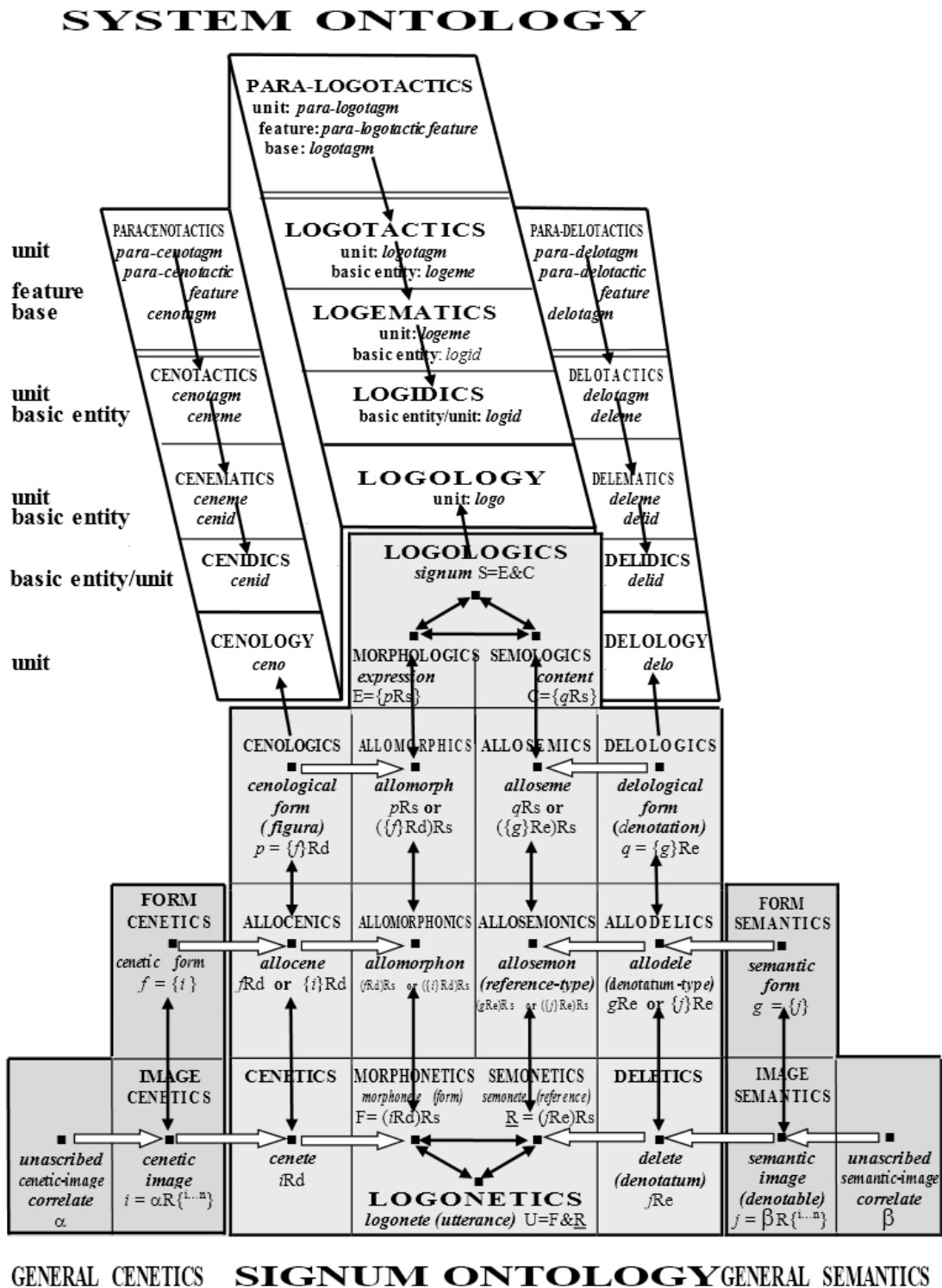
Figure 6
EAF linguistics (current version): overall model (system ontology and signum ontology)
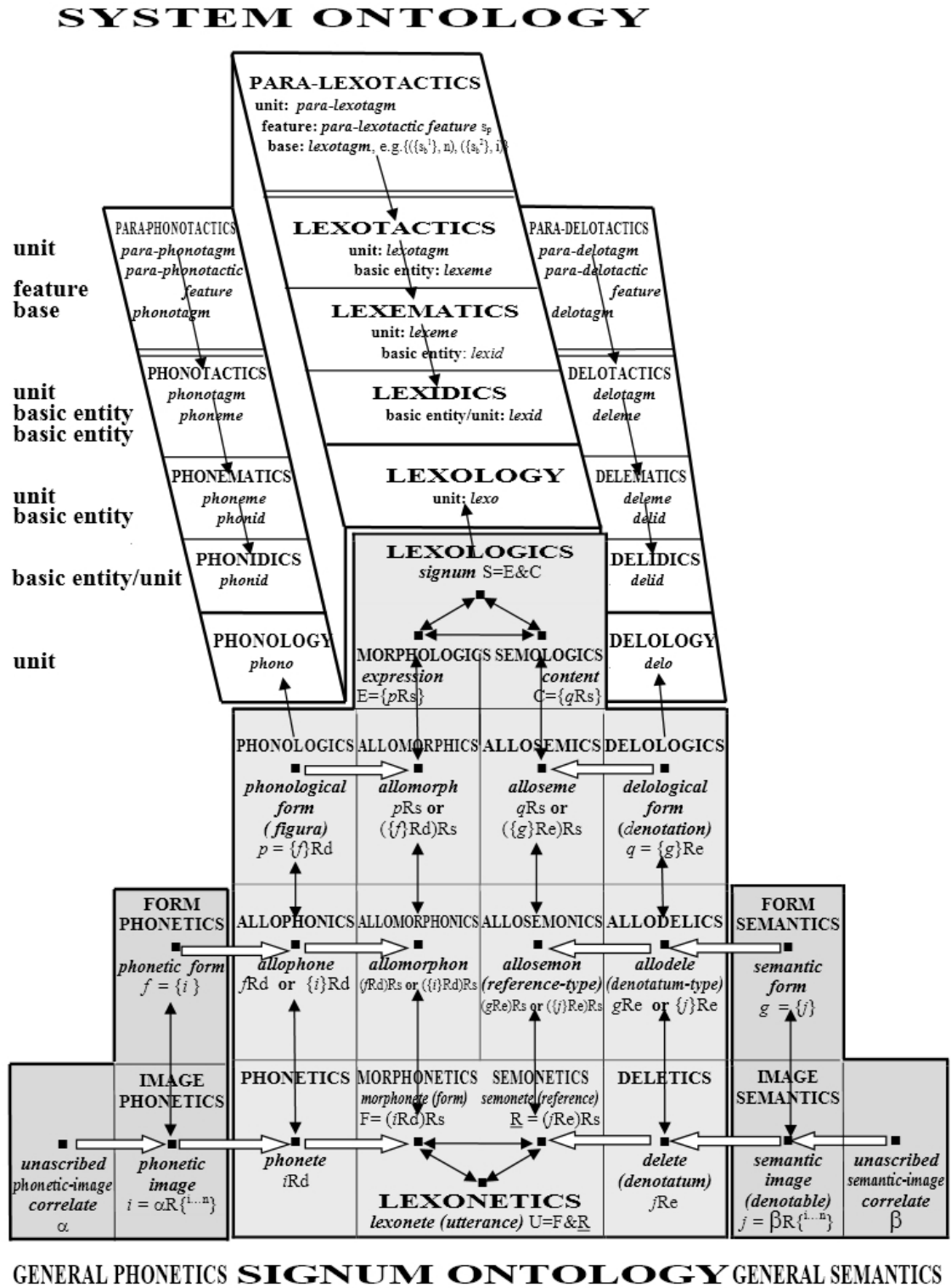
Appendix B: Revised terminology for EAF

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
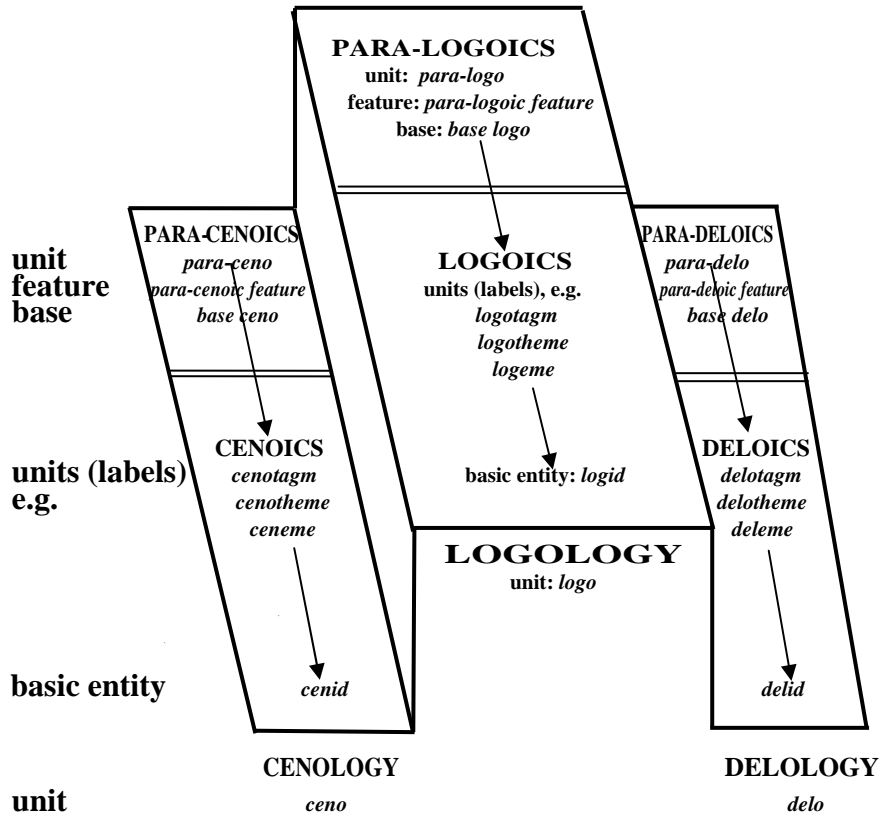**EAF semiotics (revised version): system ontology**

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	logotagm,	delotagm,
	cenotheme,	logotheme,	delotheme,
	ceneme,	logeme,	deleme,
	etc.	etc.	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,	lexotagm,	delotagm,
	phonotheme,	lexotheme,	delotheme,
	phoneme,	lexeme,	deleme,
	etc.	etc.	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)
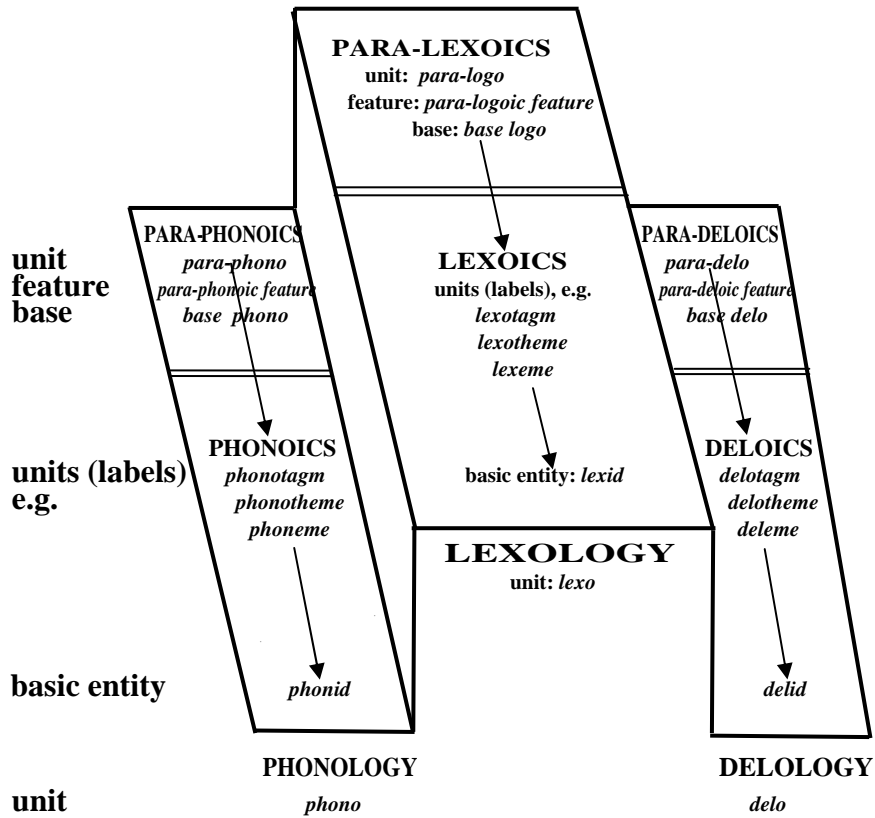
SYSTEM ONTOLOGY

PARA-LOGOICS
unit: *para-logo*
feature: *para-logoic feature*
base: *base logo*

PARA-CENOICS
para-ceno
para-cenoic feature
base ceno

LOGOICS
units (labels), e.g.
logotagm
logotheme
logeme

PARA-DELOICS
para-delo
para-deloic feature
base delo

unit
feature
base

CENOICS
cenotagm
cenotheme
ceneme

basic entity: *logid*

DELOICS
delotagm
delotheme
deleme

units (labels)
e.g.

LOGOLOGY
unit: *logo*

basic entity

cenid

*delid*

CENOLOGY
ceno

DELOLOGY
delo

unit

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

SYSTEM ONTOLOGY

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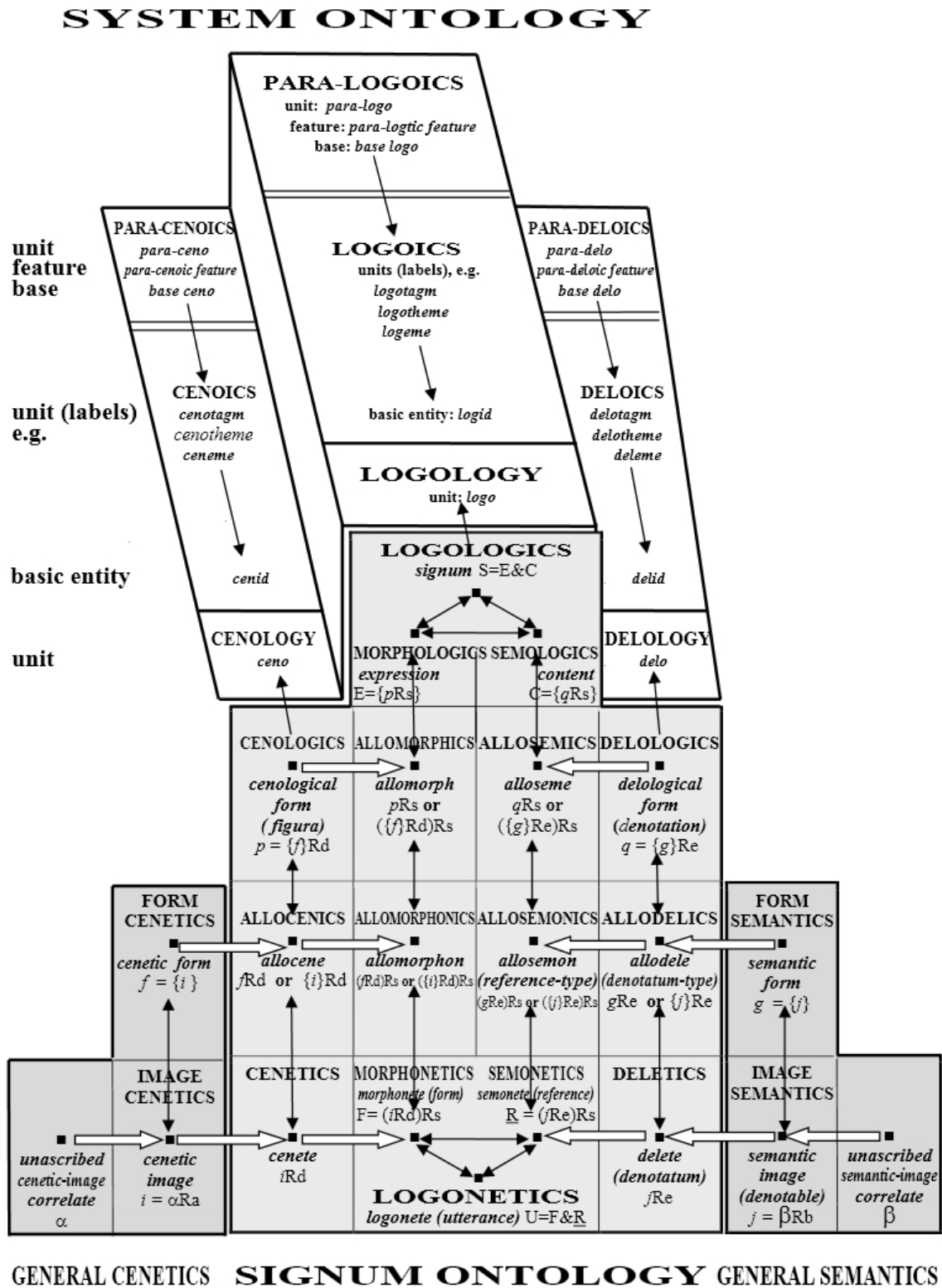
Figure 12
EAF linguistics (revised version): overall model (system ontology and signum ontology)
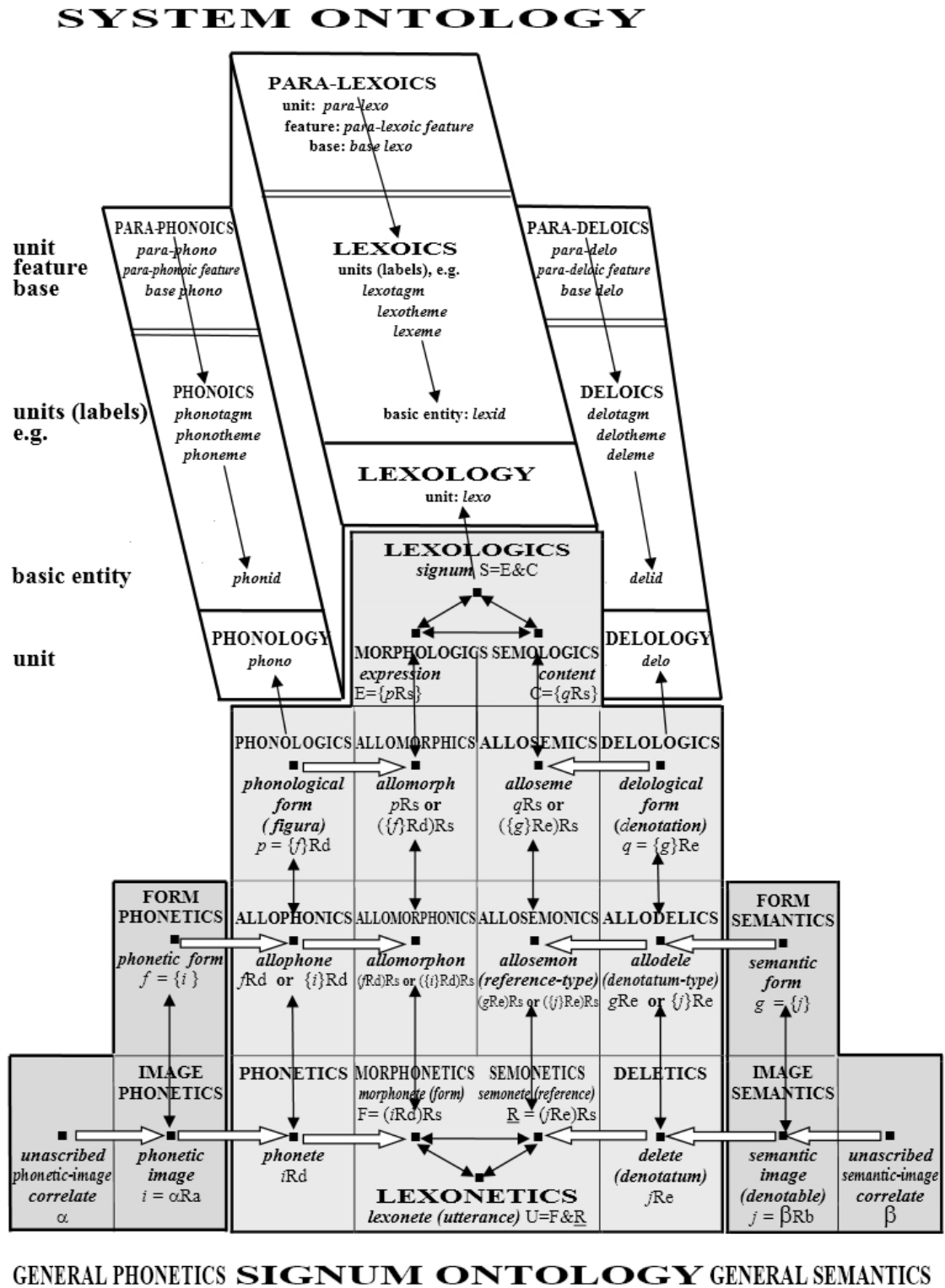
Endnotes

[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: $/i_1mpo_2rt/ \times /i_2mpo_1rt/$. 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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