

Chapter 4

Applying the Theory: the Analysis of Data

4.1 Introduction

In Chapter 3 the PCD approach was outlined in detail. In this chapter the approach will be demonstrated by the analysis of a variety of morphemic entities. The data includes single realisation root and affix morphemes; complex family morphemes; discontinuous, replacive, and positionally flexible morphemes; and non-segmental morphemes. The purpose of this range of data is to demonstrate the ability of the PCD approach to meet a wide variety of morphological problems.

The examples given all involve segmental or non-segmental morphemes. To deal adequately with the large and complex subject of suprasegmental morphology is beyond the scope of the present work, but preliminary analyses suggests that the PCD approach is as effective in identifying and isolating suprasegmental morphemes as it is with the data given.

4.2 Free Monomorphemic Roots

The most straightforward data for PCD analysis are monomorphemic words with a single realisation. Consider the verbs in:

- (1) (1.1) I walk to Sydney.
(1.2) I hurry to Sydney.

Let us assume the semantic values <propel self on legs> for *walk*; and <proceed at an enhanced pace> for *hurry*.

(2) Comparing *walk* and *hurry*:

Features	Commonality	Distinctiveness
formal		wɔk / hʌri
semantic		propel self on legs/proceed at enhanced pace

Table (2) reveals a complete absence of commonality. *Walk* and *hurry* share no phonemes: there is even no correlation of place or manner of articulation, voicing,

canonical structure, etcetera. Semantically there is no shared element of meaning.¹ On the basis of (2) the two correspondences of formal and semantic distinctiveness may be postulated as two unrelated morphemic entities.

The occurrences of these entities in polymorphemic words may be examined:

(3)	walked	hurried
	walking	hurrying
	walks	hurries

As a representative sample table (3) demonstrates the absence of feature variation. However in *a walk* and *a hurry* the morphemes are nouns not verbs. Yet in neither case is word class morphologically marked. There is no semantic variation within the morpheme itself which corresponds to the variation in syntactic function, and so *walk* and *hurry* are underspecified for word class. On the basis of this evidence, the two entities may be regarded as the sole realisations of their respective morphemes.

These morphemes may now be entered in the lexicon. No structural features have been discussed in relation to either entity, so for present purposes they will be represented as {X}. This will be the practice throughout the chapter when an entity's structural features have not been discussed.

The lexical entries for *walk* and *hurry*:

(4)	$\begin{bmatrix} C_1 & V_1 & C_2 \\ & & \\ w & o & k \end{bmatrix}$	< propel self on legs >	{X}
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1. {} <> {}

(5)	$\begin{bmatrix} C_1 & V_1 & C_2 & V_2 \\ & & & \\ h & a & r & i \end{bmatrix}$	< proceed at an enhanced pace >	{X}
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1. {} <> {}

1. Both *walk* and *hurry*, involve some concurrent elements of meaning. It is, for example, possible to *hurry* while *walking*. However, the key semantic feature of *walk* is the physical motion, while the key semantic feature of *hurry* is the pace: *hurry* may involve no physical movement whatsoever. There is no commonality of meaning between the two.

4.3 English Plural Suffixes

English regular plural formation and the irregular suffix *-en* exemplify both the separation of structurally identical but distinct morphemes; and morphophonemically driven feature underspecification. Consider:

(6)	(6.1)	books	[bʊks]	< book, plural >
	(6.2)	cats	[kæts]	< cat, plural >
	(6.3)	dogs	[dogz]	< dog, plural >
	(6.4)	fans	[fænz]	< fan, plural >
	(6.5)	cars	[ka:z]	< car, plural >
	(6.6)	pies	[paɪz]	< pie, plural >
	(6.7)	watches	[wɒtʃəz]	< watch, plural >
	(6.8)	ridges	[rɪdʒəz]	< ridge, plural >
	(6.9)	dishes	[dɪʃəz]	< dish, plural >
	(6.10)	bosses	[bɒsəz]	< boss, plural >
	(6.11)	noises	[nɔɪzəz]	< noise, plural >
	(6.12)	oxen	[ɒksən]	< ox, plural >
	(6.13)	brethren	[brɛðrən]	< brother, plural >
	(6.14)	lessen	[lɛsən]	< cause to be less >
	(6.15)	brighten	[braɪtən]	< cause to be bright >

A PCD analysis of this data reveals that there are five morphemic entities operating as suffixes: [s]:<plural>; [z]:<plural>; [əz]:<plural>; [ən]:<plural>; and [ən]:<cause to be>.

(7) Comparing the two [-ən] suffixes:

Features	Commonality	Distinctiveness
formal	ən	/
semantic		plural / cause to be

These two entities are formally identical but demonstrate total semantic dissimilarity. They are therefore separate morphemes.

Of the plural suffixes, [s], [z] and [əz] occur in specific phonological environments, while [ən] occurs idiosyncratically. Consequently at least the three [S] entities are parts of a single morpheme, with the variation ascribed to phonological and morphophonemic rules.

All four involve an alveolar consonant, and [-əz] and [-ən] both involve schwa. This is not sufficient to constitute a formal commonality. The schwa is not a commonality, since in [-əz] it is the result of a rule and so not a feature of the

morpheme, while in [-ən] the rule does not apply so the schwa must be underlying. If the entities were conflated the two schwas would have to be described separately. This leaves only consonantal place of articulation as a commonality.

It could be argued that [+alveolar] is a commonality conflating the two suffixes into a single morpheme: underlyingly an optional schwa followed by C:[+alveolar]; with two Separate Surface Realisations (SSRs), in one case schwa and [+nasal], in the other [+fricative]. This, however, is not a complex family morpheme with a number of realisations with complex and numerous formal features. Here both entities consist of a limited set of formal features differing in canonical shape and all phonological features except [+alveolar]. A single shared feature in otherwise phonologically distinct entities is insufficient to justify conflation.

(8) Comparing the two entities:

Features	Commonality	Distinctiveness
formal		S / ən
semantic	plural	/

This reveals that the two are synonymous but separate morphemes.

The [s], [z] and [əz] are SSRs of a single morpheme. As the alternation is phonological the realisations are not listed in the lexicon: the entry is underspecified for voice, and includes appropriate rule referrals, and specification for regular productive status:

(9)	$\begin{bmatrix} <- C_1 & \\ & \\ +\text{alveolar} & \\ +\text{fricative} & \end{bmatrix}$	< plural >	{ Specification for PLURAL and for DEFAULT status. ² Morphophonemic rule referral for voice assimilation. }
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1. [] < > {}

This entry generates all three [S] realisations. The [-ən] is a separate morpheme with its own lexical entry:

(10)	$\begin{bmatrix} <- V_1 C_1 & \\ & \\ \text{ə} & \text{n} \end{bmatrix}$	< plural >	{ Specification for PLURAL }
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1. [] < > {}

2. This DEFAULT status indicates that when a noun does not specify some idiosyncratic plural formation, it automatically takes this suffix. It means that this suffix is the regular productive marker. This is discussed in detail in 3.9.5.

4.4 The *go* and *do* paradigms

These paradigms, involving suppletion and the presence of Realisation Features, exemplify the way PCD deals with irregular paradigms.

Ignoring the regularly formed present participle, the paradigms are:

(11)	1, 2 + 3PL	3SG	PASTPART	PAST
'go'	goU	goUZ	gon	went
'do'	du	dΔZ	dΔn	did

Assume for present purposes the semantic concepts <go> and <do>.³ These paradigms are interesting because of: the suppletion *went*; the regular suffix and idiosyncratic vowel in *did*; the irregular vowels of *gone* and *done*; and because, contrary to expectations, *does* shares its vowel with the irregular *done*, not with *do*.

(12) There is no relationship between *go* and *do* :

Features	Commonality	Distinctiveness
formal		goU / du
semantic		go/do

The distinctiveness correspondences generate the following unrelated morphemic entities:

(13)	[goU]	<go>
	[du]	<do>

A comparison of past participle forms reveals a suffix:

(14) Comparing *gone* and *done*:

Features	Commonality	Distinctiveness
formal	n	go / dΔ
semantic	past participle	go/do

Evidence elsewhere in English confirms the suffix [n]:<pastpart.>. Thus three additional morphemic entities may be postulated:

(15)	[go]	<go>
	[dΔ]	<do>
	[n]	< past part.>

3. Assumed semantic values such as these are a device for the purposes of exemplifying analytic procedures in cases where the semantic values of the examples are not at issue. This is discussed in 3.7.

Compare the roots in (15) to those in (13).

(16) Comparing *go* and the *go-* in *gone*:

Features	Commonality	Distinctiveness
formal	g	oU / o
semantic	go	/

(17) Comparing *do* and the *do-* in *done*:

Features	Commonality	Distinctiveness
formal	d	u / ʌ
semantic	do	/

Tables (16) and (17) indicate that the vowel variation in each root has no semantic value, and therefore no morphemic status.

English has no general phonological rules which account for the variation in either. These alternations are also unique among roots in this environment, and thus not a morphophonemic effect of the suffix. In every other instance of the [n] suffix occurring with [oU] the vowel undergoes no change (*sewn, mown, thrown*); and in all but one collocation of the [n] suffix and [u] the vowel realisation undergoes no change (*strewn, hewn, proven*). In that one exception the alternation is [oU] (*choose - chosen*).

The alternation in (16), however, is not unique outside this environment (*pose-posit, know-knowledge, psychosis-psychotic*). This may be generalised as a morphophonemic rule. Vowel shortening readily produces [o] from the diphthong, while a rule generating the reverse is much harder to formulate.⁴ Consequently [oU] is proposed as underlying. The *go* morpheme is specified for that rule in the lexicon and consequently has only one SSR.

The vowel alternation in (17), however, is unique, and attributable to no morphophonemic rule. The *do* morpheme has two SSRs, which differ in vowel quality.

Now consider the 3SG forms.

(18) Comparing *goes* and *does*:

Features	Commonality	Distinctiveness
formal	z	goU / dʌ
semantic	3SG	go/do

4. In fact historically the diphthong is derived, but we are concerned here solely with synchronic analysis.

Evidence elsewhere confirms the [z]:<3SG> suffix. Table (18) generates three further tentative entities:

(19)	[goU]	< go >
	[dΔ]	< do >
	[z]	< 3SG >

A comparison of (19) and (13) reveals that the 3SG suffix causes no phonological variation in *go*. This is entirely regular and requires no further comment. In the case of *do*, there is vowel variation associated with 3SG.

(20) Comparing the roots in *does* and *done*:

Features	Commonality	Distinctiveness
formal	dΔ	/
semantic	do	/

The same realisation of the root is present in both. Now compare *do* and *did*.

(21) Comparing *do* and *did*:⁵

Features	Commonality	Distinctiveness
formal	d	u / id
semantic	do	not past / past

Table (21) contradicts our previous analysis of *do* as an undecomposable entity. Moreover, the alveolar stop past tense morpheme occurs nowhere else as [id]. Regarding this as a unique variant of the suffix complicates both root and suffix. Regarding *di-* as a variant of *do* occurring only with the regular suffix complicates only the root. Consequently we propose a third SSR for *do*:

(22)	[du] }	< do >
	[dΔ] }	
	[dɪ] }	

The first realisation is specified as not subcategorising for past, past participle, or 3SG. The second subcategorises for past participle and 3SG, and the third subcategorises for past.

(23) Comparing *go* and *went*:

Features	Commonality	Distinctiveness
formal		goU / went
semantic	go	not past / past

5. In this analysis the term 'past' is used to refer to the past tense excluding the past participle.

In (24) no formal material corresponds with the semantic commonality. Yet [goU]:<go> has already been established. In accordance with Principle 2 the absence of a formal commonality demands the inclusion of the semantic commonality in both distinctivenesses:

(24) The revised version of (23):

Features	Commonality	Distinctiveness
formal		goU/went
semantic		go, not past/go, past

On the basis of (24) two entities are postulated:

(25)	[goU]	< go, not past >
	[went]	< go, past >

In the absence of formal links the two must be considered separate morphemes.⁶

These are the lexical entries for the *go* and *do* roots:

(26)	$\begin{bmatrix} C_1 & V_1 & V_2 \\ & & \\ g & o & U \end{bmatrix}$	< go, not past >	{specification for -PAST; rule referral for irregular PASTPART formation; morphophonemic rule referral for vowel alternation}
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1. [] <> {}

(27)	$\begin{bmatrix} C_1 & V_1 & C_2 & C_3 \\ & & & \\ w & \varepsilon & n & t \end{bmatrix}$	< go, past >	{specification for +PAST}
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1. [] <> {}

6. Comparing *went* with other forms in the language reveals the tantalising presence of a word final alveolar stop. So is *went* dimorphemic? While the final consonant is not the regular past suffix, which would be voiced following [n], there are several apparently similar irregular past forms where a voiceless alveolar stop co-occurs with a voiced consonant. Four English verbs have the pattern *dwel->dwelt*, possibly suggesting a root [wen-]. However in each of the four cases the root is an [e] final free morpheme. Further, there is no evidence anywhere in the language to support [wen-]. A similar pattern involves vocalic ablaut. Again the roots are free. They are typically, though not exclusively, [i] final, (*feel->felt*, *mean->meant*). In this case the postulated root for *went* would be [win-], for which there is also no supporting evidence. Finally there is the pattern in *lend->lent* and *send->sent*. This is slightly more promising: in four out of the five examples of this pattern the rhyme is [end]. This suggests a possible root [wend], and this exists, although it is marginal. However the past tense of *wend* is either *wended* or *wound*, and definitely not *went*. *Went* and *wend* are semantically distinct, while *went* and *go* vary only in tense. (Historically *went* was the past tense of *wend*. That is very definitely not the case now, and we are concerned solely with synchronic analysis.) The only possible analysis is that *went* is semantically undecomposable.

(28)	$\begin{bmatrix} C_1 & V_1 (->) \\ & \\ d & \end{bmatrix}$	< do >	{ Rule referral for irregular PAST PART formation.}	
	1.	$\begin{bmatrix} V_1 \\ \\ u \end{bmatrix}$	< >	{specification for -PAST, -PASTPART and -3SG}
	2.	$\begin{bmatrix} V_1 -> \\ \\ I \end{bmatrix}$	< >	{subcategorisation for +PAST}
	3.	$\begin{bmatrix} V_1 -> \\ \\ \Delta \end{bmatrix}$	< >	{subcategorisation for +3SG and +PASTPART}

In (28) the vowel is underspecified in the UR, allowing for the presence of RFs at the SSR level. Each set of RFs fully specifies its vowel.

4.5 The Word Class Markers *-sis* and *-tic*

Consider the following data:

(29)	hypnosis/tic	hipnoUsIs	hipnotIk
	psychosis/tic	saIkoUsIs	saIkotIk
	narcosis/tic	nakoUsIs	nakotIk
	neurosis/tic	nyəroUsIs	nyərotIk

A conventional analysis of this data would involve the derivation of one form from another, with the underived form being undecomposable and underlying. In PCD such forms consist of isolatable morphemes, with no form more basic than another.

Let us compare elements of this data, assuming the semantic values <psycho> and <hypno>:

(30) Comparing *psychosis* and *psychotic*:

Features	Commonality	Distinctiveness
formal	saIk	oUsIs / otIk
semantic	psycho	noun / adjective

(31) Comparing *hypnosis* and *hypnotic*:

Features	Commonality	Distinctiveness
formal	hɪpn	oʊsɪs / oʊtɪk
semantic	hypno	noun / adjective

In each the commonality apparently reveals a root, and the distinctivenesses two word class marking suffixes. Almost twenty English pairs conform to this pattern. However, the boundary vowels are problematic. On the basis of the data in (29) they appear to belong to the suffixes. There is some apparently supporting evidence: *psych* occurs freely as a verb and a noun, and in compounds such as *psych-ward*. However *psycho* also occurs freely, and also in *psychoanalysis*, paralleling *hypnotherapy* and *neurosurgeon*. It is unlikely these involve variants *-oanalysis*, *-otherapy* and *-osurgeon*. Assume the semantic values <analysis> and <therapy>.

(32) Comparing *psychoanalysis* and *analysis*:

Features	Commonality	Distinctiveness
formal	əˈnæləsɪs	saɪkoʊ /
semantic	analysis	psycho /

(33) Comparing *hypnotherapy* and *therapy*:

Features	Commonality	Distinctiveness
formal	θerəpi	hɪpnoʊ /
semantic	therapy	hypno /

These results are supported elsewhere and indicate that (29) is representative of a set of bound roots ending in the vowel alternation [oʊ~o]. As our discussion of *go* indicated, this alternation can be attributed to a morphophonemic rule, with [oʊ] underlying. We can now propose the set of morphemic entities [hɪpnoʊ], [saɪkoʊ] etcetera.

This analysis also generates the proposed morphemic entities [sɪs]:<noun> and [tɪk]:<adjective>. These are supported elsewhere. For example:

(34)	catharsis/tic	kəθəˈsɪs	kəθəˈtɪk
	ellipsis/tic	əˈlɪpsɪs	əˈlɪpˌtɪk
	synopsis/tic	sənˈɒpsɪs	sənˈɒptɪk
	parenthesis/tic	pəˈrɛnθəˈsɪs	pəˈrɛnθəˈtɪk

This data represents about a dozen forms with the same suffixes. Assume the semantic values <cathar> and <ellip>.

(35) Comparing *catharsis* and *cathartic*:

Features	Commonality	Distinctiveness
formal	kəθə	sɪs / tɪk
semantic	cathar	noun / adjective

(36) Comparing *ellipsis* and *elliptic* :

Features	Commonality	Distinctiveness
formal	əlɪp	sɪs / tɪk
semantic	ellip	noun / adjective

This confirms the postulated suffixes. Now consider:

(37)	analysis/tic	ənæɪlɪsɪs	ænəɪlɪtɪk
	dialysis/tic	daɪælɪsɪs	daɪəlɪtɪk

This represents a handful of forms with the apparent suffix alternations [ɪsɪs] and [ɪtɪk]. Unlike the [oʊ] final forms, there is no evidence elsewhere disproving this alternation. However, there is also no evidence supporting it. There is thus no justification for complicating these suffixes. The data simply indicates that some co-occurring roots are [ɪ] final.

Three pairs are problematic:

(38)	gnosis/stic	noʊsɪs	nostɪk
	prognosis/stic	prɒɡnoʊsɪs	prɒɡnostɪk
	diagnosis/stic	daɪəɡnoʊsɪs	daɪəɡnostɪk

Let us assume the semantic value <progno>:

(39) Comparing *prognosis* and *prognostic* :

Features	Commonality	Distinctiveness
formal	prɒɡnoʊ	sɪs / stɪk
semantic	prɒɡno	noun / adjective

This appears to indicate the adjectival marker variant [stɪk]. In 4.6 analysis will demonstrate that a single root is present in the data in (38). Accepting that, this suffix variant occurs only with that root. If this is right it complicates the suffix. Alternatively, analysing the root as actually [s] final complicates neither the root nor the suffix. In this analysis the initial [s] of the noun marker assimilates.

(40) Table (39) revised:

Features	Commonality	Distinctiveness
formal	progn <u>o</u> s	s <u>i</u> s / t <u>i</u> k
semantic	progno	noun / adjective

On this basis (38) contains the same suffixes as the rest of the data.

Having examined all occurrences of the two morphemes, the following lexical entries may be proposed:

(41) $\left[\begin{array}{c} \left\langle -C_1 V_1 C_2 \right\rangle \\ \left[\begin{array}{ccc} | & | & | \\ s & I & s \end{array} \right] \end{array} \right]$ < conceptual noun > { Specification for NOUN.}

1. {} <> {}

(42) $\left[\begin{array}{c} \left\langle -C_1 V_1 C_2 \right\rangle \\ \left[\begin{array}{ccc} | & | & | \\ t & I & k \end{array} \right] \end{array} \right]$ < adjective > { Specification for ADJECTIVE.}

1. {} <> {}

4.6 Acknowledge and ignore: A Family Morpheme

The analysis of family morphemes is complex, and results in a complex lexical entry. Such morphemes contain several semantically and formally diverse SSRs, and demonstrate the effects of Principle 2. Consider:

(43) (43.1) know [noʊ] < know, verb >
 (43.2) knowledge [nɒlɪʃ] < know, noun >
 (43.3) acknowledge [əknɒlɪʃ] < admit, know, verb >

(44) Comparing *knowledge* and *acknowledge*:

Features	Commonality	Distinctiveness
formal	nɒlɪʃ	/ ək
semantic	know	/ admit

However, there is no evidence elsewhere supporting the entity [ək]:<admit>. But there is a prefix [ə], co-occurring with isolatable forms in *astray*, *asleep*, *astern* etc, and in *ascend* as opposed to *descend*, *attract* versus *detract* etc. It has a locative sense, indicating immediate association with the semantic value of the root. *Acknowledge*

may be analysed semantically as an assertion of the presence of knowledge.

That being so, the [k] either belongs to a unique alternation of the prefix, or belongs to the root. While there is no evidence to support the former, there is evidence, discussed later, that the [k] belongs to the root. This proposes the alternation [nɔlfj ~ knɔlfj] which may be accounted for phonologically: English phonotactics prohibit the word initial cluster [kn]. If that cluster is underlying and the morpheme appears word initially, a phonological rule eliminates the [k].⁷ Two morphemic entities may now be tentatively postulated:

- (45) (45.1) [knɔlfj] < know, noun >
 (45.2) [ə] < admit, verb >

In (43.1) and (43.2), *know* and *knowledge* demonstrate the morphophonemic vowel variation [ou ~ o] discussed in 4.4 in relation to *go*, with [ou] underlying.

(46) Comparing *know* and *knowledge*:

Features	Commonality	Distinctiveness
formal	noU	/ ɪfj
semantic	know	verb / noun

Like the [k] in [æk], the appearance of the [ɪ] in [ɪfj] finds no supporting evidence. There is plenty of evidence supporting the noun marker [ɪfj]: *parent~parentage*, *vicar~vicarage* etc.⁸ Since the most regular analysis is the most likely to be correct, and this suffix is a much more widespread regularity in the language than the root, the unique idiosyncrasy [ɪ] is more logically ascribed to the root and not the suffix. Isolating the root, consider the status of the [ɪ].

(47) Comparing *know* and *knowl-*:

Features	Commonality	Distinctiveness
formal	noU	/ ɪ
semantic	know	verb /

In (47) the semantic value <noun> is absent as it is a feature of the removed suffix. The formal distinctiveness has no semantic correspondence, and thus no morphemic status. It is therefore a Realisation Feature (RF) of the morpheme, and

7. According to Katamba (1989:164-166) syllable based phonotactic rules like this are useful for determining morpheme boundaries: an impossible syllable initial cluster can *a priori* not be morpheme initial. The morpheme under analysis in this section disproves that assertion. What does proceed from syllable structure is phonological rules deleting segments from, or adding epenthetic segments to, impossible clusters.

8. These suffixes are spelled differently, however, since they are the same in pronunciation and meaning, and we are concerned with only synchronic analysis, they are the same entity

not a submorpheme. Equally, the semantic distinctiveness <verb> has no formal correspondence so is also not a submorpheme.

The distinctivenesses in (47) indicate that two SSRs are present. From the analysis so far, the morpheme has this lexical entry:

(48)	$\left[\begin{array}{cccc} C_1 & C_2 & V_1 & V_2 (C_3 \rightarrow) \\ \left \right. & \left \right. & \left \right. & \left \right. \\ \left[\begin{array}{cccc} k & n & o & u & l \end{array} \right] \end{array} \right]$	<know, (verb) >	{ X }
	1. []	< verb >	{ Specification for VERB. }
	2. [C ₃ ->]	< >	{ Subcategorisation for suffix. Subcategorisation for possible prefix. }

Because [l] is an RF not a submorpheme it appears in the UR as optional, along with the OMR arrow. So far the two always co-occur, so they appear in a single set of option brackets. The RF <verb> also appears in option brackets.

SSR1 has empty formal brackets indicating that the only features present are those obligatory in the UR (thus excluding [l->]). The semantic brackets invoke <verb>, and the structural brackets specify that syntactic category. This entry generates *know*.

SSR2 invokes the optional formal features by listing them without the option brackets. The phonological features of C₃ are listed in the UR so are not repeated. No additional semantic features are present, and the structural brackets specify appropriate affixing. This entry generates *knowledge*, and makes possible *acknowledge*.

Now consider a further body of data:

(49)	(49.1) cognitive	[kognətɪv]	< knowing, faculty, adjective >
	(49.2) cognition	[kognɪʃən]	< knowing, faculty, noun >
	(49.3) cognizant	[kognəsənt]	< knowing, adjective >
	(49.4) recognise	[rekəɡnaɪz]	< knowing, again, verb >
	(49.5) recognition	[rekəɡnɪʃən]	< knowing, again, noun >

Compare (49.2) and (49.5), assuming the first schwa in *recognition* is the result of a vowel shortening rule affecting unstressed vowels in certain environments.

(50) Comparing *cognition* and *recognition*:

Features	Commonality	Distinctiveness
formal	kognɪʃən	/ rɛ
semantic	knowing	faculty/again

On this basis two entities are tentatively postulated:

- (51) [kognɪʃən] < knowing, (faculty) noun >
[rɛ] < again >

(52) Comparing *recognise* and *recognition*:

Features	Commonality	Distinctiveness
formal	rɛkəgn	aɪz / ɪʃən
semantic	knowing	verb/noun

The distinctivenesses are supported by evidence elsewhere in the language. The list of postulated entities may be revised.

- (53) [kogn] < knowing, (faculty) >
[rɛ] < again >
[ɪʃən] < noun >
[aɪz] < verb >

(54) Comparing *cognitive* and *cognition*:

Features	Commonality	Distinctiveness
formal	kogn	ətɪv / ɪʃən
semantic	knowing, faculty	adjective/noun

This supports (53) and expands the list of entities:

- (55) [kogn] < knowing, (faculty) >
[rɛ] < again >
[ɪʃən] < noun >
[aɪz] < verb >
[ətɪv] < adjective >

Now consider the remaining example, (49.3).

(56) Comparing *cognizant* and *cognition*:

Features	Commonality	Distinctiveness
formal	kogn	əsənt / ɪʃən
semantic	knowing	adjective/faculty, noun

This semantic correspondence for [ɪʃən], however, does not precisely match that in (55). Evidence elsewhere supports the latter, indicating that the semantic value <faculty> is a potential feature of the root.

(57) The revised version of (56):

Features	Commonality	Distinctiveness
formal	kogn	əsənt / ɪʃən
semantic	knowing, (faculty)	adjective/noun

On the above analysis a single root is present in all the data in (49):

(58) [kogn] < knowing, (faculty) >

Now consider a further body of data:

(59)	(59.1) ignore	[ɪgnə]	< know, not, pretence, verb >
	(59.2) ignorant	[ɪgnərənt]	< know, not, adjective >
	(59.3) ignoramus	[ɪgnərəɪməs]	< know, not, noun >

While *ignorant* is the absence of knowledge, and an *ignoramus* is one who displays that absence, *ignore* is more complicated. To ignore someone is to pretend one does not know them, virtually the antonym of 'recognise'. To ignore a fact or person is to act as though it was not known. *Ignore* involves behaving in a way consistent with an absence of knowledge. It involves a disingenuous absence of knowledge: the pretence of that absence.

(60) Comparing *ignorant* and *ignoramus*:

Features	Commonality	Distinctiveness
formal	ɪgnər	ənt / eɪməs
semantic	know, not	adjective/noun

This isolates the word class markers, and allows the tentative postulation:

(61) [ɪgnər] < know, not >

(62) Comparing (61) and *ignore*:

Features	Commonality	Distinctiveness
formal	ɪgn	ər / ə
semantic	know, not	/pretence, verb

While (61) is underspecified for word class, *ignore* is always a verb. This is represented in (62).

The formal distinctiveness [əɪ] has no semantic correspondence and is thus part of the root. This being so, the apparent [ɔ]:<pretence, verb> distinctiveness must be either replacive, for which there is no supporting evidence; or an alternation of [əɪ]. Phonological rules of vowel shortening and epenthetic semivowel insertion generate this alternation in the appropriate environments. The alternation thus has no morphemic significance. Consequently the semantic distinctiveness <pretence, verb> is an optional RF of the root. Two SSRs are thus present.

(63) Comparing the free SSR in *ignore* and the bound SSR in *ignorant*:

Features	Commonality	Distinctiveness
formal	Ignɔ	-> /
semantic	know, not	/pretence, verb

On this basis a tentative entity is proposed for the data in (59):

(64) [Ignɔ] < know, not >

This entity is similar to the postulated entity in (58). The two must be compared to determine whether they are parts of a single morpheme. This involves redescribing the semantic value <knowing> as <presence of knowledge>.

(65) Comparing *cogn-* and *ignore*:

Features	Commonality	Distinctiveness
formal	gn	ko - / I - ɔ
semantic	know	presence (faculty)/not (pretence,verb)

The [ko]:<presence> entity is supported by the widespread presence of a prefix with the semantic value <association>: *collocation* (associated locations); *correspondence* (a series of associated responses) etc. The prefix *co-* in (65) provides an association with knowledge, the presence of knowledge. *Cognition* is the human faculty to know (as in understand, rather than the storage of facts). Consequently an entity is proposed:

(66) [ko] < association >

Now consider the other distinctiveness correspondence: [I - ɔ]:<not (pretence, verb)>. There is no evidence to support this as an entity. There is evidence elsewhere of a negating prefix [I] as a variant of the *in-* ~ *im-* prefix (as in *irreducible*).

This may be proposed as a separate entity:

(67) [ɪ] < negative >

The optional semantic feature <verb> occurs only in *ignore*, in other words, only and always when there is no word class marking suffix. This is also the case with *know*, suggesting that words containing the morpheme are verbs unless otherwise marked. Thus <verb> is a default value of the morpheme as a whole, rather than a feature specific to any SSR or subfamily group. The default value <verb> is specified in the UR, and at no other level.

Table (65) may now be revised.

(68) Comparing the roots in *cogn-* and *ignore*:

Features	Commonality	Distinctiveness
formal	gn	/ɔ
semantic	know	(faculty)/(pretence)

While both distinctivenesses have semantic correspondences, they are optional. Since a morphemic entity must have an obligatory semantic value, these distinctivenesses have no morphemic status. They are thus not submorphemes, but RFs. The roots in the entities in (58) and (64) are SSRs of a single morpheme.

(69) [gnɔ] < know (pretence) >
 [gn] < know (faculty) >

These two SSRs may be represented in the lexicon as in (70). This entry contains two subfamily groups, each with two SSRs. As V_1 occurs in subfamily group 2 but not in group 1 it is optional in the UR. All SSRs have a prefix and so the UR has an obligatory Other Morpheme Requirement (OMR) for a prefix. The suffix OMR and the various semantic RFs are optional in the UR, and the structural brackets specify the default value VERB.

Subfamily group 1 invokes the suffix OMR the optional semantic RF <(faculty)>, and specifies that the prefix OMR must be satisfied by [ko]. SSR1.1 involves no additional formal features, does not invoke the RF <(faculty)>, and specifies appropriate suffixes. This SSR generates *cognizant*, *recognise* etc. SSR1.2 also involves no additional formal features and specifies appropriate suffixes, but does invoke <faculty>. This generates *cognitive* and *cognition*.

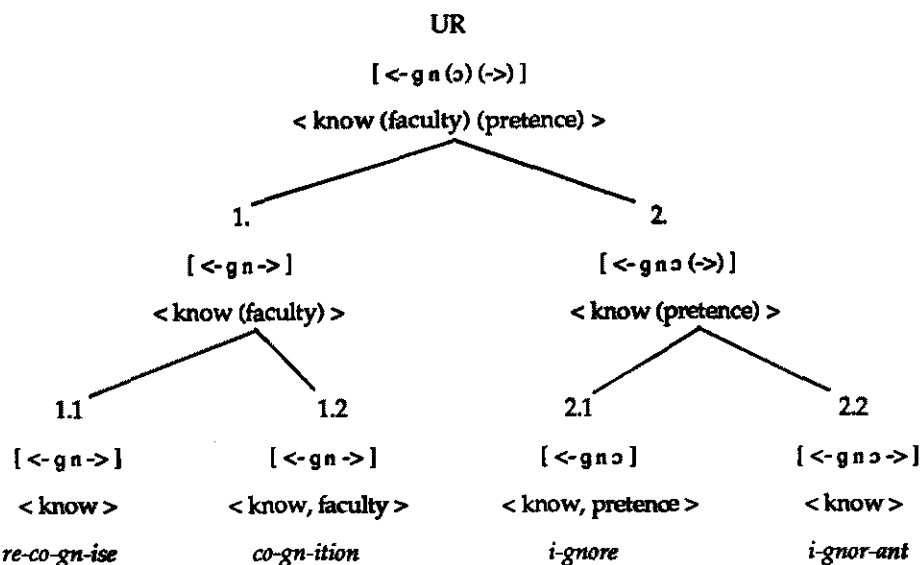
Subfamily group 2 invokes V_1 [ɔ], indicating that every SSR in the group contains that segment, invoking the still optional suffix OMR and semantic RF<(pretence)>.

and specifies the prefix [i]. SSR2.1 invokes the semantic RF <pretence>, but does not invoke the suffix OMR, indicating that no suffix is required. This generates *ignore*. SSR2.2 invokes the suffixing OMR but not the semantic RFs, and specifies appropriate suffixes, generating *ignorant* and *ignoramus*.

(70) Representing the SSRs in (69) in the lexicon:

$\left[\begin{array}{c} \left[\begin{array}{c} <- C_1 C_2 (V_1) (->) \\ \quad \quad \\ g \quad n \quad \circ \end{array} \right] \end{array} \right]$	< know (faculty) (pretence) >	{ Specification for default word class VERB.}
1. [->]	< (faculty) >	{ Subcategorisation for prefix.}
1.1. []	< >	{ Subcategorisation for suffixes.}
1.2. []	< faculty >	{ Subcategorisation for suffix.}
2. [V ₁ (->)]	< (pretence) >	{ Subcategorisation for prefix.}
2.1. []	< pretence >	{ }
2.1. [->]	< >	{ Subcategorisation for suffixes.}

(71) For the purposes of clarity (70) may be represented as a tree structure:



This demonstrates the UR's distillation of formal and semantic features.

Now let us compare the entity proposed in (70) with that proposed in (48) (from *knowledge* etc). Both consist of a velar stop, followed by [n], followed by an optional non-high-back vowel.

(72) Comparing *-gn(ore)* and *know(-)*. This requires introducing a CV tier to the PCD table to represent the voicing distinction:

Features	Commonality	Distinctiveness
formal	$\begin{array}{c} C_1 \quad C_2 \quad V_1 \quad (->) \\ \quad \quad \\ +\text{velar} \quad n \quad +\text{back} \\ +\text{stop} \end{array}$	$\begin{array}{c} <- \quad C_1 \quad (V_1) \quad / \quad C_1 \quad V_1 \quad V_2(C_3) \\ \quad \quad \quad / \quad \quad \quad \\ +\text{voice} \quad +\text{high} \quad +\text{long} \quad / \quad -\text{voice} \quad +\text{low} \quad u \quad 1 \end{array}$
semantic	know	(faculty)(pretence)/

Here The presence of C_1 as an alveolar stop is a commonality, while its voicing status is a distinctiveness. The presence of a possible V_1 as a back vowel is also a commonality, though its optionality status and height and length are distinctivenesses. It is apparent from (72) that *-gn(ore)* and *know(-)* share a significant proportion of their formal features, particularly those which are obligatory; as well as all obligatory semantic features. The formal distinctivenesses correspond to either no semantic features, or to only optional ones, and consequently have no morphemic status. In keeping with Principle 2 the two belong to a single morpheme.

That being so, the configuration of subfamily groups must be determined. In the two groups in the entry in (70) the initial stop is voiced, while in (48) it is not. This indicates there are three subfamily groups, two occurring within a larger group.

The lexical entries in (48) and (70) are now combined and revised in (73). The entry has a new UR with all the features required by the many SSRs. The prefix OMR, not applying to every SSR, is optional. The voicing status of C_1 and the underspecified features of V_1 are specified at the subfamily group or SSR level. The UR's semantic brackets contain the full distilled set of obligatory and optional semantic features.

Below the UR are two subfamily groups. Subfamily group 1, revised from (48), specifies and invokes appropriate features from the UR: the -voice status of C_1 ; the presence and additional features of V_1 ; and the presence of V_2 and the still optional C_3 and suffix OMR.

Subfamily group 2, revised from (70), specifies C_1 as +voice; invokes and specifies the still optional V_1 and suffix OMR. The appropriate optional semantic features are also invoked. This group's sub-groups and SSRs are unchanged.

(73) The new lexical entry:

$\left[\begin{array}{l} \langle \leftarrow \rangle C_1 \quad C_2 \quad (V_1 \quad (V_2 \quad (C_3))) \quad \langle \rightarrow \rangle \\ \left[\begin{array}{l} \\ +\text{velar} \quad n \quad +\text{back} \quad U \quad 1 \\ +\text{stop} \end{array} \right] \end{array} \right]$	< know (faculty) (pretence) >	{ Specification for default word class VERB. }
---	-------------------------------	---

1. $\left[\begin{array}{l} C_1 \quad V_1 \quad V_2 \quad (C_3) \quad \langle \rightarrow \rangle \\ \left[\begin{array}{l} \\ -\text{voice} \quad +\text{low} \end{array} \right] \end{array} \right]$	< >	{ }
--	-----	-----

1.1. []	< >	{ }
----------	-----	-----

1.2. [$C_3 \rightarrow$]	< >	{ Subcategorisation for suffix. Subcategorisation for possible prefix. }
----------------------------	-----	--

2. $\left[\begin{array}{l} \langle \leftarrow \rangle C_1 \quad (V_1) \quad \langle \rightarrow \rangle \\ \left[\begin{array}{l} \\ +\text{voice} \quad +\text{high} \\ +\text{long} \end{array} \right] \end{array} \right]$	< (faculty) (pretence) >	{ }
--	--------------------------	-----

2.1. [\rightarrow]	< (faculty) >	{ Subcategorisation for prefix. }
------------------------	---------------	--------------------------------------

2.1.1. []	< >	{ Subcategorisation for suffixes. }
------------	-----	--

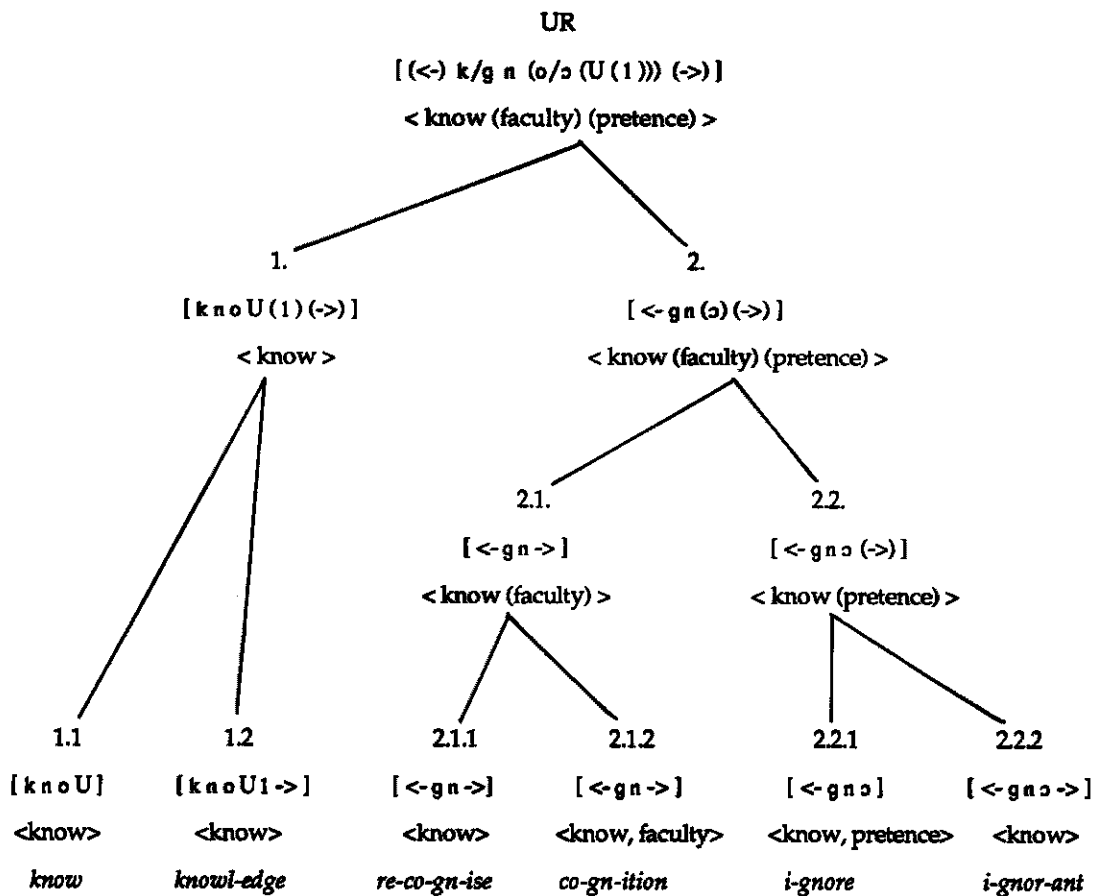
2.1.2. []	< faculty >	{ Subcategorisation for suffix. }
------------	-------------	--------------------------------------

2.2. [$V_1 \rightarrow$]	< (pretence) >	{ Subcategorisation for prefix. }
----------------------------	----------------	--------------------------------------

2.2.1. []	< pretence >	{ }
------------	--------------	-----

2.2.2. [\rightarrow]	< >	{ Subcategorisation for suffixes. }
--------------------------	-----	--

(74) Lexical entry (73) represented as a tree structure:



Now consider a further set of data:

(75)	(75.1) prognosis	[prɒgnɒʊsɪs]	<prediction, noun>
	(75.2) prognostic	[prɒgnɒstɪk]	<prediction, adjective>
	(75.3) diagnosis	[daɪəgnɒʊsɪs]	<analysis of condition, noun>
	(75.4) diagnostic	[daɪəgnɒstɪk]	<analysis of condition, adjective>
	(75.5) agnostic	[ægnɒstɪk]	<spiritual knowledge, absence, adj/noun>
	(75.6) gnosis	[nɒʊsɪs]	<spiritual knowledge, noun>
	(75.7) gnostic	[nɒstɪk]	<spiritual knowledge, adjective/noun>

The word class marking present in this data was analysed in 4.5, particularly in (38) to (40). Also present is the morphophonemic [oU~ɔ] alternation discussed in 4.4 in relation to *go*; and, in (75.6) and (75.7), the phonotactically dictated absence of the initial stop, as discussed in (45) in relation to *know*. Assuming these analyses, the data may be re-presented:

(76)	(76.1) prognos-	[prɒgnɒʊs]	<prediction>
	(76.2) diagnos-	[daɪəgnɒʊs]	<analysis of condition>
	(76.3) agnos-	[ægnɒʊs]	<spiritual knowledge, absence>
	(76.4) gnos-	[gnɒʊs]	<spiritual knowledge>

The semantic relationship between (76.3) and (76.4) is transparent. The relationship between *prognosis* and *diagnosis* is less clear. A *prognosis* is a kind of prediction, but not a guess-like prediction. It implies expertise on the part of the predictor enabling an empirically based prediction.⁹ A *prognosis* is not a prediction of what might happen, but of what will almost certainly happen. Knowledge plays a role in the semantics of *prognosis*: it is knowledge of the future, as far as that is possible.

The same applies to *diagnosis*. It is an analysis of the nature of a condition, again based on expert knowledge and involving no guesswork. Both *diagnosis* and *prognosis* involve knowledge achieved as the result of empirical analysis. One is knowledge of actuality; the other, advance knowledge of what will be.

(77) Comparing *prognos-* and *diagnos-*:

Features	Commonality	Distinctiveness
formal	gnoUs	pro / daɪə
semantic	know, empirical	advance/condition

The commonality correspondence reveals a single shared entity; while the distinctiveness correspondences reveal separate prefixing morphemes.

(78) Comparing *gnos-* and *agnos-*:

Features	Commonality	Distinctiveness
formal	gnoUs	æ /
semantic	know, spiritual	absence/

The distinctiveness reveals the prefix [æ]:<absence>. The isolation in (77) and (78) of the three prefixes exposes a root with two slightly differing meanings.

(79) Comparing the two meanings of *gnos-*:

Features	Commonality	Distinctiveness
formal	gnoUs	/
semantic	know	spiritual/empirically

As the semantic distinctivenesses do not correspond to any formal distinctivenesses they have no morphemic status and are therefore semantic RFs of the commonality. The data in (75) contains a single root:

(80) [gnoUs] <know (spiritual) (empirically)>

9. For example an economist may be able to make a prognosis of the effects of a stock market collapse while a doctor would not, but the reverse would be true of the effects of a body injury.

A comparison of this entity with that proposed in (73) reveals that both consist of a velar stop, followed by [n], followed by a nucleus which is potentially [oU], followed by a possible alveolar consonant ([s] or [l]); and they share the obligatory semantic feature <know>. In keeping with Principle 2 (73) and (80) belong to a single morpheme.

It remains to determine to which existing subfamily group, if any, the new entity belongs. Comparing (80) with the two subfamily groups detailed in (73) reveals that the new entity shares commonalities with both. Group 2 shares the voiced initial consonant, while group 1 shares the presence of V₂ and C₃, the vowel features of the nucleus, and the place of articulation of the coda.

(81) Comparing (80) with (73) subfamily group 1:

Features	Commonality	Distinctiveness
formal	$\begin{array}{ccccc} C_1 & C_2 & V_1 & V_2 & C_3 \\ & & & & \\ +\text{velar} & n & o & U & +\text{alveolar} \\ +\text{stop} & & & & \end{array}$	$\begin{array}{ccccc} C_1 & C_3 & / & C_1 & C_3 \\ & & / & & \\ -\text{voice} & +\text{lateral} & / & +\text{voice} & +\text{fricative} \end{array}$
semantic	know	/ (spiritual) (empirically)

(82) Comparing (80) with (73) subfamily group 2:

Features	Commonality	Distinctiveness
formal	$\begin{array}{ccc} C_1 & C_2 & V_1 \\ & & \\ g & n & +\text{back} \end{array}$	$\begin{array}{ccccc} V_1 & / & V_1 & V_2 & C_3 \\ & / & & & \\ +\text{high} & / +\text{low} & U & 1 & \\ +\text{long} & & & & \end{array}$
semantic	know (empirically) / (pretence)	(spiritual) / (faculty)

Aside from features specified in the UR, the two entities in (82) share only the initial consonant voicing, while many features, including entire segments are distinctive.

In (81) a much closer relationship is apparent. Indeed, the distinctivenesses are limited to initial consonant voicing, and the manner of articulation of C₃. The C₁ voicing could be used to argue that the new entity should form a third subfamily group. To some extent this is supported by the complete dissimilarity of all semantic features aside from the obligatory <know>. However all that semantic material is optional. That, coupled with the overwhelming number of formal commonalities, indicates that the new entity and subfamily group 1 combine to form two groups within a new subfamily group 1.

(83) The lexical entry with the revised subfamily group 1 incorporating the entity proposed in (80):

$$\left[\begin{array}{l} \langle (-) C_1 C_2 (V_1 (V_2 (C_3))) (-) \rangle \\ \left[\begin{array}{l} +\text{velar} \quad n \quad +\text{back} \quad U \quad +\text{alveolar} \\ +\text{stop} \end{array} \right] \end{array} \right] \langle \text{know (faculty) (pretence)} \rangle \left\{ \begin{array}{l} \text{Specification} \\ \text{(empirically) (spiritual)} \end{array} \right\} \left\{ \begin{array}{l} \text{for default} \\ \text{word class} \\ \text{VERB.} \end{array} \right\}$$

1. $\left[\begin{array}{l} \langle (-) V_1 V_2 (C_3) (-) \rangle \\ \left[\begin{array}{l} +\text{low} \end{array} \right] \end{array} \right] \langle \text{(empirically) (spiritual)} \rangle \{ \}$

1.1 $\left[\begin{array}{l} C_1 (C_3) (-) \\ \left[\begin{array}{l} -\text{voice} \quad +\text{lateral} \end{array} \right] \end{array} \right] \langle \rangle \{ \}$

1.1.1 $[] \langle \rangle \{ \}$

1.1.2 $[C_3 -] \langle \rangle \left\{ \begin{array}{l} \text{Subcategorisation for} \\ \text{suffix. Subcategorisation} \\ \text{for possible prefix.} \end{array} \right\}$

1.2 $\left[\begin{array}{l} \langle (-) C_1 C_3 - \rangle \\ \left[\begin{array}{l} +\text{voice} \quad +\text{fricative} \\ -\text{voice} \end{array} \right] \end{array} \right] \langle \text{(empirically) (spiritual)} \rangle \left\{ \begin{array}{l} \text{Subcategorisation} \\ \text{for suffixes.} \end{array} \right\}$

1.2.1 $[\langle -] \langle \text{empirical} \rangle \left\{ \begin{array}{l} \text{Subcategorisation} \\ \text{for prefixes.} \end{array} \right\}$

1.2.2 $[] \langle \text{spiritual} \rangle \left\{ \begin{array}{l} \text{Subcategorisation} \\ \text{for possible prefix.} \end{array} \right\}$

2. $\left[\begin{array}{l} \langle - C_1 (V_1) (-) \rangle \\ \left[\begin{array}{l} +\text{voice} \quad +\text{high} \\ +\text{long} \end{array} \right] \end{array} \right] \langle \text{(faculty) (pretence)} \rangle \{ \}$

2.1 $[-] \langle \text{(faculty)} \rangle \left\{ \begin{array}{l} \text{Subcategorisation} \\ \text{for prefix.} \end{array} \right\}$

2.1.1 $[] \langle \rangle \left\{ \begin{array}{l} \text{Subcategorisation} \\ \text{for suffixes.} \end{array} \right\}$

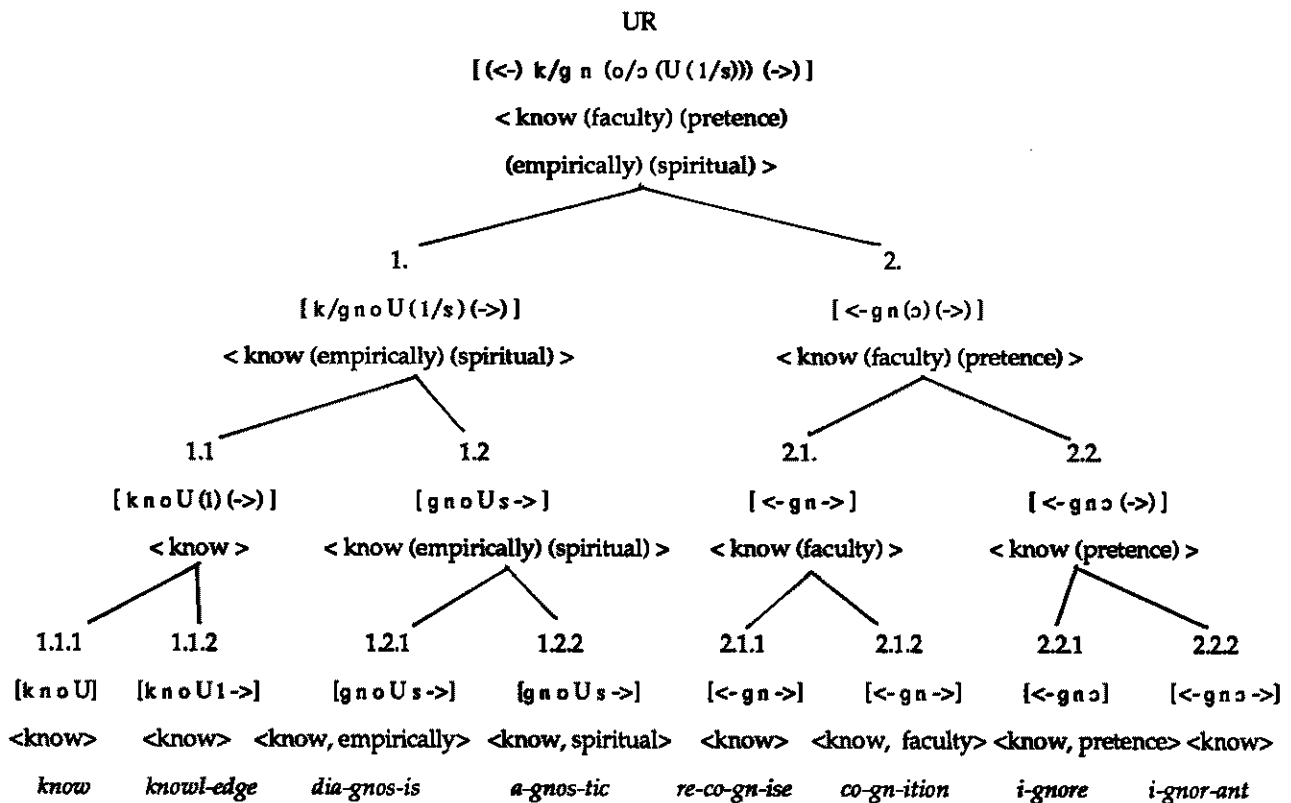
2.1.2 $[] \langle \text{faculty} \rangle \left\{ \begin{array}{l} \text{Subcategorisation} \\ \text{for suffix.} \end{array} \right\}$

2.2. [V ₁ (->)]	< (pretence) >	{ Subcategorisation for prefix.}
2.2.1. []	< pretence >	{ }
2.2.2. [->]	< >	{ Subcategorisation for suffixes.}

This entry accounts for the roots in all the data presented in this section. The entry is largely unchanged from that in (73). The UR now underspecifies C₃ as [+alveolar], allowing for the realisations [l] or [s]; and contains the two additional optional semantic RFs.

Subfamily group 2 is unchanged. In group 1 the voicing status of C₁ is underspecified. C₃ is invoked, but also remains underspecified. Within group 1, subgroup 1.1 specifies the voicing status of C₁, and the manner of articulation for C₃. Subgroup 1.2 incorporates the two new SSRs within their own subgroup. In the formal brackets it invokes the still optional prefix OMR, and specifies the voicing status of C₁, and C₃'s remaining features. It also invokes the appropriate semantic RFs, still optional. One of the two SSRs has the prefix OMR, now obligatory, and the semantic RF <empirical>, generating *prognosis*; while the other has no prefix OMR and the semantic value <spiritual>, generating *agnostic*.

(84) Once again it is useful to represent the entry as a tree structure:¹⁰



10. The apparent binary structure of this morpheme is accidental and of no significance.

4.7 The Morphemes *Post*

In 4.6 the analysis revealed a body of formally and semantically diverse data containing realisations of a single morpheme. Homophony exemplifies the opposite.

Consider the following data:

(85.1)	(the) post	[pɒʊst]	< mail, noun >
(85.2)	post (a letter)	[pɒʊst]	< mail, verb >
(85.3)	post (a bulletin)	[pɒʊst]	< disseminate, verb >
(85.4)	postman	[pɒʊstmən]	< deliverer of mail, noun >
(85.5)	postbox	[pɒʊstbɒks]	< receptacle for mail, noun >
(85.6)	poster	[pɒʊstə]	< document for public display, noun >
(85.7)	post it note	[pɒʊstɪt noʊt]	< adhesive note for messages, noun >
(85.8)	(Washington) Post	[pɒʊst]	< Proper Name of newspaper or magazine, noun >
(85.9)	post	[pɒʊst]	< upright member set in ground, noun >
(85.10)	fencepost	[fentspɒʊst]	< upright member supporting fence, noun >
(85.11)	lamppost	[læmpspɒʊst]	< upright member supporting lamp, noun >
(85.12)	postwar	[pɒʊstwɔː]	< period following a war, adjective >
(85.13)	post-nuptial	[pɒʊstnʌpʃəl]	< period following nuptials, adjective >
(85.14)	postdoctoral	[pɒʊstdɒktərəl]	< (work) undertaken following doctorate, adjective >

Isolating the second syllable of *postman* and of *postwar* leaves homophonous residues.

(86) Comparing the *post-* in *postman* with that in *postwar*:

Features	Commonality	Distinctiveness
formal	pɒʊst	/
semantic		mail / period following

The formal commonality has no semantic correspondence and thus two unrelated entities are present.

(87) The commonality in (86) ascribed to the distinctivenesses:

Features	Commonality	Distinctiveness
formal		pɒʊst / pɒʊst
semantic		mail / period following

In *fencepost* and *Washington Post* [poUst] is again isolated.

(88) Comparing the *-post* in *fencepost* with that in *Washington Post*:

Features	Commonality	Distinctiveness
formal	poUst	
semantic		upright member/journal name

As in (86) there is no semantic commonality so the form is ascribed to the distinctivenesses.

(89) The commonality in (88) ascribed to the distinctivenesses:

Features	Commonality	Distinctiveness
formal		poUst / poUst
semantic		upright member / journal name

Throughout the set the formal features are identical. With this data the analysis separates or conflates only on semantic grounds:

(90) *Postwar*, *post-nuptial* and *postdoctoral*: a period of time characterised by a preceding specified temporal event.

Post, *fencepost* and *lamppost*: a long, thin, solid object, with a form designed to enable one end to be embedded in a surface, from which it projects, typically at right angles, and which is intended to be able to support something else.

The two entities in (90) are formally identical, but demonstrate no semantic commonality. Two homophonous entities are present:

(91) [poUst] < period following another time >

(92) [poUst] < upright support >

The remaining data is slightly more complex. In (85.1) and (85.2) the two differ only in word class. *The post* means two things: an organised system for the conveyance of items, usually messages but also small objects typically accompanied by a message (*the post has been*); and those items themselves (*the post has arrived*). To *post* means to consign an item to this system of conveyance, and by doing so typify the item as an item of post.

The *postman* and the *postbox* are straightforward: a person characterised by their role in the system of conveyance; and a receptacle for holding items conveyed by the system. There exists an entity [poUst] with the referent of that system and its items.

Now consider *poster*, *postit note* and *to post a bulletin*. The suffix [ə] in *poster* is identifiable in English as a kind of noun marker.¹¹ *Poster* identifies an object which does something, but what? It is a sheet of something, usually paper, carrying text and/or imagery, and is designed to be displayed so that the text and/or imagery can be seen. What a *poster* does is convey a message.

Postit note is semantically similar to *poster*. *Note* refers to a piece of paper, typically small, with the function of conveying messages.

To *post* a bulletin is to locate it to enable the content to be received by others. While it may take various forms and be posted in various ways, the effect is identical.

The *post* in *The Washington Post* is commonly found in periodical names. Like any periodical it is an assembly of information and images, an extensive set of messages, intended to be received.

These examples involve a single entity: one form which refers to the presentation of information intended for a recipient.¹² This entity shares a central concept with *post*, as in mail: all involve a message or information in a conveyable and receivable form. It has a sender, and is intended to have a recipient.

(93) [poʊst] <information transferal>.

The data in (85) contains three root morphemes. Their lexical entries are:

(94)
$$\left[\begin{array}{cccccc} C_1 & V_1 & V_2 & C_2 & C_3 & - > \\ | & | & | & | & | & \\ p & o & u & s & t & \end{array} \right]$$
 < Location in time following another location in time.> {X}

1. []

< >

{ }

11. I do not intend to deal with this large and complex subject here, but suffice to say that it is widely given two functions marking agents and marking instrumental nouns. This distinction is spurious: a *truckdriver* drives a truck, and a *screwdriver* drives a screw. The distinction between agent and instrument rests on will and ability to act alone, which a *truckdriver* has and a *screwdriver* doesn't. The distinction is contextual and nothing to do with the suffix.

12. There is, incidentally, nothing inherently public about this. A poster may be made and hung in a locked room so that only the person who put it there will ever see it; and a postit note may be put on a secret document. In these cases the intended recipient of the message is its sender. Also, it may be suggested that there is no particular recipient of the message in a poster. Yet while no specific individual is envisaged as the recipient, posters typically have a commercial target. If they are advertising the intended recipient is not just anybody, but those who are potential purchasers of that which is advertised. If the poster conveys a message which is, for example, political or religious, the intended recipient is anyone who may react positively to the message. If the poster is simply decorative, then the intended recipient is anyone to whom the object will appeal.

(95) $\begin{bmatrix} C_1 & V_1 & V_2 & C_2 & C_3 \\ | & | & | & | & | \\ p & o & u & s & t \end{bmatrix}$ < upright support > {X}

1. [] <> {}

(96) $\begin{bmatrix} C_1 & V_1 & V_2 & C_2 & C_3 \\ | & | & | & | & | \\ p & o & u & s & t \end{bmatrix}$ < information transferal > {X}

1. [] <> {}

4.8 The Phonestheme *fl-*

In 2.2.6 it was proposed that phonesthemes fulfil the requirements of Principle 1, and are thus morphemes. The effect of the PCD approach on the analysis of phonesthemes may be demonstrated on fragments of data from the example used in 2.2.6: the onset [fl] and the corresponding semantic value <movement>.

Consider this data:

(97) flow [floʊ] < move evenly >
 flitter [flɪtə] < move erratically >

A comparison of these on the PCD table makes their relationship transparent.

(98) Comparing *flow* and *flitter*:

Features	Commonality	Distinctiveness
formal	fl	oʊ / ɪtə
semantic	movement	evenness / erraticness

The commonality correspondence and both the distinctiveness correspondences allow the tentative postulation of three entities:

(99) (99.1) [fl] < movement >
 (99.2) [oʊ] < evenness >
 (99.3) [ɪtə] < erraticness >

Flow and *flutter* may be placed in a paradigmatic relationship with *glow* and *glitter*:

(100)		evenness	erraticness
	movement	floU	flItə
	emission of light	gloU	glItə

(101) Comparing *glow* and *glitter*:

Features	Commonality	Distinctiveness
formal	gl	oU / Itə
semantic	emission of light	evenness / erraticness

Table (101) supports the proposed entities in (99.2) and (99.3) and allows the tentative postulation of a further entity:

(102) [gl] < emission of light >

(103) Comparing *flow* and *glow*:¹³

Features	Commonality	Distinctiveness
formal	oU	fl / gl
semantic	evenness	movement / emission of light

A comparison of *flutter* and *glitter* gives similar results. Further data analysis supports the entities proposed in (99) and (102).

The [fl]:<movement> entity may be given a tentative lexical entry:

(104) $\left[\begin{array}{cc} C_1 & C_2 & -> \\ | & | & \\ f & l & \end{array} \right]$ < movement > { Subcategorisation for collocation with another phonestheme.}

1. [] < > {}

As there is so far only one SSR, the UR fully specifies all features, including the OMR arrow. In this case the other morpheme required will be a root forming entity,

13. Had we compared *flow* and *glow* before *flow* and *flutter* or *glow* and *glitter*, the result would not have been as in (103), but would instead have been:

Features	Commonality	Distinctiveness
formal	loU	f / g
semantic	evenness	movement / emission of light

On this basis incorrect forms would be tentatively postulated. A more widespread comparison would then correct this. This is one of the strengths of the PCD approach, and why postulations must be tentative pending supporting evidence: applying the table to a single pair may generate occasional mistakes, but the systematic application of PCD across a large body of data gives an accurate analysis. PCD is inherently self-correcting.

not a suffix, and this will be specified in the structural brackets.¹⁴

Now consider this data:¹⁵

(105)	flee	[fli]	< move rapidly away from >
	flail	[fleɪl]	< move uncontrollably >

(106) Comparing *flee* and *flail*:

Features	Commonality	Distinctiveness
formal	fl	i / eɪl
semantic	movement	rapid, away / uncontrollable

Again the commonality is [fl]:<movement>. The distinctiveness correspondences allow the postulation of the following entities:

(107)	(107.1)	[i]	< rapid, away >
	(107.2)	[eɪl]	< uncontrollable >

Being unique, and satisfying an OMR, these two entities are submorphemes. The lexical entry for *fl-* must be revised to incorporate these submorphemes and allow the generation of *flee* and *flail*:

(108)	$\begin{bmatrix} C_1 & C_2 & - > \\ & & \\ f & l & \end{bmatrix}$	< movement >	{ Subcategorisation for collocation with another phonestheme.}
	1. []	< >	{}
	2. $\begin{bmatrix} [V_1] \\ [] \\ [i] \end{bmatrix}$	<< rapidity, away >>	{}
	3. $\begin{bmatrix} [V_1 & V_2 & C_3] \\ [] & [] & [] \\ [e & l & l] \end{bmatrix}$	<< uncontrollable >>	{}

The UR still lists all the features of the morpheme, but not those of the submorphemes, which are separate entities. SSR1 has no submorpheme to satisfy the OMR, so the OMR remains, allowing the collocation of appropriate morphemes like [oʊ] and [ɪtə]. SSR2 and SSR3 each list the features of their submorpheme. These

14. An OMR may potentially demand any kind of morpheme. There is no expectation that OMRs refer to affixes, merely to any appropriate morphemic entity.

15. The submorpheme in *flee* was discussed in 3.12.

features are added to those listed in the UR, satisfying the OMR and generating potentially free words.

Now consider still further data:

(109)	inflate	[ɪnfleɪt]	< fill (something) with air >
	deflate	[dəfleɪt]	< let air out of (something) >
	conflate	[kənfleɪt]	< join (some things) together >

These are not the kinds of words usually associated with phonesthemes, but here again is the [fl]:<movement> morpheme.

The verb marker *-ate* is found in words such as *dominate* as related to *dominion*, *calculate* - *calculus*, *renovate* - *renew* etc.

The prefix *in-* appears elsewhere with the locative meaning 'within' or directional 'into': an *infix* gets fixed into rather than at the edge of a root. To *inflate* is to move air into, a balloon for example.

The prefix *de-* involve opposition to an existing context. With *deform* the action is in opposition to the existing context of, say, natural shape. The *-sist* in *desist* is a continuous state or activity: *insist*, *consist*, *resist*, *exist* and *persist* all have that sense of continuation. Meanwhile, *desist* is a cessation: an opposition to the state of continuation. So *deflate* is an action of opposition to the existing state of, for example, the balloon.

Con- means in association with. *Confront*: one front in association with another; face to face. *Confirm*: associate the metaphorical firmness of certainty with a proposition. To *conflate* is to move things together and so unify.

Isolating the form and meaning of the suffix and the prefixes leaves the correspondence [fl]:<movement>.

(110) Comparing the *-fl-* from *inflate* and the *fl-* from *flow*:

Features	Commonality	Distinctiveness
formal	fl ->	<- /
semantic	movement	/

This reveals that the two are part of a single morpheme. However, are they occurrences of the same SSR? The only distinctiveness is the prefix OMR, and it could be argued that there is no prefix OMR, there just may or may not be a prefix. However, only one of a specific set of prefixes may occur, and only in association

with a specific suffix. These are considerations, not of morphemic status, but of morphological structure: in one environment a prefix is obligatory. This means that **flate* is impossible, as is **conflow* and **conflitter*.

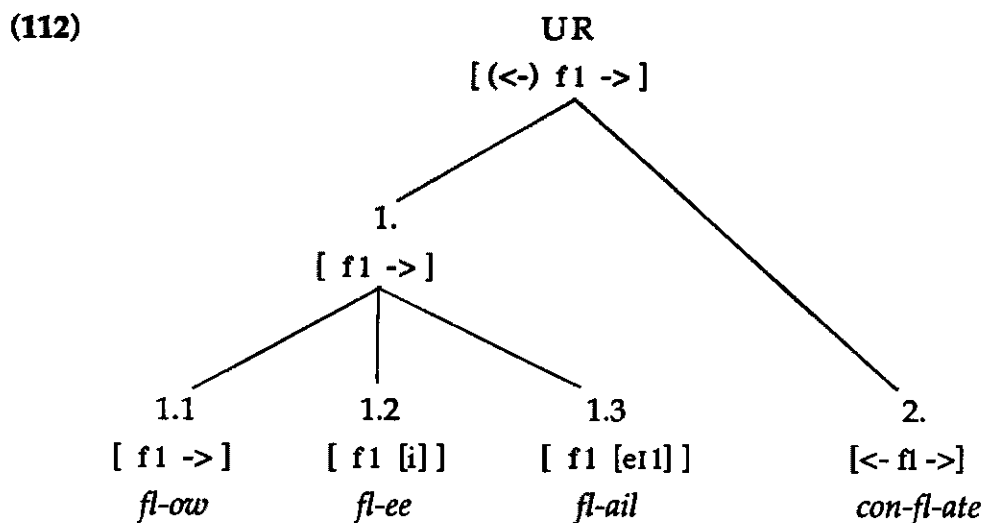
While the present work is not concerned with word formation, this is an example of the impact of structural concerns on morphemic status. In this case quite distinct environments are required for realisation of the two [fl] forms, and since this is manifest in a formal sense by the prefix OMR, this entity constitutes a separate surface realisation.

The distinction between the prefixing *fl* and the non-prefixing *fl* in (110) is the same as that applying to any of the non-prefixing SSRs. This indicates that the SSRs listed in the entry in (108) form a subfamily group excluding the SSR in *inflate*. A revised lexical entry incorporates the new SSR and subfamily group:

(111)	$\begin{bmatrix} [(-) C_1 C_2 ->] \\ [\quad \quad] \\ [\quad f \quad 1] \end{bmatrix}$	< movement >	{ X }
	1. []	< >	{ Subcategorisation for collocation with another phonestheme, including phonesthemes possible. }
	1.1 []	< >	{ }
	1.2 $\begin{bmatrix} [[V_1]] \\ [[\quad \quad]] \\ [[i]] \end{bmatrix}$	<< rapidity, away >>	{ }
	1.3 $\begin{bmatrix} [[V_1 V_2 C_3]] \\ [[\quad \quad \quad]] \\ [[e \quad 1 \quad 1]] \end{bmatrix}$	<< uncontrollable >>	{ }
	2. [<-]	< >	{ Subcategorisation for suffix and possible prefixes. }

The UR lists the optional prefix OMR, which is invoked by SSR2, thus generating *conflate* etc. The subfamily group does not invoke it so it does not apply there.

The lexical entry in (111) represented as a tree structure:



4.9 The *-ought* Replacive Past Tense

The PCD approach allows for replacive morphemes. Consider the following data:

(113)	(113.2) bought	[bɒt]	< buy, past >
	(113.3) brought	[brɒt]	< bring, past >
	(113.4) sought	[sɒt]	< seek, past >
	(113.5) taught	[tɒt]	< teach, past >
	(113.6) caught	[kɒt]	< catch, past >

And possibly:

(113.7) fought	[fɒt]	< fight, past >
----------------	---------	-----------------

Consider also:

(114)	(114.1) think	[θɪŋk]	< think >
	(114.2) buy	[baɪ]	< buy >
	(114.3) bring	[brɪŋ]	< bring >
	(114.4) seek	[sɪk]	< seek >
	(114.5) teach	[tiːʃ]	< teach >
	(114.6) catch	[kætʃ]	< catch >
	(114.7) fight	[faɪt]	< fight >

For the purposes of this analysis assume the semantic values <think>, <buy> etc.

A comparison across the data in (114) reveals no morphemic commonalities. This is not the case in (113).

(115) Comparing *thought* and *bought*:

Features	Commonality	Distinctiveness
formal	ɔt	θ / b
semantic	past	think / buy

(116) Comparing *taught* and *caught*:

Features	Commonality	Distinctiveness
formal	ɔt	t / k
semantic	past	teach / catch

The unavoidable conclusion from (115) and (116) is that the following morphemic entity is present in the data:

(117) [ɔt] < past >

Now compare corresponding forms:

(118) Comparing *think* and *thought*:

Features	Commonality	Distinctiveness
formal	θ	ɪŋk / ɔt
semantic	think	not past/past

(119) Comparing *catch* and *caught*:

Features	Commonality	Distinctiveness
formal	k	æç / ɔt
semantic	catch	not past/past

The rest of the data provides similar results.¹⁶ This supports the entity proposed in (117).

Other implications of (118) and (119), however, are more problematic. They reveal distinctivenesses involving the apparent morphemic entities [ɪŋk]:<not past> and [æç]:<not past>. The rest of the data gives similar results. If these are separate entities, as the tables suggest, then the each root morpheme consists solely of the onsets ([θ]:<think>; [k]:<catch>; etc), with an OMR (since a single C cannot occur in isolation); each occurring with one of seven unique <not past> markers. These apparent markers, satisfying an OMR, would be submorphemes. Each root morpheme would obligatorily occur with a tense marking submorpheme except

16. Except for *fought* and *fight*, where the final [t] is also a commonality. This may be significant, in which case the past tense formation is by means of vowel variation. On the other hand it may be a coincidental irrelevancy that the root is [t] final, in which case the same past tense formation is applying here as with the rest of the data. This is not significant for our purposes.

when marked PAST. This analysis complicates the non-past forms of these words, and moreover, English verbs typically are not morphologically marked for non-past.¹⁷

Alternatively, if the forms in (114) are undecomposable root morphemes, as everything except their past tense forms indicate, then the entity in (117) must replace the rhyme of its host.

Both analyses are possible within PCD. The second analysis allows for straightforward, free, single-SSR verb morphemes, and a past tense morpheme which is complicated slightly by being specified structurally as replacive. The first analysis simplifies the tense marker only by removing that replacive characteristic. It correspondingly complicates the roots by requiring 2 SSRs, one involving a submorpheme and one onset-only.

The most elegant solution is the replacive. That analysis says that something strange is happening with the tense marker, rather than that something strange is happening with the word *think*, and with the word *buy*, etcetera. This is a general part of the PCD approach: if something apparently strange is going on with each item in a set of data, it is likely to be the effect of whatever is common to all the affected items, rather than the effect of the distinctive elements.

The entity proposed in (117), now specified as replacive, is entered in the lexicon:¹⁸

(120)	$\begin{bmatrix} \leftarrow & V_1 & C_1 \\ \left[& & \right] \\ \left[& \text{ɔ} & \text{t} \right] \end{bmatrix}$	< past >	{ Specification for PAST; specification for replacement of host word's rhyme.}
	1. []	< >	{ }

4.10 Semitic Discontinuous Roots

In the PCD approach discontinuous morphemes are no more difficult to analyse than any other. Consider the Hebrew data in (121).

17. Other than 3SG marked forms.

18. The English past tense, if marked morphologically, is marked either by vocalic ablaut, or by a suffix involving an alveolar stop. The latter includes the productive marker and a number of idiosyncratic forms. This regularity suggests the presence of a single morpheme with several variants, including this replacive suffix. Further analysis of this extensive subject is beyond the scope of this work, but it appears that the entity in (120) is an SSR of a larger morpheme.

(121) Hebrew data:¹⁹

(121.1)	[šamar]	< he has guarded >
(121.2)	[šomer]	< guarding >
(121.3)	[šamur]	< being guarded >
(121.4)	[šmor]	< (to) guard >
(121.5)	[ganab]	< he has stolen >
(121.6)	[goneb]	< stealing >
(121.7)	[ganub]	< being stolen >
(121.8)	[gnob]	< (to) steal >

Assume the semantic values <guard> and <steal>.

(122) Comparing (121.1) and (121.2):

Features	Commonality	Distinctiveness
formal	š - m - r	- a - a - / - o - e -
semantic	guard	he, past completed/present continuing

(123) Comparing (121.3) and (121.4):

Features	Commonality	Distinctiveness
formal	š (-) m - r	- a - u - / - o -
semantic	guard	beneficiary, continuing/unmarked action

These two tables isolate a referential entity and four inflectional entities.

(124) Comparing (121.5) and (121.6):

Features	Commonality	Distinctiveness
formal	g - n - b	- a - a - / - o - e -
semantic	steal	he, past completed/present continuing

(125) Comparing (121.7) and (121.8):

Features	Commonality	Distinctiveness
formal	g (-) n - b	- a - u - / - o -
semantic	steal	beneficiary, continuing/unmarked action

Tables (124) and (125) isolate a further root entity, and support the analysis of the inflectional entities.

Now compare across the paradigms.

19. This data is from Sapir (1921:59)

(126) Comparing (121.1) and (121.5):

Features	Commonality	Distinctiveness
formal	- a - a -	š - m - r / g - n - b
semantic	he, past completed	guard / steal

This and similar analyses across the data support the six proposed morphemic entities. It remains to consider whether any of these entities are linked.

(127) Compare the inflectional entity in (126) with that found in (121.2) and (121.6):

Features	Commonality	Distinctiveness
formal		- a - a - / - o - e -
semantic	he, past completed/present continuing	

This and other similar tables reveal that none of the six proposed entities have any correspondence of semantic and formal links, and thus all constitute separate morphemes.

The two referential morphemes must specify the co-occurrence of a vocalic morpheme either between the second and third segments or between each of the segments. This involves a discontinuous infixing OMR. Equally, the inflectional morphemes must specify the presence of a discontinuous consonantal root morpheme. This requires an OMR like that discussed in 3.10, which indicates that the other morpheme is both around, and within the form.

The lexical entries for the two referential morphemes are:

(128) $\left[\begin{array}{c} C_1 \text{ (<-) } C_2 \text{ -> } C_3 \\ | \quad | \quad | \\ \text{š} \quad m \quad r \end{array} \right]$ < guard > {X}

1. [] < > {}

(129) $\left[\begin{array}{c} C_1 \text{ (<-) } C_2 \text{ -> } C_3 \\ | \quad | \quad | \\ g \quad n \quad b \end{array} \right]$ < steal > {X}

1. [] < > {}

The infix OMR has an optional first element to allow for forms such as [šmor].

Despite this being optional, the OMR cannot consist in either position of a double ended arrow as this would indicate that two separate infixes were required.

The inflectional morphemes' lexical entries are:

(130) $\left[\begin{array}{c} \lll- V_1 - V_2 -\ggg \\ | \quad | \\ a \quad a \end{array} \right]$ < he, past completed > { Specification for 3SGM and PASTPERF.}

1. [] <> {}

(131) $\left[\begin{array}{c} \lll- V_1 - V_2 -\ggg \\ | \quad | \\ o \quad e \end{array} \right]$ < present, continuing > { Specification for PRESPROG.}

1. [] <> {}

(132) $\left[\begin{array}{c} \lll- V_1 - V_2 -\ggg \\ | \quad | \\ a \quad u \end{array} \right]$ < beneficiary, present continuing > { Specification for PRESPROG.}

1. [] <> {}

(133) $\left[\begin{array}{c} \lll- V_1 -\ggg \\ | \\ o \end{array} \right]$ < infinitive > { Specification for INF.}

1. [] <> {}

In (130), (131) and (132) the circumfixing OMR is present, but the OMR dash between the Vs has no arrows. This is because it is part of a single OMR present in this entity. This OMR indicates that to be realised, this morpheme must combine with one which has three discontinuous segments. Entry (133) has a single V, and a simple circumfixing OMR.

These examples demonstrate the role of OMRs in morphological structure. Hebrew word formation rules specify that forms such as those in (128) and (129) combine

with inflectional morphemes, and vice versa. The three inflectional entities (130) to (132) conform to that, as their OMRs demand: to be realised they require another morpheme with the canonical form of the referential morphemes. They map onto the positions dictated by the OMRs of the referential morphemes. The inflectional morpheme in (133), being a single segment, maps onto only one V slot in a referential morpheme, and so automatically maps onto the obligatory, not the optional slot. If a single vowel morpheme maps on to a root like those in (128) and (129), it will map onto the second V position leaving the first V position unfilled. The OMRs allow the referential and inflectional morphemes to combine, generating words. OMRs allow the lexicon to play a part in generating words by listing forms in a way which predicts what other types of morphemes must be present in surface words.

It will be noted that a PCD analysis gives full and equal status to both the root and the inflectional morphemes.

4.11 Position Affected Morphemes: Verbal Agreement in Georgian

In some languages the inflectional morphology includes pairs of phonologically identical forms whose inflectional function is related but not identical, and whose positions in word formation vary. Georgian verb agreement marking exemplifies this.²⁰ This involves a series of Subject markers (applying to both transitive and intransitive verbs), a series of Direct Object markers, and four series of Indirect Object markers. All differentiate first, second and third person singular and plural. The choice of the four series of Indirect Object markers is a lexical property of the verb stem.

The third person singular subject marker is a suffix, phonologically either /-s/ or /-a/ depending on the conjugation class of the verb. Examples (134) and (135) show this suffix with a transitive and an intransitive verb. The suffix is in bold:²¹

(134) k'at'a- m ik'navl- a
 cat- ERG meowed- 3SBJ
 The cat meowed.

(135) ivane- m mc'er- i mo- k'l- a
 John- ERG insect- NOM PVB- killed- 3SBJ
 John killed the insect.

20. The data in this section comes from Anderson (1984).

21. PVB indicates a preverb.

One of the Indirect Object marker series marks third person singular with the prefix /a-/:

- (136) vano anzor- s a- dareb- s givi- s
 Vano Anzor- ACC 3IO- compare- 3SBJ Givi- DAT
 Vano is comparing Anzor to Givi.

The Subject marking suffix /a/ and the Indirect Object marking prefix /a/ may occur in a single morpheme string:

- (137) vano- m gela- s še- a- jul- a
 Vano- ERG Gela- DAT PVB- 3IO- cause to hate- 3SBJ
 nik'o
 Niko-NOM
 Vano made Gela hate Nik'o.

Example (136) also includes the third singular subject marker /-s/. The choice between the two subject markers depends on the conjugation class of the verb stem, so is a feature of the stem not the marker. So are they parts of a single morpheme, or does the language have two third singular subject marking morphemes?

- (138) Comparing the two forms marking third singular subject:

Features	Commonality	Distinctiveness
formal		a / s
semantic	3SGSBJ	/

The two have no phonological features in common. There being no commonality correspondence between them, Georgian must be regarded as having two synonymous but separate morphemes which mark third person singular subject. The lexical entries for these morphemes must specify among their structural details the verb conjugations to which each apply.

Now compare the /a/ Subject marker and the Indirect Object marker:

- (139) Comparing the two /a/ affixes:

Features	Commonality	Distinctiveness
formal	a	
semantic	3SG	subject/indirect object

The two entities are phonologically identical and share the semantic features <third person> and <singular>. The distinctiveness is limited to their role in the action. The formal and semantic links are sufficient to conflate the two into a single

morpheme. This morpheme represents third person singular, either subject or indirect object.

This does not mean that the morpheme has two related but distinct meanings. The UR specifies 3SG as obligatory, and Subject and Indirect Object as optional. In the SSRs this becomes specified as the two possible semantic RFs are invoked and associated with either a prefix or suffix OMR.

Other entities in the verbal agreement system form discrete commonalities of form and the full set of relevant semantic features, and are not underspecified in any way. The morpheme analysed here differs in that it may represent either subject or indirect object and may occur as either a prefix or a suffix. This demands a lexical entry which involves each of those features as optional RFs:

(140)	$\left[\begin{array}{c} \langle \leftarrow \rangle V_1 \langle \rightarrow \rangle \\ \\ a \end{array} \right]$	$\langle \text{third person singular, (subject) or (indirect object)} \rangle$	$\{ \text{Verb agreement marker.} \}$
	1. $\langle \leftarrow \rangle$	$\langle \text{subject} \rangle$	$\{ \text{Specification for SUBJ, subcategorisation for conjugation class of host verb stem.} \}$
	2. $\langle \rightarrow \rangle$	$\langle \text{indirect object} \rangle$	$\{ \text{Specification for IOBJ, specification for presence in appropriate IOBJ marker series.} \}$

The conjugation class specification in the structural brackets of SSR1 allows any verb of the appropriate class to select this entity rather than the /-s/ suffix. In SSR2 the structural brackets specify to which series of indirect object markers this entity belongs. This allows the morpheme to be invoked automatically as the indirect object marker appropriate to a verb root which specifies that series.

4.12 Non-segmental Morphemes

The PCD approach provides little possibility of identifying zero morphemes. Where such entities are identified they are distinctive absences.

Consider *sheep*. The singular and plural forms are identical, however on the basis of structural distribution it has been argued that the plural occurrence contains a zero plural morpheme. Other words, such as *people* and *fish* appear similar.

However in one sense *people* is inherently plural: there may be *fifty people in the room*, but not **a people in the room*. Yet while the Germans are *a people*, they and the French are among *the peoples of Europe*.

While *people* operates syntactically as singular or plural depending on context, it is a semantically innumerate substance, rather like *gas*: a singular matter consisting of a plural number of components. Semantically it operates as a substance with components which may be numbered (*fifty people*), or as a substance which may itself be numbered (*our two peoples*).

In some dialects *fish* behaves similarly. The barramundi is *a fish* (referring to all barramundi), and the barramundi and the bream are *fishes*. But unlike *people*, while there may be *fifty fish in the room*, there may also be *one fish in the room*. *Fish* is not innumerate, it is two semantically distinct things: an innumerate substance like *people* or *gas*, and a countable unitary object like *cat* or *hippo*. Many English nouns share the characteristic of being a substance: for example *the tabby is a cat* (referring to all tabbies). In these cases, however, this characteristic is not manifest formally: just as *the tabby and the tortoiseshell are cats* so too *Lybica and Claude are cats*. With *fish* the distinction between substance and object is formally realised and so has morphemic significance.

Sheep, on the other hand, behaves like *cat* and *hippo*. Its existence as a substance is of no morphemic significance (*the Merino and the Suffolk are sheep*). In other words, the distinction is not morphologically recognised and *sheep* behaves semantically exactly like *cat*: it is really singular in one context and really plural in another. *Sheep* only differs from *cat* in that it does not formally mark plural. So why not just say that the plural *sheep* is marked with a zero suffix? After all, it is formally no different to a zero person/number marker in a paradigmatic gap. However, the PCD approach reveals that there is a difference: in *sheep* the absence is not distinctive, and does not contrast in any way with the singular form.

In a paradigmatic gap, however, the absence, occurring in a closed set, is contrastive. Consider this data from Asmat:²²

(141)	ap - i	< I am >
	ap - em	< you (SG) are >
	ap	< he/she/it is >
	ap - om	< we are >
	ap - okom	< you (PL) are >
	ap - es	< they are >

22. This data is from Palmer (MS), drawn from the data of Drabbe (1959) and Voorhoeve (1965). In fact /ap/ is one of five Positionals in Asmat which function as the verb 'to be'. /ap/ applies to squat objects including humans.

(142) Comparing the singular and plural occurrences of *sheep*:

Features	Commonality	Distinctiveness
formal	šip	/
semantic	sheep	singular / plural

The semantic distinctivenesses have no corresponding formal distinctivenesses, so have no morphemic status.

(143) Comparing the 3SG paradigmatic gap in (141) with the 1SG form:

Features	Commonality	Distinctiveness
formal	ap	i /
semantic	be	1SGS / 3SGS

This reveals the distinctive correspondences [i]:<1SG> and [∅]:<3SG>. By directly contrasting with other morphemic entities [∅] is demonstrated to fulfil all the requirements of a morpheme: it is an identifiably distinctive form, with a corresponding distinctive semantic value. It functions as if it was segmental, and is entered in the lexicon normally.²³ The structural component of the lexicon specifies the nature of potential host morphemes.

(144)	[<- ∅]	< third person singular >	{ X }
	1. []	< >	{ }

It could be argued that <3SG> is a default value, making it a feature of every root in the language. However, within the PCD approach the only analysis possible is that a true non-segmental morpheme is present. In Asmat there is an expectation that verb roots will be marked for person and number. The non-segmental morpheme is a failure to meet that expectation. This failure is an absence, not in the sense that there is nothing, but rather that something is missing. This missing piece, is formally identifiable and thus has a formal character that the *sheep* plural lacks. As such it must be represented formally, and [∅] serves this purpose.

The PCD approach inevitably analyses contrastive zeros as morphemic entities, while excluding the hundreds of imaginary morphemes demanded by structural parallel.

23. This does not imply in any way that the zero is regarded as having a CV structure.

4.13 Conclusion

Throughout this chapter the PCD approach has been demonstrated on various bodies of data. It has been shown that while PCD is effective in identifying, isolating, and characterising straightforward entities, it is equally effective when faced with more problematic phenomena. Many of the problems discussed in 2.2 have been tackled and an analysis given. Within complex groups of apparently related forms, such as the *know/ignore* group, the relationships between members of the group are readily apparent if viewed in the proposed model. The morphemic status of irregular and idiosyncratic phenomena such as the closed sets of word class marking suffixes *-sis* and *-tic*, and the *go* and *do* paradigms, becomes apparent within the approach, as does the status of a range of problematic phenomena, exemplified here by replacives, discontinuous morphemes, morphemes affected by word-internal position, paradigmatic gaps, and phonesthemes.

It is intended that the range of morphemic entities dealt with in this chapter indicate the flexibility of the PCD approach in dealing with an extensive range of morphemic problems.

Chapter 5

Conclusion

In Chapter 1 it was suggested that there exist morphological problems which are not dealt with by existing theories. It was suggested that these problems all involve a disparity between the nature of the phonological and semantic relationships between morphological objects and the relationships between those objects' roles in word formation. These problems may be reduced to an underlying issue of the nature of morphemes as phonological and semantic entities. This drew attention to the need for an approach which focuses on morphemes in their own right, and not as an incidental concern within the field of morphological structure. The present work has set out to propose a possible approach to morphemics.

In Chapter 2 a variety of problems were examined in detail to exemplify the nature of these concerns. Later in Chapter 2 it was argued that existing morphological theories fail to deal with these problems. This failure is an inevitable consequence of the focus of morphology being the processes of word formation, and not the nature of morphemes. The structuralist school was very much concerned with the nature of morphemes themselves, but since the generativist revolution, all morphological theory has proceeded from the perspective of morphological structure. Indeed, aside from the work of Mark Aronoff, no leading morphological theory has dealt explicitly with the notion of morpheme. These theories assume there is a notion of morpheme, and that morphemes are defined and identifiable objects. In morpheme based morphology that assumption is false. Only Aronoff has explicitly characterised 'morpheme', and has done so within a word based model.

The failure of existing theories to deal with the kinds of relationships discussed earlier is also the result of an unwillingness to recognise either the validity of 'morpheme' as a phenomenon in its own right, or the significance of semantics in morphology, or both. Many theories involve a model in which word formation is driven by words themselves, and consequently reject the existence of 'morpheme' as a phenomenon in its own right. Other theories, typically those which are explicitly concerned with the notion of 'morpheme', propose that meaning is not an inherent feature of morphemes.

The approach presented here does something which no existing theory does: it deals explicitly with the notion of morpheme, and regards the morpheme as the basis of morphology, and recognises the inherently meaningful nature of morphemes. It regards morphemes as correspondences of form and meaning; as psychologically real semantically undecomposable objects. Throughout the work evidence is

presented supporting the linguistic reality of this perspective.

The proposed approach is set in context by a discussion of the symbiotic relationship between form and meaning in morphology. A distinction is drawn between morphemics and morphological structure, and a definition of morpheme is proposed which recognises its combined phonological and semantic nature, and is consequently capable of accounting for the lexical regularities that exist between morphemes, regardless of the nature of their structural relationships. The internal structure of the morpheme is characterised, and a practical and systematic procedure for the rigorous analysis of morphemic data is proposed. This procedure, in the form of the Principle of Commonality and Distinctiveness, is capable of isolating and characterising morphemic entities, as well as determining the relationships between them. A lexical structure is proposed which reflects the relationships revealed by PCD in a learnable and storable manner.

The proposed approach predicts that where entities display discernible phonological and semantic similarities, they will be regarded as being in some way 'the same thing', and where one or both such similarities are absent, the entities are in a way 'not the same thing': *noun* is like *name* in way that it is not like either *noon* or *title*; and *go* is like *gone* in a way that it is not like *went*. The approach predicts that a constant process of speaker reanalysis occurs in which these kinds of relationships are recognised and influence language change.

This work is intended to be an indication of a direction in the study of morphology. It is intended to suggest a perspective from which to view the notion of 'morpheme'. A considerable amount of work is required to bring the proposed approach to fruition. A great deal more data needs to be analysed to test both the hypotheses upon which the approach is based, and the mechanics of implementing it. Larger bodies of more diverse data need to be examined, and the emphasis needs to be more on exotic data. The applicability of the approach to suprasegmental phenomena needs to be tested. Within English data a PCD analysis of the subregularities of strong verb past tense and past participle formation will provide an interesting test for the approach. As a side issue inspired by the proposed approach, a great deal of work remains to be done on phonestemes, a phenomenon present in a wide variety of languages.

There are two significant areas in which the present approach requires further development. The first is word formation. While the present work is an approach to morphemics, it is not at this stage a unified theory of morphology. In this respect the approach is in marked contrast to existing theories: despite being theories only of word formation, and not of morphemics, many purport to be unified theories of morphology. The present approach is concerned specifically with the notion of

morpheme. It is proposed that this forms the appropriate basis for the development of a theory of morphological structure: once the nature of morphemes is understood, a linguistically real approach to morphological structure will present itself.

The second and most significant area requiring development is the lack of a rigorous and systematic means of identifying semantic features. The development of such a system is well beyond the scope of this work, but is essential to the effective application of the approach proposed. There is a need for a system which is capable of formally recognising various elements of meaning in a way that enables the comparison of sets of such elements, and yet which is not unwieldy.

This work proposes a detailed approach to morphemic analysis. It may be that elements of this approach will be disproven after further work. I very much hope, however, that if nothing else, the present work draws attention to the need for explicit consideration of the notion of morpheme, and that such consideration should recognise the inherently meaningful nature of the phenomenon.

APPENDIX I

Additional Examples of Data Analysis

1. English Comparative Suffixes

The English suffixes occurring regularly as *-er* and *-est* provide an example for analysis both of derivational affixes, and of the relationship between regular productive affixes and their irregular unproductive allomorphs.

Consider first the data in (1). Let us assume the semantic values <happy>, <big> and <weak>; and the semantic values <more> as a comparative, being an increase, and <most> as a comparative, being the maximum possible.

(1)	(1.1) happy	[hæpi]	< happy >
	(1.2) happier	[hæpiə]	< more happy >
	(1.3) happiest	[hæpiəst]	< most happy >
	(1.4) big	[biɡ]	< big >
	(1.5) bigger	[biɡə]	< more big >
	(1.6) biggest	[biɡəst]	< most big >
	(1.7) weak	[wik]	< weak >
	(1.8) weaker	[wika]	< more weak >
	(1.9) weakest	[wika:st]	< most weak >

A number of correlations are immediately apparent throughout the set. For example compare *happy* and *happier*:

(2)	Features	Commonality	Distinctiveness
	formal	hæpi	/ ə
	semantic	happy	/ more

Now compare *weak* and *weaker*:

(3)	Features	Commonality	Distinctiveness
	formal	wik	/ ə
	semantic	weak	/ more

These tables reveal the presence of the following comparative morphemic entity:

(4)	[ə]	< more >
-----	-------	----------

A comparison of *happy* and *happiest*, and *weak* and *weakest* gives parallel results:

(5)	Features	Commonality	Distinctiveness
	formal	hæpi	/ əst
	semantic	happy	/ most

(6)	Features	Commonality	Distinctiveness
	formal	wik	/ əst
	semantic	weak	/ most

These reveal the entity:

(7)	[əst]	< most >
-----	---------	----------

The results in (4) and (7) suggest a possible relationship between the two comparatives. Clearly there is a semantic relationship: if something is *bigger*, but an even greater size is possible, if that greater size is the maximum possible, then it will be *biggest*. *Biggest* indicates something in addition to *bigger*.

However is there a formal relationship? The PCD table reveals that there is:

(8)	Comparing <i>-er</i> and <i>-est</i> :		
	Features	Commonality	Distinctiveness
	formal	ə	/ st
	semantic	comparative	/ maximum possible

Since *biggest* is something in addition to *bigger*, it seems appropriate that it should be represented formally by additional formal material.¹

On that basis the following lexical entries may be proposed:

(9)	$\left[\begin{array}{c} \left\langle - V_1 \right\rangle \\ \left[\begin{array}{c} \\ \text{ə} \end{array} \right] \end{array} \right]$	< more >	{ Specified as regular productive form.}
-----	---	----------	--

1. []	< >	{ }
--------	-----	-----

1. Actually the schwa present in the two suffixes may have different underlying vowels. I intuitively feel that the vowel in *-er* is underlyingly [ɜ], while the vowel in *-est* is underlyingly [ɛ]. However I have no evidence at this stage to support that analysis, and so the results of (8) must tentatively stand.

(10)	$\begin{bmatrix} <- C_1 C_2 \\ \\ s t \end{bmatrix}$	< most >	{ Specified as regular productive form. Subcategorisation for collocation with (9).}
	1. []	< >	{ }

Now consider a further set of data. Assume the semantic values <good> and <bad>. For *less* assume a semantic value of <decreased X>, represented for our purposes as <less>, and for *latter* and *last* assume the semantic value <positioned following another position>, represented for our purposes as <late>.²

(11)	(11.1) less	[lɛs]	< less >
	(11.2) lesser	[lɛsə]	< more less >
	(11.3) least	[list]	< most less >
	(11.4) good	[gʊd]	< good >
	(11.5) better	[bɛtə]	< more good >
	(11.6) best	[bɛst]	< most good >
	(11.7) bad	[bæ:d]	< bad >
	(11.8) worse	[wɜ:s]	< more bad >
	(11.9) worst	[wɜ:st]	< most bad >
	(11.10) latter	[lætə]	< more late >
	(11.11) last	[lɑ:st]	< most late >

(12) Compare *less* and *lesser*:

Features	Commonality	Distinctiveness
formal	lɛs	/ ə
semantic	less	/ more

This conforms to the earlier analysis and the proposed morpheme in (9). A comparison of *good* and *better*, however, provides different results. In (11.4) to (11.6) suppletion is at work. There is no free, unmarked root corresponding to *better* and *best*. Consequently (13) compares *better* with other comparative forms in an attempt to isolate a comparative suffix from that example.

(13) Comparing *lesser* and *better*:

Features	Commonality	Distinctiveness
formal	ə	lɛs / bɛt
semantic	comparative	less / good

2. Of course *late*, in its sense of 'positioned in time following the last appropriate position in time', attracts the regular suffixes discussed earlier to form *later* and *latest*. There is, however, a relationship between *latter* and *last* paralleling *later* and *latest*, and there is a semantic relationship between the two roots *late*. These two senses of *late* are semantically divergent SSRs, each taking different forms of the comparative suffixes. This is not significant in the current discussion.

This supports the results of the analysis so far. It may be proposed that *better* contains the comparative suffix listed *-er*, combining regularly with a bound root [bɛt], which has the semantic value <good>.

In *bad*, *worse* and *worst* suppletion is again at work. This time, however, there is no comparative schwa morpheme present: *worse* is the comparative of *bad* without any suffix present.

Lesser and *least* also do not have a free root present in the given data. *Latter* may be analysed in a similar manner to (13):

(14) Features	Commonality	Distinctiveness
formal	ə	lɛs / læt
semantic	comparative	less / late

Once again the comparative suffix in (9) may be isolated, and an apparently bound root (or at least root SSR) has been isolated. On the basis of the analysis in (11) to (14) four root morphemes may be proposed:

(15)	(15.1) [lɛs]	< less >
	(15.2) [bɛt ->]	< good >
	(15.3) [wɜs]	< more bad >
	(15.4) [læt ->]	< late >

Now consider the forms in (11) which correspond to *biggest*, *happiest* etc. While *lesser* corresponds with *less* in the regular way, *least* does not. If this was the regular application of the morpheme listed in (10) the form would be **lessest*. The fact that this is not so is not the result of a phonological rule, or a morphophonemic rule applying generally to this suffix (consider *crassest*). Clearly something other than the regular application of the morpheme in (10) is happening.

Equally with *bett-* corresponding to *best*, and *latt-* corresponding to *last*, an alternative maximal comparative marking phenomenon is occurring. Compare *better* and *best* :

(16) Features	Commonality	Distinctiveness
formal	bɛ (-) t	-ə / -s-
semantic	good	comparative/maximal

This contradicts the existing analysis results. Since Ockham's Razor supports the analysis of [bɛt] as a discrete entity, and the maximal suffix [st] has already been isolated it is more appropriate to analyse the [t] as not a commonality. On that basis

(16) may be reanalysed as follows:

(17) Features	Commonality	Distinctiveness
formal	be	-tə / -st
semantic	good	comparative/maximal

However this involves reanalysing the [t] in *better* as part of the comparative suffix, an unsupported complication of both morphemes. An alternative is to maintain the regular analysis of *better* proposed earlier, and attribute the variation to some kind of replacive feature of the maximal suffix. In seeking an explanation for this it may be observed that unlike the regular formation, as in *biggest*, the suffix is occurring without the additional presence of the comparative [ə] morpheme. This indicates that a different SSR of the maximal comparative morpheme, one not demanding the presence of the other comparative, is occurring in *best*. It will also be observed that the morpheme, consisting of an alveolar fricative followed by an alveolar stop, appears to replace a consonant which is also alveolar. This suggests that assimilation is occurring, rather than that the SSR is replacive. If that is so, then the assimilation is possible because the consonants are adjacent, rather than separated by the comparative morpheme's schwa.

This analysis suggests that *crass* subcategorises for the regular maximal comparative, which in turn demands the presence of the comparative schwa:

(18) [kræs] + [ə] + [st] -> [kræsəst]

On the other hand *bett-* subcategorises for the SSR of the maximal comparative which does not require collocation with the comparative schwa suffix. This places the alveolar suffix adjacent to the alveolar final C of the root, and morphophonemic assimilation occurs:

(19) [bet] + [st] -> [betst] -> [best]

Now this additional SSR of the maximal comparative has been proposed let us examine *least*, *last* and *worse*, and determine whether this analysis works for those example:

(20) [les] + [st] -> [lesst] -> [list]

(21) [læt] + [st] -> [lætst] -> [last]

(22) [wɜs] + [st] -> [wɜsst] -> [wɜst]

This supports the proposed irregular SSR, but poses the new problem of root vowel alternation. It is, however, apparent that the vowel alternation is not a feature of the new suffix SSR. After all, in (20) [ε] → [i], while in (19) that vowel remains unchanged. The responsibility for the vowel alternation appears to lie with the root itself. A possibility to be considered is that a morphophonemic rule is being invoked by the roots in (20) and (21). Pending evidence on that matter, the roots must be tentatively postulated to have SSRs which occur with the maximal suffix.

In addition since the root *worse* is itself the comparative form and does not take the comparative schwa suffix, that must be specified in its lexical entry.

On the basis of this analysis it is now possible to propose that the maximal comparative suffix has two SSRs, one productive, which demands the collocation of the comparative schwa suffix, and the other which is unproductive and makes no such collocative demand. In addition four roots may be proposed, two of which are bound, and two of which have vocally varying SSRs. The suffix will have the lexical entry in (23), a revised version of that in (10). The proposed roots will have the tentative lexical entries in (24), (25), (26) and (27).

- (23)
$$\left[\begin{array}{cc} \leftarrow C_1 & C_2 \\ \left[\begin{array}{c} | \\ s \end{array} \right] & \left[\begin{array}{c} | \\ t \end{array} \right] \end{array} \right]$$
 < most > { X }
1. [] < > { Specified as regular productive form. Subcategorisation for collocation with (9).}
2. [] < > { Subcategorisation for non-collocation with (9), rule referral for morphophonemic assimilation.}
- (24)
$$\left[\begin{array}{ccc} C_1 & V_1 & C_2 \rightarrow \\ \left[\begin{array}{c} | \\ b \end{array} \right] & \left[\begin{array}{c} | \\ \epsilon \end{array} \right] & \left[\begin{array}{c} | \\ t \end{array} \right] \end{array} \right]$$
 < good > { Subcategorisation for collocation with (9) or (23.2)}
1. [] < > { }

- (25) $\begin{bmatrix} C_1 & V_1 & C_2 \\ | & | & | \\ 1 & -low & s \\ & +front & \end{bmatrix}$ < less > {X}
1. $\begin{bmatrix} V_1 \\ | \\ -high \\ -long \end{bmatrix}$ < > { Subcategorisation for no maximal comparative.}
2. $\begin{bmatrix} V_1 \\ | \\ +high \\ +long \end{bmatrix}$ < > { Subcategorisation for collocation with (23.2).}
- (26) $\begin{bmatrix} C_1 & V_1 & C_2 & - > \\ | & | & | & \\ 1 & +low & t & \\ & -back & \end{bmatrix}$ < following > { Subcategorisation for collocation with a comparative suffix.}
1. $\begin{bmatrix} V_1 \\ | \\ +front \\ -long \end{bmatrix}$ < > { Subcategorisation for no maximal comparative.}
2. $\begin{bmatrix} V_1 \\ | \\ -front \\ +long \end{bmatrix}$ < > { Subcategorisation for collocation with (23.2).}
- (27) $\begin{bmatrix} C_1 & V_1 & C_2 \\ | & | & | \\ w & 3 & s \end{bmatrix}$ < more bad > { Subcategorisation for non-presence of non-maximal comparative suffix. Subcategorisation for possible collocation with (23.2)}
1. [] < > {}

In addition to the data discussed above, the presence of the comparative morphemes will have been noticed in the words *more* and *most*. These forms have a relationship with each other, and indeed a relationship with *many*, which in turn may have a relationship with *any* and perhaps *much*. I do not intend to deal with this complicated set of data here, except simply to indicate the presence of the two comparative morphemes in *more* and *most*.

2. The *Nose* Group

There are a number of words related to *nose* which, like the *know/ignore* group, provide an example of the analysis of a family morpheme. *Nose* may be characterised as referring to the olfactory organ, a protuberance with orifices, located in the middle of the face, through which breathing also takes place. For our purposes we will refer to these semantic features as <nose>. Consider the following data:

- | | | | | |
|------|---------|---------|-----------|--|
| (28) | (28.1) | nose | [noʊz] | < nose, noun > |
| | (28.2) | nostril | [nostrəl] | < nose, orifice, noun > |
| | (28.3) | nasal | [neɪzəl] | < nose, adjective, noun > |
| | (28.4) | nozzle | [nozəl] | < small protuberance with orifice, noun > |
| | (28.5) | nuzzle | [nʌzəl] | < press with nose, verb > |
| | (28.6) | sniff | [snɪf] | < short inhalation through nose, verb, noun > |
| | (28.7) | sniffle | [snɪfəl] | < multiple short inhalations through nose, noun > |
| | (28.8) | snuff | [snʌf] | < powder for inhaling through nose, noun > |
| | (28.9) | snuffle | [snʌfəl] | < multiple dull noises, breathing through nose, noun > |
| | (28.10) | sneeze | [sniz] | < involuntary exhalation through nose caused by irritation in nose, verb, noun > |
| | (28.11) | snigger | [snɪgə] | < suppressed laugh, verb, noun > |
| | (28.12) | snore | [snɔ] | < sharp noise caused by breathing through nose while asleep, verb, noun > |
| | (28.13) | snort | [snɔt] | < sharp noise caused by sharp inhalation through nose, verb, noun > |
| | (28.14) | snout | [snaʊt] | < nose of animal, noun > |
| | (28.15) | snoot | [snʊt] | < nose, noun, jocular > |
| | (28.16) | snot | [snɒt] | < mucous formed in nose, noun > |

It is hard to ignore the semantic correlation throughout this set of data. Three of the words mean simply <nose>: *snout* is relevant to animals, and *snoot* is jocular. The relationship between *nose* and *nasal* is transparent, and *nostril* is all and only nasal orifices. *Sniff*, *sniffle*, *snuffle*, *sneeze*, *snore* and *snort* are all kinds of nasal breathing and their associated noises. *Snuff* is powder meant to put up the nose, and *snot* is the mucous which is formed there. *Nuzzle* is an action involving the nose. Less transparent is *nozzle*, which refers to a protuberance with an orifice at the end. It is an artificial thing with many of the characteristics of a nose. Less transparent still is *snigger*, a suppressed laugh, but it is a laugh suppressed by closing the mouth, which has the effect of laughing through the nose.

Equally the data displays transparent formal similarities. All involve [n], either followed or immediately preceded by an alveolar fricative. The presence of the velar nasal throughout the *nose* set could perhaps be in opposition to the presence of the labial nasal in words referring to the other facial orifice: *mouth, maw, muzzle, murmur, mumble, mutter, smattering, smirk, smile* and so on. This relationship is tantalising, but must be left for another work.

Now let us examine the data in detail. Compare *nose* and *nasal*:

(29) Features	Commonality	Distinctiveness
formal	n - z	oʊ / eɪ - əl
semantic	nose	noun / adjective

Evidence elsewhere in English fails to confirm this analysis, and reveals existence of an adjectival marker [əɪ]. Since isolating that suffix leaves a bound entity with no semantic distinctiveness from the commonality, and that the other distinctiveness does not appear to have an overt word class marker, a tentative postulation may be made that the nuclei demonstrate Realisation Features in the form of vowel variation. On that basis it may be proposed that two Separate Surface Realisations are present in those two examples. Now compare *nose* and *nozzle* :

(30) Features	Commonality	Distinctiveness
formal	n - z	oʊ / ɔ - əɪ
semantic	nose, noun	/ artificial

This time the vowel quality of *nose* is a formal distinctiveness with no semantic correspondence, and the semantic value <noun> is present with the consonant segments in the commonality. These facts indicate that the vowel variation has no morphemic status and supports the view that in (29) vowel variation occurs within the morpheme. Furthermore the vowel variation revealed by (30) is the morphophonemic [oʊ] -> [ɔ] encountered frequently throughout Chapter 4. Now (30) may be revised:

(31) Features	Commonality	Distinctiveness
formal	noʊz	/ əɪ
semantic	nose, noun	/ artificial

This brings into question the status of the [əɪ]. Being a distinctive formal/semantic correspondence it is a morphemic entity. Is this another occurrence of the suffix isolated in (29)? It is not particularly significant that [əɪ] is an adjective marker and *nozzle* is a noun. As noted regarding *agnostic*, and as also seen in many other suffix bearing words such as *an Australian* and *the Bicentennial*, adjectival markers in

English lend themselves to extension as markers of nouns denoting things with the attributes referred to by the adjective. Thus while *nasal* is the adjective of *nose*, it is also a noun, a thing characterised by the key feature of its relationship with the *nose*. So the [əɪ] in *nozzle* could mark an adjectival noun. However, it has the semantic correspondence <artificial>. So is this unique, is the entity a submorpheme, or is it an occurrence of some other morpheme. The term <artificial> must be reexamined. A *nozzle*, as discussed earlier, is a thing with many of the characteristics of a nose. Data elsewhere in English reveals a suffixing morpheme with the form [əɪ], and a meaning which indicates that the referent (either an action or an object) is like the root, has some of the characteristics of the root. This is found in pairs like *daze* and *dazzle*, *spark* and *sparkle*, *prick* and *prickle*, *wag* and *wiggle* and indeed *sniff* and *sniffle*. The second of each of these pairs may be a verb, or a noun, or both, but in each case it refers to an action or object characterised by the referent of the root.

On that basis *nozzle* appears to have a suffix. It may be suggested that there is a relationship between this suffix, and the adjective marker isolated earlier. Both characterise the referent by means of the characteristics of the root. There are, however, differences. The [əɪ] in *nozzle* appears to combine only with roots containing phonesthemes, and is only productive in the way that phonesthemes are. Furthermore it only occurs in verbs or nouns, and appears to be part of the same morpheme as the phonesthemic suffix [ə]. The [əɪ] in *nasal* on the other hand is clearly a word class marker, only occurs with adjectives and adjectival nouns, and is productive in a very different way to that in *nozzle*. In addition it appears it may actually have the underlying form [æɪ]. Having raised this issue, no conclusion will be made either way. Suffice to say that a separate, suffixing morpheme is present in *nozzle*.

The result of all this analysis is the proposal of two realisations of a single morpheme:

- (32) [noʊz] < nose >
 [neɪz ->] < nose >

Now consider *nuzzle*. Here the same suffix is present as found in *nozzle*. The root is yet another variant of the morpheme outlined in (32). This time the word is a verb, and is an action involving the nose. So now we have another formal realisation:

- (33) [nʌz ->] < nose >

The remaining [n] initial item in the data is *nostril*. Its formal relationship with *nose* again contains the morphophonemic variation [oʊ] -> [o]. Accepting that, let us

now compare the two:

(34) Features	Commonality	Distinctiveness
formal	noU	z / strəl
semantic	nose	/ orifice

Once again the [z] is demonstrated to not be separate from the root. Consequently the status of the [s] in *nostril* is called into question. If it forms part of the distinctiveness as isolated in (34), then *nose* must have another SSR in the form [noU]. The alternative is that the relevant SSR is [noUs], and the new entity is [trəl]. If this analysis is correct it will reduce the differences between the SSRs to just the voicing of the final C. This is the least complicated analysis and so is accepted. Now a new SSR has been isolated:

(35) [noUs ->] < nose >

So where does this leave [trəl]? It is a morphemic entity, but occurs nowhere else. According to Principle 4 a unique entity can be either a morpheme, or a submorpheme. The distinction depends on whether the entity satisfies an OMR or not. If it does it is a submorpheme. The SSR [noUs] has an OMR. The entity [trəl] satisfies that requirement, and is thus bound to the host as a submorpheme.

So from the data in (28.1) to (28.5), a number of SSRs have been proposed, one associated with a submorpheme. Do any of these form a subfamily group? It may be suggested that the formal distinctiveness of final consonant voice suggests two groups based in that distinctiveness. On the other hand the vowel Realisation Features present in *nose* and *nostril* indicate a grouping there. The first proposal would involve combining all SSRs except one into a group, with every formal diversity in the set present in the group with the exception of a single voicing feature. The second proposal involves placing together in a group two SSRs whose RFs vary only in that single voicing feature, and the presence of the OMR. A PCD comparison of the two proposals indicates the latter is the simpler and therefore is accepted. The lexical entry for the morpheme as analysed so far is depicted in (36).

The UR is underspecified for vowel quality, and represents the second vowel of the diphthongs as optional. In addition it underspecifies the final C for voice. Subfamily group 1 specifies the remaining features of the nucleus and refers the form to the morphophonemic rule present. That group contains two SSRs, the first specifying voice for C₂ as well as the possible suffix. This generates *nose* and *nozzle*. SSR1.2 specifies a voiceless C₂ and includes the submorpheme. This generates *nostril*. The remaining two SSRs are independent of any subfamily group, and specify the remaining RFs of the nuclei and the relevant suffix specifications.

(36)	$\left[\begin{array}{cccc} C_1 & V_1 & (V_2) & C_2 \text{ (->)} \\ & & & \\ n & +\text{low} & +\text{high} & +\text{alveolar} \\ & & -\text{long} & +\text{fricative} \end{array} \right]$	< nose >	{ X }	
	1.	$\left[\begin{array}{cc} V_1 & V_2 \text{ (->)} \\ & \\ +\text{back} & +\text{back} \end{array} \right]$	< >	{ Referral to morphophonemic rule for vowel shortening. }
	1.1	$\left[\begin{array}{c} C_2 \\ \\ +\text{voice} \end{array} \right]$	< >	{ Subcategorisation for possible suffix. }
	1.2	$\left[\begin{array}{c} C_2 \\ \\ -\text{voice} \end{array} \right] \left[\begin{array}{cccc} C_3 & C_4 & V_3 & C_5 \\ & & & \\ t & r & \text{ə} & l \end{array} \right]$	<< orifice >>	{ }
	2.	$\left[\begin{array}{cc} V_1 & V_2 \text{ ->} \\ & \\ -\text{back} & +\text{front} \\ -\text{front} & \\ +\text{long} & \end{array} \right]$	< >	{ Subcategorisation for suffix. }
	3.	$\left[\begin{array}{c} V_1 \text{ ->} \\ \\ -\text{back} \\ -\text{front} \\ -\text{long} \end{array} \right]$	< >	{ Subcategorisation for suffix. }

Now consider the data in (28.6) to (28.13). All eight words are nouns, or verbs and nouns, and refer to breathing through the nose, or to noise caused by breathing through the nose.

In all eight it appears that the rhymes are phonesthemes. For *sniffle* etc, consider *whiffle*, *waffle*, *huff*, *muffle*, *baffle* etc: all indicate an indistinct or diffuse nature. Equally for *sneeze* consider also *wheeze* and *breeze*. For *snigger* consider also *giggle*.

Consider the relationship between *snore* and *snort*. The former is a continuous sound or series of sounds, without any specification for inhaling or exhaling. The latter is a very similar sound, except that is a single sound, in other words one with an unambiguous end point. This relationship is made clearer by means of the PCD table, as (37) demonstrates.

(37) Features	Commonality	Distinctiveness
formal	snɔ	/ t
semantic	sharp noise etc	continuous/terminating

On the basis of this table the formal distinctiveness has some morphemic status. If it is a unique entity, then it is a submorpheme. Once again, however, it may be suggested that it has phonesthemic strength and is not unique, in which case it is a separate entity which combines with *snore* in this instance.

And to *snore* itself, it again seems possible that a phonestheme is present. Consider also *roar*.

No conclusion is drawn here on these points, however for the purposes of our analysis the presence of phonesthemes will be assumed. In the case of these examples the following SSR will be proposed:

(38) [sn ->] < nose, breathing, sound >

Now consider (28.14), (28.15) and (28.16): *snout*, *snoot* and *snot*. They also have the initial consonant cluster [sn]. None however refer to breathing and consequent sounds associated with the nose. Compare *snout* and *snoot*:

(39) Features	Commonality	Distinctiveness
formal	sn - t	aU / u
semantic	nose	of animal/jocular

These apparent distinctivenesses warrant closer attention. The term *snoot* refers to the nose of any animal or person, and is jocular in register. The term *snout* on the other hand specifically refers to non-human noses, except that by virtue of that very fact the term is also used to refer to human noses in a jocular or derogatory sense. *Nose* refers specifically to either human or animal noses. *Snout* refers just to animal noses. Like describing a human as *feeding* rather than *eating*, using *snout*, which specifically indicates an animal nose, to refer to a human nose, focuses on that human as an animal. It is from that focus that the humour or derogation derives, and not from any inherent meaning of the word.

However considering the potential for a jocular reading of *snout*, coupled with the lack of any non-register distinctiveness for *snoot*, it is possible to say that neither word contains a morphemically significant distinctiveness. The distinctivenesses are the result of Realisation Features, and the two words are closely related SSRs.

Now compare *snout* and *snot* :

(40)

Features	Commonality	Distinctiveness
formal	sn - t	aU / o
semantic	nose	animal / mucous from

The distinctivenesses in (40), involving formal and semantic correspondences, are morphemic entities, but are unique. Since they must satisfy an OMR present in the commonality, they are submorphemes. The discussion of (39) suggested that *snout* and *snot* are closely related semantically. On that basis they form a subfamily group based on one of the submorphemes revealed in (40). In addition *snot* must also be accounted for in the lexicon by the presence of a submorpheme. This will also mean all three SSRs will include the form revealed by the commonality in (40). This commonality will provide grounds for including both *snot* and the *snout/snot* group in a single, larger, subfamily group. This group will have the lexical entry as follows:

(41) $\left[\begin{array}{c} C_1 \ C_2 \leftrightarrow C_3 \\ | \quad | \quad | \\ s \quad n \quad t \end{array} \right]$ < nose > {X}

1. $\left[\begin{array}{c} V_1 \ (V_2) \\ | \quad | \\ -front \ u \\ -back \\ +long \end{array} \right]$ << (animal) (*jocular*) >> {}

1.1 $\left[\begin{array}{c} V_1 \ V_2 \\ | \quad | \\ +low \end{array} \right]$ < animal > {}

1.2 $\left[\begin{array}{c} V_1 \\ | \\ +high \end{array} \right]$ < *jocular* > {}

2. $\left[\begin{array}{c} V_1 \\ | \quad | \\ o \end{array} \right]$ << mucous from >> {}

Now three entities have been isolated: one represented in (41); one isolated from the phonestheme bearing words; and one isolated from *nose* etc. A comparison of these reveals strong formal and semantic links, so they are related within a single

morpheme. However do they fall into groups other than those identified at each stage of the analysis? Compare the [sn<->t] entity with the *nose* group:

(42) Features	Commonality	Distinctiveness
formal	$\begin{array}{c} C \quad - \quad C \\ \quad \quad \\ n \quad +\text{alveolar} \end{array}$	$\begin{array}{c} V(V)C \quad / \quad C \quad \leftrightarrow \quad C \\ \quad \quad \quad \quad \\ +\text{fricative} \quad / \quad s \quad +\text{stop} \end{array}$
semantic	nose	/

This reveals a large number of formal distinctivenesses, but no semantic distinctivenesses. Now let us compare the entity in (41):

(43) Features	Commonality	Distinctiveness
formal	$\begin{array}{c} C_1 \quad C_2 \\ \quad \quad \\ s \quad n \end{array}$	$\begin{array}{c} -> \quad / \quad \leftrightarrow \quad C_3 \\ \quad \quad / \quad \quad \quad \\ \quad \quad \quad \quad \quad \quad t \end{array}$
semantic	nose	breathing, sound /

In this comparison the formal distinctivenesses are few, but there is a semantic distinctiveness. On the basis of the results of (42) and (43) it is apparent that the group with entry (41) is not more closely to one group rather than another. This indicates three groups are present.

The above analysis of the entire body of data in (28) generates the lexical entry in (44), on the following page.

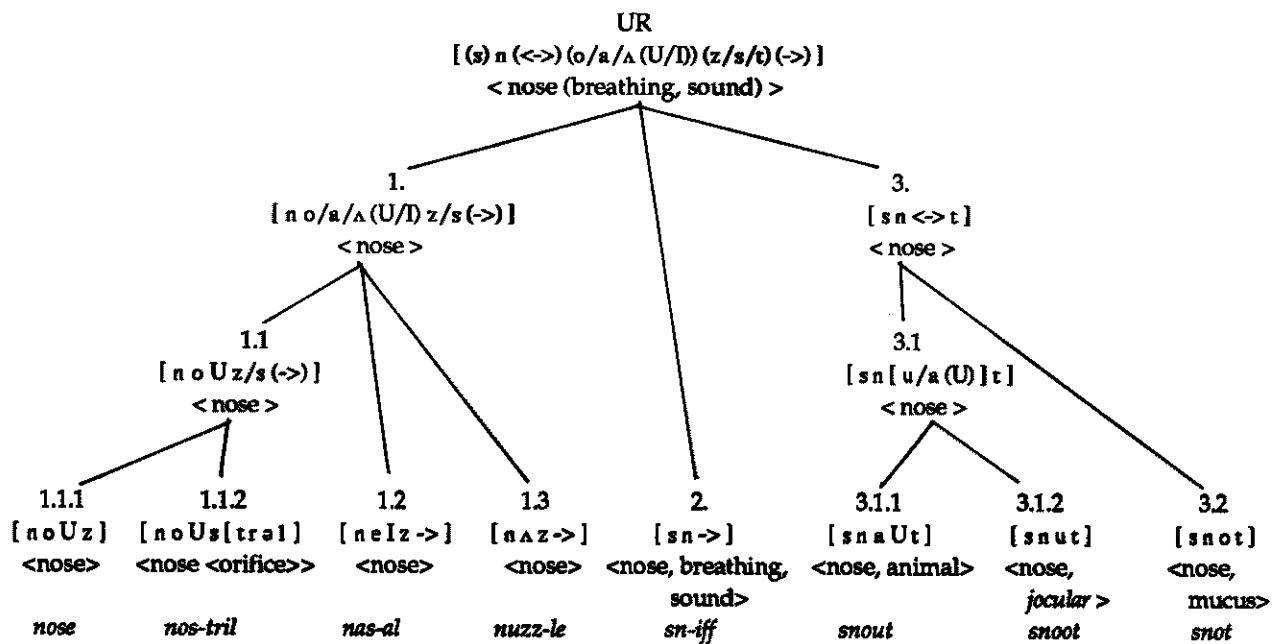
There is a significant regularity in this data which has not been captured by the approach as it is proposed here. Every item in the data contains an [n], either followed or preceded by an alveolar fricative. The key formal features of the morpheme appear to be that collocation of alveolar fricative and nasal. However since the fricative on occasions precedes and on occasions follows the nasal, it is listed in both positions as optional. In fact it is optional in each position, but is obligatory in one or the other position. With the current optional status of both alveolar fricatives it appears from the UR that the morpheme could potentially be realised without either, which is not correct. An attempt to rectify this component of the depiction to eliminate this potential to mislead must be undertaken at some later stage.

- (44) $\left[\begin{array}{c} (C_1) C_2 (<->) (V_1 (V_2)) (C_3) (->) \\ | \quad | \quad | \quad | \quad | \\ s \quad n \quad +low +high +alveolar \\ -long \end{array} \right]$ < nose (breathing, sound) > { X }
1. $\left[\begin{array}{c} V_1 (V_2) C_3 (->) \\ | \\ +fricative \end{array} \right]$ < > { }
- 1.1 $\left[\begin{array}{c} V_1 \quad V_2 (->) \\ | \quad | \\ +back +back \end{array} \right]$ < > { Referral to morphophonemic rule for vowel shortening. }
- 1.1.1 $\left[\begin{array}{c} C_3 \\ | \\ +voice \end{array} \right]$ < > { Subcategorisation for possible suffix. }
- 1.1.2 $\left[\begin{array}{c} C_3 \quad [C_4 C_5 V_3 C_6] \\ | \quad | \quad | \quad | \\ -voice \quad [t \quad r \quad ə \quad l] \end{array} \right]$ << orifice >> { }
- 1.2 $\left[\begin{array}{c} V_1 \quad V_2 \quad C_3 -> \\ | \quad | \quad | \\ -back +front +voice \\ -front \\ +long \end{array} \right]$ < > { Subcategorisation for suffix. }
- 1.3 $\left[\begin{array}{c} V_1 \quad C_3 -> \\ | \quad | \\ -back +voice \\ -front \\ -long \end{array} \right]$ < > { Subcategorisation for suffix. }
- 2 [C₁ ->] < breathing, sound > { Subcategorisation for possible OMR fillers. }

3. $\left[\begin{array}{c} C_1 \leftrightarrow C_3 \\ \quad \quad \quad | \\ \quad \quad \quad +\text{stop} \\ \quad \quad \quad -\text{voice} \end{array} \right]$ < > {X}
- 3.1 $\left[\begin{array}{c} \left[\begin{array}{c} V_1 \quad (V_2) \\ | \quad \quad | \\ -\text{front} \quad \text{U} \\ -\text{back} \\ +\text{long} \end{array} \right] \end{array} \right]$ << (animal) (*jocular*) >> {}
- 3.1.1 $\left[\begin{array}{c} V_1 \quad V_2 \\ | \quad \quad | \\ +\text{low} \end{array} \right]$ < animal > {}
- 3.1.2 $\left[\begin{array}{c} V_1 \\ | \\ +\text{high} \end{array} \right]$ < *jocular* > {}
- 3.2 $\left[\begin{array}{c} V_1 \\ | \\ \text{o} \end{array} \right]$ << mucus from >> {}

This morpheme may be usefully represented as a tree structure:

(45)



APPENDIX II

Additional Evidence Supporting the Existence of Phonesthemes

1 Background

The term 'phonestheme' was first recorded as used by Fred Householder in a 1946 seminar,¹ although he later (1971:143) attributes the term to Firth. He used the term to refer to a phoneme or cluster of phonemes shared by a group of words which also share some element of meaning or function. Phonesthemes were taken to be iconic. Iconicity will not be dealt with in this work, as that issue has no bearing on the morphemic status of the forms.

Since Householder, the term 'phonestheme' has been used in the analysis of IE languages to refer to any form demonstrating a sound-meaning correspondence, identifiable by means of recurrent association, and operating below the level of a structurally defined morpheme.

In fact these small, apparently sub-morphemic, sound/meaning associations are not limited to IE languages. Their presence in Austronesian languages has been discussed at length, notably by Blust (1988) Nothofer (1990 and 1991) and McCune (1988). The phenomenon has been identified in the Australian language Kuniyanti by McGregor (MS). Ratliff (1983 and 1986a) has proposed that the phenomenon exists in tonal form in Hmong. The evidence suggests that recurrent sound/meaning correspondences may be found throughout the world's languages.

2 The Commonness of Phonesthemes

In addition to the cluster /fl/ discussed in 2.2.6, a brief analysis was made of the initial cluster /spr/. These two clusters are typical of English phonesthemes.

In an examination of OED entries with the initial consonant cluster /spr/, of the 24 familiar words, 9 (37.5%) had meanings involving the dispersal of small elements of some greater whole, six (25%) involved lively, light movement and daintiness, and a further 6 (25%) potentially fitted either category. Only 3 (12.5%) fitted neither

1. Householder introduced the notion of 'phonestheme' in a seminar titled *On the Problem of Sound and Meaning, An English Phonestheme* which he gave on 23 February 1946. This seminar is reviewed in *Word* Vol. 2 (1946:83).

category. This breakdown is as follows (the definitions are abbreviated versions of those appearing in the OED).

(1) Dispersal of small element(s) of a greater whole. (9)

sprawl	spread out carelessly
spray ₁	liquid flying in small drops
spray ₂	spread of small foliage (shoots, buds, flowers)
spread	extend coverage of something
sprig	piece of small foliage
sprinkle	scatter in small drops or particles
sprit	small spar reaching diagonally from mast
sprocket	each of teeth on wheel engaging with links on chain
sprout	shoot of plant

Lively, light of movement, dainty. (6)

spree	lively frolic
sprightly	vivacious, lively
sprint	run short distance at full speed
sprite	elf
spruce ₁	neat, smart
spry	active, lively

Fitting both categories. (6)

spring	jump, move suddenly or rapidly; arise; well; season.
springer	point on arch where curve begins.
springbok	gazelle with habit of springing into action
springy	elastic
sprang	past tense of <i>spring</i>
sprung	past participle of <i>spring</i>

Other (3)

sprain	wrench joint causing pain and swelling but no dislocation
sprat	type of fish
spruce ₂	type of conifer

In fact *sprat* may reasonably be placed in the 'either category' list. Although it refers to a specific type of fish, it is also often used to refer to any fish which shares its characteristics: a small (dainty?) fish, being part of a large school of such fish.

3 Phonesthemic Productivity

3.1 Phonological Change

Two further examples of phonological reanalysis are *flounder* and *founce*. The American Heritage dictionary claims that *flounder* was derived from the verb *founder*. The OED lists it as imitative, perhaps by association with *founder* and *blunder*. While *flounder* retains the meaning 'being in difficulty' from *founder*, the inclusion of the whole /fl/ cluster gives the new word the additional sense of 'moving around' in difficulty.

Equally *flounce* is identified by the OED as 16th century, possibly imitative of *pounce* and *bounce*. The *-ounce* has been retained and consequently so has a sense of lightness of movement. The addition of the /fl/ cluster distinguishes the new word while retaining a general sense of movement.

3.2 Semantic Change

Bolinger (1968:242) discusses phonesthemically driven semantic change: "Shifts of meaning often go in the direction of a family of words having phonesthematic ties. The word *bolster* no longer suggests a padded and comparatively soft support but rather a stiff and rigid one, because of the attraction of *brace, bolt, buttress* ... Phonesthemes are often the principle ingredient of new words: *hassle* probably follows from *tussle, bustle, wrestle*."

A further example of this is *flourish*, which originally meant 'having the qualities of a flower'. The word retains the sense of success, good health and rapidity of growth associated with flowering, much as *blooming* does. In addition, however, it has developed the meanings listed in the OED as "show ostentatiously; wave (weapon) about; move (limbs) about vigorously". Once again the presence of the cluster /fl/ has led to an association of the word with movement and a consequent shift in meaning.

4 Word Creation

The appearance of phonesthemes in words created as acronyms supports the view that phonesthemes are semantically powerful entities. Using the cluster /fl/ again as an example, this cluster is used as a unit in acronym formation when the neologism has a movement related meaning.

Discussed briefly in 2.2.6, the word *flak* is an excellent example of phonesthemically driven word creation, borrowing and meaning change. It was originally coined in German at a time of official enthusiasm for acronyms. The term was derived by acronym from *Flieger Abwehr Kanone*, literally 'flyer defence cannon', and had the German meaning of 'anti-aircraft gunfire'. It is significant that the entire initial consonant cluster of *flieger* was used in the acronym. The word was not coined as **fak*, which would be the strict acronym, and there is no phonological reason in German why it shouldn't be **fak*. But the use of the whole /fl/ cluster allowed the retention of the sense of movement which is both present in *flieger*, and central to the meaning of *flak*.

Then the word was borrowed into English, still with the meaning of anti-aircraft fire. At the same time two synonymous terms were coined in English: *AA* [eɪyeɪ], the initials of 'anti-aircraft artillery', and *ack ack* [ækæk], a sort of derived acronym of the same thing. Both had the sense of repetitiveness associated with anti-aircraft fire of the time. In addition *ack ack* had the phonesthemic strength of the [æk], with its meaning of dangerous impact, as in *smack*, *whack* and so on. *Flak* on the other hand had both the dangerous impact of [æk], and the sense of movement implicit in /fl/.

Having been borrowed, *flak* then became the common term, supplanting its locally coined competitors, which disappeared from the language. The combination of the phonesthemes of movement and dangerous impact gave the term a semantic strength which enabled it to not only replace its competitors, but undergo a broadening of meaning: it now refers to anything incoming which will cause damage if it connects, even criticism.

The semantic strength of this diphonesthemic word demonstrates the premise that words with phonesthemic strength are more likely to be borrowed into a language, and less likely to be lost to it, than words without that strength. Of the three words *AA*, *ack ack*, and the foreign *flak*, the word with greatest phonesthemic strength which gained currency.

As a further example, Webster's Encyclopedic Dictionary records the term 'FLIP', and gives the following acronymic source and definition:

- (2) **FLIP, flip, n.** [(FL)loating (I)nstrument (P)latform] An ocean-going research vessel which can be towed into place horizontally and then flipped into a vertical position to float bow-up like a buoy.

Once again the initial /fl/ of the first word is used as a unit. There is nothing in the phonology of English to prevent **fip*. The use of the cluster serves to allow the term to be homophonous with the verb for a movement the object undergoes. It also serves to associate the referent with movement. In the given definition this research vessel is distinguished from other types of research vessels by the key semantic element that it undergoes a movement: it is 'flipped'. It is noteworthy that the definition provides no information about features of this research vessel such as what it researches, whether it is staffed, and so on. Three pieces of information are presented by the compilers as sufficient to distinguish the referent from other types of research vessels: it is towed, it is flipped, and it floats. All these refer to movement (and note that two involve the initial cluster /fl/). The approach taken to coining the term, and the subsequent approach taken by the compilers of Webster's to defining it, both point to a perceived correspondence between /fl/ and 'movement'.

In addition to the creation of words as acronyms, phonesthemes appear to be productive in a more general manner. In Green's Dictionary of Jargon many of the entries list modified uses of existing words, but there are also 11 entries which are entirely new. These are either phonologically completely new forms, or are words which have the same form as an existing word, but a semantic value which appears to have no specific connection with that of the familiar form. Nine of the eleven have meanings involving movement and two do not. They are:

(3) Movement Neologisms:

fleck <i>v</i>	[<i>Coursing</i>] used of a greyhound which snatches the hare then loses hold.
flirt <i>n</i>	[<i>Industry</i>] a device, often a lever, used for causing sudden and intermittent movement, that is used especially in certain clock mechanisms.
flirting <i>adv</i>	[<i>Archery</i>] describing an arrow which wobbles in flight.
flooding <i>n</i>	[<i>Communications</i>] in packet-switching, this is a routing method in which each node reproduces in-coming packets and sends duplicates to its neighbours; this ensures swift and accurate communications, but uses up a very large amount of transmission capacity.
flops <i>n</i>	[<i>Computing</i>] acro floating-point operations per second the measure of power used for extra-powerful computers; this is always qualified by a statement of the precision to which the operations are carried out.
flub	1. <i>v, n</i> [<i>Golf</i>] to mis-hit the ball; a flub is a mis-hit. 2. <i>v</i> [<i>Theatre, Film</i>] to make a mistake in delivering ones lines.
fluctustress n	[<i>Printing</i>] an underlining that is represented by an undulating rather than a straight line.
flugie <i>n</i>	[<i>US</i>] [<i>Politics</i>] a rule that benefits only the creator of that rule, and one that can always be changed as required by the creator to ensure that no-one else is ever able to use it to their own advantage.
fluther <i>v</i>	[<i>Science fiction</i>] to move around aimlessly.

Non-movement neologisms:

fled <i>a</i>	[<i>Pottery</i>] liable to crack at a late stage of manufacture because of too rapid a change in the temperature during or after a firing.
flubdub <i>n</i>	[<i>Printing, Journalism</i>] any ornamental piece of type used on a page, eg: an asterisk, a bullet, etc.

5 Brand Names

The marketing of products often involves the naming of the product in a way which is going to suggest to potential purchasers some attribute of the product by means of the sound of the name. The use of names which contain phonesthemes provides further evidence of the semantic strength of the phenomenon. Using /fl/ again as an example, the sense of movement carried by the phonestheme is used to suggest the key marketed feature of the household products *Flash* and *Flick*.

Flash is a cleanser, and consists of two phonesthemes which provide a semantic value of 'movement' plus 'force and intensity'. Intensity of movement implies rapidity, and the product is marketed with phrases such as "cuts through the toughest dirt" (*cut* suggesting not only force and movement but ease of movement); "quick rinse formula" (*quick* again suggesting ease of movement); and "powers

away dirt in a flash" (*powers away* equals force plus movement and *flash* reinforces the ease of movement). These phrases suggest rapidity and force of action, implying the cleaning task will be quicker and easier, and these attributes are encapsulated in the name *Flash* itself. The name captures the key features that the marketers believe will make the product desirable: cleaning kitchen or bathroom surfaces involves movement which is regarded as hard work, and naming the product *Flash* is a claim that the product makes this movement quick and easy.

The insecticide *Flick* works on the same principle: insecticides are marketed as getting rid of insects. In fact they don't move them, just kill them, but the slogan "one flick and they're gone", and the name itself (with its senses of movement and suddenness), suggest moving the insects, and a sense of immediacy.

In both these cases the product names involve a sense of movement: associated in one case with a sense of ease and power, and in the other with suddenness or immediacy. These semantic features correspond to the phonesthemes present in the words.

The naming of these products would have involved a judgment by the marketers on the associative impact of the terms. This judgment would have been based on their own intuitive reactions to the terms, and the intuitive reactions of participants in market research. The associations the names carry, and their choice as suitable vehicles for conveying attributed characteristics, support the view that each conveys a set of semantic features corresponding to the phonesthemes present.

The phonesthemic break down of these kind of words is supported by the example of the recent television superhero *The Flash*. His key characteristic appears to be the ability to move so rapidly he seems to vanish and then reappear elsewhere instantaneously. Once again the name contains phonesthemes with the semantic elements of movement and intensity. This example supports my reassessment of Bloomfield's analysis of /fl/. He gave it the two separate meanings 'moving light' and 'move through air'. I propose that /fl/ simply means 'movement'. The 'light' component of the meaning of *flash* is incidental to the key semantic features of 'movement' and 'intensity'.

6 Phonesthemes in Language Proficiency Testing

In multiple choice language tests it is common for a distractor or foil to be used which has a phonological similarity to the given word. In many such cases phonesthemes are used, as Bolinger (1968:242) observes: "The makers of multiple-choice tests find phonesthemes useful as distractors for their questions; if

twisted is offered as an equivalent for *knurled*, as was done in one test, it is on the assumption that persons not fully acquainted with *knurl* will assume that it is related to *twirl*, *whirl*, *birl*, *tirl*, *furl*, and *spiral*." The process he refers to involves giving as an option a synonym for a word which has sound similarities with the question word. In fact the use of phonesthemes in language tests often goes beyond this to a more direct relationship between the question word and distractors. An example from a common set of such tests was given in 2.2.6.

In these tests on every occasion in which a phonestheme appears in the given word, the same phonestheme appears in the answer options. Two questions have a single foil which shares the given word's phonestheme. In a further two questions there are two separate foils each containing the phonestheme. In each case there is a semantic relationship between the given word and the foil which can be attributed to the phonestheme. In a further question it is the correct answer which shares the phonestheme, and in another, both the correct answer and a foil share a phonestheme with the given word.

Example (16) in 2.2.6 involves the given word *sparkle* and the foil *sprinkle*. These share not one, but variants of the same two phonesthemes. In that example the correct answer is presumably *glitter*, itself involving two phonesthemes though unrelated to those found in the question word. The foil *sprinkle* is an incorrect answer, yet it has both a semantic and a phonological relationship with *sparkle*. The initial consonant cluster variants /sp/, /spl/ and /spr/, meaning 'the dispersal of small element(s) of a greater whole', is found in *spatter*, *spit*, *spark*, *speck*, *spoke*, *spot*, *spout*, *spurt*, and *sputter*; in *splatter*, *split*, *splotch*, *splash*, *splinter* and *splay*; and in *sprout*, *spray*, *sprig*, *sprawl*, *spread* and so on. The residues -arkle and -inkle are phonesthemic variants in a set as discussed in 2.2.6. *Sprinkle* and *sparkle* share variants of their two component phonesthemes. As an aside this may be further broken down. *Sparkle* has a transparent formal relationship with *spark*, and while *sparkle* represents an unordered scattering of small elements of light, a *spark* is a single unordered scatter of a small element of light. Equally *prickle* and *prick* share the [p~pr] found in *poke*, *point*, *prod*, *pierce*, *puncture* and so on, with a semantic value of the impact of a salient element. And while *prickle* represents the unordered impact of many such elements, *prick* represents the effect of a single such element. This applies equally to the verb and noun uses of the terms.

A further example:

- (4) 13 clutch
 A brake
 B touch
 C stroke
 D grip
 E keep

The *brake* option is a nasty trick to play on a target group too young to drive. That aside, here the correct answer is presumably *grip*. In this case the phonesthemic foil is *touch*. There is a semantic relationship between *clutch* and *touch* which is so transparent that it requires no comment. Like *sparkle*, *clutch* consists of two phonesthemes. The [ki] initial cluster is not represented by a foil option, but it could readily have been used. I suggest that if the choices given had been *touch*, *clasp*, *grip* and *grasp* the question would have been an impossible one.

In (5) there are not one, but arguably two phonesthemically related foils.

- (5) 26 cluster
 A grapes
 B bunch
 C close
 D collect
 E chain

While we are not told in (5) whether *close* is the adjective of proximity or the verb of shutting, in either case there is a semantic sense of adjacency which is carried by the [ki] and is involved in the adjacency of physical contact in the discussion above of the *clutch* question, and also in the range of types of adjacency found in *cling*, *clump*, *clutter*, *class*, *clan*, and *club* (the organisation). It is arguable that this association of consonants and meaning is also present in *collect*: it is to make the 'collectee' adjacent to the 'collector'. Collecting stamps makes them adjacent not only to each other but more importantly to the collector, and collecting a parcel has the same effect. This would explain the common Australian idiomatic use of the term in "he drove home drunk and collected a bus", meaning "ran into". There is no picking up and taking away. The underlying semantic focus is on the act of the driver making their vehicle very much adjacent to the bus. The correspondence of this form with an at least metaphorical adjacency is also found in *collide*, *collate* and *collude*. Here then is another example of not one but two foils involving variations of a phonestheme found in the question word.

Two further questions involve the same phonestheme, present in the question word, and in a foil; and one uses the same phonestheme for the correct answer as well.

- (6) 32 corrugated
 A wavy
 B twisted
 C rounded
 D ragged
 E holey

- (7) 33 *craggy*
 A *haggard*
 B *wrinkled*
 C *jagged*
 D *sleek*
 E *shabby*

Here *ragged*, *craggy*, *haggard* and *jagged* have a transparent phonological relationship present in the rhyme of the first syllable, and that bears a marked similarity to the rhyme of the second syllable of *corrugate* (the *co-* is identifiable as a possible prefix). In addition in the case of each of these five words there is present a semantic element of 'unevenness of edge or surface'. This is found elsewhere in *baggy*, *shaggy* and so on. The familiar metal roofing material has given *corrugated* a sense of even waves, but a drive along an unsealed road which the elements have corrugated exemplifies the inherent sense of unevenness. The roofing material is corrugated as opposed to flat. Presumably *wavy* is the correct answer to (6). *Ragged* shares a more fundamental semantic commonality. In (7) the phonestheme is present in the given word *craggy*, in the foil *haggard*, and also in the correct answer *jagged*. It is interesting to note that these two questions were adjacent in the test

A final example of a phonestheme based given word:

- (8) 4 *squash*
 A *squeal*
 B *tread*
 C *hit*
 D *crush*
 E *hurt*

Here the often discussed phonestheme *-ash* with its sense of forcefulness of action, appears as the variants found in *squash* and *crush*. The vowel quality of the former is perhaps the result of the preceding [w]. The latter is a variant also found *gush* and *flush*, and possibly *rush*.

These language proficiency test examples may be seen as evidence supporting the psychological reality of small root-forming morphemes. The test designers have set out to include distractors which will be considered by the undertaker of the test because of a similarity of some phonological material. In the tests every time a phonestheme appeared in a given word the designers came up with at least one phonologically similar word in which the phonological similarity was in fact another appearance of the same phonestheme. In one case a word consisting of two phonesthemes was a foil for a question word containing variants of the same two phonesthemes; in another two phonesthemically related foils were given for a phonesthemically related question word. In two cases the correct answer also shared the presence of the phonestheme. These test were compiled not by linguists but by

psychologists, who were unlikely to have been aware of the concept of the phonestheme. Foils were required which had phonological similarity to the question words. The semantic strength of phonesthemes led the compilers to come up with foils which are semantically related to the given word in 100% of cases where phonesthemes are present in the given word.

I suggest that this is evidence of firstly the existence of phonesthemes in English, that is small sub-word elements with semantic values; and secondly that although those semantic values are more nebulous than simple referents, they lack nothing in strength of semantic association.

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