THE MORPHOLOGY AND PHONOLOGY OF ENGLISH NOUN-VERB STRESS DOUBLETS

Base-driven lexical stratification, prefixes and nominalisation

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Acknowledgements and Declaration

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I hereby declare that this thesis is my own work, written by me, and has not been submitted in any previous application for a higher degree.

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Abstract

In this thesis I analyse the English 'stress doublets' – bisyllabic words which are nouns with initial primary stress, and verbs with final primary stress – in a model of lexical phonology with base-driven stratification (BDLP; Giegerich 1999). The work has two main aims: to give a detailed exploration of this morphological pattern and compare it with related processes; and to test BDLP to see how well it accounts for the data.
BDLP is a derivational model which uses rules and constraints. I argue that such models should be explored alongside Optimality Theory, since OT itself must admit the use of rules (LaCharité & Paradis 2000, McMahon 2000b), and does have shortcomings as a morpho-phonological model.

I show that the stress doublets are almost all prefixal, and their internal complexity forms a cline from obscurity to compositional transparency. Phonologically, a line can be drawn across this continuum separating forms in which the verb's initial syllable is stressless from those in which it has secondary stress. This line coincides with a division between the obscured or unproductive prefixations and the most transparent ones. Analysis of the semantic relationships between the nouns and verbs (cf. Clark & Clark 1979) shows another division along the same line: productive prefixations have regular noun-verb relationships, while unproductive or obscured prefixations have irregular noun-verb relationships.
So stress doubletting is not one, but two patterns; these are sited on different strata in BDLP. On Stratum 1 Latinate and unproductive prefixal stress-doublets share a common underspecified root with no directional derivation: stress alternation is a matter of foot assignment, nouns being assigned two feet and verbs only one. On Stratum 2, productively prefixed verbs undergo a regular Verb-to-Noun rule. Prefixes are aligned with feet rather than prosodic words (cf. Raffelsiefen 1999). Stress doubletting derives from the different relative prominence between the two feet in nouns and verbs, assigned by the Lexical Category Prominence Rule (Hogg & McCully 1987, McCully 1997).

BDLP has been developed from earlier stratified lexical phonological models, e.g. Kiparsky (1982, 1985); cf. Booij (1994), McMahon (2000a). I show that BDLP retains the bracketing paradox problems suffered by these models, but this is solved with reference to blocking. However, the theory has a more serious problem: its use of lexical category assignment to produce the Derived Environment Condition results in a ban on any structure-changing rules which are sensitive to stress. I outline a solution to this problem using declarative well-formedness conditions; but conclude that the model is still in need of revision.

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Chapter 1: Introduction

1.1 Introduction to the thesis

This is an examination and analysis of various phonological and morphological patterns in English – prefixation, deverbal nominalisation, and some particle formations – within 'base-driven lexical phonology' (BDLP), a rule-based model which proposes the division of the English lexicon into two ordered levels, or strata: the Root level and the Word level (Giegerich 1994, 1999). At the centre of the study are what I term 'stress doublets' – the mainly bisyllabic words which as nouns have primary stress on the first syllable, but as verbs have primary stress on the last; e.g. *rebél*$_{V}$ ~ *rébel*$_{N}$; *prodúce*$_{V}$ ~ *pródùce*$_{N}$; *rèwríte*$_{V}$ ~ *réwrìte*$_{N}$; *òverflów*$_{V}$ ~ *óverflòw*$_{N}$. My aim is twofold: to give a detailed exploration of the morphology, phonology and semantics of these and related noun-verb pairs and prefixations; and to test the BDLP model to see how well it can account for this data.

In the course of the analysis many issues are raised, in particular: morphological complexity and how it should be represented; whether or not the 'prosodic word' is the best way of accounting for the particular characteristics of prefixal phonology; the semantics of lexical nominalisation in English; as well as the technical problems of whether the BDLP model's use of lexical category assignment to effect Blocking, and thus the Strict Cyclicity Condition (see sects. 2.2, 2.3), can be upheld, and whether its avoidance of 'bracketing paradoxes' is actually effective.

The stress-doublets are often mentioned, with a handful of examples, as an instance of verb-to-noun stress-derivation in English (e.g. Spencer 1991: 16). This pattern has attracted some attention over the years (e.g. Jespersen (1909/1949), Gimson (rev. Cruttenden 1994), Fudge (1984), Svensson (1997)), but has never been thoroughly analysed with respect to internal morphological structures, segmental phonology, and the regularity of the semantic relationships between the nouns and verbs. I aim to establish whether or not 'stress derivation' *does* form one unified morphological pattern of verb-to-noun derivation. I investigate how it compares with (and interacts with) other verb-noun relationships in terms of productivity and semantic regularity; and what the phonological and morphological limitations are on the forms which may enter into this pattern.

My data and analyses of it are presented in Appendices I, II and III and Chapters 3 and 4. I group the data according to internal morphological structure, note phonological characteristics, and categorise the semantics (or the syntacto-semantics) of the noun-verb relationships. The stress-doublets are examined alongside a control list of noun-verb pairs which have no stress-alternation, such as *consent*, *respect*, assumed to be verb-to-noun derivations because the nouns share the verbs' pattern of final main stress. The semantic regularity of these two patterns is compared with that of nominalising suffixes for which the verbs might be eligible, especially *-ation*. I consider how the interaction of these potentially competing processes might be accounted for using lexical stratification, and also the notion of morphological blocking.

I will show that stress-derivation occurs in various different types of English words, but that, interestingly they are almost all prefixal or particle formations with monosyllabic bases. Close analysis of this internal morphological structure, based on the correlative recurrence of phonological strings and semantics, shows that in the Latinate and older native prefixed forms there is a cline of morphological complexity, from the words which are so obscured as to be monomorphemic, to those which are nearly fully semantically and phonologically compositional. Such gradience does not find natural reflection in a rule-based model such as BDLP, with discretely morphologically-bracketed representations.

It will become apparent that stress-derivation is not a unified verb-to-noun derivational pattern: among certain morphological groups, especially Latinate prefixed forms, the noun-verb semantic relationships are irregular and unpredictable; while among others – notably the productively-formed prefixations – they are very regular, the nouns transparently action nominalisations of the verbs. This difference in noun-verb semantic regularity correlates with the phonological transparency of the relationship (i.e. whether or not there are segmental differences between noun and verb). And it also correlates with the transparency of the internal morphological structure of the noun or verb; the more obscured the prefixal structure, the less regular the noun-verb semantic link.

By contrast, there is no such variation in the non-stress-alternating noun-verb pairs; this 'zero-derivation' is always semantically regular, producing action nouns. This difference is reflected in the rate of suffixal action nominalisation among the different groups of verbs: Latinate verbs with stress-doublet nouns generally also have nominalisations in *-ation*, while those with zero-derived nouns do not.

I propose an analysis which accounts for these facts. Latinate prefixations of both the stress-doublet and the non-stress-alternating groups are internally morphologically complex on

Stratum 1. Differing degrees of morphological complexity are to be expected on this stratum, since it is the home of unproductive and fossilised morphology. I argue that accurate representation of such gradience is unnecessary in a model such as this. However, I do propose a method of morphological bracketing intermediate between simplicity and complexity: semi-complexity. It only exists on the first stratum; it is respected by some structure-building phonological processes but not others; it does not constitute synchronic morphological derivation. It is an acknowledgement that morphological divisibility, based on correlative phonological and semantic recurrence, is not an on-or-off state.

These Stratum 1 forms, whether simple, complex or semi-complex, are roots and as such can have no lexical category in Giegerich's BDLP model. I argue that the stress doublets are roots which are listed to become both verbs and nouns – i.e. there is no directional derivation; such a relationship is not supported by my semantic analysis. The non-stress alternating forms are listed only to become verbs. Phonologically, separate nominal and verbal foot-building rules account for the stress-doublet pattern without any need for verb-to-noun conversion or stress-shifting. Thus part of the stress-derivation pattern – the part in which noun-verb semantic relations are irregular and unpredictable - is accounted for.

On the second stratum, prefixations in *re-* 'again' and *mis-* 'bad(ly)' are formed. Then, verbs like *rethink* or *misprint* – and the Latinate non-stress-alternating verbs like *consent* – enter a rule of verb-to-noun conversion on this level. This rule is semantically very regular, producing action nouns. Phonologically, I propose that Stratum 2 is the site of a rule of Prefix Footing, which aligns productive prefixes with feet. I argue that this is a better way of accounting for prefixal phonology than using the prosodic word, a construct not well-justified in English lexical phonology. Relative prominence between prefixal and base feet can be determined by the Lexical Category Prominence Rule (LCPR) (Hogg and McCully 1987); this will have the appropriate results for nouns and verbs. Thus the second-stratum stress-alternation pattern is accounted for. The lack of stress-alternation in *consent* etc. is explained by the fact that these verbs only receive one, final, foot on Stratum 1; they are ineligible for the rule of Prefix Footing on Stratum 2 because they are not prefixed on this level. Therefore the LCPR cannot apply to them, and nouns and verbs must share the same stress pattern.

The LCPR and the phenomenon of Blocking combine to produce an explanation of why stress doublets are almost always monosyllabically-based prefixal or particle forms. Such difference in stress prominence between nouns and verbs can only happen where forms have monosyllabic (non-branching) right feet; therefore the bases of prefixation must be monosyllabic. And monosyllabic verbs typically do not take the first-stratum nominalising suffixes which in other prefixal verbs block verb-to-noun conversion on Stratum 2 (cf. *re-examine-ation*).

The stress doublets, and other related forms, are a particularly apt section of the English vocabulary on which to test BDLP because they are predominantly prefixal; and most lexically-stratified models have been unable to deal with prefixation and its interactions with suffixation because they run into the problem of 'bracketing paradoxes' (see sects. 2.2 and 2.3 below). The BDLP model is designed to avoid this problem: my thesis explores the model to see whether it really does offer a solution. I argue that it does not; but that bracketing paradoxes should actually be explained with reference to Blocking, since prefixed verbs always nominalise with the suffixes they choose when not prefixed – i.e., any existing nominalisation of a verb will block the creation of a new one, prefixed or not. This aside, though, I reveal a flaw in BDLP's architecture which has serious implications for the model. While the problem can be bypassed in some interesting ways, ultimately it must mean that this lexical phonological model needs to be redesigned. I explore the implications of this, and sketch out a possible new direction for such a model, in Chapter 8.

1.2 Organisation of the thesis

The thesis is organised as follows. Chapter 2 provides a general theoretical background: section 2.2 gives an outline and history of Lexical Phonology, and mentions some live issues within the theory; and then in section 2.3 the recent BDLP model is introduced. In section 2.4 I give an outline of an entirely different phonological model: Optimality Theory (OT). OT claims to use only constraints rather than rules, and on this basis has revolutionised phonology and become its 'standard theory' (Ritter 2000). But I raise some problems with this model, particularly with its claim not to need rules as a theoretical device; I conclude that mixed models with rules and constraints, like BDLP, must still be pursued. In section 2.5 I introduce Prosodic Phonology, a theory of phonological representation (involving the phonological word) used within OT and in the fullest recent analysis of the phonology of English prefixation, that of Raffelsiefen (1999). In section 2.6 I discuss the particularly interesting features, phonological and otherwise, of prefixes, since prefixations form such a large part of my data. Finally, the subject of section 2.7 is that of morphological representation.

Chapters 3 and 4 are the data chapters of the thesis; the former focuses on data collection, morphology and phonology, the latter on the semantic/ syntactic classification of the noun-verb relationships.

In Chapter 3, section 3.2 I discuss the sources of my data, and the compilation and presentation of the lists which are given in full in the appendices. The subject of 3.3 is the morphological classification of the data; in 3.4 I outline the phonological characteristics of the different morphological groups.

Then, in Chapter 4, I discuss the semantic analysis and classification of the noun-verb relationships. My methods, and the categories used, are outlined in section 4.2. In 4.3 I present a sample of the results for both the stress doublets and the non-stress-alternating words; results in full, with definitions and categorisations, are given in Appendices II and III. The results of the categorisations of the stress doublet nouns are discussed in section 4.4, and those of the non-stress-alternating nouns are given in section 4.5. In 4.6 I discuss alternative, suffixal nominalisations of both the stress doublet verbs and the *consent* verbs; I note whether or not these verbs have suffixal nominalisations, and whether they are semantically more closely or regularly related to the suffixal nominalisations than to the stress-doublet or zero-derived noun. In section 4.7 I discuss the results of these semantic investigations, and draw conclusions.

In Chapter 5 I discuss previous analyses of stress-alternating and prefixal nouns and verbs in generative phonology and in a prosodic-phonological/ OT framework. In section 5.2 I discuss previous approaches to the morphological structure of the Latinate prefixations which form the bulk of my data, and to the question of whether stress doubletting is an example of verb-to-noun derivation. The remaining sections are phonological in focus: in 5.3 previous prosodic phonological approaches to English prefixation, and stress doublets, are explored; then in section 5.4 more traditional generative and metrical phonological approaches are assessed. In 5.5 the standard lexical phonological account of stress doubletting – that of Kiparsky (1982) is discussed. I give a summary of the main issues to be addressed in my new account in section 5.6.

In Chapters 6 and 7 my analysis of the various stress doublet nouns and verbs, non-stress alternating forms, and other prefixations and suffixations, is presented. In Chapter 6 I focus on the second-stratum part of the analysis, in Chapter 7 the first-stratum part.

In section 6.2 the second-stratum morphological processes undergone by stress doublets – prefixation and verb-to-noun conversion – are described. In 6.3 I discuss the phonology, in particular the new proposal of Prefix Footing, aligning productive prefixes with feet rather than with the prosodic word. In 6.4 I show how this analysis will also cover independently prefixed nouns, and non-stress-alternating noun-verb pairs. However, after a summary in section 6.5, I go on to discuss some problems with and extensions to the analysis in 6.6. Here I give an explanation – morphological and phonological - of why the stress-doublets are usually prefixations with monosyllabic bases. I introduce blocking as the obvious solution to bracketing paradoxes; and propose some foot-prominence principles which may be necessary in addition to the LCPR. I note that all the phonological processes suggested in the derivation could actually be seen as well-formedness conditions (or constraints) rather then necessarily as derivational phonological rules.

In Chapter 7, the more complicated first-stratum derivation is presented. In section 7.2 I give a morphological analysis of these forms, introducing the idea of morphological semi-complexity (which exists alongside full complexity on Stratum 1), and proposing equal derivation from a common root for the stress doublets, rather than a directional verb-to-noun derivation. In section 7.3 I give a phonological derivation of these forms, suggesting that Latinate prefixes should be represented with underspecified underlying vowels, since they may surface with full lax vowels, or full tense vowels, or (most often) schwa; and schwa is represented in BDLP as an underspecified vowel. The vowel melody to be inserted in these prefixes will depend on stress; and, I argue, on the presence or absence of a prefixal bracket.

On Latinate verbs, one final stress is assigned; in the nouns, a final and an initial foot are built. Thus all the Latinate prefixations, whether stress doublet nouns and verbs, or just verbs, are accounted for.

In section 7.4 I outline an analysis of stress-alternating particle compounds, showing that these are best dealt with on Stratum 1. Then, after a general summary of the first-stratum analysis in section 7.5, I go on in 7.6 to explore a serious problem in the BDLP model. It is constructed in such a way that it bans the application of any structure-changing rules sensitive to stress – and many such rules have been well-established in generative phonology. I show how this problem can be bypassed with the use of underspecification and statements of well-formedness in syllabification, sensitive to morphological and phonological factors; but leave discussion of its implications to Chapter 8.

Finally, in Chapter 8 I summarise the results of my investigations, and discuss some of the implications for the BDLP model, in particular the implications raised by the final problem of section 7.6. The first two sections of the chapter summarise the thesis. Then, in 8.3, I look briefly at the diachronic dimension of stress doubletting, noting that it is a feature of Old English, but that its development since that period deserves further research. Finally, in 8.4 I examine the implications for BDLP of the model's problem, and the potential solution, discussed in 7.6. I propose a possible new direction for the model, involving declarative well-formedness conditions and repair statements, but maintaining the two morphological levels; but conclude that more research would be needed to test its viability.

Chapter 2: Theoretical Background and Issues

2.1 Introduction to chapter

This chapter offers some general theoretical background to the whole thesis. My work is cast within the base-driven lexical phonological model (BDLP) of Giegerich (1994, 1999). I therefore give a general outline and history of Lexical Phonology and the idea of lexical stratification in section 2.2, and an introduction to the main features of BDLP in 2.3.

BDLP is a rule-driven model which uses lexical stratification, and as such is not so fashionable in current phonological theory: the preferred model of the moment is of course Optimality Theory. I give a description of this model, and my reasons for not employing it here, in 2.4. Then, in 2.5 I turn to another influential phonological theory, that of Prosodic Phonology. PP has had particular success in accounting for prefixal phonology (almost all the stress-doublet data is prefixal); and the fullest recent analysis of English prefixation, that of Raffelsiefen (1999) (reviewed in sect. 5.3) uses it, especially its concept of the prosodic word.

In 2.6, I move away from phonological theory and describe various interesting features of prefixes in English (and other languages), since they feature so heavily in my data, and since they have often been ignored in lexically stratified models.

Finally, in 2.7 I give some idea of the general approach to morphology, and morphological representations, in this work, with some examples from my data.

2.2 Lexical Phonology and Modern English: history and criticisms

The theory of Lexical Phonology (LP) makes two essential claims: that some phonological rules operate together with the morphology in the lexicon; and that a separate block of phonological rules, with different characteristics, applies postlexically and postsyntactically (cf. Booij 1994: 3-4; McMahon 2000a: 5). However, a further claim very often associated with LP is that of 'level ordering' – i.e. that the lexicon is split into two or more ordered levels, or strata. Each stratum is the site of particular morphological rules; the phonological rules may apply on more than one level. Much of the discussion below relates to the level-ordering hypothesis and its history, since it has attracted much attention within LP, and has also often been used by critics as a stick with which to beat the whole theory. Level-ordering is also a central feature of base-driven lexical phonology (BDLP), the subject of section 2.3. Before moving on to this, though, I give an outline of the history of the development of LP.

As part of the generative approach to linguistics, Lexical Phonology has its roots in the founding work in English generative phonology, *The Sound Pattern of English* (SPE) (Chomsky and Halle 1968). In common with this work, LP has 'at its core...a set of underlying representations of morphemes, which are converted to their surface forms by passing through a series of phonological rules' (McMahon 2000a: 5). It is well known that the SPE framework did not allow for a separate morphological component in the generation of utterances – words were built in the syntax in the same way as sentences, their structure visible to the phonology through use of the boundary symbols =, +, # and ##. But by the early 1970's, following Chomsky's (1970) 'Remarks on Nominalization', generative linguists were recognising the need for an independent morphology. The seeds of LP were sown by Siegel (1974), who argued that morphological rules are interleaved with phonological rules in the lexicon.

Building on the SPE observations that derivational affixes introduced with the '+' boundary tend to affect the stress pattern of their bases, while affixes with the '#' boundary are stress-neutral, Siegel pointed out that + affixes can attach to words or (bound) stems, while # affixes only attach to words (1974: 151). Furthermore, + affixation always seems to precede # affixation, i.e. + affixes are closer to the base, and cannot be attached outside # affixes (Siegel 1974: 163). Thus, for example, *+ity* cannot follow *#ful*: **harmfullity*; while it may follow other + affixes, e.g. *nation+al+ity*, and *#ful* can be followed by other # suffixes, as in *harm#ful#ness*. This observation about the stacking behaviour of affixes later became known as the Affix Ordering Generalisation (AOG), following Selkirk (1982: 91).

Siegel also argued that while # affixes never affect the stress of their base, they may be sensitive to existing stress patterns: thus noun-forming *-al* (as in *refusal*) only attaches to end-stressed verbs; *-ful* requires final stress on its base noun (1974:164-74). All these observations led her to the following ordering of morphological and phonological operations:

(1)

+ derivational affixation ('Class I')
Cyclic stress rules
derivational affixation ('Class II')
Word level phonology

By the early 1980's, this interleaving and ordering of morphological and phonological rules had developed into the 'level ordering' for which LP is (in)famous. The lexicon, the site of all morphological and many phonological processes, is split into a number of different levels, or strata. Each level is the home of particular affixation processes, and the site of particular phonological rules; stratification is largely determined by affixal – or more accurately, suffixal - behaviour, i.e. which phonological rules an affix may trigger, and how it is ordered relative to other affixes. Thus, for example, Kiparsky's (1982) model:

(2)

Stratum 1	Class I derivation e.g. *–ity*, *-th*; irregular inflection. Rules: Trisyllabic Shortening, Stress
Stratum 2	Class II derivation, e.g. *–ness*, *-er*; compounding. Compound stress
Stratum 3	Regular inflection. Laxing

After this lexical derivation, words enter the syntax; following this are the rules of the postlexical phonology, which may be quite different from the lexical phonological rules.
Note that not only derivational morphology (as in Siegel's model), but also inflection and compounding have now migrated from the syntax to the lexicon. Plus, for the stratification of this expanded lexicon, the emphasis is now firmly on affixal behaviour – Siegel's observation about the availability of bound bases for Class I affixation but not Class II affixation was not developed any further in mainstream LP. Selkirk's (1982) model incorporated this observation, but apart from this, the current model of Base-Driven Lexical Phonology has been the only one to explore its implications (Giegerich 1999: 73; and see sect. 2.3 below). It is also the only model to capture the differences in productivity between Class I and Class II affixes (the former tend to be unproductive, the latter productive) in a principled way, by a difference in affixation format.
Alternative lexical organisation was proposed by Halle and Mohanan (1985) and Mohanan (1986):

(3)

Stratum 1	Class I derivation, irregular inflection; stress, Trisyllabic Shortening
Stratum 2	Class II derivation, Velar Softening, Vowel Shift
Stratum 3	Compounding
Stratum 4	Regular inflection
Postlexical Phonology	

The final block of rules here deserves a particular mention. The distinction between lexical and postlexical phonology, always present in LP, is particularly emphasised by Mohanan (1986: 5, 8). Postlexical phonological rules apply after the morphology and syntax. They should not be able to see word-internal morphological boundaries (and indeed may apply across them) because these are invisible once words exit the lexicon, owing to the Bracket Erasure convention. (Bracket Erasure, which originates in the removal of brackets after each cycle in SPE, applies at the end of each stratum, ensuring a form's derivational history is invisible to the phonology and morphology of subsequent strata (Mohanan 1986: 22-3; Halle & Mohanan 1985: 61; Kiparsky 1982: 11; Goldsmith 1990: 239)). Howevever, postlexical rules do not seem to be well understood at present: McMahon (2000a: 53-5) reports on research by Carr (1991) which suggests that morphological structure, or at least a notion of 'derived environment' *should* be available postlexically. And while it has generally been assumed that postlexical rules may introduce segments or combinations of segments which are not present in the underlying forms of the language, i.e. they are not structure-preserving as lexical phonological rules are, Carr's paper also suggests that this might not be the case. (Structure preservation is not discussed here, but has received much attention as a constraint within LP; e.g. in Kiparsky 1985; Borowsky 1989, 1990; Goldsmith 1990: 223ff.; Kaisse and Hargus 1994; McMahon 2000a: 78-80)

To return to the lexicon, though, we can see from the models outlined above that the number of lexical strata proposed for English increased over time, from Siegel's two, to Kiparsky's three, to Halle and Mohanan's four, with no apparent constraints on any further increases. This is a result of LP's reliance on stratification rather than morphological representation to express whether or not a given morphological process may trigger a particular phonological rule. In SPE, the phonological effects of different morphemes were encoded by the boundary symbols =, +, # etc.: phonological rules (or the conventions of their application) were formulated to refer to particular boundaries. These boundary symbols were retained during LP's beginnings, by Siegel (1974) (with the exception of the Latinate prefixal = symbol) and by Allen (1978). But by the 1980's they had been replaced by level-ordering: if a morphological rule did not trigger a particular phonological rule, then the two rules were assigned to different strata, with the morphological rule crucially being on a later stratum than the phonological one. The ability of phonological processes to refer to representations of morphological structure was limited (e.g. Mohanan 1986: 20-21); the only potential representational (as opposed to purely stratal) distinction in morphology was in bracketing, by which prefixation, suffixation and compounding could be distinguished – i.e. [prefix [base]] vs. [[base] suffix] vs. [[word][word]] respectively.

This bracketing was introduced by Kiparsky (1982), in his three-levelled model of the lexicon. But Halle and Mohanan (1985) and Mohanan (1986) rejected it, instead insisting that all formatives should be represented in the same way, enclosed in '[ ]', i.e. [[prefix][base]], [[base][suffix]], [[word][word]]. Their policy was that differences in the phonological effects of morphological processes must be captured using stratification, not bracketing.

Halle and Mohanan implemented this policy when they found apparent differences in the phonological effects of Class II derivation vs. compounding, with respect to the rule of Stem-final Tensing[1]. Unable to distinguish between the two processes with bracketing representations, they had to do it stratally – hence their four-levelled lexicon as compared with Kiparsky's three-levelled one.

Today Kiparsky's bracketing has become conventional in LP, although I suggest below that for both semantic and phonological reasons it may be appropriate to refine it. Indeed, the whole issue of morphological representations, and the more general treatment of morphology

[1] Underlying final [ɪ] is tensed in *happy* and in the compound *happy hour*, but not in Class II derivations like *happiness*, *happily*; hence the phonological rule of Stem-final Tensing must be on the same stratum as compounding, and both must be on a later stratum than Class II derivation. Halle and Mohanan's evidence for this rule has been – quite reasonably – treated with some suspicion by other researchers (e.g. Kaisse and Shaw 1985, Gussmann 1988).

within LP (which has been criticised[2]) is a very interesting one, and I will discuss it further in section 2.7 below. See also McMahon (2000a: 62ff.) for useful discussion on the bracketing distinction vs. stratal distinction issue.

The fact that Halle and Mohanan (1985) and Mohanan (1986) could introduce a whole new lexical stratum for the sake of one (very doubtful) phonological rule raised some serious problems for the theory of level-ordering. There was no principled limit on the number of strata: theoretically it would be possible to have a separate stratum for each morphological rule (as pointed out in McMahon 2000a: 47; cf. also Goldsmith 1990: 240) – even though this might only be justifiable phonologically, not morphologically.

Furthermore, by differentiating morphological operations using strata rather than distinct bracketings to get the correct phonological output, Halle and Mohanan found they needed a device fatal to any theory of level-ordering: the loop. Phonologically, with regard to their rule of Stem-final Tensing, Class II derivation and compounding behave differently, and therefore are assigned to different strata. But morphologically, as Kiparsky pointed out with examples like *re-air-condition* and *rule-governedness* (1982: 18-21; cf. Selkirk (1982: 92)), compounding and Class II derivation feed each other. Kiparsky sited them on the same stratum, being able to distinguish between them with brackets. But Halle and Mohanan could not do this: instead they were forced to let level 3 compounds loop back up to level 2 in order to undergo affixation. The very notion of looping has to be untenable within a level-ordered lexicon; the loop was described by Gussmann as 'a noose for Lexical Phonology' (1988: 237). (This scathing review of Mohanan 1986 is discussed in detail in Giegerich 1999: Ch.1; on the deadliness of the loop cf. McMahon 2000a: 51). Subsequent research has rejected the device, rendering it unnecessary by controlling the number of lexical strata. Where stratification is used, just two levels are generally accepted for English, e.g. by Booij and Rubach (1987) (a model which they claim is universal) and by McMahon (2000a); the base-driven model of the English lexicon under consideration in this thesis also has two strata (Giegerich 1994, 1999). Other researchers have rejected the idea of ordered strata: Booij (1994), for example, notes that affix selection may alternatively be explained by the

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[2] Gussmann, in his 1988 review of Mohanan (1986), was highly critical of its 'impoverished' approach to morphology, but elsewhere within the theory, not least within the current model, many of his criticisms are unjustified.

native/ Latinate distinction (1994: 17), and the differences in phonological effect may be captured with the use of prosodic constituents (1994: 18ff.; see also sect. 2.5 below).

The loop was not the only substantial threat to the theory of level-ordering within LP; additionally, the validity of the Affix Ordering Generalisation had been seriously undermined by the late 1980's (cf. on this subject Giegerich 1999: Ch.2; Goldsmith 1990: 265; Aronoff and Sridhar 1983). Counterexamples, systematic rather than random, were cited, in which level 2 affixes appeared to attach outside level 1 ones, giving rise to bracketing paradoxes, where the apparent ordering of the morphological processes is at odds with the operation of the phonological rules. The most notable cases are of two kinds. Firstly, there are prefix-suffix incompatibilities, exemplified most famously by *ungrammaticality*, where the level 2 prefix *un-* attaches to the adjective *grammatical* and then the level 1 suffix *–ity* attaches to form a noun; this kind of AOG-violation is found regularly in English word-formation, and led Strauss (1982b) to suggest that left- and right-adjunction should be treated independently of each other in ordering generalisations.
The second kind of AOG-violation is suffix-suffix misordering, e.g. *commercialisation*, where the level 1 stress-shifting suffix *–ation* attaches after the apparently level 2, stress-neutral *–ise*; again, such affix-ordering is common in English morphology and cannot really be treated as random or exceptional. Morphological operations which violated the AOG were known from the early days of level-ordered LP – for example, Kiparsky discussed *ungrammaticality* and suggested exceptional suspension of Bracket Erasure to deal with it (1982: 28-29 & f.n. 13). But they were treated as exceptions rather than addressed as serious problems within the theory, an approach which denied their systematic nature. As we shall see in sect. 2.3 below, the problems with the AOG are tackled within BDLP, where a solution is found through a different basis for lexical stratification.

One possible solution to violations of the AOG is to allow the affixes in question to attach on more than one stratum. This approach has also been employed for phonological reasons, e.g. where an affix might affect the stress of the base in some cases, but be stress-neutral elsewhere. In a critical discussion, Szpyra (1989: 46ff.) lists examples of dual-class affixes, including *–able*, which may sometimes behave phonologically as though it is a Class I affix, e.g. with stress shift in *lamént* ~ *lámentable*, or segmental changes in *div*[aɪd] ~ *div*[ɪz]*ible*; but more often leaves its base unchanged, e.g. *prolong* ~ *prolongable*. Morphologically, *-able* may behave as though it is Class I, regularly nominalising with stress-shifting *–ity*, e.g.

likeability (Szpyra 1989: 57ff., based on discussion in Aronoff 1976). Szpyra's point is that the phonological and morphological diagnostics for stratal siting do not always match up, and this seriously weakens the level-ordering theory. How can we base lexical stratification on affixal behaviour when this behaviour is so contradictory?
Allowing affixes to attach on more than one stratum has been claimed as a virtue – an affix could be in the process of moving from one level to another, and thus the model can reflect ongoing language change (Katamba 1993). But as Giegerich argues (1999: Ch.2), it is normal, not exceptional, for affixes to attach on more than one stratum: this is a feature of a stable linguistic system as much as of a changing one. Consequently, if the lexicon is to be stratified, this stratification cannot be based on affixal behaviour because it is almost always equivocal: we must look elsewhere for our criteria. As we will see in the following section, the attributes of the bases of derivation may be a better starting-point.

Further criticisms of the AOG and more generally of level-ordered LP were made on the grounds that lexical stratification does not actually make many predictions about affix ordering and selection in word-formation (e.g. Fabb 1988, Gussmann 1988, Szpyra 1989: 39-40). The question of how affixes are ordered within a given stratum, for example, is largely unanswered (and often even unasked) within level-ordered LP. Fabb (1988) argues that many more generalisations about affix-selection can be made than a simple division of derivational morphology into two blocks could allow; and moreover, that bases, or suffixes already attached to bases, seem to choose their affixes. (This is seen with the AOG-violating examples *commercialisation* and *likeability* above, where the suffixes *–ise* and *–able* have selected their following nominalising suffixes). This observation could not be accounted for in LP models where attachment behaviour was treated as a property of affixes rather than of bases, e.g. models which use affixal subcategorisation frames like those of Lieber (1981). Again, this criticism is addressed in the current base-driven model of LP, see section 2.3 below.

Leaving the organisation of the lexicon aside, another main concern within LP has been to limit some of the excesses of the SPE model; i.e. to reduce the abstractness of underlying representations, and to control the application of phonological rules. Here I will briefly look at the question of cyclic rule application and how it can be constrained, since this in particular has been highly influential in the development of base-driven LP.

It has been established that some of the derivational phonological rules of English appear to operate cyclically[3]; first they apply to the innermost morphological constituent of a word, then they cycle again (and again) until they have scanned the entire word including all affixes. A well-known example of such rule application is stress assignment in English: in SPE it was argued that the reason for the stress difference between *còndènsátion* and *còmpensátion* was that the bases of the *–ation* suffix, *condénse* and *cómpensàte*, received different stress patterns on their first pass through the stress rules. On the second cycle, with the suffix *–ation* included in the scan, the original stress pattern was respected. The rule of Trisyllabic Shortening (TSS), which shortens long vowels in antepenultimate syllables, has also been argued to be cyclic, e.g. its application in *n/a/tional* (< *n/e/tion*) is respected in *nationality*. (see especially Kiparsky 1982: 35ff.).[4]

Stress assignment and TSS are examples of two different kinds of cyclic rules: the former is structure-building, adding to the underlying representation without changing anything already present; while the latter is structure-changing, i.e. it does alter existing phonological structure – in this case by changing the value of the vowel length or tenseness feature. Clearly all morphemes must undergo structure-building rules such as stress assignment if they are to leave the lexicon as utterable words. However, it has long been accepted within LP that structure-changing rules should not be allowed to apply to all instances of a morpheme, but should instead be restricted to derived forms. Otherwise, the theory would face the same criticisms of excessive abstractness which were levelled at SPE, where for the sake of representational economy underlying forms were allowed to bear very little resemblance to their surface realisations; numerous phonological rules could apply unconstrainedly to produce the correct output. The differences between underlyers and surface forms were in principle limitless; the underlyers could therefore be inaccessible to the language learner, removing any claim SPE-style generative phonology might make to psychological plausibility.

But what form should constraints on cyclic rule application take? McMahon (2000a: 45), discussing Kiparsky (1982) and his references to Kean (1974) and Mascaró (1976), gives the

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[3] Currently in LP it is generally accepted that English has a cyclic stratum 1, and a non-cyclic stratum 2, see e.g. Booij and Rubach (1987), Giegerich (1994, 1999), McMahon (2000a).

[4] However, Szpyra (1989: 71ff.) is critical of Kiparsky's approach, arguing that TSS need not be seen as cyclic – it just regularly shortens the last vowel in a base morpheme. I return to this rule in Chapter 8.

well-known Strict Cycle Condition (SCC). This basically states that structure-changing cyclic rules apply in derived environments only, with 'derived' meaning that the environment for the rule in question must have been created by either a morphological or a phonological rule earlier on the same cycle. But although the SCC may produce the desired effect, it is a stipulation on the grammar, not an inherent part of it. Kiparsky (1982, 1985) and Giegerich (1988, 1994, 1999) have addressed the problem of how to remove this stipulativeness and incorporate the SCC's effects in the basic operation of the lexical phonological model; we will return to these developments, which have been central to the theory of BDLP, below.

To summarise, then: Lexical Phonology has been in development, and consistently controversial, for over a quarter of a century. Within the theory, some very strong claims about the organisation and phonological content of the lexicon have been made; and detailed attention has been given to the nature of phonological rules and how to constrain them. Although lexical stratification is not a necessary part of LP, it has often been used by researchers within the theory and is a vital part of base-driven LP. Level-ordering has been used as a way of simplifying morphological representations: if two morphological rules have different phonological consequences, then they can be sited on different lexical strata, and the relevant phonological rule(s) may only operate on one of these strata. Thus the various boundary symbols of SPE are rendered unnecessary. But this policy of replacing representational distinctions with stratal ones was taken too far by e.g. Halle and Mohanan (1985), who had to introduce the massively damaging device of the loop, which allowed the output of level 3 to return to level 2 for morphological purposes. This loop quite rightly attracted a great deal of criticism – as did the concomitant implication of unlimited numbers of lexical strata. Although neither of these problems is inherent in LP (and more recent models avoid both of them), they did seriously harm its credibility.

Almost all the proposed models of lexical stratification have been affix-driven, i.e. based on the stacking behaviour and phonological effects of derivational affixes, usually suffixes. But affix-driven stratification even from early days has been dogged by problems: there are numerous exceptions to the Affix-Ordering Generalisation, both morphological and phonological; and allowing affixes to attach on more than one stratum is no solution, because the majority of affixes would need to do this – making a level-ordered lexicon based on affixal behaviour untenable. Furthermore, even if it were tenable, it would still fail to capture many interesting facts about affix-selection (as argued by both Fabb 1988 and Gussmann 1988), such as choices between competing affixes, and the ordering of affixes within strata.

One LP model which retains stratification while addressing the above criticisms is Base-Driven Lexical Phonology (BDLP), as developed by Giegerich (1988, 1994, 1999). Here, stratification is determined by the bases to affixation and not by the affixes; and, unlike other models, stratum 1 morphological rules have a different format from those on stratum 2 – which reflects productivity differences between the two strata, and also addresses the issue of how affixes are selected. Not only does BDLP make advances here, though: a major impetus in its development has been the question of constraints on rule-operation in generative phonology. The development and operation of this model of the lexicon is the subject of the next section.

2.3 Base-Driven Lexical Phonology

One of the main aims of this thesis is to explore and test the model of Base-Driven Lexical Phonology (BDLP) which has been developed by Giegerich (1988, 1994, 1999) in response to some of the criticisms of the more mainstream stratified lexicalist models discussed in 2.2 above. As pointed out in Ch.1, the stress-doublet noun-verb pairs are particularly apt sections of the English vocabulary on which to test such a model, given that they represent various types of prefixation, and prefixes have proved troublesome for stratified LP models.
Here I give an outline of the main features of the theory, following closely the works of Giegerich referred to above.

There are two particular ways in which BDLP improves on previous models of lexical stratification: in constraining the operation of cyclic rules and making this constraint part of the operation of the model rather than an independent stipulation; and in sweeping away the dependence on the problematic AOG and deriving lexical level-ordering from the characteristics of bases rather than of affixes.
I touched upon the question of constraining cyclic rules in 2.2, noting the general acceptance of the Strict Cycle Condition, reformulated here:

(4) The Strict Cycle Condition (SCC)

Structure-changing cyclic rules apply in derived environments only, where a derived environment is one which has been created by either a morphological or a phonological rule earlier on the same cycle.

Although the effects of the SCC are desirable, its stipulative nature, and the arbitrariness of the link between cyclicity, structure-changingness and morphologically or phonologically derived environments, are not. Kiparsky (1982) considers these problems, discussing how to stop Trisyllabic Shortening from wrongly applying in words like *nightingale*, and from giving morphologically simple forms like *camera* or *enemy* a free ride from unnecessarily abstract underlyers with long vowels. He suggests that the SCC can actually be derived from the (morphologically-motivated) blocking effect (Kiparsky 1982: 46).

The phenomenon of blocking has long been recognised (Kiparsky 1982: 6, Koenig 1999: 117ff., Giegerich 1999, 2001, and references therein). A morphological rule will be blocked if its output would have the same meaning or the same phonological form as either a pre-existing simple word, or as the output of a more specific (i.e. more limited in its input) morphological rule. Thus, for example, the existence of the ablaut past tense form *wrote* blocks the application of the regular *–ed* past tense rule to *write*, so there is no **writed*. Or, the fact that the adjective *wide* takes nominalising *–th*, producing *width*, means the application of the more general adjective-to-noun suffix *–ness*, which would create **wideness*, is blocked. If this latter form is created, it must have different semantics, e.g. it will not refer specifically to a measurable quantity.

The blocking effect could be argued to fall out from the organisation of a stratified lexicon, where Stratum 1, the home of the more irregular (phonologically and semantically) and more restricted morphological processes, precedes Stratum 2, whose morphological processes are regular and more general. However, stratification may only partially capture the effect, since it cannot say anything about interaction between affixes on the same stratum. Kiparsky formalises blocking as the Elsewhere Condition:

(5) The Elsewhere Condition (EC)

Rules A, B in the same component apply disjunctively to a form Φ iff:

(i) The structural description of A (the specific rule) properly includes the structural description of B (the general rule), and

(ii) The result of applying A to Φ is distinct from the result of applying B to Φ.

In that case, A is applied first, and if it takes effect, then B is not applied

(Kiparsky 1982: 6; cf. Giegerich 1994: 31). The SCC follows from (5) if we accept Kiparsky's assumption that every lexical item, simple or complex, constitutes an 'identity rule' (i.e., effectively, lexical items are listed and this listing is a rule). These identity rules act as 'rule A': each rule's input is only one form, making it maximally specific; and this form is unchanged, so the output will always be distinct from that of any structure-changing rule B. Hence, Kiparsky prevents *nightingale* from undergoing TSS: the identity rule's only input is *n*[aɪ]*ghtingale* – which, as a form with a long, stressed vowel (or diphthong) in the antepenultimate syllable, is a subset of the candidates for TSS. And TSS's output, which would be *n*[ɪ]*ghtingale*, is distinct from the output of the identity rule, *n*[aɪ]*ghtingale*. Ingenious though this solution may be, it has met with criticism, in particular on the grounds that the identity rules are not independently required in the grammar, and that there is no link with cyclicity or with first-stratum application any more: why should the same conditions not apply on the (non-cyclic) word level? (McMahon 2000a: 82, Giegerich 1988: 128-9, both referring to Mohanan and Mohanan 1984; Giegerich 1994: 32). Plus, while morphological rules (e.g. affixations) may trigger phonological rules, is it appropriate for such a morphological operation to block the application of a phonological one?

So, is it possible for something akin to the identity rules to be independently motivated, and to have an association with just the first stratum (or nonfinal strata)? The answer, Giegerich (1988, 1994, 1999) argues, is yes – if we turn the accepted notion of stratification on its head, and organise the lexicon according to the characteristics of the bases of affixation, rather than to the affixes themselves. As Selkirk (1982: 59, 77, 94ff) claims, the inputs to morphological operations in English are either roots or words, and we can divide the lexicon into strata on this basis. So, Stratum 1 is the site of root-affixation and Stratum 2 the site of word-affixation, with the affixes themselves able to attach on both strata. This means, as Giegerich points out (1994: 32, 1999: 73), that, unconventionally, the category 'root' must be recursive, since the output of one Stratum 1 morphological rule can be the input to another. Kiparsky's identity rules are replaced by the Root-to-Word Rule, which allows Stratum 1 roots to proceed to Stratum 2 by converting them to words; it can be formulated (for now) as:

(6) Root-to-Word rule (first version)

$$[\ ]_R \rightarrow [[\ ]_R]_W$$

With the operation of the Elsewhere Condition, the SCC is achieved.

There is good justification for differentiating roots from words and placing them on different strata. The affixes most usually described as 'Stratum 1 affixes' do regularly attach to bound roots: thus, for example *sardon+ic*, *acerb+ic*, *amen+ity*, *etern+ity*, *nocturn+al*, *fratern+al*; also the 'dual class' affixes, e.g. *ris+ible*, *amen+able*, *orna+ment*, *detri+ment*. Such behaviour is very rare with the productive second-stratum affixes such as *–ness* or *–less*, whose bases are overwhelmingly free words: forms like *gormless*, *feckless*, *ruthless*, *hapless* really are the exceptions which prove the rule. Now affixes are free to attach on either stratum; but *–less*, for example, will attach far more often on Stratum 2, because it is usually word-based. So the Affix Ordering Generalisation is not totally lost.

Furthermore, Giegerich (1994, 1999) argues that roots do not carry lexical category – so the Root-to-Word rule assumes greater importance as the rule which gives forms status as nouns and verbs and so on. Thus it is reformulated as:

(7) Root-to-Word rule (final version)

$$[\ ]_R \rightarrow [[\ ]_R]_L \qquad \text{where } L = N, V \text{ or Adj.}$$

This lack of lexical category can be justified by looking at some of the bound roots exemplified above: our arguments for assigning them lexical category may at best be circular, and at worst self-contradictory. We might say that *ornament*, for instance, consists of a verb root *orna*, and a nominalising suffix *–ment*, on the pattern of *chastise*$_V$ *ment* or *arrange*$_V$ *ment*. But there is no independent corroboration of *orna*'s status as a verb: the argument is circular. In the case of *eternity*, we might say that since *–ity* usually nominalises adjectives, *etern* must be an adjectival root. But what then of *eternal*? Since *–al*, when it attaches to free forms such as *autumn*, converts nouns into adjectives, we would have to say that *etern* there is a noun root. It seems simpler not to assign lexical category to roots at all.

But the lexical category specification is one of the main features used in writing rules for morphological operations. Suffixes, including first-stratum ones, are always described as attaching to forms of one lexical category, and producing forms of another[5] (see e.g. the organisation of Marchand (1969), Bauer (1983)). Losing the ability to express this, in the recursive root, has to be a major objection to organising the lexicon in this way. It seems counterintuitive: although the arguments for bound, simple roots such as *orna* or *etern* lacking lexical category are strong, there are no reasons for saying *ornament*, *national*, or other complex forms which are inputs to first-stratum affixation, are also uncategorised.

However, there is another feature of BDLP's morphology which obviates the functional need for lexical categories on Stratum 1. This is the fact that first-stratum morphological rules (if we can truly call them that) have a different format from word-level rules: all processes are listed. That is, simple roots are listed with the affixations they may undergo; and affixes have their own entries, listed for the affixes which may follow them. Both roots and affixes are also listed (where appropriate) with whichever part of the Root-to-Word (RW) rule they enter.

Examples of these lexical entries (from Giegerich 1994: 40):

(8)

$$\begin{tikzcd} & \text{-al} \\ \text{nation} \arrow[ur] \arrow[dr] & \\ & \text{RW (N)} \end{tikzcd} \qquad \begin{tikzcd} & \text{-ity} \\ \text{-al} \arrow[ur] \arrow[r] \arrow[dr] & \text{-ise} \\ & \text{RW (Adj)} \end{tikzcd}$$

$$\begin{tikzcd} & \text{-ity} & & \text{-ation} \\ \text{matern} \arrow[ur] \arrow[dr] & & \text{-ise} \arrow[ur] \arrow[dr] & \\ & \text{-al} \arrow[ur] \arrow[dr] & & \text{RW (V)} \\ & & \text{RW (Adj)} & \end{tikzcd}$$

[5] Though this is not true at all of prefixes, which very rarely determine lexical category, and may indeed choose their bases according to semantic rather than syntactic criteria.

Thus, instead of an unordered list of affixes and roots, attached by subcategorisation frames, we have chains, or even a web, of morphological relations (which seems to have something in common with connectionist-derived approaches such as that of Bybee (1985, 1988, 1995)). On Stratum 2, the word level, morphological rules take a more conventional format (the model is compatible with both Lieber's (1981) subcategorisation frames, and Aronoff's (1976) word-formation rules), being able to refer to lexical category and having a generalisable semantic effect – something not so typical of Stratum 1 affixation. This difference in rule format neatly captures the widely-noticed productivity differences between the two strata.

Here is an example of how the model represents different derivations from one root on Stratum 1:

(9) Root derivations

$$
\begin{array}{l}
\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad \nearrow \; [[[[\text{nation}]_R\ \text{al}]_R\ \text{is}]_R\ \text{ation}]_R \\
\qquad\qquad\qquad \nearrow [[[\text{nation}]_R\ \text{al}]_R\ \text{ise}]_R \longrightarrow [[[\text{nation}]_R\ \text{al}]_R\ \text{ise}]_V \rightarrow \textit{Stratum 2} \\
\qquad [[\text{nation}]_R\ \text{al}]_R \\
\nearrow \qquad\qquad\qquad \searrow [[[\text{nation}]_R\ \text{al}]_R]_{Adj} \rightarrow \textit{Stratum 2} \\
[\text{nation}]_R \\
\qquad \searrow \\
\qquad [[\text{nation}]_R]_N \rightarrow \textit{Stratum 2}
\end{array}
$$

(again cf. Giegerich 1994: 33).

On the assumption that morphology always precedes phonology (which is admittedly a stipulation, but so would the reverse be; see Giegerich (1999: 4.2.1); cf. Mohanan (1986: 49), Booij (1994: 7)), the Root-to-Word rule will always precede any potential structure-changing phonological rules which might apply to a simple root such as $[\text{nation}]_R$. And so, because of RW's status as the specific rule in the Elsewhere Condition (like Kiparsky's identity rules), it will always block them. Hence the SCC is achieved, but through the structure of the model rather than stipulatively.

So now, with the lexicon stratified according to the characteristics of bases rather than affixes, the problems with the AOG which have dogged other stratified lexical models are no longer. Affixal dual class membership can have no weakening effect on BDLP's stratification. Recall the examples in sect. 2.2 above, where the suffixes *–ise* and *–able* were noted as being good phonological candidates for word-level attachment (as in *commercial*$_{Adj}$ *ise*$_{V}$, *like*$_{V}$ *able*$_{Adj}$), yet morphologically they could be followed by the Stratum 1 stress-shifting suffixes *–ation* (*commercialisation*) and *–ity* (*likeability*) respectively. In the present model, it is perfectly acceptable for any affix to attach freely on either stratum. Similarly with examples where Stratum 2 prefixation appears to have preceded Stratum 1 suffixation, as in *ungrammaticality*: *un-* can attach to the root *grammatical* on level 1, and then *ungrammatical* can be listed for *–ity* suffixation before undergoing the RW rule.

Such is the basic operation of base-driven Lexical Phonology. However, there are a few questions we might ask about the details of how the morphology and phonology work.

Above, I raised the issue of the lack of lexical categorisation on all roots, simple or complex: it could be argued that depriving even complex roots of lexical category is just an ad hoc way of giving the Root-to-Word rule greater justification than Kiparsky's identity rules had. On the surface, this does not appear to have serious consequences for the operation of the Stratum 1 morphology, since this is all listed rather than reliant on generalisable rules (which usefully distinguishes it, and its irregular, unproductive nature, from the word-level morphology). But if we are serious about allowing all affixes to attach on either stratum in avoidance of bracketing paradoxes, then the fact that the morphological operations on Stratum 1 are listed and not open to generalisations based on word category could be problematic. There may be some productive affixes theoretically attachable on Stratum 1, for which listing is inappropriate. For example, in *ungrammaticality*, by simply listing *un-* as one of the affixes *grammatical* may take, we are unable to capture the generalisation that *un-* regularly attaches to adjectives, and that all potential outputs of this process are surely not listed. Likewise in *likeability*: *-able* is a productive suffix which attaches to verbs and makes adjectives whether or not it is followed by *–ity* – but the design of Stratum 1 does not allow us to express this. I return to this possible problem with the model in Chapter 6, during analysis of productively prefixed nouns and verbs, and the suffixes which may attach to them.

The RW rule and its assignation of lexical category may also cause phonological problems, since the stress rules of English are sited on Stratum 1, but are sensitive to whether their input is nominal, verbal or adjectival; so they must be ordered after RW. This will plainly have ramifications for the application of structure-changing phonological rules which are sensitive to stress; the issue is explored in Chapters 7 and 8.

Furthermore, the characterisation of the RW rule as the universal maximally specific rule, rule A of the Elsewhere Condition (see above) is also doubtful. In order to be the blocking rule, RW has to be unique for each of its inputs – this is the only way to guarantee that its input will always be a subset of the input of any given structure-changing rule. This suggests that there are as many RW rules as there are listed words in English. But if RW's sole function is to assign lexical category then there should really only be as many RW rules as there are lexical categories in the language; and the input to each one will be very general. From this point of view, RW cannot be treated as a maximally specific rule at all, and therefore may not effect blocking. This is addressed in Chapter 7.

These potential problems with the model are variously discussed in the course of Chapter 5, where the applicability of previous accounts of prefixations and particularly stress-doublets within BDLP is considered; and in Chapters 6 and 7, where new analyses are proposed. The results and their implications are discussed in Chapter 8.

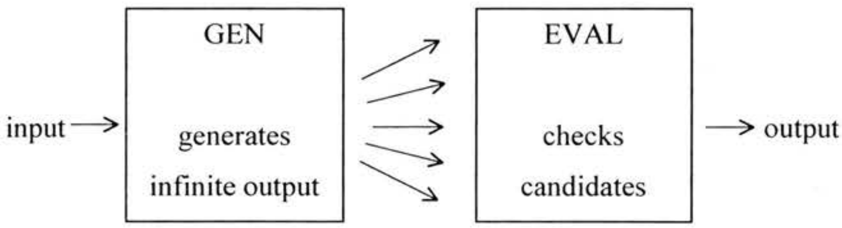
2.4 Rules, constraints and Optimality Theory

The analytic framework in which this thesis is set is a rule-based, derivational theory. Its most basic premise is that there is a set of underlying representations of morphemes which go through a series of phonological and morphological rules to emerge in their surface form. As well as rules, the model also makes use of constraints: there are constraints on the application of the rules, notably the Strict Cycle Condition (here derived from the blocking effect, as described in 2.3 above); and constraints on the representations they may map, e.g. well-formedness conditions for syllable structure. The interaction between the rules, representations and constraints in such derivational models is complex and is not always made explicit. For example, Bird (1995) criticises generative phonology's silence on whether rules are 'globally' aware of a particular condition on their output, and therefore see in advance when they should not apply; or whether they always apply when possible regardless of whether their output satisfies a particular constraint or not. In the latter case, repair strategies (i.e. more rules) may be needed in order to satisfy the constraint in question. (In the analysis proposed below conditions used are suprasegmental in nature (e.g. Prefix Footing, sect. 6.3.3), and can be seen as behaving like rules, assigning well-formed structure. (cf. Mohanan 2000 on the logical equivalence of rules and constraints)).

This rule-based derivational approach is certainly not the only one available in phonology, though, and is no longer even the dominant one. From the mid-1990's the constraint-focused approach of Optimality Theory (OT) (Prince and Smolensky 1993, McCarthy and Prince 1993, Archangeli and Langendoen 1997, Kager 1999, Dekkers et al. 2000, McMahon 2000b) has rapidly gained popularity among phonologists, and has now assumed 'the authority of being the present-day standard theory' (Ritter 2000: 111). There is not space to go into detail here, but I outline the theory and some of its achievements below; and then give a few criticisms of the model and some of the claims that have been made for it. I will argue that OT is not actually so different from models which explicitly employ both rules and constraints, and therefore should not be seen as an entirely new and superior research programme.

OT's proponents claim that it represents a complete break with the traditions of derivational phonology; it has certainly breathed lungfuls of fresh air into phonological theory. The OT model does not generate correct surface forms by a serial derivation of underlying representation → rule → representation → rule → representation, etc., in which the output has no status other than being the representation left when all possible rules have applied (McMahon 2000b: 4). Instead, it is output-oriented, focusing on the question of why any given surface form has the shape it has, and not any other. Mapped to one input is a whole host of potential outputs, which are evaluated in parallel by a component of the grammar called EVAL; the optimal candidate is the surface form. EVAL is the set of language-universal, potentially conflicting but crucially violable, ranked constraints. The model can be diagrammed as follows:

(10) The OT model



So, inputs, i.e. underlying representations (Kager 1999: 19), are fed into GEN, the generator. GEN is 'quite creative, being able to add, delete, and rearrange things without restriction.[...so] the candidate set created by GEN for any given input is infinite'

(Archangeli 1997: 14) – though these candidates do apparently follow some principle of linguistic well-formedness, being 'couched within the universal alphabet of representational options' (Kager 1999: 21).

GEN's infinite outputs are then submitted to EVAL, where they are evaluated against the set of ranked constraints. These constraints are supposedly innate and universal: different languages simply have different rankings (McCarthy and Prince 1993: 83, 86, Archangeli 1997: 15; McMahon 2000b: 6). They may also make conflicting demands: Kager (1999) presents OT as representing the conflict between markedness (unmarked structures will be preferred) vs. faithfulness (maintenance of linguistic contrasts). But the constraints are violable and ranked; the optimal output will be the one whose worst violation is of a lower-ranked constraint than any other candidate's worst violation. That is, a principle of strict dominance operates: two low-ranked constraints may not gang up together and dominate a single higher-ranked constraint.

So, unlike rule-based theory, OT is concerned with universals in the sense that one set of constraints is said to be innate and shared by all languages. These constraints are supposed to embody markedness by 'directly stating marked or unmarked patterns, for example "front vowels are unrounded"' (Kager 1999: 3). Their violability captures the fact that different languages do tolerate marked structures to varying degrees. Related to this embodiment of markedness is another OT tenet: that constraints should be '*phonetically grounded* in some property of articulation or perception' (Kager 1999: 11; italics his). This groundedness gives the theory hopes of explanatory rather than just descriptive power.

OT's constraints may be divided into families, as suggested by the mention of the conflict between markedness and faithfulness above. There are markedness constraints such as 'front vowels are unrounded' or (another of Kager's examples) 'syllables are open', i.e. NO CODA (McCarthy and Prince 1993: 102). These compete with faithfulness constraints, which require identity between input and output, e.g. DEP-IO 'all segments in the output must be present in the input' or IDENT-IO (voice) 'input and output segments must agree in voicing' (Kager 1999: 68, 14; McMahon 2000b: 33). There are also alignment constraints, which state how the left and right edges of morphological and phonological constituents align with each other, e.g. ALIGN (stem, R, σ, R) or ALIGN (σ, L, Σ, L) (McCarthy and Prince 1993; Kager 1999: 118-9; see also Chapter 5 below). These latter constraints are permitted to be language-specific.

OT is claimed to be formally superior to derivational, rule-based phonological models on the grounds that it uses only one type of process, constraint interaction, rather than both rules and constraints (Kager 1999: 187-8; see also McMahon 2000b: 13). Its simplicity also apparently means that it avoids the 'duplication problem' rule-based models may encounter, i.e. that the same structural information may be found in Morpheme Structure Conditions, or in constraints, and also in the rules which produce conforming outputs. Plus, the lack of ordered rules means that OT analyses are not burdened with various intermediate levels of representations which are unevidenced on the surface.

The theory can certainly claim empirical success. And in moving analytical focus away from language-specific rule systems at a point where they appeared to have reached an impasse, it has rejuvenated phonological theory and generated much interesting work.

One major success has been in being able to capture so-called 'rule conspiracies' in a satisfying way. Kisseberth (1970) is credited with noticing that various rules in a language may apparently conspire to avoid or achieve particular output representations (Kager 1999: 55-6; LaCharité and Paradis 2000: 216): for example, consonants may be deleted or vowels inserted to make sure that syllables are always open. But because outputs have no special status in rule-based theory, this 'functional unity' of different rules cannot be explained: the rules of epenthesis and deletion cannot be linked together in any way, even though they share a common goal. In OT, on the other hand, such a situation is entirely natural, because of the theory's focus on outputs. A high-ranked markedness constraint on output can force violations of lower-ranked input-output faithfulness constraints. So, for example, if a constraint requiring that syllables have simple onsets outranks DEP-IO 'all segments in the output must be present in the input, i.e. no epenthesis' and MAX-IO 'all segments in the input must be present in the output, i.e. no deletion', then a vowel may be lost to remove a disobedient syllable; or a consonant may be inserted to provide the syllable with an onset. (Cf. Kager 1999: 100ff. The choice between epenthesis and deletion may depend on other contextual factors).

OT's notion that a language has preferences for particular structures but that these preferences may be overridden is an intuitively satisfying one. And its insistence on the parallel evaluation of GEN's candidates also seems appropriate, in tune with other approaches in linguistics and neuroscience such as neural networks and Parallel Distributed Processing (Rumelhart and McClelland 1986; cf. Pinker 2000: 116-131, Hammond 1999: 13). Additionally, OT's gains in simplicity – avoiding the reliance on many unevidenced, non-surfacing intermediate representations as rule theory typically does – also seems progressive.

So, there has been much enthusiasm for and research in the OT model, while 'very few critical assessments of this approach and its implications for the field have received much acclaim' (Ritter 2000: 11). Indeed, the theory's honeymoon period has lasted right up to the turn of the millennium, and is only now drawing to an end with the publication of critical evaluations such as McMahon (2000b), the articles in Ritter (ed.) (2000) and LaCharité and Paradis (2000). Previously most work on OT has been concerned with producing new analyses of phonological patterns in various languages, expanding the proposed constraint set, and developing the scope of the theory. Many implications, possibilities, and intricate workings of the model have yet to be thoroughly explored or established, and this makes criticism difficult. However, there are definite problems with the model and with some of the claims made by Optimality theorists. Some of these are conceptual and have been present since the model's inception; some are empirical and yet to be given a satisfactory solution. There is not room here to give all (or very many) of these the attention they deserve (for example, see McMahon 2000b for a detailed critique of OT's handling of language change, and other issues); but I will discuss a few pertinent and serious objections below.

The first problems to mention relate to the claims made for the universality of constraints, and their embodiment of markedness. Is it reasonable to assume that all languages share the same constraints? It seems plausible to posit a common core, but the detailed workings of individual languages belie OT's universalist stance. Analyses of particular languages have introduced many and various constraints, often against particular segments or combinations of segments, which are doubtful in both universality and in any embodiment of markedness. For example, Fukazawa et al. (1998) propose '*p' for Japanese – a constraint against one of the commonest segments in the world's languages (Maddieson 1997: 636-7). Prince and Smolensky suggest '*ř̆t' for Lardil (referred to by McMahon 2000b: 21); proposals against commonly-found cardinal vowels like /i/ and /a/ have also been made (see Kager 1999: 283, fn.11, 284). As McMahon says (2000b: 21-2),

> This implies that there are innate constraints referring to every possible segment or sequence type [....] [I]t follows that the constraint list will be

> extremely long and its organisation into language-specifically relevant versus irrelevant categories potentially a Herculean task of acquisition.

It seems unlikely that the innate human facility for spoken language contains objections to all possible configurations of the articulators on which it depends.

The claim that 'OT is a theory of markedness' (Boersma et al. 2000: 2) is also questionable. While some proposed constraints, e.g. ONSET and NOCODA, seem well-supported, either by the cross-linguistic spread of certain structures, or by articulatory or perceptual factors, this is surely not extensible to all areas of phonology. Can every segment or combination of segments have a markedness assessment relative to every other segment or combination of segments? And if so, will these values hold for all languages? It seems unlikely that all these assessments are innate.

The fact that antagonist well-formedness constraints have been proposed within OT reveals the problem with taking the universal markedness approach too far. Kager notes that

> markedness is an inherently asymmetrical notion. Hence, the universal constraint inventory lacks [...] *antagonist* constraints [...] which make opposite requirements 'syllables must have codas', 'sonorants must be voiceless', etc.

(Kager 1999: 10; italics his). But in a footnote to this statement, Kager admits that some markedness constraints do have antagonists; and the contradiction is not acknowledged by Hammond, who proposes opposing markedness constraints like:

(11)

MAX CODA	Affiliate as many consonants to the left as possible when there is more than one
NO CODA	Syllables do not have codas

(Hammond 1999: 219. Elsewhere he proposes both ONSET (p.218) and NO ONSET (p.226)). This suggests that one type of structure can be simultaneously marked and unmarked, which renders the notion of markedness meaningless. The problem may be related to the claim of universality: markedness need not be equal across languages; cf. McMahon (2000b: sect 4.2) on the relative merits of the approaches to markedness in Natural Morphology and OT.

OT's claim that all its constraints are equal, the same type of formal object, and violable (Kager 1999: 188, 105) also probably cannot be upheld. There are constraints on constraint interaction – metaconstraints – which must be stated in the grammar or as a condition on the grammar, e.g. Transitivity and Strict Dominance. Presumably these are different in kind from the constraints on linguistic outputs, and inviolable.
The violability of all constraints on linguistic output is also doubtful. This is especially apparent with constraints which define linguistic representations, e.g. NUC 'every syllable must have a nucleus' (Prince and Smolensky 1993: 87, reported in McMahon 2000b: 16). Such constraints appear to be universally undominated and inviolable: should they then form a separate set from the other, violable constraints in EVAL? As McMahon points out, if this possibility is not admitted by OT then 'the clustering of a certain set of constraints at the top of all dominance hierarchies [...] will be fortuitous' (McMahon 2000b: 16-17) – and therefore unexplained by the theory.
Hammond discusses the constraint 'Onsets cannot bear moras' and says it 'appears never to be violated and so I take this to be either part of GEN or top ranked' (Hammond 1999: 206) – an admission that all constraints may not hold in EVAL alone. It would make sense to assume that universally inviolable structural requirements are produced by the generator, rather than allowing them to be violated in GEN's output but weeded out by fortuitously undominated constraints in EVAL.

Indeed, whether such 'defining' constraints are part of EVAL or should be seen as part of GEN is a question OT needs to address, especially given its requirement that GEN somehow 'knows' it must only produce candidates which are 'linguistic objects, ones composed from the universal vocabulary' (Archangeli 1997: 14). But *how* does GEN do this? What set of instructions or constraints governs GEN?

This leads to what I think is the fundamental problem for OT: the nature and inner workings of GEN. This component of the grammar is almost universally ignored in OT work: writers typically repeat the same two basic statements about it – that it generates infinite output candidates, and that these candidates are composed of acceptable linguistic representations (Archangeli 1997: 14; Kager 1999: 21; Boersma et al. 2000: 2) – but rarely examine the implications of these statements in any depth. But their implications are far-reaching, and potentially fatal to OT's claims of formal superiority over other approaches to phonology. We have already seen that there must be some kind of formal restrictions on what GEN can produce for evaluation: the alphabet of linguistic representations must be defined somewhere, presumably in GEN itself. So it seems there must be inviolable constraints in GEN, violable constraints in EVAL, and constraints on constraint interaction.

Another issue is that GEN produces infinite output candidates – as Archangeli says, it is 'able to add, delete, and rearrange things without restriction [...] the candidate set created by GEN for any given input is infinite' (Archangeli 1997: 14). But she goes on to admit that '[t]his particular property is a serious problem for those who wish to implement Optimality Theory either as a production and processing model or as a computational model' (p.14) and 'it does hamper efforts to explore psycholinguistic and computational models of language, since neither responds happily to infinite sets' (p.29). The idea of infinite generation is seriously counterintuitive, and presupposes a massively wasteful use of processing power. This waste arises not only with GEN's infinite overgeneration, but also with EVAL's infinite weeding-out function. It makes OT very doubtful as a plausible model of human language production.

Kager denies that infinity is a problem, arguing (based on points made by Prince and Smolensky 1993) that we must recognise the distinction between competence and performance here, i.e. that infinite outputs are theoretically possible but will not occur in practice. He also uses the analogy of the solvability of algebraic equations such as $3n^2 - 3 = 45$, whose solutions are drawn from an infinite set. But to argue that the competence-performance distinction makes a difference to a fundamental function of the model seems weak unless a performable alternative to infinity is proposed – an alternative which would guarantee the generation of the desired output. And the algebra analogy is unconvincing when we consider that ordered rules are employed to solve equations like Kager's example: we do not evaluate infinite candidate solutions.

So, the infinite – or finite but very large – generation of candidate outputs, and equally large weeding-out operations, means that the OT model is burdened with immensely wasteful overgeneration. This arguably negates its claims to superiority over mixed rule-and-constraint systems that it does not duplicate representations as they do. Some duplication is surely less costly than OT's alternative: repetitive generation and evaluation of an infinite number of non-duplicated representations.

OT may contain its own solution to the problem of infinity, though – if it would admit that GEN contains *rules*, which produce its output candidates. How else can it perform its various operations on the input? We have already seen that GEN must have some operating instructions to enable it to produce well-formed outputs from the inputs. LaCharité and Paradis (2000) demonstrate that GEN must consist of rules which can insert and delete both content and structure, concluding that 'OT does indeed rely on rules, as well as constraints' (LaCharité and Paradis 2000: 230). They argue that OT is actually only different from other theories invoking both rules and constraints in that it orders all its constraints after all the rules, thus disallowing repair rules which operate in response to constraints. It is worth noting that GEN's rules must be substantial in number to be able to produce infinite outputs. McMahon (2000) also discusses OT's need for rules as well as constraints, noting that some OT researchers have occasionally invoked language-specific rules, especially in segmental phonological analyses, e.g. Blevins (1997), McCarthy (1993). She argues that these may be necessary additions to universal constraints.

The issues relating to OT discussed above are the main ones I raise in this section. We have seen that OT's claims to deal only in language universals probably cannot be upheld; and that the aim of grounding all constraints in markedness or articulatory or perceptual factors has been undermined by the introduction of antagonistic constraints. The claim that OT makes use of only one formal object, i.e. crucially violable, ranked constraints, is also doubtful: some constraints surely are inviolable (and presumably not ranked with respect to each other). It seems that inviolable constraints might operate on GEN rather than in EVAL.

Indeed, the whole question of the inner workings of GEN is a fascinating one usually ignored by OT researchers. This component seems to be OT's Achilles heel: the general assumption that its output is infinite contradicts standard psycholinguistic and computational linguistic (and commonsense?) assumptions; and GEN surely uses rules to map single inputs to infinite outputs – a device OT theorists claim their model does not need. The upshot of these arguments is that OT, while strongly universal, must have language-specific devices too; it must have inviolable as well as violable constraints; and it cannot claim formal superiority over other mixed rule-and-constraint models. If the tenet of infinite candidate outputs is maintained – though it need not be, if GEN is admitted to contain rules – then OT is arguably inferior to other phonological models in its overgeneration.

Many other criticisms of the OT model, and responses to them, have been made; in a short summary such as this there is no room to mention more than a fraction of them (the reader is referred to McMahon 2000b and articles in Ritter (ed.) 2000). But there are two more points relevant to my interest in pursuing a morpho-phonological investigation in a rule-based theory, which I will raise before moving on to the section on Prosodic Phonology.

The first of these is the question of morphology in OT. Most optimality-theoretical attention has been paid to phonological structures; and while OT principles have also been extended to syntax (see articles in Archangeli and Langendoen (eds.) 1997; Kager 1999: Ch. 8; Dekkers et al. (eds.) 2000: Part 3), morphology as an independent discipline has received little attention. McCarthy and Prince's (1993) Generalized Alignment covers the alignment of morphological and phonological constituents (and has borne fruit in analyses of infixation, e.g. in Tagalog (McCarthy and Prince 1993: sect. 4)); but how an inventory of morphological constituents is reached, and what categories of constituents there should be, are not so clear. Morphology seems to be taken for granted in OT analyses – a criticism which can also be made of Prosodic Phonological (PP) analyses (see sect. 2.5 below, and my discussion of Raffelsiefen (1999) in sect 5.3). This criticism is made by McMahon (2000b: 44-7), quoting Russell (1997: 129):

> It is often tacitly assumed that there is a morphology-like component which chooses the right underlying representations and ships them off to GEN in the phonological component, complete with handy morphological annotations like "Prefix" or "Stem", but little effort has been spent on figuring out what this component is or how it works.

The workings of morphology in OT may not be well explored, but the interaction between morphology and phonology has received more attention. The different phonological effects of different affixes – 'Class I' vs. 'Class 2' affixes – have been analysed by Benua (1997) using Output-to-Output (OO) Correspondence, an extension of OT which allows faithfulness constraints to hold not just between input and output, but also between two different surface outputs, e.g. a base and a morphologically derived form. Different constraint rankings hold for different classes of affixes, so (to take the most popular example) the emergence of tense /Æ/ in American English *pass* and *passing*, but lax /æ/ in *passive*, is explained by a base-affixation (OO) faithfulness constraint on the feature [± tense] holding with derivations in *-ing*, but not in *-ive*. McMahon is critical of this approach, arguing that there is no way of determining which member of a relationship is basic, i.e. the source of OO faithfulness, and which derived. As Kager (1999: 287) points out, there is no formal limit on which words can be treated as related to which other words, which leaves OO correspondence open to charges of unrestrictiveness.

Furthermore, without a more clearly defined approach to morphology, there will be no apparent limit on the number of different sets of rankings the theory can admit – a problem analogous to the multiplying-levels problem in 1980's Lexical Phonology (see sect. 2.2 above). And how different may the different rankings for each affix or set of affixes be from other rankings of constraints? Is there any restriction on the number of places up or down the hierarchy given constraint can rise or fall?

The OT approach to morphology and morphologically-governed phonological alternations is really still in its infancy, so present criticisms may not be applicable when more research has been carried out. But at the moment, BDLP offers a better-defined and more sophisticated approach to morphology.

The second point to make here (and the final OT criticism I will raise in this section) is one of the possible superiority of theories which use ordered rules over a parallel-constraint-evaluation model like OT. While OT's focus on outputs has brought a considerable gain in the analysis of rule conspiracies (see above), it suffers a concomitant loss in analysing cases of phonological opacity (Kager 1999: Ch. 9, McMahon 2000b, Idsardi 2000). Phonological opacity happens when a phonological process appears to have occurred in an environment where it should not; or where a process fails to occur where we would expect it to. An example from Turkish is given by Kager (1999: 373-4). Operative in Turkish is a process of vowel epenthesis, where a vowel (here /ɨ/) is inserted to break up consonant clusters at the end of words: thus /bɑʃ-m/ → [bɑ.ʃɨm] 'my head'. But the language also has a process of intervocalic velar deletion, such that a stem-final /k/ will be lost if a suffix composed of a single vowel is attached: thus /ɑjɑk-i/ → [ɑ.jɑ.ɨ] 'his foot'. And these two processes interact as follows:

(12)

/ɑjɑk-m/ → [ɑ.jɑ.ɨm] 'my foot'

/inek-m/ → [i.ne.im] 'my cow'

The velar consonant which, in combination with the suffix *–m*, triggered vowel epenthesis, does not appear on the surface: thus 'the output is opaque with respect to epenthesis, because its context of application is not recoverable at the surface level' (Kager 1999: 373).

For a model which bases its generalisations on surface forms, this poses a problem. Kager goes on to demonstrate that the relevant constraints - *VkV 'no intervocalic k', *COMPLEX 'no complex codas', MAX-IO 'no deletion' and DEP-IO 'no epenthesis' - *cannot* be ordered in such a way as to produce the correct output [ɑ.jɑ.ɨm] rather than the incorrect [ɑ.jɑm] (pp. 376-7). The latter form's violations are a subset of the former's, and '[t]his finding destroys all hope that the problem is solvable without the help of additional constraints (or even new theoretical machinery)' (Kager 1999: 377).

By contrast, such opacity can be dealt with very straightforwardly in a rule-based derivational model. The process of vowel epenthesis can simply be ordered *before* velar deletion: this gives an intermediate non-surfacing representation, [ɑjɑkɨm], from which the correct output [ɑ.jɑ.ɨm] can be derived by velar deletion.

Such apparent vindications of the derivational approach (and they are quite common) have forced the introduction of new and powerful machinery to OT, as Kager's comment above suggests. But none of this has yet proved satisfactory, and satisfactorily restrictive, as Kager's review (1999: Chapter 9) shows. The most promising approach seems to be that of McCarthy (1998). He proposes 'sympathy theory' in which to be successful a candidate must correspond in some way to a 'sympathy candidate' – an output of GEN which does not surface, but which is the most harmonious candidate to obey the 'sympathy selector' constraint, usually an IO faithfulness constraint. Thus, like rule theory, OT may allow reference to opaque, non-surfacing representations. But sympathy has many problems: there is no way of determining what the sympathy selector constraint should be, and any evidence for its choice can, as Kager says, only reside in the opaque form itself. Plus, as McMahon (2000b) argues, it involves a great increase in computational complexity: the sympathy selector has to be determined, the sympathy candidate chosen, and the desired output chosen too – challenge enough to raise the question of whether OT's adherence to parallelism can be maintained. Furthermore, Kager says, sympathy does not offer a way for OT to account for chain shifts, another problem for the model.

This brief summary of a major challenge facing OT's empirical adequacy has been short, but demonstrates (I hope) that the theory has a long way to go before it can truly claim superiority over rule-based models, rather than the status of a promising alternative.

To summarise: while OT has enlivened the phonological debate of the past few years, and has produced successful analyses of previously problematic phenomena, there are some serious problems with the model and the claims that have been made for it. Notably, OT almost certainly has to rely on rules as well as constraints, as do most other phonological models. Its approach to morphology is as yet underdeveloped; and its achievements in analysing conspiracies come at the cost of not being able to deal with phonological opacity. Hence other approaches to phonology, including BDLP, should still be explored alongside OT; and BDLP has the advantage of a more developed theory of the interaction of phonology and morphology, necessary for the analysis of different types of prefixations which I undertake in this thesis.

2.5 Lexical Phonology and Prosodic Phonology

The theory of Prosodic Phonology (PP) is, like LP, concerned with the phonology-morphology interface. (The theory also covers the interaction of phonology and other components of the grammar such as syntax, not addressed here). As we will see below, prosodic phonological constituents have been suggested as a replacement for lexical stratification; and PP provides the framework for a detailed analysis of English prefixation discussed in Chapter 5, that of Raffelsiefen (1999). For these reasons, I offer an outline of PP here. I focus particularly on its use of the phonological word (pword), because this construct has been widely used in analyses of prefixal phonology (see 2.6 below, and e.g. Hannahs 1995a, b), but in English is not well justified by other lexical processes.

PP's focus is on organisation and representation within phonology, rather than on phonological rules; it has survived the general transition in mainstream phonological work from rule-based to constraint-based approaches, and is used in Optimality Theory (see especially McCarthy and Prince 1993). Central to the theory is the idea that utterances are composed of discrete, hierarchically arranged prosodic constituents, each of which acts as a domain of application for phonological rules and phonetic processes (cf. Nespor and Vogel

1986: 1). Authors differ in how many of these constituents they recognise, but the common core of prosodic domains is as follows:

(13) Prosodic constituents/ domains

phonological utterance	
intonational phrase	
phonological phrase	Postlexical
phonological/ prosodic word (pword) (ω)	
foot (Σ)	Lexical
syllable (σ)	

(cf. Hall (1999: 9)). In LP terms, constituents up to and including the phonological word may be referred to and generated within the lexicon; the phonological word is available to lexical and postlexical phonology, while constituents higher up the prosodic hierarchy are postlexical (Inkelas 1990, 1993; Booij and Lieber 1993).

Once these prosodic constituents have been generated, phonological processes may not refer to any non-phonological information – so, they may not see or be conditioned by morphological brackets. Whether or not there are phonological rules which do have direct access to morphological structure is an unresolved question within PP. Nespor and Vogel (1986) allow for the existence of such rules, ordering them before the strictly phonological ones (1986: 18-19, 27-30); Loporcaro (1996) argues that segmental phonological rules must have access to morphological brackets. Inkelas, however, rejects this, positing the Indirect Reference Hypothesis: 'phonological rules refer to only prosodic constituent structure' (Inkelas 1990: 10; and cf. Inkelas 1993: 77). Thus the phonological rules have a kind of purity, being blind to other components of the grammar such as morphology or syntax.

Instead of letting syntax or morphology condition rule application, PP expresses their influence on phonology by making them vital to the building of rule domains, i.e. prosodic constituents. Each phonological rule must be listed with a statement about which domain(s) it applies in, or across. For example, stress assignment and syllabification are commonly held to apply within the prosodic word. The pword (like other prosodic domains above the foot) is constructed by mapping rules which refer to morphological or syntactic structure.

For example, Szpyra (1989: 185-6) gives the following algorithm for the creation of the pword in English, where square brackets are morphological, parentheses phonological:

(14)

[ ] → ([ ])$_\omega$

where [ ] can contain any number of left and right brackets, but no internal occurrences of][.

Szpyra encloses stems and LP's 'Class II' prefixes and suffixes in '[ ]' morphological brackets[6], so the algorithm parses them as separate pwords; thus

(15)

[[[un] [happi]] [ness]] → ([[un])$_\omega$ ([happi])$_\omega$ ([ness]])$_\omega$

The two elements of a compound would also form separate pwords. Class I affixes, meanwhile, are for Szpyra not enclosed in '[ ]', instead being represented as [[base] suffix] etc. Since their morphological boundary with their bases is not as strong as '][' , they become part of the same pword:

(16)

[[synonym] ize] → ([[synonym] ize])$_\omega$

Thus, the phonological behaviour typical of Class I affixes – e.g. their tendency to change the stress of their bases, by imposing a new stress pattern as though on a monomorphemic word – can be captured. Similarly, the fact that Class II affixes seem able to stack up on their bases and yet make no difference to stress patterns is captured by the fact that they leave their base's pword intact and unchanged.

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[6] I have simplified Szpyra's system of morphological representation in the examples given; the details are not relevant here since they make no difference to the phonological word algorithm. The reader is referred to Szpyra's own work (1989:184 ff.).

In Optimality Theory (OT), the mapping between morphological and prosodic structure is effected by alignment constraints (McCarthy and Prince 1993, Kager 1999) which may refer to the left and right edges of constituents independently, with a format like this:

(17)

ALIGN (grammatical category left/ right, prosodic category left/ right)

This approach is used by Raffelsiefen (1999), as discussed in Ch.5.

The question of what diagnostic criteria should be used in identifying the pword is a live issue within PP (Hall 1999, and other articles in Hall and Kleinhenz (eds.) 1999). Opinions vary as to which morphological structures may align with the pword, and what phonological information may be used to justify this. Raffelsiefen (1998), for example, unlike Szpyra, does not allow any English suffixes to be separate pwords, instead dividing them into two prosodic classes according to whether they are vowel-initial or consonant-initial. Thus she uses (segmental) phonological as well as morphological information in building pword structure, as do Nespor and Vogel (1986) on Italian, and Wiese (1996) on German; Nespor and Vogel also use suprasegmental phonological information (i.e., syllable count) for constructing the pword in Yidiɲ.
Diagnostics aside, there is general agreement that, crosslinguistically, pword boundaries always coincide with morphosyntactic boundaries (e.g. Aronoff and Sridhar 1983, Nespor and Vogel 1986, Hall 1999, Raffelsiefen 1999). This is also true of constituents higher up the prosodic hierarchy: only the syllable and the foot are built without extensive reference to morphosyntactic structure.

Crucially, although prosodic and morphosyntactic boundaries may align, the constituents they enclose do not. Prosodic domains are not necessarily coextensive with any morphosyntactic constituents. The two may be isomorphic – in Szpyra's representation of *synonymize* above, the morphosyntactic word and the pword align perfectly, and in *unhappiness*, each pword corresponds to a morpheme – but this is certainly not always the case. Examples of mismatches between phonological and morphological structures – often, interestingly, involving prefixes (and not just in Indo-European languages) – are common.

This approach to non-isomorphism returns us to the problem of bracketing paradoxes encountered by level-ordered Lexical Phonology. Recall the example of *ungrammaticality* from section 2.2: *un-* is a Stratum 2 prefix, while stress-shifting *–ity* is a classic example of a Stratum 1 suffix. Morphologically *un-* has to attach to *grammatical* before *–ity* does; *un-* attaches to adjectives, not nouns; but phonologically, being stress-neutral, it should attach afterwards. Prosodic Phonology, with its extra layer of constituent structure, offers a solution to this problem.

Booij and Rubach (1984: 12-14, and see Booij 1994:19) argue that instead of ordering the morphological and phonological operations relative to each other, we should simply separate their domains. Then morphological processes can apply in any order, with their phonological effects constrained by prosodic boundaries. So, for example, in the case of *ungrammaticality*, we have the morphological structure:

(18)

[[un [grammatical]] ity]

and from this we generate the prosodic structure:

(19)

$(\text{un})_\omega$ $(\text{grammaticality})_\omega$

The fact that *un-* has no influence on the stress of its base is captured not by attaching it on a later stratum than the stress rules, but by making it a separate prosodic word. The suffix *-ity* may be attached after *un-* and yet affect the stress of *grammatical* because it joins the latter's pword. Stress assignment applies within but not across the pword's boundaries; so $(\text{grammaticality})_\omega$ is stressed independently of $(\text{un})_\omega$, even if morphologically the two are part of one unit. Syllabification too has the pword as its domain, which explains why the /n/ of *un-* does not (in careful speech) become a syllable onset, even given the operation of the onset-maximisation principle and a base which is vowel-initial (e.g. *un.appealing*, *un.interested*). Since *–ity* does affect the stress of its base, it must be part of the same pword, i.e. be a 'cohering affix', in Booij and Rubach's terms – but it is free to attach after *un-*, without any phonological ramifications.

So, the pword lets us avoid the problems of bracketing paradoxes and the loop which have dogged level-ordered LP. And this use of prosodic constituents instead of level-ordering need not mean we lose stratified LP's constraints on morphological combinations, Booij argues. Instead, he suggests that combinatorial possibilities can be expressed by features such as [± latinate] and [± native].

Thus, with morphological and prosodic structure simultaneously available in the lexicon, PP can account for phenomena beyond the explanatory reach of conventional LP with affix-driven lexical stratification. In much work since the later 1980's prosodic constituents have replaced level-ordering as a preferred way of capturing the interrelationship of phonological and morphological processes (e.g. Booij and Rubach 1984; Szpyra 1989; Inkelas 1990; Booij and Lieber 1993; Booij 1994; Hannahs 1995a, b; Bullock 1995; Oh 1995). In her model, Prosodic Lexical Phonology, Inkelas (1990, 1993) is explicit about the translation of level-ordering into prosodic constituents, and indeed proposes the introduction of the prosodic root and the prosodic stem as lexical prosodic constituents which, with the pword, directly correspond to Kiparsky's (1982) three-strata lexical model (Inkelas 1990: 33-5).

The lexical model I investigate in this thesis, BDLP, is level-ordered, and is designed to avoid bracketing paradoxes without referring to an extra layer of constituent structure. The concept of the prosodic word should be unnecessary; all phonological rules are here assumed to have direct access to morphological structure. But PP has special relevance to us because much of the data I will be considering is prefixal: prefixations have provided fertile ground for PP analyses, providing much justification for the concept of the pword.
As we noted in 2.2 above, prefixation is an area generally ignored, or at least not much discussed, in works on lexical stratification, probably because productive prefixes like *un-* and *re-* 'again' are often involved in bracketing paradoxes. But they have received much more attention within PP because prosodic constituents, notably the pword, have provided a new way of accounting for their particular, wordlike phonological characteristics. Productive prefixes in English always bear stress and are syllabified separately from their bases (behaviour which will be discussed in more detail in section 2.6 below); within PP they are classified as pwords, unlike the majority of suffixes. Prefixes have not only been analysed as separate pwords in English, but also (among others) in Polish (Booij and Rubach 1984); French (Hannahs 1995a, b, Bullock 1995), German (Wiese 1996), and Hungarian (Nespor and Vogel 1986).

However, the pword as a prosodic constituent is not otherwise well-motivated in English lexical phonology; I will argue in Chs. 5 and 6 that it is unnecessary and even inadequate in accounting for features of prefixal phonology.

The most obvious objection to the pword is that its boundaries always align with morphological brackets – it is wholly derivative. Any distinctions in prosodic structure will be based on distinctions in pre-existing morphological structure; so PP simply adds another set of predictably-placed brackets to the representations. If all the information necessary to generate the pword is present with our morphological brackets, then why not use those, instead of creating a new layer of derivative representation?

Certainly some pword functions can be restated (perhaps less elegantly) with reference to morphological boundaries. For example, instead of saying that syllabification applies within the pword (as do Booij and Rubach 1984: 13; Nespor and Vogel 1986: 67, 103, 109; Raffelsiefen 1999; cf. Inkelas 1990: 38-39), we could say that it does not cross the '[' bracket: this captures the fact that productive prefixes, separated by '[' from their bases, are syllabified independently of them. Cf. Laeufer 1995, Giegerich 1999: sect. 8.2.2, and Rubach's (1993) statement of Slovak prefix vowel-lengthening.

Being derivative of morphology, prosodic structure is derivative of something which is itself derivative. Morphological structure is based on correlative phonological and semantic recurrence; for example, we say *un-* is a prefix in English because the phonological string /ʌn/ recurs word-initially, consistently negating the meaning of its (recurrent, free word) base. This means that the pword is a phonological unit based on morphological structure which is partly justified on phonological grounds. This has a whiff of circularity; and to some extent makes the pword an artefact of a high degree of analysis.

Circularity is a charge which has been laid against the pword from another quarter; Laeufer (1995: 106-7) argues that whether or not a suffix (in van der Hulst's (1984) analysis of Dutch) is treated as a separate pword is based on the suffix's syllabifying behaviour – and then this syllabification is attributed to the pword or non-pword status of the suffix.

The relationship between prosodic and morphological constituents is also worth critical examination. The strictly morphological analyses underpinning prosodic mapping are often not discussed – Hannahs (1995a, b) for example does not raise this topic, and nor really does Raffelsiefen (1999) (a criticism raised in 5.3.2 below). And sometimes (perhaps because of this neglect?) the pword seems to become a pseudo-morphological constituent. For example, Raffelsiefen (1999), discussing the English prefix *iN-*, argues that prosodic structure must be determined by suprasegmental, and not segmental, phonological behaviour (*iN-* is subject to segmental assimilation with its bases, but may nevertheless be stressed separately). And she claims that when pword boundaries are so determined, they correlate with semantic interpretation. Prosodic constituents here encroach on morphological territory. If the pword is justified with reference to suprasegmental phonology and semantics, does this mean that morphological structure may only refer to segmental phonology and semantics? What exactly is the nature of the overlap between morphological and prosodic constituents?

I noted above that Loporcaro (1996) argues that segmental phonology should have direct access to morphological boundaries, and does not have the pword as its domain. Raffelsiefen (1999) seems to be of similar opinion, emphasising the importance of suprasegmental over segmental phonology for prosodic constituency. But even in the suprasegmental realm, a detailed analysis of Raffelsiefen's account of English prefixation (see 5.3 below) shows the pword to be inadequate as the proposed domain of stress and syllabification. As we will see, Raffelsiefen ends up aligning feet as well as pwords with morphological boundaries – that is, stress refers directly to morphology and cannot be described within the domain of the pword alone.

I will expand on some of these arguments in Ch. 5, and in my analysis of the prefixal stress doublets in Ch.6. For now, we have seen some of the advantages of the idea of prosodic constituents in the lexicon, notably of the pword: they provide a simple and straightforward system of domains for phonological processes; they can solve the problem of prefix-suffix bracketing paradoxes; and they have had particular success in analyses of prefixal phonology. So far, stratified lexical phonological models have not managed this. However, there are also disadvantages associated with the pword as a constituent in English lexical phonology – derivativeness, circularity, and ultimately superfluousness. If we can adequately analyse English morpho-phonological interactions (especially prefixal ones) in a stratified lexical model without the pword, then it is unnecessary in lexical phonology.
Next, after the mention of particular features of prefixations in the preceding section, it is time to look at these morphological operations in more detail.

2.6 Prefixation

Interestingly, the data which is central to this thesis – the pairs of bisyllabic, stress-alternating nouns and verbs – is all prefixal[7]. As we have seen in the preceding sections, prefixes have proved problematic for level-ordering versions of LP because they create ordering paradoxes; while prosodicists, with tools more appropriate to prefixal phonology, have more often taken the opportunity to analyse such data, as studies such as Booij and Rubach (1984), Wennerstrom (1993), Hannahs (1995a, b), Bullock (1995) and Raffelsiefen (1999) show.

Before going on, I should note some problems with the actual definition of 'prefix'. In his chapter on prefixation, Marchand (1969: 129) defines prefixes as 'bound morphemes which are preposed to free morphemes', but remarks that earlier grammarians (e.g. Mätzner 1873, Paul 1920) rarely used the term, instead treating such formations as compounds. He says this is 'hardly acceptable', arguing that a firm distinction must be drawn between the preposing of bound and free material. But Marchand himself does not entirely hold to his own definition when it comes to the matter of the neoclassical prefixes or compounding elements of a more scientific nature such as *astro-*, *socio-* etc., which he rules out of consideration as prefixes even though they are bound, preposed morphemes. These, which morphologically seem like word-roots rather than prefixes (e.g. arguably taking suffixes in the case of *social*, *astral*), and which have compound-like semantics, are difficult to categorise. Bauer (1983: 213-20) says 'these combining forms cannot be normal affixes, and calls them 'initial' and 'final' 'combining forms'. Wolff (1984: 86-7) does not treat them as prototypical prefixes, but finds the processes are best treated as being on a continuum; Lehrer (1995: 134) believes there is a cline of morphemes from those which are very lexeme-like, to those which are purely affixal in character.

In defence of those earlier grammarians who simply called all prefix-formations compounds, it has often been noted that many prefixes have origins as free words (Bybee et al. 1990; Hall 1992; Rubach 1993 on Slovak). Admittedly, origin as a free form has also commonly been attributed to suffixes, indeed to bound morphemes in general. But, in European languages at

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[7] The only significantly-sized exceptional (non-prefixal) group of stress-alternators – not dealt with here – consists of the post-particle forms like *tùrn óff*$_V$ ~ *túrn-òff*$_N$, which historically replaced English's older particle-prefixation method of word formation, as in *oversee*, *underlie*. See 3.2.2 and 3.3.4.2 below.

least, formal identity with existing prepositions or particles is a feature of prefixes rather than suffixes. Consider for example the German separable verbal prefixes, which have corresponding prepositions; or the English prefixes *under-* 'insufficiently' and *over-* 'excessively', with formally identical free adverbs/ prepositions. According to Allen (1981) prefixes in the Romance languages have been much more likely to survive when they have a corresponding free form; so, for example, *con-* is still used in Spanish and Italian, which retain the preposition *con* 'with'; while it has disappeared in French, which has *avec* for 'with', rather than a reflex of Latin *cum* (Allen 1981: 83-4).

But even productive prefixes which are completely bound, i.e. not formally identical with existing prepositions or particles, e.g. *un-* 'not', *re-* 'again', *pro-* 'in favour of', still all share a number of phonological, morphological and semantic characteristics which mark them as being more like free forms than suffixes. These I will outline below.

Some of these prefixal phonological characteristics have already been mentioned in the section on Prosodic Phonology above. Firstly, productive prefixes, not just in English but in other (mostly European) languages too, form independent domains for syllabification in careful speech. Even when the final segment of the prefix is a consonant, and the base begins with a vowel, still, in defiance of the onset-maximisation principle, there is no syllabification across the morphological boundary. Indeed, discussing diachronic change, both Lutz (1997) and Raffelsiefen (1999) say that when prefixes do syllabify with their bases, this is a sign of unproductivity and/or imminent death. So, with the examples given in the preceding section, *un.appealing*, *un.interested*. The same thing happens with the boundary between two elements of a compound in English (Giegerich 1999: 240; and Wiese 1996: 65 on German). But, by contrast, vowel-initial suffixes do accept syllabic onsets from their bases, e.g., with aspiration on the voiceless stops, *brea.kage*, *pain.ting* (though consonant-initial suffixes do not accept further onset segments).
Likewise, prefixes also form independent domains for stress assignment. All the truly productive prefixes in English are stressed, whether or not their stress is dominant within the whole word. The exceptions to this, and the other generalisations, are the category-changing 'head prefixes', *a-*, *be-* and *en-*, which are in any case of limited productivity (Marchand 1969: 148, 164; Lehrer 1995: 134). The only other category-changing prefix, *de-* as in *delouse*, does follow the phonological pattern of prefixes such as *re-* or *un-*.

The final suprasegmental phonological trait shared by prefixes is their compliance with the minimal word size constraint in English. They are always phonologically equivalent to free lexical words: if monosyllabic, they must have a branching syllable rhyme, i.e. either contain a long vowel, or a short vowel followed by at least one consonant. On the skeletal tier of representation (for more, see 6.3.2 below), they must have at least –XX. So, for example, *re-* 'again' /ri:/; *co-* 'joint' /ko:/; *ex-* 'former' /ɛks/; and so on for the others.
This combination of independent syllabification and stress, and the minimal size requirement, has – as we saw above - led to prefixes being treated as separate phonological words within Prosodic Phonology. It might also be worth noting here that all English prefixes, including the category-changing ones, at least contain a vowel, which means that they form an extra syllable. Suffixes, though – especially inflectional ones - can be smaller than this, i.e. just a single consonantal segment (e.g. *waged* 'provided with a wage', with derivational /d/). This difference may just be historical accident, though it is interesting given the existing phonological differences between prefixation and suffixation; and given too that consonantal extrametricality in English is only right-edge, where the suffixes are, rather than left-edge, where the prefixes are.[8]

Perhaps related to their stress and their syllabic independence is a characteristic of the segmental phonology of prefixes: it is unchanging; they show no allomorphy. So, for example, *re-* in word-based formations where it means 'again', e.g. *re-examine*, *re-categorise*, is always /ri:/; compare the root-based, unproductive latinate prefix *re-* as in *restore* ~ *restoration*, where the vowel is /rə ~ rɪ/ when unstressed, /rɛ/ when stressed. There is however one possible exception to this generalisation: the negative prefix *iN-*, whose final consonant may either assimilate in place of articulation to the initial consonant of the base, or simply disappear. This was mentioned in 2.5 above; Raffelsiefen (1999) argues that *iN-* should be accorded status as a separate pword in at least some of its formations, on the grounds of stress patterns rather than of segmental phonological traits.

It is not only the phonology of prefixes that is worth commenting on here; they also differ from suffixes (and group with the first elements of compounds) morphosyntactically. Like

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[8] Cf. McCully and Hogg's (1990) paper in which it is claimed that, in Old English, extrametricality is left-edge, with the stress assignment rules parsing from right to left, in a mirror-image of the present-day situation, with right-edge extrametricality and stress parsing from left to right. Was there any corresponding difference in the minimal sizes of left- and right-adjoining affixes?

the first elements of compounds, prefixes may be coordinated, as in (20a, b) – occasionally with free words, as in (20c):

(20) a. pro- and anti- European
b. pre- and post-natal
c. his ex- and future wife

And they can be factored out – e.g.

(21) ex-housewife and homemaker
anti-abortion and segregation

(these two examples from Strauss 1982a: 43).
But, as Bauer (1988: 89) notes, this cannot be done with suffixes, which seem to have a greater morphosyntactic, as well as phonological, coherence with their bases.

Another manoeuvre open to prefixes, but not to suffixes, is iterative application. Many prefixes are able to attach more than once to the same base: thus

(22)	re-re-draft the paper	'produce a third draft of the paper'
	un-undo what you've done	'reverse the reversal of your action'
	anti-anti-capitalists	'those opposed to anti-capitalists'

are possible formations. And – again bearing in mind semantic and pragmatic limitations - prefixes can stack with each other iteratively on one base:

(23)	out-under-perform	'perform even worse than s.o. else who is performing badly'
	anti-pseudo-intellectual	'against [being or s.o. who is] pseudo-intellectual'
	pseudo-anti-intellectual	's.o. who pretends to be anti-intellectual'

From the last two examples, notice that (again, semantics allowing) the prefixes can stack in any relative order (see Lehrer 1995, from whom these two examples are drawn, for a discussion of individual prefixes' stacking behaviour).

This last fact may have something to do with prefixes' general tendency to be semantic modifiers rather than lexical-category modifiers. Most English derivational suffixes determine lexical category: they select bases of a particular word-class, and from them derive words of another class. Logically this must mean there are restrictions on how much stacking can occur, and on which suffixes may stack onto others. By contrast, most prefixes modify the base's semantics rather than changing its lexical category – the 'head prefixes' like *be-* and *de-* are unusual in this respect. And even they may only change the category of a word which has not already undergone category-changing morphology: Hammond (1993) observes that they only attach to underived bases. So, for example, denominal verbs like *de-ice* may only be formed from simple nouns. But when *de-* forms verbs from existing verbs (and therefore does not change the word-class), these may be morphologically complex, e.g. *detoxify*, *demagnetise*.

Since prefixes are more semantically than syntactically concerned in terms of how they modify their bases, this may also be true of how they select them. Bauer (1983: 216) says that 'the majority of prefixes may be added to bases of more than one form class': above we noted the privative *de-* attaching to both nouns and verbs; *un-* negates adjectives (*unable*) and is reversative with verbs (*unfasten*); *anti-* and *pro-* may both attach to nouns and adjectives, e.g. *antibacterial*, *anti-fox-hunting*. Indeed, this apparent freedom with regard to lexical category may offer a way of avoiding the bracketing paradoxes which have caused so many problems for stratified Lexical Phonology: thus for example, *ungrammaticality* could be seen as an example of *un-* attaching on Stratum 2 to the noun *grammaticality*, with the base chosen for its semantics, not for its lexical category. This approach was taken by Allen (1978), though Strauss (1982a) argued against it; it will be explored with relation to Base-driven Lexical Phonology below.

So, prefixes have a number of phonological, morphosyntactic and semantic features which give them more in common with free words than with suffixes; yet, of course, by definition, they are bound morphemes. But halfway status is also suggested by the fact that, in English at least, prefixes are more likely than suffixes to yield free-standing analogues (Hall 1992: 109): so, for example, used as independent words we have *anti*, *pro*, *ex*, *hyper*, versus the ('marginal') suffix-derived *ism*.

Hall's work on prefixes looks beyond English and the European languages, taking a broader cross-linguistic approach to prefixation with the work of Greenberg (1966) on language universals as a starting point. Marked differences between prefixation and suffixation do not occur only in the European languages, but universally. For instance, it has often been observed that, cross-linguistically, suffixation is greatly preferred to both prefixation and infixation as a morphological process. The raw numbers from the 71-language database used by Bybee et al. (1990) make this clear enough: looking at verbal morphology, they found 1236 suffixes and only 426 prefixes - almost a three-to-one ratio. But why should bound morphemes be so much more likely to attach to the right edge rather than the left edge of their bases? Some explain this phenomenon with the 'fossilised syntax' approach, saying that an affix's position is determined by the position of its syntactically independent lexical ancestor (see also Bybee et al. 1990). There have also been explanations from psycholinguistic research on language processing; arguments that the left-edge of a word must have greater phonological clarity because it is processed earlier and is therefore more significant for word-recognition are especially interesting given the phonological characteristics of English and European prefixes (see Hall 1992 for discussion).

This question of the general preference for suffixing over prefixing is very interesting, and more work could certainly be done in the area. Bybee et al.'s (1990) study, for example, considers only verbal morphology, and does not separate inflectional affixes from derivational ones. It would be interesting to compare semantic vs. syntactic functions of derivational prefixes across a broader range of languages too, and see to what extent Hammond's (1993) theory that due to human language processing restrictions category-changing affixes should be found at only one edge of a word, not both, is borne out.

Given the great similarities in the (phonological, at least) behaviour of prefixes in languages such as English, French and Polish, a look at the history of prefixes and their phonology in Indo-European might also prove worthwhile. In Latin at least, it seems that prefixes probably did have a special kind of status. Although Nespor and Vogel (1986: 115-6) analyse the Latin prosodic word as consisting of the stem and all affixes, Heslin (1987) offers some phonological evidence for a stronger boundary between prefixes and bases than between bases and derivational suffixes. Morphosyntactically, both Heslin (1987) and Allen (1981) refer to the classical Latin literary device of tmesis – where prefixes can be separated from their bases, with other words inserted in between them – as more evidence that Latin prefixes show less coherence with their bases than suffixes do. More research might shed brighter light on the history of the Indo-European prefix's more independent status, and its status as a prosodic word.

Although these cross-linguistic and historical areas of prefixal behaviour are very interesting, we will leave them here and turn back to the attributes of contemporary English prefixes which so distinguish them from suffixes. To sum up: we have seen that suffixes in English are either inflectional or, if derivational, generally lexical-category-changing. But prefixes are never inflectional, and only exceptionally category-changing. They are more concerned with the semantics of their bases than with the syntactic function, both in terms of how they select them, and how they modify them. And, prefixes share with the first elements of compounds (which themselves provide semantic rather than syntactic modification of their second elements) a degree of independence from their bases: they may be both factored out and co-ordinated, as we saw in the examples *pro- and anti- European*, and *ex-housewife and homemaker*. Furthermore, they may be attached iteratively to their bases (*re-re-draft*), and stacked with each other (*pro-anti-capitalist*) with far fewer ordering restrictions than apply to suffixes.

And, to return to the point we started from: the phonological characteristics of prefixes which mark them out as different from suffixes, showing less coherence with their bases. All of the non-category-changing prefixes share these attributes: they form independent domains for stress and syllabification, always bearing stress; they seem to follow the same minimal size restrictions as free lexical words; and they show no segmental allomorphy. Additionally, I noted that because they all (including the category-changing ones) at least contain a vowel, prefixes always add an extra syllable on to their bases, while suffixes may be smaller than this, consisting of only a consonant.

In the section on Prosodic Phonology above I have already touched upon the question of how we should represent prefixes morphologically, and mentioned criticisms of the tendency to let phonological constituents encroach upon morphological territory. In the next section I look more closely at the question of morphological representation.

2.7 Morphology and morphological representations

In this section I will address the general approach to morphology taken in this thesis – in particular the issue of how morphological structure should be established, and how it should be represented and made visible to phonology – more specifically, of how, and to what extent, different degrees of phonological and semantic fusion between affixes and their bases, i.e. different degrees of morphological complexity, might be represented.

Before giving some examples of varying degrees of morphological complexity in the prefixations in my data, I would like to go back to first principles with the point that morphology is cline-like, and that fitting it into discrete categories can be problematic. I have already mentioned (in 2.4 above) that morphological structure is justified by the correlation of semantic and phonological recurrence. (This is expressed particularly clearly by Bybee (1985: Ch.5; 1988), in whose model of the lexicon words may be connected by phonological and semantic links, and a connection with both types of link means there is a morphological relationship). So, when a word can be split into recurring phonological strings which are associated with recurrent semantics, then it is morphologically complex. For instance, in English, *–less* /ləs/ appears in many adjectival formations, with a consistent phonological form; its bases are regularly free words and are left phonologically unchanged so they keep a consistent form too; and *–less* is regularly associated with the same semantics, roughly 'lacking in/ without (base)'; thus *windowless* 'without a window'; *hairless* 'without hair'. These formations are transparently morphologically complex.

This analysability depends on analogy with a number of other words, of course: to say *likeable* is decomposable into *like* and *–able*, then ideally the speaker should be aware of the analogous existence of, for instance, *manageable*, *washable*, *drinkable*, etc., all with certain semantics in common, and all with a consistent relationship with, respectively, *manage*, *wash* and *drink*. (There would still be some degree of decomposability even if the relationships here were only phonological).

But, of course, both semantics and phonology can vary, and vary independently of each other at that, making morphological complexity a rather slippery notion. Semantic compositionality can falter if an affix loses productivity and its formations end up lexicalising and drifting apart; it then becomes harder to map a particular meaning to each of its instances. Similarly, if the base loses semantic touch with its independent word, or if it ceases to be used as an independent word altogether, it becomes harder to decompose the word into identifiable separate semantic constituents. Phonology naturally plays a role here too: base and affix may fuse, or one may cause changes in the other; and again the composite word may be harder to split into two constituent parts, or each part may not be recognisable as an instance of the affix or base in question.

So, for example, with a word like *business*, while the affixal phonological string *–ness* is still intact at the end of the word, it cannot have its regular semantic mapping: phonological change has rendered the base unrecognisable as the independent word *busy*, and the meaning change has rendered the base unrecognisable as the independent word *busy*, and the meaning of the whole formation cannot be cleanly split into two parts. Arguably in this case (and in others such as *reckless*, *amiable*) the only function which can be salvaged for the affixal strings is word-category assignment – *business* is still a noun, as of course are all productive formations with *–ness*; and similarly, *reckless* and *amiable* are adjectives, as are productively-formed *–less* and *–able* words. So, there are still reasons, phonological and semantic/syntactic, for saying these words are morphologically complex; but their divisibility is certainly not as clear as that of *happiness*, *careless* or *likeable*. Modern English monomorphemic *ánswer*, from Old English *ánd-swàrian*, gives an even clearer example of how phonological attrition, along with semantic change, obscures morphological boundaries.

Because morphological structure depends on the variable behaviour of both semantics and phonology, then, it is itself variable. There are degrees of morphological complexity. And this is very clearly illustrated in the prefixal stress-doublet data on which this thesis is based. More details will of course be given below, but for now I give a sample of stress-alternating nouns and verbs in *re-* in Table 2.1. The prefix(es) spelt *re-* can mean: 'do verb's action again' – the productive use; or, in older (unproductive) formations, 'backwards, away'; or there may be no meaning at all.

Table 2.1 Nouns and verbs in *re-*[9]

	Verb pron.	**Noun pron.**	**Verb definition**	**Base in isolation**
rebel	rɪ'bɛl	'rɛbl̩	to resist or rise up against authority	-
remit	rɪ'mɪt	'ri:mɪt	to send payment for goods or services	-
recoil	rɪ'kɔɪl	'ri:kɔɪl	to move back suddenly	coil, 'wind into loops/ curve'
rebound	rɪ'baʊnd	'ri:baʊnd	to spring back, recoil	bound, 'jump'
rewind	ˌri:'waɪnd	'ri:waɪnd	to wind a tape backwards	wind 'turn or cause to turn'
rewrite	ˌri:'raɪt	'ri:raɪt	to write sth again	write 'put words on paper'

[9] Definitions from online Encarta and Cambridge dictionaries.

Remembering the word-like phonological behaviour of productive prefixes which was discussed in the previous section (2.6) (i.e. that they all bear stress, minimally have a branching syllable rhyme, syllabify independently of their bases and are segmentally invariable), there is some variation in how much of this behaviour the prefixes in the table exhibit. In the words higher up in the table, the verb's prefix is pronounced /rɪ/, unstressed and not minimal-word-sized. Semantically, we cannot say the prefix has any function in *remit* or *rebel*, since neither *mit* nor *bel* are independent words, and neither recurs with any consistent meaning. Nor do the whole formations *remit* and *rebel* have anything semantically in common with other formations in *re-*. Phonologically, in the nouns *rebel* and *remit*, *re-*, pronounced /rɛ/ and /ri:/ respectively, displays segmental allomorphy alien to productive prefixes. With no apparent semantic function, and not even much recurrent phonology (only the segment /r/ is consistent with these formations), the *re-* of *rebel* or *remit* can hardly be called a prefix. Only *mit*'s recurrence might justify morphological complexity.

Going to *recoil*, phonologically the prefix still varies segmentally between its nominal and verbal pronunciation, with the verb's /rɪ/ unstressed and smaller than a minimum word. Semantically, though, the whole formation does include the meaning 'back, away' like a few other *re-* words. But *recoil*'s semantics are not truly compositional since the base *coil*, although an independent word referring to movement, always means 'turn, twist' – something quite absent from *recoil*. The only thing *recoil* suggests about the manner of the movement is that it is fast.

While both semantically and phonologically, the case for saying *recoil* is morphologically complex is better than the case for *remit* and certainly for *rebel*, if we look at *rebound* we see an even clearer justification. Here the independent meanings of prefix and base are clear, the only weakness being that *re-* 'back, away' only very rarely has compositional semantics with its bases, making decomposition on grounds of analogy less likely. Phonologically, however, the verbal prefix is still not wordlike, with no stress and only one X-position in the syllable rhyme. The next table entry, *rewind*, with verbal /ri:/, does fulfil this criterion, although it still has the unproductive meaning of *re-*, 'back' usually only associated with verbal /rɪ/ (though interestingly, this particular word could be analysed as containing the 'again' meaning – it would amount to the same thing). And finally, *rewrite* shows a completely transparent, phonologically and semantically compositional structure, with segmental invariance and consistent stress in the prefix, which has the productive 'again' meaning; and with a base completely identical to the independent word.

With forms arranged on a cline of morphological segmentability like this, how can a system (rule-based or otherwise) divide them into the right number of discrete groups, such that they have appropriately distinct representations for phonological processes?

As we saw in the discussion of Lexical Phonology in 2.2 above, not only is it commonly accepted that there should be a representational distinction between prefixation, suffixation and compounding; there is also a generally-accepted two-way split between the more productive prefixes and suffixes, which are word-based, and which create phonologically and semantically transparent formations; and the less productive ones, which may be root based, and whose formations are less transparent. In SPE, Chomsky and Halle use different boundary symbols to distinguish between the two basic types; in LP with affix-led stratification, they are assigned to different levels, but given the same bracketing representation. In the current model, base-driven Lexical Phonology, all affixes can in principle attach on either stratum, though in practice the less productive ones will attach on the root stratum, and the more productive ones on the word level.
In Prosodic Phonology (sect. 2.5), which extends to constraint-based as well as rule-based theories, the different morphological types are typically given different prosodic representations – so, for instance, 'Level 2' productive prefixes are made separate phonological words, while 'Level 1' unproductive ones are not (e.g. Hannahs 1995a, b on French). Indeed, with the relaxation of the Strict Layer Hypothesis (see Hall 1999: 10-11, Selkirk 1995), Prosodic Phonology offers an opportunity for more degrees of differentiation than just a two-way split between different groups of morphological structures. As we will see in 5.3 below, Raffelsiefen's (1999) analysis of English prefixations splits them into three different groups; in theory, presumably, more would be possible.

This ability to distinguish more finely between different kinds of morphological structures is an advantage for PP, and although of course the representations are phonological, not morphological (see 2.5 above), it is generally phonological rules which refer to them. Given the cline-like nature of morphological complexity, this kind of flexibility in differentiating between different structures is useful – and is not something that theories like BDLP (or other stratified rather than prosodic versions of LP) necessarily have, given that they rely on level-ordering, a device which has to be very restricted, to distinguish between different kinds of prefixation or suffixation. If we can only justify having two levels in the lexicon, then, for instance, Raffelsiefen's three-way distinction between different kinds of prefixes is unavailable to us without more sophisticated morphological bracketings.

So how do we deal with prefixations like those above with the two discrete levels of BDLP? Where should the line between Stratum 1 and Stratum 2 formations be drawn? While *rebel* and *remit* would certainly be Stratum 1, if indeed we could call *rebel* complex at all, on which level should *recoil*, *rebound*, or *rewind* be sited? If we put them on Stratum 2, this suggests that *re-* 'back' is a productive prefix, which it is not, and also means its phonological irregularities may lose us some generalisations about Stratum 2-prefixal behaviour. We could put them on Stratum 1, which might be better for the phonology of the prefixes - though only the verbal ones, since in the nouns they are invariant. This would also allow for the slightly divergent semantics between the bases and their independent-word forms, although this is only really apparent in *coil*. But then how may we distinguish *rebound*, for example, from *remit*, which has a completely bound, meaningless base? And how could we distinguish either from a formation like *record*, which on formal grounds is as segmentable as *remit*, but in which the nominal prefix /rɛ/ does not obey the minimal word constraint, and does syllabify with the first consonant of the base?

Even just this small selection of examples shows very clearly how morphology's dependence on a correlation between semantics and phonology, and the regular, unexceptional recurrence of these correlations, makes it very hard to divide into discrete groups. I will discuss this problem in more detail in the next chapters, where the possibility of refining the current bracketing practice is raised, such that we could distinguish between different degrees of morphological complexity within one stratum, probably Stratum 1. We could bracket the less complex forms as [prefix [base], for instance, showing that while some of our stress-doublet prefixations are arguably segmentable, they should not be treated as concatenations, and are in fact stored as whole forms with a bracket which is really just a historical residue.

This would not only be useful for making sure that prefixes are given the correct prosodic or suprasegmental representations: there is also evidence that phonological behaviour in some fossilised compounds can only be explained with reference to a historical morphological boundary (Giegerich 1999: 244-6, 275-6, and 7.2.1 below). So, there may be different saliencies of both the '[' and the ']' morphological brackets. However, I will also raise the point that it is not clear that even an extended system of discretely bracketed representations is really appropriate. A rule-based system like the present one does not have the same degree of freedom in this respect that a connectionist lexicon like Bybee's (1985, 1988, 1995) dynamic lexical model has.

Chapter 3: The Data I: Sources, Morphological Types and Phonological Characteristics

3.1 Introduction

In this chapter I will introduce the data on which much of this thesis is based, and examine its morphological and phonological characteristics.

For a thorough examination of the stress-alternating nouns and verbs in the English lexicon, a complete list is needed, so I have compiled one. Below, the lists drawn up by previous authors, and some of the problems of trying to collect such data, are discussed. For the sake of comparison, in addition to the stress-doublet data I also provide a 'control' list of noun-verb pairs which (in terms of phonology and morphological structure) have everything in common with the stress-doublets, except the stress-alternating pattern itself. Complete data lists are given in the appendices.

Morphologically, as we will see, both the stress-doublet and the non-stress-alternating words are almost all prefixations of various kinds. For the purposes of analysis, I divide the data of both sets into different morphological groups according to phonological recurrence and semantic compositionality. Justification for this morphological classification is given in section 3.3. Then, in section 3.4, I discuss the phonological characteristics of the different prefixal groups in the stress-doublet set. We will see correlations between the semantic transparency of a prefixation and the phonological behaviour of the prefix; and that both of these factors are gradient in nature. Throughout the chapter, I will also be bearing in mind the implications the data holds for the lexical stratification of the various phonological and morphological processes involved.

3.2 The stress doublet data

3.2.1 Lists made by previous authors

While the stress-doublet pattern of bisyllabic nouns and verbs such as *convict* etc. has often been noted in passing in discussions of English phonology or morphology (e.g. Spencer 1991: 16; Bauer 1988: 29), and words which follow this pattern are generally assumed all to be part of the same nominalising phenomenon, few writers give more than a handful of examples, or explore the words in any depth. The three main exceptions to this are Fudge (1984), Gimson (rev. Cruttenden 1994), and Jespersen (1909/1949), who each provide lists of stress-doublet nouns or adjectives and verbs. These lists form the basis for my own.

Fudge's list (1984: 32; 189-92), with over a hundred entries, is the longest and most useful of the three with regard to contemporary English. Fudge is also the only author to categorise the words according to morphological structure, separating prefixal from non-prefixal words – although this is as far as his divisions go. Gimson's (rev. Cruttenden 1994) list of stress-doublet nouns and verbs – like Fudge's, also in a book often used for the teaching of English pronunciation to foreign learners - is considerably shorter, making no claim to completeness. The list given by Jespersen (1909/ 1949: 173-184), meanwhile, is quite different. Jespersen takes a historical approach to the subject, categorising the words according to whether their origins are native or Romance. His list includes entries which are no longer part of the stress-doubletting pattern in present-day English, either through the obsolescence of one of the members, or because of a change in the stress contours. So, for example, the obsolete verbs *humdrum*, *captive*, *colleague* and *turmoil* are listed as end-stressed partners for the corresponding nouns or adjectives. Jespersen also lists as end-stressed verbs which are now found only with initial stress, such as *exile*, *envy*, *blackmail* and *ambush*; rarer are nouns previously stressed on the initial syllable, now on the final, e.g. *cement*, *manure*. Being of more interest for a diachronic study of English stress, none of these examples is included in my own list.

3.2.2 The present list

The list of stress-doublets included here, then, is based on the work of Fudge and of Jespersen, as noted above. In addition, I consulted dictionaries of contemporary English, in particular Wells' (1990) *Longman Pronunciation Dictionary* (LPD); but also (mainly for definitions) the *Collins English Dictionary* (Millennium edition, 1998), the *Concise Oxford Dictionary* (1990 edition), and the *Encarta World English Dictionary* (British edition, Bloomsbury 1999).

Of course, the business of compiling a complete (or near-complete) list of words with certain stress patterns is complicated by variations in pronunciation, and by disagreements between dictionaries. A not untypical example of the variability with which these words are treated comes with *crosscheck*: LPD has it as a noun-verb stress doublet, with *crósschèck* for the noun and *cròsschéck* for the verb; Collins and Encarta give end-stress to both noun and verb; the COD gives initial stress to both noun and verb. So, noun-verb pairs which are stress

doublets for some speakers may well be missing from my list; and equally, pairs may be included which do not have stress-alternation for all speakers.
By and large, any word included in the data list is given stress-alternating noun and verb pronunciations in at least two of the dictionaries mentioned above; my basic aim is simply to stay within the boundaries of present-day RP and near-RP English. (This is the main reason for avoiding using the Oxford English Dictionary itself as a source of evidence, since its scope is too diachronic for my purposes).
In total, I have collected 204 noun-verb pairs with stress alternation, certainly the fullest list of which I am aware. The complete list is given in Appendix I, the phonological appendix, discussed in this chapter; and Appendix II, the semantic appendix, which has definitions of the nouns and verbs and a classification of the relationship between them, and is the subject of Chapter 4. Samples of the data from each appendix are given in shorter tables in the text of the thesis at appropriate points in the discussion.

In Appendix I, a pronunciation for each noun and verb is given, and their phonological characteristics are summarised. These will be fully discussed in this chapter after the morphological classifications, but a note about the pronunciations is necessary here.

They are based on those given for RP by Wells in LPD, with certain vowel symbols changed to conform to the inventory of Giegerich (1992). For example, what Wells treats as diphthongs, /eɪ/ and /əʊ/ (phonetically more accurate for RP) are marked as phonemic monophthongs /e/ and /o/ respectively, symbols which clearly link them with their monophthongal equivalents in other English accents such as that of Scottish Standard English. I have deviated from this system in using length marks for the vowels rather than relying only on a quality (tense v. lax) distinction; this has been done for the sake of clarity in reading, and does not represent any kind of theoretical position.

The main issue regarding the pronunciations is the marking of secondary stress. Wells marks no post-tonic secondary stress in LPD, so even transparent noun compounds, universally accepted to have primary stress on the first word and secondary stress on the second, are marked with only one stressed syllable – thus *flówer bed, alárm clock* as opposed to *flówer bèd, alárm clòck*. This means that secondary stress in the nouns under consideration here is not marked, since it comes after the primary (prefixal) stress. However, in many of these

cases it is definitely present, as evidenced by the presence of full, and sometimes long, vowels in the syllables in question (cf. Giegerich 1992: 179-80, Pater 1995: 2 (fn. 1)).
Of course the presence of secondary or lower degrees of stress is notoriously difficult to verify (cf. Fudge 1984: 5), depending as it does on various gradient phonetic and physiological correlates. However, as Fudge says, a non-reduced vowel signals the presence of some degree of stress: in this data, I have taken the presence of full vowels such as /ɛ/ or /ʌ/, or any long vowel or diphthong, to indicate a secondary-stressed syllable (cf. Pater 1995). Problems arise with /ɪ/, which occurs regularly in unstressed as well as stressed syllables – indeed it seems to be in free variation with /ə/ in many cases (Gussmann 1991, cf. Szpyra 1996). Where nominal final syllables with /ɪ/ correspond to fully stressed verbal final syllables with /ɪ/, i.e. there is no vowel reduction or change, I have generally assumed they are secondary-stressed; thus *'con,vict*$_N$ because of *con'vict*$_V$.

I should point out that, strictly speaking, the list of stress doublets is not complete because there is another group of stress-alternating nouns and verbs in English which I have not examined. These are the post-particle or phrasal verbs and their corresponding nouns, such as:

(1)

Verbs	**Nouns**
brèak dówn	bréakdòwn
brèak thróugh	bréakthròugh
rìp óff	rípòff
slìp ón	slíp-òn
stàke óut	stákeòut
stànd bý	stándbỳ
stànd ín	stánd-ìn

These also have the familiar pattern of final primary stress in the verbs, and initial primary stress in the nouns. They are a varied and interesting group, made with a very productive method of word-formation (Marchand 1969: §2.35.7, Fraser 1976: 27-29, Sørensen 1986). We will touch on them later when discussing one of the stress-doublet categories, the preparticle nouns and verbs such as *outlay*, *overflow* etc., whose place in English word-formation has over time been usurped by the postparticle forms (Marchand 1969, Hiltunen 1983).

I have not dealt with these words in any depth here partly for reasons of space, and partly because of their ambiguous place straddling syntax and morphology; they may be interrupted by other syntactic terminals (e.g. *stake the place out*; *rip the customers off*), and it is not clear that they are always lexical creations (cf. Stiebels and Wunderlich 1994, Spencer 1991: 44).

Although formed by a highly productive method of English word-formation, the postparticle words are very different from productive prefixations or suffixations in that their meanings – both in terms of the internal morphological combination, and the relationship between the nouns and verbs - are frequently highly idiosyncratic and unpredictable. For instance, there is nothing in the meaning of *rip* 'tear, rend' or *off* that would let us predict that *rip off* means 'to cheat sb'. So, further examination of the post-particle verbs might yield results quite different from the ones found here for the present list of stress-alternating nouns and verbs.

3.2.3 The Control List

For the sake of comparison in the semantic and morphological studies, I have compiled a further list of bisyllabic words which occur as both nouns and verbs, which (like the stress doublets) are generally assumed to be basically verbs, with the nouns (zero-) derived from them (e.g. Marchand 1969: §5.6). One reason for this assumption is their phonology: the nouns share the verbal stress pattern, having primary stress on the final syllable. I refer to this group as a control group because they share similar internal morphological structure, bisyllabicity, and the general assumption of a verb-to-noun derivation with the stress-doublet group: the only difference is the lack of stress-shift. Examples include *consent*, *respect*, *distrust*: noun and verb are segmentally and suprasegmentally identical.

Both this list and that of the stress-doublets aim for completeness, at least in terms of LPD (75 000 entries), from which they are drawn. There are 127 non-stress-alternating nouns and verbs listed according to internal morphological structure in Appendix III. As with the stress doublets in Appendix II, definitions (from the *COD*, *Collins* and *Encarta* dictionaries as mentioned above) and a semantic classification of the noun-verb relationship are given; alternative nominalisations associated with the verb are also listed, and similarly classified.

Like the stress doublets, these words are also mostly prefixal; but their distribution among the different prefixal categories is quite different. This morphological structure will be discussed below; for obvious reasons, the phonological behaviour will not be analysed in the phonology section. Since the main reason for the inclusion of these words is to compare the semantics and regularity of their noun-verb relationships with those of the stress doublets, they will be more important to the discussion in Chapter 4.

3.3 Morphological classifications

3.3.1 Outline

The great majority of the noun-verb pairs in both the stress-doublet and the non-stress alternating sets are prefixations of some sort – some 95% of the former set, and 87% of the latter. I divide these into different groups according to the nature, or the extent, of their internal morphological complexity. As we saw in section 2.7, morphological complexity as seen here is derived from a correlation of phonological and semantic features, and is therefore gradient in nature.

In classifying the data morphologically, I consider the phonological shape of each word's prefixal and base constituents, taking into account whether or not they are recurrent in morphologically analogous structures, and whether or not this formal recurrence coincides with recurrent meaning. I also consider whether or not the semantic relationship between prefix and base in each word tallies with that in other words formed with the same prefix. Another important factor is the potential each prefix has for entering into new combinations with consistent meaning and form. Dividing prefixations into groups with different characteristics is made all the harder in English by the fact that many prefixes are orthographically the same, and phonologically similar, but differ greatly in the bases they take, and how they semantically modify these bases (if they do at all). This problem may be remembered from the discussion of some formations with *re-* in sect. 2.7 above.

The stress-alternating words fall into four main categories, two of which are further subdivided; the non-alternating set has three main divisions. These are outlined here, with detailed discussion below:

1. Latinate prefixations, i.e. words mostly borrowed from Latin or French with a prefix-base structure, where the base is not a free English word, e.g. *increase*, *convert*, *defect*. These are further divided into:
    i. Bound-base prefixations with non-recurrent base, e.g. *alloy*, *escort*.

ii. Bound-base prefixations with both prefix and base recurrent, e.g. *conserve*, *dispute*.

iii. Prefixations where the base is similar to, but not semantically the same as, a free word; where the prefix is unproductive; or where the formation is not semantically compositional; e.g. *recoil*, *incline*.

'Recurrent' here means that the base occurs in other analogous formations; thus for example *fect* occurs with various prefixes: *infect*, *affect*, *defect*, etc. So the *bel* of *rebel* has not been treated as recurrent just because of the existence of *bell* or *bellicose*; aside from having no semantics in common, they also enter into very different morphological patterns.

2. Productive prefixations: words such as *rewrite*, *mishit*, semantically transparent, formed on free word bases.

3. Particle formations, i.e. words prefixed with particles or prepositions such as *over*, *under*, *out*. These are divided into two main groups:

   i. Particle compounds, where the particle has the same meaning as it does when it occurs as a free word, e.g. *uplift*, *outlay*, which are basically equivalent to *lift up*, *lay out*.

   ii. Particle prefixations, where the particle is used with a meaning which it does not have as a free word, e.g. *overdose*, *overweight*, which are not equivalent to *dose over*, *weight over*.

4. Others. These eleven words are the only non-prefixal ones in the whole stress-alternating group: six of them are bound-base suffixations with *–ment*. Stress-alternation in non-prefixal forms is exceptional.

The non-stress-alternating words fall into similar groups:

1. Latinate prefixations, with the same three subgroups.
2. Productive prefixations, although these are much lower in number.
3. Others.

These non-alternating words are a much less heterogeneous set than the stress-doublets: there are no particle formations among them, and the proportion of productive prefixations is much smaller, the proportion of Latinate prefixations being considerably larger. The 'others', the leftover suffixal and morphologically simple words, are a disparate group with nothing particular in common: some seem to be loan words, probably originally nouns with exceptional final stress (*garotte*, *balloon*, *burlesque*); four of the seventeen words contain the suffix *–ade*; but with so small a number of words, there are no really interesting generalisations to be made.

3.3.2 The Latinate formations

3.3.2.1 Outline

These words, originally prefixations in Latin or French, and analysable in English as having a prefix + bound base structure, form the majority of both the stress-alternating and the non-stress alternating groups. Of the non-stress alternators (from now on, for ease of reference, the *consent* group), 81% are Latinate prefixations; the figure for the stress doublets is 53%, considerably lower, but still a majority.

Analysing words such as *increase, decrease, invert, convert, pervert, perfect, defect* as morphologically complex is not uncontroversial. Each word can be split into two recurrent phonological strings, prefix (i.e. *in*, *per*, *con*, *de*) and base (i.e. *crease*, *vert*, *fect*), each of which recurs in analogous formations. But these prefixes and bases do not satisfy the other main requirement for being recognised as morphological formatives, i.e. semantic consistency. They bring no semantics to the words they make. So, for example, there is nothing in the relationships between *consent* and *assent* or *commit* and *permit* which would tell us, from understanding *avert* and *pervert*, what *convert* should mean. There is no semantic analogy to be drawn. We can formally subdivide the words, but cannot subdivide their semantics along the same lines.

Indeed, even their phonological divisibility is open to question: there are stress alternations and segmental variability in Latinate formations, to the extent that a prefix such as *coN-* has many different forms: /kɒn, kɒm, kɒŋ, kən, kəm, kəŋ, kə/ in *concept*, *complex*, *congress*, *connive*, *commence*, *congratulate*, and *collect* and *correct* respectively. Phonological consistency is the strongest reason to say these words are morphologically complex, since there is no semantic consistency: but even this is not a clear-cut matter.

The morphological analysis of these words will be discussed in more depth in Chapter 5, where we will see that previous writers on their internal structure have generally agreed that they should be treated as morphologically complex. If they are complex, then in the terms of the present base-driven model of lexical stratification (BDLP; see section 2.3), it is certainly first-stratum complexity.

Some of these Latinate forms appear to have greater claim on complexity, in terms of prefix or base recurrence, and semantic consistency, than others. I have divided the whole set into three subgroups along these lines. These are: bound-base prefixations in which one element (usually the base) is non-recurrent; bound-base prefixations where both elements are recurrent; and prefixations in which the base is phonologically and semantically similar to, but not the same as, a free word, or where the formation is not semantically compositional.

3.3.2.2 Bound-base prefixations with a non-recurrent element

These words look segmentable, but in all of them, either the prefix or - much more often - the base is non-recurrent, which further weakens their claim on morphological transparency. In this group I include words such as *rebel* and *attack*: the bases /bɛl/ and /tak/ do occur as independent words (semantically unrelated to *rebel* and *attack*), but never recur in analogously-structured prefixations (there is no **debel*, **pertack*, etc.; and there cannot be any semantic or phonological reasons for this). I treat them as cases of accidental homophony.

So, whether words of this group should be treated as morphologically divisible or not is therefore especially questionable, since there is no distributional reason to call one part of the word a morpheme. These are cranberry morphs; their status can only be justified by parallelism with other morphs which are not unique (cf. Bauer 1988: 40).

Only 9% - less than a tenth - of the stress-alternating nouns and verbs fall into this category; examples include *combat*, *concert*, *exploit*, *invite*. By contrast, nearly a third, 32%, of the *consent* group are bound-base prefixations with a non-recurrent base – for example, *alarm*, *assault*, *control*, *debauch*, *demur*, *recruit*.

3.3.2.3 Bound-base prefixations with both elements recurrent

This is the core prefix-bound base set of words: both prefixes and bases recur in similar formations; the bases are bound; and all are semantically deficient. Examples include *convert*, *invert*, *extract*, *contract*, *permit*, *remit*.

In both the stress-alternating set and the *consent* set, bound-base prefixations with both elements recurrent form the largest single morphological grouping. With 73 members, they make up 36% of the stress-doublets. Similarly 37% of the non-stress-alternating set (i.e. 47 words) fall into this category.

3.3.2.4 Borderline free-word-based prefixations

This third subcategory is perhaps the hardest one to justify; it could be argued that it is the result of over-precision in morphological analysis. Some of the words here could probably be placed with the productive prefixations, others with the bound-base ones. But I think there are good semantic reasons for separating them from these groups. Their constituent parts are not meaningless, but either the prefix is usually unproductive with the meaning it has, or the formation is not sufficiently semantically compositional. They cannot be unambiguously assigned to either Stratum 1 or Stratum 2, and thus constitute something of a problem for the discrete stratification of lexical phonology.

These borderline cases are a minority in both the stress-doublet and the *consent* group of words: only 9% of the former, and 13% of the latter, fall into this category.

The bases of these formations generally resemble free words, not just in terms of phonological form (which, as we saw above, may simply be accidental homophony), but also semantically. This semantic resemblance may be strong enough to say there is identity, as with *wind* and *rewind*, both referring to just the same action; or it may be weaker, as with *coil* and *recoil* (see discussion in sect. 2.7 above) or *claim* and *acclaim*, which are only very loosely linked by referring to the verbal expression of an opinion.

But they do not fit in with the free-word-based productive prefixations, either because their bases have drifted a little too far from being wholly identifiable with independent words, or because the prefix is either unproductive, or does not have the meaning it has when it is productive. Basically, the words either do not have compositional semantics, or have meanings which are rarely or never recurrent.

So, to give some examples: while the meaning of *exchange* is related to the meaning of *change*, it is not clear quite what *ex-* brings to the formation – certainly not its productive meaning ‘former’, and apparently not even the less productive but sometimes recognisable ‘out of, from’. In some contexts *change* and *exchange* are interchangeable.

As another illustration, *refund* does not mean 'fund again, finance an undertaking again'; instead it involves a rarer meaning of *re-*, 'back, away'. It means 'to give back money which has already been paid for sth.'. But we could not paraphrase it as meaning 'to fund (sb) back'; the use of *fund* is not quite the same as when it is an independent word. Compare the productive, 'again' *re-* prefixations, which always can be paraphrased as 'to (verb) again'; e.g. *resit* 'to sit (an exam) again'.

I have given more space to this section, and provided more examples, to illustrate the problems of detailed analysis of morphologically complex words; these borderline cases all have particular semantics identified with the base and the prefix; but these are unproductive meanings, or slightly different from the morpheme's occurrence elsewhere, so the forms cannot be derived by a simple second-stratum (in terms of the present model) rule. They rather have the character of listed formations. We will see from phonological evidence presented below that these prefixations are probably best treated with the other Latinate words as Stratum 1 formations; but for now it is worth noting that, within the whole bound-based Latinate group, different degrees of morphological complexity are clearly emerging.

3.3.3 The word-based, productive prefixations

These prefixations have totally transparent and compositional semantics: the bases are fully identifiable as free words, and the prefixes have consistent, regular meanings. So they are easily paraphraseable: *re-* means 'do (the action of the verb) again', thus *remake* means 'make again', *repaint* 'paint again', *recount* 'count again'; similarly, *mis-* means 'do (verb) badly or wrongly', so *mishit* means 'hit incorrectly, badly', *misrule* 'rule badly', etc. In the present model, these words are created by Stratum 2 processes, as opposed to having the listed, Stratum 1 complexity of the previous group.

There is a substantial difference in the proportion of each group, stress-alternators and non-stress-alternators, which are productive prefixations. 22% of the stress doublets are productive prefixations, the majority - nearly two thirds - with *re-*. By contrast, only 6% of the *consent* group are productively prefixed, most with *mis-* (which is however also well-represented in the stress-doublet group) and none with *re-*. Outside the Latinate prefixations, most of the other morphological types are only lightly represented in the *consent* group, while various types of prefixal structures are well evidenced in the stress-doublet set. Why there should be such a difference in the behaviour of *mis-* as opposed to *re-*, though, is not clear.

3.3.4 Particle Formations

3.3.4.1 The two groups

The particle formations, words like *overflow*, *underline*, *upturn*, are a heterogeneous set. They are all composed of a free word base prefixed with a prepositional particle: *in*, *off*, *out*, *over*, *under* or *up*. Since these are also free words, these formations could arguably all be treated as compounds (as they are by Marchand (1969: §§2.26 - 2.30)). But I have split them into two groups, compounds and prefixations, because of differences in the semantic function of the particles.

In some of these words, the particle has a locative meaning similar to the one it has as an independent preposition or adverb, e.g. *uplift* 'elevate, lift up'; *overflow* 'to flow over, flood': these I treat as compounds. But in other formations the particles' meanings are quite different from those they have as independent words. In *overspend* 'to spend too much', or *undercharge* 'to charge too little', for example, *over* and *under* mean 'excessively' and 'insufficiently' respectively - meanings which they do not have in isolation (cf. Marchand 1969: 100). These are grouped as particle prefixations here.

This distinction arguably draws a line through a continuum, since the meanings of *over* and *under* as prefixes are not completely removed from their meanings as free words (roughly 'above' and 'below') but are metaphorical or figurative extensions of them. However, a division between the two groups is appropriate, especially since – as we will see in the further discussions of the groups immediately below – the internal semantics of the particle prefixations are very regular, whereas those of the particle compounds are riddled with unpredictability.

Interestingly, there are no particle formations at all in the *consent* group; they are only found in the stress-doublets, of which they make up around 20%.

3.3.4.2 Particle-compounds

The particle-compounds, both nouns and verbs, are close in meaning to their equivalent verb-plus-particle phrases. So, for example, the verbs *inlay* and *overdub* can be paraphrased respectively as 'lay in' and 'dub over (sth)'; the nouns can be seen as nominalisations of verb-particle phrases, so *inset* is 'something set in', or *uplift* 'the act of lifting up', and so on.

This method of word-formation – placing the particle at the front of the word – is now relatively rare: preparticle verbs like *outpour* 'to pour out' have an archaic flavour, or are restricted to poetic usage. They are a remnant of an earlier word-formation pattern, dating back to Old English, when the language had verbs with separable locative particles which in the infinitive form always appeared before the verb (cf. present-day German *ausfahren* 'drive out' ~ *er fährt aus*, 'he drives out'). By the 14th century, though, postparticle verbs had become established (cf. section 3.2.2: postparticle verbs are also involved in stress-doubletting), and the preparticle pattern began to die out (Marchand 1969: 2.35.2, 3.1.4; Hiltunen 1983, Sørensen 1986, Kastovsky 1992).

The semantics of the particle compounds may be straightforward enough, as in the examples of *inlay*, *uplift* or *outpour* above; but sometimes their meanings cannot be predicted from the sums of the parts. For example, the difference between *outlay* and *inlay* cannot be explained by the difference in meaning between *out* and *in*; there is no way of predicting what *overhaul* means, since it does not involve hauling anything over anything else. These formations are neither semantically transparent nor productive, and on these grounds I would suggest they may best be sited on Stratum 1 within the current model.

3.3.4.3. Particle-prefixations

Most of the examples of particle-prefixations in the data are formed with *over-*, 'excessive(ly)', e.g. *overdose*, *overspend*, though there are two noun-verb pairs in *under-* 'insufficient(ly)', *undercharge* and *undershoot*. Unlike the particle-compounds, the particles in these words cannot be separated from and placed after the base-words – *undercharge*$_N$ does not mean 'an act of charging under'. *Under-* and *over-* here have different meanings than the independent words *under* and *over*. As pointed out above, these meanings are related to the prepositional and adverbial meanings of the words, being figurative extensions of them. But they are sufficiently different to justify separate treatment as prefixes – in which capacity they are both very productive in Modern English. Unlike the prepositions and adverbs which form postparticle verbs productively in English, they are semantically transparent, always modifying the bases in the same way.

3.3.5 The Others

These words are a very small and diverse group, both in the stress-doublets (of which they form about 5%), and in the non-stress-alternators (13%), and as such will not be discussed much in this thesis. They are a mix of suffixal and morphologically simple forms: stress-derivation and zero-derivation are plainly exceptional ways of nominalising non-prefixal verbs (assuming that these are nominalisations). In the suffixations this could be because suffixes are more likely than plain roots or bases to attract further suffixation (cf. Fabb 1988); so for example verbs in *-ate* are more likely to have related nouns in *-ation* than stress- or zero-derived nouns.

3.4 The phonological characteristics of the stress-doublets

3.4.1 Introduction and sample of Appendix I (phonology)

Obviously, the two main sets of data, the stress doublets and the non-stress-alternating bisyllabic nouns and verbs, are here because of their stress patterns: in the former group, primary stress is initial in the nouns and final in the verbs, while in the latter group primary stress is final in both nouns and verbs. But there is more to the phonological relationship between stress-doublet noun and verb than this: namely the variable occurrence of secondary stress, and the occurrence (or not) of segmental phonological differences between noun and verb in the different morphological groups.

First, I give a sample of stress-doublets from the full data list, Appendix I. A proportionate number of examples from each morphological group are given, with internal morphological boundaries. For each noun-verb pair I give pronunciations, and a note as to whether there are segmental differences between noun and verb, and if there are, whether they are in the prefix, the base, or both.

Table 3.1 Sample of data from Appendix I: phonology

	Word (with morphological segmentation)	Verb Pronunciation	Noun/Adj. Pronunciation	Segmental difference between verb and noun? In prefix or base?
Latinate, bound-base, non-recurrent	con.cert	kən'sɜ:t	'kɒnsət	Yes: prefix and base
	ex.ploit	ɪk'splɔɪt	'ɛk,splɔɪt	Yes: prefix
	re.bel	rɪ'bɛl	'rɛbl̩	Yes: prefix and base
Latinate, bound base, recurrent	com.mune	kə'mju:n	'kɒm,ju:n	Yes: prefix
	de.fect	dɪ'fɛkt	'di:,fɛkt	Yes: prefix
	dis.pute	dɪ'spju:t	'dɪs,pju:t	No
	ex.port	ɪk'spɔ:t	'ɛk,spɔ:t	Yes: prefix
	pro.ject	prə'dʒɛkt	'prɒ,dʒɛkt	Yes: prefix
	re.cord	rɪ'kɔ:d	'rɛ,kɔ:d	Yes: prefix
	re.fuse	rɪ'fju:z	'rɛf,ju:z	Yes: prefix
	re.ject	rɪ'dʒɛkt	'ri:,dʒɛkt	Yes: prefix
	trans.port	,trans'pɔ:t	'trans,pɔ:t	No
Borderline bound/ free word base?	in.cline	ɪn'klaɪn	'ɪn,klaɪn	No
	re.bound	rɪ'baʊnd	'ri:,baʊnd	Yes: prefix
	re.coil	rɪ'kɔɪl	'ri:,kɔɪl	Yes: prefix
Productive prefixations	inter.change	,ɪntə'tʃe:ndʒ	'ɪntə,tʃe:ndʒ	No
	mis.print	,mɪs'prɪnt	'mɪs,prɪnt	No
	mis.shape	,mɪs'ʃe:p	'mɪs,ʃe:p	No
	re.make	,ri:'me:k	'ri:,me:k	No
	re.shuffle	,ri:'ʃʌfl̩	'ri:,ʃʌfl̩	No
	re.think	,ri:'θɪŋk	'ri:,θɪŋk	No
	re.tread	,ri:'trɛd	'ri:,trɛd	No
	re.write	,ri:'raɪt	'ri:,raɪt	No
Particle compounds	out.lay	,aʊt'le:	'aʊt,le:	No
	over.dub	,o:və'dʌb	'o:və,dʌb	No
	up.lift	,ʌp'lɪft	'ʌp,lɪft	No

Particle prefixations	over.dose	ˌo:vəˈdo:s	ˈo:vəˌdo:s	No
	over.spend	ˌo:vəˈspɛnd	ˈo:vəˌspɛnd	No
Others	fer.ment	fəˈmɛnt	ˈfɜ:ˌmɛnt	Yes: base (suffixation)
	dict.ate	ˌdɪkˈte:t	ˈdɪkˌte:t	No

3.4.2 The phonology of the productive prefixations and the particle words

The first groups of stress doublets whose phonology I will discuss are the productive prefixations (*misprint*, etc.) and the particle formations, both compounds such as *outlay* and prefixations like *overdose*. Phonologically, these groups all behave in the same way.

From the rightmost column of the table above it is easy to see that these groups of stress-doublets are the only ones which consistently display no segmental phonological differences at all between noun and verb. Both the prefixal and the suffixal syllables of each word bear stress; the difference between noun and verb comes at the foot level, where relative prominence between the two stressed syllables depends on lexical category, with nouns being left-strong, verbs right-strong.

This phonological behaviour bears out the discussions of prefixal phonology in sect. 2.6. There, it was noted that prefixes in English, as in many other European languages, have particular phonological traits in common. Firstly, unlike suffixes, they form their own independent domains for syllabification, separate from their bases. Despite the onset-maximisation principle, in careful speech a prefixal final consonant does not become an onset to the base's first syllable; nor does an initial consonant in the base become a coda to a prefixal syllable. Illustrations of this from the data are not plentiful, since many of the prefixes end in vowels; but two examples (with the full stop indicating syllable boundary) are the verbs *misprint*, syllabified *mis.print* not *mi.sprint* although /spr/ is a perfectly acceptable onset in English; and *discount*, syllabified as *dis.count* rather than *di.scount*. The particle forms share this characteristic, with *uplift* syllabified as *up.lift*, the /p/ subject to the glottal reinforcement typical of voiceless stops in syllable-coda position.

Secondly, all productive prefixes bear stress[10]. This is clearly illustrated in the data here: all verbal prefixes have secondary stress, all nominal prefixes primary stress. The bases to all these prefixations are free lexical words, so they are also always stressed.

[10] Except the marginal (and – again unusually – lexical-category-changing) *a-*, *be-* and *en-*.

The third suprasegmental phonological trait which productive prefixes have in common, and which they share with free lexical words, is a minimal size requirement. If they consist of only one syllable, that syllable must have a branching rhyme, i.e. contain a long vowel, or a short vowel followed by at least one consonant – and of course, this minimal syllable weight cannot be bolstered by taking segments from the onset of the base's initial syllable. The productive prefixations and particle formations here all conform to this requirement: e.g. with a long vowel, we have *re-*, /ri:/; with consonantal codas we have *dis-*, *mis-*, *sub-* (see appendix), and *up*, /dɪs/, /mɪs/, /sʌb/, and /ʌp/ respectively; *inter-*, *over* and *under* of course have more than one syllable.

Their independent syllabification and consistent stress contributes to (or causes) another typical characteristic of true prefixes discussed in sect. 2.6: they exhibit no segmental allomorphy[11]. Thus, to use some of the same examples from the table above, *dis-*, *mis-*, *re-*, *sub-* and *inter-* never assimilate to their bases, always keeping the same segmental form. There is no variation in voicedness in the final consonants, for instance: *dis-* and *mis-* always have /s/, never /z/ - cf. the semi-obscured *disease*, *dis* + *ease*, with /z/. *Sub-* keeps its final /b/ even if followed by another /b/, resulting in a geminate (e.g. *sub-base*, /ˈsʌbˌbe:s/) - compare the bound-based, Latinate *sub-* in *support* and *suppose*, where the final consonant of the prefix has disappeared, presumably after assimilating to the voiceless /p/ of the base. Like the productive prefixes, the particles *over*, *out*, *under* and *up* also maintain invariant shapes.

The decisive criteria in classifying the stress doublets into these groups were the semantic relationship between the prefix and the base, and whether or not the base was a free word. But we can see now that these criteria correlate completely with the phonological prefixal characteristics discussed here and in sect. 2.6. All the members of the productive prefixations group have transparent, regular semantic relationships between prefix and base, and free words as bases; and all the prefixes behave as phonological words: they are stressed, separately syllabified, have branching syllable rhymes, and are (with the same semantics) segmentally invariant.

But does the phonological behaviour of the productive prefixations support the suggestion of section 3.3.3 that they are second-stratum formations within BDLP? The answer is yes,

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[11] Negative *iN-*, which in some circumstances assimilates to the first consonant of its base, is the one productive prefix in English which is an exception to this generalisation.

because the nouns and verbs differ only in the application of a simple foot prominence rule. Since in the present model, feet are assigned on Stratum 1, but relative prominence between feet is decided on Stratum 2 (cf. Giegerich 1999: 270-1, and Chapters 6 and 7 below), it is clear that the *misprint, resit* group of stress-doublets may be formed on the second stratum. The same line of reasoning also holds for the particle prefixations, which arguably could be included in the *misprint* group. For the particle compounds, though, the picture is not so clear. While phonologically they behave in the same way as the productive prefixations, we saw above (sect. 3.3.4.2) that the semantics of their composition may often be irregular and unpredictable, suggesting formation on Stratum 1 rather than Stratum 2.

In the next section we will examine the phonology of the three groups of Latinate prefixations, and confirm section 3.3.2's suggestion that, if morphologically constructed at all, they should be constructed on Stratum 1.

Before moving on to this, it is worth pausing over the relationship between the internal prefixal structure of the *misprint, overdose* words, and the external phonological and semantic relationship between noun and verb. Because all prefixes and bases are stressed, they are resistant to phonological reduction, which exerts pressure for nouns and verbs to remain segmentally the same. This phonological fact may well apply a brake to any semantic divergence between noun and verb – i.e. transparent internal morphological structure is linked to transparent external noun-verb relationships. This finds natural expression within the BDLP model: if the verbs are productively prefixed on Stratum 2, and therefore only come into existence on this level, then they can only be related to the nouns on this stratum too; and the latter relationship, being a second-stratum one, should be semantically transparent.

3.4.3 The phonology of the Latinate prefixations

3.4.3.1 Introduction

The phonology of all three groups of Latinate prefixations strongly contrasts with that of the productive prefixations and the particle words. The main difference is that the Latinate prefixes, while stressed in the nouns, are regularly stressless in the verbs. This means they often contain reduced vowels in the verbs, but full vowels in the nouns – i.e. there are regularly segmental differences between noun and verb. This stresslessness matches other non-pword characteristics of the Latinate prefixes: they may syllabify with their bases, and they may segmentally assimilate to them.

This all means that relating the Latinate nouns and verbs to each other by phonological rule is a rather more complicated prospect than doing the same with the productively prefixed nouns and verbs. Not only does their phonological behaviour confirm the first-stratum nature of the Latinates' internal prefixal structure; it also strongly suggests that, if there is a relationship between the nouns and verbs, then it is a Stratum 1, not a Stratum 2, derivation.

Before looking in more detail at the phonology of these groups, an interesting point should be noted: although none of the prefixations is as phonologically transparent as the productive and particle prefixations, some are closer than others. The phonological transparency of these prefixations actually increases in line with semantic transparency, and with the base's closeness to being a recurrent, free word. The non-recurrent bound base words (*rebel*, etc.), closest to being internally morphologically simple, show the greatest phonological differences between noun and verb; while the borderline-free-word prefixations (*imprint*, etc.) show far fewer phonological differences between noun and verb, with these differences being more predictable in nature. Because of this correlation between internal prefixal semantic transparency, and external (noun-verb) phonological transparency, I explore the phonology of these Latinate prefixations in some detail.

3.4.3.2 Segmental differences between noun and verb

The far higher proportion of nouns and verbs in the Latinate groups which differ segmentally as well as stresswise from their partners can be seen from the table of examples (table 3.1) in sect. 3.4.1 above. The rightmost column of this table notes whether or not there are any segmental differences between the paired nouns and verbs, and if so whether they are in the prefix, the base, or both. While for the productive prefixations and the particle formations the answer is always 'no', for the three groups of Latinate words it is nearly always 'yes'. This impression is confirmed by a closer look at the data as a whole.

The table 'Segmental differences between noun and verb' (table 3.2) overleaf, based on all the phonological data in Appendix 1, shows just what percentage of nouns and verbs in each group differ from each other segmentally – and shows some interesting patterns in these differences.

For the Latinate group as a whole, two thirds, 66%, show segmental divergence between noun and verb. This figure breaks down quite interestingly between the three subgroups

Table 3.2 Segmental differences between noun and verb

	Segmental differences between noun and verb							
Word Group	**Total**		**Just Prefix**		**Just Base**		**Both**	
	No.	% of total in group	No.	% of total in group	No.	% of total in group	No.	% of total in group
Bound base, non-rec.	13/18	72.2%	8	61.5%	1	5.6%	4	22.2%
Bound base, recurrent.	52/73	71.2%	48	92.3%	1	1.4%	3	4.1%
Borderline	7/18	38.9%	7	100%	-	-	-	-
TOTAL LATINATE	72/109	66.1%	63	87.5%	2	2.8%	7	9.7%
Productive prefixations and particle formations	-	-	-	-				
Others	4/11	36.4%	N/A					

though: of the prefixations with a bound, non-recurrent base, over 70% of the pairs have segmental differences; and the figure is similar for the bound-base, recurrent prefixations. But in the borderline-free-word-base prefixations, only 39% have segmental differences between noun and verb. This is a far lower figure, only a little over half that of the other Latinate groups. When compared with the figure for the productive prefixations - 0% – it confirms the halfway status of the *imprint*, *rebound* group. Not being completely semantically opaque, they do not quite belong with the bound-base Latinate prefixations; but not being completely semantically compositional, neither do they belong with the productive prefixations. Their phonology mirrors this.

Table 3.2 also gives figures for which part of the word – prefix, base, or both - contains the segmental divergence between noun and verb. Again, we see interesting differences between the three subgroups of these Latinate prefixations. In the great majority of cases, 87.5% overall, the segmental difference between noun and verb lies in the prefix – since the bases are usually stressed in both nouns and verbs. But the difference can be in the base as well: the proportion of pairs where the segmental difference is *only* in the prefix climbs as we go through the different morphological groups, from the non-recurrent bound-base set, at 61.5%, through the bound, recurrent base set (92%), to the borderline-free-word set (100%). The less claim a given noun-verb pair has to internal morphological complexity, the more likely there is to be segmental divergence between noun and verb; and the more likely this divergence is to be in the base as well as in the prefix. So, for instance, *rébel* ~ *rebél* in the non-recurrent bound-base set: the prefix has a different vowel in the noun, /ɛ/, than in the verb, /ɪ/; and likewise the base has /ə/ in the noun, /ɛ/ in the verb. This word is not untypical of the non-recurrent bound-base group: over a fifth, 22% of them, show segmental divergence from their doublet in both the prefix and the base. The nouns of these pairs, unlike those of almost all the other stress-doublets, have no secondary stress on their bases, which can therefore contain reduced vowels. So these bases are the least pword-like, as well as being non-recurrent.

In the main Latinate sub-group, the *convict* words, where both prefix and bound base are recurrent, only 4% show segmental divergence in both base and prefix. And of course in the borderline-free-word-base group, there are no differences at all in the base between verb and noun. The stronger a noun-verb pair's claim to internal complexity, the less segmental divergence there is between noun and verb, and the more likely this divergence is to be restricted to the prefix alone. These segmental differences can be explained by the suprasegmental behaviour of the Latinate prefixations (the subject of the next section): the prefixes, while primary-stressed in the noun, may be stressless in the verb, and therefore generally have the reduced /ə/, or /ɪ/, as their vowels.

Before we discuss suprasegmentals, there is another way in which the Latinate prefixes' segmental phonology differs from that of the productive prefixes: they have allomorphy other than the stress-governed vowel alternations. As noted in section 2.6, a characteristic of productive English prefixes is that they have no allomorphy: they are always realised in the same way. So, for example, there are no consonant assimilations or losses.[12] But this is exactly what we do find with the Latinate prefixes: *coN-* provides a good example. It surfaces with a bilabial nasal when the base begins with a bilabial consonant (*combine*, *compound*), with an alveolar nasal before alveolar consonants (*conserve*, *contrast*), and, in one case in the data, with a velar nasal before /k/ (*concrete*). There is one example in the stress-alternating nouns and verbs of assimilation and loss of the nasal before /l/, *collect* - cf. cases outside this set of data such as *collude*, *corrupt*, *correct*.

So, this prefix can have various different forms, some dependent on nasal-to-liquid assimilations which surely do not form a part of synchronic English phonology. This provides more evidence that these Latinate forms, if complex, must have Stratum 1 complexity. As well as being suprasegmentally different from productive prefixations, segmentally their phonology seems much more complex than we would expect from a Stratum 2 prefixation.

3.4.3.3 Suprasegmental behaviour of Latinate prefixes

The Latinate prefixes, unlike the productive prefixes, exhibit none of the typical characteristics of the phonological word. As we have already seen above, they are certainly not always stressed – indeed, they are almost never stressed in the verbs. While they are primary-stressed in nouns, there is the distinct possibility that this is because of the general operation of English stress rules (which assign leftmost stress in bisyllabic nouns unless the second syllable has a long vowel – see Chapter 5 below), rather than because of any prefixal status they may have.

Furthermore, the Latinate prefixes do not conform to minimal word-size requirements, i.e. having a long vowel or at least one coda consonant, if monosyllabic. Very often they are light syllables, with a simple CV shape: thus *re-*, *de-*, *pre-*, *pro-* are /rɪ/, /dɪ/, /prə/, /prə/ respectively, as in the verbs *refuse*, *defect*, *present*, *project*.

[12] Once again, remember *iN-*.

Of course the nominal Latinate prefixes, being stressed, do follow the minimal word constraint, since English stress is weight-sensitive - i.e. all stressed syllables must be heavy. But where the prefixes themselves do not contain a long vowel or a consonantal coda, they syllabify across the morphological boundary, using the first consonant of their bases as codas: thus *rebel*, morphologically *re.bel*, but syllabically *reb.bel*, the /b/ making up prefixal syllable weight although it should belong to the base; and similarly the nouns *ally*, *addict*, *affect*, *present*, *prospect*, *affix*. Syllabification also occurs across the morphological boundary in verbs like *dispute*, where the prefix is consonant-final: the /s/ becomes part of the onset of the base's syllable, i.e. *di.spute*. This contrasts with a productive prefixation like *misprint*, which may not be syllabified as *mi.sprint*, in spite of the onset maximisation principle. So again, in not forming separate domains for syllabification, the Latinate prefixes lack the pword characteristics of the genuine, productive, English prefixes.

So, the suprasegmental phonology of the Latinate prefixations differs significantly from that of the productive prefixations. But, as with their segmental phonology, the Latinates are not one homogeneous group in this respect. In the nouns at least, they appear to be more likely to meet the pword criteria met by the productive prefixes, the greater the claim to morphosemantic compositionality any given formation has. That is, the prefixes seem more likely to have long vowels, and more likely to syllabify separately from their bases, as we move along the cline of morphosemantic compositionality from the bound-non-recurrent *rebel* group, through the bound-recurrent *convict* group, to the borderline-free-word-based *rebound*, *imprint* group. This behaviour matches that of the segmental phonology, where greater morphosemantic compositionality means less segmental difference between verb and noun.

This can be illustrated with the examples already given in the discussion on morphological representations in sect. 2.7. Consider the nouns *rebel* (from the non-recurrent group); *record*, *refuse*, *remit* and *reject* (from the recurrent-bound-base group); and *recoil*, *rebound* and *rewind* (from the borderline-free-word group). The prefix has the short vowel /ɛ/, and syllabifies across the morphological boundary, in the first three words. But in *remit* and *reject*, and in all of the final group, the prefix has the long vowel /i:/, thus obeying the pword minimal size requirement, and independent syllabification. It also means something, i.e. 'back(wards), away' in the last three words. The same happens, on a lesser scale, with *pre-*: in *presage*, with a non-recurrent base, it is /prɛ/; in the bound-based *present* and *premise*, likewise; but where it actually carries some meaning, as in the borderline case *prefix*, it is /pri:/.

While these correlations are interesting, though, the number of examples in the data is too small to draw any firm conclusions. And there is a possible counter-example in the shape(s) of *pro-*, which seems to vary randomly in nouns between /prɒ/ and /pro:/, with no semantic significance: *proceed* always has /pro:/, *produce* and *prospect* /prɒ/; but *project* and *progress* can have either, and there seems to be no way of accounting for this variation. While the phonology of the Latinate forms does become more typically prefixal the greater their morphosemantic claim on internal complexity, this is more clearly illustrated in the segmental differences between noun and verb, than in the suprasegmental behaviour of the prefixes.

3.4.4 Phonology of the stress doublets: a summary

Before moving on to Chapter 4's exploration of the semantic relationships between the verbs and nouns, I summarise the phonological findings.

Phonologically the stress-doublet data splits into two main groups. On the one hand we have the productively prefixed words and the particle formations. These all have two stresses, one on the base and one on the prefix; the only phonological difference between the verbs and nouns is that of primary stress placement, since segmentally they are identical. Their prefixes all share the pword characteristics discussed in sect. 2.6 above, namely: they form a separate domain for syllabification; they always bear stress; and they are at least of minimal word size. And they show no allomorphy, always having a consistent form.

The other main group is the Latinate prefixations. These typically have a different stress pattern from the productively prefixed and particle words: while the nouns have primary stress on the prefix and secondary stress on the base, the verbs have no prefixal stress at all, with only the base syllable heading a foot. This means that the vowel in the verbal prefix is often reduced – so, since the primary stressed nominal prefixes always have full vowels, there is a very high rate of segmental divergence between verb and noun. And, of course, it means that the Latinate prefixes do not share the pword characteristics of the productive prefixes: not only do they lack consistent stress, but they may also syllabify across the morphological boundary, and fall short of the minimal word requirements. A further un-prefixal trait they share is that they exhibit widespread allomorphy, both in consonants and vowels.

The Latinate prefixations are not homogenous though: they have differing phonological tendencies, a fact which supports their morphosemantically-motivated separation into three groups, and also supports the decision to keep the third group (borderline-free-word-based forms like *imprint*, *rebound*) separate from the productive prefixations. Firstly, the first Latinate subgroup, the non-recurrent bound-base prefixations like *rebel*, contains the only nouns which stress only the prefix, with no secondary stress on the base. These monopedal nouns make up over a fifth of their subgroup. Secondly, there are differing rates of noun-verb segmental divergence between the three Latinate subgroups, notably with the borderline-free-word based forms (*refund*, etc.) having about half as much divergence as the other two groups. However, this divergence still covers a high proportion of the words in this subgroup. Thirdly – although this is the least well-supported finding – it seems there may be a correlation between how close phonologically a prefix in a particular formation is to being a pword, and how morphosemantically compositional the formation is.

I have also touched on the issue of lexical stratification during the discussion of the data's phonology. Basically, I have argued that the transparency and regularity of the productive prefixations' phonology strongly suggests they should be formed on Stratum 2. And the ease of relating verb to noun, with just a simple change in foot prominence, points to a Stratum 2 relationship between them. By contrast, the allomorphy and extensive vowel reductions in the Latinate formations mean their prefixal structure is more likely to exist on Stratum 1. The extent of the segmental differences between verb and noun, as well as the fact that their suprasegmental differences are in the presence or absence of feet, rather than just in relative prominence between feet, also indicate a first-stratum relationship.

The issue of lexical stratification will of course recur throughout this thesis. Now, though, it is time to leave the phonology aside, and examine the semantic relationships between verb and noun, in both the stress-alternating and non-stress-alternating sets of data.

Chapter 4: The Data II: Semantic relationships between nouns and verbs

4.1 Introduction

In this chapter I will explore how close and how regular the semantic relationships between the paired nouns and verbs in both the stress-doublet (*convict*) and the non-stress-alternating (*consent*) sets are. The main questions I want to answer are: Does the (generally assumed) verb-to-noun 'stress derivation' have a particular semantic function? How regular is it compared with verb-to-noun zero derivation, with no stress alternation? And do the answers to these questions depend on the internal morphological structure, i.e. the type of prefixation, of the input verb? In other words, is there a difference in the verb-noun relationship between the Stratum-1-type Latinate prefixations like *invite*, *convict* and *dispute*, and the Stratum-2-type productive prefixations of the *misprint*, *resit* set? If there is, it will be interesting to see which group the borderline *rebound*, *incline* nouns and verbs align themselves with. Could their semantic relationships suggest that splitting the lexicon into two discrete blocks is oversimplifying? Plus, examining the different noun-verb semantic relationships and their regularity will tell us whether there should be a productive verb-to-noun rule on Stratum 2 of the BDLP model, or whether the verb-noun relationships in these different groups are best treated as first-stratum.

So, the possible interaction of prefixation processes with verb-to-noun derivation should shed some light on the issue of lexical stratification. And whether or not it is appropriate to posit a live verb-to-noun derivational morphological rule on Stratum 2 is an important question, since if (as we have suggested) the *resit* and particle-prefixed verbs are only themselves created on that stratum, they would be unavailable for an earlier, first-stratum nominalisation process.

As will already be clear, the non-stress-alternating *consent* set of paired nouns and verbs forms a control, or perhaps rather a comparison group here. They have been selected because formally they have nearly everything in common with the stress alternators except the stress alternation itself. They are predominantly bisyllabic prefixations, with monosyllabic bases; they form noun-verb pairs in which the verb is generally assumed to be basic, the noun derived (cf. Marchand 1969: §5.5-5.7)). The only difference is that there is no stress alternation, or any other kind of phonological variation, between the verbs and nouns. So, by examining their semantic relationships, I will see whether there is any difference in regularity between zero-derivation and stress-derivation.

I add another dimension to this study by examining the semantic nature and regularity of alternative, i.e. suffixal, nominalisations of the verbs. Analysing the semantics of the relationships between the stress-derived and zero-derived nouns and verbs gives us only half of the picture: these must be considered in the context of the whole web of nominalising morphological relationships surrounding each verb. How regular these alternative forms of nominalisation are might explain, or at least shed light on, the regularity or irregularity of stress- or zero- derivation. This could also open up questions about blocking relationships. Blocking was introduced in section 2.3; for present purposes it can be characterised as a relationship between two rules, A and B, where the potential inputs to A (a comparatively minor rule) form a subset of the potential inputs to B (a more general rule). If A's output is semantically the same as B's, but phonologically distinct, then A will apply and block the application of B. Here, the alternative nominalisations of the verbs I am examining may well have the same kind of semantic results as the zero- or stress-derivations. Blocking relationships, and the question of how they interact with lexical stratification, could be of interest here.

A note about the use of the term 'nominalisation' is needed. I try not to make any assumption about the direction (if there is one) of the relationship between the nouns and verbs in the data, although, as noted, it is generally assumed that in both the stress-derived and zero-derived words, the verbs are basic and the nouns derived (cf. sects. 3.2.3 above & 4.2.2 below). In the case of these 'alternative nominalisations', though, the term seems apt because there are no alternative verbs morphologically related to the nouns.

Detailed and comprehensive analysis of all the individual semantic relationships within a particular morphological pattern is unusual in a study such as this, and is not generally common. Aside from handbooks such as Marchand (1969), the only similar investigation of which I am aware is Clark and Clark (1979), who examine the range of semantic types of noun-to-verb zero derivation, but limit their data to nouns denoting concrete objects; cf. also Buck (1997)). But such depth and breadth is necessary if we want accurate answers to the questions asked above. A handful of supposedly representative examples cannot tell us very much about the real semantic regularity of a whole morphological group – especially in a process such as this stress derivation, where the inputs are of many diverse types. The fact that all the nouns and verbs here share a stress pattern and a syntactic category relation does not mean that they are all part of one regular morphological derivation. Nominalisation can take various semantic forms, and only if there is consistency in this, as well as in the phonological relationship, can we say there is a clear morphological rule relating noun and verb.

4.2 Methods of semantic analysis and comparison

4.2.1 Definitions of the nouns and verbs

I have gathered definitions for each noun and verb in the data from the three single-volume dictionaries mentioned in sect. 3.2.2, i.e. the *COD*, *Encarta* and *Collins*. Obviously there is variation between these dictionaries; my definitions, given in Appendices II and III, and in the example table below, represent a consensus opinion.

In some cases, generally in the Latinate vocabulary, a word may have one meaning related to that of its partner noun or verb, and one which is totally unrelated. Where the unrelated meaning is much commoner than the related meaning (i.e. where it is clearly the primary definition of the word, and the related meaning is rare or old-fashioned), this has been taken into account in the categorisation of relationships.

There are also cases where a given noun or verb may have two different definitions related to that of its partner; again, I have allowed for this in classifying the relationship between noun and verb.

4.2.2 Categorisation of the noun-verb relationship

The noun-verb relationships are basically categorised according to which of the verb's arguments or thematic roles the noun represents, if any. Alternatively, the noun may either refer to the action of the verb or an instance of this action; or noun and verb may be unrelated.

Category membership is established in two ways: one of these is paraphrasing the noun in terms of the verb, so for example the noun *produce* is 'that which has been produced'; the noun *delight* is 'state of being delighted'; the noun *rebel* is 'one who/which rebels' (cf. Clark and Clark 1979: 769). The second method is considering a simple example sentence in which the verb is used with all its arguments, to see which one the noun represents. E.g. with *attire*, an example could be 'they attired her in velvet robes', i.e. 'x attires y in/with z': the noun *attire* represents z, the velvet robes.

Again, at this point, I should note that this approach does not entail any assumption of a direction of derivation; it is simply a useful way of classifying noun-verb relationships. Clark and Clark (1979) investigate just the reverse of nominalisation, i.e. verbs derived from nouns – but they use a similar kind of categorisation, with base nouns representing roles such as the Instrument or Goal of their derived verbs.

I should also note that the categories themselves could be described as syntactic as well as semantic, being a combination of grammatical terms such as 'Object' and thematic roles like 'Locative' and 'Instrument'. (The terminology is that of Comrie and Thompson (1985), on whose work my categorisation is based - see below). 'Semantic' is really used as a cover term for the non-phonological side of the morphological relationship. My interest is in identifying the closeness and regularity of the morphological relationships between these nouns and verbs, and these relationships may have a syntactic as well as a semantic dimension. Given the diversity of the groups of nouns and verbs in question, this syntacto-semantic categorisation seems to be the best way of dealing with them.

An objection may be made to this method of evaluating the semantics of the verb-noun relationship on the grounds that what categories are open to the nouns will depend on the internal semantics of the verbs: if a verb is intransitive, for example, there is no way its partner noun may represent an object argument. But – again - the purpose of this exercise is to find out about regularities in these noun-verb relationships. A word-formation rule may have (semantically or syntactically) varied inputs, and this need not affect its generality; but if we cannot state coherently its semantic effect - its output - then it is not a unified, generalisable rule. Besides, as we will see below, the commonest category in the stress-alternating nouns is one which can be created from practically all verbs in the language, so, lexical category aside, there are no limits on its input.

4.2.3 The categories: previous studies

What the possible types of lexical nominalisation (or noun-verb relationships) might be is a question which has apparently received surprisingly little attention. Muysken's (1999) article "Nominalization" is representative of the general trend in placing much greater emphasis on syntactic than on lexical nominalisation (and cf. Rappaport (1983)). Hence, there are not many precedents for the kind of categorisation attempted here.

Marchand (1969) does describe the possible semantic/ syntactic range of the morphological operations he lists, though his syntactic divisions (e.g. Object, Predicate) are not as finely-made as those mentioned below, and his listed semantic effects of particular word-formation patterns do not have the general applicability which would make them useful here.

Clark and Clark (1979) classify their denominal verbs according to the case roles given by Fillmore (1968, 1971), which (for these purposes) are broadly comparable with the thematic roles developed by Gruber (1965) and discussed in, among many others, Jackendoff (1972), Dowty (1991), and the papers in Wilkins (ed.) (1988) and Roca (ed.) (1992). However, there is little consensus on what roles are necessary for linguistic analysis, which makes it very difficult to specifically categorise nouns which do not seem to belong to the core group of (for example) Agent, Patient, Theme, Experiencer, Goal, Instrument and Locative. Literature on thematic relations is not generally derivationally-morphologically-orientated, and where it is (e.g. Rozwadowska (1988), Booij (1992)), interest has focused on the verbal roles which nouns may inherit, rather than the ones they may represent.

One useful exception is Comrie and Thompson (1985), who consider the various types of morphological nominalisation found in languages across the world. Their work on categorising deverbal nouns is worth discussing in some depth; this I do in the next section.

4.2.4 Comrie and Thompson's types of nominalisation and my adaptation of them

Comrie and Thompson list seven different types of nominalisation, with a fundamental split between those nouns which represent an argument of the verb, and those - action or state nouns - which do not. Their types are as follows in table 4.1:

Table 4.1 Comrie and Thompson's seven categories

Type of nominalisation	Gloss
A. Action/ state	'the fact, the act, the quality, or occurrence of that verb'
B. 1. Agentive nouns	'one which "verbs"'
2. Instrumental nouns	'an instrument for "verbing"'
3. Manner nouns	'way of "verbing"'
4. Locative nouns	'a place where "verb" happens'
5. Objective nouns	'the result..or the ...object of an action' [cf. Marchand 'that which has been "verb"ed']
6. Reason nouns	'the reason for "verbing"'

(collated from Comrie and Thompson 1985).

Comrie and Thompson's list is intended as a general cross-linguistic account of nominalisation types, however, and is therefore not entirely appropriate for an in-depth analysis of English alone. So, I have modified their list to produce one which fits this data more closely. These changes merit some explanation, so I will discuss them below before going on to give the full list of my own categories, and some examples of their application.

The first thing to note about lexical nominalisations is that they are highly susceptible to semantic drift away from their verbs. The nouns come to have particular restrictions in their meanings, and are no longer generally applicable to any instance of the particular argument of the verb they represent. Comrie and Thompson themselves remark on this, saying 'it is very common to find a deverbal noun taking on special and unpredictable meanings' (1985: 357). Where nouns in the data do still represent either the action or one of the arguments of the verb, but only in specialised senses, this has been noted, with the nouns categorised 'Action (spec.)', 'Locative (spec.)' and so on. For example, the noun *transplant* can be both an Action noun ('the act of transplanting') and an Object noun ('the thing transplanted'). But in both cases its meaning is specialised, since it refers only to the surgical, rather than the general, meaning of the verb *transplant*.

These nouns have not been included in the totals for the categories (Action, Locative, etc.) in question, because the semantic specialisation means the relationship with the verb is not really generalisable.

A further qualification which may be added to all categories is 'subsidiary', where either the noun or verb has more than one meaning, and the dominant meaning is unrelated to that of the partner noun or verb. The meaning which does relate the noun or verb to its partner is definitely subsidiary, being either rare or old-fashioned. An example is *commune*: the verb means 'to talk intimately with', and while the noun may mean 'intimate conversation', it much more commonly refers to a 'group of people living together' in some sense. This latter meaning is the only one given in three EFL dictionaries I consulted (*Collins*, *Longmans* and *Oxford Advanced Learner's*), which, being corpus-based, provide a useful guide to the frequency of a word's use.
I also add a new category to Comrie and Thompson's list, 'Unrelated', which is self-explanatory. It is used in cases where the noun bears no semantic relation to the verb at all, or where the relationship is so specialised that the two words are effectively unrelated. *Desert* is a good example here: a desert may be described as a place which is deserted, but this link is not strong enough to merit anything other than an 'Unrelated' classification. Drawing the line between specialisation of meaning and unrelatedness is probably arbitrary in some cases; but my main aim here is to separate the relations which may be captured by rule or generalisation from those which may not, and whether a relationship is specialised or unrelated, it clearly falls into the 'not' camp.

To return to Comrie and Thompson's original categories, they include two which are not really morphologically expressed in English: Reason and Manner. I have not used the former at all; only three nouns in the data could possibly fall into the latter, so it is used, but is certainly not significant to the overall results. (On 'Manner' cf. Marchand (1969: §5.6.3.9)).

Other categories given by Comrie and Thompson which are not well-represented in this data are Instrument and Locative nouns, though they are still used. Agent nouns are also low in number, possibly because of the strong association of this thematic role with the *–er* nominalising suffix (as in *invader*, *cleaner*, etc.).

The Action category is the commonest in the data, and is probably the most broadly defined. It can mean the action of the verb, an act, fact, quality or instance of the verb's occurrence; or it can represent the state of the verb's being, as *delight* or *alarm*. As Anderson (1985: 18) says, there is 'an action nominal for virtually every verb in the language', so this breadth of definition is probably inevitable, given the range of possible verbal meanings, concrete or abstract, transitive or intransitive, state, process or event. Even though the Action category is strongly associated with the suffixes *–ation* (for Latinate verbs) and *–ing* (the default action nominaliser which can attach to practically any verb), it still emerges as a major function of stress-derivation.

However, delimiting the Action category can be difficult. From the meaning 'instance of the verb's action', it is only a short step to 'result of the verb's action', and here the Action and Object categories overlap. This is implicit in Marchand's description of the *-ing* suffix, where the examples of different meanings progress from 'action of –' to 'particular single instance of –' to 'concrete result of the verbal action', e.g. *building*, *clearing*, which fit the Object definition of 'that which has been verb-ed' (Marchand 1969: §4.48). The place of result nominals in this scheme of categorisation is unclear: Comrie and Thompson (1985: 355-6) include them in the Object group, while Muysken (1999: 249) places them with Action nouns.

One way of dealing with the issue would be to introduce a new Result category for nouns such as *digest*, *record*, *impress*, *refund*, but I have not done this. Instead, if the noun could possibly be described as 'act of verb-ing', 'example or instance of verb-ing', or 'state of being verb-ed' I have included it in the Action group.

Otherwise, I have put it in the Object group – but this is a modified Object group. Following Fillmore (1968: 4) I have made a distinction between Affected and Effected Object. Thus nouns like *record* and *impress*, which represent new entities brought about by the action of the verb, are Effected Objects; while nouns like *convict* or *inlay*, which are not new entities, but existing ones acted on by the verb, are Affected Objects. There are also nouns which represent existing entities so fundamentally changed by the verb's action that I describe them as Effected, e.g. *annex*, *excerpt*, or *conserve*.[13] This affected – effected distinction proves very interesting with respect to the productive *re-* prefixations, as we will see below.

Staying with Objects, I have also added the category Indirect Object, for nouns such as *overburden*, *overweight*, *accent*, *pigment*. I do not consider these to be Instruments because they are an inherent part of the result of the action (cf. Clark and Clark 1979: 778); but they cannot be paraphrased as 'that which has been verb-ed' and therefore cannot be included as direct Affected or Effected Objects. They are not really Agents, since the verbs generally

[13] Fillmore's illustration of the distinction between Affected and Effected object is the difference between the sentences *John built the table* and *John ruined the table*. The question 'What did John do to the table?' only makes sense with respect to the latter sentence, with the Affected, pre-existing, object. A similar test performed on *annex* and *excerpt* shows that they belong with the Effected group.

have animate agents. They would correspond to the Theme in traditional thematic role work, but this has turned out to be a controversial and underdefined category, best avoided here (cf. Rozwadowska 1988: 151, Dowty 1991: 548-9). Hence the labelling 'indirect object'.

Finally, I should note that there are a few examples in the data which cannot be categorised as nominalisations at all, because they are adjectives (included because they share the stress-doublet pattern). They have simply been noted as such.

So, the categories I have ended up with are:

Action
Agent
Affected Object
Effected Object
Indirect Object
Instrument
Locative
Manner
Unrelated
(Specialised/ subsidiary)

Nouns in all of the above categories (except Unrelated) may also be marked as specialised or subsidiary, as explained above. These are not included in the total figures for that category, since their specialisation renders the noun-verb relationship unpredictable.

4.2.5 Evaluating the alternative nominalisations

I have placed limits on which alternative nominalisations are included for consideration, excluding nouns formed by affixation of the agentive suffix *-er* and the action suffix *-ing*. These affixes can be attached to practically all verbs as, respectively, default agent or action nominalisers, even where other agent or action nominalising processes may apply. Because of this, I do not think taking them into account will shed much light on how nominalising functions are divided between other morphological processes. My real interest is in exploring

nominalising suffixes which cover the same semantic territory as, and therefore potentially compete with, or at least place limits on, zero- and stress-derivation.
The semantic relationships between the verbs and their alternative, suffixal, nominalisations have been classified in the same way as the stress-doublet and zero-derivation ones, although definitions have not been noted in my presentation of this data.
As well as assigning the nouns semantic/ syntactic categories, I have also noted whether or not they are more closely or transparently related to the verbs than the zero- or stress-derived nouns. As we will see, the main function of both stress- and zero-derivation is to produce action nominals. So where the suffixal nominalisations are action nouns, and the stress- or zero-derived nouns are not, I have considered the suffixations to be more transparently related to the verbs: the same applies where the suffixal nominalisations are more common than, or have less specialisation in meaning than, the stress- or zero-derived nouns.

To some extent these judgements rely on native-speaker intuition, so there is obviously a degree of subjectivity here. Given the nature of the question, though, this is unavoidable. All the judgements are noted in full in the final columns of Appendices II and III. I will discuss the results of the alternative nominalisation investigation in sect. 4.6 below, after presenting and discussing the results of the classification of the stress-derived and zero-derived nouns. Before this, though, I give a sample of the data from Appendices II and III, in which the stress-doublets and zero-derivations respectively are semantically defined and categorised, and any alternative nominalisations noted and categorised.

4.3 Sample Tables

The following tables give some idea of how the classification works in practice. The first (table 4.2) contains stress-doublet nouns and verbs, using the same sample as given in the phonology table in sect 3.4.1 above. The second contains non-stress-alternating nouns and verbs. In both, definitions for noun and verb are given, the noun's relationship to the verb is classified; and in the final column, the existence of any alternative nominalisations, and whether or not they are more closely related to the verbs, is noted. A full list of classifications of the noun-verb semantic relationships is given in Appendix II for the stress doublets, and Appendix III for the non-stress-alternating forms.

Table 4.2: Stress-doublet semantic classifications

	Verb definition	**Noun definition**	**Noun's relationship to verb**	**Alternative nominalisations of verb (* if rarer or less clearly related to verb)**
Latinate bound-base, non-rec.				
concert	to arrange by mutual agreement	musical performance / agreement, accordance	Action (subsidiary)	-
exploit	to take advantage of (resources, people) for one's own ends	deed, feat	Unrelated	exploitation (Action)
rebel	to resist or rise up against authority	a person who resists or fights authority	Agent	*rebellion* (Action)
Latinate bound-base, recurrent				
commune	to talk intimately with	group of people living together / intimate conversation	Action (subsidiary)	-
defect	to desert one's country, cause, etc. and join opposing forces	shortcoming, imperfection	Unrelated	*defection* (Action - 'desertion')
dispute	to argue, debate	argument, debate	Action	*disputation* (Action)
export	to send or sell goods/ services to foreign countries	goods/ services sent or sold to foreign countries; the process of exporting	Action & Affected Object	*exportation* (Action)
project	to predict, estimate / to stick out	proposal, scheme	Unrelated	*projection* (Action & Effected Object)
record	to set down in some permanent form	lasting account of sth	Effected Object	**recording* (Action & Effected Object (spec))
refuse	to decline to accept sth / to not grant a request	rubbish	Unrelated	*refusal* (Action)
reject	to refuse to accept, acknowledge, or use sth	sth rejected	Affected Object	*rejection* (Action)

transport	to carry people or goods from one place to another	act of carrying from one place to another / means of travelling	Action & Instrument	*transportation* (Action)
Borderline				
incline	to be disposed to do sth / to slope or slant	a slope	Action & Effected Object	*inclination* (Action)
rebound	to spring back, recoil	the act of springing back	Action	
recoil	to move back suddenly	sudden backward movement	Action	
Word-based prefixations				
interchange	to change places, exchange	the act of exchanging or changing places	Action	
misprint	to print (a letter) incorrectly	an error in printing	Action & Effected Object	
misshape	to shape sth badly	sth that is badly shaped	Effected Object	
remake	to make (esp. a film) again or anew	sth that is made again, esp. a film	Effected Object	
reshuffle	to shuffle again/ to interchange jobs within a government	act or instance of reshuffling	Action	
rethink	to think about sth again	act or instance of rethinking	Action	
retread	to put a fresh tread on a tyre	a retreaded tire	Effected Object	
rewrite	to write sth again	act or instance of rewriting/ sth rewritten	Action & Effected Object	

Particle compounds				
outlay	to expend	laying out, expenditure / that which has been spent	Action & Effected Object	
overdub	to impose additional sounds onto an existing recording	sounds imposed over a recording	Affected Object	
update	to bring (a person or information) up to date	act or instance of updating	Action	
uplift	to raise, elevate, lift up	elevation; act or process of lifting up	Action	
Particle prefixations				
overdose	to take or give too large a dose	an excessive dose	Action & Indirect Object	
overspend	to spend too much	instance of overspending	Action & Affected Object	
Others				
ferment	to undergo fermentation / to stir up excitement	agitation, unrest / agent causing fermentation / fermentation itself	Action & Agent (inan.)	*fermentation* (Action)
dictate	to say or read (words to be written down or recorded) aloud / to command authoritatively	authoritative command	Effected Object	*dictation* (Action)

Table 4.3 Non-stress alternating words' semantic classifications

	Verb definition	Noun definition	Noun's relationship to verb	Alternative nominalisations of verb (* if rarer or less clearly related to verb)
Latinate bound-base, non-rec.				
advance	to move forwards	forward movement, progress	Action	**advancement* (Action)
disdain	to refuse with disdain	feeling or show of superiority, contempt	Manner	
embrace	to hug	the act of embracing	Action	**embracement* (rare) Action)
release	to free from captivity	act of freeing	Action	
Latinate bound-base, recurrent				
accord	to be in harmony, agree	agreement, harmony	Action	**accordance* (Action)
appeal	to earnestly request	an earnest request	Action	
commute	to travel between home and work	journey made by commuting	Action	
preserve	to make sure sth lasts, incl. food	area of activity etc. sb has exclusive use of/ fruit preserved as jam	Effected Object (spec)	*preservation* (Action)
repose	to lie resting	state of rest	Action	**reposal* (Action)
Borderline				
disguise	to change sb or sth's appearance	sth worn or done in order to change appearance	Instrument	
reform	to change, improve sth	reorganisation and improvement	Action	**reformation* (Action)
Word-based prefixations				
misrule	to govern badly	bad government	Action	
mistrust	to be suspicious of sb or sth, lack confidence in	suspicion, lack of confidence in sb or sth	Action	

4.4 Results: The categorisations of the stress-doublet nouns

4.4.1 Introduction; raw figures

With the matter of categorisation settled, from this point we can begin to consider the questions asked at the beginning of this chapter – i.e. whether or not stress-doubletting has a particular syntactic/ semantic function ; how regular its function is compared with that of zero-derivation; and whether there might be a relationship between noun-verb semantic regularity and internal morphological structure. That is, can the stress-doublets be split into two groups in terms of the semantic relationships between noun and verbs, in the same way as they can be in terms of the phonological relationship between nouns and verbs? Remember from Chapter 3 that this phonological division correlated with one in internal morphological transparency: where the verbs' initial syllables bore stress, the forms were far more transparently internally complex; while where they did not (resulting in segmental differences between verb and noun), they had a weaker claim to internal prefixal complexity. However, there were degrees of morphological complexity among the 'weaker' group; these Latinate prefixations split into three subgroups, a division which might also be borne out in the analysis of the noun-verb semantic relationships.

I present the initial results here, spread over three tables, nos. 4.4, 4.5 and 4.6. These are rather complex but are given so that the range of results is available for reference.

In the first table, no. 4.4, the categorisations of the noun-verb relationships among all 204 stress doublets are given, with numbers and percentages of the nouns which fall into each of the main categories. The first three categories in the table are Action, Object (or rather the subcategories Affected Object, Effected Object, and Indirect Object), and Agent. All these figures exclude those nouns marked as specialised or subsidiary, because this is treated as a separate category; but include nouns which may represent more than one role – hence the numbers will add up to more than 204. The next category in the table is Unrelated; and then the number of Adjectives is given. The other categories used, as listed at the end of 4.2.4 (i.e. Instrument, Locative, Manner) are so underrepresented among the stress doublets that they are collapsed together as 'others'. Then, the number of nouns which are categorisable, but only with a meaning which is either very specialised (and therefore not generally representative of that category), or which is a rare or unusual, is given.

The final grouping is that of nouns which may represent more than one of the verb's arguments or thematic roles: such flexibility of reference actually varies across the different prefixal types of stress doublet. Most such nouns represent the Action and one other role; figures for the commonest combinations are listed.

Table 4.4 Nominalisation types over all stress-doublet nouns and verbs

Type of nominalisation		**ALL stress doublets**	
		Number	**Percentage (%)**
ACTION		85	41.7
OBJECT	Object – affected	24	11.8
	Object – effected	47	23
	Indirect Object	6	2.9
AGENT		11	5.4
UNRELATED		27	13.2
ADJECTIVES		5	2.5
OTHER CATEGORIES		7	3.4
SPECIALISED/ SUBSIDIARY	Action	10	4.9
	All Objects	9	4.4
	Agent	2	1
	Total spec. / subsid.	24	11.8
NOUNS WITH TWO ROLES	Action and agent	3	1.5
	Action and aff. object	5	2.5
	Action and eff. object	15	7.4
	Action and other	3	1.5
	Total rep.ing two roles	29	14.2
	TOTAL	204	

From table 4.4, we can see a first answer to the question of whether stress-doubletting has a particular function: for the pattern as a whole, the answer is, probably not. Action nouns form the largest single group, but at 41.7% they are a minority. There is a fair spread of nouns across the other categories too, with Affected and especially Effected Object (11.8% and 23% respectively), and the Unrelated group (13.2%) all well-represented.

However, if we go on to look at tables 4.5 and 4.6 , where the figures for the stress-doublet nouns are broken down according to morphological type (with the presentation of categories the same), a clearer and rather interesting pattern emerges. The tables are given on the following pages.

In table 4.5 the figures for the Latinate stress-doublets are given; in 4.6, the figures for the other morphological types (all as listed in section 3.3). With these results, we can begin to answer the questions of whether internal morphological structure is linked to the semantics of the noun-verb relationship; and whether the split between the 'Stratum 1'-type Latinate prefixations, and the 'Stratum 2'-type productive prefixations, which was particularly clear phonologically, holds in the transparency of the noun-verb semantic relationship too.

The answers to both of these questions are positive. If we look at the second-left column of table 4.5, where the categorisations of all the Latinate prefixations as a group are given, we see that the variability of reference apparent in the stress doublet nouns as a whole is exaggerated. Barely over a quarter (25.7%) of the Latinate nouns are Action nouns, a figure not much higher than the 22% which are semantically totally unrelated to their verbs – and compare the 18.3% which are only related to the verbs by a specialised or subsidiary meaning. This means that over 40% of the Latinate prefixal nouns have either an ungeneralisable semantic relationship, or none at all, with their stress doublet verbs. And where the relationships are generalisable they are not consistent, with 25.7% Action nouns, 12.8% Affected Objects, and 17.4% Effected Objects.
If we compare these figures with those for the productive prefixations, given in the second-left column of table 4.6, we see striking differences. The great majority of the *resit* nouns are Action nominals – 77.3% have this meaning, making it a strong, regular pattern. The unrelated or specialised/ subsidiary nouns are negligible (4.6% in total, slightly over a tenth of the proportion in the Latinate forms).

Table 4.5 Nominalisation types in the Latinate prefixal stress-doublets

Type of nominalisation		**Latinate (first-stratum) prefixal stress-doublets**							
		ALL		**Bound-base, non-recurrent**		**Bound-base, recurrent**		**Borderline**	
		No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
ACTION		28	25.7	2	11.1	19	26	7	38.9
OBJECT	Object – affected	14	12.8	-	-	11	15.1	3	16.7
	Object – effected	19	17.4	4	22.2	9	12.3	6	33.3
	Indirect Object	1	0.9	1	5.6	-	-	-	-
AGENT		5	4.6	3	16.7	2	2.7	-	-
UNRELATED		24	22	6	33.3	17	23.3	1	5.6
ADJECTIVES		4	3.7	-	-	4	5.5	-	-
OTHER CATEGORIES		4	3.7	-	-	4	5.5	-	-
SPECIALISED/ SUBSIDIARY	Action	10	9.2	3	16.7	4	5.5	3	16.7
	All objects	6	5.5	-	-	4	5.5	2	11.1
	Agent	2	1.8	-	-	2	2.7	-	-
	Total spec./ subsidiary	20	18.3	3	16.7	12	16.4	5	27.8
NOUNS WITH TWO ROLES	Action and agent	-	-	-	-	-	-	-	-
	Action and aff. object	2	1.8	-	-	2	2.7	-	-
	Action and eff. object	2	1.8	-	-	-	-	2	11.1
	Action and other	1	0.9	-	-	1	1.4	-	-
	Total rep.ing two roles	8	7.3	1	5.6	3	4.1	4	22.2
TOTAL		109		18		73		18	

Table 4.6 Nominalisation types in the particle-formed, productively-prefixed, and 'other' stress doublets

Type of nominalisation		Productive prefixations		Particle prefixations		Particle compounds		Others	
		No.	%	No.	%	No.	%	No.	%
ACTION		34	77.3	6	50	14	50	3	27.3
OBJECT	Object – affected	1	2.3	1	8.3	8	28.6	-	-
	Object – effected	17	38.7	2	16.7	4	14.3	5	45.5
	Indirect Object	-	-	4	33.3	-		1	9.1
AGENT		2	4.5	1	8.3	2	7.1	1	9.1
UNRELATED		1	2.3	-	-	2	7.1	-	-
ADJECTIVES		-	-	-	-	-		1	9.1
OTHER CATEGORIES		1	2.3	-	-	2	7.1	-	-
SPECIALISED/ SUBSIDIARY	Action	-	-	-	-	-		-	-
	All objects	1	2.3	-	-	1	3.6	1	9.1
	Agent	-	-	-	-	-		-	-
	Total spec./ subsidiary	1	2.3	-	-	2	7.1	1	9.1
NOUNS WITH TWO ROLES	Action and agent	1	2.3	-	-	1	3.6	1	9.1
	Action and aff. object	-	-	1	8.3	2	7.1	-	-
	Action and eff. object	12	27.3	-	-	1	3.6	-	-
	Action and other	-	-	1	8.3	1	3.6	-	-
	Total rep.ing two roles	13	29.5	2	16.7	5	17.9	1	9.1
TOTAL		44		12		28		11	

And the other clear pattern among the productive prefixations is the high proportion of Effected Object nouns, at 38.7%. A substantial number of the productively prefixed nouns represent both the Action and the Effected Object of the verb, a flexibility of reference quite lacking among the Latinate nouns, and which surely supports the idea of a transparent, productive relationship between verbs and nouns in this group.

From these basic figures it seems we can divide the stress doublets into two groups along stratificational lines. On the first stratum we have the Latinate prefixations, with obscured or unproductive internal morphology, with stressless prefixes in verbs and therefore segmental differences between noun and verb; and with semantically irregular relationships (or none at all) between noun and verb. And on the second stratum are the productive prefixations, with transparent internal structure, no segmental differences between noun and verb, and a regular semantic relationship between the two.

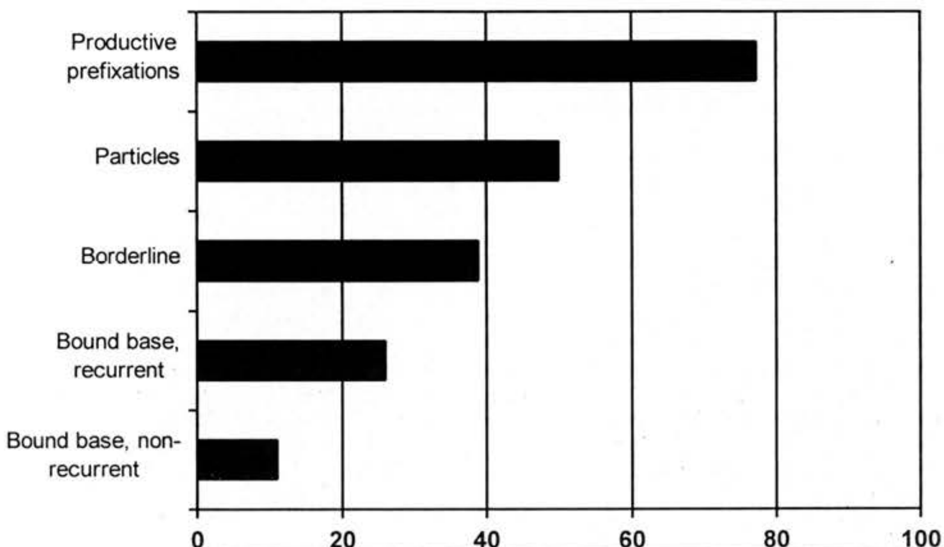
However, the picture is a little more complex than this. There are clearly differences in the regularity of the noun-verb semantic relationships among the three subgroups of Latinate prefixations: consider for example the proportion of nouns which are 'Unrelated' to the verbs. Of the Latinate prefixations with a non-recurrent, bound base this proportion is 33.3%; among those with a recurrent bound base it falls to 23.3%; and among the 'borderline' cases it is only 5.6%. Plus, there are the particle formations of both kinds to consider: phonologically these pattern with the productive prefixations, but in terms of the noun-verb relationships, with 50% Action nouns their allegiance is not so clear-cut.

Some more aspects of the stress doublets' noun-verb relationships, and how they relate to internal morphological structure, are considered in the following sections. In 4.4.2, I consider the spread of Action nominals among all the different prefixal or particle types, showing how the proportion of these correlates with internal morphological transparency. In 4.4.3 I look at the proportion of Effected Object nouns (which as noted, is especially high in the productive prefixations) and of nouns which represent more than one category. In 4.4.4, I consider the number of stress doublet nouns specialised in meaning or plainly semantically unrelated to their verbs. A summary of these findings is given in 4.4.5.

4.4.2 The Action nominalisations

As we have already seen, Action nominalisations, although a minority, form the largest single group in the data as a whole – but are far better represented in the productive prefixations than in the Latinate group as a whole. When we look at the figures more closely, we see that the proportion of nouns in each group which are Action nouns varies considerably, and in an interesting way: the higher the degree of internal morphological transparency a verb has, the more likely its stress-derived noun is to be an Action noun. This is shown in fig. 4a below:

Figure 4a: Proportions of Action nouns in different morphological groups



	Bound base, non-recurrent	*Bound base, recurrent*	*Borderline*	*Particles*	*Productive prefixations*
■ *% Action nouns*	*11.1*	*26*	*38.9*	*50*	*77.3*

While over three-quarters, 77.3%, of the productive word-based prefixations – the *resit*, *misprint* group – fit into the Action category, only one in nine (11.1%) of the Latinate prefixations which have a bound, non-recurrent base (the *rebel*, *concert* set) do. This difference is quite striking. Even more striking is the way the percentages of Action nominalisations climb as the prefixations become more transparent – more 'Stratum 2' in nature. The Latinate prefixations with a recurrent bound base (the *convict*, *dispute* set), analysed as morphologically complex on firmer grounds than those with a non-recurrent base, show 26% Action nouns. And the 'borderline' Latinates, much more transparently prefixations, but with either unproductive prefixal meanings, or not-quite-compositional semantics, have a notably higher rate of Action nominals, at 38.9%. Just as these forms are arguably morphologically in between Strata 1 and 2, so they are in noun-verb semantic relationships too.

The particle formations, both compounds and prefixations, are non-committal here, each group having 50% Action nouns – a proportion notably higher than that of the borderline prefixations, but much lower than that of the productive prefixations.

From these results, it looks as though the stress-derivation nominalisation does have a clearly-defined, regular function in the word-based prefixations, forming Action nouns. While it does not have this function in the Latinate prefixations, its link to internal morphological transparency is very interesting.

4.4.3 The Effected Object nominalisation, and nominalisations of more than one category

Effected Object is another category which at first glance seems to be better represented the closer the prefixation type is to being word-based and productive. Here are the figures:

Table 4.7 Effected Objects

Morphological category	*Bound base, non-recur*	*Bound base, recurrent*	*Borderline*	*Productive prefix'ns*	*Particle compound*	*Particle prefix'ns*
% Effected Object	*22.2*	*12.3*	*33.3*	*38.7*	*14.3*	*16.6*

Once again, the Stratum 2 prefixations have the highest proportion of nominalisations in this category – though the percentage is considerably lower than that for the Action nouns, at 38.7%. They are much closer to the borderline prefixations this time – 33.3% of the *incline* set have nominalisations which represent the Effected Object of the noun. However, the correlation with the degree of morphological transparency does not carry on down into the other Latinate prefixations in this category: only 12.3% of the recurrent-bound-based nouns are Effected Objects, compared with 22.2% of the less transparent, non-recurrent-bound-based ones.

Both types of particle formation, compound and prefix, this time group with the Latinate prefixations, having 14.3% and 16.6% Effected Object nominalisations respectively.

What is really happening here is probably not a correlation between internal morphological transparency and the incidence of Effected Object nouns, so much as a function of the semantics of *re-* prefixation. Whether or not a verb can have an Effected Object depends on its own semantics, especially on transitivity. And *re-* is well-represented among the productive prefixations (66% of them are formed with this prefix) – and regularly attaches to transitive verbs, producing verbs likely to have an Effected Object, one transformed by the process of verbing. This issue will be explored in sect. 4.7.

The other interesting thing about the Effected Object nominalisation is that the productively prefixed stress doublet nouns often represent both this *and* the Action of their verbs – see table 4.8 below:

Table 4.8 Action and Effected Object nominalisations

Morphological category	*Bound base, non-recur.*	*Bound base, recurrent*	*Borderline*	*Particle compounds*	*Particle prefixation*	*Productive prefixation*
% only Action nouns	*11.1*	*26*	*27.8*	*42.9*	*50*	*50*
% only Effect Obj	*22.2*	*12.3*	*33.3*	*10.7*	*16.6*	*11.4*
% Both Action and Effect Obj	-	-	*11.1*	*3.6*	-	*27.3*
TOTAL (% any of the above)	*33.3*	*38.4*	*72.2*	*57.1*	*66.6*	*86.4*

So, 86.4% of the word-based prefixations are either Action or Effected Object nouns, or both. The figures for the borderline Latinate prefixations, and for the particle prefixations, are also high (72.2% and 66.6% respectively), but not nearly as decisive, especially when we bear in mind that these two-category figures are lower than the percentage of Action nouns alone (77.3%) in the *resit* group.

So, a notable proportion of nouns in the word-based prefixations represent both the Action and the Effected Object of the verb. This flexibility of reference could be significant, suggesting a creative, productive relationship with the verb, and one which may contribute towards resistance to the attachment of any nominalising suffix.

Table 4.9 Nominalisations of more than one category

Morphological category	*Bound base, non-recur.*	*Bound base, recurrent*	*Borderline*	*Particle compounds*	*Particle prefix'ns*	*Productive prefix'ns*
More than one category	*5.6*	*4.1*	*22.2*	*17.9*	*16.7*	*29.5*

Once again, the word-based prefixations stand out, although the borderline Latinate prefixations are not so far behind. Indeed, this almost suggests that the (stratificational) line between the different morphological groups is in the wrong place: do the borderline-word-based prefixations group with the productive prefixations in terms of flexibility of nominal reference, or with the other, more definitely Stratum 1, formations? All we can say here is that it seems that the more transparent the internal morphological structure of the group, the more likely it is that the nouns will be flexible in their meaning, able to represent more than one argument of the verb.

Anyway, the morphological group with the clearest results in this section is once again the word-based prefixation group: their nouns stand out as the group most likely to be Action or Effected Object nouns or both, and most likely to be flexible in how they relate to the verbs. These therefore seem the best candidates for derivation by a live Stratum 2 verb-to-noun rule.

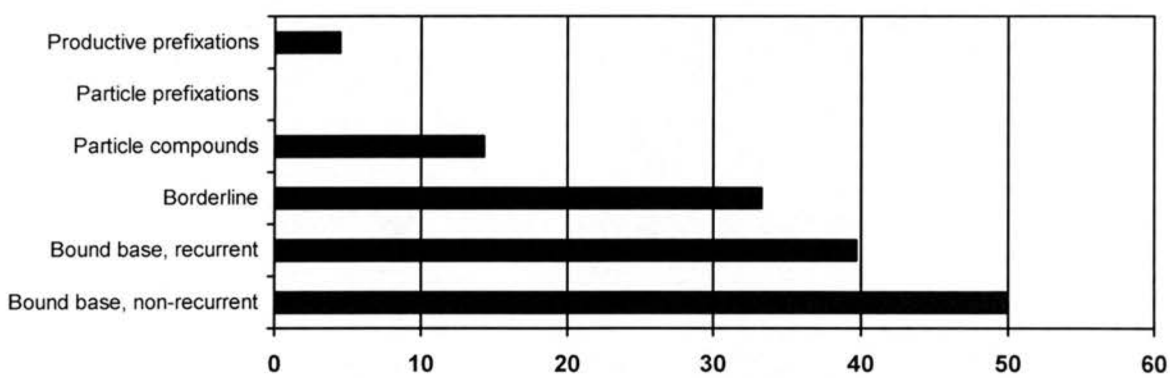
4.4.4 Nouns unrelated to their verbs, or specialised in meaning

It is time now for a look at the categories in which the Latinate nouns are best represented. These are the 'Unrelated' nouns, where there is no plausible semantic tie between noun and verb; and the nouns (of any category) marked 'specialised' or 'subsidiary', either because they are particularly specialised in their reference, and therefore cannot be straightforwardly related to their verbs, or because either the noun or the verb is only related to its partner by a rare or subsidiary definition. Nouns of all these categories I consider unrelatable to their verbs by any regular, generalisable rule. I give figures for these nouns in table 4.10; a chart showing the proportion of nouns with no regular relationship with their verbs in each group is given as fig. 4b.

Table 4.10 Unrelated, specialised or subsidiary nominal meanings

Morphological category	*Bound base, non-recur.*	*Bound base, recurrent*	*Borderline*	*Particle compounds*	*Particle prefix'ns*	*Productive prefix'ns*
% Specialised/ subsidiary	*16.7*	*16.4*	*27.8*	*7.1*	-	*2.3*
% Unrelated	*33.3*	*23.3*	*5.6*	*7.1*	-	*2.3*
Total %	*50*	*39.7*	*33.3*	*14.3*	-	*4.5*

Figure 4b: Irregular semantic relationships



	Bound base, non-recurrent	*Bound base, recurrent*	*Borderline*	*Particle compounds*	*Particle prefixations*	*Productive prefixations*
■ *Total % unrelatable*	*50*	*39.7*	*33.3*	*14.3*	*0*	*4.5*

Like the proportion of Action nouns, but unlike the proportions of Effected Object and of dual-role nouns, the proportions of Unrelated and specialised nouns show the borderline-word-based prefixations grouping firmly with the other Latinate sets. The percentage of nouns in the borderline group unrelatable to their verbs by regular rule, 33.3%, is not substantially different from that in the recurrent-bound-based group (39.7%).

Once again we see a relationship between internal morphological transparency and nominal membership of this particular category. The highest proportion of unrelatable nouns is in the least morphologically segmentable or transparent group of words, the non-recurrent-bound-based prefixations. Half of the nouns in this group are either completely unrelated to their verbs, or related only in a tenuous (irregular) way. It could be significant that this was the only group of nouns to show segmental phonological divergence from the verbs in both prefix and stem: the weakness of the phonological noun-verb relationship is reflected in the weakness of the semantic relationship.

The particle formations, especially the particle prefixations, here group with the productive prefixations in having a very low rate of unrelatedness between noun and verb. Only 4.5% of the nouns in the latter group show marked semantic divergence from their nouns; compare 14.3% of the particle compounds, and none of the particle prefixations. Some of the unrelatedness in these groups could be to do with the possibility that the nouns and verbs are (or were) independently formed by two separate live word-formation rules, rather than having drifted apart: this will be discussed in sect. 4.7 below.

4.4.5 Stress doublet categorisations: a summary

We have seen that the most commonly represented nominal categories among stress doublets are Action, Effected Object, and Unrelated or specialised nouns. The Affected Object category also has a number of members; Agent nouns are scarce. The proportion of nouns which represent the Instrument, Locative or Manner of their verbs is negligible.

The two main results from this survey are that, firstly, the productive prefixations stand out as having clear, regular noun-verb semantic relationships, while this is certainly not true of the Latinate prefixations as a group. The line drawn in Chapter 3 between the *resit* doublets and the 'borderline' cases on phonological and internal morphological grounds should on these semantic results still stand. But secondly, there is also a correlation between the transparency of internal morphological complexity and a generalisable semantic relationship between nouns and verbs.

The proportions of Action nominals in the different groups prove both of these points. There are far more Action nouns among the productive prefixations than among any other group (77.3% versus 50% as the next highest figure). But there are significantly more Action nouns in the 'borderline' Latinate prefixations (38.9%) than among the 'bound, recurrent base' ones (26%); and in turn this latter figure is far higher than that for the 'bound, non-recurrent base' Latinate prefixations (11.1%).

However, for the Effected Object category, the figures are not quite so clear: the word-based prefixations have the highest proportion, but the figure for the borderline prefixations is comparable, while the other Latinate prefixations have a low proportion of Effected Object nouns. The issue of the relevance of the semantics of the original verbs is discussed in section 4.7: it will be impossible for a derived noun to represent Effected Object, or Locative, for example, if the base verb does not have such arguments. The fact that most of the word-based prefixations are formed with *re-*, which has particular, transitive semantics, is particularly relevant here.

Other Object categories have not been discussed in this section, because they have fewer members in the data as a whole than Effected Object, and because they do not show such clear distributional patterns. One main exception here is the proportion of particle prefixations – a third - which are classified as Indirect Objects. Possible reasons for this will be discussed in sect. 4.7 below.

The third aspect of the categorisation results considered in this section has been the proportion of nouns which fall into more than one category. This is higher in the word-based prefixations than in any other group, though again the figure for the borderline cases is closer to that of the productive prefixations than that of the other Latinate prefixations. This apparent flexibility of reference could again point to a more productive (Stratum 2?) relationship between the verbs and nouns in question.

Finally, I have considered the percentage of nouns which fall into the Unrelated or specialised/ subsidiary categories. Far more of the Latinate nouns (including the borderline group) than of the word-based formations are unrelatable to their stress-doublet verbs by regular rule. In this particular case, the particle formations pattern with the productive prefixations, but with regard to the other nominalisation categories, their alliance with either the Stratum 2 group (productive prefixations), or the Stratum 1 group (Latinate prefixations), has been equivocal. However, they are very few in number, especially the particle prefixations, which with 12 members form less than 6% of the whole set of stress doublets.

The possible reasons for these results, and their implications, especially for the BDLP lexical stratification model, will be discussed in section 4.7. First, the results of the other two semantic inquiries will be given: in the next section, 4.5, we see the semantic patterns in the zero-derived nouns, and in section 4.6, we look at possible alternative nominalisations of the verbs in both sets of data.

4.5 Results: The categorisations of the *consent* nouns

4.5.1 Introduction; raw figures

As with the stress doublets in sect. 4.4 above, I present the overall results of the categorisation of the *consent* nouns in tables here. This time there are only two tables: 4.11, where the categorisation of the *consent* nouns as a whole group is given; and 4.12, where figures are broken down according to internal morphological category. The figures are tabulated in a very similar way as for the stress doublets, with the numbers and percentages for the categories Action, Object (subcategories Affected and Effected), Agent, Instrument, Unrelated and Others given; then the figures for the nouns with specialised or subsidiary meanings (which are not included in the main categories); and finally the figures for nouns which represent two roles (which are included in the main categories, so the numbers will add up to more than 100%).

The table of the *consent* nominalisation types is smaller than that for the stress-doublet nominalisations: fewer categories need to be represented. There are no nouns in the *consent* group which represent, for example, both Action and Effected Object; I do not give figures for Indirect Object, Object (spec.) or Agent (spec.) because the tiny number of examples does not merit it. Nouns which fall into any category not separately mentioned in the table are grouped under 'Other'.

Table 4.11 Nominalisation types of all non-stress alternating noun-verb pairs

Type of nominalisation		ALL non-stress alternating nouns	
		Number	**Percentage (%)**
ACTION		98	77.2
OBJECT	Object – affected	8	6.3
	Object – effected	5	3.4
AGENT		6	4.7
INSTRUMENT		5	3.4
UNRELATED		5	3.4
OTHER CATEGORIES		8	6.3
SPECIALISED/ SUBSIDIARY	Action	4	3.1
	Total spec. / subsid.	6	4.7
NOUNS WITH TWO ROLES	Action and agent	5	3.4
	Action and aff. object	4	3.1
	Action and other	3	2.4
	Total rep.ing two roles	12	9.4
TOTAL		127	

Table 4.12 Nominalisation types in non-stress alternating noun-verb pairs by internal structure

Type of nominalisation		Bound base, non-rec.		Bound base, recurrent		Border-line		Product. prefix'ns		Others	
		No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
ACTION		31	77.5	34	72.3	15	93.4	7	100	11	64.7
OBJECT	Object – affected	3	7.5	5	10.6	-	-			-	-
	Object – effected	1	2.5	4	8.5	-	-			-	-
AGENT		2	5	2	4.3	1	6.3			1	5.9
INSTRUMENT		1	2.5	-	-	-	-			4	23.5
UNRELATED		4	10	1	2.1	-	-			-	-
OTHER CATEGORIES		3	7.5	3	6.4	1	6.3			1	5.9
SPECIALISED/ SUBSIDIARY	Action	2	5	2	4.3	-	-			-	-
	Total spec. / subsid.	4	10	2	4.3	-	-			-	-
NOUNS WITH TWO ROLES	Action & agent	2	5	2	4.3	1	6.3			-	-
	Action & aff. object	2	5	2	4.3	-	-			-	-
	Action & other	3	7.5	-	-	-	-			-	-
	Total rep.ing two roles	7	17.5	4	8.5	1	6.3			-	-
TOTAL		40		47		16		7		17	

From these tables, it is immediately clear that regularity in nominalisation types is much greater in the *consent* group than it is in the stress-alternating words. The *consent* nouns show far less variation in the verbal roles they represent – they are overwhelmingly Action nominalisations. This is the topic of section 4.5.2.

The second point of interest to be discussed is the correlation discovered in the stress doublets between the semantic closeness and regularity of the noun's relationship with the verb, and the transparency and productivity of their internal prefixal structure. This correlation is not so clear-cut in the *consent* words. How they compare in this respect with the stress doublets is the topic of section 4.5.3.

4.5.2 The Action nominalisations

The overall proportion of Action nominalisations in the stress-alternating words was 41.7%. In the non-stress alternating group it is 77.2%. These figures point to a big difference between the two methods of nominalisation, stress-derivation vs. zero-derivation. And when we look at the percentages for each individual morphological type of zero-derived noun, this impression is definitely confirmed.

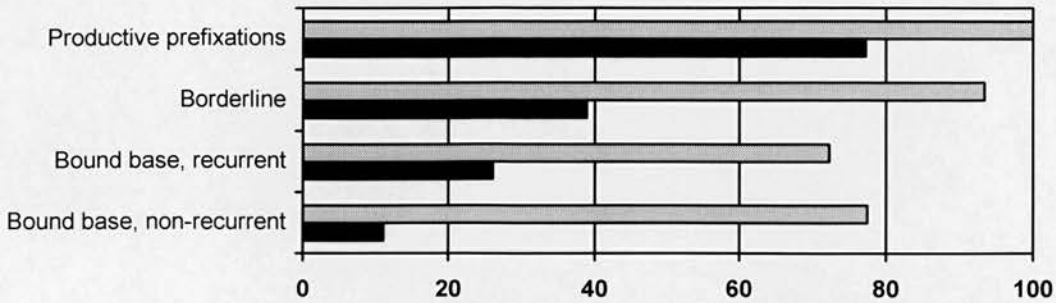
Table 4.13 Action nominalisations in the *consent* words

Morphological category	*Bound base non-recur.*	*Bound base recurrent*	*Borderline*	*Productive prefixations*
% Action	*77.5*	*72.3*	*93.4*	*100*

Even the two types of bound-based Latinate prefixations have a large majority of Action nominalisations, with around three quarters of the nouns falling into this category. Of the word-based prefixations, 100% are Action nouns – though there are only seven such words, so this result must be treated with caution. However, there may be a very slight correlation between the likelihood of an Action nominalisation and a verb's internal morphological structure, given that 93.4% of the borderline Latinate prefixations are Action nouns – a figure which sits in between those for the bound-based and word-based prefixations.

Look now at how the Action nominalisation figures for the *consent* nouns compare with those for the stress-doublets:

Figure 4c: Action nominalisations, stress alternators vs. non-stress alternators



	Bound base, non-recurrent	*Bound base, recurrent*	*Borderline*	*Productive prefixations*
□ *Non stress alternators*	77.5	72.3	93.4	100
■ *Stress doublets*	11.1	26	38.9	77.3

This is a very clear result: zero-derivation produces Action nouns. The function of stress-derivation, meanwhile, is far less well-defined; only among the productive prefixations is it comparable with zero-derivation in regularity.

4.5.3 The correlation between nominalisation category and internal prefixal structure

So, the zero-derived bisyllabic nouns show a massive preference for the Action category; but there may still be a slight correlation between the likelihood of an Action nominalisation and transparency of internal morphological structure. But what of the other types of nominalisation? These – especially the Objects and Unrelateds – were well-represented among the stress doublets.

All categories apart from Action are very weakly represented in the non-stress-alternating nouns: as can be seen from table 4.12 their percentages generally do not reach double figures. The 10.6% of the nouns in the recurrent-bound-based prefixation group which fall into the Affected Object category are exceptional, and do not seem to fit into any particular trend.

Because of the scarcity of non-Action nominalisations, there are few generalisations to be made about correlations between nominalisation type and internal prefixal structure. But the percentage of nouns which are either Unrelated, or of specialised or subsidiary meaning, is of some interest: the figures are given in the following table:

Table 4.14 *Consent* nouns unrelatable to their verbs

Morphological category	*Bound base, non-recur.*	*Bound base, recurrent*	*Borderline*	*Productive prefixation*
Total % unrelatable	*20*	*6.4*	*0*	*0*

A fifth of the non-recurrent bound-base prefixations have nouns which are either totally unrelated to their verbs, or related to them only by a specialised or subsidiary meaning. This figure drops by two thirds for the recurrent bound-base prefixations, which have greater claim to morphological complexity. And it drops to nothing for the prefixal groups which are most morphologically transparent, the borderline Latinate ones, and the word-based prefixations.

So these figures follow a similar pattern here as in the stress-doublets, although for that group they were much higher (see sect. 4.4.4), starting at 50% of the non-recurrent bound-based words.

All in all, though, the number of *consent* nouns which do not fall into the Action category is small, and shows less clear patterning than that of the stress-doublet nouns. The main conclusion to be drawn from this examination of the nominalisation types in the non-stress alternating *consent* noun-verb pairs is that they are nearly all Action nouns; other categories are minor. The regularity with which zero-derivation of nouns from bisyllabic, end-stressed, prefixal verbs produces Action nouns suggests that in the current model we need a second stratum verb-to-noun derivation with no stress alternation. Meanwhile, as we saw in sect. 4.4, stress-derivation from the same kinds of verbs does not have such a clear function, except where the verbs are word-based, productive prefixations. For these verbs (*misprint*, *rewrite* etc.) it seems we need a second-stratum verb-to-noun derivation with no stress alternation.

4.6 The alternative nominalisations

As described in sect. 4.2.5, I add a further dimension to the study of the semantic effects of stress- as opposed to zero-derivation by examining suffixal nouns derived from the verbs. Nouns formed with certain highly productive suffixes (e.g. *-ing* or *-er*) have been excluded on grounds of across-the-board applicability: listing each possible noun with these suffixes would not tell us much about how stress- and zero-derivation share their semantic space with other nominalisation methods. I have marked the existence of alternative nominalisations, and have also noted whether these nouns are more closely or transparently related to the verb. Since the main function of stress-derivation appears to be the formation of Action nouns (and since this is definitely the function of zero-derivation), I have concentrated on Action nominals here: if a suffixal nominalisation falls into this category, it is considered more transparently related to the verb.

The results of this examination of alternative nominalisations are very interesting. Firstly, there are clear differences between the Latinate prefixations (including the 'borderline' cases) on the one hand, and the natively-formed prefixations and particle forms on the other. The latter groups have no alternative action nominalisations at all: except for the very highly productive *-ing*, they accept no suffixation. Only the Latinate groups may take nominalising suffixes. This is hardly surprising, given the fact that most of the available nominalising suffixes (e.g. *-al*, *-ation*, *-ment*) are Latinate in origin. But it does quite starkly emphasise the (stratificational?) line between the two main groups of prefixations, Latinate vs. native.

Less predictably, there is also a very clear difference between the stress-alternating and the non-stress-alternating sets of words. The proportion of Latinate verbs with alternative nominalisations in the stress-alternating group is very high: 64.2%. So, almost two thirds of the *rebel*, *convict*, *recoil* verbs have suffixally derived nouns, mostly in -*(a)tion* (e.g. *rebellion*, *conviction*). By contrast, only 32% - less than one third – of the non-stress-alternating Latinate verbs (*respect*, *consent*) have suffixal nouns. This does not even amount to half of the rate of alternative nominalisations in the equivalent stress-doublet verbs.

Not only do the stress-doublet Latinate nouns have a far higher rate of suffixal siblings (or competitors?) than the non-stress-alternating Latinate nouns; it is also considerably more likely that these suffixations will be Action nouns, and commoner or more closely related to the verbs than are the non-suffixal nouns. Of all the stress-doublet verbs' suffixal nominalisations, 84.3% are more transparently related to the verb than the stress-derived noun. The equivalent figure for the *consent* verbs is 54.5% - substantially lower.

So, the Latinate verbs in the stress-doublet set are significantly more likely than those in the non-stress-alternating set to have alternative nominalisations; and these suffixal nouns are significantly more likely to be semantically closer to the verbs. Taking the figures as a whole, we find that 55% of the Latinate stress-doublet verbs are more closely related to suffixal nouns than they are to their stress-derived noun. Only 17.5% of the Latinate non-stress-alternating verbs have a closer relationship with a suffixal derivative than with their zero-derivative. So, the Latinate verbs with a stress-derived noun are three times more likely to prefer a suffixal nominalisation than the Latinate verbs with a zero-derived noun.

All these figures are collected in the following table.

Table 4.15 Alternative nominalisations

	Group	**Number with alternative nominalisations**		**No. of these noms. Action/ closer to verb's meaning**		**No. of verbs which have more closely related alternative noms.**	
		No.	**%**	**No.**	**%**	**No.**	**%**
Stress-alternators	Bound base, non-recurrent	11 / 18	61.1	10 / 11	90.9	10 / 18	55.6
	Bound base, recurrent	52 / 73	71.2	42 / 52	80.8	42 / 73	57.5
	Borderline	8 / 18	44.4	8 / 8	100	8 / 18	44.4
	TOTAL	**70 / 109**	**64.2**	**59 / 70**	**84.3**	**60 / 109**	**55**
Non-stress alternating	Bound base, non-recurrent	13 / 40	32.5%	7 / 13	53.8%	7 / 40	17.5%
	Bound base, both recurrent	16 / 47	34	9 / 16	56.3	9 / 47	19.1
	Borderline	4 / 16	25 %	2 / 4	50	2 /16	12.5
	TOTAL	**33 / 103**	**32 %**	**18 / 33**	**54.5**	**18 / 103**	**17.5**

The figures for each set, stress-alternating vs. non-stress-alternating, have been broken down into the three applicable morphological subtypes, to see whether any interesting differences emerge. Unfortunately this does not really tell us very much, except that in the stress-doublet verbs the borderline-free-word-based verbs are less likely than the other two types to have suffixal nominalisations: the figures are 44.4% with suffixal nouns in the borderline group, but 61.1% and 71.2% each in the non-recurrent and recurrent bound-based groups respectively. The figures in the non-stress-alternating groups follow a similar pattern, although they are much lower. This effect could possibly be explained by the fact that the 'borderlines' are not all strictly Latin or Romance loans; some at least are fossilised English prefixations created with native or strongly nativised bases which do not select Latin-derived suffixes, e.g. *rewind*, *rebound*.

These figures are interesting, and might have something to do with Blocking (see sects. 2.3, 4.1), whereby a rare or limited morphological process takes precedence over a more general one with semantically equivalent output. It seems that zero-derivation and *-ation* suffixation tend to be mutually exclusive, while *-ation* can happily apply to the same verbs as stress-derivation (I assume that zero- and stress- derivation do not apply to the same verb for reasons of phonological similarity). This issue is explored further in Chapter 6.

4.7 Discussion and conclusions

4.7.1 Semantic and morphological relationships between verbs and nouns: conclusions

So, after examining the semantic relationships between the verbs and nouns in the stress-alternating and non-stress-alternating groups, and between the verbs and any alternative, suffixal nominalisations they might have, what conclusions can we draw about these different morphological relationships?

Firstly, all these ways of relating nouns and verbs have one thing in common: where they have a regular function, it is producing Action nouns.

However, among the Latinate prefixations – all types, including *rebel*, *record*, *import*, *remit*, *incline* etc. stress-derivation has no regular function. It produces Action nouns, various kinds of Object nouns, semantically unrelated noun-verb pairs, and nouns too specialised in meaning to be productively related to their verbs, all in fairly equal quantities. This variability suggests that these stress doublets may not even be verb-to-noun derivations at all; they are certainly not formed by a regular, generalisable morpho-semantic or –syntactic rule. Just as their internal morphology is typically first-stratum (obscured, unproductive, irregular), so is the relationship between noun and verb.

For the productive, word-based prefixations in the stress doublet data, though, the results are quite different. This is the one group of stress-alternating nouns and verbs with highly regular semantic relationships. The great majority of the nouns are Action nouns; most of those which are not (and a notable minority of those which are) represent the Effected Object of the verb.

I mentioned in sections 4.4.3 and 4.4.5 that the predominance of Effected Object nouns in the *misprint* group could be something to do with the semantics of the prefix *re-*, which accounts for almost two-thirds of the prefixations in the group. After all, *re-* attaches only to transitive, non-stative verbs (Fraser 1976: 31, referring to Lakoff 1965): it gives the meaning '"verb" (object) again', and the verb's action will have a definite temporal end-point (cf. Marchand 1969: § 3.51.3 'it is with a view to the *result* of the action performed on an object that *re-* is used' [italics mine]). These two factors do not guarantee an Effected Object, but they do conspire to produce one. There will always be a newly (whether or not completely) "verb"ed object which has previously been "verb"ed; the implication is that the previous "verb"ing was unsatisfactory, or has been reversed. Therefore there is a high chance that in undergoing the "verb"ing again, the object will be changed substantially enough to qualify as an Effected rather than an Affected Object. So, if there is a verb-to-noun rule for these *re-*prefixations, then both its semantic input as well as its output may be clearly defined.

While the prefixal stress doublets can be split into these two main groups, there is also a general positive correlation between internal morphological transparency and the semantic regularity of the noun-verb relationship. This again could be partly due to the particular effects of *re-* prefixation – most of the word-based prefixations are *re-* prefixed verbs, for which stress-doublet nominalisation seems to be productive. If a group of verbs share a particular productive prefix, then they will also share particular semantics; as more homogeneous inputs to a nominalising rule, we might expect them to be more homogeneous outputs.

Meanwhile, the less transparent internal prefixal structure is, the more likely the verbs and nouns are to be semantically estranged. Among the Latinate prefixations, this may well be due to a long period of semantic drift, probably pre-dating their appearance in the English language. The 'borderline' group have the most transparent internal structure of the Latinate types, and have the clearer noun-verb relationships; this might partly be because they contain the more recently-formed fossilised prefixations in English (cf. Jespersen 1946: §28.23). In some ways they lean towards the productive prefixations rather than the Latinate forms.

However, despite these internal differences, all the Latinates do belong in a group together. This is especially noticeable with respect to the question of alternative, suffixal nominalisations. We saw in 4.6 that only Latinate stress doublet verbs have these – productive prefixations and particle formations never do. And the applicable nominalising suffixes almost always produce Action nouns; it is interesting that they only attach to verbs which have stress doublet nouns, where stress-doubletting does not regularly produce Action nouns.

Nouns which are zero-derived from bisyllabic Latinate verbs – the *consent* group – are regularly Action nouns[14], perhaps produced by a live verb-to-noun rule. I have tried to avoid assumptions about the direction of derivation, but the parallel between the *consent* nouns and their semantic relationships with their verbs, and the suffixal nouns and their relationships with their verbs, is clear; as is the fact that the verbs seem to be at the centre of a web of morphological relationships here: there may be various nouns related to the one verb, but no alternative verbs related to any one noun.

Assuming that semantic, as well as phonological or formal, regularity is a requirement for a live morphological relationship, then, the conclusions are quite clear:

- There is no live verb-to-noun 'stress derivation' among bisyllabic Latinate prefixations like *convict*; the noun-verb relationships are too semantically irregular. Differing degrees of regularity between the different subgroups may have historical reasons.
- Zero-derivation among the bisyllabic Latinate prefixed verbs like *consent* is a live morphological rule producing Action nouns.
- Bisyllabic Latinate verbs with stress-doublet nouns usually also have an Action nominalisation in *-ation*. The semantics of stress-derivation and *-ation* are distinct enough for blocking not to operate. But bisyllabic Latinate verbs with zero-derived

[14] Except for the small group of non-stress-alternators which are –exceptionally – end-stressed nouns with derived verbs, e.g. the Spanish loan *garotte*.

nouns do *not* regularly have an *-ation* nominalisation. Blocking appears to be in operation.

- Stress-derivation among the productively prefixed bisyllabic verbs is a live morphological rule, perhaps semantically circumscribed but productive within these limits.

4.7.2 Semantics, morphology and phonology in the data: some implications for base-driven lexical phonology

A detailed description of previous generative phonological treatments of the stress-doublet words will be given in Chapter 5, and a new, base-driven lexical phonological analysis of them (and the other sections of the English lexicon encountered in the data) is offered in Chapters 6 and 7. In this section, I look forward to these chapters by drawing together a few results from the morphological, phonological and semantic analyses of the data, and introducing some of the issues these raise within lexical phonology. This will involve a very brief outline of the architecture of the model (see also sections 2.2 and 2.3), which should serve as a kind of orientation for the chapters ahead.

As discussed in Chapter 2, then, lexical phonology makes one fundamental claim: that some phonological processes interact with morphological ones in the lexicon, and that some are postlexical. Base-driven lexical phonology (BDLP) makes the further claim that the English lexicon is split into two ordered levels. On the first level, or stratum, morphological processes are generally irregular, in semantic and/ or phonological effect. They are listed, rather than taking the form of rules; and, controversially, their inputs and outputs are (recursive) roots which may be bound, and which lack lexical categorisation. The morphology is interleaved with, and therefore may trigger, first-level phonological processes. The final morphological operation on this first stratum is the Root-to-Word rule: each potential word is listed for the noun-, verb-, or adjective-forming subpart of this rule. Subsequently, first stratum phonology has a final chance to apply, as long as it only builds new segmental or suprasegmental structures – it may not alter existing ones. Then, a given form is eligible for second-stratum morphology. This morphology, by contrast with that on the first stratum, is rule-based, productive and regular. Inputs and outputs are potentially free, lexically-categorised words, i.e. they are verbs, nouns, etc. Second-stratum phonology is not intertwined with the morphology in the same way as the first-stratum rules: instead, all the phonology applies in a block after all the morphology.

So, at first glance, how might the semantic, morphological and phonological characteristics of the nouns and verbs in the data be accounted for within such a model of the lexicon, and what problems might be encountered?

One of the first things to look at here is the question of the different kinds of prefixations (and particle-formations) found in the stress-doublet data. The Latinate prefixations seem to be good candidates for Stratum 1 formation, given the fact that many of the bases for the prefixations are bound, not free words, and that both the bases and the prefixes are semantically deficient. Meanwhile, the word-based prefixations of the *resit*, *misprint* set, with their regular semantics and phonology, seem appropriate candidates for Stratum 2 formation.

But where do the 'borderline' set of Latinate prefixations – the *rebound* words – fit in? We have seen in Chapters 3 and 4 much phonological, morphological and semantic evidence that they do not fit in completely with either the bound-based or the word-based prefixations, but instead occupy some kind of middle ground between them. This suggests it might not be appropriate to draw one absolute stratificational line across the middle of the lexicon, and that English morphology may be better seen as polar, i.e. as one continuum from obscurity to transparent complexity - a rather difficult suggestion for a lexically stratified model. Alternatively – and this is the approach I adopt here – we could interpret this result as suggesting that Stratum 1 is not homogeneous in the levels of morphological productivity and transparency it admits. The second stratum contains the clearly regular, productive morphology and phonology; the first contains the difficult cases. I return to this issue in Chapter 8.

This group of words and the general question of prefixation aside, this two-strata model does offer an immediate way of dealing with the two main kinds of stress-doublet noun-verb relationship. As we have seen in the previous two chapters, both the semantic and the phonological relationships between the *misprint*, *resit* nouns and verbs are transparent and regular, suggesting a Stratum 2 derivation – fortunate for the model given that the prefixations themselves should only be formed on this stratum.

Meanwhile, the fact that BDLP's stratum 1 morphology is listed, and does not involve lexical category, suggests a possible way of dealing with the Latinate stress doublets. The results of the last two chapters' research suggests they are not examples of live verb-to-noun derivation. The semantic and phonological relationships between them are far less regular than those of the *misprint* stress doublets. In the present lexical model (by contrast with other LP models) it might be possible to treat them as uncategorised roots, related to each other by listing. This possibility will be explored in Chapter 7.

Lexical phonology's treatment of morphological and phonological processes as distinct but interleaved means that what I have referred to as the separate processes of 'stress-derivation' and 'zero-derivation' may actually be examples of the same verb-to-noun morphological rule. The difference is that in the former case it is followed by a suprasegmental phonological rule which treats nouns and verbs differently, while in the latter case no such subsequent phonological rule applies. This means that the *consent* nouns may be derived from their verbs by the same rule which forms the *misprint* nouns from their verbs, as long as the difference in stress pattern can be accounted for. As we will see in Chapter 6, this is possible, as long as we do not assume that all the stress rules (i.e. those which build feet and those which determine the prominence between feet) should apply on the same stratum.

Another issue which this data raises is that of the interaction, or relative ordering, of different processes of Action nominalisation. What is the relationship between stress-derivation, zero-derivation, and suffixes such as *-al* or *-(a)tion*? All processes except the first in this list appear to select bisyllabic, Latinate, bound-base prefixed verbs as inputs: how do we account for the way this territory is divided between them? This is a particularly interesting question for BDLP, since some of the original motivation for its architecture came from the notion of Blocking (see section 2.3), whereby, given two morphological processes which may share the same input, the more specific process takes precedence over the more general one. How do the different methods of Action nominalisation of Latinate verbs fit into this model?

So, these are some of the issues of accounting for the stress-alternating nouns and verbs within a BDLP model which will be considered in full in Chapters 6 and 7. Before this, though, I shall review previous generative, and in particular lexical, phonological approaches to the stress doublets, looking at both their internal prefixal structure, and the external morphological relationship between verb and noun.

Chapter 5: Previous Analyses

5.1 Introduction

In the light of the detailed exploration of the phonology, morphology and semantics of the stress-doublet nouns and verbs (and of related chunks of the English lexicon) in Chapters 3 and 4, I now go on to examine previous morpho-phonological analyses of them. There is no account which covers the same range of data, but many authors have discussed particular aspects of stress-doublet morphology or phonology. The issue of the morphological complexity of the Latinate prefixations has most often been addressed; this I discuss first, in section 5.2.1. The other main morphological issue, the question of how the relationships between the stress-doublet nouns and verbs should be treated, is the subject of section 5.2.2. Phonologists who have analysed stress doublets in English have generally restricted their analyses to the Latinate prefixations rather than considering the whole range of morphological types which enter into this pattern; this is true of the generative metrical phonological analyses discussed in section 5.4, and implicitly true of Kiparsky's (1982) LP analysis, discussed in section 5.5. These approaches are most in line with the BDLP model being tested in this thesis; but a more recent, and very different analysis, that of Raffelsiefen (1999), cast in a prosodic phonology/ optimality theoretic framework, explores both Latinate and natively prefixed forms: this is examined in section 5.3.

5.2 Morphological analyses of the Latinate bound-base prefixations

5.2.1 Internal segmentability

A working definition of morphological complexity has already been given in section 2.7 (and see also 3.3), where it was said to be justified on the grounds of correlative phonological and semantic segmentability. So, if a word can be divided into two or more phonological strings, and these strings recur in other formations and/or alone, with the same semantics, then the word is morphologically complex. This is straightforwardly illustrated in our data by the productive prefixations such as *rethink*, *misprint*, and by the particle formations; because morphological complexity is uncontroversial for these words, they will not be further discussed here.

It is with the Latinate prefixations that a problem with this notion of morphological complexity arises: they are made up of recurrent phonological strings, e.g. *vert*, *mit*, *re-*, *per-*, *con-* etc., but these have no semantics. Because of their phonological distribution, though, most linguists have treated them as morphologically complex; thus for example Bloomfield (1933: 220; 241-2), Greenberg (1990: 17-18) - though for an opposing view, see Marchand (1969: §§1.4.1 ff.), and Hammond (1999: 71). In his well-known discussion of these forms, Aronoff also argues for their morphological complexity on the grounds of their allomorphic behaviour, saying (for example) that *mit* (as in *permit*, *submit* etc.) is recognisable as a morpheme not only because it recurs with different prefixes, but also because in each instance its allomorphic behaviour is the same: *permit ~ permission ~ permissive: submit ~ submission ~ submissive*, etc. (Aronoff 1976: 7-14).

This position has been accepted by most generative linguists; for example Jackendoff (1975), Lieber (1981), Strauss (1982a), Szpyra (1989), Inkelas (1990), and Anderson (1992: 299) all treat these Latinate prefixations as morphologically complex. But there is also some agreement that they should be represented differently from the productive prefixations, in a way which reflects their unproductivity, and the inability of the bases to enter the syntax (e.g. Jackendoff 1975: 653 ff., Lieber 1981: 141-3). However, not all writers agree that the limited productivity should be captured by full listing of each combination; Inkelas's (1990: 53, 88) position is typical in allowing a single underlying representation for each prefix and base (in this case a subcategorisation frame like $[[\ ]_{m\alpha}\ \text{ceive}]_{m\alpha}$ for bases, $[\text{per}\ [\ ]_{m\alpha}]_{m\alpha}$ for prefixes).

I leave the issue of how these Latinate prefixations should be represented for later; for now, it is clear that most writers seem to agree that they are morphologically complex; and that each Latinate prefix or base has its own underlying representation.

5.2.2 Problems with treating the Latinate words as complex

So, there is a general consensus that Latinate prefixations such as *convict* or *remit* are morphologically complex in spite of their semantic defectiveness; this is justified by the recurrence of prefix and base in analogous structures, and by their allomorphic alternations.

But as we saw in Chapter 3 with the different groupings of the Latinate prefixations in the data, not all of the Latinate bound bases are recurrent: in *rebel*, *contrast*, *excerpt* and others the bases do not occur with any other prefixes or suffixes. In this sense they are cranberry morphs (Bauer 1988: 40); but at least in the case of *cranberry*, *berry* is linked to recurrent semantics, so that *cran* produces a clear semantic contrast with *rasp*, *boysen* or *goose*. The *rebel* group of words do not have this claim on complexity. They are only analysable as being complex because of the recognisable prefixal strings attached to bases which, while they do not recur in analogous formations, have the phonological characteristics of free words in terms of stress and syllable structure.

And even the recurrence of the prefixal strings is doubtful. The (orthographic) Latinate prefix *re-*, for instance, may be /rə/, /rɪ/, /rɛ/ or /ri:/ (cf. section 2.7) - the first two pronunciations may be in free variation in stressless syllables, but still these realisations have only one segment in common. The same is true of *coN-*, *de-*, *pre-* and *pro-*. Their allomorphic alternations are variable; only their initial consonants are actually recurrent. Given that all true prefixes in English are constant in shape (with the by now familiar exception of *iN-*), this suggests that perhaps they should not be treated as unified morphological objects. That is, all the occurrences of the orthographic string *re-* with separable but bound bases may not be occurrences of one prefix.

Even where the bases are recurrent, the presence of regular, unique allomorphic alternations is not really very common in the Latinate roots in the data either. Aronoff's (1976) discussion of such allomorphy is limited to a few conveniently well-behaved examples: he discusses only *mit~mission~missive*, and in his table presents just five different roots, *ceive, duce, fer, mit, sume*. The great majority of Latinate roots have no unique allomorphy; they just follow the usual morphophonological patterns, e.g. /t/ becoming /ʃ/ before *-ion*, as in *perfect ~ perfection, edit ~ edition* (notice *mit ~ mission* is perfectly ordinary in this respect - only the spelling is different). So, in general we can only rely on phonological recurrence to justify morphological segmentation. But this may produce difficult results.

In other Latinate words, the root does recur – indeed, it can be hard to tell if some groups of prefixations should be analysed as sharing one and the same root or not, in the absence of regular allomorphy or common semantics. Often spelling, and sound changes over time and in different languages (some words in the data have come to English directly from Latin, some from French, and a few from Italian), have obscured morphological complexity, and interfere with our ability to tell whether in different words we are dealing with one base or many. Consider *absent, accent ~ accentuate, assent, consent ~ consensual ~ consensus, decent, descant, dissent ~ dissension, incentive, percent ~ percentage, present, presentation, resent, resentment, recent* - how many roots are there here, and which words share the same root? Even where semantically there are links between particular words (*assent, consent, dissent* for example), the morphophonological alternations that the root is listed for are different: there is no **assensual*, **consension*, **dissensus*, **dissensual*. There is a similar problem with *assert (-ive, -ion), concert (*-ive, *-ion), desert (-ion, *-ive), insert (-ion, *-ive)*; and cf. *present* and *resent*; *presentation* exists but not **resentation*; one can be *resentful* but not **presentful*. And it is possible that the <c ~ s> spellings might influence our decisions in both of these cases.

So, even where we can identify morphological segmentability, we may not be able to tell which strings are examples of one and the same root, and which are not. The only way of doing this may be with reference to etymology. This suggests that, like the prefixes discussed above, the root(s) of Latinate formations such as *present*, *resent*, *consent* should not be considered as morphologically the same object.

Obviously, though, there are some cases where we can identify one root as recurring with recurrent allomorphy – in this sense, words in *mit* or *ceive* have clearer morphological segmentability than, say, *contrast* or *present*. And there are also some examples of Latinate formatives which seem to be associated with particular semantics: this is true of *trans-*, very often associated with the meaning '(movement) across' even when its bases are meaningless roots (*transfer, transmit*). There are definite echoes of the word-based *trans-* (as in *transcontinental* - listed in Marchand 1969: §3.59). Notice too that *trans-* often has less phonological variation than other root-based Latinate prefixes, having the full-vowelled pronunciation /trans/ even in the verbs. And, as we saw in the 'borderline' bound-base prefixations in Chapter 3, there are also Latinate roots which are not entirely semantically deficient, e.g. *cline* in *incline*, *port* in *transport* and *import* - cf. *portable*, which shares the 'carry, move something' meaning - or *call* in *recall*.

While these points do not deny the possible morphological segmentability of the various types of Latinate prefixations, they do show once again how much variability there is in the group. As was discussed with the *rebound*, *recoil* words in 2.7 and with the morphological divisions of the data in Chapter 3, there are degrees of segmentability here. While not being productively formed, some of these Latinate words – for example, *transmit* – have far greater claim on morphological complexity than others, such as *rebel*; these examples each approach different ends of a cline. But should this be represented in our model (in which all these forms would be Stratum 1), and if so, how?

Related to the question of whether and how degrees of morphological complexity should be represented, is the question of morphological identity: is each occurrence of /sɛnt/, or of orthographical *re-*, to be identified respectively as the same base or prefix? I think there is good reason for doubt here, especially when we compare any Latinate form to word-based prefixations like *misprint* and *reprint*, where prefixes and bases are recurrent with exactly the same phonological form and the same semantics.

5.2.3 Stress derivation is verb-to-noun

There is general agreement that the stress doublets are verb-to-noun derivations. For instance, Marchand (1969: §5.7.4.4) says 'whenever we find stress shifting word pairs, we are dealing with deverbal substantives', although with the proviso 'unless content criteria preclude such an analysis' (1969: §5.7.4.2). So, the noun *tórmènt* is derived from the verb *tòrmént*; likewise *cónvìct* from *convíct*, and *réthìnk* from *rèthínk*. The morphologists Bauer (1988) and Spencer (1991) concur. Phonologists such as Hogg and McCully (1987: 16) and Kiparsky (1982) agree too, perhaps especially because final nominal stress is exceptional unless the noun is deverbal (see Ch. 5).

Authors expressing this view sometimes distinguish the Latinate stress-doublets from the word-based prefixations, noting greater productivity in the verb-to-noun derivation in the latter group (e.g. Marchand 1969: §5.6.8.5 and §5.7.4.3; Aronoff and Sridhar 1983; Raffelsiefen 1999).

It is also accepted that the non-stress-alternating noun-verb pairs such as *consent*, *repeat*, are verb-to-noun derivations; again, the stress pattern points this way, since final stress is much more commonly verbal than nominal. Marchand considers such zero-derivation to be a stronger pattern than stress-alternation (1969: §5.7.4.4), although my data suggests that in terms of simple raw numbers this is not the case.

5.2.4 Problems with the verb-to-noun analysis

There are two problems with the verb-to-noun analysis for the stress doublets, both of them mainly relevant to the Latinate prefixations.

The first has been extensively discussed in Chapter 4: there is little semantic regularity in the noun-verb relationships among the *rebel*, *convict*, *incline* groups of words. The commonest noun-verb relationship is the action nominalisation, but under half (42%) of these nouns represent the verb's action; a similar proportion (40%) have meanings completely unrelated to the verbs' meanings, or too specialised to be linked by any generalisable rule. Arguably, this means that the relationship between noun and verb should only be formal, because the semantics are too unpredictable for a full morphological relationship. The majority of the cases would require individual semantic interpretations: there would not be just one rule, but a plethora of sub-rules, some only applicable to one or two verbs.

By contrast, positing a verb-to-noun relationship in the *rethink* stress-doublets, or in the non-stress-alternating *consent* pairs, is semantically very reasonable. As we saw in Chapter 4, over 86% of the *rethink* nouns represent either the action or effected object of the verb, or both (remember that a substantial proportion of these nouns combined both roles). Of the *consent* nouns (all morphological groups), 77.2%, more than three-quarters, represent the action of their verb. There is far less variation in these noun-verb relationships than in the Latinate stress-doublet ones; they have a typical semantic pattern which could be captured by one morphological rule.

Even a formal relationship between the Latinate stress-doublet nouns and verbs is not straightforward: as we saw in Chapter 3, the segmental phonological differences between the nouns and verbs in a great many (about two-thirds) of the *convict* pairs also obscures the relationship and makes a verb-to-noun rule less likely. We very often see schwa (or /ɪ/) in the verbs' initial syllables but a full vowel in those of the nouns. This does not make directional derivation impossible, but compare it with the identical segmental phonology in the nouns and verbs in both the *rethink* and the *consent* cases. They have much closer phonological relationships, which supports the idea that they have closer morphological relationships too.

However, in spite of these obstacles, it might still be possible to derive the Latinate stress-doublet nouns from their verbs. In stratificational terms, irregularity is a typical feature of Stratum 1 morphological derivations. Semantics or phonology may be deficient, but there is still clearly some relationship between these nouns and verbs, particularly if the non-recurrent bound-base group (*rebel*, *exploit*), which have a higher rate of phonological diversion and semantic irregularity, are excluded.
But this uncovers a limitation of the present model of lexical phonology. It is impossible to express a verb-to-noun conversion on Stratum 1 in BDLP. As we saw in section 2.3, this is the level of root-based morphology, and BDLP's roots do not have lexical categories. On this stratum there are no verbs and no nouns as inputs to morphological operations; therefore we can have neither noun-to-verb nor verb-to-noun here. The closest we can get to this is to

have one common root which is able to leave the stratum as either a noun or a verb, i.e., which is listed for both the Noun and the Verb subrules of the Root-to-Word rule. This could be a serious flaw for BDLP (which is explored further in Chapters 7 and 8); though for the present data it is not too much of a problem. Even if there cannot be a directional relationship between *cónvìct* and *convíct*, or *rémìt* and *remít*, there may still be an expressible morphological relationship. And perhaps this is better when there is so much semantic irregularity: noun and verb may be linked formally by a common root, but in no other way.

Meanwhile, a verb-to-noun rule on Stratum 2 would be perfectly acceptable; this could be appropriate for both the *rethink* and the *consent* nouns. One possibility not covered by this account, though, is that some of the *rethink* nouns (and some of the particle nouns) may be independently-formed prefixations, not derived from the verbs. (cf. section 4.7 above).
There are a number of formations in *mis-* in the productively prefixed group; and as Marchand says (1969: §3.33.1-§3.33.4) *mis-* may attach to deverbal nouns. So, in the noun *mismatch* it could be the base, *match*, which has undergone deverbal nominalisation, not the whole prefixation. This is also a possibility for some of the nouns in *re-*: Marchand, giving examples like *re-carriage*, *rebirth*, says, 'the prefix is...found with deverbal substantives' (1969: §3.51.6). So, as we saw in section 4.7, the noun *remount* is likely to be an independent formation; the same may be true for *retread* 'a fresh tread on a tyre'. However, these instances do not affect the generalisation that most pairs in this group are examples of productive, verb-to-noun derivation.

So, one challenge for an account of the stress-doublets is the appropriate representation of their internal structure: although they are generally treated as morphologically complex, there is much variation in their phonology and semantics, and this points to varying degrees of complexity. Furthermore, while all stress-doublets have been treated as verb-to-noun derivations in the past, it seems that one apparent shortcoming of the BDLP model – the impossibility of expressing such a relationship on Stratum 1 – might actually be an advantage in that it means the semantically irregular relationship between the *convict* verbs and nouns is treated formally differently from the entirely regular relationships between the *rethink* and *consent* verbs and nouns. These latter may be verb-to-noun derivations on Stratum 2, although there are a few cases in the *rethink* group where the noun and verb may actually be independently prefixed – so our second-stratum morphology and phonology must be able to deal with these.

5.3 Prosodic phonological analyses

5.3.1 Outline: Szpyra (1989), Raffelsiefen (1999)

Prosodic phonology (PP) was introduced and discussed in section 2.5. We saw there that while lexical phonology interleaves phonological and morphological processes, PP keeps the two separate, only allowing phonology access to morphological structure for the building of the prosodic word. The analyses I will discuss here are largely concerned with the prosodic representation of different morphological structures, rather than with the morphological relationships themselves.

Although the prosodic representation of prefixation has often been discussed within PP, the stress doublets themselves have not attracted much attention. Here I will outline the conventional way the two different types of prefixations are dealt with in the theory, using Szpyra (1989) as an example. I then go on to discuss Raffelsiefen's (1999) more in-depth analysis of the English system.

Szpyra (basically following Aronoff and Sridhar 1983) takes the distinction between Stratum 1 and Stratum 2 affixes as established in affix-driven lexical stratification, and turns it into a distinction between affixes which join the same prosodic word as their bases, and affixes which form independent prosodic words (see section 2.5). The two types are distinguished by bracketing. So, representations for *remit* vs. *rethink* would be:

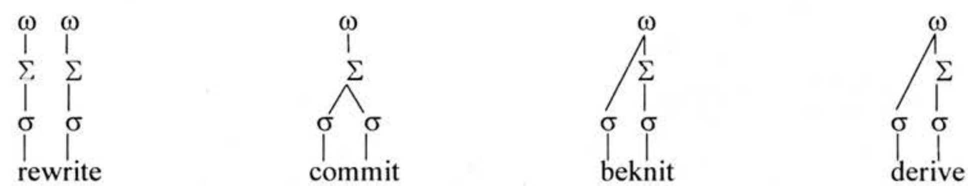
(1)	(a)	(b)
	([re [mit]])ω	([[re])ω ([think]])ω

(cf. Szpyra 1989: 179 ff.)

Any further distinctions, such as the variations in phonological behaviour, or the differences in semantic transparency, within the group of Latinate prefixations, are not considered. Neither are the relationships between prefixed nouns and verbs, which would involve the question of how prominence between the two pwords in one prefixation is determined.

Raffelsiefen's (1999) prosodic account of English prefixation looks at the system in much more depth. She distinguishes four kinds of prefixation in English, which share three types of prosodic representation. Firstly, there are the productive, word-based prefixations like *rewrite* or *unhappy*, where prefix and base are said to each form a separate pword. Then there are two types of Latinate prefixations: those which are effectively morphologically simple, with prefix and base fully integrated into one pword e.g. *commit*; and those which are complex, with the prefix part of the same pword as the base, but not part of the same foot, e.g. *derive, reduce*. These latter share their prosodic representation with the fourth type of prefixation, words with 'head' prefixes, *be-*, *en-* or *a-*, which may change the lexical category of the base. The representations of these verbs are as follows:

(2) (a) (b) (c) (d)



These prosodic representations all arise from OT constraints (see 2.4) governing the alignment of morphological and prosodic structures, which presumably require a four-way distinction in morphological structure - Raffelsiefen discusses only the prosodic and not the morphological representations. All prefixes have their left edges aligned with the left edge of the prosodic word (Raffelsiefen 1999: 167, no. 71a); but the right edge of the prefixes align in different ways.

Head prefixes are referred to as such in the constraints numbered by Raffelsiefen as (114) b and c (1999: 191), repeated here as (3) a and b:

(3) a. ALIGN (HEAD PREFIX, R; (LEFTHEADED) FOOT, L)
b. ALIGN (NON-HEAD PREFIX, R; PWORD, R)

The reference to a 'leftheaded' foot in the base captures Raffelsiefen's observation that *a-*, *be-* and *en-* only attach to monosyllabic or trochaic bases (1999:184)[15]. The Latinate *de-*, *re-*,

[15] She ascribes this to the fact that these prefixes do not form separate pwords, since prefixes which do are insensitive to the phonological properties of their bases, but this may not be a full explanation. There is a cluster of word-formation processes associated with prefixation which are sensitive to the base's prosodic structure: the stress-derivation of nouns from productively prefixed verbs (in the

pre- prefixes are dealt with separately, referred to as 'monosyllabic prefixes' – but they also have their right edge aligned to the left edge of a leftheaded foot, by constraint no. 118, p.194, given here as (4):

(4) ALIGN (MONOSYLLABIC PREFIX, R; (LEFTHEADED) FOOT, L)

The reference to their monosyllabicity is presumably supposed to distinguish them from the word-based *rewrite* prefixes, which behave differently, obeying constraint 114 c, given as (3) b above. Fourthly, there are the fully-integrated *commit* words which contain just one foot and one prosodic word; presumably these are morphologically simple.

Although prosodic structure is derived from morphological structure, and Raffelsiefen argues that it correlates with semantic compositionality (remember the criticisms made in Chapter 2 that this makes prosodic constituents pseudo-morphological), her reason for representing *commit* and *derive* differently is phonological. She says that Latinate formations in *de-*, *re-* and *pre-* may share the prosodic structure of *beknit* because, like *be-*, their prefixal vowel is potentially tense. In LPD, Wells gives /bɪ/, /bə/ and /bi:/ as possible variants for the *be-* of *besmear*, and prefixal variants with the same three vowels for apparently all Latinate prefixations in *re-*, *de-* or *pre-*, including highly obscured forms like *rebel* (though it should be noted that he marks all the tense-vowelled variants as non-RP, so they are not strictly relevant to my analysis, which refers to RP). Raffelsiefen suggests this potential tenseness may be due to analogy with the productive, word-based prefixes *de-*, *re-* and *pre-* (1999: 192-3). Since she says that only 'some speakers' assign the *beknit*-type prosodic structures to the Latinate prefixations, it seems that *reduce*, *derive*, etc. could be represented like *commit* instead – this may just depend on the individual speaker. If the prosodic structures of these words are allowed to vary, though, then presumably so do the morphological structures – e.g. perhaps [re [duce]] ~ [reduce].

The alignment constraint for the Latinate prefixes, repeated as (4) above, means that where such a prefix is followed by a stressless syllable, it may be fully integrated into the pword of the base. This has an interesting consequence: a form with the same morphological prefixal

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rewrite set) only applies when the base for the verbal prefixation is monosyllabic or (occasionally) trochaic (*reshuffle*); and pre- and post-particle formations seem also to be limited to monosyllabic or trochaic bases (*outlay*, *rip off*). With reference to the latter, cf. Fraser (1976) who notes there are very few postparticle verbs with iambic or polysyllabic bases; *divide up* is one of the few exceptions.

structure may have two different prosodic structures corresponding to prefix and base, depending on whether or not it is suffixed. Thus *de-* has a different prosodic representation in *derive* than in *derivation*, even though its morphological relationship with its base may be the same in both words:

(5) (a) (b)

[de [rive]] [[de [riv]] ation]

In *derive*, the prefix is not completely absorbed into the pword of the base; but in *derivation* it is.

So, in this account Latinate prefixations are split into two groups, one which is synchronically complex and can include any word with *re-*, *de-* or *pre-*; and one which is not. But how are the relationships between the stress-alternating nouns and verbs dealt with? Raffelsiefen discusses the Latinate prefixal stress doublets (her examples are *reject* and *defect*) separately from the productively-prefixed ones, although, as with other authors (see section 5.2.3) she considers them all to be examples of verb-to-noun derivation.

She argues that the Latinate stress doublet nouns and verbs are morphologically related to each other by a verb-to-noun conversion, 'which "feeds" a sporadic rule of stress shift which applies to all nouns regardless of their morphological structure' (Raffelsiefen 1999: 193, fn.69; quotation marks hers; notice this remark implies the use of ordered rules as well as constraints). The implementation of these processes is not discussed. That the verb-to-noun derivation and the stress-shift are independent of each other she says is proved by the existence of forms like *desire* (from our non-stress-alternating group), which undergo the former but not the latter; and *insect*, which undergo the latter but not the former. So there is nothing in either the verb-to-noun rule or the stress-shift rule which requires particular prefixal or prosodic structure.

The productively prefixed stress doublets are also examples of verb-to-noun conversion, though it is not clear whether or not this is envisaged as being the same rule; it is represented as:

(6)

$$\begin{array}{ccc} \text{w} \quad \text{s} & & \text{s} \quad \text{w} \\ [\ (\text{mìs})_{\omega}\ (\text{prínt})_{\omega}\ ]_{\mathrm{V}} & \rightarrow & [\ (\text{mís})_{\omega}\ (\text{prìnt})_{\omega}\ ]_{\mathrm{N}} \end{array}$$

(1999: 137, fn.4). As Raffelsiefen says, the verbs typically have monosyllabic bases, though she does not express this formally. As the diagram shows, the stress-shift between verb and noun is a question of the relative prominence between two pwords, not (as in the Latinate cases) of the relative prominences within one.

There are a number of features in Raffelsiefen's account which are very interesting, and which are shared with my own analysis of the stress-doublet nouns and verbs. The next section is a critical discussion of this account, in which I hope to make clear some of its implications.

5.3.2 Implications of Raffelsiefen's prosodic account

Because Raffelsiefen's analysis is couched in a prosodic and largely constraint-based framework (though apparently with rules like the stress-shift one accepted as theoretical devices), it is not as easily reconciled with the present BDLP model as are the other accounts discussed later in this chapter. I treat it slightly differently, giving less consideration to any implications it may have for lexical stratification than to its consistency with the data, and its implications for PP, especially the pword. Of course, Raffelsiefen's main interest is in the prosodic phonology of the English prefixal system, not in the relationships between certain groups of prefixal nouns and verbs, so her treatment of them is not realised in great detail.

Raffelsiefen unfortunately offers no discussion of the morphological structures which must underpin the prosodic analyses. As we saw above, she identifies four different morphological types among English prefixations: the productive ones such as *rewrite*; the head prefixations; and two groups of Latinate prefixations, those in *de-*, *re-* and *pre-*, and those which are synchronically unanalysable, such as *seduce* or *commit*. Given that many Latinate prefixations could fall into either of the two latter groups, it would have been interesting to see semantic or morphological justifications for their analysis. This would have particular relevance to the data under consideration here, of course, given the discussions in Chapter 3 on the separation of three different types of Latinate prefixation on phonological and semantic grounds. In the light of this evidence, it might be possible to redraw Raffelsiefen's boundary between *commit* and *reduce* slightly, and use it to distinguish between the 'borderline' Latinate prefixations like *rebound*, and the fully-bound-based words like *record, compound* or *produce* identified in Chapter 3.

Another major issue for the stress-doublet words that is not considered by Raffelsiefen, is the question of how the 'rule of stress shift which applies to all nouns regardless of their morphological structure' (p. 193, fn. 69) is technically implemented. This rule must be applicable to all the *rebound* nouns, where the prefixal syllable is unfooted, and also to all the *compound* words, where the prefixal syllable is part of the same foot as the base.
To take the morphologically simple forms first, let us consider the derivation of the noun *compound* from the verb *compound*. We could not simply reverse the syllable prominence, because the second syllable of the noun retains the verbal stress[16]. So, this is not so much a shift in stress as a case of having to build a foot over the initial as well as the final syllable. Thus:

(7)

It would be more accurate to talk of stress shift in the productive prefixations, where the representations are:

(8)

[16] Of course we could do this in a few of the bound-based cases like *rebel* or *desert*.

The noun *rewrite* therefore differs from the noun *compound* in containing two prosodic words as well as two feet. This could reflect the greater likelihood of nouns of the *compound* type undergoing stress reduction on their second syllables (cf. the U.S. pronunciation of *record*, /ˈrɛkɚd/ (LPD))

Raffelsiefen rules out the possibility that the *rewrite* nominal prominence pattern could be assigned independently of the derivation from the verb, asserting that the only prefixed nouns in English which have s-w prominence are those whose prefixes end in velar or bilabial consonants (e.g. *súbcùlture*), or those derived from verbs. But this is not true: as we have seen from discussion of cases like *remount*, and as Marchand makes plain (1969: §3.33.6 and §3.51.7 on bisyllabic nouns in *mis*- and *re*- respectively; and cf. §3.13.7 on *counter*-), there is a wider range of prefixed nouns, generally with monosyllabic bases, which have such prominence patterns. These patterns are surely determined independently of any related verb, and by lexical category, not by features of prefixal consonants.

How might the stress shift rule apply in the Latinate prefixal verbs in *re*- or *de*-, which Raffelsiefen treats as complex? Raffelsiefen's analysis gives these verbs asymmetric prosodic structure, so how the stress shift which provides the nouns' prosodic structure should apply is not immediately clear. The nouns' prefixal syllables must be given a foot, since they are stressed; this gives us two options for the rest of their prosodic representations. We could give the prefixal syllable its own foot, but make this part of the same prosodic word as the base. This would give the same representation as the noun *compound* in (7) above. Alternatively, we could give the nominal prefix its own foot and its own pword, so its structure would be the same as that of *rewrite* in (8) above.

If this asymmetrically-structured group is restricted (as I suggested above) to our 'borderline-word-based' Latinate prefixations like *rebound*, then the latter representation would be more appropriate. After all, as we saw in Chapter 3, the nominal prefixes in this group do behave like separate pwords, having exactly the same phonological form as the word-based prefixations. The verbal prefixes do not appear to syllabify with their bases, but they are not separate pwords, so their asymmetric structure would appear to be appropriate too.

Indeed, the latter representation has to be the one chosen. Nouns like *record* or *refuse* must be represented like *compound*, with prefix and base integrated into one pword. Their prefixes have short vowels but are stressed, so the initial consonants of their bases are taken as codas to the prefixal syllables to meet the stressed syllable minimum weight requirement. And syllabification may not cross over a pword boundary; therefore their prefixes cannot be separate pwords. In order to be able to capture the pword characteristics of the *rebound* nominal prefixes, though, these need different prosodic representation. What we then end up with is this:

(9)

[re [cord]] (verb) [re [cord]] (noun) [re[coil]] (verb) [re[coil]] (noun)

Thus Raffelsiefen's analysis can be fleshed out to cover these different kinds of prefixal stress doublets. But how applicable such an analysis might be within the BDLP model is unclear. As noted in Chapter 2, we have reservations about the necessity of the pword. Here it does distinguish between different groups of prefixations: without it, there could be no difference prosodically between *rewrite* and *recoil* vs. *record* and *compound*; and as mentioned above, nouns of the latter group but not the former may lose stress on their bases. But this seems to be its only use; and we will see below that the effect of some of Raffelsiefen's constraints is to take away much of its justification. Indeed, the pword becomes superfluous for a description of English prefixation.

Raffelsiefen's analysis casts doubt over what the domain of syllabification is. Usually the pword is taken to be the lowest constituent of the prosodic hierarchy sensitive to morphological structure; it is the domain for syllabification and foot building, which are themselves purely phonological processes (Nespor and Vogel 1986: 67, 103-5; Inkelas 1990:38-9; Raffelsiefen 1999: 154, 156; Hall 1999: 4-5, 15; Nespor 1999: 119). But here this can no longer be true. As Raffelsiefen herself says, 'while head prefixes clearly do not form separate pwords there is some evidence that they do not form a single domain of syllabification together with the stem' (1999: 187), and 'verbs derived by *be*-prefixation do not form a single domain for syllabification' (1999: 188). Her evidence is that in *beknit* and *begnaw*, the velar stops which were historically the initial consonants of the bases *knit* and *gnaw* were lost when syllable initial /kn/ and /gn/ clusters became disallowed, when we might instead have expected them to become codas to the prefixal syllable, as happened in *acknowledge*. This could just be seen as evidence for prosodic structure at the time of initial cluster simplification (i.e. in the seventeenth century (Strang 1970: 118)), rather than in contemporary English. But additionally we could point to the syllabification of *enable*, en.able (LPD), where in defiance of the maximal onset principle, the /n/ syllabifies in the coda of the prefix.

Admittedly evidence on this point is scarce, because two of the three head prefixes are unstressed Cə syllables for which liaison with the bases is impossible. But on balance, it does seem they are independently syllabified – while not being, in Raffelsiefen's representation, independent prosodic words. Syllable construction clearly refers to boundaries within the pword; the pword itself can therefore no longer be considered the domain of syllabification.

Nor can the foot be considered the domain of syllabification, since both the head- and the monosyllabic Latinate prefixes in these representations are syllabified but not footed. So what does govern the syllabification pattern seen in these prefixations?

We could say that even though syllables are not exhaustively footed, foot boundaries do align with syllable boundaries. In this case, morphological sensitivity will have to move a step down the prosodic hierarchy, from pwords to feet: foot construction would need direct access to morphological brackets so that the feet in words like *repeat, recoil* or *becalm* do not include the initial prefixal syllables (cf. the representations of the verbs *commit* or *compound*, where the foot does include the initial syllable). Raffelsiefen obviously does allow such access, as is explicit in her alignment constraint no. (114) b, given as (3) a above and repeated here:

(10) (ALIGN (HEAD PREFIX, R; (LEFTHEADED) FOOT, L))

An alternative would be to say that the syllables themselves are constructed with direct access to morphological brackets; this is not required by Raffelsiefen's analysis, but is compatible with it. In *enable* or *becalm*, initial syllabification bounded by morphological brackets would give the correct result; foot building could proceed on this basis.

So, Raffelsiefen's analysis requires that foot alignment has access to morphological structure, and is compatible with syllabification having such access too. Within BDLP of course this is perfectly acceptable (and is a feature of my analysis in Chapters 6 and 7 below). But for PP this has major ramifications.

Prosodic phonology restricts direct interaction between phonology and morphology to the construction of the pword: other phonological domains and processes are supposed to have no access to morphological structure (see Ch 2. above). However, the constraints Raffelsiefen uses, which align feet with prefixes, mean that foot building must have access to morphological structure; and that syllabification is aligned with foot or with morphological boundaries, not pword boundaries. Stress and syllabification are the main (only?) English phonological processes which have been given as justification for the pword – but now they seem not to need it.

So, for these two suprasegmental processes, the pword is unnecessary. And as we saw in Chapter 2, there are already established doubts about whether the pword should be seen as a domain for segmental phonological processes (see Loporcaro (1996) on Romance languages; Raffelsiefen's (1999) discussion of *iN-* has similar implications). Indeed, it is hard to see what role is left for the prosodic word in English with neither segmental nor suprasegmental phonological processes dependent on it; the language has no processes like Hungarian Vowel Harmony (Nespor and Vogel 1986: 122-3), which have the prosodic word as their domain.

So, with cases like *rewrite* and *derivation*, represented as follows (repeated from above):

(11) a. b.

the pword could be considered an unnecessary layer of structure, doing nothing the foot does not already do. The *re-* of *rewrite* is, as a productive prefix, independently syllabified and stressed, but this is apparently because of the morphological brackets, not because of the pword. Its lack of segmental assimilation may be independent of pword status (cf. Ch. 2 above); even the prefixal minimal word size could be described as a property of the foot, since a foot requires at least one stressed syllable, and a stressed syllable must have a branching rhyme (McCarthy and Prince (1993: 136)).

This is perhaps a rather bleak assessment of the prospects for the prosodic word: if the *recoil* and *beknit* types of prefixations are represented differently, then its problems may be resolvable. For the pword to remain the only (lexical) prosodic constituent with access to morphological structure, then the alignment constraints (or, in a rule-based model, the structure-building rules involving syllabification, footing, and pwords) may only refer simultaneously to morphological and phonological constituents when the phonological constituent is the pword. Then footing and syllabification will be purely phonological. Whether or not Raffelsiefen's distinct prosodic representations for *beknit* and *reduce* vs. *commit* or *rewrite* could be maintained though – and therefore whether maintaining the pword is consistent with the linguistic facts - is not certain.

Although Raffelsiefen's analysis does raise some real problems for the tenets of prosodic phonology, then, it does have a number of interesting features. She recognises the need to distinguish two types of Latinate prefixation morphologically and prosodically, and this is consistent with our data, where we saw (Ch. 3) that some of the Latinate nouns' prefixes behave like separate pwords, and some do not, and this correlates to some extent with semantic compositionality. However, whether or not the particular representations she uses could be adapted to work within a BDLP framework is uncertain, given not only our objections to the use of the pword (e.g. its entirely derivative nature; see Chapter 2), but also the way in which her account appears to obviate much of the need for it.
As far as the noun-verb relationships in the stress doublets are concerned, Raffelsiefen does not discuss these in much depth; although her contention that the morphological and the phonological relationships between the nouns and verbs (at least in the Latinate cases) should be treated separately is uncontroversial. She does not seem to extend this approach to the productive prefixations of the *rewrite* set, as we saw above. This is not consistent with all the evidence, though; my analysis below does allow the nouns' phonological derivation to be entirely independent of the verbs'.

5.4 Generative and Metrical Phonological Analyses

5.4.1 Outline

The metrical phonological analyses discussed in this section are set in a rule-based generative phonological framework, and so are very different from the prosodic account explored above, having more in common with BDLP. They deal directly with morphological as well as phonological structure, and allow for abstract underlying representations in which segmental phonology may be quite different from the surface realisation. The problem of how noun-verb stress doublets should be dealt with has also been addressed more directly than in prosodic phonology, so the nominal representations are made as explicit as the verbal ones.

The main sources of information for this section are Hogg and McCully (1987) (HM) and Halle and Vergnaud (1987) (HV). HM use a tree-based metrical theory in their account, while HV instead employ a metrical grid. Here, metrical trees with syllables and feet are used; the differences between these two theories are not explored.

All the stress doublets are assumed to be verb-to-noun derivations, as is usual. The analyses here relate to the Latinate prefixations rather than the word-based ones; the latter have been rather neglected. All the Latinate prefixations are treated as morphologically complex, but no distinction is made between any different types or strengths of Latinate prefixation. The greater semantic and phonological obscurity of some, e.g. *rebel*, as opposed to others, e.g. *rebound*, is not mentioned; some of the motivation for positing morphological complexity here is probably the smooth operation of the phonological rules.[17]

Before moving on to the details of the stress-doublet derivation, I give a brief outline of the generally accepted metrical phonological rules as they apply to verbs and nouns. As is well-known, the stress patterns of nouns and verbs in English are slightly different: stress generally falls one syllable further to the left in nouns than in verbs. The final syllables of nouns are rarely stressed (i.e., only if they contain a long vowel); stress falls on the penultimate syllable if it is heavy, and otherwise on the antepenult. However, for verbs, stress will fall on the final syllable if it is heavy, and otherwise on the penult. This generalisation holds with the proviso that the rightmost consonant in the coda of the verb's final syllable does not count towards that syllable's weight. This is known as Final Consonant Extrametricality (FCE) (Hayes 1982); it means that only long-vowelled or VCC-rhymed verb-final syllables count as heavy (cf. discussion in Giegerich 1999: Ch.8).

So, nominal and verbal stress rules are very similar; in fact they can be unified if we ignore the final syllables of the nouns. This can be done using the device of Noun Extrametricality,

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[17] Cf. Bauer's dry comment: 'scholars whose interest is primarily phonological consider such words to be complex' (Bauer 1983: 124).

which states that these final nominal syllables are invisible to the English Stress Rule (Hayes 1982, cf. Halle and Vergnaud 1987, Hogg and McCully 1987).

From this quick sketch, it is clear that the typical stress pattern of the Latinate verbs such as *convíct* or *recórd* is basically covered by the general principles of first-cycle stress assignment – the great majority do have heavy final syllables under FCE. The initial primary stresses on the nouns *cónvìct* and *récòrd* are also predicted by this rule. But there are things still to be explained: firstly, verbs like *remít*, *permít* and *combát* have final primary stress (the last admittedly variably) even though these syllables should count as light under FCE. And secondly, although the nouns' initial stress has been accounted for, most of them also have secondary stress on their final syllables: how is this generated?

HM explain the apparently exceptional stress pattern of verbs like *permít* (cf. *édit*) by appealing to morphological complexity. They say that these verbs all consist of a prefix plus a stem, and the metrical stress rules are sensitive to this morphological structure (cf. Liberman and Prince 1977: 306). On their first application a foot is built over the stem syllable, regardless of its phonological shape. These monosyllabic Latinate roots receive a stress just like monosyllabic words such as *sit*, *sell* etc. In a similar way, the exceptional final secondary stress of the nouns is also explained morphologically (see fn. 17 on previous page). The nouns are derived from the verbs, and undergo verbal stress assignment first. Afterwards, the stress rules cycle again and assign the usual initial nominal stress.

Now we need to look at the verbal derivations in slightly more detail. We have seen that stress is assigned to the second syllable, in some cases only because a morphological boundary has been posited. After this, the rules assign stress to the initial syllable. In HM's tree-based account, we now have:

(12)

i.e. two equal stresses. Relative prominence between them is determined by the Lexical Category Prominence Rule (LCPR), which is sensitive to both phonological and morphological (lexical category) information. Slightly simplified, it states:

(13) LCPR

> For any pair of sister nodes $[N_1\ N_2]_L$, where L is a lexical category and N_1, N_2 are feet or dominate feet, then N_2 is strong if it branches, or if the lexical category is non-nominal and N_1 does not branch.

(cf. Hogg & McCully 1987:91; and Liberman and Prince 1977: 307).
The rightmost foot in each of these verbs will thereby be marked s(trong).
HV also assign stress to the prefixal syllable of these Latinate verbs, although they need no LCPR since this syllable receives only two grid marks, i.e. lesser prominence than the three above the stem syllable.
Whatever the method, then, both accounts reach a stage where there is a \ / (w-s) stress pattern over Latinate verbs such as *convict*, *permit* etc. However, the great majority of these verbs' prefixal syllables are completely stressless, with schwa as the peak of the syllable: [kən'vɪkt], [pə'mɪt] etc. A rule of destressing is therefore applied next, to remove this unwanted prominence.

Destressing was originally formulated to remove prominence from light syllables which immediately precede stressed ones. However, the initial syllables of many of these words are not light. *Con-*, *per-*, and *ad-* for example all have –VC rhymes and therefore count as heavy. So, again, the metrical phonological derivation must refer to these verbs' prefix-stem structure: destressing is said to operate on light syllables and 'certain Latinate or Romance prefixes, e.g. *ad-*, *con-*, *pre-*, *re-*, even although they do not conform to the syllabic description' (HM 1987: 82-3; cf. Liberman and Prince 1977: 284-8; Selkirk 1980: 580-90; HV 1987: 239). These prefixes have to be diacritically marked [+ Ro] (presumably unlike word-based prefixes such as *re-* in *resit*, where destressing is plainly undesirable); and this rule can apply to practically all our bound based Latinate prefixed verbs.

After the initial syllables have been destressed, their vowels need to be reduced. Full underlying vowels have generally been assumed for all these Latinate prefixes, even though it is their occurrence in verbs (not nouns) which is taken to be basic, and in verbs the vowel

is almost always reduced. HV have a rule of Vowel Reduction which is formulated only to apply to unstressed short vowels in open syllables – presumably this, like Destressing, can be extended to closed-syllable [+ Ro] prefixes (HV 1987: 239-40).
So we end up with the surface forms of the verbs, with primary stress on the second syllable, and an unstressed, schwa-vowelled prefixal syllable:

(14)

Now let us look at the usual derivations of the stress-doublet nouns. As we have already seen, there is general agreement that these nouns are derived from their verbs; but metrical phonological accounts differ in exactly how, and at what point in the derivation, this happens. HM let the verb receive a foot over each of its syllables, and then derive the noun from it before any higher level of structure has been built, i.e. before the LCPR determines relative prominence between the feet. We saw above that the LCPR gives verbs final prominence; but in nouns, the first foot will be marked strong:

(15)

Because full underlying vowels are assumed for the prefixal syllables, the nominal derivations are now complete.[18]

By contrast, there is no point in HV's derivation of the verbs where there are two 'equal' stresses; as we saw, the stress on the verb's initial syllable is always subsidiary to that on its final syllable. So, the derived nouns inherit a \ / (w-s) stress pattern. Instead of receiving initial prominence by the usual principles of nominal stress assignment, they are diacritically marked to undergo the Rhythm Rule (HV 1987: 235; also known as Iambic Reversal, cf. HM

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[18] With the exception of the /ɜː/~/r/ complication in *permit*, which is not relevant here.

1987: 132ff.), which reverses the prominence relations by moving the highest grid mark from the final syllable to the initial syllable, giving the desired *cónvìct* stress pattern:

(16)

	*	*		Grid line 2 = primary stress
*	*	*	*	Grid line 1 = subsidiary stress
*	*	*	*	Grid line 0 = syllables
convict (verb)		convict (noun)		

(slightly simplified; the explanation of the grid marks on the right hand side should suffice). Next, of course, the stress on the initial syllable of the verb has to be removed; but notice that its presence was necessary for the operation of the Rhythm Rule. This rule requires a 'landing site' with a line 1 grid mark in order to move a line 2 grid mark, because a line *n* mark can only be moved to a site with a line *n-1* mark (see further HV 1987: 235). Indeed, the same point might be made about HM's derivation: if the unnecessary foot had not been built over the first syllable of the verbs, the LCPR could never have derived the correct stress contour for the nouns – obviously it could never have applied, since there would only be one foot in each word.

Such is the way the Latinate prefixed nouns and verbs have been analysed by generative metrical phonologists. The derivation depends on an assumed prefix-stem structure: the verbs are basic, and have a stress assigned first to their stems, and then to their prefixal syllables. At this point, the nouns are derived from them, and their own s-w prominence is assigned. The verbal prefixes must then undergo destressing and, since they are assumed to contain a full underlying vowel, vowel reduction too.

I noted earlier on in this section that the derivation of the productively prefixed stress doublets has been neglected in comparison with these Latinate forms. But it would not take too much alteration to make this analysis applicable to them too. As far as the verbs are concerned, the only real difference would be in the treatment of the prefixes, which of course do not undergo destressing or any reduction in vowel quality. To distinguish between these and the Latinate prefixations, different bracketing, or different stratal siting, could be employed. The *rewrite* nouns should be able to receive stress on base and prefix independently of their derivation from the verbs, though, since their stress pattern is not restricted to deverbal prefixed nouns. But this would not require any major alterations to the analysis.

5.4.2 Problems for the metrical phonological accounts and their implications

To a greater degree than in Raffelsiefen's (1999) account (see section 5.3), the morphological basis for these phonological analyses is unexamined. There is no justification given for the assumption of internal prefixal structure in the Latinate words; and nor is their uniform treatment as verb-to-noun derivations discussed. It seems as though morphological structure is referred to largely for the sake of regular phonological derivations, even where synchronic morphological complexity is semantically very hard to justify. (This way of using morphological divisibility is not restricted to rule-based analyses of English; cf. Hammond's (1999) OT account of the language, where the *-isk* of *asterisk, obelisk* is analysed as a suffix. Recall again Bauer's (1983: 124 comment that 'scholars whose interest is primarily phonological consider such words to be complex').

The use of morphology in these phonological derivations is also internally inconsistent. As we have seen (e.g. HM 1987), they explain the stress on the final syllables of nouns such as *protest, convict* etc. by deriving them from verbs. However, in some cases (i.e. the exceptions to FCE like *permít*) the correct stress patterns on the verbs can only be generated by assuming they have a prefix-base morphological structure. And if we accept this morphological division in *permit* or (HM's suggestions) *equip, repel* (HM 1987: 90), we really have to accept it for all the Latinate words. And then we lose the stress-based argument for deriving the nouns from the verbs in the first place. If the verbs are composed of a prefix plus a base, then the nouns must be too. Therefore - remembering what HM (1987) and Liberman and Prince (1977) say about the stress rules applying to the stem first, and then to the whole word - the stress on the nouns' final syllables could be due to their internal structure, not to derivation from the verbs. They can receive the correct stress pattern quite independently.[19] So, even though the nominal stress pattern is often presented as evidence that the nouns are derived from the verbs (e.g. HM 1987: 16), with internal prefixal structure this no longer holds.

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[19] This was actually noticed by Lieber (1981: 132), who points it out when arguing against there being any zero-derivation or conversion rules in items such as *permit*$_V$ ~ *permit*$_N$ in the lexicon.

To move on to the phonological aspects of the derivations, another problem for these generative analyses is the issue of the underlying vowels in the verbal prefixes. As we have seen, the verbs are assumed to be the basic members of the stress-doublet pairs, and in most of them, the prefixal syllable has a reduced vowel, /ɪ/ or /ə/ (see the phonological data in Appendix I, discussed in section 3.4). There is no evidence for a full vowel in the prefixes of these verbs: only under rhythmic secondary stress in suffixal derivations (e.g. *c*[ə]*nsult* ~ *c*[ɒ]*nsultation*), or under primary stress in doublet nouns, does a full vowel surface. However, as we have seen above, generative phonologists do posit a full underlying vowel in the verbs. There is an obvious abstractness problem here: how does the speaker know that the right underlyer can only be found in the derived form? And must these underlying forms be restructured once a derived word is learnt?

This problem is compounded when we realise that this full-underlying-vowel analysis must be extended to the verbs of our non-stress-alternating group, which have no doublet noun or suffixal derivatives with the necessary stress pattern to give us any evidence for the quality of the prefixal vowel. Should we say there is [ɒ] underlyingly in *confess* or in *connect*, even though it never surfaces in the simple form and there is not even any evidence of it from derived forms? And of course in many of these prefixes different full vowels may occur: would *remove* or *relieve* have the [ɛ] of the noun *refuse*, or the [i:] of the noun *reject*? Either could be possible, and there is no way of telling from the verb.

Of course, this objection is weakened if we assume that each Latinate prefix and base is one linguistic object – i.e. that the initial syllables of *reject*, *remit*, *record*, *refuse*, *remove* and so on, or of *commune, collect, confess, connect, complain* etc. - are all analysed by the speaker as different instances of one single prefix, with one underlying representation. This assumption presumably is made in these metrical generative phonological analyses. But, in the light of the discussions of their internal prefixal structure (section 3.3 and 5.2.2), I do not think it is justified. There are no semantic links at all between the different instances of 'Stratum 1' *re-*, except weakly in the (minority) 'borderline' *rebound* group; and, as we have seen with the vowel variation, the phonological links are tenuous, with only one consonant linking the different examples of 'one' prefix. This is not to deny the possibility of some prefixal structure in these forms, merely to deny the existence of each meaningless and phonologically variable prefix and base as an independently-represented morpheme.

So, for my analysis the problem of the full underlying vowel in the verbs' initial syllables remains; and it is still really present for the analyses under discussion here, given that the prefixes' occurrence in the verbs is treated as basic, and here they do not have full vowels. This issue actually goes back to Chomsky and Halle (1968), who did not permit underlying schwa. They insisted that all vowels were full underlyingly, allowing unconstrained reduction rules to apply to them at the appropriate point in the derivation (cf. Giegerich 1999): I will discuss this further in 7.3.2)

Another problem with excessive abstractness concerns the application of the stress rules in both HM's and HV's accounts: both assign stress to the verbs' initial syllables only to remove it later in the derivation. As I pointed out above, they need to do this in order to generate the right pattern for the stress-doublet nouns. But the nouns, as nouns, could be given initial stress anyway; even if they are to be derived from the verbs, they will still undergo further stress rules. So, I would suggest another improvement to these accounts might be to let stress assignment apply only to the second syllables of the verbs, and not iterate (as argued by Puppel (1979)). Again, if we look at the verbs such as *repeat* or *consent*, with non-stress-alternating zero-derived nouns, this suggestion seems even more reasonable: there is no justification even from morphologically related nouns to stress their initial syllables.

Since the BDLP model aims to be better constrained than its predecessors (cf. 2.3 above, and Giegerich 1999, 1994) we might expect that it would ban analyses involving non-surfacing full underlying vowels and stress which is first applied and then removed. Lexical phonology is supposed to have mechanisms which rule out such abstract derivations. But if we explore just how HM's and HV's analyses might fit into the present model, we get an equivocal result.

As we saw in the preceding section, Destressing and the subsequent Vowel Reduction must be sensitive to the verbs' (Latinate) prefixal structure. And, as amply discussed already (sect. 3.3, 5.2), these prefixations can only be Stratum 1 prefixations: their unproductiveness, phonological variability, and semantic emptiness guarantee this. Because of the Bracket Erasure Convention (introduced in sect. 2.2), any internal morphological structure present on Stratum 1 is invisible to Stratum 2 phonological rules. So, if Destressing and Vowel Reduction apply to these forms, they can only apply on the first stratum.

And the first stratum, as we saw in sections 2.2. and 2.3, is subject to the Strict Cycle Condition (SCC), designed to ban the application of structure-changing rules in underived environments:

(17) SCC

> Structure-changing cyclic rules apply in derived environments only (where a "derived environment" is an environment created by either a morphological rule or a phonological rule on the same cycle)

(quoted in Giegerich (1999:100), but see also Kiparsky (1982, 1985), Rubach (1993), Booij (1994)). In BDLP, as discussed in section 2.3, the SCC is captured by the independently-motivated Blocking Effect, formulated by Kiparsky as the Elsewhere Condition:

(18) Elsewhere Condition (EC)

> Rules A, B in the same component apply disjunctively to a form Φ if and only if
> (i) The structural description of A (the special rule) properly includes the structural description of B (the general rule).
> (ii) The result of applying A to Φ is distinct from the result of applying B to Φ.
> In that case, A is applied first, and if it takes effect, then B is not applied.

(Kiparsky 1982: 8; cf. Scalise 1986, Giegerich 1994, 1999) So, a particular rule whose input is a subset of the potential input to a more general rule, but whose output is distinct from the output of the general rule, blocks the more general rule. Now the input of the Root-to-Word rule (which assigns lexical category) consists of individual forms which are listed for undergoing one particular part of the rule, rather than any group of forms defined by the presence or absence of particular features in a structural description. On this view the input of Root-to-Word is always going to be a subset of the input to any other rule we might want to apply to a given form.[20] So it blocks further structure-changing rules, since these would produce a technically distinct output. But it does not block structure-building rules, because their outputs are not technically distinct from the underlying form or from the output of Root-to-Word (Giegerich 1994, 1999). So, assuming there is no pre-morphology cycle of the

[20] This view will be challenged in future chapters, though – see 7.2.2.

phonological rules (see 2.3 above, Giegerich 1999: 4.2.1), a root which is given lexical category on its first cycle cannot have its underlying structure changed, only built upon.

It might be argued that if we treat these Latinate verbs as prefixations, then the concatenation of prefix and base is their first-cycle morphological operation, and this should leave them available for structure-changing as well as structure-building rules. But even if this were not so morphologically suspicious, it would not make them derived environments for Vowel Reduction, because the prefixation would happen on a previous cycle. Destressing and Vowel Reduction obviously apply after stress assignment, and only to verbs, so they must be ordered after lexical category assignation. So indeed must the stress rules themselves, since as we have seen, they are sensitive to lexical category. That is, stress application, Destressing and Vowel Reduction must all be ordered after the Root-to-Word rule, which itself would be the beginning of a new cycle.[21]

Destressing should still be allowed to apply after Root-to-Word though, because it is not structure-changing. It only reverses the effect of the structure-building stress rules, rather than altering underlying structure; if assigning stress cannot create a form distinct from the underlying representation (or the form which undergoes Root-to-Word), then nor should removing stress be able to. The problem comes with Vowel Reduction. Notice that the SCC might have let it apply because its environment is created by the prior application of a phonological rule (Destressing) on the same cycle,[22] but in BDLP this should not be permitted. The Root-to-Word rule blocks any subsequent rule which shares the same input but would create a form technically distinct from its own output. Under HM's or HV's derivations of the Latinate verbs, Root-to-Word would have verbs with full-vowelled prefixes as output, while Vowel Reduction would have verbs with reduced vowels – schwa.

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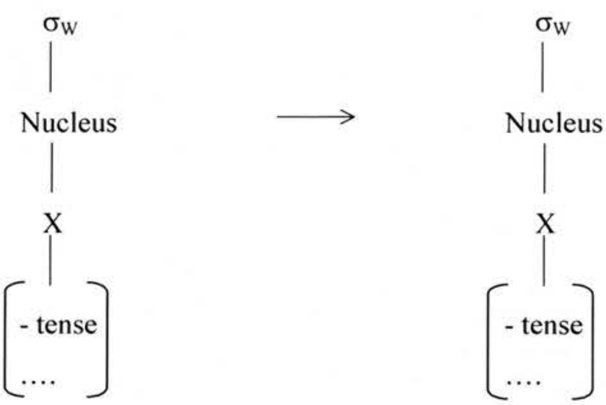
[21] This actually has serious consequences for BDLP, as discussed in section 7.6 below.

[22] Whether or not structure-building phonological rules create technically 'derived environments' has been a controversial point: Clements and Keyser (1983: 167-8), Rubach (1993: 7, fn.2) and Booij (1994: 10 and fn.12) argue that they can, while Kiparsky (1985: 91) describes this as a 'loophole' and argues that they cannot; McMahon (2000a: 46) agrees.

So, given that we might expect Vowel Reduction to be structure-changing, surely it is banned. But this assumption is actually false within the BDLP model. Giegerich (1999: 134-42) sites the rule on Stratum one,[23] formulating it as Delinking (1999: 139):

(19) Delinking



The vowel matrices go from having plus and minus specifications, to having zero values for all features which distinguish vowels from each other, except [± tense], which is [- tense]). Actual values for schwa (distinct from all other vowels by being minus for every feature) are filled in by a Default rule on Stratum 2.

Such unspecified matrices are not technically distinct from specified ones. Underlying representations may be left unspecified as a way of circumventing the SCC, because then structure-changing rules are allowed to behave as structure-building ones, simply filling in structure where previously there were blanks (see esp. McMahon 2000a: sect. 5.4). And if rules which fill in positive or negative values in feature matrices produce output which is technically non-distinct from the underspecified input, then rules which remove such positive or negative values and replace them with zeroes also produce technically non-distinct outputs. They simply work in the opposite direction; this is directly analogous to the reason for Destressing's non-structure-changing status.

For these Latinate prefixations, the operation of the Vowel Reduction rule (Delinking) within BDLP has an odd result. The prefixes *re-*, *de-*, *pre-*, *pro-*, would presumably be assumed to have a tense underlying vowel (consider their similarity to productive, word-based

[23] His reasons do not concern us here: the argument centres around allowing schwa in underlying representations (earlier we touched on the fact that this is not accepted in SPE and later works in the generative tradition).

prefixations). Obviously this would then be specified [+ tense] – meaning that Delinking would effectively be a structure-changing since as we have seen it imposes a [- tense] specification. Therefore, it would be blocked by the R-to-W rule. So, HM's and HV's analyses of verbs containing these prefixes are inapplicable within the BDLP model.

However, the prefixes *coN-*, *sub-* or *ad-* would have lax underlying vowels – and reducing these to schwa on Stratum 1 would be perfectly acceptable in the present vowel, since there is no contrast between the feature matrix for (say) /a/ and the underspecified one for schwa:

(20) a. /a/ b. Schwa

$$\begin{pmatrix} \text{- tense} \\ \text{- high} \\ \text{+ low} \\ \text{- round} \\ \text{- back} \end{pmatrix} \qquad\qquad \begin{pmatrix} \text{- tense} \\ \text{0 high} \\ \text{0 low} \\ \text{0 round} \\ \text{0 back} \end{pmatrix}$$

This means that for any surface schwa in any word, regardless of morphological complexity, a full lax underlying vowel /a ɛ ɪ ɒ ʊ ʌ/ may be posited within BDLP, and first-stratum rules may apply to turn this into /ə/. So, for instance, *banana* could be underlyingly represented as /bʊnɑnɪ/, or vanilla as /vɛnɪlɒ/. Luckily the same is not true with tense vowels; but there is clearly a problem with unconstrainedness here.

So, to summarise the arguments in this section: the metrical generative phonological analyses of Latinate prefixed verbs assume full underlying vowels in the prefixes, stress and then destress them, and then reduce the vowels to schwa. This is excessively abstract and therefore unjustifiable. There seems to be no reason why the prefixal syllables cannot simply contain surface-true underlying schwa, and never receive stress. To claim any credibility, these generative analyses must rely on the assumption of synchronic morphological complexity in these words, with prefix and base identified as independent linguistic entities. And, as argued above and in Chapter 3, the Latinate prefixes and bases do not merit this status. It may (just) be possible for the borderline *rebound* set to be synchronically analysed like this, but not for the core bound-based groups. There may be some residual morphological complexity in them, but I do not believe this should go as far as independent representations of prefix and base.

We also explored how these over-abstract generative derivations might work within the constraints of the BDLP model – and found a surprising result. We might expect this model to outlaw such analyses, but because of its use of underspecification, Destressing and (more seriously) Vowel Reduction can both apply unconstrainedly to prefixes (or indeed any stressable string) containing underlying lax vowels. Only the tense-vowelled Latinate prefixes like *re-* and *de-* are banned from undergoing Vowel Reduction (Delinking), in the formulation it has in Giegerich (1999: 139). Perhaps a reformulation of this rule which would give its output the full specifications for schwa (and thus deprive the Default rule of input) would be a solution to this problem.

This last issue is left for later sections (esp. 7.6 and Ch.8), where we will see other problems with BDLP's mechanisms for effecting SCC, in an examination of Giegerich's (1999) analysis of the vowel alternations in *Milt*[ə]*n* ~ *Milt*[ɒ]*nic* ~ *Milt*[o:]*nian*. Next I will discuss the standard account of the noun-verb stress doublets within a lexically stratified model: that of Kiparsky (1982). The metrical analyses discussed in this and the preceding section should be borne in mind in this next section, because the general approach and basic assumptions are similar, and the accounts are mutually compatible.

5.5 The stress-doublet words within stratified Lexical Phonology

5.5.1 Kiparsky (1982)

Kiparsky (1982) presents what has become the standard Lexical Phonological analysis of the noun-verb stress doublets.

In many respects this account is similar to the other generative phonological ones described in section 5.4; the same kinds of metrical phonological rules, and interleaving of phonological and morphological rules, are employed. The major difference is that Kiparsky's analysis is set within a stratified lexicon. As we saw in section 2.2, this lexicon has three levels, with the stratification affix-driven rather than base-driven. The first stratum contains '+ boundary' derivational morphology, i.e. processes such as the suffixation of *–ic* or *–ity*, which can profoundly alter the phonological structure of their bases. All stress rules except the Compound Stress Rule also apply on this first level. Regular and more productive '# boundary' morphology, such as the suffixation of *-ness*, is sited on Stratum 2, as is compounding (hence the need for Compound Stress on this level). The third stratum is where inflectional morphology operates (see 2.2 for more discussion).

With these noun-verb stress doublets, the simple fact that there *is* stress-alternation between them is evidence for Kiparsky that the nouns must be derived from the verbs on Stratum 1. Since all stress rules (certainly rules of the foot level) except Compound Stress are on the first stratum, the deverbal derivation could not happen on any later level because the nouns would not be able to receive the correct stress pattern. He says (1982: 12):

> When nouns are formed from verbs they may shift to the nominal stress pattern (18a), but when verbs are formed from nouns they do not shift as expected to the verbal stress pattern (18b):
>
> (18) a. torméntV > tórmèntN
>
> b. pátternN > *pattérnV (cf. *cavórt, usúrp*)
>
> This difference in stress behaviour is directly accounted for by forming nouns from verbs at level 1 and verbs from nouns at level 2, where they escape the level 1 rules of word stress.

Kiparsky also adduces other evidence, based on the phonological and morphological behaviour of denominal verbs and deverbal nouns, that verb-to-noun conversion happens on Stratum 1, and noun-to-verb conversion on Stratum 2. In support of the latter proposition, he claims that denominal verbs are always regularly inflected, and never take first-stratum affixes. Plus, nouns with first-stratum affixes may convert to verbs, e.g. *to engineer* (Kiparsky 1982: 12-13). The second-stratum siting of noun-to-verb derivation is in any case not disputed here: it is the nature of verb-to-noun conversion which concerns us.

In support of the proposal that verb-to-noun conversion happens only on Stratum 1, Kiparsky claims that nouns so derived may not only undergo stress shift, but also irregular phonological processes such as ablaut, e.g. *sing~song*. No suffixed verbs may convert to nouns (**a publicise*); and deverbal nouns may take first-stratum suffixes, e.g. *contract-ual*. However, these arguments for stratal siting are not supported with reference to semantic regularity; they rest on stress assignment and ablaut, and on the relative ordering of conversion and various affixation processes.

I will argue below that, in the light of our much closer look at the stress-doublet phenomenon and at lexical deverbal nominalisation, a very different Lexical Phonological account from Kiparsky's is more appropriate. His neither covers all the different types of stress-alternating words, nor accounts for the behaviour of the non-stress-alternating noun-verb pairs. I explain these criticisms more fully in the next section.

5.5.2 Problems with Kiparsky's account

As with the metrical phonological accounts examined in the previous sections, some problems for Kiparsky's analysis are empirical, and some theory-internal. And some aspects of the analysis are simply inapplicable within BDLP; these could reveal strengths or weaknesses of the model.

One problem with Kiparsky's account is that he does not acknowledge the fact that the stress-doublet words fall into different groups according to internal morphological structure - and, further, that these groups behave differently phonologically (i.e. with respect to the existence of secondary stress and full or reduced vowels in the verbs' initial syllables). The metrical phonological analyses discussed in 5.4 also ignore this, but they would not need much alteration to be able to fit all the data.

For Kiparsky's stratified account, however, the problem is more serious. The internal morphology of the *rewrite* verbs means they must be prefixed on Stratum 2 (cf. 3.3.3), and therefore the nouns may only be derived from them on this level. Indeed, as we saw in Chapter 4, the semantics of the verb-noun relationships between the *rewrite* nouns and verbs support this. But such an analysis would be impossible with Kiparsky's division of labour between the strata. He treats *all* verb-to-noun derivations and *all* (relevant) stress rules as first-stratum; on both of these counts his analysis is empirically inadequate.

Another problem arises with the question of how to deal with the *consent*, *repeat* nouns and verbs. These are bisyllabic Latinate prefixations, as are most of the stress-doublets; and the likelihood is that they are verb-to-noun derivations. In Kiparsky's lexicon these verbs would have to undergo the same verb-to-noun rule, on the same stratum, as the stress doublets – which means that there would be nothing to stop the *consent*, *repeat* nouns undergoing the same stress rules as the *convict*, *record* set. One of the two groups of words would have to be marked as exceptional.

Kiparsky does not consider the semantic regularity of the verb-to-noun derivations; but we have already seen that it is very consistent in the *rewrite* and *consent* words. This, combined with the fact that there is no irregular phonology in either set, strongly suggests that there must be verb-to-noun conversion on Stratum 2 – this process cannot be limited to the first stratum.

Other arguments Kiparsky uses for such limitation are largely based on the assumption of exclusive stratification for any given morphological process, affixal or conversional – something not assumed in BDLP. But where Kiparsky's stratification is broadly the same as the BDLP one would be, there are other explanations than an exclusive siting of verb-to-noun on Stratum 1 for the way conversions and affixations interact. For example, that first-stratum-suffixed verbs may not convert to nouns probably has much to do with their origin as nouns in the first place, or as adjectives which may be listed for nominal suffixes on the same cycle as the verbal ones, e.g. the root *public* will be 'simultaneously' listed for the nominal *-ity* and the verbal *-ise* suffixes. Synonymy blocking would presumably be in operation here. Another possible reason why first-stratum suffixed verbs do not convert to nouns could be the tendency for verbal suffixes to be strongly associated with further nominalising suffixes, e.g. *-ify* verbs regularly nominalise in *-ification*; *-ate* verbs regularly take *-(a)tion*. Here Kiparsky's argument could be turned on its head: such verbs do not convert to nouns because this conversion would happen on Stratum 2 – but is blocked by the prior attachment of the nominalising suffixes on Stratum 1. A stratified lexical phonological account of nominalising processes need not exclusively site verb-to-noun conversion on the first stratum.

In any case, as we have seen (sect 5.2.4), Kiparsky's analysis could not be transferred directly to BDLP because this model admits no possibility of verb-to-noun derivation on Stratum 1. Instead, the irregular verb-noun relationships have to be seen as derivations from one common root – which may actually be more appropriate for some of the cases which Kiparsky suggests are verb-to-noun (a static relationship like this might be a better way of dealing with semantic irregularity than a directional one). But even if we treat the Latinate prefixations as cases of verbs and nouns derived from a common root, but distinguished by stress rules which apply differently to nouns and verbs, still, as outlined above, Kiparsky's account does not cover all the data.

So, the whole question of verb-to-noun derivations needs to be reconsidered: such a rule should be allowed to operate on Stratum 2, with the right semantic restrictions. Then, the productively prefixed *rewrite* group would be eligible for it. And the *consent* words, with regular noun-verb relationships but no stress-alternation, also need to be accounted for – might they undergo the same rule? Their different phonological behaviour must also be addressed within our model; as must the fact that the LCPR plainly needs to apply on the second stratum so that the *rewrite* nouns and verbs receive the correct prominence.

In Chapters 6 and 7 I will outline a new stratified lexical phonological analysis which incorporates these improvements. In the next section, I will gather together some issues I hope to address in this new analysis; and will also consider some of the problems which are beginning to emerge for the BDLP model.

5.6 Summary of the issues to be addressed within a new BDLP account of the stress doublets

So, through consideration of previous analyses of stress-doublet type words, we have uncovered a number of issues which need to be dealt with in any new BDLP account of them; and have started to sketch an outline of this new account. But we have also exposed a few problems with BDLP itself: some adjustments may have to be made to the model (a fact which will become clearer in later chapters).

One issue is that of prefixal representation. We saw that morphological complexity is generally accepted for the Latinate prefixations (often for phonological reasons), though the cline-like nature of this complexity is not generally recognised or represented. In many of these forms the morphological boundary seems to be fossilised: some of the phonology appears to respect such a boundary (e.g. in stressing the roots of nouns such as *combat*), but the prefixes and bases cannot be seen as independent morphological objects, since they are incapable of entering into new formations, are phonologically inconsistent, and have no semantic identity. In the *rebound* group morphological divisibility is more clearly justified; but we would hardly treat these as productively formed on Stratum 2, like the *rewrite* words. With only two discrete strata, can BDLP represent three different types of prefixation?

The question of how the different relationships between verb and noun might be treated has a more obvious answer: the semantic irregularity of these relationships in the Latinate stress doublets could be captured in BDLP by deriving them from a common root on Stratum 1, while the predictability of the noun-verb relationships in the *rethink* group points to a verb-to-noun derivation on Stratum 2. This suggestion runs against the analysis of Kiparsky (1982), but, as we will see, has the advantage of also being able to account for the non-stress alternating verb-noun relationships in the *consent* group. The nouns represent the action of the verbs so regularly that they too could be derived on the second stratum.

Exploration of Raffelsiefen's (1999) PP analysis of English prefixation raised the question of what prosodic or metrical representations should be used for the different types of prefixations. It is commonly accepted within PP that the pword is the only prosodic constituent with access to morphological information, and that it forms the domain for syllabification and stress. But close examination of Raffelsiefen's account shows that her alignment constraints (and indeed those used elsewhere in OT, e.g. McCarthy and Prince 1993: 116) strip the pword of this role. The suspicions about its usefulness expressed in Chapter 2 seem to be justified; therefore a more restrictive analysis using only the syllable and the foot (and perhaps aligning the prefix with the foot) might be more appropriate.

We saw a number of problems with the generative metrical accounts of the Latinate prefixed words: morphological insensitivity and inconsistency, and excessive abstraction in their phonological derivations (in giving the verbal Latinate prefixes full underlying vowels, which are stressed, and then destressed, and then undergo vowel reduction – introducing a number of unevidenced intermediate levels of representation). The morphological problems may be resolvable in BDLP (see above); but it seems this model might not be quite as restrictive as hoped with regard to phonological abstractness. Since the great majority of the Latinate verbs always surface with reduced vowels in their prefixes, we would hope that BDLP might prevent them from having full vowels underlyingly. But this is not the case: any underlying full lax vowel may be reduced to schwa on the first stratum after the application of the Root-to-Word rule, even though this is designed to block such unmotivated derivations. This is because of the underspecification employed in the representation of schwa on Stratum 1: it has zero values for all features apart from [± tense], which means it is not technically distinct from [ɪ ɛ a ɒ ʊ ʌ]. If this could be changed, then the model might be made more restrictive.

In the following chapter I present a new analysis of the stress doublets and of the non-stress-alternating noun-verb pairs within BDLP, addressing the issues raised in this chapter, and incorporating the empirical evidence of Chapters 3 and 4.

Chapter 6: A new lexical phonological analysis, I: The Stratum 2 stress doublets

6.1 Introduction

In this chapter and Chapter 7 I present a new lexical phonological analysis of the various groups of stress-doublet nouns and verbs in English. I hope to account for the phonological, morphological and semantic data presented in Chapters 3 and 4 within the base-driven model of lexical phonology (BDLP) designed by Giegerich (e.g. 1994, 1999). This will test the model to see how it may account for the data, and how such an account may improve on the previous analyses discussed in Chapter 5. It will be a particularly interesting challenge for BDLP because the data is all prefixal; and the interaction of prefixes and suffixes has proved very difficult for previous stratified models of the lexicon to cope with.

The second-stratum stress doublets are the main topic of this chapter, and the first-stratum ones the topic of Chapter 7. Most aspects of the existing analyses of stress doublets criticised in Chapter 5 are more relevant to the first-stratum cases than to the second-stratum ones; so the problems raised in that chapter will be dealt with in Chapter 7.

In this chapter, then, I propose a new BDLP analysis of the *resit*, *overcharge* and *consent* verb-noun pairs, overturning Kiparsky's (1982) stratificational proposals (see 5.5) and instead positing a verb-to-noun rule on Stratum 2. This captures the semantic regularity of the noun-verb relationships in these groups, and has to be the case for the *resit* and *overcharge* groups because, on both semantic and phonological grounds, these are only produced (i.e. prefixed) on that stratum.

The stress-doublet verbs, footed on Stratum 1, are prefixed on Stratum 2 and then converted to nouns (sect. 6.2). The phonology is the subject of sect. 6.3. I will argue that prefixal stress is accounted for by a process of Prefix Footing, which is a better way of dealing with prefixal phonology (see sect. 2.6) than aligning the prefix with a prosodic word (cf. sect. 2.5, 5.3). Then, the relative prominence between the prefixal and base foot may be determined by the Lexical Category Prominence Rule (LCPR), which in most cases in the data will assign initial stress in nouns and final stress in verbs. These same rules are shown to apply to independent nominal prefixations in section 6.4.1.

The *consent* nouns and verbs are discussed in section 6.4.2. Their lack of stress alternation is explained by the fact that the verbs are overwhelmingly Latinate and thus receive just one (final) stress on Stratum 1. On Stratum 2 they cannot be given an initial foot because they do not have second-stratum prefixal structure; so they are not eligible for the LCPR, and the nouns and verbs have the same prosodic structure. Stress alternation in the *consent* words is thus impossible.

After a brief summary of the derivations in sect. 6.5, I then go on in sect. 6.6 to discuss various issues connected with the analysis, in particular the accuracy of the LCPR in accounting for the data (6.6.3), and – more significantly for BDLP – the problem of bracketing paradoxes (6.6.2). I find the model's architecture unsatisfactory in dealing with examples of first-stratum/ root-based suffixes attaching outside second-stratum/ word-based prefixes. Instead I propose an alternative solution to the problem: the mechanism of blocking, which is a concept very important within BDLP. The operation of blocking is exemplified with a discussion of the occurrence vs. non-occurrence, and the semantics, of alternative (suffixal) nominalisations of Latinate prefixal verbs which have either a stress-doublet or a non-stress- alternating related noun.

Finally, section 6.7 provides an overall summary of the chapter. And then we go on to Chapter 7 for the analysis of the other groups of stress-doublets, the Latinate prefixal forms.

6.2 The Stratum 2 stress-doublet morphology: the *resit* and *overcharge* groups

The reasons for treating the productive and the particle prefixations together should, in the light of Chapter 3, be clear. In both groups the prefix does not occur as a free-standing element; as argued in section 3.3.3 above (and cf. Marchand 1969: 100), *over-* and *under-* in these combinations have quite different meanings from those they have as independent words. In both groups too the prefixes are productive; they have regular, semantically transparent relationships with their bases; and the bases are always free words. Hence I see *re-*, *mis-*, *over-*, *under-* etc. all as prefixes which attach on Stratum 2. This is supported by the regular phonology of the *resit* and *overcharge* groups. Neither prefix nor base exhibits any kind of segmental allomorphy (cf. Chapter 3), and each is exceptionlessly stressed. Therefore, the first morphological operation which applies to these forms is the prefixation of the verbs, which happens on Stratum 2.

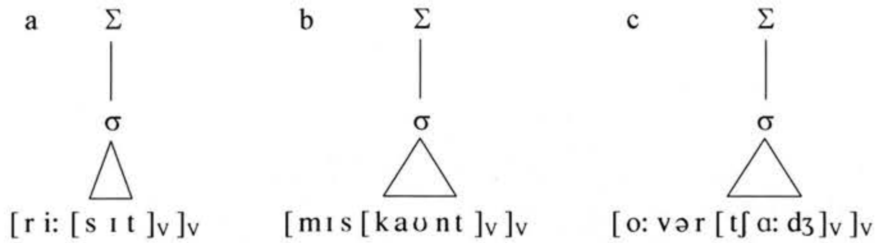
The next morphological operation is the application of the Stratum 2 verb-to-noun rule. Being a second-stratum rule, this must have semantic regularity. And as we saw in Chapter 4 (sections 4.4.1 and 4.7.1), the productively prefixed nouns and verbs do have close, regular semantic relationships. We saw a correlation between transparent prefixal structure and a semantically regular verb-noun relationship, which strongly supports the proposal that verbs are prefixed on Stratum 2, and then the nouns are derived from them on the same stratum. This link between one transparent morphological process and another (and its mirror image, the link in the Latinate prefixations between obscured internal structure and irregular noun-verb relationships) is itself supportive of lexical stratification.

However, the correlation between internal transparency and a regular noun-verb relationship is not quite so clear in the particle prefixations; while over 86% of the *resit* nouns represented the action and /or effected object of their verbs, only 67% of the *overcharge* nouns did the same (see sect 4.4.3). I do not think that this should affect their derivation via the verb-to-noun rule on Stratum 2 though, for three reasons. Firstly, the figure for action/ effected object is still high; secondly, the group of particle-prefix stress doublet nouns is too small to provide substantial counter-evidence; and thirdly, it is possible that at least some of the nouns could be independently prefixed, and therefore not necessarily regularly definable in terms of the verb's argument structure. The analysis I propose allows for this last possibility.

So, to take firm examples: on Stratum 2 we have verbs like *sit*, *count* and *charge*, represented in BDLP as $[\text{sɪt}]_V$, $[\text{kaʊnt}]_V$, $[\text{tʃɑːdʒ}]_V$. I assume that they have already been syllabified and footed on their pass through the Stratum 1 rules, although it is possible that native or nativised words which undergo no irregular Level 1 morphology might bypass that stratum altogether (Giegerich 1994; Inkelas and Orgun 1994). I do not address this issue here; it makes no difference to the derivations outlined below.

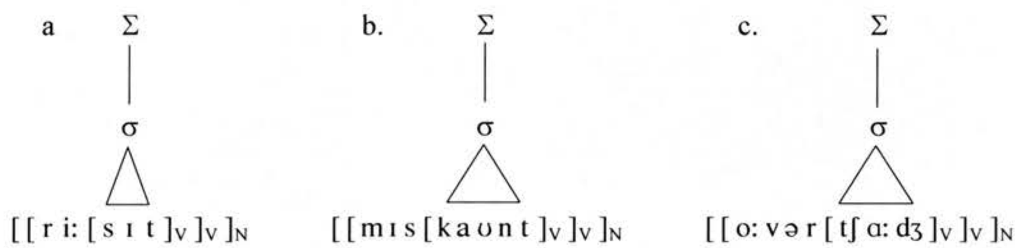
These verbs then undergo prefixation with, respectively, *re*-, *mis*- and *over*- on this second stratum, so we have:

(1)



As outlined in section 2.2 above, Stratum 2 is non-cyclic, which means that all the morphology on this level precedes all the phonology. So, the stress doublet nouns are derived from the verbs before any second-stratum phonological rules can apply. This happens next, and we are left with the same verbal structures as above, but additionally with the following nominal structures:

(2)



The prefixation and subsequent verb-to-noun derivation completes the Stratum 2 morphology for these forms; now the phonology may apply.

6.3 Phonology

6.3.1 Outline

After the morphology has applied, then, we have forms like $[re[sit]_V]_V$ and $[[re[sit]_V]_V]_N$, with the base (*sit*) already bearing metrical structure. The next step, for both verb and noun, is to syllabify and foot the prefix – the productive and particle prefixes are stressed no matter what the lexical category. After this, the relative prominence between the prefixal foot and the base foot must be determined.

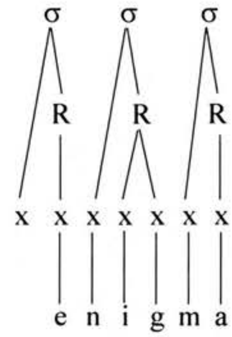
I describe the syllabification process in the first subsection below; we will see that the fact that there is no syllabification over the morphological '[' bracket is captured by the way the rules operate, and there is no need to appeal to prefixal pword status (as is usually done, cf. sections 2.5, 5.3). Next I go on to argue that a condition on the stress algorithm, requiring each Stratum 2 prefix to correspond to a foot, is the best way to capture other aspects of their phonological behaviour usually ascribed to pwordhood. Then, the final step in the phonological analysis is that of determining relative prominence between base and prefixal feet.

6.3.2 Syllabification

The separate syllabification of the prefix is actually predicted by the BDLP model as it stands. Here I give an outline of the syllabification process in this model, since it will also be relevant in subsequent sections and especially in Chapter 7. For more detail, see Giegerich (1999: sect. 8.4). I then go on to describe the derivation of the stress doublets under discussion.
As is standard now in phonological theory, Giegerich's (1999) account of syllabification assumes that the traditional segment is split across two levels of representation: there is a melody tier, where distinctive feature values are represented in matrices; and this maps to a skeleton, or X-, tier of abstract timing units. (Moras, represented by μ, are often used instead of Xs, e.g. by McCarthy and Prince (1993), Hayes (1995); the difference between the two approaches does not matter here). Each feature matrix generally maps to one X-position; but this is not always the case - lax vowels map to one X, by contrast with tense vowels which map to two.

The X tier is not usually underlying (though this is not ruled out), but is built by the three-part syllabification algorithm. Syllabification may apply on either stratum but is 'intrinsically cyclic' in the sense that it starts from the innermost morphological domain, enclosed in '[...]', and works outwards (Giegerich 1999: 256-7). (This is why it does not matter whether the bases here are prefixed on the first or the second stratum). The first operation assigns X positions to consonant matrices which could form onsets (i.e. taking into account factors such as relative sonority). The second operation is rhyme formation, which provides X position(s) for, and groups as constituents, a vowel and a maximum of one right-adjacent [+ sonorant] segment (which must not have received an X through the first operation). The third part of syllabification finally creates the syllable, σ, taking as a right-hand daughter a rhyme and as a left-hand daughter any available [+ consonantal] material; if there is no onset material available, an empty X-slot is built. One of Giegerich's examples is *enigma* (1999: 255):

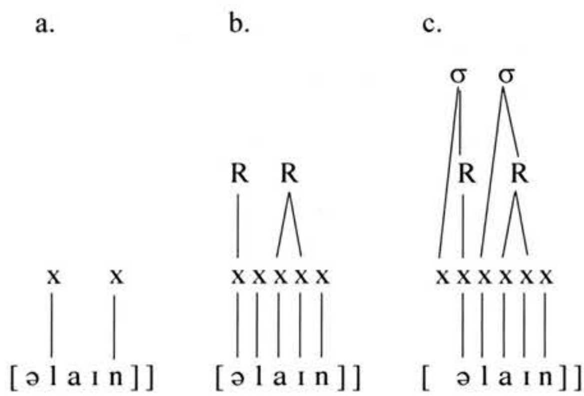
(3)



There is no lexical mechanism to fill the empty initial X slot; only postlexically may this happen.

Let us see now how this process applies in a prefixed form, e.g. the verb *misalign* (not in our data), bracketed [mis [align]]. As described above, whether *align* is syllabified alone on Stratum 1 or with the prefix attached on Stratum 2 does not matter, since the syllabification algorithm first applies within the innermost '[…]' domain; though I make the general assumption of first-stratum syllabification where possible in the derivations in this chapter. The process is as follows:

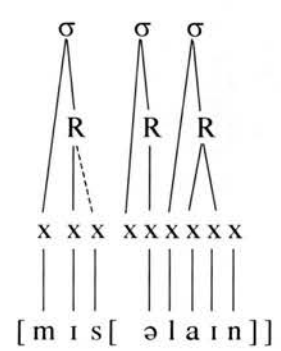
(4)



First /l/ and /n/ are given X slots; then the vowels are given Xs made into rhymes. The rhymes do not contain the sonorant segments to their right because these have already been assigned skeletal positions and reserved for onsets. Then the final part of the syllabification rule applies: it gathers together the /l/-onset and the /aɪ/ rhyme into a syllable; and builds an empty X slot to form the left daughter (onset) for the initial syllable, which has /ə/ as the rhyme. The /n/ is unsyllabified. Postlexical stray adjunction will let it become a coda for the preceding syllable (Giegerich 1999: 274-5).

After prefixation, the syllabification rule scans the outer '[…]' domain, with *mis-* now visible. /m/ and /s/ are each given X slots to be potential onsets; then /ɪ/ is given a skeletal position and made into a rhyme; this is then built into a syllable with /m/ as the left daughter. There is no way for the /s/ of *mis-* to fill the empty onset slot at the beginning of *align*; it must be assigned its own X slot. It would behave like the /n/ in *align*, undergoing no further lexical syllabification, were it not for the fact that all Stratum 2 prefixes receive stress, and stressed syllables must be heavy under the Syllable Weight Condition (Giegerich 1999: 272). This forces the /s/ into the coda of the *mis-* syllable lexically. So we have:

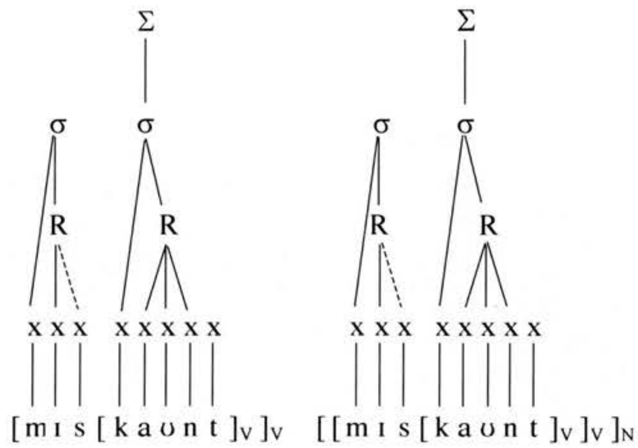
(5)



By contrast, in a suffixed form like *keeping*, as is well known, syllabification over the ']' morphological boundary is permissible: thus we expect *kee.ping*, with the full stop representing the syllable boundary. Here the innermost domain is *keep*, with the final /p/ given an X position as a potential onset but not actually syllabified; then after the rhyme of the suffix *-ing* is built, this /p/ constitutes the [+ consonantal] material available on the left-hand side for the syllable onset.

So, to return to the examples *resit*, *miscount*, *overcharge*: with the bases already syllabified and footed (as assumed above), we must now syllabify the prefixes. Thus, exemplifying with *miscount*: the /m/ and the /s/ are first given X slots, then the /ɪ/ is made into a rhyme, then the syllable is built, which (initially) excludes the /s/. This cannot be syllabified with the *count* syllable, though, as should be clear from the preceding discussion. The representations are:

(6) a. b.



(with the dotted line representing the fact that the /s/ is later taken into the coda of the *mis-* syllable).

Syllabification is now complete; the next step is to derive the correct stress contours in noun and verb.

6.3.3 Stress: the foot vs. the pword, and the LCPR

As well as being independently syllabified, all productive and particle prefixes are stressed. For this purpose I propose a rule of Prefix Footing, applicable (for now) only on Stratum 2:

(7) Prefix Footing (Second stratum only)

This means that any material enclosed in uninterrupted '[...[' brackets (i.e. any prefix) must correspond exactly to a foot. By this means, the initial (or only) prefixal syllable will receive stress, and therefore an –XX rhyme, if it does not already have one (by the Syllable Weight Condition).

Prefix Footing could just as easily be stated as a well-formedness condition on metrical structure, similar to some given by Giegerich (1999) (e.g. the Maximal Onset Principle (p.

254) or the Syllable Weight Condition (p. 272); and cf. p. 256). It bears similarity to the alignment constraints of OT, effectively being a shorthand for ALIGN (prefix, L, foot, L) and ALIGN (prefix, R, foot, R); and also to declarative phonological proposals in Bird (1995: 100-104) (cf. Coleman 1998, 2000).

Saying a prefix corresponds to a metrical foot is out of step with most recent analyses of productive English prefixes; as we saw in sections 2.5 and 5.3, prefixes are commonly analysed as prosodic words (e.g. Raffelsiefen 1999, Wennerstrom 1993, Szpyra 1989, Booij and Rubach 1984). Pword status is held to explain three main phonological characteristics shared by productive prefixes: they form separate domains for syllabification; they are always stressed; and thirdly, they are of minimal word (MinWd) size, i.e. always contain at least one heavy (-XX rhymed) syllable.

But I will argue that we do not need the pword to account for these characteristics: the foot does so just as well, and, moreover, accounts for other aspects of prefixal phonology which cannot be explained by pwordhood.
We have just seen above that prefixes' lack of syllabic liaison with their bases is already predicted by the present model of syllabification. Even if this were not the case, their independent footing would, under some approaches, ensure separate syllabification: in her analysis of English prefixes, Raffelsiefen says 'syllables must be properly contained within feet' (1999: 191); that boundaries of syllables and feet cannot cross over each other is a tenet of PP (Nespor and Vogel 1986: 7 'A unit of a given level of the hierarchy is exhaustively contained in the superordinate unit of which it is part.'), though in the present model the Syllable Weight Condition (Giegerich 1999: 272) conflicts with this).

The second phonological characteristic of prefixes, the fact that they are always stressed, is of course captured by making them equivalent to feet. Indeed, English prefixes never contain more than one stressed syllable (cf. below): this is predicted by the foot analysis, but not by the pword analysis.

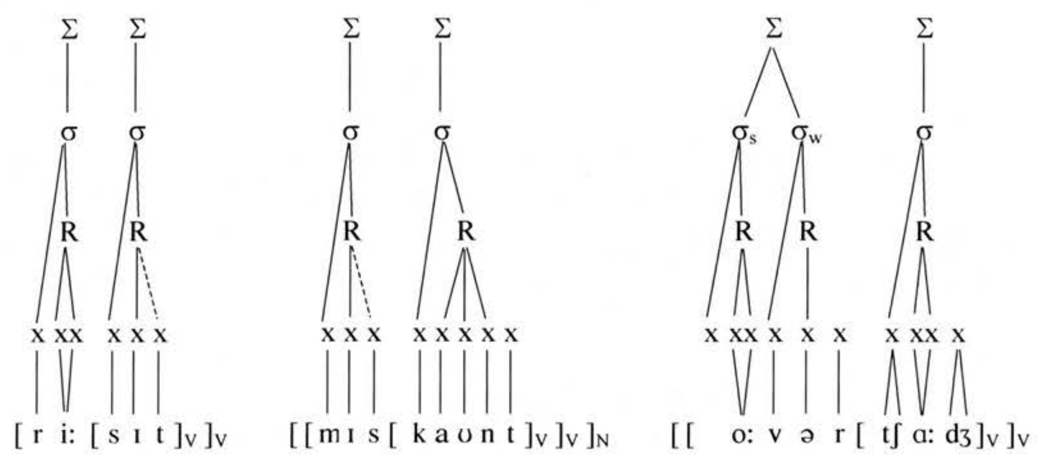
The third aspect of prefixal phonological behaviour, their MinWd status, is also as successfully covered by aligning them with feet as by aligning them with pwords. A foot by definition contains at least a stressed syllable, and stressed syllables must be heavy, i.e. have at least an –XX (branching) rhyme. So, a stressed syllable, and therefore a foot, is minimally equivalent to a MinWd. So the minimal size of the foot is the same as the minimal size of the pword. This result is actually encapsulated by a constraint McCarthy and Prince claim is undominated, FT-BIN: 'Feet must be binary under syllabic or moraic analysis' (McCarthy & Prince 1993: 91).

With this constraint we see a clear advantage of treating the productive English prefix as a foot rather than a pword – because, like the foot, the prefix is maximally binary. No English prefix is less than bimoraic, or more than bisyllabic (cf. Marchand's list of English prefixes (1969: xii-xiii; 139-207)). The same is true of preparticle elements. The pword analysis cannot account for this fact because 'there is no upper bound on the length of a PrWd' (McCarthy and Prince 1993: 85). A pword may also contain more than one stressed syllable, something neither a simple foot, nor a prefix, can do. Only by aligning the prefix with a foot can both its maximal and its minimal size be captured.

So, the Prefix Footing condition accounts for productive prefixal phonology well. But it obviously does not apply, at least in this form, to all prefixes: none of the Latinate prefixed verbs have feet over their initial syllables, and the 'head' prefixes are similarly stressless. I discuss this issue further below (section 7.3) – but note here that one possible approach might be to let Prefix Footing apply to words of all lexical categories on Stratum 2, but limit it to certain groups of prefixed nouns on Stratum 1, and not let it apply to verbs.

Returning to the derivation of the nouns and verbs *resit*, *miscount*, *overcharge*, after Prefix Footing is satisfied we have representations like the following, with both prefix and base syllabified and footed (I show *resit* and *overcharge* as verbs, and *miscount* as a noun; the only difference between verb and noun lies in the morphological bracketings):

(8) a. b. c.



The next step is of course to determine relative prominence between the prefixal and base feet, and in doing so to produce the stress-doublet pattern, assigning final main stress in verbs and initial main stress in nouns. This is achieved by application of the Lexical Category Prominence Rule (LCPR), which was introduced as (13) in Chapter 5:

(9) LCPR

For any pair of sister nodes $[N_1\ N_2]_L$, where L is a lexical category and N_1, N_2 are feet or dominate feet, then N_2 is strong if it branches, or if the lexical category is non-nominal and N_1 does not branch.

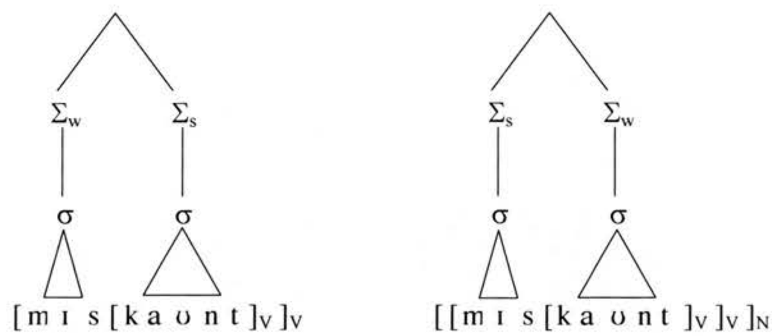
(cf. Hogg and McCully 1987:91; and Liberman and Prince 1977: 307. Like Prefix Footing (no. (7) above), the LCPR could also be restated as a well-formedness condition rather than a rule).

In the nouns and verbs in question, 'N_1' is of course the prefixal syllable, and 'N_2' the base syllable. In the verbs, the base will be marked 'strong': it is not branching, but the lexical category is of course non-nominal, and the prefixal foot does not branch. In the nouns, meanwhile, N_1, the prefixal foot, must be marked strong since N_2 is non-branching and the lexical category is (obviously!) *not* non-nominal.

So, this is the end of the second-stratum derivation, and we end up with the following representations for, e.g., the noun-verb pair *miscount*:

(10)

a b



Thus the derivation of the productive- and particle prefixation stress doublets on Stratum 2 is complete.

6.4 Related cases: independently prefixed nouns and the *consent* words

6.4.1 Independently prefixed nouns

I noted above that the phonological rules applied in the previous section to derive the *resit* and *overcharge* stress doublet nouns and verbs could equally well apply to those nouns in the productive prefixation data which, instead of being derived from their verbs, seem (on semantic grounds) to be separate prefixations. Consider for example *remount*. The verb *remount* means 'mount (a horse) again', but the noun does not refer to the action of remounting (as we might expect) or to the horse which is being mounted again; instead it means 'a new mount' i.e. a fresh horse. It is a case of the prefix *re-* attaching to the noun *mount* 'horse'. A similar argument could apply to *retread* or *mismatch*, both words in which the base of the prefixation exists as a noun and as a verb, and the prefixed noun could be interpretable as either a derivation from the verb, or as an independent formation. (Of course such an analysis is not available for all the stress-doublets in this group: the noun *resit*, for example, must be derived from the verb *resit*, since there is no noun *sit* with the right semantics ('an exam') to produce, with *re-*, the definition of *resit* 'an examination which is retaken').

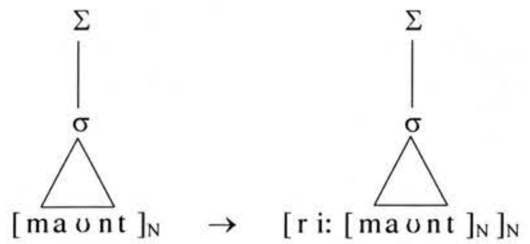
To derive the nouns *remount* or *mismatch* in this way, we would need to prefix *re-* and *mis-* to the nouns *mount* and *match* on Stratum 2, just as the verbs *sit*, *charge* and *count* were prefixed in section 6.2.1. Allowing this to happen may be somewhat controversial: *re-* in particular is generally assumed to be a verbal prefix (e.g. Strauss 1982a, Selkirk 1982: 99, 103). But Marchand notes that *re-* 'is, as a matter of fact, found with deverbal substantives' and that 'the type has [...] a certain degree of independence in so far as such substantives are coined regardless of the existence of the verb' (1969: §3.51.6). This is even more true of *mis-*: '[d]everbal substantives are especially frequent. [...] the corresponding verb is often not in existence' (Marchand 1969: §3.33.3; on both of these prefixes attaching to nouns, support comes from Bauer 1983). Marchand's examples of nominal prefixation include *misalliance*, *miscarriage*, *misconduct*, *rebirth*, *re-appointment*. In the case of *rebirth*, the noun *birth* can hardly be synchronically related to *bear*: this is unequivocally a nominal prefixation.

These prefixes are able to attach to nouns as well as verbs because semantics is more important than syntactic category for prefixation. As we saw in section 2.6, the great majority of English prefixes do not change the lexical category of their base, but instead perform semantic modification. So it seems reasonable to say that their bases are selected not on grounds of syntactic category, but because of their meanings. In other words, prefixes operate on semantics, so their operands are semantically rather than syntactically defined. Therefore as long as a noun has the meaning appropriate for *re-* attachment – i.e. 'action' semantics, the action having an object (see section 4.7.1) - then it may take that prefix. The noun *mount* may take *re-* because it defines a horse as the object of an action (mounting).

Of course, unambiguous examples of *re-* attaching to nouns are rare, which throws into doubt the productivity of this process, and therefore the appropriacy of its second-stratum siting. But this objection can be turned around: *re-* usually attaches to verbs because the kind of semantic input it takes is predominantly found in verbs. Where nouns have the appropriate semantics for *re-* attachment, they are generally deverbal derivatives, so it is not clear in a case such as *re-appointment* (which Marchand treats as a nominal prefixation) whether we are dealing with *re-* + *appointment*, or *re-appoint* + *-ment*: is this nominalisation then prefixation, or the prefixation of a verb followed by the addition of a nominalising suffix? Verbs typically refer to actions and nouns to entities; this is why *re-* generally seems to be a verbal prefix, and why nouns with action semantics are very often deverbal derivatives. (cf. Croft 1990: 141-2; Dixon 1991: 8-9; Anderson 1997).

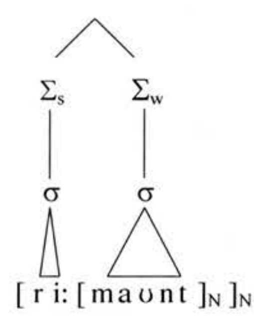
So, controversial though it may be, I think a case can be made for nominal prefixation with *re-* on Stratum 2. The derivation of *remount*, *rebirth* or *mismatch* should now be clear. Firstly, the nouns *mount*, *birth* and *match* (which already bear metrical structure from Stratum 1) are prefixed as follows

(11)



The prefix is then syllabified, and footed by Prefix Footing, as in section 6.3.3 above; and finally the LCPR applies, making the prefixal stress primary and the base stress secondary:

(12)



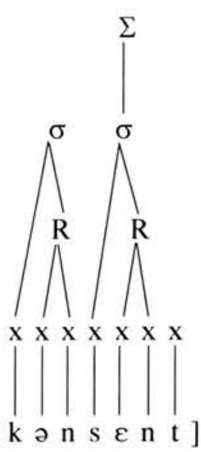
This analysis can also be applied to other transparently prefixed nouns, e.g. *có-stàr, có-pìlot, ántimàtter*, *cóunterblàst*, *súbpàrt*. In section 5.3.1 we saw that Raffelsiefen (1999) claims prefixed nouns only receive initial main stress when the prefix ends in a bilabial or velar consonant, but these examples, as well as *remount*, *rebirth* and *mismatch* disprove this claim. However, it is patently not true that all prefixed nouns have initial primary stress: consider *cò-deféndant*, *rè-appóintment, dè-seléction* and other examples with polysyllabic bases. But the LCPR does actually predict main stress on the base in these cases, because its foot is branching: N_1 is only strong where N_2 does not branch.

Still, though, this is not the whole story of nominal prefixations; there are further exceptions to these rules, and generalisations to be made about these exceptions. I take the issue no further at this point, though, since the operation of the LCPR does cover the majority of cases. For further discussion see the end of the following section; and especially section 6.6.2.1, where the problem of bracketing paradoxes (root-based suffixes apparently attaching outside word-based prefixes) is addressed.

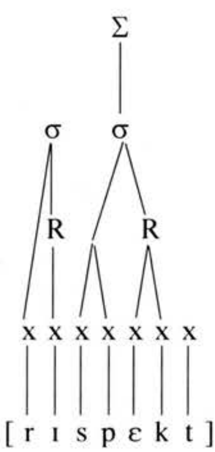
6.4.2 The *consent* words: verb-to-noun derivation with no stress alternation

It was established in section 3.3.2 that the great majority, some 81%, of the non-stress-alternating noun-verb pairs (the *consent*, *respect* words) are Latinate prefixations, i.e. have Stratum 1 morphological complexity. The issue of their internal morphological structure, and the details of their first-stratum phonological derivation, will be discussed in Chapter 7 as part of the analysis of the Latinate stress doublets. It will be shown that verbs like *consent* and *respect* exit Stratum 1, and enter Stratum 2, syllabified and footed as follows[24] (note any internal morphological brackets which may have existed on Stratum 1 will be erased before entry to the second level by the Bracket Erasure Condition (sect 2.2)):

(13) a.



b.



This is the starting point for the following discussion.

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[24] The qualities of the vowels in the initial syllables are not necessarily established at this point (they may be underspecified), but this makes no difference to the analysis proposed in this section.

At this stage, entry to the second stratum, none of the nouns of the *consent, respect* type yet exists. Bearing in mind the semantic regularity of the noun-verb relationships in this group (see sect. 4.5), I propose that the nouns *consent, respect, attack*, etc. may be derived from their verbs by the same Stratum 2 process which nominalises verbs of the productively prefixed *resit* group. This is the only morphological operation to apply to this group of words on the second stratum: its outputs are represented prosodically like those above, the only difference being the morphological structure: $[[\text{kənsɛnt}]_V]_N$ etc.

On the phonological side, the *consent* nouns cannot now be assigned any initial stress and become stress doublets: they are ineligible for Prefix Footing because any internal prefixal structure they might have had is removed on entry to Stratum 2 by Bracket Erasure. And of course the LCPR cannot apply to either the noun or the verb because they each only contain one foot.

Thus there is no relevant second-stratum phonology to apply to the nouns and verbs of the *consent, respect, attack* group (with the exception of determining vowel quality in the initial syllables, which happens in the same way in both noun and verb and is not relevant to the present derivation – see Chapter 7). The derivation is complete.

This analysis accounts successfully for the great majority of the non-stress alternating, end-stressed bisyllabic noun-verb pairs, though there are a few exceptions. Some of the words in this group should actually be seen as noun-to-verb derivations, e.g. *cocoon, garotte, tattoo*: these are basically nouns with final stress. They present no problem to my analysis: the nouns may be syllabified and stressed (exceptionally, if necessary) on Stratum 1, and then enter the second stratum and be inputs to its productive noun-to-verb rule (cf. Kiparsky 1982).

More problematic is the (very small) set of non-stress-alternating noun-verb pairs with productive word-based prefixes, including *miscue, distrust, misrule, undress*. There seems to be no particular reason why these formations do not follow the stress-doublet pattern, with initial primary stress in the nouns: this is what the analysis proposed here would predict, whether the nouns are derived from the verbs or independently prefixed.

Of course, I noted in the previous section that there are exceptions to the stress patterns proposed here for prefixed nouns; *miscue* etc. may just be examples of such exceptions. A possible explanation could be the apparent newness of the primary-stress-on-nominal-prefixes pattern: from the remarks Marchand (1969) makes, it would appear that nominal pronunciations like *rébìrth, récòunt, mísmàtch* rather than *mìsrúle, dìstrúst* are relatively recent. For example, on *re-* he says 'with disyllabic substantives there is now a stronger tendency to stress the prefix' (§3.51.7) and (on *mis-*) 'According to OED and Webster the prefix never bears the main stress. In recent usage, however, disyllabic substantives may have forestress' (§3.33.6).

There is plainly still some variability in the stress patterns of prefixed nouns unaccounted for by the present analysis. This issue is addressed further in section 6.6.3.

6.5 Summary

Before considering how this analysis fits into the broader morphological and phonological context, and exploring its shortcomings and the implications for the BDLP model, I will summarise the proposals made so far in this chapter.

I have claimed that the regular semantic relationship and the stress-doublet phonological relationship between the nouns and verbs of the *resit* and *overcharge* groups are accounted for by second-stratum morphological and phonological processes. I have also shown that the noun-verb pairs with no stress alternation, i.e. the *consent* words, can also be handled by the same rules.

On the morphological side, the productive prefixes (and particle prefixes) like *re-*, *mis-*, *dis-*, *under-*, *over-* are attached to their bases on Stratum 2. The phonological and semantic transparency and regularity of words formed with these prefixes shows that they must be analysed in this way; they show none of the irregularity or unproductiveness typical of first-stratum morphological processes.

In the great majority of the *resit* and *overcharge* stress doublets, the verb appears to be basic, and the noun derived from it. Therefore, I assume that the verb is first subject to second-stratum prefixation, and then forms input to a verb-to-noun conversion rule. This verb-to-noun rule also applies to the verbs of the *consent* group, which (like the prefixed verbs) have very regular semantic relationships with their nouns.

After the second-stratum morphology, the phonology applies. I assume that the bases to the productive prefixations, i.e. *sit*, *charge*, *write*, etc. are syllabified and footed straightforwardly on the first stratum; therefore this part of their derivation is not dealt with here. Similarly, I assume that the *consent* verbs are syllabified and then assigned a final foot on the first stratum, in a process detailed in Ch.7 (where the first-stratum morphophonology of the Latinate prefixations is covered). The corresponding nouns will inherit the same phonological structure when they are derived on the second stratum.

So, the only phonology which applies to any of these words on Stratum 2 (with the exception of the default feature-filling of the underlying vowels in the prefixal syllables of Latinate forms like *consent*, *respect* etc., which makes no difference to the present analysis) is that of the productive prefixations. I proposed a rule or well-formedness condition of Prefix Footing to account for the prefixal characteristics of always bearing stress, being of Min Wd size, and always being monosyllabic or trochaic. I argued that this is a better way of dealing with these characteristics than the pword analysis, because the pword cannot account for the apparent maximum size limit on prefixes, and as a construct is anyway not well justified in English phonology. The independent syllabification of prefixes is predicted by the algorithm proposed by Giegerich (1999: Ch.8) (though this as it stands is dependent on sequential ordering; cf. sect.8.4.4 below).

Thus Prefix Footing stresses prefixes in both the verbs and the nouns of the *resit* and *overcharge* groups. Meanwhile, the initial syllables of the *consent* words remain stressless since, even if they do have internal prefixal complexity, this would be first-stratum complexity.

Relative prominence between the prefixal and base foot in the *resit*, *overcharge* nouns and verbs is determined by the LCPR (like Prefix Footing, itself amenable to interpretation as a well-formedness condition). This assigns left-strong prominence in the nouns, since the base's foot is non-branching, but right-strong prominence in the verbs, since the prefixal foot is non-branching. However, I noted that, while the LCPR gives the correct results in most cases, there are some exceptions – e.g. a few of the nouns in the *consent* group have productive prefixal structure (*misrule*, *distrust*) and should therefore have initial stress according to this analysis.

These phonological problems will be explored in the following section. But first I will note a few general problems of, and additional questions raised by, this analysis – including a potential difficulty on the morphological side for the BDLP model itself.

6.6 Some problems

6.6.1 Restrictions on entry to the Stratum 2 stress-doublet pattern

While this analysis is relatively simple and does appear to account for most of the data under present consideration, there are a few further issues to be raised, one of which is potentially very difficult for the BDLP model.

A feature all the productively prefixed stress doublets share is that the bases of the prefixations are all monosyllabic (with the exception of the trochaically-based *reshuffle* and *overburden*, which do not always exhibit stress alternation). We noted in section 5.3.1 (fn. 15) that a monosyllabic or trochaic base is a feature of a number of word-formation processes associated with prefixes or particles. Here, it seems that only monosyllabically-based prefixed verbs may have a stress-doublet noun. Why is this? And do the rules proposed above, and the framework within which they are set, account for it?

I will argue in the next section, 6.6.2, that there are clear morphological reasons for this limitation on the entry of prefixed forms to the verb-to-noun rule: prefixed verbs always nominalise in the same way as they would without prefixes, i.e. they are faithful to their suffixes. Bisyllabic and longer verbs in English usually nominalise suffixally (the *consent* group excepted) – they are often Latinate, and therefore unlike native or nativised verbs have a range of Latinate suffixes (often first-stratum, listed suffixes) available to them. This leads to a discussion of the most troublesome of issues for stratified LP models, the bracketing paradox. I will argue that although BDLP has been designed to avoid this problem, the solution it offers is unsatisfactory. Rather, bracketing paradoxes should not be seen as a problem at all, but a predictable result of the operation of synonymy blocking: the listing of a deverbal action noun as an output of Stratum 1 blocks the formation of a new action nominal from the same verb on Stratum 2, whether the verb is prefixed or not. Blocking is also the reason for the different rates of alternative, suffixal nominalisations shown by the Latinate stress doublet verbs as compared with the *consent* verbs.

In the subsequent section, 6.6.3, I will explore the phonological aspect of the analysis, asking how the LCPR captures the apparent restriction of stress-alternation to monosyllabic or (occasionally) trochaic bases. Most longer verbs do nominalise suffixally, which seems to render them (when prefixed) unavailable for conversion; but the explanation is not wholly morphological. The LCPR has a role to play here, because there are prefixed verbs which may convert to nouns with no stress alternation, e.g. (from the *consent* group) *rè-repéat*, *rè-arrést*. I will also consider how well it copes with other groups of data, including the *misrule* class of exceptions discussed in section 6.4.2 above.

6.6.2 Morphological restrictions

6.6.2.1 Suffix-faithfulness and bracketing paradoxes

I noted above that all the productively prefixed verbs with a stress doublet noun have monosyllabic, or occasionally trochaic, bases: thus *discount*, *foretaste*, *interlock*, *miscount*, *replay*, *reshuffle*, *resit*, *overdose*, *overload*, and so on. The explanation for this is partly morphological: none of the monosyllabic base verbs *count*, *taste*, *lock*, *sit* etc. takes any kind of suffixal action nominalisation other than the default *-ing*, which is unique in attaching to pretty much any verb regardless of any other nominalising process which might apply. So when these verbs are prefixed, there is no pre-existing type of nominalisation to provide an alternative to the verb-to-noun conversion.

Meanwhile, longer or iambic verbs are usually Latinate and tend to nominalise with Latinate suffixes such as *-(a)tion*, *-al* or *–ment*. And, when such verbs are prefixed, they remain faithful to these suffixes, always nominalising in the same way as they do when morphologically simple: thus *admit* ~ *admission*: *re-admit* ~ *re-admission*; likewise *readjust* ~ *readjustment*, *reappraise* ~ *reappraisal*; *re-emerge* ~ *re-emergence*; *re-examine* ~ *re-examination*, and so on. It seems that the existence of suffixal nominalisations of the unprefixed verbs prevents any different nominalising process from applying to the prefixed verbs. This applies to monosyllabic or trochaic verbs too, when they have particular ways of nominalising: consider *rè-énter* and *rè-éntry*, or the verb *rè-ú*[z]*e* and its derived noun *rè-ú*[s]*e* (note the verbal-style stress pattern on these nouns).

So, the generalisation is that, when prefixed, verbs follow the same nominalising processes as they do when not prefixed, *-ing* attachment excepted. Thus a verb like *re-admit* does not undergo verb-to-noun conversion, because the nominalisation with *-tion* applies to *admit* (supplying *re-admission*). But the prefixed verbs with native or nativised monosyllabic bases can undergo verb-to-noun conversion, because they have no other kind of nominalisation to block it. (Note that the attachment of the default nominaliser *-ing* does not inhibit conversion: the verb *sit* is generally nominalised as *sitting*, but the verb *resit* yields the noun *resit*.) This appears to be the morphological reason for the restriction of the stress-doublet pattern to prefixations with monosyllabic or trochaic bases.

The faithfulness of prefixed words to the morphological processes undergone by their unprefixed bases is also exhibited in forms like *unhappier* and *reappraisal*. The words *unhappy* and *reappraise* here take suffixes which are sensitive to the prosodic structure of their bases, and which on these grounds should not attach to such trisyllabic forms. Comparative *-er* attaches only to adjectives which are monosyllabic, or bisyllabic with the second syllable a final sonorant (Rubach and Booij 1984: 15): *unhappy* does not meet these criteria. Nominalising *-al* regularly attaches only to bisyllabic verbs with final stress (Giegerich 1999: 16-17, 113; Siegel 1974: 164ff.): *reappraise* is trisyllabic. However, the existence of *happy* ~ *happier* and *appraise* ~ *appraisal* respectively seems to overrule this prosodic limitation, so *unhappier* is preferred to *more unhappy*, and *reappraisal* is chosen over *$reappraise_N$.

But there is a very familiar problem with much of this post-prefixation suffixation for most lexically stratified models: the problem of bracketing paradoxes. Prefixes such as *re-* or *un-* are word-based, productive, second-stratum affixes. But many of the suffixes in question are typically first-stratum affixes: they are unproductive or irregular, and may have a strong impact on the base's phonology. For example, for the *-tion* suffix to attach on Stratum 2, we would have to introduce unproductive phonological allomorphy rules such as the one which changes /t/ to /ʃ/ in *construct* ~ *construction*. Or, for *-ation* to attach to *explore* on the second stratum, we would have to allow *explore*'s prosodic structure to be dismantled and built again from scratch, as in *rè-explóre* ~ *rè-èxpl*[ə]*rátion*; but the foot-building rules are sited on the first, not the second stratum.
This problem is the *ungrammaticality* one discussed in Chapter 2. We saw there that affix-driven models of lexical stratification foundered because of the regular occurrence of such counter-examples: the morphological structure of *ungrammaticality*, *re-exploration*, *reappraisal*, *readmission* or *unhappier* demands suffixal attachment *after* prefixation; but the phonological evidence of stress patterns, segmental allomorphy and syllable count suggests the suffix attaches *before* the prefix.

The mismatches between phonological and morphological structure as evidenced in these forms have been explained within Prosodic Phonology (PP) as proof of the separate pword status of the prefix (e.g. Rubach and Booij 1984: 12-15). Prosodically-sensitive suffixes like comparative *-er* or nominalising *-al* can only see phonological structure within the base's pword; as a separate pword the prefix is prosodically invisible as far as these suffixes are concerned. Similarly, since the pword is the domain of stress assignment, footing happens separately in the two pwords of $(\text{un})_\omega$ $(\text{grammaticality})_\omega$ or $(\text{re})_\omega$ $(\text{exploration})_\omega$; so a suffix may apply after prefixation and still affect the stress pattern of the base.

This solution does capture the apparent phonological independence of the productive prefixes. But we have already seen that much justification for use of the pword in analyses of English lexical phonology is weak, and that the prefix is phonologically better fitted to the foot (5.3.2, 6.3.3). And while this approach covers the phonological side of the problem, it does not really address the morphological side, i.e. the suffixal faithfulness of prefixed verbs when they nominalise.

So how does BDLP cope with these issues? Can it account for suffix-faithfulness, and – a more immediate concern for a lexically stratified model – the problem of bracketing paradoxes? The model has been designed to avoid this problem, allowing affixes to attach on both strata. But on closer examination, as we will see below, this is an unsatisfactory way of dealing with the problem. And so is another solution which has been proposed, that of assuming the prefixes are attaching to deverbal nouns in all the troublesome cases. I will argue that bracketing paradoxes should not be seen as a problem at all; they are naturally explained by (even predicted by) synonymy blocking, a mechanism fundamental to the operation of the BDLP model.

As outlined in 2.3, BDLP relies on the characteristics of bases rather than of affixes for its stratification, so bracketing paradoxes should not technically be a problem for the model. Strata 1 and 2 are defined by the fact that roots undergo morphological processes on the former, while words undergo them on the latter. Affixes are not restricted to one particular stratum, but are free to attach on both, as long as they take both roots and words as bases.
So, in nouns like *re-admission*, *re-exploration*, *re-entry*, etc., *re-* 'again' could be attaching to roots on Stratum 1, and then these complex roots may undergo suffixation on the same level. Thus, for example, we would have a derivation like:

(14)

$$[\text{explore}]_R \rightarrow [\text{re}[\text{explore}]_R]_R \rightarrow [[\text{re}[\text{explore}]_R]_R\text{ation}]_R \rightarrow [[[\text{re}[\text{explore}]_R]_R\text{ation}]_R]_N$$

(the last step being the application of the Root-to-Word rule).
In principle, then, there should be no ordering paradoxes for BDLP. Attachment of prefixes like *re-* or *un-* on Stratum 1 is enabled; we would just have to let Prefix Footing (see sect. 6.3.3) apply on the same level in order to give them the right phonological characteristics.

The faithfulness of verbs to their suffixes, and therefore the restriction on the entry of prefixed verbs to the verb-to-noun rule on level 2, would then be explained by the listed nature of the first-stratum morphology (Giegerich 1999, 1994). Roots are listed for which affixes they may take: so whether *explore* has already been prefixed with *re-* or not would make no difference to the attachment of *-ation*.

But on closer inspection there are a number of problems with BDLP's apparent solution to the bracketing paradoxes. Firstly, there are many good reasons for saying that *re-* 'again', *mis-* 'badly', *un-* and the other prefixes involved typically attach on Stratum 2, not Stratum 1. They are overwhelmingly word-based; they are semantically and phonologically transparent, and are also very productive. None of these features supports the idea that they are affixed to bound roots on the first stratum.

Plus, there is no evidence that *explore*, *appraise*, *admit*, *enter*, *use* etc. as bases to these prefixations are roots and not words. The natural assumption is that they are verbs, and free words, and it is only because of the suffixal derivatives that this is changed – a rather ad hoc reason for calling them roots.

Furthermore, because of the great difference between the morphological formats of Strata 1 and 2 it is hard to see how productive prefixation could actually be integrated into the former level. First-stratum morphology is all listed, as just noted, and as discussed in sect 2.3 above, which reflects its unproductivity and irregularity very well. It is hard to see how such a format – almost as much a (static) web of morphological relationships as a group of rules or processes - could in any way systematically produce new words (or roots). By contrast, the second stratum morphology is more conventionally rule-based, with unlisted outputs. The productivity of these prefixes means they are better suited to the latter than to the former stratum.

There is also a phonological objection to allowing these prefixes to attach to roots on the first level. Prefix Footing, by which we accounted for their prosodic behaviour, cannot apply to all prefixes on this level as it would on Stratum 2. First-stratum verbal prefixes are not footed, as shown by *enable*, *besmear*, *rebound*, *recoil*. Allowing the formation of the verbs *re-explore*, *re-select*, etc. on this stratum would remove this generalisation and necessitate distinctive diacritic markings or morphological bracketings to distinguish between the two groups of prefixed verbs.

So, the solution to the bracketing paradoxes offered by BDLP is unsatisfactory. The prefixes in question have to be attached to words on the second stratum; that the stratification is base- rather than affix-driven does not change this.
One possible way to solve the problem would be to allow suffixes like *-(a)tion*, *-al* or *-ment* to attach on the second stratum. This is perfectly acceptable for *-al* and *-ment*, since in prefixations like *re-adjust* they obviously take word bases, and they do not alter the phonological structure of these bases – indeed, nominalising *-al* has to be attached to words on the second stratum because of its sensitivity to prosodic structure (for details see Giegerich 1999: 114). Indeed, in some cases it may be possible for *-(a)tion* too to attach on the second level: in *rè-exàminátion*, for example, the stress pattern of *exámine* is not altered by the addition of *-(a)tion*. The suffix merely adds another foot which is given primary prominence; this may quite legitimately happen on the second stratum.

But there are good phonological reasons why in many cases the nominalising suffixes in question must apply on Stratum 1. I noted above how *-(a)tion* can change the stress of its base, and may cause segmental allomorphy; in cases like *re-admission* and *re-exploration* (not to mention irregular nominalisations like those in *re-entry* and *re-use*), the phonology points to first-level affixation.

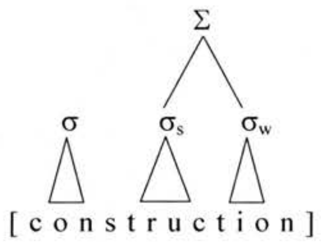
An alternative solution to the bracketing paradoxes involves a return to some of the ideas put forward in the discussion of nouns like *remount* in section 6.4.1. There I noted that prefixes like *re-*, usually perceived as strictly verbal, must sometimes attach to nouns, as in *rebirth* or *remount* (cf. Marchand 1969: §3.51.6). Bearing in mind Hammond's (1993) point that English productive prefixes do not change the lexical category of their bases, instead performing semantic modification (or, perhaps more accurately, semantic addition – they do not alter or remove anything from the base's meaning), I suggested that prefixes might select their bases on semantic rather than on lexical category grounds, or at least that semantics might play a more important role than is generally assumed in prefixation.

Examples of *re-* attaching unambiguously to nouns are rare, but this does not necessarily detract from the point; it probably just reflects the fact that verbs (and nouns clearly derived from them) have the monopoly on the kind of transitive action semantics that *re-* requires.

If these prefixes are flexible about the lexical category of the bases they attach to, this paves the way for the affixation of *re-* to the nouns *admission*, *appraisal*, *entry*, *use*, and so on; and by extension, it could mean that *un-* may attach to *grammaticality* too. Of course the derivational history of these nouns – their morphological deverbalness or deadjectivalness – would not necessarily be available to the prefixes; but their semantic deverbalness and deadjectivalness (so to speak) would be. Thus the bracketing paradox is once again vanquished. (Such a solution was suggested by Allen 1978; cf. Strauss 1982a).

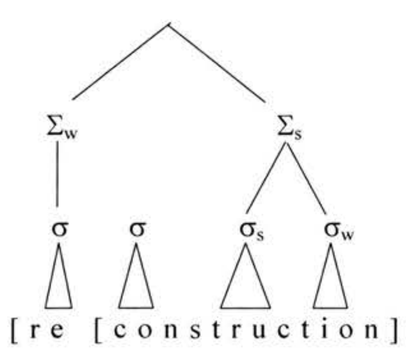
Phonologically, prefixation of such suffixations on the second stratum would be quite within the scope of the LCPR. A noun like *construction*, to take an example, would be suffixed, syllabified and footed on Stratum 1, and would be available for second-stratum morphology with the following representation:

(15)



Prefixation applies, followed by syllabification and Prefix Footing; then all that is needed is for the LCPR to determine the relative prominence between the two feet. Since *reconstruction* is a noun, N_2, the base's foot, is strong if and only if it branches (see sect. 6.3.3) – and of course it does branch, since it is bisyllabic. Hence the stress pattern of reconstruction, with main stress on the *-struc-* syllable, is easily generated.

(16)



However, as a solution to the bracketing paradox, relaxing restrictions on what lexical categories prefixes may attach to is not without flaws. Its controversialness is one of them: Allen's (1978) proposal has not received general acceptance. And the fact that it introduces indeterminacy to the derivation is possibly another. In nouns with second-stratum suffixes it would no longer be possible to tell which came first, prefix or suffix: *readjustment* could be $[[\text{re } [\text{adjust}]_V]_V \text{ ment}]_N$ or $[\text{re } [[\text{adjust}]_V \text{ ment}]_N]_N$; by extension, *re-analysable* could either be a prefixed adjective or a suffixed verb....and so on.
Furthermore, this analysis still does not capture verbal suffix-faithfulness. Allowing prefixes to attach to a freer range of bases does mean that there need be no nominalisation of *re-enter*, for instance, because the noun *re-entry* can be formed from entry. But it does not in itself explain why there is never any other kind of nominalisation of *re-enter* (*-ing* aside, once again).

While these objections do not necessarily disqualify this last possible analysis, nor do they strengthen it. Indeed, I think the best option for BDLP is to look in an entirely different direction for a solution to the bracketing paradox, one in which it is no longer a problem but expected morphological behaviour: blocking.

6.6.2.2 Blocking

The concept of blocking was introduced along with BDLP in section 2.3. There, the process was informally described as 'a morphological rule will be blocked if its output would have the same meaning or the same phonological form as either a pre-existing simple word, or as the output of a more specific (i.e. more limited in its input) morphological rule'. We saw that Kiparsky (1982: 6) formalised blocking through the Elsewhere Condition, repeated here:

(17) Elsewhere Condition (EC)

Rules A, B in the same component apply disjunctively to a form Φ iff:

(i) The structural description of A (the specific rule) properly includes the structural description of B (the general rule), and

(ii) The result of applying A to Φ is distinct from the result of applying B to Φ.

In that case, A is applied first, and if it takes effect, then B is not applied.

In BDLP, the Root-to-Word rule acts as a kind of universal 'rule A'. All first-stratum roots, simple and complex, which may surface as words, must undergo Root-to-Word. This rule essentially ensures each output of the Stratum 1 morphology is individually listed: the blocking it effects is basically the blocking of a rule by a pre-existing form, rather than by a more specific rule.

This is clarified by Giegerich (2001) who argues for a reformulation of (17) whereby 'rule A' must be restricted to a single lexical item (2001: 92). Giegerich argues that the application of one rule cannot block the application of another, unless the former rule is the Root-to-Word rule, interpreted as being restricted to a single lexical item (see Ch. 8 for more discussion on this point). That is, there is no such thing as 'type blocking': the only form of blocking is 'token blocking', i.e. the existence (≈ listing) of one form blocking the creation of another by rule.

One of the results of this approach is that blocking cannot operate between rules on Stratum 2. Giegerich (2001: 74) claims that where two morphological rules with semantically very similar outputs apparently compete for inputs, an 'informal tendency of synonymy avoidance' (2001: 69) will either prevent both rules applying to the one input, or will ensure that if they do both apply, their outputs will be distinct in some way.

So, items created and listed (by the Root-to-Word rule) on Stratum 1 will block the creation of synonyms on Stratum 2, by the EC.

As established in this chapter, where suffixal nominalisations of verbal roots have been created and listed on Stratum 1, they block second-stratum nominalising processes with the same semantic outputs from applying to these verbs – including when the verbs are prefixed. The verb-to-noun rule only applies to a prefixed verb when the corresponding unprefixed verb is subject to no other nominalising processes which could block it. Thus the existence of *entry* blocks the formation of **re-enter*$_N$, *admission* blocks **re-admit*$_N$, and so on; while the non-existence of **writement*, **writation*, **writal* etc. means that *rewrite*$_N$ can be formed. The prefix has not actually changed the semantic content of the verbs *enter* or *admit*, or of their nouns *entry* or *admission*; it has only added to it, and the blocking relationships are left unchanged.

If we accept the extension of blocking to explain verbs' faithfulness to their particular nominalising suffixes – and intuitively it fits the facts very well – then the bracketing paradox problem disappears; instead, it becomes an expected phenomenon. The first-stratum processes which block the verb-to-noun rule do not have to apply on Stratum 2 for this analysis. What happens is that when the verb-to-noun rule scans *re-admit* (for example) for applicability, the combination of *admit* being part of the potential input, and 'noun – action' (crudely) being part of the rule's potential output actually triggers the insertion of *admission* instead, because it already exists and carries the features in question, i.e. *admit*'s semantics, and the property of being an action noun. It blocks the creation of a noun **re-admit*. And since *admission* already exists in a syllabified and footed form, there is no need for any phonology other than the LCPR to apply – and we saw in the previous section, 6.5, that it will generate the right results.

This nearly brings us to the end of the morphology section, but on the subject of blocking there is another matter to discuss. The reader may remember that in Chapter 4, as well as comparing the semantic relationships between the verbs and nouns of the stress-doublet and non-stress alternating groups, I also explored any alternative (i.e. suffixal) nominalisations that the Latinate prefixed verbs of each might have, and noted whether these were semantically more or less closely related to the verbs. The results of this study provide another interesting illustration of blocking; this is the subject of the following section.

6.6.2.3 Blocking and the 'alternative nominalisations'

The study of the semantic relationships between the Latinate bisyllabic prefixed verbs and (where they have them) their stress-doublet nouns and suffixal nominalisations offers a good example of blocking. It produced a very interesting result: nearly two-thirds of the Latinate prefixed verbs with stress-doublet nouns also had a suffixal nominalisation, while less than one third of the Latinate verbs with a zero-derived noun did. Thus it is easy to find examples like *convíct*$_V$ ~ *cónvìct*$_N$ ~ *conviction*, *rebél*$_V$ ~ *rébel*$_N$ ~ *rebellion*, *rejéct*$_V$ ~ *réjèct*$_N$ ~ *rejection*, *refúse*$_V$ ~ *réfuse*$_N$ ~ *refusal*, where the verb has both a stress-doublet noun and a suffixal one, usually in *-(a)tion*. But among the *consent* words such cases are much rarer, although of course they do exist (e.g. *repute* (verb and noun) ~ *reputation*; *reform* ~ *reformation*).

Not only are alternative suffixal nominalisations very common among the Latinate stress-doublets; they are also usually more transparently related to the verbs, and much more likely to represent the verb's action, than are the stress-doublet nouns. The relationship between the suffixation and the verb is more flexible, more generalisable. Compare the nominalisations in the following examples:

Table 6.1: Alternative nominalisations

Words	Verb definition	Stress-doublet noun definition	Suffixation definition
abstract, abstraction	remove, separate from	summary of contents of an article	process of abstracting ideas/ ideas abstracted
affix, affixation	attach	part added to a word	act or instance of affixing
exploit, exploitation	take advantage of sb/ sth	deed, feat	act of exploiting
intercept, interception	stop or seize on the way from one place to another	(maths) point at which two figures intersect	act of intercepting
suspect, suspicion	believe sb to be guilty	person suspected	act or state of suspecting

In each case the stress-doublet noun is more restricted in reference than the suffixal nominalisation; the latter is much more easily defined with reference to the verb alone, and therefore has a clearer, more generalisable relationship with it. In all, over 80% of these alternative nominalisations have a more transparent relationship with the verbs than the stress-doublet nouns.

By contrast, where the *consent* verbs have alternative, suffixal nominalisations, these tend to be rare by comparison with the zero-derived nouns, and less transparently related to the verbs. Typical examples are *embracement*, with the same (action) meaning as the noun *embrace*, but much less common; likewise *divorcement*, *arrestation*. *Advancement* is 'a less common word for *advance*' (Collins), except where its specialised meaning 'promotion in rank' is concerned; *reformation* as an alternative to the noun *reform* is inhibited by association with (the) *Reformation*. Most of the suffixal nouns in this group are action nouns; but slightly less than half of them act as more general nominalisations of the verbs than the zero-derived nouns.

So, all in all, as reported in section 4.6, this means that 55% of the verbs with stress-doublet nouns have a closer relationship with a suffixal nominalisation; while only 17.5% of the *consent* verbs do (i.e. in 82.5% of the *consent* cases the zero-derived noun has a more transparent relationship with the verb than any suffixal nominalisation does).

The interaction of these nominalising processes very strongly suggests that blocking is at work here. Basically, stress-doublet nominalisation does not block *-(a)tion* nominalisation because its semantics is sufficiently distinct; but *-(a)tion* nominalisation does block (second stratum) zero-derivation because they both usually produce action nouns.

Where Latinate prefix verbs have stress doublet nouns, these nouns are semantically irregular and often either unrelated to their verbs or specialised in meaning. So this stress-doublet nominalisation cannot block *-(a)tion* or other nominalising suffixes because, unlike them, it does not regularly create unmarked action nouns. While the inputs to stress-doubletting and *-(a)tion* suffixation may be the same, the outputs are both phonologically and semantically distinct. Hence there is no blocking. The nouns *ábstract* and *abstraction*, *áffix* and *affixation*, *cónvict* and *conviction*, *éxploit* and *exploitation*, *rébel* and *rebellion*, and *súspect* and *suspicion*, can all be created and co-exist on Stratum 1.[25]

However, the existence of suffixal nominalisations (perhaps in combination with the stress-doublet nouns) on Stratum 1 does block the application of the verb-to-noun rule on Stratum 2. Either the stress-doublet or the suffixal noun will have the 'action, instance or state' semantics also associated with verb-to-noun conversion – which is therefore blocked, because it would produce too close a synonym to a pre-existing word (the outputs of the first stratum being listed). Hence while the nouns *ábstract* and *abstraction*, *éxploit* and *exploitation* or *súspect* and *suspicion* may coexist, the non-stress-alternating nouns **abstráct*, **explóit*, **suspéct* (with 'act of ..' meanings) cannot be created by the verb-to-noun rule on Stratum 2.

But of course most verbs of the *consent* group are not listed for nominalising suffixes on Stratum 1; they escape suffixation, and therefore have action nouns created by the verb-to-noun rule on Stratum 2, which is not blocked. There is no **collapsation*, **returnery* or

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[25] Interestingly, where the stress-doublet nouns do have general 'action' meanings, the rate of suffixal nominalisations of the verbs is lower, and the relationship between suffixal noun and verb is usually less transparent. 64% of all Latinate verbs with stress-doublet nouns have suffixal nominalisations, but only 39% of Latinate verbs with stress-doublet action nouns have suffixal nominalisations; and only about a third of these suffixal nouns are more transparently related to the verbs.

**disgracion* to block the formation of the action nouns *collapse*, *return* or *disgrace* by the verb-to-noun rule. And indeed, where verbs with zero-derived nouns do also have suffixal derivatives, e.g. *advancement* and *reformation*, the two are not synonymous; where the suffixal noun is much rarer than the zero-derivative, it is probably actually blocked for most speakers.

Hence the patterns of suffixal nominalisations, stress-derivation and zero-derivation among these Latinate prefixed nouns gives an interesting illustration of synonymy blocking. The former two processes may both apply to the same verb, since their results are semantically different; but the latter process is usually blocked by nominalising suffixes (*-(a)tion* in particular) because it would produce synonymous output. However, it is not blocked in the *consent* verbs because these are not listed for *-(a)tion* (or other affixations) on Stratum 1. (indeed, the Stratum 2 nominalising suffix *-ment* is commoner among the *consent* verbs than among the *convict* ones – see Appendix 2) The way in which these different processes are stratified in BDLP neatly captures these interrelationships.

6.6.2.4 Summary of morphological problems

In the BDLP analysis presented in the previous section, verbs of the *resit* and *overcharge* groups, and of the *consent* group, all undergo a verb-to-noun rule on the second stratum. The stress-alternation in the former sets of noun-verb pairs is explained by the fact that they are productive prefixations, and the prefixes are subject to a rule of Prefix Footing. The LCPR will assign different prominence patterns between the two feet in nouns and verbs: initial main stress in nouns, final main stress in verbs; thus the stress-doublet pattern is captured. The *consent* words are assigned no initial prefixal foot (they are not morphologically complex on the second stratum), so the single foot they received on the first stratum is the only one they may have – hence there is no stress alternation between nouns and verbs.

However, although this analysis covers most of the data, a few questions remain. As noted in section 6.6.1 above, of the productively prefixed verbs, only those with monosyllabic (or occasionally trochaic) bases enter into the stress-doublet verb-noun pattern: why is this? Why do prefixed iambic or polysyllabic verbs not undergo verb-to-noun conversion and have stress-doublet nouns? How is this accounted for in the BDLP model?

There is a phonological side to this question, which will be addressed in the next section. but here I have considered the morphological side; this has led us into discussion of level ordering, bracketing paradoxes, and the phenomenon of morphological blocking.

It seems exceptionlessly to be the case that whatever nominalising pattern verbs follow when they are unprefixed, they will use the same pattern when they are prefixed. In other words, verbs are faithful to their suffixes. In our data this morphological factor coincides with monosyllabicity because most deverbal nominalising suffixes in English are Latinate and therefore tend to attach to Latinate bases – which are usually not monosyllabic or trochaic, but polysyllabic or iambic.

However, this 'suffixal faithfulness' is effectively another term for the prefix-suffix bracketing paradoxes which have done so much damage to affix-based models of lexical stratification: second-stratum prefixes are attaching before first-stratum suffixes, which should be impossible. The only solution would appear to be a Loop (see section 2.2).

The BDLP stratificational model, designed to give affixes the freedom to attach on any stratum, should solve the bracketing paradox problem by allowing the productive prefixes such as *re-* or *mis-* to attach on level 1. But the listed nature of the first-stratum morphology, and the lack of lexical categorisation on roots (although this latter need not be too problematic for prefixes), combine to make this an unattractive solution.

One alternative would be to allow prefixes to attach to words of more than one lexical category on Stratum 2, so for example *re-* could be affixed to the noun *examination*, or to *admission*. While this idea is supported by the fact that prefixation typically performs semantic rather than lexical-category modification, and therefore its bases may be selected on semantic rather than lexical-category grounds, it is not an entirely satisfactory solution. It does not account for the fact that prefixed verbs do nominalise, and that they may do so with suffixes which ought to be unavailable to them on the word level.

I proposed that a better solution to the problem would be to employ the notion of blocking. Prefixed verbs such as *readmit*, *misuse* or *reanalyse* may not undergo the Stratum 2 verb-to-noun rule because nominalisations of the base verbs (with action semantics) already exist. *Admission*, *use* [ju:s] and *analysis* prevent any verbal string including *admit*, *use* or *analyse* from entering further action nominalisation because such a process would produce a semantically non-distinct form. Verbal suffix-faithfulness, i.e. the prefix-suffix bracketing paradox, is synonymy blocking in action.

Thus the original question of this section – why are the only prefixal entrants to the verb-to-noun rule those verbs without alternative nominalising suffixes – is answered; and a solution to the bracketing paradox problem has been offered. This also enabled us to explain the alternative nominalisation pattern discovered in Chapter 4 (section 4.6), where it was found that Latinate prefixed verbs with stress-doublet nouns often also have related nouns in *-(a)tion*, e.g. *suspect* ~ *suspicion*, *convict* ~ *conviction*; while those Latinate prefixed verbs with non-stress-alternating nouns, e.g. *consent*, *assault*, usually do not (**consention*, **assaultation*). The semantics of the stress-doublets and the *-(a)tion* nominalisations rarely overlap, but *-(a)tion* and the verb-to-noun rule do have very similar semantic effects. This can be explained by the idea of blocking: stress-doublet nouns and the *-(a)tion* suffixation do not have a blocking relationship because they are semantically (and phonologically) distinct; but when a verb is listed to take *-(a)tion* on Stratum 1, the application of the verb-to-noun rule on Stratum 2 is blocked, because it would produce synonymous output. So, for example, the existence of the first-stratum noun *cónvìct* does not block the formation of the first-stratum noun *conviction*; but *conviction*'s action meaning does block the second-stratum creation of a noun **convíct*, because it would be synonymous. The *consent* verbs are not often listed for action-nominalising suffixations on the first stratum, so the verb-to-noun conversion for them is not inhibited by synonymy blocking.

6.6.3 Phonological limitations: can the LCPR cope?

In the preceding sections we have seen that there is a notable restriction on entry to the Stratum 2 prefixal verb-to-noun stress-doublet pattern: the bases of the prefixations are almost all monosyllabic. There are morphological reasons for this, discussed in 6.6.2 above: basically, shorter verbs tend not to be subject to any suffixal action nominalisations which would block the application of the verb-to-noun rule. Here, I want to examine the phonological side of this restriction, and see how well the LCPR copes with the different prominence patterns of prefixations, whether they are verbs or nouns, and whether they have monosyllabic, trochaic, iambic or polysyllabic bases.

I claimed in section 6.3.3 that the LCPR does cover most of the data. I repeat the formalisation of this rule here:

(18) LCPR

For any pair of sister nodes $[N_1\ N_2]L$, where L is a lexical category and N1, N2 are feet or dominate feet, then N2 is strong if it branches, or if the lexical category is non-nominal and N1 does not branch.

It operates differently in verbs and nouns; in verbs, the second (base) foot is marked strong unless the prefixal foot branches, so given that most of the prefixes under consideration are monosyllabic, i.e. have non-branching feet, it gives the correct prominence pattern. In nouns, the prefixal foot is marked strong unless the base foot branches, and thus the monosyllabicity of the stress-doublets' bases is explained: main prominence only goes on the prefixal foot if the base foot has only one syllable, i.e. does not branch. Where the base is longer, e.g. in a noun such as *re-arrest*, the main stress will go on the branching base foot, thus *rè-arrést*. This covers the stress patterns in many nouns with both prefixes and suffixes, e.g. *rèexaminátion*, *mìsalígnment*, *rèappráisal*, etc.

However, there are also a number of exceptions to the LCPR's correctness. We have seen that there are a few productively prefixed nouns in the *consent* group, i.e. with final main stress even though the operation of Prefix Footing and the LCPR on the second stratum predicts initial main stress – e.g. *mìsrúle*, *ùndréss*. These nouns are small in number, though; and the same is true of the trochaically-based nominal prefixations which according to the LCPR should have main stress on the base, but which often have main stress on the prefix instead. In the stress doublet data we have *réshùffle* and *óverbùrden* as examples; the prominence patterns on these words are variable, but this is not the case with other examples such as *stépfàther*, *ántimàtter*, *cópìlot*. On the other hand, the existence of nouns such as *rèéntry*, trochaically based but with the stress pattern predicted by the LCPR, shows that there is much variability in the stress patterns of nominal prefixations with trochaic bases.

A further exception, and this time not one which is a question of variability, is that of verbs with bisyllabic prefixes. In the data this includes *ìnterchánge*, *ìnterfáce* and *ìnterlóck*, and the particle prefixations, which all have a bisyllabic prefix, either *under-* or *over-*. This is part of a wider problem: prefixed verbs always have primary stress on the bases and secondary stress on the prefixes, but the LCPR will assign main stress to the prefix where its foot has two syllables, i.e. where it branches. Thus instead of the correct patterns signified above, it will give **ínterchànge*, **ínterfàce* and so on.

So, while the LCPR does usually assign the correct stress pattern to prefixed nouns and verbs, there are some exceptions. Some of these reflect a degree of variability which seems to be permitted with prefixed nouns, rather than showing the LCPR to be systematically wrong: in this group I would include monosyllabically-based nouns like *misrule* and the trochaically-based words like *reshuffle*. Even as a native speaker, I have no particular intuitions as to which pattern would be right in cases where the stress could be on prefix or base. I would suspect there is a greater likelihood of stress on the base if the base itself is morphologically derived, and this is evidenced phonologically (as in *rèéntry* ~ *enter*, *reú*[s]*e* ~ *u*[z]*e*, vs. *ántimàtter*, *cóunterclàim*), but this would hardly cover all the potentially variable cases.

However, for the verbs, where primary stress is always on the base regardless of branchingness, the LCPR seems to be systematically wrong and I would suggest it should be replaced by a condition like the following:

(19) Weak Prefixal Foot

$$\Sigma_{(W)}$$

$$[\ldots.[_{(V)}$$

i.e. the prefixal foot will always be marked W(eak) where the lexical category is verbal (obviously there will always be a base foot to be marked strong). Weak Prefixal Foot could be merged with Prefix Footing, though here I take this possibility no further.

Given Marchand's remarks on the relative newness of the prefixal-main-stress pattern for nouns (Marchand 1969: §§ 3.33.6, 3.51.7, and see section 6.4.2 above), perhaps this condition has in the past more generally applied to nouns as well as verbs, but is now in retreat, losing ground to the LCPR. We could still allow it to apply to nouns in cases where the prefix is unexpectedly weak, e.g. *misrule*. Then both the LCPR and the Weak Prefixal Foot condition would be in agreement on the prominence patterns on longer prefixed verbs, e.g. *rèexaminátion* or *mìsmánagement*.

However, the Weak Prefixal Foot condition would give the same result as the LCPR where the bases of nominal prefixations are trochaic, i.e. it would put the main stress on the base – and as we have seen in the stress doublets *réshùffle* and *óverbùrden*, and in prefixations like *stépfàther* or *cópìlot*, this is not always desirable.

There are potentially a number of ways in which we could solve this problem and permit (limited) primary stress on the prefix in these nouns, assuming variability or optionality of rule (or well-formedness condition) application. I will sketch some possible approaches here but do not explore them in great depth because, given the very small number of nouns involved in this variability, I do not think the analysis overall would gain much from it. However, there should be some mechanism by which nominal prefixations with trochaic bases can be assigned an initial-strong as well as an initial-weak prominence pattern.

It might be possible to tinker with the LCPR itself in order to alter the stress pattern it would give to prefixations. However, given its widespread applicability (Hogg and McCully 1987, McCully 1997), this may not be a good idea.

An alternative could be to invoke the rule which assigns initial prominence to compound nouns such as *hánd tòwel* or *árt depàrtment*. But compound stress itself is variable (cf. *stàinless stéel*, *hèad stárt*, *hèavy métal*), and this would not help to address the generalisation that it is only nominal prefixations with monosyllabic or occasionally trochaic bases which may get initial stress.

More interesting might be an exploration of the possibility of taking prefixed forms out of the LCPR's remit, and instead applying more limited well-formedness conditions to them. For example, the limitation of Weak Prefixal Foot to verbs could be relaxed; instead it could operate alongside a condition like the following:

(20) Strong Prefixal Foot

$$\Sigma_S \quad \Sigma_W$$

$$\sigma_{(s)} \ (\sigma_w)$$

$$[\ldots\ldots[\ldots\ldots\ldots\ldots]]_N$$

This would make the prefixal foot in a noun strong, as long as the base consists of a monosyllabic or trochaic foot; otherwise, Weak Prefixal Foot applies and the base foot is made strong. Strong Prefixal Foot is to some extent optional, but the trochaic subpart is more optional (certainly less often applied) than the monosyllabic one. Strong Prefixal Foot is in competition with Weak Prefixal Foot, only clearly winning where monosyllabically-based nouns are concerned. It may be a fairly new condition, if initial stress in productively prefixed nouns is relatively new; it could actually be expanding, with the trochaic possibility newer than the monosyllabic one.

Such an analysis would not weaken the LCPR too much either, if we bear in mind that it could be restated as a well-formedness condition in a diagrammatic form similar to those above, something like:

(21) LCPR

Condition: non-nominal lexical category

'N_2 is strong if it branches.....'

'...or if the lexical category is non-nominal and N_1 does not branch'

Since LCPR lacks the prefixal-bracket specification, Weak and Strong Prefixal Foot would apply instead of it where appropriate, given the principle of blocking discussed in the previous section, i.e. the precedence of the specific over the general.

This would solve the problem of the variability in prominence patterns in prefixed nouns, allowing for *mìsrúle*, *rèú*[s]*e*, *rèappráisal*, *réwrìte*, *mísmàtch*, *rèéntry*, *ántimàtter* and either *réshùffle* or *rèshúffle* all to be derived. Plus, it would ensure that verbal prefixes are never given primary stress. We would lose the simplicity of just having the LCPR (which does, after all, cover most cases), but gain accuracy in the derivation.

6.7 Overall summary

In this chapter I have presented a new lexical phonological analysis of the productively prefixed and particle-prefixed stress doublets, and of the *consent* verb-noun pairs with no stress alternation.

I have argued in section 6.2 that verbs of these groups are all subject to a Stratum 2 verb-to-noun rule. Previously in lexical phonology verb-to-noun conversion was thought only to be possible on the first stratum. But the regularity and productivity of the semantic relationships between these verbs and nouns, especially in the prefixal stress doublets, suggests otherwise. Plus, the verbs of the *resit* and *overcharge* groups are only actually prefixed on Stratum 2 (by a semantically regular, productive word-formation process), so they would in any case be unavailable for a first stratum verb-to-noun rule.

The subject of section 6.3 was the phonology of these words. In 6.3.2 the syllabification process of BDLP was outlined, and it was shown that the independent syllabification of productive prefixes falls out from the organisation of the syllabification process and need not be explained by the pword. In section 6.3.3 I argued that the pword is also unnecessary in accounting for prefixal stress and prosodic size, and instead proposed that the prefix should be aligned with the foot. The suggested condition, Prefix Footing, accounts for the maximal as well as the minimal prosodic size of the prefix, as well as stressing it.

With a foot built over each prefix and base, relative prominence between feet is determined by the LCPR (sect. 6.3.3). This accounts for the great majority of the stress doublets, but as seen in sections 6.4.2 and 6.6.3, there are some cases it cannot cover, e.g. verbs with bisyllabic prefixes, and exceptional nouns like *misrule* with a V pattern. In 6.6.3 I proposed alternative ways of determining relative prominence between prefixal and base feet: Weak Prefixal Foot, which deals with all verbs and some nouns; and Strong Prefixal Foot, which gives nominal prefixes primary prominence where the base is monosyllabic or trochaic. The operation of these conditions must be to some extent optional.

In section 6.4 I discussed the other second-stratum derivations, first showing how independently prefixed nouns fit neatly into the present analysis. I pointed out that nouns like *remount*, initially analysed as derivations from their stress doublet verbs, may actually be independently formed. It is possible that productive prefixes like *re-* or *mis-* could attach to nouns as well as verbs; they modify semantics rather than lexical category, so they may well select their bases on the former criteria. Phonologically the derivation is straightforward.

I also showed how the *consent* nouns may be derived from their verbs on Stratum 2. The absence of the stress-doublet pattern ix explained by the fact that the verbs (which are mostly of Latinate prefixal structure) leave Stratum 1 with only one, final, stress; they cannot be eligible for Prefix Footing on Stratum 2 because any internal morphological bracket would be lost on entry to this stratum. Therefore no difference in prominence between verb and noun can be assigned by the LCPR, because there is only one foot in each word.

While this analysis is fairly simple and adequately covers the data in question, there are further morphological issues to consider. Only prefixations with monosyllabic or (occasionally) trochaic bases seem to both undergo the verb-to-noun rule and stress alternation: longer verbs either remain faithful to the nominalising suffixes they would take if unprefixed (e.g. *readmission*); or they have zero-derived nouns with no stress alternation (e.g. *rèarrést*). The latter case was discussed, with questions about the accuracy of the LCPR, in section 6.6.3, and alternatives were suggested (see above).

But the former issue – suffix-faithfulness – led to the reopening of an old wound of stratified lexical phonology, the problem of bracketing paradoxes. BDLP has been designed to avoid the problem by allowing affixes to attach on either stratum. But this solution is unsatisfactory: there may be nothing to stop productive prefixes attaching to roots, but the fact that all these attachments would have to be listed (as first-stratum morphology) runs counter to their productive nature.

I proposed that the mechanism of blocking is a more appropriate solution to the problem. So, for example, the prior existence of *admission* as a first-stratum nominalisation of *admit* blocks any alternative nominalisation (e.g. by the verb-to-noun rule) of the verb as part of the prefixation *readmit* on Stratum 2.

I also used the idea of blocking to account for interesting apparent overlaps and gaps in the occurrence of suffixal and zero-derived nouns related to Latinate stress-doublet and *consent* verbs on Strata 1 and 2; this gives an interesting explanation for their different rates of alternative nominalisations, as noted in Chapter 4.

Thus the derivation of the stress-doublet productive prefixations, particle prefixations, and non-stress-alternating *consent* nouns and verbs is complete.

Chapter 7: A new lexical phonological analysis, II: The Stratum 1 stress doublets and related forms

7.1 Introduction

In this section we leave the second stratum aside and concentrate on the Stratum 1 part of the analysis, covering the different types of Latinate prefixal stress doublets, as well as the *consent* verbs, the head prefixations, and the particle compound stress doublets.

This means that we will return to some of the problems with previous accounts, raised in Chapter 5, which are relevant to the Latinate prefixations but not to the productive ones. In that chapter I noted that standard derivations of these prefixations assign full underlying vowels to the prefixal syllables; these syllables are first stressed, then (in verbs) destressed and subject to vowel reduction. This, I argued, is unnecessarily complex; surely it would be better to give the verbs at least, and perhaps also the nouns (given the general assumption that they are derived from the verbs) surface-true underlying prefixal schwas. This option is implemented here, with an underlying underspecified schwa as used in Giegerich (1999; cf. Gussmann 1991).

Furthermore, I argued that stressing and then destressing these syllables in the verbs could also be avoided by simply not stressing the initial syllable in the first place; again, I put this into practice in the following analysis. I suggested it would reflect well on the BDLP model if it might ban changes like destressing and especially vowel reduction in underived forms; however, due to the use of underspecification in the present formulation of vowel reduction (delinking), it seems this is not the case; there might be a problem with unconstrainedness here. I return to this issue in 7.3.3 below; it becomes more relevant here because of the underspecification of the underlying schwa.

So, the analysis presented below will offer some solutions to these phonological problems, and will explore the question of derivational constrainedness in the BDLP model in depth.

There are also morphological problems with the way the Latinate prefixations have generally been analysed, also discussed in detail in Chapter 5. The first of these is the question of adequate morphological representations for their gradient complexity; the reader will remember that they were divided into three broad groups in Chapter 3 on grounds of phonological and semantic recurrence. Here a division into three is maintained (though along slightly different lines) by the use of a potentially controversial 'semi-complex' morphological status.

The second problem is that of capturing the relationships between the nouns and verbs of the stress-doublet pairs. We saw in Chapter 4 that they are semantically irregular and must therefore be dealt with on Stratum 1; but we saw in Chapter 5 that a verb-to-noun (or for that matter a noun-to-verb) relationship cannot be expressed on this stratum because it is the root level, and these roots are not lexically categorised. I make use of the only option available on BDLP's first stratum, and derive both noun and verb from a shared lexically unspecified root.

The Latinate prefixal forms receive the most attention in this chapter because they present the most awkward problems to the analyst, and have received the most attention in previous generative phonological analyses. But head prefixations and particle compounds are also dealt with here, as forms whose home is the first stratum. Head prefixes produce either verbs or adjectives; they are dealt with alongside the fully morphologically complex Latinate prefixed verbs, because their phonology is very similar.

Particle compounds are treated here as first-stratum compounds which, like the Latinate prefixal roots, are listed to become verbs and nouns. Their phonology is straightforward, though the application of the LCPR again runs into problems as it did in section 6.6.3; new solutions are proposed.

The chapter is organised as follows. Section 7.2 deals with the morphology of the Latinate prefixal words (7.2.1 the representation of their internal morphological structure, 7.2.2 their derivation from a common root). Section 7.3 covers their phonology, the main sections being 7.3.2 on the question of the underlying prefixal vowel, 7.3.3 on the verbal phonology, and 7.3.4 on the nominal phonology. The topic of section 7.4 is the particle compounds. All the derivations are summarised in section 7.5; then, as a coda to the chapter, an interesting problem with the BDLP model, encountered in 7.3.4, is explored in section 7.6.

7.2 Morphology

7.2.1 Morphological representations

The main theme running through my discussions of these Latinate prefixations is that they have varying degrees of morphological complexity; it is an oversimplification to say they are either complex, or not. How then should they be represented morphologically? The standard choice is between (to take an example) [re [mit]], which entails a previous operation joining the prefix *re-* to the root *mit*; and [remit], with no internal morphological complexity.

The problem is that it is hard to fully justify either of these representations for most of the Latinate prefixations in the data. Morphological complexity depends on a number of features. The main diagnostics are recurrence of the phonological strings respectively analysed as prefix and base (either independently or in the same positions in comparable constructions), and recurrence of particular semantics associated with each of these strings. The existence of regular allomorphic behaviour has also been cited as justification for positing morphological complexity, e.g. by Aronoff (1976). And we can additionally consider factors such as whether the base is phonologically of MinWd size, and whether it is separately syllabified and stressed; similar considerations apply to prefixes, since typical phonological features of English non-head prefixes are MinWd size, stress, and separate syllabification.

In none of these Latinate prefixations do all of these factors unanimously suggest morphological complexity; often they give conflicting results.

As detailed in Chapter 3, the words in the data (both stress doublets and non-alternating forms) were initially divided into three groups on the grounds of whether or not they contain a recurrent base, and whether or not this base is associated with any recurrent semantics (see Appendices). The words of the first group, exemplified by *alloy*, *exploit*, *rebel*, are those with bases which are non-recurrent. They are semantically empty; and (since they do not recur) have no confirmed individual allomorphic patterns. Notably they are almost the only prefixations in the data (with two exceptions, both adjectives, *perfect* and *absent*) in which the base syllable may be unstressed in unsuffixed nouns. Plus, the prefixes do not always syllabify independently, which also suggests there is no morphological boundary in these words.

The only grounds for saying these words are complex is the recurrent prefixal string (though there may be much variability in its form, cf. 3.3.2.1, 5.2 above), and in some cases the stress on the base syllable. Bisyllabic verbs are regularly stressed on the second syllable only where it contains a long vowel or a short vowel and two consonants (see sect. 5.4.1 above); so the final stress on *rebél* and *combát* is either exceptional, or due to the fact that these final syllables are roots (Liberman and Prince 1977: 306, Hogg and McCully 1987: 90). Similarly, final stress in bisyllabic nouns would only be expected where the vowel is long; so, the nouns *cómbàt*, *ánnèx* and *íncènse*, with secondary stress on the final syllable, would also have to be treated as exceptional if we do not recognise an internal morphological boundary. So, occasional exceptional stress patterns, and recurring prefixal strings, clash with the other diagnostic features for morphological complexity, by which the *accent*, *rebel* group of words would be morphologically simple. On balance, the case for complexity is not strong.

The second and largest group of Latinate prefixations, e.g. *convict*, *pervert*, *produce*, *remit*, do contain recurrent bases which are always stressed (though only in unsuffixed forms; cf. *consérve* ~ *cons*[ə]*rvation*; *convérse* ~ *conv*[ə]*rsation*). Again, there are cases where this stress would be exceptional if the item is analysed as morphologically simple, e.g. the nouns *impact*, *subject*, *extract*, and *nouns* and verbs *remit*, *progress*, *transfer*. Some of the bases also share recurrent allomorphy, e.g. that of *mit* in *permit* and *remit* (see discussion of Aronoff in Ch. 5 above); there is also an example of a word in *duce* (~ *duct*) in the data, *produce*. But again these bases have no semantics, and the prefixes are phonologically very variable and do not consistently syllabify independently of the bases.

The third group of Latinate prefixations, labelled 'borderline' in Chapter 3, not only have recurrent prefixes and bases – the bases also have some sort of recurrent semantics, because of associations (of differing degrees of closeness) with free words. Examples are *implant*, *prefix*, *recoil* and *rebound*; the bases all have some kind of relationship with the independent verbs *plant*, *fix*, *coil* and *bound* respectively (though this is stronger in, for example, *bound*, than it is in *coil*). The prefixes generally have some recurrent meaning too, e.g. *re-* often means 'back' in these formations. In the nouns of this group the prefixes are all of MinWd size, stressed and syllabified separately from their bases. They do not qualify for second stratum formation because of a lack of full compositionality, or because the prefixes they contain are unproductive with those particular meanings (e.g. *re-* meaning 'back' is not productive in English). But they are certainly the best candidates in the data for first-stratum complexity.

This last group of words is the only one which can truly be called morphologically complex. Both prefix and base in each case is recurrent, and each is typically associated with some kind of recurrent semantics. The base is always stressed, and the prefix always separately syllabified. The lack of complete semantic compositionality may be explained simply by the

Stratum 1 siting of the process. Morphological processes on this level are generally not as transparent as processes on Stratum 2, and so some irregularity is to be expected.
So, these words will be represented as [re [bound]], [re [lapse]] etc.: the bases are listed for the attachment of the prefix as one of the possible first-cycle operations, thus:

(1)

$$
[\text{lapse}]_R \begin{array}{l} \nearrow \quad \text{Root-to-Word: } [[\text{lapse}]_R]_N \\ \rightarrow \quad \text{Root-to-Word: } [[\text{lapse}]_R]_V \\ \searrow \quad \textit{re-}\text{ attachment: } [\text{re}[\text{lapse}]_R]_R \end{array}
$$

The first two groups of Latinate prefixations are more problematic, though. As we have seen, most of the words have some claim on morphological complexity, e.g. stress patterns or recurrent initial segment(s); but there are also good reasons for saying they are internally simple, e.g. the lack of semantics, and equivocal suprasegmental phonology. Morphological divisibility is a cline, which cannot be captured by a two-way simple-or-complex distinction.

We could take a step towards representing differing degrees of phonological and semantic complexity by introducing an intermediate level of morphological bracketing – a kind of semi-complexity. This might not only help to give some kind of resolution to the morphological problem, but can also have practical application for the phonological rules. Our problem is that some structure-building phonological rules, e.g. stress or syllabification, appear to respect a morphological boundary where there is no semantic justification for such a boundary.

Something like this is actually proposed by Giegerich (1999: 244-6, 275-6) in his discussions of the irregular syllable structure in place and personal names like *Grimsby*, *Neasden*, *Wilmslow*, and *Edward*, and other historically morphologically complex words like *ordnance*, *harpsichord*, *gormless*, *feckless*.
There are two kinds of syllabic irregularity here. Firstly, *Grimsby*, *harpsichord* and *gormless* (for example) all contain word-medial superheavy syllables, i.e. with –XXX rhymes (The reader is referred to section 6.3.2 above for explanation of syllabification in this model). These are normally disallowed: Giegerich notes, referring to Borowsky (1989), that as a general rule syllable rhymes containing three skeletal positions occur only morpheme-

finally; they are practically impossible medially, where a maximum of two X-positions are permitted[26] (Giegerich 1999: 244). However, they do occur medially in these examples. But what all these words have in common is that historically they all contained a morphological boundary immediately following the superheavy syllable, even though today this complexity is semantically obscured.

Another irregularity occurs with *Edward*, *reckless* and *feckless*. Here we would expect ambisyllabicity of the medial stops /d/ and /k/ respectively, since consonants tend to syllabify in onsets rather than rhymes where possible (again see 6.3.2 above), and /dw/ and /kl/ are acceptable English onsets. But the stops here syllabify exclusively with the initial syllables, thus *Ed.ward*, *feck.less*. Once again, these words are historically morphologically complex, this time with the boundary between the two consonants.

Giegerich says that 'such items are amenable to a unified explanation referring to their historic origin as morphologically complex forms' (1999: 245), elaborating:

> The phonological behaviour of such items becomes regular if they are assumed to have retained an internal ']' bracket (Allen 1980), which automatically licenses a preceding consonant – a diacritic solution, of course, but one that has strong diachronic motivation [...] it is in any case not only possible, but in certain instances necessary, to store historically complex items as simple forms on stratum 1.

(Giegerich 1999: 276). To develop this notion, we could say that such words are stored on Stratum 1 as semi-complex, with one underlying fossilised internal morphological bracket, thus: [Grims] by], [feck] less], [gorm] less] etc. If they were full suffixations, of course, they would be put together by morphological operation and represented as [[Grims] by], [[feck] less] etc. But through time and semantic obscuration, they have lost this status, simply retaining some of the historical division between the two parts of the word. This is borne out by the unusual syllabification patterns.

Similarly, the phonological behaviour of some of the Latinate prefixations – string recurrence, stress on the bases even when by regular phonological rules they would be unstressed, and separate base and prefixal syllabification – could also be reflected by a single

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[26] The exception being cases of homorganicity as in *angel*.

stored morphological bracket. These forms would not count as 'derived' for the purposes of structure-changing rules; but some structure-building rules appear to be sensitive to such a boundary. The evidence for this boundary from suprasegmental phonological behaviour is not as clear-cut here as it is in the cases Giegerich discusses, but the recurrence of the base and prefixal strings is striking.
In all cases these boundaries are justified either by historical full morphological complexity in English, or by the synchronic recurrence of strings on either side of the boundary in comparable constructions, and historical morphological complexity in French or Latin.

Such 'halfway' morphological complexity on Stratum 1 could be an appropriate way of capturing historical morphological change. In the examples above it reflects a stage in the process of morphological death, where there are phonological and/ or distributional reasons, but no semantic reasons, for positing morphological complexity. As Bauer (1990: 100) says, when a phoneme's distinctive power is lost, it disappears altogether from the system; but when a morpheme's productivity and even meaning is lost, it still lingers in existing words.

But it could also be a stage for morphological birth as well as morphological death. English has a number of productive affixes, like second stratum *re-* 'again' or *-able*, which are French or Latin in origin, and entered the language because of their repeated presence in loanwords. Their status as recurrent phonological strings attached to recurrent bases would give them a single underived morphological bracket; then the growing number of bases recognisable as independent words, and the strengthening association of the affix with particular semantic modification, would give the justification for a change from a single bracket analysis, to a full morphological process analysis. Thus there are three stages in the beginnings of productivity of a suffix like *-able* in English: [...able] to [....]able] to [[...]able] (*-able*'s association with the free word *able* would probably assist this process). I would assume that this happens on the first stratum, and then as the affix gains productivity with native words, its attachment may happen on the second stratum. This seems a more natural way of capturing the birth of an affix than a jump from representation of words containing it as morphologically simple, [.....], to fully fledged concatenative status represented by [...[...]].

Admittedly, though, this semi-complexity is still an imposition of discrete degrees of structure on a continuous cline of morphological divisibility. It has the advantage of letting us distinguish between morphological complexity justified by both semantics and phonology, and complexity justified only phonologically (and diachronically), while restricting true 'derived' status to the former. But it is still a considerable oversimplification of the variability found in the data.

However, it is hard to see how such continuousness might be represented, and indeed whether it would even be desirable to represent it in a model such as this one, given that the phonological rules sensitive to morphological structure do not have continuous output (e.g. a heavy syllable has either a three-X or a two-X rhyme, with no in-between option). We could break morphology down into connections between phonology and semantics, i.e. abandon a morphological level of representation as such, and see words as being composed of phonological strings which may map, with differing degrees of exclusivity, to particular semantic atoms. If a phonological string frequently recurs associated with a particular meaning, i.e. the mapping between phonology and semantics is exclusive and very strong, it would correspond to what in more traditional analysis would be called a morpheme. Such mapping between phonology and semantics may have varying strengths, resulting in varying levels of morphological complexity: in the Latinate prefixations, there is no semantic mapping, just recurrent phonological strings.

Such an approach is similar to that taken by Bybee (1985, 1988, 1995) in her connectionist-inspired model of the lexicon, and is a plausible way of accounting for morphological complexity. However, in the present model it is more appropriate to stay with a more traditional kind of analysis, since BDLP is a rule-based system which has discrete inputs and outputs. The notion of morphological semi-complexity allows us to give some kind of status to recurrent morpheme-like phonological formatives without full semantic mapping, and this is all the model needs.

So, if we accept the possibility of a kind of morphological semi-complexity, as well as ordinary full complexity, among stratum 1 forms, then how might these structural analyses apply to the Latinate prefixations in our data?

I will take the position that the base of the prefixation must be recurrent, and must always be stressed, separately syllabified, and of MinWd size. The prefix must also be separately syllabified, which means that in nouns (where it is stressed) it will be of MinWd size too. These characteristics are always found in prefixes and bases (words) on Stratum 2, so I think it is reasonable to say they are requirements for any similar kind of status on Stratum 1. So, suprasegmental phonological rules must treat both prefix and base as though there is a morphological boundary between them.

This means that the words with non-recurrent bases will here be treated as morphologically simple, which is surely uncontroversial in *accent*, *convert*, *desert*, *presage*, *rebel*, where the base in nouns is unstressed. In *intrigue* or *combine*, of course there is stress on the base, but it is still non-recurrent, and these words are treated as no more complex than the phonologically similar *balloon*.

Words with recurrent bases may be semi-complex if the prefix is syllabified independently of the base: thus [re [mit], [de [crease] (where in nouns the stressed prefix has a long vowel, rather than taking the base's initial consonant for weight), [im [port], with a morphological boundary but no concatenation or truly derived status. In the last example, *import*, and in *convict*, *construct*, *pervert* and *subject*, complexity is indeterminate, since the prefix ends in a consonant and therefore does not need ambisyllabicity of the base's initial consonant in order to count as a heavy syllable. Perhaps for some speakers there may be semi-complexity in these forms, for others not. One factor possibly worth considering might be prefixal phonological similarity to productive English prefixes – that is, the link between the *re-* of *remit* and the *re-* of *rewrite*, or the *sub-* of *subject* and the *sub-* of *sublet*, might support a semi-complex analysis.

Obviously a number of factors may combine to justify the positing of morphological complexity or semi-complexity. I am simply very hesitant about assigning such status too easily, wishing to avoid stretching the definition of 'morpheme' to include any convenient phonological string. This latter approach is not uncommon in theoretical phonology, as evidenced by my criticisms of the generative analyses of Latinate words in Chapter 5, and more recently by Hammond (1999), in whose OT analysis of English phonology *obelisk* and *asterisk* are treated as suffixations in order to protect a phonological generalisation (1999: 256, 260). I think it is preferable to have some criteria involving recurrence, semantics, suprasegmental phonology, and informally the historical dimension, to support analyses involving morphological complexity.

So, we end up with the following representations of the Latinate prefixations:

(2)

[rebel]	[refuse]	[concert]
?[consent]	[convict]	
?[im [port]	[sub [ject]	
[re [mit]	[in [crease]	[de [crease]
[re [bound]]	[re [lapse]]	[dis [card]]

The question mark means that the bracketing analyses are open to debate. *Consent* and *convict* are treated as simple because *coN-* does not have any kind of productive counterpart, while *import* and *subject* are treated as complex because of *iN-*'s similarity both formally and semantically to the preposition *in*, and *sub-*'s formal resemblance to the word-based prefix *sub-*.

Before moving on to the next section, a brief note about the other prefixal words covered in the Stratum 1 analysis is needed. The verbs of the *consent* group mostly have the same kinds of internal structures (and structural problems for the analyst) as the stress-doublet Latinate verbs, and the reader should therefore assume they are treated in the same way where they are not explicitly referred to. The other group of words to mention is the head-prefixes *a-*, *en-* and *be-*. I assume these predominantly attach to roots on Stratum 1, since none is very productive (Marchand 1969), and all may feature with bases of differing lexical categories. These prefixes syllabify separately from their bases (see above sect. 5.3.1) but unlike non-head prefixes are never stressed (so if they also attach on Stratum 2, which would be perfectly acceptable in BDLP, they would have to be made exceptions to Prefix Footing; or this condition could be changed to exclude category-determining prefixes). Interestingly, head prefixes never produce nouns, the only lexical category in which any prefixes are stressed on the first stratum. In terms of morphological bracketing, most of them may be represented like *rebound*, with concatenative brackets; thus $[\text{be}[\text{knit}]_R]_R$, $[\text{en}[\text{able}]_R]_R$ etc.

7.2.2 The first-stratum noun-verb relationship

As seen in previous chapters, it has generally been assumed that the Latinate stress-doublets are cases of verb-to-noun derivation (see e.g. sect. 5.2.4). However, my investigation of the semantic relationships between these nouns and verbs has shown that this is probably not the case. There is not much regularity in these relationships, and often the verbs and nouns either share no semantic link at all, or a link which is too specialised to be generalisable (see Ch. 4, esp. sect. 4.7.1). It is certainly far harder to justify a directional relationship between the Latinate nouns and verbs than it is to justify one between the productively prefixed nouns and verbs.

The irregularity and unpredictability of the noun-verb relationships in these stress doublets enables us to make a virtue out of necessity as far as BDLP is concerned. As we have seen in sections 2.3, 4.7.2 and 5.2.4, not only might it be undesirable to treat them as verb-to-noun derivations; it is actually impossible to do so on Stratum 1 of this model. Roots on Stratum 1 have no lexical category: the status of being a noun or a verb, etc., is only conferred by the Root-to-Word rule, which is the last morphological process to apply on that stratum. This means that there can be no conversion or zero derivation from one lexical category to another on level 1.

However, we can capture the relationships between the nouns and verbs by deriving them from a common, lexically unspecified root. Given the semantic irregularity of the noun-verb relationships, this may well be a better way of analysing them than trying to impose a directional derivation. It is an economical approach, since we need only assume as much semantic (and phonological) information in the root as the nouns and verbs share. It reflects the fact that there is a connection between them, but that this connection is really only *some* shared phonological and semantic information; it is not general or predictable enough to be a regular morphological operation.

So, a root like [im[port], if we assume it is stored with an underlying residual bracket as discussed above, will for its first-cycle operation be listed to undergo either one of two subparts of the Root-to-Word rule (RW): it can become a noun or a verb:

(3)

$$\begin{tikzcd}[column sep=small]
 & \text{RW} \rightarrow [[\text{im}[\text{port}]_R]_V \arrow[r] & \text{Stress rules, exit stratum} \\
{[\text{im}[\text{port}]_R} \arrow[ur] \arrow[dr] & & \\
 & \text{RW} \rightarrow [[\text{im}[\text{port}]_R]_N \arrow[r] & \text{Stress rules, exit stratum}
\end{tikzcd}$$

The common root contains only as much semantic information as is shared by both verb and noun. This is quite a lot of information in the case of [im[port]$_R$, where verb and noun are closely related (verb: 'buy or bring in from another country', noun: 'goods/ services brought in from foreign countries'), but may be rather less in other Latinate noun-verb stress pairs (e.g. *permit*, where the verb has the general meaning 'allow, tolerate', and the noun the highly specialised 'official document giving permission for sth.').

However close the relationship, though, there must be some way for semantic differences to be assigned to the different derivations, nominal, verbal, and sometimes adjectival (cf. *abstract*) from the one common root. Perhaps this could be part of RW's function: it could assign not only lexical category, but also semantic information lacking in the unspecified root. For the noun *import*, for example, this would mean assigning a general 'object of action' meaning; the noun *permit* would need more semantic elaboration, to show that it is an particular kind of inanimate agent, an official document or card giving permission for something.

Such a function would greatly enhance RW's status as the 'more particular' rule for the Elsewhere Condition, which was criticised above (see section 2.3 above). We have seen that in BDLP, RW is used as the blocking rule: it prevents the application of structure-changing phonological rules, and of morphological rules which would have output synonymous with the output of an earlier-cycle RW. It does this because its input is supposed to be maximally specific: there is said to be a RW rule tailored for each potentially free root, so for instance the RW rule for the root $[\text{run}]_R$ would be:

(4)

$$[\text{run}]_R \longrightarrow [[\text{run}]_R]_V$$

Each RW's input is then a subset of any subsequent structure-changing rule's input, and will therefore block it, since the outputs will be distinct.

However, this is open to criticism on the grounds that if RW only assigns lexical category then there are only as many RW rules as there are lexical categories in the language; and the input to each one will not be maximally specific but very general. By this interpretation, $[\text{run}]_R$ will not be listed to undergo a rule

(5)

$$[\text{run}]_R \longrightarrow [[\text{run}]_R]_V$$

but instead to undergo a rule

(6)

$$[\ldots]_R \longrightarrow [[\ldots]_R]_V$$

From this point of view, RW cannot be treated as a maximally specific rule at all, and therefore may not effect blocking. So, giving it additional function as a full semantic specifier is very useful; it truly makes each application of the rule different, so RW's status as the blocking rule is secured.

The idea that common semantic information is stored in the shared root, and any individual differences are assigned by RW to the nouns and verbs, may also be useful in accounting for the imbalance of generality of meaning between verb and noun in the stress-doublets. In a number of cases it seems that the verbs have a more general, less tightly-defined meaning than the nouns, which tend to be specialised. This is evidenced in the example of *permit* above, but also (for example) in *compress*, *implant*, *insert*, *intercept*, *transform*, among others (see Appendix II for definitions). This must be a large factor in the general tendency to treat these Latinate stress doublets as verb-to-noun derivations. The nouns can to some extent be defined in terms of the verb's meaning, with the addition of their own unpredictable specialisation.

In the present model this generalisation is not lost. The shared root will contain the general, common semantics; then the verbal RW rule will effect little if any semantic addition, while the nominal RW rule would have a greater information-bearing load. Thus the action of a verb-to-noun rule is mimicked, but with the advantage that specialisation in the noun's meaning is more economically captured; and specialisation or change in the verb's meaning may also happen.

Not all the Latinate stress doublets need actually share a root. Those with meanings which are synchronically unrelated, such as *désert*$_N$ 'uninhabited, uncultivated land' and *desért*$_V$ 'abandon' (where the phonological link is also weak), may simply have independent roots.
Of course the *consent* Latinate words are only listed for a verbal RW, since non-stress-alternating nouns are derived from them on Stratum 2 (see section 6.4.2 above). The head prefixations too may only have one RW listing, either to become adjectives (e.g. *aglow*, *ablaze*) or verbs (e.g. *bedeck*, *enable*).

I now give some illustrations of the Stratum 1 morphological divisions of some Latinate prefixations in the data: the noun-verb pairs *desert*, *present*, *import* and *rebound*, and a verb with a Stratum 2 zero-derived noun, *consent*.

(7)

STRATUM 1	STRATUM 2
$\nearrow$ RW(verb) $\rightarrow [[\text{desert}]_R]_V$ - $\dashrightarrow$ $[\text{desert}]_R$ $\searrow$ *-ion* $\longrightarrow [[\text{desert}]_R\ \text{ion}]_R \rightarrow$ RW(noun) $\rightarrow [[[\text{desert}]_R\ \text{ion}]_R]_N$	*-er*
$[\text{desert}]_R \rightarrow$ RW (noun) $\rightarrow [[\text{desert}]_R]_N$	
$\nearrow$ RW (verb) $\rightarrow [[\text{present}]_R]_V$ $[\text{present}]_R \rightarrow$ RW (noun) $\rightarrow [[\text{present}]_R]_N$ $\searrow$ *-ation* $\longrightarrow [[\text{present}]_R\ \text{ation}]_R \rightarrow$ RW(noun) $\rightarrow [[[\text{present}]_R\ \text{ation}]_R]_N$	
$[\text{consent}]_R \rightarrow$ RW (verb) $\rightarrow [[\text{consent}]_R]_V$ - $\dashrightarrow$	Verb-to-Noun
$\nearrow$ RW (verb) $\rightarrow [[\text{im}[\text{port}]_R]_V$ $[\text{im}[\text{port}]_R \rightarrow$ RW (noun) $\rightarrow [[\text{im}[\text{port}]_R]_V$ $\searrow$ *-ation* $\longrightarrow [[\text{im}[\text{port}]_R\ \text{ation}] \rightarrow$ RW(noun) $\rightarrow [[[\text{im}[\text{port}]\text{ation}]_R]_N$	
$\nearrow$ RW (verb) $\rightarrow [[\text{bound}]_R]_V$ - $\dashrightarrow$ $[\text{bound}]_R$ $\qquad\qquad\qquad\qquad\nearrow$ RW (verb) $\rightarrow [[\text{re}[\text{bound}]_R]_R]_V$ $\searrow$ *re-* $\longrightarrow [\text{re}[\text{bound}]_R]_R$ $\qquad\qquad\qquad\qquad\searrow$ RW (noun) $\rightarrow [[\text{re}[\text{bound}]_R]_R]_N$	Verb-to-Noun

Each root is listed for one or two RW rules; alternatively on the first cycle there is the possibility of prefixation or suffixation, but on subsequent cycles these operations will be followed by their own RW rules. In the second column I make a note of the morphological operations which apply on the second stratum; thus *consent*, for example, merely undergoes RW conversion on Level 1, but is subject to verb-to-noun derivation on Level 2.

7.2.3 Summary

I have proposed that morphological bracketing on Stratum 1 should have three different levels: simple, complex and semi-complex. This gives us some ability to capture the cline-like nature of morphological complexity, since the 'semi' stage can be applied to forms for which only some, not all, of the diagnostic features for morphological complexity apply. Semi-complex forms are not technically derived, so their morphological structure does not enable the application of structure-changing phonological rules (which keeps our model restrictive). However, some structure-building phonological rules may be sensitive to their internal morphological boundaries, as we will see in the phonology section below.

The noun-verb relationships among the Latinate prefixal stress doublets are, like their internal morphological complexity, problematic. They cannot be treated as straightforward verb-to-noun derivations because of their semantic irregularity, and in any case such an analysis is impossible within the present model because roots in BDLP have no lexical category: a lexical-category-changing operation cannot be modelled. But an alternative analysis – derivation from a common root – has been shown to have a number of advantages, not least among these the fact that it boosts RW's position as the maximally specific rule (the blocker) of the Elsewhere Condition.

7.3 Phonology

7.3.1 Outline

The phonology of the Latinate prefixal noun-verb pairs follows in the next few sections. Here some of the problems with earlier generative analyses (as outlined in Chapter 5) will be addressed – namely, the issue of what underlying vowels the initial (prefixal) syllables should contain in order for both noun and verb to be derived as simply as possible from one root; and how the stress rules should operate in order to avoid having to apply destressing, and instead have a 'one-only' application. This leads us to further consideration of the LCPR (more especially in section 7.4). These priorities, and the architecture of the BDLP model, force us to look carefully at the way syllabification operates: it appears to be sensitive to lexical category in first-stratum prefixations, which uncovers some problems with the model.

In 7.3.2 the question of the underlying prefixal vowels is discussed, with an underspecified schwa (zero specification for all vowel features except [-tense]) as used in Giegerich (1999) proposed. We see in the verbal phonology (7.3.3) that this underspecified vowel, if unstressed (which it is, because I propose non-iterative stressing for these forms to avoid stressing then destressing the initial syllable), will have the features of /ə/ filled in by the Default Rule on Stratum 2. I propose an additional Default Rule to fill in the features of /ɪ/, since these two vowels are in free variation in unstressed syllables in English. In 7.3.4 I outline the nominal derivation, which is entirely independent of the verbal one. I argue that certain prefixes must contain a [0 tense] underlying vowel, and that with such underspecification, syllabification must be sensitive to lexical category in first-stratum nominal prefixes. This causes problems for BDLP with its recursively lexically unspecified roots, and its use of lexical categorisation to effect the Strict Cyclicity Effect by blocking subsequent structure-changing rules.

7.3.2 Underlying vowels

So, each stress-doublet Latinate prefixal noun-verb pair is to be derived from one common root on Stratum 1. But what phonological form should these common roots take? If we consider the segmental phonology of a few average stress-doublet pairs like *convict* /ˈkɒnvɪkt ~ kənˈvɪkt/, *refuse* /ˈrɛfjuːz ~ rɪˈfjuːz/, *subject* /ˈsʌbdʒɛkt ~ səbˈdʒɛkt/, *protest* /ˈproːtɛst ~ prəˈtɛst/, *defect* /ˈdiːfɛkt ~ dɪˈfɛkt/, *invite* /ˈɪnvaɪt ~ ɪnˈvaɪt/ (see further Appendix I), it is immediately obvious that this question really centres around the underlying prefixal vowel in the common root, since the other segments are the same in noun and verb. The verbs typically have /ə/ or /ɪ/, the vowels which occur in unstressed syllables in English, while the nouns always have full vowels, lax or tense: /ɒ ɛ ʌ o i ɪ/ respectively in the examples listed here. The choice of /ə, ɪ/ vs. a full vowel appears to be a function of stress. But what vowel should be posited in each common root, so that we can generate noun and verb from a shared underlyer? I will argue that underlying schwa, which is an underspecified vowel in the BDLP work of Giegerich (1999), is for most of these roots the most promising candidate.

First, though, I will deal with the small number of cases where schwa is not the most appropriate underlyer. The prefix *trans-* always has a full vowel, /a/ or /ɑ/, in both verb and noun, so this surface vowel should be underlying in the common root. And the prefix *iN-*, in *intrigue*, *invite*, *insert*, *implant* and other stress doublets, has /ɪ/ as its surface vowel in both verb and noun; so this vowel too should be underlying in the common root. And finally the head prefix *be-* (and perhaps also *en-*) may also have a fully specified /ɪ/ underlyingly, since there is no stress-governed variation here – though, as with many of the Latinate prefixes when stressless, /ɪ/ and /ə/ seem really to be in free variation, so an underlying schwa would also be appropriate.

For most of the Latinate prefixes under consideration here, though, the underspecified schwa is the most likely underlyer.

We saw in Chapter 5 that previous generative phonological analyses of the Latinate prefixal words assume a full underlying vowel in the prefix; so for example *respect*, *release*, *refuse*, *remit* etc. all begin underlyingly with /riː/, while *progress*, *produce*, *provide* all begin with /proː/, and so on – regardless of the vowel qualities in the surface forms. The unpredictable variation in *re-*, *de-* and *pro-*'s surface forms under stress in nouns between the tense and lax vowels /i ~ ɛ / and /o ~ ɒ/ respectively is not generally explained – shortening and vowel-shifting rules must presumably be applied. In the verbs, the initial syllable is traditionally subject to stressing, destressing and vowel reduction to generate the desired surface schwa (see sections 5.4 and 5.4.1 above). Positing an underlying schwa in these syllables was not considered in these analyses because it was simply not permitted in SPE (Chomsky and Halle 1968): all underlying vowels there were full.

I criticised this derivation in section 5.4.1, arguing that the verbs with these prefixes are seen as basic and the stress-doublet nouns (where they exist, which is in the minority of cases) as derived; so surely it would be better if there were a surface-true underlyer in the verb's initial syllable, rather than in the noun's. The verbs nearly always have schwa (in some cases alternating with /ɪ/) in their prefixal syllables, with the exceptions noted above, with no evidence for a tense vowel; the nouns may have schwa, or a tense vowel, or a lax vowel – as in the nouns *r/ə/spect*, *r/i/mit*, *r/ɛ/fuse*, respectively. This points towards schwa being the natural underlying vowel. And, as far as rules for generating different vowels from one underlyer without being structure-changing are concerned, having underspecified schwa as that underlyer makes the most sense.

Structure-changing rules should be avoided in these prefixations because they are not derived environments. Their prefixal structure does not create such an environment because, as argued in 5.2 above, in most cases this structure should not be seen as created by the concatenation of prefix plus base. The prefixes cannot really be seen as single linguistic items because they have no semantics and are phonologically very variable in form: it is morphologically very suspicious to claim that there is a prefix spelt <con, cor, col, com>, for example, which in each instance is attached anew to the roots *bat*, *pel*, *lect*, *rode*, *mit*, *duct*, *sent*, etc.

Even if these prefixes and bases were to be identified as concatenated morphemes, still the application of structure-changing rules would be suspicious. Given that most of the bases are not words, have no recurrent semantics, and never even occur without a prefix, arguably there would be no reason why they could not be assigned any underlying form at all, and be subjected to a battery of rules to derive every single surface output. There is no way of ascertaining whether or not any given base *x* is identifiable as actually being base *y* after the application of a structure-changing rule, or whether it is an entirely separate base with a distinct underlying form. So, for example, *resent* and *consent* could share the same base, with a voicing rule applying to the initial consonant after a vowel-final prefix (cf. Strauss 1982a); but there is no non-circular way of independently verifying this. If we allow structure-changing rules to apply in these prefixations they will be unconstrained. Latinate prefixations must be seen as underived.

If we try to apply structure-changing rules like vowel reduction to these Latinate forms in BDLP, we find they are blocked anyway. Being stress-sensitive, vowel reduction would have to apply on the cycle started by the Root-to-Word (RW) rule – but on this cycle there is no morphological derivedness and no structure-changing rules may apply. So, assuming the alteration to Delinking suggested above is carried through (and in many cases, even if it is not), the traditional vowel-reducing analysis of these prefixes cannot apply in the present model. So, it would seem preferable to posit an underlying schwa as the prefixal vowel in the Latinate stress-doublets.

Giegerich (1999: 134-42) discusses this issue in his treatment of the vowel alternations in words such as *atom~atomic*, and *deter~deterrent~deterring*. He argues that allowing schwa in underlying representations obviates any need for structure-changing rules like Vowel Reduction to apply unconstrainedly on Stratum 2. Underlying schwa is an underspecified vowel, having no value for any of the vowel distinctive features except [tense], which is [- tense]. Its representation as an underlying segment will be '∅' here.

If after stress assignment the underlying schwa is unstressed, then on Stratum 2 a Default Rule applies, which fills in schwa's empty melody tier (see 6.3.2 on melodies and skeletons) with negative values for all distinctive features. Slightly adapting the formulation of Giegerich (1999: 138-9), we can express the Default Rule as follows:

(8) Default Rule (Stratum 2)

$$
\begin{array}{c}
\text{Nucleus} \\
| \\
\text{X} \\
| \\
\left(\begin{array}{l}
[0\ \text{tense}] \\
[0\ \text{high}] \\
[0\ \text{low}] \\
[0\ \text{back}] \\
[0\ \text{round}] \\
\text{etc.}
\end{array}\right)
\end{array}
\longrightarrow
\begin{array}{c}
\text{Nucleus} \\
| \\
\text{X} \\
| \\
\left(\begin{array}{l}
[-\ \text{tense}] \\
[-\ \text{high}] \\
[-\ \text{low}] \\
[-\ \text{back}] \\
[-\ \text{round}] \\
\text{etc.}
\end{array}\right)
\end{array}
$$

If the syllable containing the underlying schwa is assigned stress, though, it will be subject to a rule of Blank Filling on Stratum 1. This rule inserts plus and minus values for all schwa's underspecified features, deriving the appropriate full vowel (see Giegerich 1999:142).

(9) Blank Filling

$$
\begin{array}{c}
\Sigma \\
| \\
\sigma_S \\
| \\
\text{Nucleus} \\
| \\
\text{X} \\
| \\
[\emptyset]
\end{array}
\longrightarrow
\left\{\begin{array}{c}
[\text{a}] \\
[\text{ɛ}] \\
[\text{ɪ}] \\
[\text{ɒ}] \\
[\text{ʌ}]
\end{array}\right\}
$$

The vowel will be lax, since [- tense] is already specified. Giegerich goes on to argue that the particular values inserted into the melody tier by Blank Filling actually depend on the spelling of the form in question, so that for instance an <e> in the orthography will trigger Blank Filling to assign /ɛ/ vowel features, an <o> will trigger /ɒ/ features, and so on. The default phonological value of the orthographical symbol is the vowel which will be inserted (cf. Giegerich 1999, Carney 1994, e.g. 321, 355). I discuss Blank Filling in more depth in section 7.3.4 below.

If we have underlying schwa in the prefixal syllables of the Latinate words, then both the noun and the verb should be phonologically derivable from the one common root with no need for any structure-changing rules. For example, the root shared by the noun *pródùce* and the verb *prodúce* may be underlyingly $[\text{pr}\varnothing\text{djus}]_R$. It will be listed for a verbal Root-to-Word rule, producing $[[\text{pr}\varnothing\text{djus}]_R]_V$; then the stress rules will apply, leaving the initial syllable unstressed (see 7.3.3). The Default Rule will assign schwa's features on Stratum 2. When $[\text{pr}\varnothing\text{djus}]_R$ undergoes the nominal Root-to-Word rule for which it is also listed, though, the stress rules will build a foot over the first syllable (see 7.3.4), and Blank Filling will apply, since it is not structure-changing, and fill in values for /ɒ/. Thus both verb and noun can be derived from a common underlying root with no structure-changing rules.
There is a handful of stress-doublets where phonological deviation between verb and noun is found not only in the prefix, but also in the base, because the noun has no secondary stress there: for example, *accent* /ˈaksənt ~ akˈsɛnt/, *rebel* /ˈrɛbl̩ ~ rɪˈbɛl/, *desert* /ˈdɛzət ~ dɪˈzɜːt/. In some such cases, where the meanings of the two words are as divergent as their phonology, it might be easier to give them separate underlying roots. But they could also be derived from the same root, with an underspecified underlying schwa in the final as well as the initial syllable, with vowel qualities once again derivable from stress.

As we will see, there are potential problems for the underlying schwa analysis, though. One is that underlying schwa and Blank Filling may only yield lax full vowels and not tense ones. The obvious remedy for this – removing schwa's [- tense] specification – will be explored in 7.3.4 below.
Secondly, this analysis is open to the same kinds of objections which I raised to Giegerich's Delinking rule in Chapter 5. There, I criticised this rule for being insufficiently constrained. Delinking removes full vowel melodies and replaces them with the schwa melody,

underspecified for all features except [- tense]. This underspecification, I said, means that any full lax vowel could be posited as an underlyer for forms with surface schwa (see 5.4.1 above). Underspecification can be used to allow structure-changing rules to be rewritten as structure-preserving ones; they then escape the constraints of Strict Cyclicity.

Here there is a similar problem: all vowels could be underlyingly underspecified and only given distinctive feature values by Blank Filling. However, this would only be likely if an extreme preference for calculation over storage in the operation of the grammar is assumed, even where there is no alternation in the vowels in different morphological derivatives of a word.

Another defence comes from the fact that schwa never contrasts with any full vowels: full vowels (mostly) occur only in stressed syllables, while schwa occurs only in unstressed syllables. There is no functional contrast between, for example, /ə/ and /ɒ/. Therefore an objection to underspecification in the case of schwa vs. full vowels, on the grounds that it bypasses constraints on structure-changingness, is not as well founded as an objection to underspecification in, say, voiced vs. voiceless stops: the latter involves the preservation of linguistic contrasts and the former does not. Vowel quality is partly a function of stress, and that fact is captured by the present analysis.

I return to the issues of schwa, underspecification and Blank Filling in the section on the Latinate prefixal nouns, 7.3.4 below. There the matter of constrainedness and underlying feature specifications will again be discussed, as will the fact that some of the verbal prefixes in question actually surface with /ɪ/ rather than /ə/. For now though, I let the underlyingly underspecified schwa analysis stand.

7.3.3 Latinate verbs

Here I discuss the derivation of the different types of first-stratum prefixal verbs. This includes the stress-doublet verbs treated here as morphologically simple, e.g. [rebel], [convict], [refuse]; those which are semi-complex, such as [re[mit], [pro[test], [re[ject], [sub[ject]; and those with full first-stratum complexity, e.g. [re[bound]], [re[lapse]]. Most verbs of the *consent* set may also be classified into these three categories, e.g. [assault], [esteem], [a[cclaim], [dis[guise]], [re[claim]], and can be derived in the same way. (The exceptions in this set are the few productively prefixed forms like *misrule*, discussed in 6.6.3

above; there are also non-prefixal words like *garotte* which I assume are exceptionally end-stressed nouns, entrants to the noun-to-verb rule on Stratum 2; these are not included in this section's discussion.). I also outline the derivation of the head prefixations like [be[friend]], [a[sleep]], [en[danger]]; most of these are verbs, though some are adjectives or adverbs.

These verbal derivations are in general much simpler than the nominal ones (which are dealt with in section 7.3.4 below). For most verbs I assume an underlying schwa in the prefixal syllable, since the unstressed /ɪ/ in cases like *desert*, *refuse*, is often pronounced as /ə/, with which it is in free variation (Gussmann 1991); the exceptions are the prefixes *iN-* and *trans-*, as discussed above.

In the BDLP model, there is no pre-morphology cycle of any phonological rules (see sect. 2.3); so, for the simple and semi-complex verbs (remembering that semi-complexity is stored, not generated), the first operation is the Root-to-Word (RW) rule. The roots [rebel]$_R$, [convict]$_R$, [refuse]$_R$, [pro[test]$_R$, [re[ject]$_R$, [sub[ject]$_R$, [re[mit]$_R$ are all listed for both the verbal and the nominal RW rule – it is only the former which concerns us here. Thus we have the verbs [[rebel]$_R$]$_V$, [[convict]$_R$]$_V$, [[refuse]$_R$]$_V$, [[pro[test]$_R$]$_V$, [[re[ject]$_R$]$_V$, [[sub[ject]$_R$]$_V$, [[re[mit]$_R$]$_V$.

For the verbs with full morphological complexity, though, the first operation will be prefixation. So, for example, *rebound* , *relapse*, *discard*, *reclaim* – and head prefixations like *beknit*, *befriend*, *asleep*, *entrap* – the roots [bound]$_R$, [lapse]$_R$, [card]$_R$, [knit]$_R$, [friend]$_R$, [sleep]$_R$, [trap]$_R$ will be listed for prefixation with *re-*, *dis-*, *be- a-*, *en-* respectively. For example:

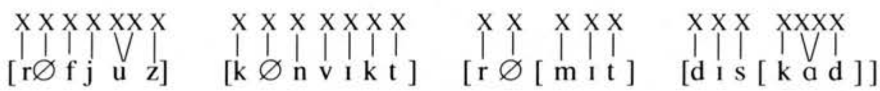
(10)

$$\begin{tikzcd} & \text{RW (verb)} \arrow[r] & {[[\text{bound}]_R]_V} & \\ {[\text{bound}]_R} \arrow[ur] \arrow[dr] & & & \text{RW (verb)} \\ & \textit{re-}\text{ prefixation} \arrow[r] & {[\text{re}[\text{bound}]_R]_R} \arrow[ur] \arrow[dr] & \\ & & & \text{RW (noun)} \end{tikzcd}$$

$$[\text{friend}]_R \rightarrow \begin{cases} \text{RW (noun)} \longrightarrow [[\text{friend}]_R]_N \\ \textit{be-}\text{ prefixation} \longrightarrow [\text{be}[\text{friend}]_R]_R \longrightarrow \text{RW (verb)} \end{cases}$$

After the initial morphological cycle, whether it has effected prefixation or lexical category assignment, phonology may apply. The first process is syllabification, the operation of which was explained in section 6.3.2 above. First, skeletal positions are generated for the melody tiers. This is a straightforward and automatic operation: each melody tier receives one X-position unless it is a vowel specified as [+ tense], in which case it gets two X-positions. The underlying schwa, being [- tense], gets one X, so for example, we have:

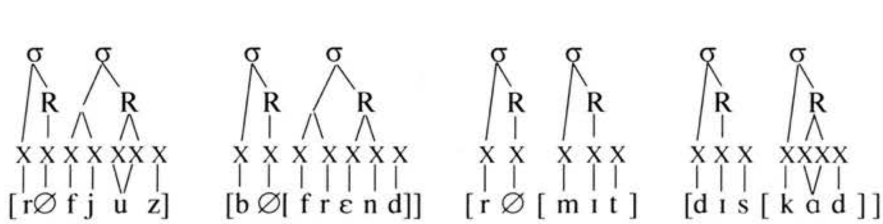
(11)



As we saw above, syllabification starts with the innermost '[ ]' brackets and then cycles outwards. This will mean that in morphologically complex and semi-complex forms, which have an internal '[', there will be no syllable liaison between prefix and base. The relevance of this is more apparent in the nouns than in the verbs because of their tendency to initial stress, which affects syllable weight; though because of the '[', the /s/ of the verb *discard* will not become part of the onset of the *card* syllable. We have now captured the generalisation made by Raffelsiefen (1999: 184, and see 5.3.1 above) that head prefixes syllabify separately from their bases.

After syllabification, we have (for example):

(12)



The verbs which are complex or semi-complex, i.e. those which were assigned lexical category as their first morphological operation, may now be stressed. But the prefixations [en[trap]], [a[sleep]], [re[bound]], [re[lapse]], [re[claim]], [dis[card]] etc. all still lack lexical category, syllabification having been triggered by the action of prefixation. Since stress in English is sensitive to word-class, they must undergo RW before the phonology can proceed.

While the Latinate prefix *re-* in *rebound, reclaim*, does not appear to determine lexical category (the bases may have the same category as they would if unprefixed), the head prefixes do. These prefixes can be listed in the same way as category-changing suffixes like *-ify*, having a particular RW rule as part of their listing (cf. Giegerich 1999: 82), e.g.

(13)

$$\begin{tikzcd} & \text{-ise} \\ \text{-al]} \arrow[ur] \arrow[r] \arrow[dr] & \text{-ity} \\ & \text{RW (adj)} \end{tikzcd} \qquad \begin{tikzcd} & \text{-ation} \\ \text{-ify]} \arrow[ur] \arrow[dr] & \\ & \text{RW (verb)} \end{tikzcd}$$

$$\text{[be-} \longrightarrow \text{RW (verb)} \qquad \text{[en-} \longrightarrow \text{RW (adj)}$$

Forms with head prefixes are generally not subject to further Stratum 1 category-changing operations (cf. Hammond 1993) – as though the prefix only allows progression to RW and exiting the stratum. The Latinate prefixes by contrast exercise no such control. Even the lexical category is unpredictable: sometimes prefixations are just listed for the verbal RW like the bases, but sometimes – as in the stress-doublets – they are listed for the nominal RW too.

Now all our forms are ready to be stressed, on the first cycle for *rebel*, *refuse*, *remit*, *protest*, *consent*, etc.; but on the second cycle for *rebound*, *reclaim*, *befriend*, and so on.

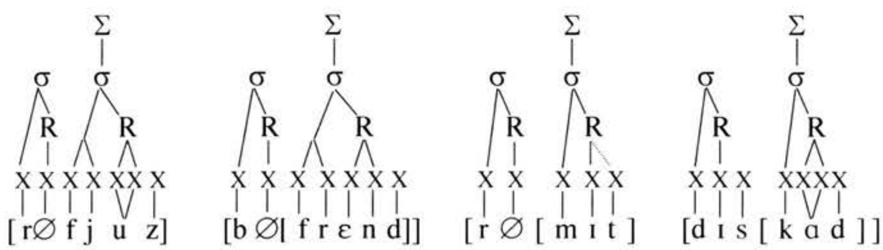
As outlined in Chapter 5, verbs' final syllables are stressed by the usual metrical phonological rules if their rhymes contain a long vowel or a short vowel and two consonants. These two environments can be unified as heavy (XX) rhymes by the device of extrametricality of a final consonant (Hayes 1982; see 5.4.1 above). Here, extrametricality is brought about by the operation of syllabification, without needing separate stipulation, since the final consonants are reserved for onsets (see 6.3.2, Giegerich 1999: Ch.8).

So, the final syllables of the verbs *refuse*, *convict*, *consent*, *rebound*, *reclaim*, *befriend* etc. will be stressed, since they are all of the required weight. But what of *entrap* or *remit*, verbs in which the final syllable is too light to attract stress? Here the stress rules respect the internal '[' of complex and semi-complex verbs, giving the final syllable stress because it is a root, enclosed in '[ ]' brackets (Liberman and Prince 1977; Hogg and McCully 1987).

However, by the strict diagnostics for morphological semi-complexity suggested in section 7.2.1 above, the verbs *rebel* and *combat* do not qualify for any kind of internal morphological bracket. Their final stress on a light syllable cannot therefore be explained by reference to prefix-root structure; the only alternative is to treat it as exceptional. Of course, we could abandon the restrictiveness on the notion of semi-complexity imposed above, and expand it to include words such as these. This would be phonologically satisfying, but I think the present approach is less morphologically doubtful. Besides, the 'root' of the verb *rebel* may be stressed, but in the noun *rebel* it has no stress at all – which suggests the word is actually morphologically simple.

So, whether exceptionally or because of morphological structure, we end up with most Latinate stress-alternating and *consent* verbs, and head prefixations, having one final stress, e.g.

(14)



By the Syllable Weight Condition (Giegerich 1999: 272), which demands that all stressed syllables be heavy, the final /t/ of *remit* becomes part of the rhyme of the final syllable (symbolised above by a dotted line); likewise in *combat*, *rebel* and *entrap*.

If the base of the prefixation is trochaic instead of monosyllabic, as is the case with some head prefixations (see sect 5.3.1; Raffelsiefen 1999: 184), we would still get the correct stress patterns, since the final syllables of such bases are light, and stress is assigned to the base's initial syllable instead, as in *belíttle* or *endánger*.

I now propose another break with earlier generative phonological analyses: there is no further cycle of the stress rules after this one foot is built (Puppel 1979). First-stratum verbal prefixes are practically all stressless, so there is simply no need for any further stress assignment.

The only possible exceptions here are one or two of the words in *re-*, and the verbs in *trans-*, where the verbal prefixes may have stress, since they may surface with full vowels. *Reclaim* and *rewind* vary between having /rə/ and /ri/; *trans-* always has a full vowel, e.g. *trànsfér*, *trànspórt*. Perhaps *trans-* and these instances of *re-* could be stressed by an equivalent of the second-stratum rule or condition of Prefix Footing (see 6.3.3 above), though this would of course be exceptional among first stratum prefixed verbs. Alternatively, *trans-* might attract stress because of its extra-heaviness, or a full underlying vowel, though these possibilities are not available to *re-*.

Then, relative prominence between the two stresses will be determined by the LCPR, as in section 6.3.3 above. Because the words in question are verbs, primary prominence will go on the final syllable.

Anyway, now the first stratum phonology is complete for the prefixal and Latinate verbs, and they proceed to Stratum 2. Here the only relevant phonological rule to apply is the Default rule, as formulated in (8) above, which fills in the specification for schwa, i.e. minus values for all features having underlying zero specification. Thus the derivations of the verbs *rebel*, *refuse*, *consent*, *convict*, *protest*, *remit*, *rebound*, *relapse*, *asleep*, *befriend*, *endanger*, etc. are complete.

Bearing in mind previous comments about how /ə/ is probably in free variation with /ɪ/ in unstressed syllables (Gussmann 1991); and indeed noting that /ɪ/ is commoner than /ə/ in the verbal prefixes *re-* and *de-*, an additional Default rule is proposed here:

(15) Default /ɪ/

$$
\begin{array}{c}
\text{Nucleus} \\
| \\
\text{X} \\
| \\
\left(\begin{array}{l}
[0\ \text{tense}] \\
[0\ \text{high}] \\
[0\ \text{low}] \\
[0\ \text{back}] \\
[0\ \text{round}] \\
\text{etc.}
\end{array}\right)
\end{array}
\longrightarrow
\begin{array}{c}
\text{Nucleus} \\
| \\
\text{X} \\
| \\
\left(\begin{array}{l}
[-\ \text{tense}] \\
[+\ \text{high}] \\
[-\ \text{low}] \\
[-\ \text{back}] \\
[-\ \text{round}] \\
\text{etc.}
\end{array}\right)
\end{array}
$$

This operates alongside Default Schwa on Stratum 2.
It could be noted that in complex and semi-complex noun-verb pairs like *defect*, *remit*, *recoil*, where the verbs usually have prefixal /ɪ/ and the nouns /i/, there is no need for extensive underspecification of the kind used for schwa here: features such as [+ high], [- round], [- back] could be specified underlyingly since they are shared in verbs and nouns.

So, to summarise: the derivations of the Latinate bisyllabic prefixal verbs, both those with stress-doublet nouns, and those with zero-derived nouns, are now complete. These verbs may be morphologically simple, semi-complex, or complex. If simple or semi-complex, the Root-to-Word rule is the only morphological operation to apply to them, after which they are syllabified, then assigned stress on the final syllable only. There is no further iteration of the stress rules, and they exit to the second stratum. Here the vowel in their initial (prefixal) syllables may be specified as /ə/ or as /ɪ/; underlyingly it is underspecified (which is the way schwa is underlyingly represented). Complex Latinate prefixal verbs first undergo whatever prefixations the base is listed for; then they are syllabified, and then the second cycle starts with the Root-to-Word rule. After this, the derivation proceeds in exactly the same way as for the simple and semi-complex words.

Now it is time to turn to the derivations of the stress-doublet nouns, i.e. *rébel*, *réfùse*, *cónvìct*, *prótèst*, *rémìt*, *rébòund*, *rélàpse*, etc. There are no head prefixations to be discussed here, since head prefixes never produce nouns; and of course all the nouns of the *consent* group have already been dealt with above as second-stratum zero-derivations.

7.3.4 Latinate nouns

The phonological derivation of the stress-doublet nouns is more complex than that of the verbs, though the morphological derivation is the same. They start from the same common root, with the same underlying prefixal vowel, i.e. in most cases the underspecified but [- tense] schwa, but /ɪ/ in *iN-* and /a/ in *trans-*, and perhaps a vowel specified for being high, front and non-round in the *remit*, *defect*, *recoil* words. Noun and verb are 'equal' derivations from this common root, as e.g.:

(16)

$$\begin{tikzcd} & \text{RW (verb)} & & & \text{RW (noun)} \\ {[\text{refuse}]_R} \arrow[ur] \arrow[dr] & & & {[\text{re}[\text{mit}]_R} \arrow[ur] \arrow[dr] & \\ & \text{RW (noun)} & & & \text{RW (verb)} \end{tikzcd}$$

Or, with the full prefixations:

(17)

$$\begin{tikzcd} & \text{RW (verb)} & & \\ {[\text{bound}]_R} \arrow[ur] \arrow[dr] & & & \text{RW (verb)} \\ & \textit{re-} \arrow[r] & {[\text{re }[\text{bound}]_R]_R} \arrow[ur] \arrow[dr] & \\ & & & \text{RW (noun)} \end{tikzcd}$$

After the RW rule, nouns and verbs follow separate derivational paths, unlike in traditional generative analyses, where the stress pattern on the nouns is partly explained by their derivation from end-stressed verbs (see Ch. 5). So, *refuse*, *convict*, *remit*, *subject* and the others are all syllabified both as verbs and as nouns in separate operations; for morphologically simple and semi-complex Latinate prefixations like these, this is the first phonological rule to apply. The full prefixations like *rebound* are syllabified before lexical category has been assigned, on the cycle started by the process of prefixation.

Syllabification is assumed to be insensitive to lexical category (though see below), so it will operate in the same way in nouns as in verbs; for details the reader is referred to sections 6.3.2 and 7.3.3 above. Like the verbs, the nouns generally have the vowel ∅ underlyingly in their initial syllables; this is, as we have seen, [- tense], and so (like the other possible underlying vowels) yields just one X-position. And, again like the verbs, if a form has an internal '[', syllabification will not cross it; the effects of this (on the underlying schwa especially) will become clear after stress assignment in the nouns *rebel*, *refuse*, *remit*, and others.

The stress rules, being sensitive to lexical category, apply after RW: so, the nouns *rebound*, *recoil*, etc. are syllabified on the first cycle and stressed on the second (as are their stress-doublet verbs), while the nouns (and verbs) not built by prefixation, e.g. [re[mit], [refuse], [sub[ject], [convict] are both syllabified and stressed on their first and only Stratum 1 cycle, that triggered by RW.

Most of the Latinate stress-doublet nouns have two stresses, the initial one primary and the final secondary. Final stress is unusual in nouns, which has been a major factor in the assumption that they are derived from the stress-doublet verbs (Hogg and McCully 1987, cf. Lieber 1981; Chapter 5 above). But in BDLP this stress pattern must be independently assigned, since the nouns cannot be derived from the verbs on the first stratum. So how do the stress rules produce this output without reference to their related verbs?
In section 5.4 it was noted that final stress in nouns is rare; indeed, final nominal syllables are usually treated as extrametrical, since this has the effect of uniting noun and verb stress patterns – nouns typically have stress one syllable further to the left than verbs. But nouns do usually have stress where the final syllable contains a long vowel, as in *ballóon*, *Julý*, *téxtìle* (cf. Giegerich 1992: 199): these are exceptions to Noun Extrametricality. So, it is straightforward for the metrical phonological rules as they stand to build a foot over the final syllables of *rébòund*, *réfùse*, *állòy*, *cómbìne*, *íntrìgue*, *díspùte*, *íncrèase*, *súrvèy*, *rélày*, etc. (see Appendix I for full listing), regardless of internal morphological structure.

But in the other usual environment for final stress in verbs – where the rhyme of the last syllable contains a short vowel and two consonants – there is generally no stress in nouns (cf. *párent*, *bállast*, *frágrance*). Such syllables may be treated as invisible to the stress rules. So, the final secondary stress in doublet nouns like *ánnèx*, *cónvìct*, *súbjèct*, *rémìt*, *cónstrùct*, *dígèst*, *óccùlt* etc. is irregular. And this irregularity covers a wider range of cases than the *remit*-type irregularity (stress on a short-vowelled final syllable with only one following consonant) did in the verbs.

But the solution has to be the same: in some cases morphological complexity or semi-complexity will secure a foot over the final syllable because it is enclosed in '[ ]' and counts as a root; thus [re[mit], [sub[ject], [de[fect], [pro[gress]. In others – those where even assigning semi-complexity is too much of a morphological stretch – we simply have to rely on exception marking. This is already necessary anyway, to account for cases like *cadét*, *garótte* (remember this last as one of the *consent* nouns), *gýmnàst*, *ínsèct* (cf. Halle and Vergnaud 1987: 236).

So, either because of a long vowel, or prefixal structure (or both), or because of exception-marking, most stress-doublet nouns receive a foot over their final syllables. There is just a handful of exceptions, those nouns which have no final stress: *áccent*, *cóncert*, *désert*, *présage*, *rébel*, *présent*, *prémise*; and the adjectives *ábsent* and *pérfect*. For these, unexceptional operation of the nominal stress rules generates the correct pattern; they have no internal morphological complexity (and so no internal root), and short vowels in their final syllables – so their initial syllables are made the heads of feet.

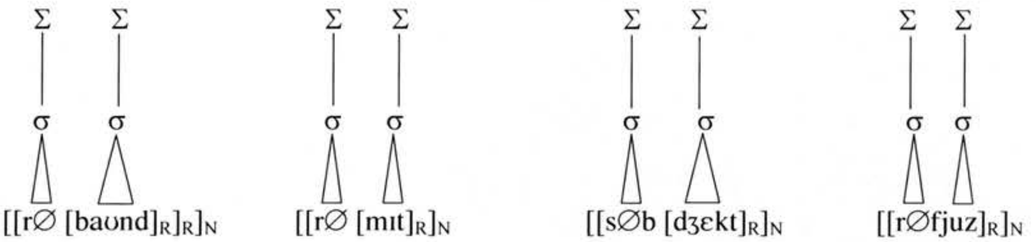
Now we must assign stress to the nouns' initial syllables. In some cases, initial stress could be secured by a first-stratum version of Stratum 2's Prefix Footing, this time limited to nouns. Those nouns with internal complexity or semi-complexity would get prefixal stress by the following:

(18) Prefix Footing (Stratum 1)

Condition: nominal.

This is a nice counterpoint to the second-stratum rules, and rules out head prefixes from ever being stressed, since they do not produce nouns; although it is not strictly necessary. Stress must cycle on all these doublet nouns and give initial prominence even where there is no complexity or semi-complexity – cf. *gýmnàst*, *cónvìct*, *réfùse*, *téxtìle*, *sýntàx*, *bàmbóo*, *códèx*. So, while stress does not iterate on bisyllabic Latinate verbs, it does iterate on the nouns. Thus we have:

(19)



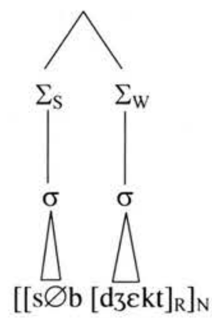
So, now the footing on all these nouns is correct. But there are still a number of issues to settle. We need to determine relative prominence between the two feet, and we need to apply Blank Filling to generate the right vowel qualities for the underlying underspecified ∅s.

The question of relative prominence is the easiest to settle: the LCPR will assign the correct left-strong pattern to all the Latinate nouns in the data. The LCPR was used in the derivation of the productively prefixed verbs and nouns (*resit*, *mismatch*, etc.) on Stratum 2 (see sects. 6.3.3, 6.4.1 above). We saw problems associated with its application to these productive prefixations in sect. 6.6.3; but none of these are relevant here.

Should the correct stress contours on *convict*, *refuse*, *remit*, *relapse* etc. also be determined on Stratum 2? They could be; but it is preferable to let the LCPR operate on the first stratum as well. Kiparsky (1982) notes that nouns like the stress-doublet *prótèst* may actually yield phonologically identical verbs by the productive noun-to-verb rule on Stratum 2, thus *prótèst*$_V$ 'attend a demonstration' (with a meaning distinct from that of the stress-doublet verb *protést* 'make a strong objection to sth.', so the new formation is not blocked). If the relative prominence between *prótèst*'s two feet had not already been determined on Stratum

1, then the verb would wrongly receive weak-strong prominence (i.e. become **pròtést*) by the LCPR on Stratum 2. So, the final stress patterns of these nouns are decided on Level 1. Thus:

(20)



In most of these nouns (i.e. those with underspecified underlying vowels), Blank Filling now applies, given as (9) in sect. 7.3.2. This rule fills in full vowel features - /a ɛ ɪ ɒ ʌ/ according to spelling - for underspecified vowel melodies which are assigned stress.

Thus nouns like *refuse*, *rebel*, *desert*, *convict*, *compound*, *object*, *occult*, *subject* may now have their derivations completed.

Blank Filling can also be seen operating in suffixal derivatives from Latinate prefixed verbs, e.g. in *r/ɛ/putation*, < *r/ə/pute*; *c/ɒ/nservation*, < *c/ə/nserve*; *d/ɛ/gradation*, < *d/ə/grade*; *s/ʌ/pposition*, < *s/ə/ppose*. To take the case of *reputation*, the root is [r∅pute]$_R$, with underspecified vowel; it is listed for RW (verb) or for the attachment of *-ation*. In the former case, the initial syllable never receives stress, so the vowel is filled in by the Default rule as /ə/. In the latter case, it is assigned secondary stress, and the vowel is Blank Filled to /ɛ/.

For most stress-doublet nouns the derivation is now complete. Notice that in all the examples given above (*refuse*, *rebel*, *desert*, *convict*, *compound*, *object*, *occult*, *subject*), the Syllable Weight Condition (SWC) is satisfied. This well-formedness condition, as outlined in sect. 6.3.2, requires that all stressed syllables have minimally –XX rhymes – forcing ambisyllabicity of following consonants where necessary. Underlying ∅, being [- tense], generates just one X. But most nouns have another X available for their rhymes and uncontroversially satisfy the SWC. In some cases the initial syllable has a consonantal coda, e.g. *intrigue*, *convict*, *subject*.[27] Elsewhere, the prefixal syllable is vowel-final, with just one X generated from the [- tense] underspecified schwa. But the SWC can be easily satisfied in the absence of a prefixal bracket. In [refuse] and [rebel], /f/ and /b/ become ambisyllabic; etymologically, they are part of the base, but syllable liaison is possible because there is no synchronic complexity or semi-complexity, i.e. no '[' to prevent cross-syllabification.

However, in some nouns there is no consonant available for the satisfaction of the SWC, because the prefixal syllable ends in a vowel (the [- tense] ∅ or the underlying partly specified, but still [- tense] high front vowel [ɪ]), and an internal '[' bans syllabic liaison with the base. The prefixes in these nouns all surface with tense vowels, e.g. [re[mit], [de[fect], [pro[test], [re[bound]], [re[coil]]. But how are these –XX tense vowels, /i/ or /o/, to be generated from the [-tense] underlyer?

In order to retain the common-root link with the stress-doublet verbs and keep the derivations from this root simple, then we must either change the [- tense] specification of schwa to [+ tense] in the course of the nominal derivation – i.e. apply a structure-changing rule – or we must remove it and change the underlyer to [0 tense] in order to produce a surface [+ tense] vowel For either of these options, introducing a new variant of Blank Filling which can fill in tense as well as lax vowel features would be quite easy, as we will see below.

The first option – applying a structure-changing rule – is actually blocked by BDLP's version of the Strict Cyclicity constraint. Even though nouns like $[[\text{re}[\text{bound}]_R]_R]_N$ are complex – morphologically derived by a process of prefixation – they cannot technically form the derived environments in which structure-changing rules are possible. (And of course, as made clear above, morphological semi-complexity as in [de[fect] gives no derived status at all).
To illustrate the problem, let us consider how such a structure-changing rule, one which would give the desired [+ tense] –XX vowel, would have to operate. We would want it to apply only in '[…[' environments, where the lexical category is nominal. So it could not

---

[27] In this latter example, assuming a fossilised prefixal bracket, [sub[ject], [ject] would be syllabified first, since it is enclosed in '[ ]' brackets; then *sub-* would be scanned, and the /b/ would not automatically be part of the prefixal syllable coda, instead being treated as a potential onset. It would become part of the coda by the SWC, on the first stratum.

apply to $[r\varnothing[\text{bound}]_R]_R$ or $[r\varnothing[\text{lapse}]_R]_R$ on the first cycle because at this stage they have no lexical category – remember the derivation of the Stratum 1 prefixed stress doublets:

(21)

	CYCLE 1: prefixation, syllabification	CYCLE 2: RW, stress
$[\text{lapse}]_R \longrightarrow$	$[r\varnothing[\text{lapse}]_R]_R \longrightarrow$	$[r\varnothing[\text{lapse}]_R]_R]_N$
	$\searrow$	$[[r\varnothing[\text{lapse}]_R]_R]_V$

Prefixation is the first-cycle operation, and its input is the lexically unspecified root $[\text{lapse}]_R$; its output, $[r\varnothing[\text{lapse}]_R]_R$, is still lexically unspecified, i.e. neither verb nor noun. Syllabification may apply, but we cannot lengthen the nominal vowel at this stage (e.g. by generating –XX) without lengthening the verbal one too, since they are undifferentiated. So, our vowel lengthening rule would have to apply on the second cycle, where nouns and verbs are distinguished.

However, here the function of the Root-to-Word (RW) rule is problematic. This rule is designed to be the 'blocker' (Rule A) under the Elsewhere Condition, introduced in Ch. 2 and repeated here (cf. Kiparsky 1982: 6, Giegerich 1994: 31; see also 6.6.2.2):

(22) Elsewhere Condition

Rules A, B in the same component apply disjunctively to a form Φ iff:

(i) The structural description of A (the specific rule) properly includes the structural description of B (the general rule), and

(ii) The result of applying A to Φ is distinct from the result of applying B to Φ.

In that case, A is applied first, and if it takes effect, then B is not applied.

RW is the universal 'more specific' rule; its input is supposed always to be a subset of the input to any possible subsequent structure-changing rule, since each potential lexical item has its own RW (though see 7.2.2 above and 8.4.3 below); and, being structure-preserving, its output will always be distinct. So, RW will always take precedence over any subsequent structure-changing rule, and will therefore block it. In this case it would block vowel lengthening because of the change it would effect from [- tense] to [+ tense]. In short, structure-changing rules which make reference to lexical category cannot apply on BDLP's first stratum, because lexical category is itself assigned by the rule which effects Blocking. So, we cannot have a rule which would change the underlying [- tense] to [+ tense] in nouns on Stratum 1. If the verbs and nouns are to be derived from a common root with a shared underlying prefixal vowel, we must turn to the second option proposed above, and specify this vowel as [0 tense].

As pointed out above (5.4.2), a completely unspecified vowel melody may be too unconstrained as an underlyer; here it is effectively a way of getting round the strong constraints imposed by the model. So is BDLP actually being too restrictive in this case? In making roots lexically uncategorised, and the act of lexical categorisation the final morphological process on the stratum, it forces us to represent any non-affixal relationship between words of different lexical categories as derivations from a common root. The actual act of this derivation – the RW rule – then blocks any subsequent structure-changing rule. So even if there were good justification for saying the stress-doublet nouns should be derived from the verbs on this stratum, there is no way of reflecting that relationship, or of treating either member of it as 'derived' for the purposes of the phonological rules.

This idiosyncrasy of the model does have weaknesses; but, as argued above, it can have advantages too. Semantically this equal relationship between verb and noun is actually quite appropriate, since neither is easily and regularly derived from the other. So the model is probably not too restrictive as far as stress-doublet nouns and verbs are concerned. Both noun and verb are equally basic, so both should be immune to structure-changingness.

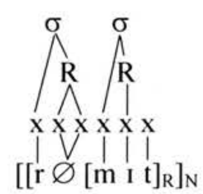
It is more appropriate to try and remedy the lopsidedness of the way schwa and lax vowels may be interchanged depending on stress patterns, but not schwa and tense vowels. Why should just one distinctive vowel feature be specified in underlying schwa when all others are not? The obvious solution to this problem is a [0 tense] specification on underlying schwa. (The problem with lexically unspecified recursive roots, the RW rule and its role as the Elsewhere Condition's universal 'rule A' does not end here, however; it has serious implications for the BDLP model. These will be explored in section 7.6, and more generally in Ch.8 below; now I continue with the derivation of the prefixal stress-doublet nouns on Stratum 1.)

So, we have established that, if we are to derive noun-verb pairs such as *rebound*, *remit*, *defect*, *reject*, *relapse*, *protest*, *decrease* from one common root with one common underlying prefixal vowel, this vowel must be [0 tense]. So, our underlying schwa is now underspecified for all distinctive vowel features; by this method the tense /i/ and /o/ of the nouns and the /ɪ ~ ə/ of the verbs may hopefully be derived from the one common underlyer.

But even this apparent maximal unconstrainedness causes problems with structure-changingness, the interpretation of the tenseness specification by the X-mapping part of the syllabification algorithm, and the RW rule.

These problems do not arise with the semi-complex nouns like [re[mit] or [de[fect]; they are only apparent in the true prefixations such as [re[bound]] or [re[coil]]. In *remit*, *defect*, *protest*, the derivation from the [0 tense] specification is straightforward, because syllabification only applies after the RW rule. So, in *remit*, for example, after it has been listed as a noun with its underspecified prefixal vowel, syllabification applies. Assuming some condition that Stratum 1 nominal prefixes (i.e. material enclosed in '[..[' (cf. Rubach 1993)) must contain at least one heavy syllable (a MinWd condition which could be related to a Stratum 1 Prefix Footing condition), then the first syllable of *remit* will be syllabified as follows, the underspecified vowel assigned two skeletal Xs to make the correct syllable weight:

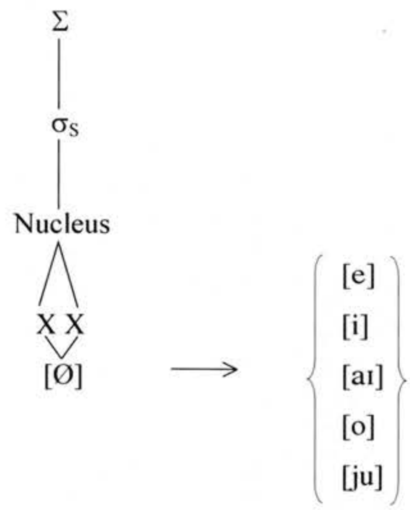
(23)



As a default, underspecified ∅ will map to just one X (shortness being the unmarked value for vowels, cf. Burzio (2000: 66)) – this is what happens in the verbs. In the nouns, though, it is long because of the prefixal structure.

Blank Filling can be expanded to allow us to fill tense as well as lax vowels in the unspecified slot, as suggested above. Alongside (9) above, which should now be renamed Lax Blank Filling, we can have a rule of Tense Blank Filling:

(24) Tense Blank Filling



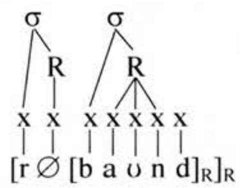
Giegerich's original Blank Filling rule operated with reference to orthography, filling in lax [ɛ] for the spelling <e>, [ɒ] for <o> etc. Such correspondences are easy to justify if we look for example at Carney (1994), who says that the default phonological value in English for the graph <e> is [ɛ], and the default value for <o> is [ɒ], etc. (Carney 1994: 321, 355).

But a Blank Filling rule inserting tense vowel features can also refer to spelling. If we are filling in a vowel matrix with two X-positions, then <e> must represent [i:], since a single <e> never represents any other tense vowel or diphthong in English (cf. Carney p.307), and a similar argument holds for single <o> (i.e., it must represent [o:]) as well. Each vowel graph has an expected long/diphthongal value as well as an expected short vowel value – reflected in the alphabetic names of the letters, where <a e i o u> = [e i aɪ o ju] respectively.

Thus the derivation of the semi-complex Latinate nouns with tense vowels in their prefixal syllables is straightforward. They and their verbs can be derived from a common underlyer; the difference between tense and lax vowel is related to size conditions on nominal prefixes, which mirror Stratum 2's size conditions on all prefixes.

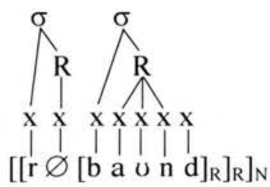
But with *rebound*, *recoil*, *relapse* even this unconstrained, completely underspecified underlyer does not enable us to generate the stress-doublet pairs from a common source. It is the fact that there is a pre-RW phonological cycle, triggered by prefixation, which causes the problem. The difficulty is that syllabification applies after prefixation but before RW, so it cannot be conditioned by word category as it is in the *defect*, *remit*, *protest* semi-complex nouns. Since we cannot differentiate between verb and noun at the syllabification stage (they are still united as one common root), we are forced to choose one syllabification pattern or another: the underspecified vowel must map to one X position or to two. Whichever we choose, some structure-changing rule will have to apply after RW to get the correct number of X positions (and therefore the desired vowel, /i/ or /ə/) in either the verb or the noun. But such a structure-changing rule would be blocked by RW. For instance, if we generate a default single X from underlying ∅, then we would have the following representation for the entrant to the two RW rules, verbal and nominal:

(25)



As output, the only change would be an extra surrounding set of morphological brackets, thus:

(26)



The fact that the RW rule has taken as its input and produced as its output a form with a one-X initial vowel means that any subsequent changes to the X-mapping of this vowel are blocked. (Likewise, if two Xs were mapped by the post-prefixation syllabification, we would have the same problem trying to generate the right structure for the verb.)

The number of nouns which prove problematic in this way in BDLP is very small, as a glance at the 'borderline' category of stress-doublets in Appendices I and II will show. Most Latinate prefixal nouns are treated as simple or only semi-complex in this analysis, and are therefore easily derived by the rules outlined above. So, the difficulty is not too great for

BDLP; it just shows that the operation of the RW rule is rather awkward for first-stratum prefixation, since prefixes on this level behave differently depending on whether they are in nouns, or in verbs or adjectives. First stratum nominal prefixes behave like second-stratum prefixes in terms of stress and MinWd size; first stratum verbal and adjectival prefixes do not. This generalisation cannot easily be captured in BDLP because of the manipulation of lexical category to effect blocking.

I return to these problems with the RW rule below. For now, the derivation of the nouns *rebound, recoil, relapse* may be rescued by stipulating that syllabification may not apply in prefixal forms until after lexical category is assigned.

The derivation of these Latinate stress-doublet nouns has been a long and complex one, so a condensed summary is given here. Morphologically, the nouns almost all share a common underlying root with their stress-doublet verbs. These roots are divided into three groups: the morphologically simple, as [rebel]; the semi-complex, as [re[mit]; and the fully complex prefixed forms like [re[coil]]. The underlying vowel in the initial syllable is in most cases underspecified schwa with zero values for all features including [0 tense]. Syllabification must apply in all cases after lexical category is assigned. Tense (-XX) vowels will be generated in nominal prefixes, i.e. material enclosed in '[[' brackets. But the default skeletal mapping for the [0 tense] ∅ will be a single X, i.e. it will be treated as [- tense].

The stress pattern shared by these nouns has usually been assumed to be derived from the verbal pattern, but it cannot be here. Final stress must be assigned to the great majority, either because of a long vowel, or because the final syllable is a root enclosed in '[ ]' brackets, or simply exceptionally. I have avoided an ad hoc morphological solution to this irregularity, even if in terms of the phonological system this would be more satisfying.

Stress on the initial syllables of these nouns is in most cases assigned by the iteration of the stress rules, although a first-stratum Prefix Footing condition may apply to the '[[' enclosed syllables; the same condition applies to prefixations of all lexical categories on Stratum 2.

Blank Filling and the LCPR finish these derivations, with a new version of the Blank Filling rule producing tense vowels. This rule could actually be avoided and the appropriate vowel alternants could be listed instead (since Blank Filling effectively works as a form of listing by referring to stored representations of words' spellings).

7.4 Other first stratum stress-doublets: The particle compounds

The particle compounds, so named in Chapter 3, are alone among the first-stratum derivations in being neither prefixal nor Latin-derived; so although some aspects of the foregoing derivations are relevant, they are covered in this separate section. Examples include *inlay*, *offset*, *overthrow*, *upgrade*, *overdub*, *update*.

I treat these words as first-stratum derivations largely because the word-formation process by which they are created is unproductive in English. A small number of the particle compounds in the data are twentieth-century formations, e.g. *overdub*, *update*, *upgrade* (cf. OED), but most are much older. The semantic relationship between the two elements, particle and base, is often non-compositional and unpredictable, another indicator of first-stratum complexity: thus *inlay* and *outlay* do not have a relationship comparable with that between *in* and *out*; the meaning of *overhaul* has little relation to *over* and *haul*. (Though on the other hand, the semantic compositionality of the highly productive post-particle word formation process is similarly irregular and unpredictable – cf. *rip off* etc. in sect. 3.2.2).

I treat these forms as compounds as opposed to prefixations because the particles do often appear to have a locative meaning, and therefore are identifiable with the free words whose forms they share. The compound *outlay* may have the same meaning as the combination *lay out*; *overpass* may mean *pass over*, etc.

So, I assume that roots like $[\text{over}]_R$, $[\text{out}]_R$, $[\text{dub}]_R$ and $[\text{lay}]_R$ etc. exist independently on Stratum 1; they are listed for compounding where appropriate. For example,

(27)

$$\begin{tikzcd}
{[\text{out}]_R} \arrow[r] & {[\ldots[\text{lay}]_R]} \arrow[dr] & & \text{RW (noun)} \\
& & {[[\text{out}]_R\ [\text{lay}]_R]_R} \arrow[ur] \arrow[dr] & \\
{[\text{lay}]_R} \arrow[r] & {[[\text{out}]_R\ldots]} \arrow[ur] & & \text{RW (verb)}
\end{tikzcd}$$

The composite roots like $[[\text{out}]_R\ [\text{lay}]_R]_R$ are listed for both the nominal and the verbal Root-to-Word rules, as should now be familiar from the Latinate prefixal noun-verb stress doublets. There is room in this derivation for particle compound nouns without verbal doublets to be created (perhaps *outreach*), and, equally, for verbs to be created without nominal partners.

There is no need for underspecified underlying vowels in these words since both elements of the compounds always receive stress and therefore consistently have full, invariant vowels. So *outlay* will be (as a compound root) $[[\text{aʊt}]_R\ [\text{le}]_R]_R$, for example.

Syllabification may apply immediately after the process of compounding; the two elements will syllabify separately since they are each enclosed in '**[ ]**' brackets – no liaison would be permitted.

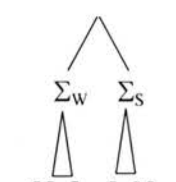
Stress does not apply until the Root-to-Word cycle, as discussed above. Here it operates in the same way in verbs and nouns, building a foot over each syllable, since each is a root, enclosed in '**[ ]**' brackets.

Then, relative prominence between the two feet must be determined. This job is usually performed by the LCPR, introduced in sect. 6.3.3 and shown to operate on Stratum 1 as well as Stratum 2 in sect. 7.3.4 above. Here – as in 6.6.3 - there are some problems, however. The LCPR will only assign right-strong prominence to verbs where the left foot does not branch, which is plainly at odds with data such as the prefixal *ìnterlóck*, *òverchárge*, and the compounds *òverdúb*, *ùnderlíne*, where the right foot has primary prominence even though the left foot is bisyllabic.

In 6.6.3 above I proposed an alternative to the LCPR for second-stratum prefixations. Prefixed verbs are better served by the Weak Prefixal Foot condition (no. (19)), which correctly assigns a \ / stress pattern to prefixal verbs regardless of whether the left or right foot branches. But this is not much help to us here, though, since these words are first-stratum compounds, not second-stratum prefixations. By Bracket Erasure all their internal structure will be lost on entry to the second stratum, even if Weak Prefixal Foot could be altered to accommodate compounds.

Instead, a compound stress condition is needed for verbs on Stratum 1, which has the same effect as Weak Prefixal Foot. Thus:

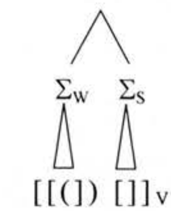
(28) Verbal Compound Stress



This assigns a \/ prominence pattern to verbal compounds regardless of branchingness. Interestingly, according to Marchand, the only true verbal compounds in English are preparticle words like these under consideration in this section: 'the only types of verbal compounds fitting the description are verbs with a locative particle for a determinant' (Marchand 1969: §2.26, p.96). Other apparent verbal compounds such as *proofread, blindfold, stagemanage* 'are actually derivatives from nominal composites' (Marchand 1969: §2.31, p.101). So, if the particle compounds, which are unproductive formations, are the only verbal compounds in English, then we need no Verbal Compound Stress on Stratum 2 – no productive verbal compounding happens there, and compound verbs derived from nouns inherit the nominal stress pattern (cf. *próofrèad, blíndfòld*).

On Stratum 1, it would be possible to unite Weak Prefixal Foot with Verbal Compound Stress:

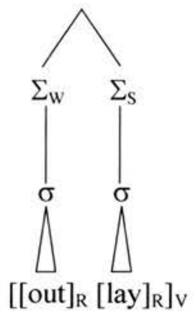
(29) Verbal Compound/ Prefixal Stress (Stratum 1)



Weak Prefixal Foot alone operates on Stratum 2, where nouns may occasionally undergo it too (the verbal condition is violable or variable). But this combined condition operates on Stratum 1. It will also cover the occasional first-stratum verbal prefixation in which the prefix is stressed, e.g. *trànspórt* and (variably) *rèwínd, rècláim* (see 7.3.3).

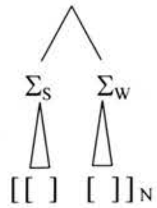
So, applying this condition to the particle compound verbs, we end up with forms like:

(30)



In nouns, the LCPR is more adequate to its task, though as in 6.6.3 above there will still be a problem if the second root's foot branches, because then it will wrongly receive primary prominence in place of the first foot. Instead we could simply apply a Compound Stress condition, assigning initial stress:

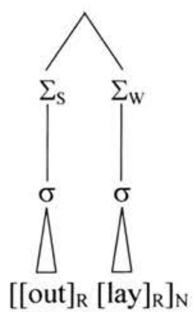
(31) Compound Stress



Something like this must also operate on Stratum 2 for productively-formed compounds – though compound stress is variable, so the condition above is not the only one in operation. As with Verbal Compound Stress, the nominal condition could be united with the prefixal prominence pattern which most often seems to apply to nouns, Strong Prefixal Foot; it is possible that this operates instead of the LCPR with first-stratum nominal prefixations, though there are very few of these, and those there are would receive the same prominence pattern from either condition.

So, after Compound Stress has applied, the nouns may be represented as follows:

(32)



The derivations of the particle compounds are now complete.

7.5 Summary

Here I summarise the derivations of all the Stratum 1 forms discussed in this chapter, namely: the Latinate prefixal nouns and verbs (stress doublets and the Latinate *consent* words); the head prefixations; and the particle compounds.

Firstly, the Latinate prefixations. All of these are etymologically morphologically complex, but synchronically in English they are divisible into three morphological groups. Some must be treated as full first-stratum prefixations since either prefix or base or (more often) both are associated with recurrent semantics: examples are *discard*, *prefix*, *impress*, *recoil*. Some are given an underlying morphological bracket to reflect the fact that prefix and base are recurrent, and some structure-building phonological rules respect internal morphological structure here: examples are *retard*, *relay*, *proceed*, *defect*. And some must be treated as synchronically morphologically simple, even if there is sometimes recurrence of base or prefix: e.g. *rebel*, *refuse*, *convict*.

These roots are listed for Root-to-Word rules deriving both verbs and nouns (in the case of the stress doublets), or just verbs (in the case of the *consent* words).

The question of what prefixal vowel can be underlying in the common root shared by each noun-verb pair has proved very hard to answer. When we were analysing the verbs, underlying /ɪ/ in roots in *iN*-, /a/ in roots in *trans*-, and underlying schwa, unspecified for all vowel distinctive features except [± tense], for roots with other Latinate prefixes, were suggested. (We also allowed for the possibility that where surface /ɪ/ in verbs corresponds to surface /i/ in nouns, the 'underlying schwa' could actually be a vowel with specifications for height, frontness, and other shared features).

This suffices for most nouns; but for those with prefixal syllables with tense vowels, the [- tense] specification has had to be changed to [0 tense] for avoidance of structure-changing rules. A charge of excessive unconstrainedness could be levelled here; in defence, I reiterate that schwa does not in any circumstances contrast with any full vowels, tense or lax: the choice between schwa and a full vowel in these words is dictated by stress, which itself is dictated by lexical category.

The formulation of Blank Filling to refer to spelling is also a constraining factor. Effectively, it means that any given vowel slot with maximal underspecification may surface with one of at most three vowels, e.g. /ə/, /ɛ/ or /i/; or /ə/, /ɒ/ or /o/. The vowel /ə/ occurs when the syllable is unstressed; the full lax vowel appears when the syllable is stressed; and the full tense vowel surfaces under stress in exceptional circumstances (here because the syllable is prefixal). Whichever possibilities are available in a given syllable could simply be listed at the root instead of being produced through a generative mechanism; this might be a simpler approach.

Syllabification applies as outlined in Chapter 6. In most forms it applies after the RW rule has assigned lexical category because RW is the first morphological operation, which triggers the first-cycle phonology. In the truly prefixed forms, syllabification could apply after prefixation and before the RW rule. But in these prefixations it is sensitive to lexical category, and so must be delayed until it has been assigned. The underspecified vowels (represented as ∅) are mapped to two X positions if they are [0 tense] and in nominal prefixes; in all other circumstances they are mapped to the default one X.

Stress is then assigned; again, unlike previous generative accounts, it is assigned separately in nouns and verbs. In verbs, final stress is regularly assigned because most of the final syllables are heavy, i.e. contain a long vowel or a short vowel plus two consonants. In a few cases the final stress must be treated either as exceptional, or as caused by prefix-root structure (i.e. the final syllable is enclosed in '[ ]'). I have suggested that stress does not cycle again on Latinate bisyllabic verbs; the initial syllables never receive prominence. Therefore the underspecified vowels in these stressless syllables may have /ə/ or /ɪ/ values filled in by one of two Default rules, Default /ə/ or Default /ɪ/, on Stratum 2.

This analysis of the Latinate prefixal verbs is also applicable to the head prefixations, which produce verbs and adjectives but no nouns. In the head prefixations, stress will be assigned to the initial or only syllable of the base by the regular phonological rules acting on material enclosed in '[ ]'. Non-nominal prefixes may only be exceptionally stressed on the first stratum, so the head prefixes remain stressless.

To return to the Latinate prefixal nouns, stress is also assigned to final syllables. This is not usual for nouns and will be exceptional, unless the final syllable contains a long vowel, or is bounded by brackets. Because I have been strict about the circumstances in which morphological complexity or semi-complexity may be assigned (see 7.2.1), exceptionality may be commoner here than it would be in generative phonological analyses with a looser approach to morphology.

Then, stress cycles again, building a second monosyllabic foot over the initial syllable. This could in complex and semi-complex forms be brought about by an equivalent of Stratum 2's Prefix Footing condition (sect. 6.3.3), limited on Stratum 1 to nouns.

After stress assignment, Blank Filling – Tense or Lax – applies to the vowels in the initial syllables to generate the correct output – or, as suggested above, the appropriate listed vowel melody could be linked to the X-tier.

The LCPR also needs to apply on Stratum 1 to determine the relative prominence between the two stresses (one on each syllable) most of the nouns contain. It will assign the desired initial prominence in all cases. The ordering of the LCPR relative to Blank Filling does not matter.

There is no relevant phonology on Stratum 2 for most of these nouns – the derivations are complete. The only rule which might be applied in a few cases is the Default Schwa rule (see 7.3.2). I noted at one point that in nouns like *rebel*, *accent*, which share a common root with a stress-doublet verb on semantic grounds, but where there is a schwa-full vowel alternation in the final as well as the initial syllable (dependent again on stress), the underlying vowel of that syllable could be the underspecified schwa. If so, the Default Schwa rule will apply in these nominal forms on Stratum 2.

The final derivation to be summarised is that of the particle compounds. These are composite roots: each (lexically uncategorised) element is listed for the other root(s) it may compound with, and the resulting compounds may undergo both the nominal and the verbal Root-to-Word rules. Syllabification is not in these cases sensitive to lexical category, and there is no underspecification in the underlying forms. The stress rules assign a foot to each element of the compound, because each is enclosed in brackets. Finally, relative prominence between the feet must be determined, to produce the stress doublet pattern. This is done by Compound Stress rules, which assign left prominence in nouns and right prominence in verbs. On Stratum 1, Verbal Compound Stress may be merged with the Weak Prefixal Foot condition.

Thus we reach the end of the derivation of the first-stratum forms. But there is one issue which has arisen in the course of the nominal derivations which deserves to be re-examined: that is the action of the Root-to-Word rule as the blocking rule, rule A of the Elsewhere Condition. We saw in the discussion of first-stratum prefixal syllabification that this use of lexical category specification has undesirable effects: these are explored in the next section.

7.6 A Problem: Lexical category, blocking, derived and underived environments

In the course of the derivation of the Latinate nouns in section 7.3.4, we came across an apparent difficulty with the way the BDLP model ties lexical category assignment to the blocking of structure-changing rules in underived environments.

Roots on Stratum 1 carry no lexical category specification, so the inputs and outputs of morphological processes on this stratum cannot be defined by word-class (hence the Latinate stress-doublet nouns and verbs are in this model analysed as being equal derivations from a shared root, not as directional derivations from verbs to nouns). The last morphological operation to apply on this level is the Root-to-Word rule (RW), which assigns lexical category. A final cycle of phonological rules may follow RW - indeed stress assignment must, because it is sensitive to word category - but no more first-stratum morphology may apply.

RW is assumed to be uniquely tailored for each of its inputs; and thus it always acts as the 'more specific' rule referred to in the Elsewhere Condition (given as (22) above). This means that it will block any subsequent structure-changing rules, since its input will be a subset of the input to such a rule, but the outputs would be distinct.

As we saw in the derivation of Stratum 1 prefixations like *rebound*, this means that no structure-changing rules sensitive to lexical category may apply on the first stratum. The particular problem with *rebound* is that the syllabification of the prefix is sensitive to lexical category, giving a different structure in the verb (a one-X rhyme) than in the noun (a two-X rhyme). Syllabification is a structure-building process; but because it will automatically first apply straight after prefixation, when lexical category has not yet been assigned (and noun and verb not yet distinguished), we will be forced to apply a structure-changing correction to either verb or noun after they have both been created by the RW rule. But the RW rule would block such a correction, because no structure-changing rules may apply after it on Stratum 1. So, either we can give the prefixal vowel in the shared root the right number of Xs for the verbal form, or we can give it the right number of Xs for the nominal form; but we cannot do both. And then after noun and verb have both been derived from the common root, we cannot change whichever structure we assigned to make both outputs correct.

The number of first-stratum 'true' prefixations (as opposed to etymological prefixations which are synchronically simple, or semi-complex) which are stress doublets and thus present this problem is very small; and the problem is to some extent a function of the chosen analysis, and open to various possible solutions. Above, I suggested a stipulated delay in syllabification, not allowing it to apply in prefixed forms until lexical category has been assigned. Alternatively, an appropriate structure-changing rule could have been formulated to apply on Stratum 2 (though this is an unconstrained solution probably better avoided). But, basically, the phonology of the *rebound* nouns is not a significant problem for the BDLP model.

But the way in which BDLP withholds lexical category from its roots, using its assignment to bring about the Strict Cyclicity Effect after the completion of all first-stratum morphological operations, has wider-reaching problems than this. It means that no structure-changing rules sensitive to stress may apply on Stratum 1.

The stress rules can only apply after the RW rule, because, as is well-known, they are sensitive to lexical category. This in itself is unproblematic: stress assignment is a structure-building operation, so it will not produce output that is technically distinct from RW's output. Stress rules will not be blocked, in other words. But structure-changing rules sensitive to stress – and these include Trisyllabic Shortening (TSS) and CiV Tensing (Kiparsky 1982, Szpyra 1989, SPE: 181, Halle and Mohanan 1985) – will be blocked. Such rules necessarily follow stress assignment, since its outputs form their inputs: for example, the input to TSS must contain a trisyllabic string, the first syllable of which is stressed. And stress assignment necessarily follows the RW rule because its operation varies depending on lexical category. So, we have the ordering Root-to-Word → Stress → Structure-changing rule, e.g. TSS. But the structure-changing rule will be blocked by RW, because the inputs of the two rules are not technically distinct, but the outputs are.

This is not a desirable outcome for a generative phonological model like BDLP. We may quite legitimately wish to apply a stress-sensitive structure-changing rule in a morphologically derived form; but this form has to go through RW before it can be stressed, and RW prevents any subsequent structure-changing rule from applying.
It seems that BDLP's blocking mechanism kicks into action one cycle too early in morphologically derived forms, which need a pass through the stress rules before the blocker applies. So the use of lexical category assignment to give Kiparsky's identity rules some independently-motivated function (see 2.3 above) makes the model over-constrained.

This problem can be given practical illustration with Giegerich's (1999) analysis of the vowel alternations in words such as *Milton* ~ *Miltonic* ~ *Miltonian*. In this analysis, the two suffixal derivations from *Milton* are formed on the first stratum. The common root $[\text{milton}]_R$ surfaces as the noun /mɪltən/, with its second vowel underlyingly underspecified schwa, familiar from my analysis of the Latinate prefixes above. In Giegerich's analysis, this vowel has zero specifications for all distinctive vowel features apart from [± tense], which is [- tense].

The root $[\text{mɪltØn}]_R$ is listed for three first-stratum morphological operations: it may undergo RW and become a noun; it may take the *-ic* suffix; or it may take the *-ian* suffix. By the first option, it becomes $[[\text{mɪltØn}]_R]_N$, the *-ton* syllable receives no stress, and the final vowel surfaces with /ə/ after the Default rule applies on Stratum 2.

If instead *-ic* is attached, the form becomes $[[[\text{mɪltØn}]_R\text{ɪk}]_R]_A$ by the RW rule, after which the *-ton* syllable receives stress. As a result, the underspecified vowel melody has all the features of lax /ɒ/ inserted by the stress-sensitive, structure-building rule of Blank Filling (7.3.2, 7.3.4).

So far, so good. But it is with the $[[[\text{mɪltØn}]_R\text{iən}]_R]_A$ form that Giegerich's analysis runs into difficulties. *Milton*'s second vowel here surfaces as tense /o/. Giegerich produces this vowel by letting the syllable receive stress (as it does by regular adjectival stress rules, following RW). Then, Blank Filling applies to give full vowel features; the Ø vowel has been specified as [- tense] and Blank Filling in this analysis is only equipped to fill in the features for lax /ɒ/.

Then, in order to derive the tense vowel /o/ from this intermediate /ɒ/, the structure-changing rule of CiV tensing is applied. It environment is met in *Miltonian* by the stressed lax vowel /ɒ/ being followed by the suffix /-iən/,[28] which is assumed to create a derived environment. CiV tensing changes the [- tense] specification to [+ tense]. Then another structure-changing rule, Tense Vowel Shift, must apply to produce the correct vowel quality (i.e. change /ɒ/'s [+ low] specification to /o/'s [- low]: cf. Giegerich 1999: 121).

The problem with this analysis is that the structure-changing rules CiV tensing and Tense Vowel Shift cannot apply at this point in the derivation, because they will be blocked by the prior application of the Root-to-Word (RW) rule. RW necessarily applies before them

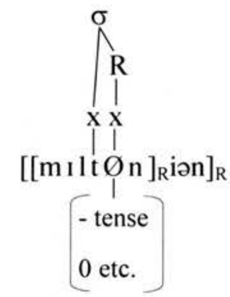
[28] The last vowel of this suffix will also be underlyingly underspecified, but this is irrelevant to the present discussion.

because it provides the environment for stress assignment (lexical categorisation); and both CiV tensing and Tense Vowel Shift are sensitive to stress.

RW is, as has already been explained (cf. 6.6.2.2), the universally more specific rule ('rule A') of the Elsewhere Condition. This states that, where the structural description (input) of rule A is a subset of that of rule B (say, CiV tensing), and the outputs of the two rules are distinct, then rule A will apply and block rule B.

The input of RW is represented as follows:

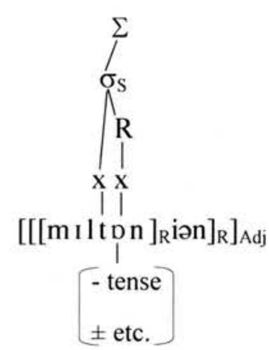
(33)



(The form will have been fully syllabified after suffixation, but only relevant detail is shown). The output will be phonologically the same, but will have an extra set of surrounding morphological brackets and of course a lexical category specification.

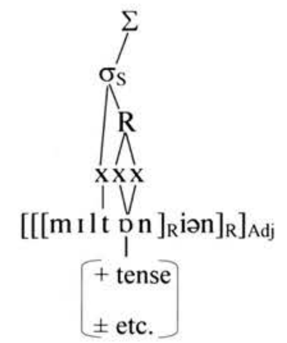
So, RW's input is non-distinct from - just less specified than - the input to CiV tensing:

(34)



The differences between the two input forms have been created by structure-building rules, so they are technically non-distinct. But the two outputs are distinct, because CiV tensing changes the [- tense] specification shared by Ø and /ɒ/ to [+ tense]; which also forces a change in the single X mapping. The output of CiV tensing is:

(35)



So, the *Miltonian* input to RW is a subset of the input to CiV tensing and the outputs are distinct; the Elsewhere Condition is met; RW applies and blocks CiV tensing.

The use of lexical category assignment as the blocking rule thus has far-reaching effects. It works perfectly well in the truly morphologically simple forms in which we would want all structure-changing rules to be banned (*nightingale* is a familiar example), because it is quite reasonably their first morphological operation. But the delay in assigning lexical category to roots which undergo affixation means that stress assignment must be delayed until the final cycle, on which all forms are morphologically complete and count as underived. RW cannot act on output forms of Stratum 1, as Kiparsky's identity rules did, because the property it gives to roots is referred to by some Stratum 1 phonological rules.

So if BDLP as a rule-based generative phonological model is to claim well-constrained rule application, the role of the RW rule and the way in which Strict Cyclicity is effected through blocking will have to be rethought.

We could pursue another avenue, though. With the tools of greater underspecification, Tense Blank Filling, and morphologically-sensitive syllabification (all employed to some degree in 7.3.4), it is possible to get around this obstacle and produce an EC-compliant analysis of *Miltonian* (and by extension other morphologically derived forms in which stress-sensitive structure-changing rules are blocked) in BDLP. I provide an outline of how such an approach may work below. This is worth pursuing because instead of tackling the problem with RW and blocking, it alters the role of traditional generative phonological rules. However, I reserve a discussion of the implications of the RW problem, and its solution, for Chapter 8.

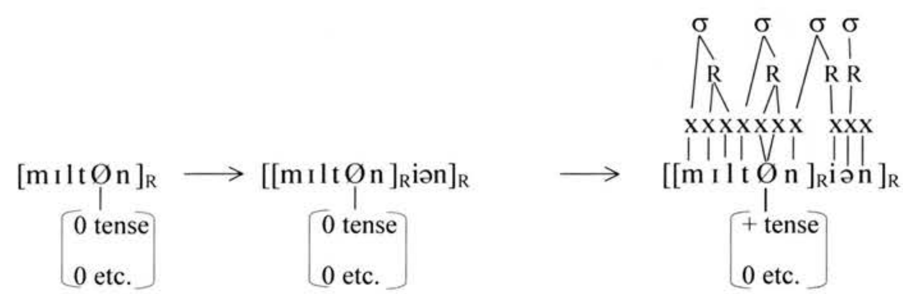
So, how might a revised analysis of *Milton* ~ *Miltonic* ~ *Miltonian* work?

Firstly, in the second syllable of *Milton* we must posit the fully underspecified vowel used in the Latinate prefixes in 7.3.4, with zero specification for [± tense] as well as for all other distinctive vowel features. In the simple form *Milton*, $[[\text{mɪltØn}]_R]_N$, little is changed. The second syllable will be unstressed, and the vowel will have its melody features – this time including [- tense] - filled in by the Default rule as above.

In *Miltonian*, though, the derivation will be very different. Here 'CiV tensing' can precede the RW rule by being encoded in the syllabification triggered by *-ian*'s suffixation. A syllabic well-formedness condition will force the syllable before the /-iən/ suffix to have a [+ tense], -XX vowel. This condition may refer to the combination of the /iə/ phonology, and the preceding morphological bracket, if not the *-ian* suffix itself. So the vowel of the *-ton* syllable will be given a [+ tense] vowel; after RW and stress assignment, it will be stressed, and will then have the other features of /o/ inserted by Tense Blank Filling (as formulated in 7.3.4 above). The crucial part of the process will be the first-cycle syllabification:

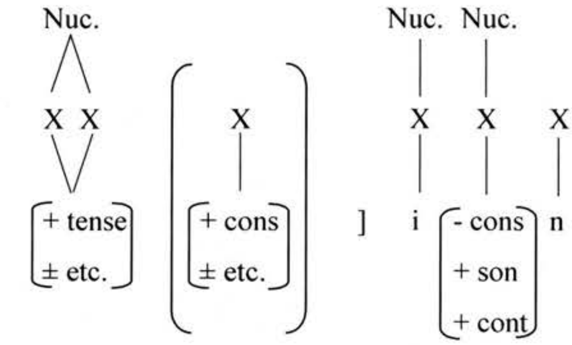
(36)

ROOT ⟶ CYCLE 1: SUFFIXATION ⟶ SYLLABIFICATION



The syllabification algorithm will have to respect a well-formedness condition such as the following:

(37) CiV Tensing



This condition could easily be rewritten to cover other CiV environments in which vowel tensing is triggered, such as those in *Can*/ə/*da* ~ *Can*/e/*dian*, *rem*/ə/*dy* ~ *rem*/i/*dial* and *margin*/ə/*l* ~ *margin*/e/*lia*. It is simply a syllable structure requirement which refers to a particular phonological environment and a morphological bracket. Indeed, it may operate in a structure-changing way if necessary, since it does not need to refer to stress and can therefore apply before the RW rule. This must actually be the case in *marginalia*, if we assume a derivation from $[\text{margin}]_R$ to $[[\text{margin}]_R\text{al}]_R$ to $[[[\text{margin}]_R\text{al}]_R\text{ia}]_R$. The affixation of *-al* will trigger a first cycle of syllabification, with the final (underspecified) vowel of *margin* receiving the default one X position. Then a second pass at syllabification will follow the attachment of *-ia*, at which point the final vowel of *margin* will be structurally changed to be tense and map to two X positions, in obedience to CiV tensing. This cannot be blocked by RW, because RW has not yet applied. Then, as in the derivation of *Miltonian*, Tense Blank Filling will apply; this time the <a> spelling will prompt the insertion of values for the tense vowel /e/.

In the suffixation *Miltonic*, meanwhile, *-ic* imposes no requirements on the tenseness of the base's final vowel. So, after affixation, $[[\text{mɪltØn}]_R\text{ɪk}]_R$ will be syllabified by the regular algorithm, with the underspecified vowel assigned one X slot by default. After stress assignment, this vowel will be Lax Blank Filled as in Giegerich's analysis.

So, instead of being dependent on the application of stress and lexical category, the structure-changing rule of CiV tensing can be restated as a condition on the syllabification applied immediately after suffixation. It could not apply in a morphologically simple form because the morphological bracket is part of its environment; and in any case a morphologically simple form will have RW as its first cycle operation and will only be syllabified afterwards, when structure-changing rules imposing tensing will be blocked. This analysis seems reasonably restricted, and has the advantage of rendering Tense Vowel Shift completely unnecessary in syllables with schwa~full vowel alternations.

In this section I have explored a major problem with BDLP's implementation of Strict Cyclicity, touched on some of its implications, and sketched a possible (part) solution. Throughout Chapter 7, we have seen that while the model works well for morphologically simple forms on Stratum 1, it has some serious flaws for complex ones like prefixed Latinate nouns, and suffixal derivatives in which structure-changing rules sensitive to stress should normally apply.

The further implications of the problem, and of the solution outlined here, are further explored in the following, concluding chapter.

Chapter 8: Summary, conclusions, implications and speculations

8.1 Chapter summary

This first section is a brief summary of the contents of each chapter. Following this, in section 8.2 I give a description of the empirical achievements of the investigation, and summarise my BDLP analysis of the data. In section 8.3 I suggest a further avenue of research which follows on from the present study. Finally, in 8.4 I return to the problem with the BDLP model raised at the end of Chapter 7 – the excessive constraint on rule application imposed by the use of lexical category assignment as a blocking device - and sketch an outline of a possible alternative approach.

Chapter 1 offered a short introduction to the whole thesis, and stated its main aims: to explore in detail the phenomenon of stress-doubletting in English; and to analyse these and related sections of the English vocabulary in a lexical model which uses base-driven stratification, BDLP (Giegerich 1994, 1999), in order to test how the model copes.

In Chapter 2 I gave some theoretical background to the study. I introduced the basic ideas of Lexical Phonology, and went on to describe the theory explored in this thesis, base-driven lexical phonology (BDLP), a rule-driven model which uses lexical stratification but allows affixes to attach on either of the two strata posited for the English lexicon; the strata are defined by properties of the bases and different formats of morphological rules. I then discussed the main current alternative to rule-driven phonology, Optimality Theory (OT), which is concerned with surface forms and constraints rather than underlying representations and rules. I argued that OT's success should not mean the abandonment of other 'mixed' models such as BDLP, since OT itself must admit the use of rules as well as constraints as theoretical devices, and therefore its difference from other models is really one of focus rather than of fundamentals. Next, I discussed Prosodic Phonology, a theory of representations, in particular its use of the phonological word. I also introduced the special morphological and phonological characteristics of prefixes, since they are central to the data; and the problem of necessarily discrete representations of continuous morphological data.

In Chapters 3 and 4 I introduced and examined the data which is the basis for this investigation, full lists of which are given in the appendices.

In Chapter 3 I gave a morphological analysis of the stress doublets and the 'control' set of non-stress-alternating noun-verb pairs, dividing them into groups according to internal structure, and discussing their phonological characteristics, by which the stress doublets can be divided into two main groups.

In Chapter 4 I analysed the semantics of the noun-verb relationships among the stress doublets and showed that they can be split into two sets along the same line as the phonological divide - those with irregular vs. those with regular semantics. The former have obscured internal morphology, the latter transparent prefixal structure. I compared the stress doublets with the non-alternating pairs, which turned out to have regular noun-verb relationships. I also examined the interactions of these nominalising processes with suffixes which derive nouns from verbs.

In Chapter 5 I returned to the morpho-phonology of the stress doublets, reviewing previous generative phonological and morphological analyses of these and other similar prefixal forms. None of these had dealt with the whole pattern in depth.

Then, in Chapters 6 and 7, I presented a new lexical phonological analysis of the stress doublets and other related patterns, including the *consent* verb-noun pairs, head prefixations and certain suffixal processes. Chapter 6 dealt with the second-stratum derivation of the productively prefixed stress doublets, and the non-alternating nouns of the *consent* group; I proposed a live verb-to-noun conversion on this stratum. Chapter 7 dealt with the first-stratum derivation of the stress doublets with obscured internal structure.

Chapters 6 and 7 also carried some implications for the BDLP model itself, one of which – relating to the use of lexical category to effect blocking – is very serious. I return to this matter in section 8.4.

8.2 Overall summary: the empirical results and their analysis in the BDLP model

The main empirical achievement of this investigation has been to reveal a great deal about the semantics, morphology, and phonology of the phenomenon of stress-doubletting in English – and in fact to redefine it as two different patterns.

I have compiled a comprehensive list of stress doublets and divided them into groups according to internal morphological structure (see Appendices I and II). I have shown that they are practically all prefixal or particle formations, but that prefixal divisibility forms a continuum, from the obscured Latinate prefixations like *rebel*, through the phonologically segmentable but semantically totally fused forms like *remit* or *subject*, to semantically compositional but unproductive structures like *rebound*, to fully transparent, productive prefixations like *misprint* or *rewrite*.

Although the internal morphology of the prefixal stress doublets forms a cline, they can be divided into two clearly distinct groups phonologically. In one group are all the transparent and productive prefixations, and the particle forms: among these words the verbs all have secondary-stressed initial syllables containing full vowels, i.e. a \ / contour, while the nouns have a / \ contour; there are no segmental differences between verb and noun. In the other group are all the Latinate and unproductive prefixations: here the verbs have stressless initial syllables often with reduced vowels, i.e. a 0 / contour; the nouns again have / \. So there is a full vowel-reduced vowel alternation in the initial syllables of these doublets.

This division into two phonological groups closely matches a division into two groups on the basis of the semantic regularity of the noun-verb relationship. I analysed these semantic relationships in detail, classifying the nouns according to which (if any) syntactic-semantic argument or thematic role of the verb they represent; or whether they are action nouns, or are simply unrelated to the verb. The Latinate and unproductive prefixations – those stress doublets in which the verbs have unstressed initial syllables – generally have irregular, unpredictable noun-verb relationships. About a quarter of the nouns are action nouns; nearly a third are either affected or effected objects; just under a fifth have meanings with unpredictable specialisation of whatever role they represent; and over a fifth are simply unrelated to the verbs.

By contrast, the productive prefixations, with initial secondary stress in verbs and therefore no noun-verb segmental phonological alternation, have highly regular noun-verb semantic relationships, with the great majority of nouns (over three quarters) meaning 'act or instance of "verb"ing'.

There is a correlation between transparency of internal morphological structure, and transparency of the external relationship between noun and verb. Both of these are clines (see Chapter 4), but there are good reasons for splitting them up into two main groups along phonological lines. One of these groups consists of the Latinate and unproductive prefixations, which can be arranged along a continuum of internal complexity and transparency of noun-verb relationship. The second group – the productive prefixations – are more uniform in complexity and transparency, and represent the productive end of the continuum.

So, stress-doubletting among prefixal forms is not one unified pattern in English, but is better viewed as two. One is that of stress doublets with obscured internal morphological structure: these have irregular noun-verb relationships, and the verbs have stressless initial syllables. The second pattern appears to be a productive one. It covers prefixations (including particle prefixations) with transparent internal morphological structure; these have semantically regular noun-verb relationships, and the verbs have secondary-stressed initial syllables. There is one exceptional group – the particle compounds, which have initial secondary stress in verbs, but in other ways pattern with the Latinate rather than with the transparent forms.

I have compared the stress doubletting pattern with another non-affixal morphological relationship between bisyllabic nouns and verbs which is generally assumed to be verb-to-noun derivation: non-stress-alternating conversion, as found in *consent*, *respect*, *delight*, etc., where the noun shares the verbal stress pattern. The internal morphological structure of these forms is similar to that of the first group of stress doublets – they are mostly Latinate prefixations – but the semantics of the noun-verb relationships are shown to be far more regular, the nouns generally meaning 'action or instance of "verb"ing'. So, in spite of their obscured internal morphological structure, semantically these noun-verb pairs group with the productively prefixed stress doublets.

The differences between stress-doubletting and zero-derivation as a way of relating bisyllabic nouns and verbs are highlighted when we consider their interactions with nominalising suffixes which produce action nouns, especially *-(a)tion*. Latinate verbs with stress-doublet nouns generally also have suffixal nominalisations to which they are semantically more closely related. But Latinate verbs with zero-derived nouns usually do not have suffixal nominalisations; and when they do, they are generally rarely used, or have only a distant semantic relationship with the verb. There seem to be no Latinate verbs with both a stress-doublet and a zero-derived noun, presumably for reasons of phonological similarity.

These have been the main empirical results of the investigation. Turning now to a summary of their analysis in BDLP, we see that on the whole the model accounts for them well. The two main stress-doubletting patterns very naturally align with the two different strata in the BDLP lexicon. BDLP's Stratum 1 is independently established as the home of irregular, listed morphological processes which phonologically may involve segmental alternations and differences in foot assignment (cf. Giegerich 1999) – all of which are typical of the Latinate and unproductive prefixal stress doublets. Meanwhile, BDLP's Stratum 2 is the site of rule-based, productive morphological processes, and phonologically of the rule which determines the relative prominence between feet – making it the natural home for the productively prefixed stress doublets. It is interesting that the different features of phonology, internal morphological transparency, and the regularity of the noun-verb relationships all group together in this way in the data – this lends further support to the basic idea of lexical stratification.

Drawing the stratificational line between the *resit*, *rewrite* prefixations and the *rebound*, *rewind* set, means that most of the cline of internal morphological segmentability described in Chapters 3 and 7 is actually left on Stratum 1. Only the clear transparency of productive prefixation and the regular verb-to-noun rule are sited on the second stratum; any other process which does not match this uniform compositionality and productivity – no matter how close it may come – is banished to the first stratum. So on the first stratum there will be differing degrees of morphological segmentability, with some processes being closer to Stratum 2 in their characteristics than others. This seems appropriate given Stratum 1's status as a kind of graveyard of morphology, home of processes which are either no longer productive, or which entered the language in loans and have never been productive in English.

In order to represent these differing degrees of morphological compositionality on Stratum 1, I proposed a new type of morphological bracketing – 'semi-complexity'. Certain forms with historical or etymological segmentability which in synchronic terms is doubtful may retain a single internal bracket, as in [re[mit] or [gorm]less] (cf. Giegerich 1999). This does not constitute a derived environment, but it may be referred to by certain structure-building (suprasegmental) phonological rules. Among the Latinate forms I argued that syllabification must respect such a single prefixal bracket – hence the MinWd-sized, independently syllabified prefixes in nouns like *defect*, *proceeds*, *reject*, and *relaxation*, as opposed to those in nouns like *desert*, *refuse*, *produce*, *reputation*, where the first consonant of the base has been used to satisfy the weight requirement for the stressed prefixal syllable.

Alternatively, such a fossilised internal bracket could have been posited in a wider range of Latinate forms to explain otherwise irregular final stresses; I decided against this option because it would have given morphological complexity in *rebél*$_V$ (but not *réb*[ə]*l*$_N$) and *combát*$_V$, where the bases are meaningless and non-recurrent. All forms in which the prefixes syllabify independently in both verbs and nouns contain recurrent, stressed bases.

All Latinate forms – of the stress doublet and the non-stress-alternating group – are treated as lexically unspecified roots on BDLP's first stratum, regardless of whether they are prefixally complex, semi-complex, or simple. The stress doublets' roots are listed for two Root-to-Word rules, verbal and nominal; while the *consent* roots are listed only to become verbs. Thus the irregular, non-directional relationship between the stress doublet verbs and nouns is captured. Their common root contains an underspecified prefixal vowel: this is how surface schwa is represented in this model (cf. Giegerich 1999, Gussmann 1991), so it is appropriate in the verbs; and the full vowels in the nouns can easily be produced by a Blank Filling rule which is sensitive to the stress assigned to this syllable. Nouns and verbs are stressed independently of each other, the verbs being assigned just one final foot, the nouns two feet.
On Stratum 2 the morphology is word-based and unlisted. Verbs are prefixed and may then undergo a verb-to-noun conversion rule which produces action nouns. Prefixes in both verbs and nouns are subject to Prefix Footing, aligned with the foot and not the pword since this accounts for all their phonological characteristics, including their typical maximal as well as minimal size. Then the relative prominence between the prefixal and base feet is determined by the Lexical Category Prominence Rule, which applies differently in verbs and nouns, assigning final prominence in the former and initial prominence in the latter.
The other main feature of my BDLP account of stress doubletting and related forms of lexical nominalisation was the use of blocking. One result of the syntactic-semantic categorisation of the noun-verb relationships was that it illuminated the interaction of stress-doubletting, zero derivation, and *-(a)tion* suffixation among the Latinate prefixal verbs. I argued that blocking could be in operation between *-(a)tion*, which regularly produces action nouns from Latinate verbs, and the second-stratum verb-to-noun conversion rule posited to cover the *rewrite* and *consent* forms, which also produces action nouns. The suffix *-(a)tion* is often irregular in its phonological effects, especially in bisyllabic verbs, since as *-ation* it generally forces the initial syllable to be stressed and the second syllable to be unstressed – the reverse of the pattern in the unsuffixed verbs – and as *-tion* it mutates or deletes the final consonant. So, it will usually be listed for attachment on Stratum 1, as in *c*[ə]*nsérve* ~ *còns*[ə]*rvátion*, *admi*[t] ~ *admi*[ʃ]*ion*. It blocks the application of the verb-to-noun rule on Stratum 2 because the semantic effect of the two processes is the same. Thus *conviction*$_N$ blocks the formation of **convict*$_N$ on the second stratum: the verb *convict* does not produce a

zero-derived noun on the Stratum 2 like *consent* because of the prior attachment of *-(a)tion* to form an action noun. Similarly, the formation of *admission*$_N$ blocks the formation of a noun **admit*, and so on. I argued that blocking applies when verbs are prefixed too: thus the existence of first-stratum *admission* blocks the potential derivation of **re-admit*$_N$ from the second-stratum prefixed verb *re-admit*; the existence of first-stratum *entry* blocks the formation of **re-enter*$_N$; first-stratum *application* blocks the formation of **mis-apply*$_N$.

The *consent* forms are not listed for *-(a)tion* attachment on Stratum 1, so these verbs are free to form action nouns by the verb-to-noun rule on Stratum 2; this is how they nominalise when prefixed too, e.g. *re-arrest*$_N$, *re-release*$_N$.

These then are the main results of the investigation, and an outline of how they can be accounted for in the BDLP model. However, this analysis also uncovered a serious problem with the model – in particular with its use of lexical category assignment on roots (the Root-to-Word rule) to effect the Strict Cyclicity Condition through blocking. This problem, a possible solution, and its implications, are the main focus of this chapter. They are discussed in section 8.4.

Before moving on to this issue, though, there is another topic to explore, one which also follows on from the research presented in the preceding chapters. This is the history of the stress doublet pattern in English.

8.3 A further area of interest: history

My analysis of stress doubletting has been limited to the patterns found in present-day English; there has not been the space to explore the history and development of the phenomenon too. But a lexical phonological account of this development would be a very worthwhile object of future study. Stratum 1's status as the home of fossilised patterns in the language suggests that the stress alternation in the nouns and verbs on this stratum might have a long history. And the divergent origin of the doublets on this stratum – particle compounds as a pattern going back to Old English (see Ch.3), and Latin-derived prefixal forms borrowed in Middle and Modern English – hints that this history could be rather interesting.

Indeed, Old English had a stress doubletting pattern surprisingly similar to the one found in Modern English: prefixal and particle forms had initial main stress in nouns and final main stress in verbs, e.g.:

(1)

Verbs		Nouns	
abélgan	to offend	*æbylgþ*	offence
arísan	to arise	*ærist*	resurrection
awéallan	to bubble up	*æwielm*	spring, fountain
begán	to occupy	*béganga*	inhabitant
oncwéþan	to reply	*ándcwiss*	answer
ongítan	to perceive	*ándgiet*	understanding
onsácan	to contest	*ándsæc*	denial
		ándsaca	adversary

(cf. Campbell (1959), Pilch (1970), Hogg (1992), Kastovsky (1992), Bosworth-Toller)

This noun-verb difference is said to originate in the proto-Germanic stress shift, in which initial stress was established on prefixed nouns at a time when what were to become verbal prefixes did not form one word with their bases (Hogg 1992: 45, 48).

Direct comparison with the present-day pattern is difficult. On the phonological side, whether or not verbal prefixes or particles bore secondary stress is unclear: Pilch (1970), for example, marks them as stressed, while Campbell (1959) marks them as unstressed. Morphologically, the semantic transparency of the prefixations or of the noun-verb relationships could not be established with the same accuracy as in the Modern English data. It is very hard to tell from the few examples typically given in handbooks whether the Old English (OE) stress doublet pattern is uniform, or whether it might split into two (or even more) subpatterns, e.g. prefixal versus particle formations. Plus, there are also often suffixal or other alterations to the base in the nouns as compared with the verbs, e.g. the suffixed <þ> and internal vowel change in *æbylgþ*$_N$ as compared with *abelgan*$_V$; this does not happen in the Modern English stress doublets (with the very occasional exception, e.g. *prócèeds*$_N$ ~ *procéed*$_V$).

Whatever the details of this pattern, the OE prefixal system entered a vertiginous decline later in the period, and had disappeared 'as though swept aside overnight' (Hiltunen 1983; cf. Lutz 1997, Kastovsky 1992, Horgan 1980) by Early Middle English. Given modern evidence, we might assume that the stress alternation of OE's preparticle forms has two outcomes in Modern English. It may be the source of the stress alternation in Middle

English's incipient post-particle pattern, which thrives to this day in forms like *blàck óut*$_V$ ~ *bláckòut*$_N$, *rìp óff*$_V$ ~ *ríp-òff*$_N$ (cf. Marchand 1969: §5.10, Hiltunen 1983, Ch. 3 above). And the continuous existence of preparticle forms in the language since the OE period, productive or not, may have given rise to the present-day alternation in preparticle forms, compound and prefixal, such as *update*, *overdose*, *overdub* - even in the absence of actual noun-verb pairs, as long as the two word classes had different stress patterns.

But the source of the stress doublet pattern in Modern English productive prefixations (in *re-* especially, but also in *mis-* and others) is not clear. Does it originate with the OE particle stress doublet pattern, or have other factors been at work? Today's productive prefixes are mostly Latin or French in origin, entering the language through the Romance loans borrowed from the Middle English period onwards. Stress-doubletting has of course been established in such prefixal loanwords – but can this be explained entirely by analogy with existing native prefixal or particle forms? Jespersen and Marchand believe that analogy has been influential; Jespersen also notes that, although borrowed with main stress on the root syllables, most Latinate prefixal verbs would not actually have had final stress because they would have ended in an inflectional syllable (Jespersen 1909/1949: 175 (§5.73); Marchand 1969: 379 (§5.7.4.3)). This last suggestion is developed in Minkova's (1997) OT account of the Middle English stress system, where the greater tendency towards leftward stress-shift in the bisyllabic Latinate nouns than in the verbs is explained by the operation of a Nonfinality constraint on primary stress placement. Minkova argues that nouns were far less likely to have inflectional syllables than verbs; so while such syllables guaranteed verbal obedience to Nonfinality, nouns would be in violation of this constraint unless their stress was shifted to the initial syllable.

The pull of analogy with existing prefixal or particle verbs and the avoidance of final main stress do seem the most plausible sources of the modern stress doublet pattern. But many details remain to be worked out. For example, what is the role of secondary stress here, given that its presence in verbal prefixal syllables is a major difference between Latinate and productively prefixed forms in the modern stress doublet pattern? How active could Nonfinality be given the number of monosyllabic nouns in the language? And how would such a process interact with general principles of stress assignment in prefixations?

Although most productive prefixes in English are Latinate in origin, they always have secondary stress, unlike the root-based Latinate prefixes - but like the native particles. Perhaps the *rèwríte*$_V$ ~ *réwrìte*$_N$ pattern has been influenced by the native preparticle forms, which show that all transparent prefixal or compound elements carry stress, and that no compound verb or prefixal verb has initial main prominence in English, while most compound and prefixal nouns do. It is possible that such a dual stress-doublet pattern – one consisting of obscured prefixal forms, Old English or Latinate, with stressless initial syllables in verbs, and the other consisting of particle forms and latterly productive prefixations, with secondary-stressed initial syllables in verbs – has existed for a long time in English. It seems that the proto-Germanic stress shift has had far-reaching consequences.

This has just been a brief sketch of the possible historical development of the stress-doublet pattern in English; there is no space here for more detail. But I think this outline has established the potential interest there could be in a diachronic lexical phonological account of noun-verb stress alternation which covers all the different types of word-formation in which stress doublets are found.

However, I leave this topic for further research. In the next section, I return to the main subject of this chapter: the implications for the BDLP model of the flaws in the operation of the Root-to-Word rule.

8.4 Implications for the BDLP model

8.4.1 The problem

As already mentioned in the general summary above (section 8.2), on the whole the BDLP model copes well with the stress-doublets and other prefixal forms. The difference in the format of morphological processes between the two strata is very appropriate for this data. Stratum 1's listed format captures the irregular, obscured, or just plain unproductive nature of the prefix-base and noun-verb relationships among the *desert*, *refuse*, *convict*, *rebound* groups of words; Stratum 2's conventional rule format is well suited to the productivity and regularity of the prefix-base and noun-verb relationships among the *rewrite*, *misprint* words. And the importance BDLP assigns to blocking offers an ideal way to solve the prefix-suffix bracketing paradoxes from which it still suffers, in spite of being designed to allow any affix to apply on either stratum (see 6.6.2 and Giegerich 1999). The attachment of root-based, listed suffixes outside rule-governed word-based prefixes is, I argued, best explained by morphological blocking.

However, in Chapter 7, during the analysis of the prefixed stress doublets on Stratum 1 (the *rebound*, *rewind* words), a serious flaw in the BDLP model was uncovered. We found that the model overconstrains the application of structure-changing rules which are sensitive to lexical category or to stress placement.

For most of the Latinate or unproductive forms I proposed an underspecified underlying vowel in the prefixal syllable; this is the underlying representation for schwa, and as such is a good source for both the /ə ~ ɪ/ found in the verbs, and (because of its underspecification) the full vowels found under stress in the nouns. The problem is, however, that in *rebound* and other forms in which the prefix is attached to the base as the first morphological operation, syllabification is triggered by the act of prefixation and therefore applies before lexical category assignment. But in these cases syllabification – in particular, the mapping of vowel melodies to X-positions – is actually sensitive to lexical category. In the nouns *rebound*, *recoil* etc. the prefixal vowel is full and tense and thus has two X-positions; while in the doublet verbs it is lax, and has only one. This is a problem because any correction to the X-tier mapping after lexical category assignment – i.e. after the Root-to-Word rule has applied – is blocked. The Root-to-Word rule is the universal 'more specific' rule for the Elsewhere Condition, and therefore blocks any subsequent structure-changing rule.

While this proved an avoidable problem, and one which only occurs in a very few cases (see sect. 7.6; syllabification is certainly not normally sensitive to lexical category), it revealed deeper difficulties for BDLP. Having a Root-to-Word rule which blocks all subsequent structure-changing rules makes the model too restrictive: since stress can only be assigned when lexical category is known, it means that no structure-changing rule sensitive to stress (or lexical category) may apply. Therefore well-known rules like Trisyllabic Shortening (TSS) and CiV Tensing are banned; in 7.6 I showed how Giegerich's (1999) analysis of the vowel alternations in forms like *Milt*[ə]*n* ~ *Milt*[o]*nian* cannot actually stand. Basically, the manipulation of lexical category assignment in roots to effect blocking and therefore the Strict Cyclicity Condition is unsustainable.

However, in that section I also sketched out the beginnings of a way of avoiding this problem. It involved the use of greater underspecification in the representation of underlying schwa – i.e. [0 tense] as well as zero values for all other vowel distinctive features – combined with a strictly structure-building version of CiV Tensing, expressed as a well-formedness condition specifying syllabic structure in a particular morpho-phonological environment. Any vowel nucleus followed by an optional consonant, a ']' bracket and then heterosyllabic [i] and [ə], is by this condition required to map to two X-positions. Otherwise, underspecified vowels will default to one X-position. The question of structure-changingness does not normally arise because *-ia* or *-ian* suffixation generally starts a root's first morphological cycle, at which point the underspecified vowel has not yet been X-mapped; and since it has no specification for [± tense] it can be assigned either one or two X-positions without alteration to any existing structure. But even in cases where the entrant to CiV suffixation has previously been syllabified as a lax, one-X vowel (e.g. *marginalia*, assuming the derivation *margin* → *marginal* → *marginalia*), the Strict Cyclicity Condition could not be a problem, since the environment has been newly created by a morphological process, and the Root-to-Word rule has not yet applied to the form.

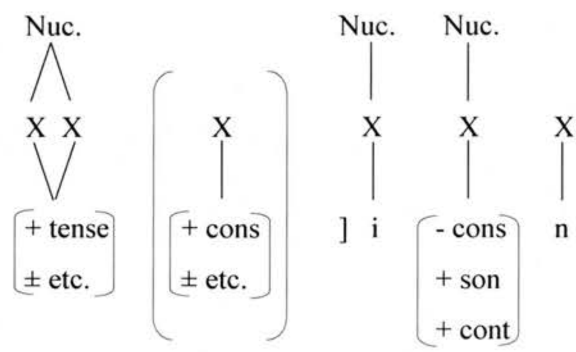
This way of approaching CiV Tensing does not just pre-empt the over-application of BDLP's blocking mechanism: it also renders Giegerich's (1999) use of Tense Vowel Shift on the CiV-tensed vowels unnecessary. Once the underspecified vowel has been specified as tense, a Blank Filling rule applies to assign the correct full vowel specification. Previously, Blank Filling only applied to lax vowels (cf. sect. 7.3.4); this alteration captures the fact that the tense-lax vowel pairs /i ~ ɛ/, /e ~ a/, /o ~ ɒ/ have special relationships in English morpho-phonology, sometimes with schwa as a third vowel which may fill the same slots. And another feature of this analysis is that it avoids the use of intermediate representations which are distinct from both the underlying and the surface forms.

This was as far as I went in Chapter 7 in exploring this major problem with BDLP, and a possible way of improving the model. In the remainder of this chapter, I investigate the matter further. First, in 8.4.2, I explore how the potential solution outlined above might extend to other first-stratum morpho-phonological alternations. Then, in 8.4.3, I discuss the difficulty of finding a replacement for the Root-to-Word rule, and the consequences for BDLP of losing this rule. Overall implications for the model are discussed in section 8.4.4.

8.4.2 An alternative approach

We have seen above that the derivations problematic for BDLP as it stands – the CiV-Tensing cases where a full tense vowel alternates with basic schwa – can be reformulated using underspecification and well-formedness conditions on syllabification. If we make schwa completely underspecified, we can apply conditions or rules which are non-structure-changing, such as the CiV Tensing one proposed above (7.6), repeated here:

(2) CiV Tensing



Its application is tightly constrained by the reference to the internal morphological bracket. And reference to stress is no longer necessary since the *-ia*, *-ian* suffixes are stress-determining – they cause stress to fall on the same syllable in which tensing occurs. That is, tensing need not be seen as dependent on stress; instead, both are dependent on morphological structure, or rather on the phonological structure of the following morpheme. In morphologically simple forms with underlying schwa, or in words derived from them in which neither CiV Tensing nor any similar condition is applicable, the [0 tense] vowel maps by default to one X-slot, becoming lax, as in *Milt*[ə]*n* ~ *Milt*[ɒ]*nic* or *Byr*[ə]*n* ~ *Byr*[ɒ]*nic*. Full specifications for the vowels are filled in after stress assignment by Tense or Lax Blank Filling (which in literate speakers may be sensitive to spelling) – or schwa features get filled in on Stratum 2.

This seems on the face of it a reasonable way to treat these alternations. Underspecification is only used for vowels which surface as schwa in morphologically basic forms; otherwise vowels must be fully specified. Free rides are ruled out by this requirement, and by the fact that the CiV Tensing condition makes direct reference to a morphological bracket. The extension of Blank Filling to cover tense as well as lax vowels means that the close link between the pairs /i ~ ɛ/, /e ~ a/ and /o ~ ɒ/ in English morphophonology is recognised (each member of the pair is triggered by the same spelling symbol), and means that we do not need the Vowel Shift rule, with its entailment of contrastive intermediate levels of representation, to generate the correct output.

The combination of tightly-controlled underspecification and strictly structure-building rules, with the obviation of vowel shifting, means that the problem with the Root-to-Word rule as the source of the Strict Cyclicity Condition can be avoided. Indeed, the SCC itself is actually rendered unnecessary.

The question I wish to ask here is: can this approach be extended? Might we re-state other structure-changing rules as morphologically-governed well-formedness conditions, and fulfil these conditions with structure-building phonology? Could BDLP have a first stratum in which SCC and many of the rules which have needed it (those creating and working on contrastive intermediate levels of representation) are unnecessary? I will argue that this is possible. We will first see that the use of structure-building rules filling in underspecified features, as in the schwa-full vowel alternations, will not extend to other areas of first-stratum morpho-phonology. However, I argue that structure-changing operations need not be completely avoided; but that we need to apply them in some other way than as rules dependent on the SCC and abstract intermediate representations. I sketch a possible way of achieving this in the tense-lax full vowel alternations of TSS cases like *serene* ~ *serenity*; and then consider how this approach might be integrated with the schwa-full vowel alternations as analysed above. Ultimately, it may be possible for BDLP's first stratum to jettison RW or any other manifestation of Strict Cyclicity.

The limitations of the schwa-full vowel analysis outlined above rapidly become apparent if we consider the large number of vowel alternations which involve the same tense-lax pairs, but no schwa. Examples are plentiful: consider TSS (Trisyllabic Shortening) alternations as in *serene* ~ *serenity*, *explain* ~ *explanatory*, *derive* ~ *derivative*; and others where a tense vowel is basic and a lax one derived, e.g. *keep* ~ *kept*, *tone* ~ *tonic*, *hysteria* ~ *hysteric*, *rabies* ~ *rabid*, *atrocious* ~ *atrocity*, *grateful* ~ *gratitude*. Since the full vowels here never alternate with schwa, there is little justification for a completely underspecified underlying vowel. Such treatment would be possible, if we were to relax the requirement that complete underspecification should only be used for surface schwa. But this would mean that a large number of words could contain underspecified vowels, with full features only filled in by rule after stress assignment. Most of the Latinate vocabulary would contain no full vowels: *derive* would be $[\text{d}\emptyset\text{r}\emptyset\text{v}]_R$, *serene* would be $[\text{s}\emptyset\text{r}\emptyset\text{n}]_R$, *sane* would be $[\text{s}\emptyset\text{n}]_R$, and so on. Once the link between the zero matrix and surface schwa is severed, then underspecification could be used unconstrainedly.

There might also be a problem with the widespread application of Blank Filling, since this rule is formulated to derive phonology from spelling (see 7.3.2 above, and Giegerich 1999). Reference to spelling is plausible in rarer words, and alternations generally found in written rather than spoken English. But it does not seem likely that this would extend to large parts of the vocabulary, much of which may be learned without reference to spelling. However, this does not mean that Blank Filling, or a rule very like it, should not apply. Essentially the Blank Filling rules introduce another level of representation into the phonology, so as well as feature matrices and X-slots, we have a kind of segmental level too. While this may be an orthographical representation, it need not be. It could be seen as a memorised diacritic instead.

However, even if unrestricted underspecification and widespread Blank Filling were to be accepted, difficulties would remain. In the analysis presented in Chapter 7, the unspecified vowel melody maps by default to one X-position – i.e. it becomes a lax vowel, as is necessary for the generation of the basic surface schwa. With [- tense] as the default value, though, special diacritic marking would be needed for the basic [+ tense] vowels in forms like *keep*, *feel*, *cone*, *tone*, *sane*, *define*, etc., if they were to be represented as [0 tense] underlyingly in order to enable the alternation with the full lax vowels in *kept*, *felt*, *conic*, *tonic*, *sanity*, *definitive*, respectively.

In any case, the use of underspecification to avoid restrictions on structure-changingness will be unnecessary if conditions on the insertion of tense or lax vowels can be tied to particular morphological-phonological structures, and thereby limited to strictly derived environments. It would be perfectly acceptable to have a TSS condition on syllabification – like CiV Tensing - which imposes a structural change on the melody tier from [+ tense] to [- tense]. Then, underlying representations of e.g. *keep*, *feel*, *tone*, *sane*, *define* may be $[kip]_R$, $[fil]_R$, $[ton]_R$, $[sen]_R$, [dØfaɪn]$_R$ respectively, with fully specified tense vowels (and a diphthong in *define*). Such surface-trueness is necessary if we are to avoid excessive abstraction.

But if the CiV Tensing or TSS conditions simply impose changes in the tenseness feature of fully specified vowels, then first-stratum Vowel Shift rules (Tense and Lax – cf. McMahon 1990, Giegerich 1999: 121-126) must be triggered in order to get the correct values for [± high] and [± low] in these vowels, since changes in these features accompany the switch in tenseness. The difference between /i/ and /ɛ/, for example, is not just one of [± tense]: /i/ is [+ high] and [- low] while /ɛ/ is [- high] and [- low]. Applying tensing or laxing rules, and vowel shift rules in order to derive the right output, is the traditional generative approach to these alternations (Chomsky and Halle 1968: 180-190; Halle and Mohanan 1985: 76ff.). And in theory it is acceptable here too – after all, the forms to be vowel shifted are all derived.

But of course such a Vowel Shift rule introduces an extra level of representation which is distinct from both underlying and surface forms – exactly the kind of thing we are trying to avoid here. E.g., for the *sane* ~ *sanity* /e/ ~ /a/ alternation the /e/ of the root and /a/ of the derived form would be linked through an intermediate /ɛ/, the output of TSS and input to Lax Vowel Shift (cf. McMahon 1990, Giegerich 1999). But there is no actual evidence for this intermediate /ɛ/. Tense and lax vowels do form pairs with differences in height between members; but these differences are arguably arbitrary. One historical raising process need not burden the language half a millennium later with two separate but necessarily extrinsically ordered phonological rules, a tenseness change and a separate height change which is dependent on it.

Because vowel shifting is formulated to be independent of tensing or laxing, but is actually dependent on the prior operation of one of these processes, its retention will require the SCC – which we are trying to avoid. Vowel shifts must only be allowed to apply in morphologically derived environments, in association with phonological tensing or laxing conditions. They cannot be allowed to apply in simple roots.

Perhaps the SCC could still be enforced by the Root-to-Word rule. The fate of RW in BDLP is not yet clear; while Ch. 7's analysis of schwa-full vowel alternations rendered it unnecessary as a blocking device, it did not entail its abandonment. However, it proves to be inadequately restrictive: vowel shift would still wrongly be able to apply in suffixed forms where no change in tenseness occurs. For example, there would be nothing to stop *growth* undergoing Tense Vowel Shift and becoming **gr*/u/*th*; *complexity* would Lax Vowel Shift to **compl*/a/*xity*, *seniority* would become **s*/aɪ/*niority* and *periodic* **p*/aɪ/*riodic*. Using the Root-to-Word rule as the blocking rule does restrict vowel shifting to morphologically derived environments, but cannot impose the additional requirement of *phonological* derivedness.

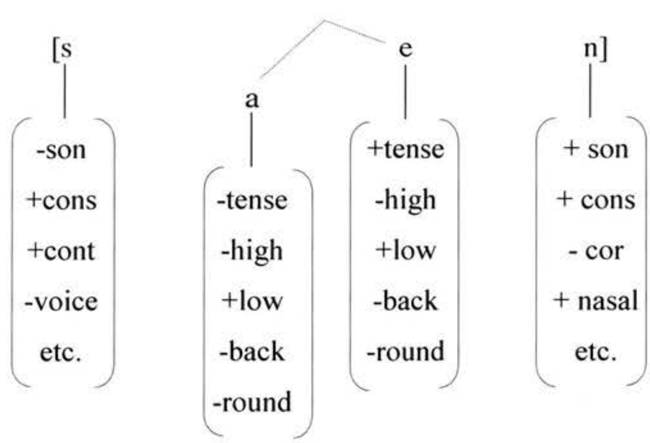
What we really need to do is replace Tense and Lax Vowel shift with something more inherently constrained, such that neither SCC stipulation nor the RW rule is needed. We have already seen great problems with the latter, and here we are working towards a model in which it is unnecessary.

But if we disallow vowel shifting as a structure-changing contextual rule, how can we capture the vowel alternations? Vowel shifts cannot be treated like CiV Tensing and TSS, expressed as well-formedness conditions relating to morpho-phonological structure. There is no link between the segmental or syllabic form of a suffix, and a particular vowel height in the final syllable of its base. Vowel shifting is not a static condition, but a dynamic change, triggered by an alteration in X-mapping or tenseness.

It was comparatively easy to obviate vowel shifting in the Chapter 7 analysis, since there we were dealing with underlying schwa, which has no feature specifications to shift. Is there some way in which a similarly simple analysis, with no vowel shifting, could apply here, where vowels in basic roots should be fully specified? I think there is. There are two ways of doing this, in fact: one in which underlying representations are enriched to become two-dimensional; and one in which each pairing of a tense and a lax vowel is stated as a bidirectional relationship which can act as a kind of repair to make sure a given suffixed form meets conditions like TSS.

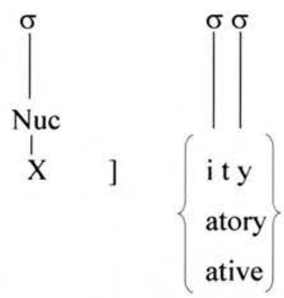
The 'enriched representations' approach would work as follows: wherever a word contains a full vowel which alternates between members of a tense-lax pair, its underlying melody tier could actually contain two linked feature matrices, one 'dominant' and one 'recessive'. The dominant one will map to the skeleton tier by default if no contradictory conditions on tenseness apply. The recessive vowel melody will take over the slot instead if prompted by CiV Tensing or TSS; otherwise it will not be X-mapped or syllabified, and, prosodically unparsed, will be unpronounced. So *sane*, to take a familiar example, could be represented as follows:

(3)



The tense vowel /e/ has the dominant position, and when the simple adjective *sane* is syllabified, it will be the vowel which fills the nucleus. However, if *sane* is suffixed with *-ity*, the TSS condition will apply on syllabification, specifying that the final syllable nucleus in the base morpheme must contain a lax vowel, as:

(4) TSS



This will automatically mean that the lax vowel of the pair, /a/ must syllabify and surface instead, since it takes just one X-slot while /e/ needs two. In this case, /e/ will not be parsed into any syllabic or foot structure, and will therefore be unpronounced. The two melodies are effectively in a see-saw kind of relationship. The vowel alternations in *keep* ~ *kept*, *define* ~ *definitive*, *opaque* ~ *opacity*, *cycle* ~ *cyclical*, etc., can all be treated in this way.

So, prosodic conditions imposed by the morphology can select one of two vowel melodies available in roots where there is alternation, like *sane*, *keep*, *mania*, etc. As with the derivations in Chapter 7, the first-stratum phonology simply imposes greater specification on existing representations: a condition like TSS chooses one potential output over another. It does not technically impose any structural change.

With an approach like this, the familiar complexities of ordered feature-changing rules and intermediate representations can be avoided. The possible featural changes a given root may undergo are listed as variants of the underlying representation; the conditions in which these changes arise are expressed as well-formedness conditions on morpho-phonological structure. A two-dimensional vowel melody will only be posited as an underlyer where there is evidence of alternation, so while the relationship between $kneel_{V}$ and $knelt_{V_{past}}$ suggests that the root kneel has a /i ~ ɛ/ underlying vowel, the fact that the vowel is unchanged in $peep_{V}$ ~ $peeped_{V_{past}}$ (**pept*) suggests that this verb's root has a simple /i/. Exceptions to TSS or CiV Tensing can be treated as having one-dimensional melodies for their final vowels, so while *serene*, *obscene*, etc. have /i ~ ɛ/ vowels, *obese* – exceptionally for a Latinate root – has simple /i/ in its final syllable. *Trinidad*, which yields the derivative *Trinid*[a]*dian*, similarly has just /a/ and not /e/.

Of course, a major objection to this kind of analysis is that vowel alternations are localised to each individual root and are not stated as generalisations, no matter how common and predictable they are. The regular relationship between /a/ and /e/, or /ɛ/ and /i/ etc. ends up as a coincidence, with just the same status as the irregular /i ~ a/ alternation in *clear* ~ *clarity*. It could be argued that in Modern English these vowel correspondences actually should all have this status, since they do not hold in productive, second-stratum alternations, only in listed first-stratum ones. Perhaps the /i ~ ɛ/ alternation should only be distinguished from the /i ~ a/ one in degree – i.e. by frequency of occurrence – rather than in kind.

On the other hand, though, to know English is to know that the alternation in *clear* ~ *clarity* is unusual and that /i/ has a special relationship with /ɛ/. So it may be preferable to return to simple underlying vowel melodies, and instead have bidirectional relationship statements between alternating vowels of the form '/e/ ↔ /a/', shorthand for

(5)

$$\begin{pmatrix} \text{-cons} \\ \text{+son} \\ \text{+tense} \\ \text{-high} \\ \text{-low} \\ \text{-back} \\ \text{etc.} \end{pmatrix} \longleftrightarrow \begin{pmatrix} \text{-cons} \\ \text{+son} \\ \text{-tense} \\ \text{-high} \\ \text{+low} \\ \text{-back} \\ \text{etc.} \end{pmatrix}$$

- and similarly for the pairs /i/ ~ /ɛ/, /o/ ~ /ɒ/, /aɪ/ ~ /ɪ/, and perhaps /aʊ/ ~ /ʌ/ (this last pairing being rather weaker than the others).

This would mean that TSS or CiV Tensing could effectively impose simultaneous structural change, causing the replacement of one vowel by another because of their X-mapping requirements. But since (5) is just a statement of a relationship and not a contextual rule, it could not bring about vowel changes in simple forms to which no morphologically-induced condition like CiV Tensing applies. The vowel in the root *safe* will remain as /e/ because this form does not undergo any suffixation which induces vowel-changing conditions (cf. *safety*). In *sane*, though, the suffixation of *-ity* creates an environment specified by TSS as containing a lax, one-X vowel. /e/ is obviously not lax, but by (no.) it corresponds to /a/, which is, so /e/ is replaced by /a/. Effectively the '/i/ ↔ /ɛ/, /o/ ↔ /ɒ/' relationship statements offer a kind of repair to forms which do not meet morphologically-imposed prosodic conditions.

Under this approach, the tense-lax alternations could potentially be extended to new forms, which might happen if a Stratum 1 morphological process were analogically extended. (This morphology is unproductive, but this does not mean it *never* applies in new environments). Plus, the forms in which vowel alternations regularly apply would be represented more simply than the exceptions to conditions like TSS, rather than the other way round. So, *obesity* would have to be exception-marked, rather than being unable to meet the TSS condition because it has a simpler vowel representation than the two-dimensional ones in *serene*, *opaque*, *divine*, etc. And unusual alternations, like the *clear* ~ *clarity* one, could be represented by an exceptional two-dimensional underlying vowel.

Either of these two options – enriched underlying representations or the bidirectional relationship statements – enable us to capture full vowel alternations in a way which avoids SCC-governed structure-changing rules, and partially-derived intermediate representations which are distinct from both underlying and surface forms.
And additionally, it would be possible to deal with consonant alternations in similar ways too: the final velar stop in *elastic* or *electric*, for example, could have a two-dimensional representation with /k/ dominant and /s/ recessive, with a 'Velar Softening' negative condition prohibiting velar stops before suffixes beginning with /i/, like *-ity*. Or, forms subject to the Velar Softening condition could be represented with a simple final /k/, but a 'k → s' mapping would offer a repair for the violation when *-ity* is suffixed.

In neither of these approaches is there an intermediate stage at which an unevidenced combination of consonant or vowel features forms an output of one rule and an input to another. The surface phonology of a complex root is directly mapped to the surface form of its simple base. Because of its greater powers of generalisation, the bidrectional relationship approach may be the better solution to the problem of regular vowel alternations. But for unusual alternations, as in *clear* ~ *clarity*, the enriched-underlyer approach may be more appropriate.

This has just been a sketch of how full vowel alternations in Stratum 1 morphology could be handled in an altered version of the BDLP model, one in which too much abstraction, and strings of extrinsically ordered structure-changing rules like Vowel Shifts, are avoided – as is any need for either a Root-to-Word (RW) or other blocking rule, or a stipulation of Strict Cyclicity.

The spur for these proposals was the simplicity of the purely structure-building analysis of the schwa-full vowel alternations in Chapter 7, and the problems with the RW rule's blocking effect. But how might these different analyses fit together into one coherent first-stratum model? Is the approach outlined above, with morpho-phonological conditions and 'repair' statements of possible melodic alternations, consistent with the analysis of schwa as an underspecified, blank-filled vowel slot?

The simplest answer to this last question is yes: the two analyses could apply on the same stratum. However, it would not be a very coherent co-existence. If the Blank Filling rules proposed in Chapter 7 (cf. Giegerich 1999) and the 'e ↔ a' statements proposed in this section were to exist side-by-side on the same stratum, there would be a duplication problem - their functions overlap. The tense and lax Blank Filling rules link the pairs /e/ and /a/, /i/ and /ɛ/ etc., in that both members of a tense-lax pair are triggered by the same conditions – stress and the link to a particular orthographic symbol. The tenseness value is the deciding difference. But of course /e/ and /a/, /i/ and /ɛ/ etc. are also linked by the 'e ↔ a' statements used in the analysis of the full vowel alternations.

The natural response to this overlap would be to integrate the Blank Filling rules with these linking statements, perhaps in the following way:

(6) (a)

$$\begin{tikzcd}
/e/ \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & & /a/ \arrow[dl, leftrightarrow] \\
& \langle a \rangle &
\end{tikzcd}$$

(b)

$$\begin{tikzcd}
/i/ \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & & /e/ \arrow[dl, leftrightarrow] \\
& \langle e \rangle &
\end{tikzcd}$$

Then when full vowel specifications must be inserted into the empty melody of underspecified schwa, with reference to orthography, as happens under Blank Filling, the triangular relationships above may be referred to.

But the Blank Filling rules are not just statements of relationships between phonological segments and orthographic symbols; they also contain the condition for the insertion of these segments into empty melodic slots – namely stressedness. Under the approach developed in this section, though, conditions for change have been kept separate from the actual changes they prompt. While Blank Filling's local changes can be integrated into the relationship statements as in (6) above, a further condition will be needed, one which requires stressed syllables to contain full, specified vowels, something like:

(7)

$$\begin{array}{c} *\sigma_S \\ | \\ \text{Nuc} \\ | \\ /\text{ə}/ \end{array}$$

This condition must for obvious reasons not be allowed to influence stress assignment itself. But it would mean that once a syllable containing underlying schwa had been stressed, then the schwa would have to be replaced with a full vowel.

Another point of interest here is the question of whether or not the underspecification of schwa would need to be retained under this approach. Would it be possible for the statements in (6) to encompass a fully-specified schwa too? For example, they could be represented as:

(8) (a)

\begin{tikzcd}
/\text{e}/ \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & \langle\text{a}\rangle & /\text{a}/ \arrow[dl, leftrightarrow] \\
& /\text{ə}/ &
\end{tikzcd}

(b)

\begin{tikzcd}
/\text{i}/ \arrow[rr, leftrightarrow] \arrow[dr, leftrightarrow] & \langle\text{e}\rangle & /\text{ɛ}/ \arrow[dl, leftrightarrow] \\
& /\text{ə}/ &
\end{tikzcd}

If the distinct vowels /o/ and /ɒ/ (for instance) can be interchanged, depending on morpho-phonological conditions on tenseness, then could fully-specified schwa form part of the alternation, depending on stressedness? Then, for example, *convict*$_{N,V}$ or *Milton* could contain full underlying /ə/. Regular stress assignment in the verb *convict* and in *Milton* would leave their respective /ə/ syllables unstressed, so /ə/ would surface. But in the noun *convict*, a foot will be built over the first syllable (see Ch. 7); by (no. above) this will force the insertion of a full vowel. /o/ or /ɒ/ would be the possible candidates; the lax vowel can be inserted as a default, if we assume that tense vowels only replace schwa under specified conditions such as CiV Tensing, or the syllabification requirement on first-stratum prefixed nouns. In the derivation of *Miltonian*, CiV Tensing will demand the insertion of the full tense vowel /o/; in *Miltonic*, the stress condition (7) will ensure the insertion of /ɒ/.

An analysis like this may be possible, depending on the fate of the RW rule in BDLP. Schwa-full vowel alternations, being crucially dependent on stress, require lexical category specification, and therefore the prior operation of the Root-to-Word rule. The stress-sensitive replacement of a fully-specified (rather than an underspecified) schwa with another full vowel will be technically structure-changing, and if RW is retained as a blocking rule then such a replacement will be banned. However, if RW is not retained, or is stripped of this function, then underspecification may prove unnecessary, and an analysis like the one outlined in the previous paragraph will be applicable.

So, the loss or retention of RW is the subject of the next section: there I discuss the substantial problems involved in retaining it, or replacing it with a similar listing device. But, as we will see, it is in many ways fundamental to BDLP's architecture: the loss of Root-to-Word will have profound consequences for the model.

8.4.3 Replacing Root-to-Word?

The analyses of the full vowel-schwa alternations given in 7.6, and of the tense-lax vowel alternations given in 8.4.2, both attempt to avoid any need for a stipulated Strict Cyclicity Condition or other manifestation of the non-derived environment blocking of phonological rules. The original impetus for these suggestions was the difficulty with RW's function as the blocking rule. In 7.6 we saw that it is overconstraining, blocking any phonological rules sensitive to stress (since stress depends on the lexical category assigned by RW and must therefore apply after it). But in 8.4.2 we saw that RW is also arguably underconstraining, being unable to restrict structure-changing rules to phonologically-derived environments where necessary – it allows Vowel Shift to apply where no tensing or laxing happens.

In this section I will show that these are not the only difficulties with having RW as the blocking rule. There are potential objections to the concept of a lexical-category assignment rule quite independently of its role as 'rule A' of the EC; and there are also problems with any kind of listing device functioning in this way. Perhaps there are also more general difficulties with trying to link the blocking of structure-changing phonological rules with the blocking of morphological processes which would create a form semantically or phonologically non-distinct from an existing word. However, it is clear that if we were to try and remove RW from BDLP, this would have serious consequences for the model; so after considering the problems with having this rule, I go on to consider the problems with *not* having it.

We have already seen in Chapter 2 that RW is problematic in its own right, regardless of its part in the EC. It is basically a listing device given independent motivation by being made a lexical category assigner: roots in BDLP are underlyingly uncategorised, and remain so even after suffixation. However, this lack of lexical category is open to accusations of ad hoc-ness even in simple roots; in suffixed forms it is counterintuitive.

But of course, without this function RW becomes a simple listing device – its origin in Kiparsky's (1982) identity rules (see 2.2, 2.3) is clear. And such rules are immediately open to criticism on the grounds of their having no independent motivation. Kiparsky's identity rules simply re-listed forms which (when monomorphemic) would anyway have been stored as basic lexemes; their sole function was to block structure-changing phonological rules. And lack of independent motivation is not the only problem; we saw above (7.2.2) that the function of RW or any listing device as 'rule A' of the EC is questionable given that these rules arguably are very general in their input; they are not formulated differently for each root, and are therefore not really maximally specific, as a real 'rule A' must be.

We might also ask whether it is appropriate for a morphological process to be able to block a strictly phonological one. Although the inputs to the different rules might be formally the same, they are selected for different reasons – semantic or syntactic in the case of morphological rules, phonological for phonological rules.

Any listing device which might replace RW would need to operate not only on monomorphemic, simple roots, but also on complex roots, the outputs of Stratum 1 morphology. By listing complex as well as simple forms, Giegerich's RW rule can effect the blocking of second-stratum morphological rules, as well as first-stratum phonological ones. This is token blocking – i.e. the prior existence of a given item may block the formation of another. Giegerich (2001) argues that there is no such thing as type blocking (i.e. one process blocking another), only token blocking; and that this generalisation is neatly captured by this feature of BDLP. Without some kind of listing or storage of first-stratum outputs, this may be lost to us.

However, it is very difficult to formulate a listing device which will apply in both simple and complex forms, and block structure-changing phonological rules in the former but not in the latter. RW fails in this respect because it blocks some structure-changing rules in complex forms where they should be able to apply. It seems to apply one cycle too early, as noted above (7.6). Any listing device which might take RW's place would have to apply *after* the cycle of stress and the subsequent structure-changing rules in morphologically complex roots, but *before* this cycle in simple ones. It is doubtful whether these requirements could be reconciled in one independently-motivated listing rule.
Ultimately I think we might question whether or not it is really necessary to have a particular listing mechanism on the root level to effect token blocking anyway. Morphology on this stratum is in any case listed; if storage of inputs and outputs is an inherent feature of first-stratum morphology, then perhaps this could be the source of token blocking, without any need for a separate, stipulated rule.

So: there are many difficulties for the RW rule and for any possible listing device which could serve as the blocker of phonological rules on Stratum 1 and morphological rules on Stratum 2. Perhaps the idea of applying such a unifying rule is simply too ambitious, and a different approach is needed. In my suggested solution to the problems with RW (7.6, 8.4.2), I sketched out a model in which the phonological side of this blocking was hopefully rendered unnecessary. Some structure-changing phonological rules which apply in morphologically derived environments were rewritten as well-formedness conditions; and some structure-changing rules triggered by them (i.e. those which apply in phonologically-derived environments) were reformulated as repair statements. If we could obviate the concept of non-derived environment blocking, and effect morphological token blocking simply through the automatic storage of forms on Stratum 1 (perhaps with a different formulation of the EC), then the difficulties with RW and listing devices as discussed above become irrelevant.

However, RW is well integrated into the operation of BDLP's Stratum 1; the potential loss of this rule would have profound consequences for the model. The most obvious is that the lexical-category status of roots, complex and simple, is no longer clear. Without any need for a RW rule, should roots underlyingly bear lexical category, rather than being uncategorised and having it assigned on exit to the word level? Or might they remain uncategorised, with some kind of category-assignment (one without RW's blocking powers) retained? We have already seen (Chapter 2) that first-stratum morphology, being listed, does not depend on roots bearing lexical category, so from this point of view they could remain uncategorised. But it seems preferable to allow complex roots to bear lexical category, since suffixes normally determine this – e.g. forms in *-ity* and *-(a)tion* are always nouns; the outputs of 'head' prefixation on this stratum are also always categorised. Meanwhile, in bound roots, the arguments for withholding lexical category are very strong. As noted in Chapter 2, the reasoning behind saying a root like *orna*, for example, (as in *ornament*) is a verb, because *-ment* often attaches to verbs to form nouns, is circular; and different suffixations may provide conflicting evidence as to what lexical category a bound root might carry.

However, among morphologically simple, potentially free roots the situation is less clear. There is nothing to stop these forms from being lexically categorised; this could distinguish free from bound roots. However, as already pointed out, no morphological operation depends on lexical categorisation, and where one form can have more than one lexical category, it can be hard to tell which of the categories is basic and which derived.

Another factor to consider with simple, free roots is the regularising function of the RW as a lexical category assigner. It means that in all first-stratum forms, simple or complex, the generalisation 'no phonology before morphology' applies: the first cycle must be started by a morphological process, be it prefixation, suffixation, or lexical category assignment. Without a RW rule, syllabification and stress will have to apply to free roots with no morphological trigger. This means that, in complex roots, whether or not the base is syllabified and stressed and then affixed, or whether it is affixed first and then syllabified and stressed, may be ambiguous. The RW rule predicted syllabification from scratch in all first-cycle affixations (Giegerich 1999: 261); in its absence, this is no longer the case.

The question of roots and lexical category has particular relevance for the BDLP analysis of the Latinate stress doublets presented in Chapter 7: there the *convict* nouns and verbs were linked by a common uncategorised root, which could be seen as semantically underspecified. This treatment was described as making a virtue out of a necessity (verb-to-noun derivations being impossible on a stratum with no lexical categorisation); but any change to it could transform the whole analysis. In some ways it might be preferable to return to a verb-to-noun analysis for these forms; after all, the verbs usually have the more general meaning, with the nouns often referring to some very limited aspect of this. However, this would be phonologically transforming: the analysis above, where nouns and verbs were syllabified and stressed quite independently of each other, would be possible; but nominal phonology could alternatively now be derived from the verbal phonology. Indeed, as noted in the previous paragraph, this would be ambiguous.

It is clear that this matter deserves further and fuller treatment than there is space for here. The fate of the Root-to-Word rule – whether or not it is retained, whether it should effect any kind of blocking, and whether roots should be lexically categorised – is of central importance to BDLP. I have merely pointed out some of the issues involved in this section. There are obviously serious flaws in the way RW operates; but any revised or replacement listing device would be very hard to formulate, and it is not clear in any case how appropriate such a mechanism would be as a blocking rule. However, there are also advantages in having RW; and it is so well integrated into BDLP that the model would be completely transformed without it. I leave this question to further research.

Thus, the difficulty in applying structure-changing rules sensitive to stress or lexical category, as first pointed out in Chapter 7, has far-reaching consequences for BDLP. In this chapter, I have outlined a potential alternative way to deal with first-stratum phonology, and have explored some of the effects of removing the RW rule from Stratum 1; the implications of these rather speculative sections are summarised in the following, final section.

8.4.4 Implications: speculative conclusions

In Chapters 6 and 7 a BDLP analysis of the English stress-doublets, and of other prefixal forms, was developed. While the model proved successful as a framework for this analysis, a serious problem with the way it operates in certain suffixed forms was discovered. In section 7.6, and in the subsections of 8.4, the possibility of a solution to this problem, and alternative analyses of some of the morphological processes affected by it, have been considered. Here, I wish to draw together some possible implications of this work.

One of the great strengths of the BDLP model of the English lexicon is the way in which the division between its two strata is made – they are distinguished not by what morphological processes they contain, but by the format of these processes. It is expected that many affixes may attach on both strata (though usually with a preference for one or the other). As with other lexical phonological models (and sub- or co-phonologies in OT), certain phonological processes may be associated with certain morphological processes. For example, the division of phonological and morphological labour between the two strata in BDLP predicts that differences in foot assignment on a given base will be associated with first-stratum but not second-stratum morphology; while differences in the relative prominence between feet on a given form may occur with either type of morphology.

The problem of bracketing paradoxes, which have afflicted many stratified models, is solved with reference to (token) blocking. For example, if a verb has a listed first-stratum action nominalisation, no new action noun will be formed from it on Stratum 2 because any rule which would do so is blocked; and this applies where the verb has been prefixed too.

These features of the BDLP model have provided a good basis for the analysis of stress doublets. Indeed, this data has arguably given support to the idea of a two-strata lexicon like BDLP's: irregular internal prefixal structure groups with differences in foot assignment between nouns and verbs, and with irregularity in external noun-verb relationships; while regular prefixal semantics group with consistent foot assignment in nouns and verbs, and with transparency in noun-verb relationships.

However, there are other aspects of the BDLP model which have proved problematic. The denial of lexical category to all roots, even complex ones, seems stipulative. And the Root-to-Word lexical category assigner, designed as a listing device which acts as 'rule A' of the Elsewhere Condition and therefore blocks both structure-changing phonological rules and second-stratum morphological rules, is flawed. We saw that it is over-restrictive in that it blocks structure-changing phonological rules which are sensitive to stress (because this depends on lexical category); rules like CiV Tensing and Trisyllabic Shortening, formulated to be sensitive to stress, are therefore not allowed to apply. Elsewhere, though, RW is under-restrictive, able to limit rule application to morphologically derived environments, but not to phonologically derived ones. Vowel shift rules need this restriction since they must be triggered by a change in tenseness which is itself triggered by suffixation.

My initial solution to the RW problem in 7.6 was basically to sidestep it. CiV Tensing could be reformulated as a morpho-phonological well-formedness condition on syllable structure (the X-mapping of vowel melodies); if the suffixes which trigger it can be referred to directly then there is no need to relate the condition to stress. This, in combination with vowel underspecification and blank filling rules, provided a viable analysis of schwa-full vowel alternations in CiV Tensing environments.

However, this does not address the overall problem of the RW rule; and is not extensible to other first-stratum morpho-phonological alternations which are disrupted by RW. In 8.4.2 I expanded this approach; structure-changing phonological rules which apply in morphologically derived environments were rewritten as well-formedness conditions; the structural changes triggered by these were accommodated by repair statements of segmental relationships like '/e/ ↔ /a/' or '/k/ → /s/', which replaced structure-changing rules which apply in phonologically derived environments, like Vowel Shift. Thus TSS or CiV Tensing became conditions requiring a particular tenseness value (or number of X-positions) in a syllable nucleus, depending on morphological structure. Affixed bases in which the tenseness value of the syllable in question violates one of these conditions are repaired with reference to the relationship statements; these can have no relevance to morphologically simple forms not affected by conditions like TSS.

If this kind of approach is extensible to all first-stratum phonology, then there will be no need for any Strict Cyclicity Condition or RW rule – and the latter can be excised from the first stratum.

However, as we saw in 8.4.3, simply removing RW has other consequences for BDLP, opening up the question of the lexical categorisation (or not) of roots, and leaving an indeterminacy as to the relative orderings of phonological and morphological processes. And while phonological blocking may become unnecessary, RW's role in the token blocking of second-stratum morphological processes is still needed.

But hopefully this could be effected simply by reference to the listedness of all Stratum 1 morphology, and need not depend on a RW-type rule. If the first-stratum morphology is seen as a stative web of relationships, with all outputs – i.e. complex and simple forms – stored, then any second-stratum morphology which would produce exact synonyms or homonyms should automatically be blocked. This can still be consistent with one of the suggestions made in this thesis, that of morphological semi-complexity (see Ch. 7) – this may be seen as fossilised internal structure in a form not linked to another root, or may represent a weaker link between related forms than a full morphological relationship.

Naturally, this quick sketch of a possible solution to some of BDLP's problems leaves many questions unanswered and indeed unasked. A new model with (perhaps) lexically categorised roots, and first-stratum phonology expressed as stative well-formedness conditions and relations between particular segments would be very different from the BDLP assumed in much of this thesis. Further research and exploration of such a model would clearly be needed in order to assess its viability.

Of course, one main difference from the existing BDLP model would be a reduction in the number of intermediate levels of representation distinct from both underlying and surface forms. For example, consider the traditional-style derivation of *serenity* from underlying *serene*. The vowel of the second syllable of the *serene* root is [+tense, +high, -low]. After suffixation this vowel is subject to TSS, which produces a [-tense, +high, -low] output, i.e. /ɪ/, which never surfaces. Then it is lax vowel shifted to produce the [-tense, -high, -low] output of *serenity*, /ɛ/. By contrast, in the model outlined above, the base's /i/ will directly map to /ɛ/ in *serenity* by the check against the TSS condition, and its automatic repair.

This simplicity is an advantage, and chimes with approaches elsewhere in phonological theory (cf. the section on OT, 2.4). It might be possible for all the well-formedness conditions and their structural changes to operate simultaneously in producing the correct phonological output for a listed morphological combination. This would mean that stress and syllabification must be re-statable as conditions or partial templates for outputs – the syllabification algorithm used here (cf. Giegerich 1999) is designed to be sequential in operation.

If this were the case, then the relative ordering of morphological and phonological processes within the stratum (which was left ambiguous in the absence of RW) would no longer be an issue. In a sense all morphology will happen first anyway – if all simple and combined forms are listed in a kind of stative web, rather than being dynamic processes. The various conditions on phonological structure would be able to see a form's internal morphological structure; in this way apparent phonological cyclicity could be dealt with. For example, the second secondary stress in *còndènsátion* would be explicable with reference to the stress assigned to its internal verb, *condénse*. However, internal morphology is plainly not always respected in this way: *resérve*'s main stress does not appear in *rèservátion*.

It is possible that certain phonological conditions applicable within a first-stratum complex word might make conflicting demands; precedence could be determined by reference to the Elsewhere Condition, the most specific applying in preference to the more general. However, at present possibilities like this can only be speculative.

Morphologically, the first stratum of a model like this bears some similarity to the connectionist-type approach developed by Bybee (1985, 1988, 1995); and perhaps more especially to the approach of Pinker (1998, 2000), who argues that human language is produced by 'two distinct cognitive mechanisms: associative memory and symbol-manipulating rules' (1998: 219). The stative web of morphological relationships of the first stratum, and the rule-based morphology of the second stratum, are ultimately attempts to capture the same insight.

A model with a first stratum morphology and phonology organised along these lines will still be derivational, in the sense that it depends on underlying forms and a certain (limited) number of intermediate representations: the root stratum will have an output that may then be subject to word-level phonological and morphological processes. On this stratum the morphology is rule-based and productive, not listed; conventionally it precedes all the phonology. The general format of the phonological processes on this second stratum I leave open. In my analysis of the second-stratum stress doublets, the relevant phonology – the footing of prefixes and the determination of the relative prominence between prefixal and base feet – was all expressible as well-formedness conditions, and therefore consistent with a declarative-type model. This may not be the case for all second-stratum processes though.

If answers can be found to the questions and considerations raised in this and the previous section, the development of the model as sketched out in 7.6 and 8.4.2 may be possible. My basic aim in these sections has been to retain the good parts of BDLP (especially its morphological stratification, and its recognition of the significance of blocking), but to change the model so it need not rely on the RW rule or a stipulation of the SCC; and indeed to simplify its phonology and make it more declarative in nature, so that chains of rules and constraints on these rules, and intermediate representations, are unnecessary. There is not the scope here to develop such a model more fully; more research will be needed to see whether it is viable, and what the implications of its way of dealing with phonology and morphology might be.

Appendix I: Phonology of the stress-doublets

	Word	Verb Pronunciation	Noun/Adj. Pronunciation	Segmental difference between verb and noun? In prefix or base?
Latinate, bound-base, non-recurrent	accent	ak'sɛnt	'aksənt	Yes - base
	alloy	ə'lɔɪ	'alɔɪ	Yes – prefix
	annex	ə'nɛks	'anɛks	Yes – prefix
	combat	'kɒmbat/ kəm'bat	'kɒmbat	Yes – prefix
	combine	kəm'baɪn	'kɒmbaɪn	Yes – prefix
	con.cert	kən'sɜ:t	'kɒnsət	Yes - prefix and base
	contrast	kən'trɑ:st	'kɒntrɑ:st	Yes – prefix
	desert	dɪ'zɜ:t	'dɛzət	Yes – both
	escort	ɪ'skɔ:t	'ɛskɔ:t	Yes – prefix
	essay	ɛ'se:	'ɛse:	No
	excerpt	ɛk'sɜ:pt	'ɛksɜ:pt	No
	ex.ploit	ɪk'splɔɪt	'ɛk,splɔɪt	Yes - prefix
	incense	ɪn'sɛns	'ɪnsɛns	No
	intrigue	ɪn'tri:g	'ɪntri:g	No
	invite	ɪn'vaɪt	'ɪnvaɪt	No
	occult	ə'kʌlt	'ɒkʌlt	Yes - prefix
	presage	'prɛsɪdʒ / prɪ'se:dʒ	'prɛsɪdʒ	Yes – both
	re.bel	rɪ'bɛl	'rɛbl̩	Yes: prefix and base
Latinate, bound base, recurrent	absent	ab'sɛnt	'absənt	Yes – base
	abstract	,ab'strakt	'abstrakt	No
	addict	ə'dɪkt	'adɪkt	Yes - prefix
	affect	ə'fɛkt	'afɛkt	Yes - prefix
	ally	ə'laɪ	'alaɪ	Yes - prefix
	collect	kə'lɛkt	'kɒlɛkt	Yes - prefix
	com.mune	kə'mju:n	'kɒm,ju:n	Yes: prefix
	compound	kəm'paʊnd	'kɒmpaʊnd	Yes - prefix
	compress	kəm'prɛs	'kɒmprɛs	Yes - prefix
	concrete	kən'kri:t	'kɒŋkri:t	Yes - prefix
	conduct	kən'dʌkt	'kɒndʌkt	Yes - prefix
	confine	kən'faɪn	'kɒnfaɪn	Yes - prefix
	conflict	kən'flɪkt	'kɒnflɪkt	Yes - prefix
	conscript	kən'skrɪpt	'kɒnskrɪpt	Yes - prefix
	conserve	kən'sɜ:v	'kɒnsɜ:v	Yes - prefix
	consort	kən'sɔ:t	'kɒnsɔ:t	Yes - prefix
	construct	kən'strʌkt	'kɒnstrʌkt	Yes - prefix
	contact	'kɒntakt / kən'takt	'kɒntakt	Yes - prefix
	contest	kən'tɛst	'kɒntɛst	Yes - prefix

		Verb	Noun	Segmental diff.?
Latinate, bound base, recurrent	contract	kən'trakt	'kɒntrakt	Yes - prefix
	converse	kən'vɜ:s	'kɒnvɜ:s	Yes - prefix
	convert	kən'vɜ:t	'kɒnvɜ:t	Yes - prefix
	convict	kən'vɪkt	'kɒnvɪkt	Yes - prefix
	decrease	ˌdi:'kri:s	'di:kri:s	No
	de.fect	dɪ'fɛkt	'di:ˌfɛkt	Yes: prefix
	descant	dɪ'skant	'dɛskant	Yes - prefix
	digest	ˌdaɪ'dʒɛst / dɪ'dʒɛst	'daɪdʒɛst	No
	discord	ˌdɪs'kɔ:d	'dɪskɔ:d	No
	discourse	ˌdɪs'kɔ:s	'dɪskɔ:s	No
	dis.pute	dɪ'spju:t	'dɪsˌpju:t	No
	ex.port	ɪk'spɔ:t	'ɛkˌspɔ:t	Yes: prefix
	extract	ɪk'strakt	'ɛkstrakt	Yes - prefix
	impact	ˌɪm'pakt	'ɪmpakt	No
	import	ˌɪm'pɔ:t	'ɪmpɔ:t	No
	increase	ɪn'kri:s	'ɪŋkri:s	No
	indent	ɪn'dɛnt	'ɪndɛnt	No
	insert	ɪn'sɜ:t	'ɪnsɜ:t	No
	insult	ɪn'sʌlt	'ɪnsʌlt	No
	intercept	ˌɪntə'sɛpt	'ɪntəsɛpt	No
	interdict	ˌɪntə'dɪkt	'ɪntədɪkt	No
	intern	ɪn'tɜ:n	'ɪntɜ:n	No
	interrupt	ˌɪntə'rʌpt	'ɪntərʌpt	No
	introvert	ˌɪntrə'vɜ:t	'ɪntrəvɜ:t	No
	invert	ɪn'vɜ:t	'ɪnvɜ:t	No
	object	əb'dʒɛkt	'ɒbdʒɛkt	Yes - prefix
	perfect	pə'fɛkt	'pɜ:fɪkt	Yes – both
	permit	pə'mɪt	'pɜ:mɪt	Yes - prefix
	pervert	pə'vɜ:t	'pɜ:vɜ:t	Yes - prefix
	premise	'prɛmɪs / prɪ'maɪz	'prɛmɪs	Yes - both
	present	prɪ'zɛnt	'prɛzənt	Yes - both
	proceed(s_N)	prə'si:d	'pro:si:dz	Yes - prefix
	produce	prə'dju:s	'prɒdju:s	Yes - prefix
	progress	prə'grɛs	'pro:grɛs	Yes - prefix
	pro.ject	prə'dʒɛkt	'prɒˌdʒɛkt	Yes: prefix
	prospect	prə'spɛkt	'prɒspɛkt	Yes - prefix
	prostrate	prə'strɛɪt	'prɒstrɛɪt	No
	protest	prə'tɛst	'pro:tɛst	Yes - prefix
	purport	pə'pɔ:t	'pɜ:pɔ:t	Yes - prefix
	rebate	rɪ'be:t	'ri:be:t	Yes - prefix
	re.cord	rɪ'kɔ:d	'rɛˌkɔ:d	Yes: prefix
	re.fuse	rɪ'fju:z	'rɛfˌju:z	Yes: prefix
	regress	rɪ'grɛs	'ri:grɛs	
	re.ject	rɪ'dʒɛkt	'ri:ˌdʒɛkt	Yes: prefix
	relay	'ri:lɛɪ / rɪ'lɛɪ	'ri:lɛɪ	Yes - prefix
	remit	rɪ'mɪt	'ri:mɪt	Yes - prefix
	retail	rɪ'te:l	'ri:te:l	Yes - prefix
	retard	rɪ'tɑ:d	'ri:tɑ:d	Yes - prefix

		Verb	Noun	Segmental diff.?
Latinate, bound base, recurrent	subject	səb'dʒɛkt	'sʌbdʒɛkt	Yes - prefix
	survey	sə've:	'sɜ:ve:	Yes - prefix
	suspect	sə'spɛkt	'sʌspɛkt	Yes - prefix
	transfer	ˌtrans'fɜ:	'transfɜ:	No
	trans.port	ˌtrans'pɔ:t	'transˌpɔ:t	No
	traverse	trə'vɜ:s	'travɜ:s	Yes - prefix
		Verb	**Noun**	**Segmental diff.?**
Borderline bound/ free word base?	affix	ə'fɪks	'afɪks	Yes - prefix
	discard	ˌdɪs'kɑ:d	'dɪskɑ:d	No
	discharge	ˌdɪs'tʃɑ:dʒ	'dɪstʃɑ:dʒ	No
	implant	ɪm'plɑ:nt	'ɪmplɑ:nt	No
	impress	ɪm'prɛs	'ɪmprɛs	No
	imprint	ɪm'prɪnt	'ɪmprɪnt	No
	incline	ɪn'klaɪn	'ɪnklaɪn	No
	infix	'ɪnfɪks / ˌɪn'fɪks	'ɪnfɪks	No
	prefix	'pri:fɪks / ˌpri:'fɪks	'pri:fɪks	No
	rebound	rɪ'baʊnd	'ri:baʊnd	Yes - prefix
	recall	rɪ'kɔ:l	'ri:kɔ:l	Yes - prefix
	recoil	rɪ'kɔɪl	'ri:kɔɪl	Yes - prefix
	reflex	rɪ'flɛks	'ri:flɛks	Yes - prefix
	refund	rɪ'fʌnd	'ri:fʌnd	Yes - prefix
	relapse	rɪ'laps	rɪ'laps / 'ri:laps	Yes - prefix
	rewind	ˌri:'waɪnd	'ri:waɪnd	No
	transform	ˌtrans'fɔ:m	'transfɔ:m	No
	transplant	ˌtrans'plɑ:nt	'transplɑ:nt	No
		Verb	**Noun**	**Segmental diff.?**
Productive prefixations	discount	ˌdɪs'kaʊnt	'dɪskaʊnt	No
	foretaste	ˌfɔ:'te:st	'fɔ:te:st	No
	interchange	ˌɪntə'tʃe:ndʒ	'ɪntətʃe:ndʒ	No
	interface	ˌɪntə'fe:s	'ɪntəfe:s	No
	interlock	ˌɪntə'lɒk	'ɪntəlɒk	No
	miscount	ˌmɪs'kaʊnt	'mɪskaʊnt	No
	misfire	ˌmɪs'faɪə	'mɪsfaɪə	No
	misfit	ˌmɪs'fɪt	'mɪsfɪt	No
	mishit	ˌmɪs'hɪt	'mɪshɪt	No
	miskick	ˌmɪs'kɪk	'mɪskɪk	No
	mismatch	ˌmɪs'matʃ	'mɪsmatʃ	No
	misprint	ˌmɪs'prɪnt	'mɪsprɪnt	No
	misshape	ˌmɪs'ʃe:p	'mɪsʃe:p	No
	rebore	ˌri:'bɔ:	'ri:bɔ:	No
	recharge	ˌri:'tʃɑ:dʒ	'ri:tʃɑ:dʒ	No
	recount	ˌri:'kaʊnt	'ri:kaʊnt	No
	redraft	ˌri:'drɑ:ft	'ri:drɑ:ft	No
	refill	ˌri:'fɪl	'ri:fɪl	No
	refit	ˌri:'fɪt	'ri:fɪt	No
	rehash	ˌri:'haʃ	'ri:haʃ	No
	reheat	ˌri:'hi:t	'ri:hi:t	No
	relaunch	ˌri:'lɔ:ntʃ	'ri:lɔ:ntʃ	No

		Verb	Noun	Segmental diff.?
Productive prefixations	reload	ˌriːˈloːd	ˈriːloːd	No
	remake	ˌriːˈmeːk	ˈriːmeːk	No
	rematch	ˌriːˈmatʃ	ˈriːmatʃ	No
	remix	ˌriːˈmɪks	ˈriːmɪks	No
	remould	ˌriːˈmoːld	ˈriːmoːld	No
	remount	ˌriːˈmaʊnt	ˈriːmaʊnt	No
	repaint	ˌriːˈpeːnt	ˈriːpeːnt	No
	replay	ˌriːˈpleː	ˈriːpleː	No
	reprint	ˌriːˈprɪnt	ˈriːprɪnt	No
	rerun	ˌriːˈrʌn	ˈriːrʌn	No
	reset	ˌriːˈsɛt	ˈriːsɛt	No
	reshuffle	ˌriːˈʃʌfl̩	ˈriːʃʌfl̩	No
	resit	ˌriːˈsɪt	ˈriːsɪt	No
	respray	ˌriːˈspreː	ˈriːspreː	No
	retake	ˌriːˈteːk	ˈriːteːk	No
	rethink	ˌriːˈθɪŋk	ˈriːθɪŋk	No
	retouch	ˌriːˈtʌtʃ	ˈriːtʌtʃ	No
	retread	ˌriːˈtrɛd	ˈriːtrɛd	No
	revamp	ˌriːˈvamp	ˈriːvamp	No
	rewrite	ˌriːˈraɪt	ˈriːraɪt	No
	sublease	ˌsʌbˈliːs	ˈsʌbliːs	No
	sublet	ˌsʌbˈlɛt	ˈsʌblɛt	No
		Verb	**Noun**	**Segmental diff.?**
Particle compounds	inlay	ˌɪnˈleː	ˈɪnleː	No
	inset	ˌɪnˈsɛt	ˈɪnsɛt	No
	offset	ˌɒfˈsɛt	ˈɒfsɛt	No
	outlay	ˌaʊtˈleː	ˈaʊtleː	No
	outpour	ˌaʊtˈpɔː	ˈaʊtpɔː	No
	outspread	ˌaʊtˈsprɛd	ˈaʊtsprɛd	No
	overdub	ˌoːvəˈdʌb	ˈoːvədʌb	No
	overflow	ˌoːvəˈfloː	ˈoːvəfloː	No
	overhang	ˌoːvəˈhaŋ	ˈoːvəhaŋ	No
	overhaul	ˌoːvəˈhɔːl	ˈoːvəhɔːl	No
	overlap	ˌoːvəˈlap	ˈoːvəlap	No
	overlay	ˌoːvəˈleː	ˈoːvəleː	No
	overlook	ˌoːvəˈlʊk	ˈoːvəlʊk	No
	overpass	ˌoːvəˈpɑːs	ˈoːvəpɑːs	No
	overprint	ˌoːvəˈprɪnt	ˈoːvəprɪnt	No
	overthrow	ˌoːvəˈθroː	ˈoːvəθroː	No
	overturn	ˌoːvəˈtɜːn	ˈoːvətɜːn	No
	undercut	ˌʌndəˈkʌt	ˈʌndəkʌt	No
	underlay	ˌʌndəˈleː	ˈʌndəleː	No
	underline	ˌʌndəˈlaɪn	ˈʌndəlaɪn	No
	underscore	ˌʌndəˈskɔː	ˈʌndəskɔː	No
	upcast	ˌʌpˈkɑːst	ˈʌpkɑːst	No
	update	ˌʌpˈdeːt	ˈʌpdeːt	No
	upgrade	ˌʌpˈgreːd	ˈʌpgreːd	No
	uplift	ˌʌpˈlɪft	ˈʌplɪft	No
	upset	ˌʌpˈsɛt	ˈʌpsɛt	No
	upstart	ˌʌpˈstɑːt	ˈʌpstɑːt	No
	upturn	ˌʌpˈtɜːn	ˈʌptɜːn	No

		Verb	Noun	Segmental diff.?
Particle prefixations	overbid	ˌo:vəˈbɪd	ˈo:vəbɪd	No
	overburden	ˌo:vəˈbɜ:dən	ˈo:vəbɜ:dən	No
	overcall	ˌo:vəˈkɔ:l	ˈo:vəkɔ:l	No
	overcharge	ˌo:vəˈtʃa:dʒ	ˈo:vətʃa:dʒ	No
	overdose	ˌo:vəˈdo:s	ˈo:vədo:s	No
	overload	ˌo:vəˈlo:d	ˈo:vəlo:d	No
	overmatch	ˌo:vəˈmatʃ	ˈo:vəmatʃ	No
	overshoot	ˌo:vəˈʃu:t	ˈo:vəʃu:t	No
	overspend	ˌo:vəˈspɛnd	ˈo:vəspɛnd	No
	overweight	ˌo:vəˈwe:t	ˈo:vəwe:t	No
	overwork	ˌo:vəˈwɜ:k	ˌo:vəˈwɜ:k / ˈo:vəwɜ:k	No
	undercharge	ˌʌndəˈtʃɑ:dʒ	ˈʌndətʃɑ:dʒ	No
		Verb	**Noun**	**Segmental diff.?**
Others	augment	ˌɔ:gˈmɛnt	ˈɔ:gmɛnt	No
	dictate(s_N)	ˌdɪkˈte:t	ˈdɪkte:ts	No
	ferment	fəˈmɛnt	ˈfɜ:mɛnt	Yes - base
	fragment	ˌfragˈmɛnt	ˈfragmənt	Yes – suffix
	frequent	frɪˈkwɛnt	ˈfri:kwənt	Yes - both
	hydrate	haɪˈdre:t	ˈhaɪdre:t	No
	pigment	ˌpɪgˈmɛnt	ˈpɪgmənt	Yes - suffix
	quadrate	kwɒˈdre:t	ˈkwɒdre:t	No
	rampage	ˌdɪkˈte:t	ˈdɪkˌte:t	No
	segment	ˌsɛgˈmɛnt	ˈsɛgmənt	Yes – suffix
	torment	ˌtɔ:ˈmɛnt	ˈtɔ:mɛnt	No

Appendix II Semantic relationships between stress doublet nouns and verbs

Latinate, bound base, non-recurrent	***Verb definition***	***Noun definition***	***Noun's relationship to verb***	***Alternative nominalisations of verb (* if rarer or less clearly related to verb)***
accent	to distinguish with stress, emphasize	prominence given to a syllable by stress or pitch	indirect object	*accentuation*-action
alloy	to mix metals	mixture of metals	effected object	**alloyage*-action
annex	to add, esp. to sth larger / (book, document) to append	addition to a main building or document	effected object	*annexation*-action
combat	to fight, do battle	fight, conflict	action	
combine	to join two or more things together	association of persons etc. furthering their own interests / combine harvester	unrelated	*combination*-act.
concert	arrange by mutual agreement	musical performance / agreement, accordance	action (subsid)	-
contrast	to distinguish by comparison	distinction, emphasis of difference	action	
desert	to abandon	uninhabited, uncultivated land	unrelated	*desertion*-action
escort	to accompany, act as an escort to	accompanying person or group	agent	
essay	to attempt, test, try	literary composition / attempt	action (subsid)	
excerpt	to take a passage from a book	passage taken from a book, extract	effected object	*excerption*-act.
exploit	take advantage of (resources, people) for one's own ends	deed, feat	unrelated	*exploitation*-act.
incense	to enrage	aromatic substance	unrelated	*incensement* –act.
intrigue	to make interested or curious	clandestine plotting or affair	unrelated	
invite	to ask sb courteously to do something, offer entertainment	(colloq.) invitation, an offer of entertainment	action (spec) & effected object	*invitation*-act.
occult	to hide or be hidden (a celestial body by another)	supernatural or magical phenomena	unrelated	*occultation* –act.
presage	to give a forewarning of sth.	warning of sth about to happen	inanimate agent	

rebel	to resist or rise up against authority	a person who resists or fights authority	agent	*rebellion* –action
Latinate, bound base, recurrent	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
$absent_A$	to keep (oneself) away	not present	-adj-	
$abstract_{N,}$	to remove, separate from	summary of an article's contents	effect. obj. (spec)	*abstraction*-action
addict	to cause (sb or self) to become dependent on sth, esp. a drug	sb addicted to habitual use of sth, esp. a drug	affected object	*addiction* –action
affect	to have an effect on, influence	an emotion (psych.)	unrelated	**affection* –unrel.
ally	to unite	one united, associated with another	agent (reflexive)	*alliance* –action
collect	to gather together	a short prayer	unrelated	*collection* –act.
commune	to talk intimately with	group of people living together / intimate conversation	action (subsid)	*communion* –act.
compound	to combine	mixture of elements	effected object	
compress	to press together to make smaller or firmer	pad of material for pressing on wounds	instrument (spec)	*compression* –act.
$concrete_A$	to make concrete (as opposed to abstract)	relating to particular objects / relating to things perceivable by the senses	-adj-	
conduct	to lead, guide	behaviour	unrelated	**conduction* –act. (spec)
confine	to enclose, keep within bounds	(usu. pl.) limits, boundaries	locative	*confinement* –act.
conflict	to come into opposition, clash	battle, clash	action	
conscript	to compel to military service	military recruit obtained by conscription	affected object	*conscription*-act.
conserve	to preserve in existing state / preserve fruit with sugar	preparation of fruit in sugar	effect obj (subsid)	*conservation* –act.
consort	to associate with	partner of reigning monarch	unrelated	
construct	to build, assemble	anything constructed, esp. by the mind	effected object	*construction* –act.
contact	to put, come, or be in contact with	state of touching / an acquaintance	action	
contest	to call sth into question, contend sth	competition, struggle	action (spec)	**contestation* –act.
contract	to become smaller / enter into agreement	formal agreement	effect. obj. (spec)	**contraction* –act.
converse	to engage in conversation with	opposite / conversation (arch.)	action (subsid)	*conversation* –act.
convert	to change in form, character etc. / change sb's beliefs or way of life	a person converted to a particular doctrine	affected object	*conversion* –act.

convict	to find sb guilty of an offence	a person found guilty of an offence	affected object	*conviction* –act.
decrease	to diminish, grow less	process of diminishing / amount by which something gets smaller	action	
defect	to desert one's country, cause, etc. and join opposing forces	shortcoming, imperfection	unrelated	*defection* –act.
descant	to compose or perform a descant	counterpoint above basic melody	action	
digest	to prepare food for assimilation (in the stomach) / reduce information etc. into systematic form	systematic compilation of information	effected object	*digestion*-act.
discord	to disagree	absence of harmony; strife	action	**discordance* – act. (spec)
discourse	to speak or write formally and at length / to hold a discussion	detailed treatment of a subject, dissertation / (arch) conversation	action	
dispute	to argue, debate	argument, debate	action	**disputation*-act.
export	to send or sell goods/ services to foreign countries	goods/ services sent or sold to foreign countries; the process of exporting	action & affected object	**exportation* –act.
extract	to pull out, remove, separate	sth extracted, esp. a passage from a book	effected object	**extraction* –act.
impact	to drive an object against or into another / to have an impact or strong effect	act of one body striking another, collision / impression made by an idea etc.	action	**impaction* –act.
import	to buy or bring in from another country	goods/ services brought in from foreign countries; the process of importing	action & affected object	**importation* –act.
increase	to make or become bigger	act of growing bigger / amount by which sth gets bigger	action	
indent	to move (printed matter) in from the margin	blank space left between margin and beginning of a line	effected object	*indentation* –act.
insert	to put in or between	sth inserted in a book or magazine	affected object	*insertion* –act.
insult	to speak to or treat rudely, offend	offensive remark or action	action	
intercept	to stop or seize on the way from one place to another	(maths) point at which two figures intersect	locative (spec)	*interception*-act.
interdict	to prohibit, forbid (legally / ecclesiastically)	exclusion from RC sacraments/ legal prohibition	action	*interdiction* –act.
intern	to detain, confine	(U.S.) graduate receiving work experience	unrelated	*internment*-act.

interrupt	to break the continuity of an action	signal to stop a computer running one program in order to run another	inanimate agent (spec)	*interruption* –act.
introvert	(pathol.) to turn (a hollow organ) inside out	reserved, shy person	unrelated	*introversion*-act.
invert	to turn upside down or inside out	a homosexual	unrelated	*inversion*-act.
object	to raise a reason for being opposed to sth	tangible, visible thing	unrelated	*objection*-act.
perfect_A	to make perfect	faultless, lacking nothing	unrelated	
permit	to allow, tolerate	official document giving permission for sth	inanimate agent (spec)	*permission*-act.
pervert	to lead sb or sth away from what is considered good or proper	sexual deviant	affected object	*perversion*-act.
premise	to propose sth as a premise	basis for an argument	affected object	
present	to formally give or show sth to sb	a gift	affected object (spec)	*presentation*-act.
proceed(s_N)	to continue with an action / to go on to do sth	money from a commercial transaction	unrelated	*procedure*-manner (spec)
produce	to make or manufacture sth	agricultural products	effected object	*production*-act.; *product*
progress	to move forwards	movement forwards	action	**progression*-act.
project	to predict, estimate / to stick out	proposal, scheme	unrelated	*projection* act. & eff obj
prospect	to search for mineral deposits / to search	chance of future success / vision of the future	unrelated	
prostrate_A	to lie face downwards	lying face down	-adj-	
protest	to make a strong objection to sth	complaint, objection / public demonstration of dissent	action	**protestation*-act.
purport	to claim to be sth	the meaning or significance of sth	unrelated	
rebate	to give sb a rebate	a partial refund, discount	effected object	
record	to set down in some permanent form	lasting account of sth	effected object	*recording*-act. & eff obj (spec))
refuse	to decline to accept sth / to not grant a request	rubbish	unrelated	*refusal* –act.
regress	to return to an earlier (worse) state, revert	movement backwards	action (spec)	*regression* –act.
reject	to refuse to accept, acknowledge, or use sth	sth rejected	affected object	*rejection* –act.
relay	to pass information on to sb	the passing on of sth, esp. information	action	

remit	to send payment for goods or services / to refer a matter to some authority	area of responsibility of person or group	effected object	*remission*- unrel
retail	to relate gossip	sale of goods to consumers	unrelated	
retard	to slow sth down	mentally retarded person	unrelated	*retardation* –act.
subject	to cause to undergo sth	main topic of book, conversation etc.	unrelated	*subjection* –act.
survey	to view or consider sth in a general way	comprehensive or general overview	action	
suspect	to believe sb guilty without proof	a person under suspicion of being guilty	affected object	*suspicion* –act.
transfer	to move (sth or sb) from one place to another	the conveying of sth or sb from one place to another	action	*transference*-act.
transport	to carry people or goods from one place to another	act of carrying from one place to another / means of travelling	action & instrument	*transportation* – act.
traverse	to cross, go over sth	sth being or lying across sth	inan. agent (spec)	*traversal* –act.
Latinate, bound base, recurrent	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
affix	to attach, fasten	part added to a word / something fastened or attached	affected object	*affixation* –act.
discard	to get rid of sth	a discarded item	effected object	
discharge	to release, let out, emit	person or thing discharged / permission to leave an institution	effected object & action (spec)	
implant	to firmly put sth in sth	sth implanted, esp. during surgery	affect. obj. (spec)	*implantation* – act.
impress	to have a strong effect on / to press a shape into sth	a mark or imprint produced by impressing	effected object	*impression*- act.
imprint	to mark by pressing	pressed-in shape / publication details	effected object	
incline	to be disposed to do sth / to slope or slant	a slope	action & eff. obj	*inclination*-act.
infix	to fix sth firmly in sth / to insert an affix in a word	an affix placed inside a word	affected object	*infixation* –act.
prefix	to put or place before / to add a morpheme to the beginning of a word	affix attached at the beginning of a word / sth preceding sth else	affected object	*prefixation*-act.
rebound	to spring back, recoil	the act of springing back	action	
recall	to recollect, remember	act of recalling / memory	action	

recoil	to move back suddenly	sudden backward movement	action	
reflex	to bend or cause to bend backwards	immediate involuntary response	unrelated	
refund	to return money to sb	the return of money, or the amount returned	action & eff. obj	
relapse	to go back to a former state, esp. one of illness or bad habits	act or instance of relapsing	action	
rewind	to wind a tape backwards	process of rewinding sth	action	
transform	to alter or be altered dramatically	(maths / ling.) transformation	action (spec)	*transformation* – act.
transplant	to relocate or transfer, esp. a body organ or plant.	(surgical) procedure of transplantation / the organ etc. transplanted	action (spec)	*transplantation* – act.
Word-based prefixations	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
discount	to disregard sth as unimportant / to reduce the price of sth	a reduction in the price of sth	action & eff. obj	
foretaste	to sample in advance	a sample of what is to come	action	
interchange	to change places, exchange	the act of exchanging or changing places	action	
interface	to be or become an interface (with) / to cause two devices to work together compatibly	the point of interaction btn two systems, processes, subjects etc.	locative	
interlock	to join or be joined firmly by fastening together of parts	act of interlocking or state of being interlocked	action	
miscount	to count or calculate incorrectly	an incorrect count or calculation	action	
misfire	to fail to fire as expected	an act or instance of misfiring	action	
misfit	to fail to fit or be fitted	sb out of place in a particular social environment / sth that does not fit properly	agent & inan agt	
mishit	to hit (a ball) badly	(sport) a faulty shot or stroke	action	
miskick	to kick (a ball) badly or wrongly	an instance of miskicking	action	
mismatch	to match badly	a bad or inappropriate match	action	
misprint	to print (a letter) incorrectly	an error in printing	action & eff obj	
misshape	to shape sth badly	sth that is badly shaped	effected object	
rebore	to bore out a car engine's cylinders and fit pistons	the process of reboring a cylinder	action	
recharge	to charge (with electricity, energy) again	a renewed charge / instance of recharging	action & eff obj	
recount	to count again	an instance of recounting	action	

redraft	to make a second copy of sth; to draft again	a second draft	action & eff obj	
refill	to fill again	a second / subsequent filling	effected object	
refit	to make serviceable again	act or instance of refitting	action	
rehash	to rework previously used material	act or instance of rehashing / material rehashed	action & eff obj	
reheat	to heat again / to add fuel to the exhaust gases of a jet engine	act or process of reheating (both meanings)	action	
relaunch	to launch again	act or process of relaunching	action	
reload	to load again	instance of reloading / the new load	action & eff obj	
remake	to make (esp. a film) again or anew	sth that is made again, esp. a film	effected object	
rematch	to match (two contestants) again	a second or return match between contestants	effected object	
remix	to produce a new version of a piece of music by altering the balance of the sound	a recording that has been remixed	action & eff obj	
remould	to mould again / to reform the tread of a tyre	a remoulded tyre	eff obj (subid)	
remount	to get back on a horse or bicycle	a replacement horse	unrelated	
repaint	to paint again	act of repainting	action	
replay	to play again	act or instance of replaying	action	
reprint	to print again	act or instance of reprinting/ the book etc. reprinted	action & eff obj	
rerun	to run (a race, a play etc.) again	act or instance of rerunning / a film or play etc. run again	action & eff obj	
reset	to set again	act or instance of setting again	action	
reshuffle	to shuffle again/ to interchange jobs within a government	act or instance of reshuffling	action	
resit	to sit an examination again	an examination which is retaken	affected object	
respray	to spray again (esp. paint on a vehicle)	act or instance of respraying	action	
retake	to record, photograph or film sth again	act or instance of retaking, or the product that results from this	action & eff obj	
rethink	to think about sth again	act or instance of rethinking	action	
retouch	to improve a picture etc. with new touches	act or instance of retouching	action	
retread	to put a fresh tread on a tyre	a retreaded tyre	effected object	
revamp	to improve, renovate	act of revamping / sth that has been revamped	action & eff obj	
rewrite	to write sth again	act or instance of rewriting/ sth rewritten	action & eff obj	

sublease	to lease property to a subtenant	a lease of property by a tenant to a subtenant	action	
sublet	to let property to a subtenant	act or fact of subletting	action	
Particle compounds	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
inlay	to embed in sth substance of sth else/ to insert into larger or stouter page	decoration made by inlaying / material to be inlaid	affected object	
inset	to set jewels in gold/ to insert sth in a book or magazine as an inset	sth set in, inserted in a book or magazine	affected object	
offset	to counterbalance	counterbalance	inanimate agent	
outlay	to expend	laying out, expenditure / that which has been spent	action & aff obj	
outpour	to pour out (now poetic)	act of pouring out	action	
outspread	to spread out	action of spreading out	action	
overdub	to impose additional sounds onto an existing recording	sounds imposed over a recording	affected object	
overflow	to flow over, flood	act or fact of flowing over	action	
overhang	to extend beyond or hang over sth	sth that extends beyond or hangs over sth / extent of the projection	action & inan agt	
overhaul	to examine in detail for faults and/ or to repair	act of overhauling	action	
overlap	to lap over, partially cover	occurrence of overlapping	action & eff obj	
overlay	to lay sth over sth	sth laid over sth else	affected object	
overlook	to look over the top of/ to look over & thus fail to see	(U.S.) a high place giving a good view/ act of overlooking	action & locative	
overpass	to pass over (rare) / to exceed	bridge over a road (i.e. sth enabling us to pass over sth)	locative (spec)	
overprint	to print additional matter on sth already bearing print	the additional matter printed	effected object	
overthrow	to throw over, overturn/ to bring about sb's downfall, defeat	act of overthrowing	action	
overturn	to turn (sth/ self) over/ to overthrow, destroy	act of overturning/ state of being overturned	action	
undercut	to charge less than a competitor / to cut away or into the lower part of sth	a part cut away underneath	aff obj (subsid)	

underlay	to support by placing sth underneath	sth laid under sth else	affected object	
underline	to put a line under	a line underneath, esp. under written matter	effected object	
underscore	to draw or score a line under	line drawn below a word	effected object	
upcast	to cast or throw up	material cast or thrown up	affected object	
update	to bring (a person or information) up to date	act or instance of updating	action	
upgrade	to increase the grade or status of a job / to improve equipment	an upgraded version/ act of upgrading	action & aff obj	
uplift	to raise, elevate, lift up	elevation; act or process of lifting up	action	
upset	to overturn or knock over/ to distress	act of overturning/ a disturbance	action	
upstart	to start or spring up (arch.	sb suddenly become important or wealthy	unrelated	
upturn	to turn over, up or upside down	improvement (usu. in economic or business performance)	unrelated	
Particle prefixations	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
overbid	to bid higher than is justified	a bid higher than is justified	action	
overburden	to put too great a burden on	excessive burden	indirect object	
overcall	to make a bid higher than a previous bid or player	(Bridge) a bid higher than a previous bid	action & ind. obj.	
overcharge	to charge too much	an excessive charge	effected object	
overdose	to take or give too large a dose	an excessive dose	action & ind. obj.	
overload	to load with too great a burden	too great a load	indirect object	
overmatch	to be more than a match for	person/ thing that is too great a match for some other	agent & inan agt	
overshoot	to shoot beyond a certain point & miss/ to shoot too hard	action or result of overshooting	action	
overspend	to spend too much	instance of overspending / amount overspent	action & eff obj	
overweight	to weight too heavily	extra weight	indirect object	
overwork	to work or to cause to work too hard	excessive work	action	
under-charge	to charge too little	a charge which is too low	effected object	

Others	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
augment	to increase sth	(Gk and Skr grammar) a vowel prefixed to a verb to form a past tense	indirect obj (spec)	*augmentation* – act.
dictate	to say or read (words to be written down or recorded) aloud / to command authoritatively	authoritative command	effected object	*dictation* -action
ferment	to undergo fermentation / to stir up excitement	agitation, unrest / agent causing fermentation / fermentation itself	action & inan agt	*fermentation* – act.
fragment	to break or cause to break into fragments	piece broken off or detached	effected object	*fragmentation* – act.
frequent$_A$	to visit frequently or habitually	occurring often	-adj-	
hydrate	to combine chemically with water / to cause to absorb water	a chemical compound containing water	effected object	*hydration* –act.
quadr ate	to make sth square or rectangular	a cube or square	effected object	
pigment	to impart colour to sth	substance used to colour sth	indirect object	*pigmentation* –act.
rampage	to rush about angrily or violently	angry or destructive behaviour	action	
segment	to divide sth into segments	section or portion	effected object	*segmentation* – act.
torment	to afflict with great pain or suffering	great physical or mental pain	action	

Appendix III – Semantic relationships between non-stress-alternating verbs and nouns.

Latinate, bound base, non-recurrent	*Verb definition*	*Noun definition*	*Noun's relationship to verb*	*Alternative nominalisations of verb (* if rarer or less clearly related to verb)*
advance	to move forwards	forward movement, progress	action	**advancement*-act
alarm	to fill with apprehension / to warn about danger	apprehension, fear / a signal etc. warning of danger	action & inanimate agent	
array	to dress in rich attire/ to arrange	a collection or arrangement/ (poetic) apparel	action & aff. obj.	**arrayal* – action
arrest	to deprive of liberty/ to catch and hold (attention)	the act of taking into custody/ state of being held	action	**arrestation*-action
assault	to attack, make an assault on	a violent attack	action	
attack	to launch an assault against s.o.	act or instance of attacking	action	
control	to command/ to regulate	power to determine/ means of regulation	action & instrum.	
debauch	to lead sb. into immoral behaviour	episode of dissipation	action (spec)	*debauchery* –act.
decay	to decline/ to rot	process of decline or rotting, or state brought about by this	action	
decease	to die	death	action	
decree	to order, ordain (by decree)	edict or law made by sb in authority	effected object	
defeat	to overcome/ to thwart	act of defeating/ instance or state of being defeated	action	
delight	to please greatly/ to take great pleasure in	extreme pleasure	action & inan. agt	
demur	(legal) to raise an objection	act of demurring	action	
desire	to want, long for	a wish or longing	action	
despair	to give up hope	total loss of hope	action	
despatch	to send off promptly	the act of sending off a letter, messenger/ prompt action	action	
disdain	to refuse with disdain	feeling or show of superiority, contempt	manner	
disgust	to sicken/ to greatly offend	loathing or great distaste	action	

dismay	to fill with alarm/ discouragement	feeling of discouragement	action	
display	to make sth available or arrange sth for others to see	collection of things arranged for others to see	action	
distress	to cause mental pain, suffering	mental pain	action	
divorce	to separate or be separated by divorce	legal dissolution of a marriage	action	**divorcement*-act.
embrace	to hug	the act of embracing	action	**embracement* – action
employ	to provide work for	state of being employed	action	*employment* –act.
escape	to break free	act of escaping or state of having escaped	action	
esteem	to have great respect for	high regard or respect	action	
exhaust	to drain energy from, deplete	gases ejected from an engine	unrelated	*exhaustion* – act.
mistake	to misinterpret	error or blunder	action (spec)	
rebuff	to reject, refuse or snub	blunt refusal, snub	action	
rebuke	to scold, reprimand	reprimand, scolding	action	
recruit	to enlist or enrol	newly enrolled or enlisted member	effected object	*recruitment* – act.
refrain	to abstain from action	melody	unrelated	*refrainment* – act.
regard	to look at/ to hold sth or sb in respect	gaze, look/ esteem, respect	action	
regret	to feel repentant or upset about	sense of repentance or sorrow	action	
release	to free from captivity	act of freeing	action & aff. obj. (spec)	
repeat	to do or experience sth again	act or instance of repeating	action & aff. obj. (spec)	*repetition* - action
resort	to have recourse to/ to go to frequently	place for holidays	unrelated	
reveal	to disclose a secret	vertical section of wall	unrelated	*revelation* - action
revolt	to rise up, rebel	rebellion	action	
Latinate, bound base, recurrent	***Verb definition***	***Noun definition***	***Noun's relationship to verb***	***Alternative nominalisations of verb (* if rarer or less clearly related to verb)***
accord	to be in harmony, agree	agreement, harmony	action	**accordance* –act.
account	(for) to explain/ to be responsible for	report/ explanation	action	

address	to mark (a letter etc.) with an address	location of a building	locative	
address	to speak to	a speech (esp. formal)	action	
appeal	to earnestly request	an earnest request	action	
approach	to come nearer to	act of coming nearer to	action	
assent	to agree	agreement	action	
attempt	to try, make an effort	an effort, endeavour	action	
attire	to dress, esp. in fine clothes	fine clothes	indirect object	
award	to give sth as a prize for merit	prize, sth given for merit	action & aff. obj.	
command	to order, compel	an order	action	**commandment*- action
commute	to travel between home and work	journey made by commuting	action	
concern	to relate to, affect	state of being affected by sth / sth that affects sb	action & inan. agt	
consent	to agree, give assent	aquiescence, agreement	action	
debate	to discuss, esp. formally	formal discussion	action	
delay	to put off to a later time	act or instance of delaying	action	
demand	to request forcefully	forceful request	action	
demise	to transfer by will	death / the end of sth.	unrelated	
design	to create a detailed plan of	way sth is designed, or a plan of this	effected object	
dissent	to disagree with a widely held opinion	disagreement with a common opinion	action	**dissension* –act.
effect	to bring about	result of an action	effected object	
elect	to choose	those selected, esp. by God	affected object	*election* – action
entail	to inevitably result in sth / (law) to restrict ownership of bequest	(law) restriction of ownership	action (subsid)	*entailment* – action
preserve	to make sure sth lasts, incl. food	area of activity etc. sb has exclusive use of/ fruit preserved as jam	effected object	*preservation* – action
recess	to put sth in a hollowed out space	hollowed out space	locative	*recession* – action
redress	to put right a wrong	act or instance of putting a wrong right	action	
remand	to return a prisoner to custody	act of returning a prisoner to custody	action	**remandment* –act
repair	to mend sth	act, task or process of mending sth.	action	
repeal	to undo a law	act of repealing	action	
reply	to respond to sth sb says	response, answer	action	

report	to give an account of sth that has happened	an account of sth	action	**reportage* –act (spec)
repose	to lie resting	state of rest	action	**reposal* – action
reproach	to criticize, blame	criticism, expression of disapproval	action	
repulse	to reject, rebuff	rejection	action	*repulsion* –action
repute	to consider sb to have a certain quality	public estimation	action (spec)	*reputation* –action
request	to ask for sth	act or instance of requesting	action	
reserve	to keep sth back	supply of sth kept back	affected object	*reservation* –act.
resolve	to make a decision	decisiveness/ decision	action	*resolution* – action
respect	to feel admiration for	feeling of admiration	action	
result	to cause a certain outcome	consequence, outcome	effected object	
retort	to respond sharply	a sharp response	action	**retortion* – act.
retreat	to move back, away from	movement back, away	action	
revenge	to retaliate, avenge	act of retaliation	action	
reverse	to change sth to the opposite direction, order	the opposite, contrary	action	*reversal* – action
reward	to give sth in return for sth	thing given in return for sth	affected object	
supply	to provide sth / to satisfy a need	act of supplying / goods available	action & aff. obj.	
support	to bear the weight of / to provide for	act of supporting / sth that supports	action & inan. agt	
Borderline free word base	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations (* if rarer or less clearly related to verb)***
acclaim	to praise, esp. publicly	public approval, praise	action	**acclamation* –act
affront	to insult or offend	an insult	action	
allure	to exert powerful attraction	highly attractive quality	action	
collapse	to fall down, esp. suddenly	act or instance of collapsing	action	
decline	to get smaller, weaker/ to refuse an invitation	deterioration in strength, size, quality	action	
default	to fail to fulfill an obligation	failure to do sth	action	
disgrace	to bring shame on	state of shame	action	
disguise	to change sb or sth's appearance	sth worn or done to change appearance	action & inan. agt	
elapse	(of time) to pass by	the passing of time	action	

exchange	to give sth and get sth in return	action, process or instance of exchanging	action	
express	to state thoughts / to send by rapid transport	fast delivery service	manner (subsid)	*expression* – act.
reclaim	to claim sth back	the reclaiming of sth.	action	*reclamation* –act.
reform	to change, improve sth	reorganization and improvement	action	**reformation* – act
remark	to make a comment	instance or act of commenting casually	action	
return	to come or go back	act or instance of going back	action	
review	to look at sth critically/ reconsider	act or instance of reviewing	action	
Word-based prefixations	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
distrust	not to trust sb, to lack confidence in sb or sth	lack of trust, feeling sb or sth is unreliable	action	
miscue	to make a faulty shot in snooker etc.	faulty shot in snooker etc.	action	
misdeal	to deal playing cards incorrectly	mistake in the way playing cards are dealt	action	
misfire	(of a gun) to fail to fire properly	act of misfiring	action	
misrule	to govern badly	bad government	action	
mistrust	to be suspicious of, lack confidence in sb/sth	suspicion, lack of confidence in sb or sth	action	
undress	to remove clothes	condition of having no clothes on	action	
Others	***Verb definition***	***Noun definition***	***Relationship***	***Alternative nominalisations***
balloon	to swell, increase	inflated bag	independent noun	
blockade	to block access to a place	prevention of access to aplace	action	
burlesque	to mock by imitation	mockery by imitation	action	
caress	to touch affectionately	an affectionate touch	action	
cement	to fix with cement	building material	instrument	
cocoon	to cover in order to protect	protective covering for caterpillar etc.	inanimate agent	
crusade	to campaign to promote or eliminate sth	a campaign to promote or eliminate sth	action	
deep-freeze	to freeze sth quickly	powerful freezer	instrument	
garotte	to execute using a garotte	method of / device for strangulation	instrument	
lament	to express sorrow	expression of sorrow	action	*lamentation* – act.
neglect	to fail to care for sb, sth properly	withholding of proper care	action	
parade	to go on a festive procession	celebratory procession	action	
parole	to give a prisoner parole	conditional release of a prisoner	action	

salute	to greet or show respect with a gesture	gesture of respect	action	**salutation* – act.
stockade	to enclose with a barrier	defensive barrier	action	
tattoo	to mark with a tattoo	permanent picture on the skin	action	
trepan	to cut a hole with a trepan	tool for removing circular sections of bone	instrument	

Bibliography

(Dictionaries consulted are listed separately at the end of the bibliography.)

Allen, Margaret (1978) *Morphological Investigations*. PhD thesis, University of Connecticut.

Allen, Margaret (1980) 'Semantic and phonological consequences of boundaries: a morphological analysis of compounds' in Mark Aronoff and Mary-Louise Kean (eds.) *Juncture: a collection of original papers*. Saratoga, California: Anma Libri, pp. 9-27.

Allen, A.S. (1981) 'The development of prefixal and parasynthetic verbs in Latin and Romance' *Romance Philology* 35 (1): 79-88.

Anderson, J.M.A. (1997) *A notional theory of syntactic categories*. Cambridge: CUP.

Anderson, Stephen R. (1985) 'Typological distinctions in word formation' in Shopen (ed.), pp. 1-56.

Anderson, Stephen R. (1992) *Amorphous morphology*. Cambridge: CUP.

Archangeli, Diana (1997) 'Optimality theory: an introduction to linguistics in the 1990's' in Archangeli and Langendoen (eds.), pp. 1-32.

Archangeli, Diana and D. Terence Langendoen (eds.) (1997) *Optimality Theory: an overview*. Oxford: Basil Blackwell.

Aronoff, Mark (1976) *Word formation in generative grammar*. Cambridge, Mass.: MIT press.

Aronoff, Mark and S.N. Sridhar (1983) 'Morphological levels in English and Kannada, or Atarizing Reagan' in *Papers from the parasession on the interplay of phonology, morphology and syntax*, Chicago Linguistics Society, pp. 3-16.

Bauer, Laurie (1983) *English word-formation*. Cambridge: CUP.

Bauer, Laurie (1988) *Introducing linguistic morphology*. Edinburgh: Edinburgh University Press.

Bauer, Laurie (1990) 'Level disorder: the case of *-er* and *-or*' *Transactions of the Philological Society* 88 (1): 97-110.

Benua, Laura (1997) *Transderivational identity: phonological relations between words*. PhD thesis, University of Massachusetts. Rutgers Optimality Archive 259-0498.

Bertinetto, Pier Marco (1999) 'Boundary strength and linguistic ecology (Mostly exemplified on intervocalic /s/ voicing in Italian)' *Folia Linguistica* 33 (3-4): 267-286.

Bird, Steven (1995) *Computational phonology: a constraint-based approach*. Cambridge: CUP.

Blevins, Juliette (1997) 'Rules in Optimality Theory: two case studies' in Iggy Roca (ed.) *Derivations and constraints in phonology*. Oxford: Clarendon Press, pp. 227-60.

Bloomfield, Leonard (1933) *Language*. New York: H.Holt & co.

Boersma, Paul, Joost Dekkers and Jeroen van de Weijer (2000) 'Introduction: Optimality theory: phonology, syntax and acquisition' in Dekkers et al. (eds.), pp. 1-46.

Booij, Geert (1992) 'Morphology, semantics and argument structure' in Roca (ed.), pp. 47-64.

Booij, Geert (1994) 'Lexical Phonology: a review' in Wiese (ed.), pp.3-30.

Booij, Geert and Rochelle Lieber (1993) 'On the simultaneity of morphological and prosodic structure' in Hargus and Kaisse (eds.), pp. 23-44.

Booij, Geert and Jerzy Rubach (1984) 'Morphological and prosodic domains in lexical phonology'. *Phonology Yearbook* 1: 1-27.

Booij, Geert and Jerzy Rubach (1987) 'Postcyclic vs. postlexical rules in lexical phonology'. *Linguistic Inquiry* 18: 1-44.

Borowsky, Toni (1989) 'Structure preservation and the syllable coda in English' *Natural Language and Linguistic Theory* 7: 145-66.

Borowsky, Toni (1990) *Topics in the Lexical Phonology of English*. New York: Garland.

Buck, R.A. (1997) 'Words that are their opposites: noun to verb conversion in English' *Word* 48 (1): 1-14.

Bullock, Barbara (1995) 'Prosodic constraints and morphological alignment in French' *Lingua* 96 (2-3): 95-117.

Burzio, Luigi (2000) 'Cycles, non-derived environment blocking, and correspondence' in Dekkers et al. (eds.), pp. 47-87.

Bybee, Joan (1985) *Morphology: a study of the relation between meaning and form*. Amsterdam: Benjamins.

Bybee, Joan (1988) 'Morphology as lexical organization' in Michael Hammond and Michael Noonan (eds.) *Theoretical morphology: approaches in modern linguistics*. San Diego: Academic Press, pp. 119-141.

Bybee, Joan (1995) 'Diachronic and typological properties of morphology and their implications for representation' in Laurie Beth Feldman (ed.) *Morphological aspects of language processing*. Hillsdale, N.J. : L. Erlbaum Associates, pp. 225-46.

Bybee, Joan, William Pagliuca and Revere Perkins (1990) 'On the asymmetries in the affixation of grammatical material' in William Croft, Keith Denning and Suzanne Kemmer (eds.) *Studies in typology and diachrony: papers presented to Joseph H. Greenberg on his 75th birthday*. Amsterdam: Benjamins, pp. 1-42.

Campbell, Alistair (1959) *Old English grammar*. Oxford: Clarendon Press.

Carney, Edward (1994) *A survey of English spelling*. London: Routledge.

Carr, Philip (1991) 'Lexical properties of postlexical rules: postlexical derived environment and the Elsewhere Condition'. *Lingua* 85: 41-54.

Chomsky, N. (1970) 'Remarks on nominalization' in Jacobs, Roderick A. and Peter S. Rosenbaum (eds.) *Readings in English transformational grammar*. Washington: Georgetown U.P., pp. 184-221.

Chomsky, N. and M. Halle (1968) *The Sound Pattern of English*. New York: Harper and Row.

Clark, Eve V., and Herbert H. Clark (1979) 'When nouns surface as verbs' *Language* 55 (4): 767-811.

Clements, George N. and Samuel J. Keyser (1983) *CV phonology: a generative theory of the syllable*. Cambridge, Mass.: MIT press.

Coleman, John (1998) *Phonological representations: their names, forms and powers*. Cambridge: CUP.

Coleman, John (2000) 'Candidate selection' *The Linguistic Review* 17: 167-179.

Comrie, Bernard and Sandra A. Thompson (1985) 'Lexical nominalization' in Shopen (ed.), pp. 349-398.

Croft, William (1990) *Typology and Universals*. Cambridge: CUP.

Dekkers, Joost, Frank van der Leeuw and Jeroen van de Weijer (eds.) (2000) *Optimality theory: phonology, syntax and acquisition*. Oxford: OUP.

Dixon, R.M.W. (1991) *A new approach to English grammar, on semantic principles*. Oxford: Clarendon Press.

Dowty, David (1991) 'Thematic proto-roles and argument selection' in *Language* 67 (3): 547-619.

Fabb, Nigel (1988) 'English suffixation is constrained only by selectional restrictions' *Natural Language and Linguistic Theory* 6 (4): 527-539.

Fillmore, Charles J. (1968) 'The case for case' in Emmon Bach and Robert T. Harms (eds.) *Universals of linguistic theory*. New York: Holt, Rinehart and Winston, pp. 1-88.

Fillmore, Charles J. (1971) 'Some problems for case grammar' in Richard J. O'Brien (ed.) *Linguistics developments of the sixties – viewpoints for the seventies*. Monograph series on languages and linguistics, Georgetown University, pp. 35-56.

Fraser, Bruce (1976) *The verb-particle combination in English*. New York: Academic press.

Fudge, Erik (1984) *English word-stress*. London: George Allen & Unwin.

Fukazawa, Haruka, Mafayu Kitahara and Mitsuhiko Ota (1998) 'Lexical stratification and ranking invariance in constraint-based grammars' Rutgers Optimality Archive 267-0698.

Giegerich, Heinz J. (1988) 'Strict cyclicity and elsewhere' *Lingua* 75: 125-134.

Giegerich, Heinz J. (1992) *English phonology: an introduction.* Cambridge: CUP.

Giegerich, Heinz J. (1994) 'Base-driven stratification: morphological causes and phonological effects of "strict cyclicity"' in Wiese (ed.), pp. 31-62.

Giegerich, Heinz J. (1999) *Lexical Strata in English: morphological causes, phonological effects*. Cambridge: CUP.

Giegerich, Heinz J. (2001) 'Synonymy blocking and the Elsewhere Condition: lexical morphology and the speaker' *Transactions of the Philological society* 99 (1): 65-98.

Gimson, A.C. (revised by Alan Cruttenden) (1994) *An introduction to the pronunciation of English*. London: Edward Arnold.

Goldsmith, John (1990) *Autosegmental and Metrical Phonology*. Oxford and Cambridge, Mass.: Basil Blackwell.

Greenberg, Joseph H. (1966) 'Some universals of grammar with particular reference to the order of meaningful elements' in J.H. Greenberg (ed.) *Universals of Language*. Cambridge, Mass.: MIT Press, pp. 73-113.

Greenberg, Joseph H. (1990) 'A quantitative approach to the morphological typology of language' in Keith Denning and Suzanne Kemmer (eds.) *On Language: selected writings of Joseph H. Greenberg*. Stanford, California: Stanford University Press, pp. 3-25. (Originally published in R.F Spencer (ed.) (1954) *Method and Perspective in Anthropology: Papers in honor of Wilson D. Wallis*. Minneapolis: University of Minnesota Press.)

Gruber, Jeffrey S. (1965) *Studies in lexical relations*. PhD, MIT, distrib. by IULC.

Gussmann, Edmund (1988) Review of Mohanan (1986) *Journal of Linguistics* 24: 232-239.

Gussmann, Edmund (1991) 'Schwa and syllabic sonorants in a non-linear phonology of English' *Anglica Wratislaviensia* 18: 25-39.

Hall, Christopher J. (1992) *Morphology and mind: a unified approach to explanation in linguistics*. London: Routledge.

Hall, T. Alan (1999) 'The phonological word: a review' in Hall and Kleinhenz (eds.), pp. 1-22.

Hall, T. Alan and Ursula Kleinhenz (eds.) (1999) *Studies on the phonological word*. Amsterdam/ Philadelphia: John Benjamins.

Halle, M. and K.P. Mohanan (1985) 'Segmental phonology of Modern English' *Linguistic Inquiry* 16: 57-116.

Halle, M. and Jean-Roger Vergnaud (1987) *An essay on stress*. Cambridge, MA: MIT Press.

Hammond, M. (1993) 'On the absence of category-changing prefixes in English' *Linguistic Inquiry* 24 (3): 562-567.

Hammond, M. (1999) *The phonology of English: a prosodic optimality-theoretic approach*. Oxford: OUP.

Hannahs, S.J. (1995a) 'The phonological word in French' *Linguistics* 33 (6): 1125-1144.

Hannahs, S.J. (1995b) *Prosodic structure and French morphophonology*. Tübingen: Niemeyer.

Hargus, Sharon and Ellen Kaisse (eds.) (1993) *Phonetics and phonology vol. 4: Studies in lexical phonology*. San Diego: Academic press.

Hayes, Bruce (1982) 'Extrametricality and English stress' *Linguistic Inquiry* 13 (2): 227-276.

Hayes, Bruce (1995) *Metrical stress theory: principles and case studies*. Chicago and London: Chicago University Press.

Heslin, T.P. (1987) 'Prefixation in Latin' *Lingua* 72 (2-3): 133-154.

Hiltunen, Risto (1983) *The decline of the prefixes and the beginnings of the English phrasal verb*. (Annales Universitatis Turknensis, Ser.B, Tom.160). Turku: Turun Yliopisto.

Hogg, Richard (1992) *A grammar of Old English, Vol. 1: Phonology*. Oxford: Blackwell.

Hogg, Richard and C.B. McCully (1987) *Metrical phonology: a coursebook*. Cambridge: CUP.

Horgan, Dorothy (1980) 'Patterns of variation and interchangeability in some Old English prefixes' *Neuphilologische Mitteilungen* 81: 127-30.

Hulst, Harry van der (1984) *Syllable structure and stress in Dutch*. Dordrecht: Foris.

Idsardi, W.J. (2000) 'Clarifying opacity (phonological grammars, Tiberian Hebrew)' *The Linguistic Review* 17: 337-350.

Inkelas, Sharon (1990) *Prosodic constituency in the lexicon*. New York: Garland.

Inkelas, Sharon (1993) 'Deriving cyclicity' in Hargus and Kaisse (eds.), pp. 75-110.

Inkelas, Sharon and Orhan Orgun (1994) 'Level economy, derived environment effects and the treatment of exceptions' in Wiese (ed.), pp. 63-90.

Jackendoff, Ray S. (1972) *Semantic interpretation in generative grammar*. Cambridge, MA: MIT press.

Jackendoff, Ray S. (1975) 'Morphological and semantic regularities in the lexicon' *Language* 51: 639-71.

Jespersen, Otto (1909/ 1949) *A modern English grammar on historical principles. Part 1: Sounds and Spellings*. Copenhagen: Einar Munksgaard/ London: George Allen & Unwin.

Jespersen, Otto (1946) *A modern English grammar on historical principles. Part VI: Morphology*. London: George Allen and Unwin.

Kager, René (1999) *Optimality theory*. Cambridge: CUP.

Kaisse, Ellen and Sharon Hargus (1994) 'When do linked structures evade Structure Preservation?' in Wiese (ed.), pp. 185-204.

Kaisse, Ellen and Patricia Shaw (1985) 'On the theory of lexical phonology' *Phonology Yearbook* 2: 1-30.

Kastovsky, Dieter (1992) 'Semantics and vocabulary' in Richard M. Hogg (ed.) *The Cambridge history of the English language, vol. 1: The beginnings to 1066*. Cambridge: CUP, pp. 290-408.

Katamba, Francis (1993) *Morphology*. Basingstoke: Macmillan.

Kean, Mary-Louise (1974) 'The strict cycle in phonology' *Linguistic Inquiry* 5: 179-203.

Kiparsky, Paul (1982) 'Lexical phonology and morphology' in Linguistic Society of Korea (ed.). *Linguistics in the morning calm: selected papers from SICOL-1981*. Seoul: Hanshin, pp. 3-91.

Kiparsky, Paul (1985) 'Some consequences of lexical phonology' *Phonology Yearbook* 2: 85-138.

Kisseberth, Charles (1970) 'On the functional unity of phonological rules' *Linguistic Inquiry* 1: 291-306.

Koenig, Jean-Pierre (1999) *Lexical relations*. Stanford, California: CSLI Publications.

LaCharité, Darlene and Carole Paradis (2000) 'Derivational residue: hidden rules in Optimality Theory' in Dekkers et al. (eds.), pp. 211-233.

Laeufer, Christiane (1995) 'Morphology and syllabification domains' *Lingua* 97: 101-121.

Lakoff, George (1965) *Irregularity in syntax*. PhD thesis, University of Indiana.

Legendre, Geraldine (2000) 'Morphological and prosodic alignment of Bulgarian clitics' in Dekkers et al. (eds.), pp. 423-464.

Lehrer, Adrienne (1995) 'Prefixes in English word-formation' *Folia Linguistica* 29 (1-2): 133-148.

Liberman, Mark and Alan Prince (1977) 'On stress and linguistic rhythm' *Linguistic Inquiry* 8 (2): 249-336.

Lieber, Rochelle (1981) *On the organisation of the lexicon*. Bloomington, Ind.: IULC.

Loporcaro, Michele (1996) 'Prosodic domains in Romance phonology' Ms (3rd draft), Universität Zürich.

Lutz, Angelika (1997) 'Sound change, word-formation and the lexicon: the history of the English prefix verbs' *English Studies* 78 (3): 258-290.

McCarthy, John J. (1993) 'A case of surface constraint violation' *Canadian Journal of Linguistics* 38: 169-95.

McCarthy, John J. (1998) 'Sympathy and phonological opacity'. Rutgers Optimality Archive 252.

McCarthy, John J. and Alan Prince (1993) 'Generalized alignment' in *Yearbook of Morphology 1993*, 79-153.

McCully, C.B. (1997) 'Stress, survival and change: Old English to Middle English' in Jacek Fisiak (ed.) *Studies in Middle English linguistics*. Berlin: Mouton de Gruyter, pp. 283-300.

McCully, C.B. and R.M. Hogg (1990) 'An account of Old English stress' *Journal of Linguistics* 26 (2): 315-339.

McMahon, April M.S. (1990) 'Vowel shift, free rides and strict cyclicity' *Lingua* 80: 197-225.

McMahon, April M.S. (2000a) *Lexical Phonology and the history of English*. Cambridge: CUP.

McMahon, April M.S. (2000b) *Change, chance and optimality*. Oxford: OUP.

Maddieson, Ian (1997) 'Phonetic universals' in William J. Hardcastle and John Laver (eds.) *The handbook of phonetic sciences*. Oxford and Cambridge, Mass.: Blackwell, pp. 619-39.

Marchand, Hans (1969) *The categories and types of present-day English word-formation*. (2nd. ed.) München: Beck.

Mascaró, Joan (1976) *Catalan phonology and the phonological cycle*. PhD thesis, MIT.

Mätzner, Eduard (1873) *Englische Grammatik, Teil 1: Die Lehre vom Worte*. Berlin: Weidmann.

Minkova, Donka (1997) 'Constraint ranking in Middle English stress shifting' *English Language and Linguistics* 1: 135-176.

Mohanan, K.P. (1986) *The Theory of Lexical Phonology*. Dordrecht: Reidel.

Mohanan, K.P. (2000) 'The theoretical substance of the optimality formalism' *The Linguistic Review* 17: 143-66.

Mohanan, K.P. and Tara Mohanan (1984) 'Lexical Phonology of the consonant system of Malayalam'. *Linguistic Inquiry* 15: 575-602.

Muysken, P. (1999) 'Nominalizations' in Keith Brown and Jim Miller (eds.) *A concise encyclopaedia of grammatical categories*. Oxford/ Amsterdam: Elsevier, pp. 248-52.

Nespor, Marina (1999) 'Stress domains' in Harry van der Hulst (ed.) *Word prosodic systems in the languages of Europe*. Berlin: Mouton de Gruyter, pp. 117-59.

Nespor, Marina and Irene Vogel (1986) *Prosodic Phonology*. Dordrecht: Foris.

Oh, Mira (1995) 'A prosodic analysis of non-derived environment blocking' *Journal of East Asian Linguistics* 4(4): 261-279.

Pater, Joe (1995) 'On the non-uniformity of weight-to-stress and stress preservation effects in English' Rutgers Optimality Archive 107-0000.

Paul, Hermann (1920) *Deutsche Grammatik, Band V, Teil V. Wortbildungslehre*. Halle: Niemeyer.

Pilch, Herbert (1970) *Altenglische Grammatik: Dialektologie, Phonologie, Morphologie, Syntax*. München: M.Hueber

Pinker, Steven (1998) 'Words and rules' *Lingua* 106: 219-42.

Pinker, Steven (2000) *Words and rules – the ingredients of language*. London: Phoenix.

Prince, Alan and Paul Smolensky (1993) 'Optimality theory' Ms, Brandeis University and University of Colorado.

Puppel, Stanislaw (1979) 'Some notes on the non-cyclic assignment of stress contours in disyllabic verbs and nouns in English' *Studia Anglica Posnaniensia: an international review of English studies*, 11: 87-92.

Raffelsiefen, Renate (1998) 'Phonological constraints on English word-formation' in *Yearbook of Morphology 1998*, 225 –287.

Raffelsiefen, Renate (1999) 'Diagnostics for prosodic words revisited: the case of historically prefixed words in English' in Hall and Kleinhenz (eds.), pp. 133-201.

Rappaport, Malka (1983) 'On the nature of derived nominals' in Levin, Rappaport and Zaenen (eds.) *Papers in Lexical-Functional Grammar*. Bloomington: IULC, pp. 113-142.

Ritter, Nancy (ed.) (2000) *The Linguistic Review* 17 (2-4) (Special triple issue on Optimality Theory).

Ritter, Nancy (2000) 'Introduction' *The Linguistic Review* 17 (2-4): 111-116.

Roca, Iggy (ed.) (1992) *Thematic Structure: Its role in grammar*. Berlin & New York: Foris.

Rozwadowska, B. (1988) 'Thematic restrictions on derived nominals' in Wilkins (ed.), pp. 147-66.

Rubach, Jerzy (1993) *The lexical phonology of Slovak*. Oxford: OUP.

Rumelhart, D.E. and J.L. McClelland (eds.) (with the PDP research group) (1986) *Parallel Distributed Processing (Vol. 1: Explorations in the microstructure of cognition; Vol. 2: Psychological and biological models.)*. Cambridge, Mass.: MIT Press.

Russell, Kevin (1997) 'Optimality theory and morphology' in Archangeli and Langendoen (eds.), pp. 102-133.

Scalise, Sergio (1986) *Generative morphology*. Dordrecht: Foris.

Selkirk, Elisabeth O. (1980) 'The role of prosodic categories in English word stress' *Linguistic Inquiry* 11: 563-605.

Selkirk, Elisabeth O. (1982) *The syntax of words* (Linguistic Inquiry Monographs, 7). Cambridge, Mass.: MIT Press.

Selkirk, Elisabeth O. (1995) 'The prosodic structure of function words' in J.N. Beckman et al. (eds.) *Papers in optimality theory* (University of Massachusetts Occasional Papers 18). Amherst: G.L.S.A.

Shopen, Timothy (ed.) (1985) *Language typology and syntactic description, vol. III: Grammatical categories in the lexicon*. Cambridge: CUP.

Siegel, Dorothy (1974) *Topics in English Morphology*. PhD Thesis, MIT.

Sørensen, Knud (1986) 'Phrasal verb into noun' *Neuphilologische Mitteilungen* 87 (2); 272-83

Spencer, Andrew (1991) *Morphological theory: an introduction to word structure in generative grammar*. Oxford and Cambridge, Mass.: Blackwell.

Stiebels, Barbara and Dieter Wunderlich (1994) 'Morphology feeds syntax: the case of particle verbs' *Linguistics* 32: 913-968.

Strang, Barbara M.H. (1970) *A history of English*. London: Methuen.

Strauss, Steven L. (1982a) *Lexicalist phonology of English and German*. Dordrecht: Foris.

Strauss, Steven L. (1982b) 'On "relatedness" and related paradoxes' *Linguistic Inquiry* 13: 695-700.

Svensson, Ann-Marie (1997) 'Stress shift in English disyllabic prefixed noun/verb pairs'. *Moderna Sprak* 91 (2): 130-140.

Szpyra, Jolanta (1989) *The phonology – morphology interface: cycles, levels and words*. London and New York: Routledge.

Szpyra, Jolanta (1996) '"Incomplete" vowels in English' in Henryk Kardela and Bogdan Szymanek (eds.) *A Festschrift for Edmund Gussmann from his friends and colleagues*. Lublin: University Press of the Catholic University of Lublin, pp. 269-92.

Wennerstrom, Ann (1993) 'Focus on the prefix: evidence for word-internal prosodic words' *Phonology* 10 (2): 309-24.

Wiese, Richard (ed.) (1994) *Recent Developments in Lexical Phonology*. (Theorie des Lexikons. Arbeiten des Sonderforschungsbereichs 282; 56). Düsseldorf: Heinrich Heine Universität.

Wiese, Richard (1996) *The phonology of German*. Oxford: Clarendon Press.

Wilkins, W. (ed.) (1988) *Syntax and Semantics, Vol. 21: Thematic Relations*. San Diego: Academic Press.

Wolff, Susanne (1984) *Lexical entries and word-formation*. Bloomington: IULC.

Dictionaries

Anglo-Saxon Dictionary (= Bosworth-Toller) by Joseph Bosworth and T. Northcote Toller (1898). Oxford: University Press, London: Humphrey Milford.

Cambridge Dictionaries Online (http://dictionary.cambridge.org/)

Collins Cobuild English Dictionary (1995 ed.). London: HarperCollins.

Collins English Dictionary, Millenium ed. (1998). Glasgow: HarperCollins.

Concise Oxford Dictionary, 8th ed., by R.E. Allen (1990). Oxford: Clarendon Press.

Encarta World English Dictionary, 1st. ed (1999). London: Bloomsbury. (also Online edition, at: http://dictionary.msn.com/).

Longman Dictionary of Contemporary English, 3rd. ed. (1995). Harlow: Longmans.

Longman Pronunciation Dictionary (LPD), ed. by J.C. Wells (1990). London: Longmans.

Oxford Advanced Learner's Dictionary of Current English, 5th ed. by Jonathan Crowther (1995). Oxford: OUP.

Oxford English Dictionary (OED), 2nd ed. prepared by J.A. Simpson and E.S.C. Weiner (1989). Oxford: Clarendon Press.