CHAPTER 11

Stress and intonation

11.1 Introduction: stress

This chapter is in two sections. The first section introduces you to the description of STRESS using a non-linear approach known as METRICAL PHONOLOGY. The second part is devoted to intonation.

11.1.1 What is stress?

Linguists have an intuitive understanding of the phonetic properties of stress although they find formulating a precise description of these properties problematic. Stress is primarily a matter of greater AUDITORY PROMI-NENCE. It is essentially a perceptual phenomenon, with ill-defined articulatory correlates. An element that is stressed is highlighted so that it becomes auditorily more salient than the rest of the elements in the string of which it is a part. The main phonetic ingredients of stress are PITCH, LENGTH and LOUDNESS. Stressed syllables tend to have higher pitch and longer duration than their non-stressed counterparts. In addition, they may be somewhat louder than unstressed syllables; but loudness is a much less important parameter than pitch or length. There may be also increased respiratory energy in the production of a stressed syllable although this is by no means essential. Additionally, in some languages, vowels in stressed syllables have clear or full vowel quality while vowels in unstressed syllables are reduced and have a somewhat 'muffled' quality like that of schwa (/ə/) in English. The phonetic properties of stress will not be explored in this book. Rather it is the phonological properties that will be investigated.

From a phonological angle, several different kinds of stress can be recognised. One kind is WORD STRESS. In English, for instance, every lexical item is entered in the dictionary with word stress. A particular syllable of a word is pronounced in a way that makes it more prominent than the rest. If you say words like *mother, better, cotton* and *pity*, you will notice that the first syllable in all these words is much more salient than the second. The first syllable is said to be *stressed* and the second one *unstressed*.

In longer words, there is often not just one stressed syllable and a host of unstressed ones. Besides the syllable that receives the *main* or *primary* stress, there are other syllables which receive *secondary* stress. Such syllables are more prominent than the weakest syllables of the word.

If you say the word *radiator* very carefully, you will notice that the first syllable receives primary stress and that the third syllable has secondary stress; it is more prominent than the second and fourth, though not as prominent as the first. Trager and Smith (1951) introduced the convention of recognising four levels of stress in English, marked as ′ ˆ ˋ ˇ to indicate decreasing order of prominence.

The authors of SPE continue this tradition. Their view is that at least five degrees of stress can be easily detected in English. They use the integers 1–4 to mark stress, with 1 as the strongest and 4 the weakest stress. They suggest that unstressed syllables i.e. [-stress] are 'representable as [5 stress] in this case' (SPE, page 116). In practice, for convenience, unstressed syllables are not assigned any integer, as you can see from the examples below which are taken from SPE:

[11.1]

1 3	1 3
absolute	survey (noun)
1 3	1 3
kaleidoscope	advocate
3 1	3 1
intercept	interlock
2 1	2 1
mentality	gestation
2 3 1	2 3 1
relaxation	deportation

3	4	1		3	4	1
instrumentality				complementarity		

3	4	1		3	4	1
documentation				experimentation		

Mark the most prominent syllable in the following words:

[11.2a] market   water   button   little
       analyse   equality   antagonise   indemnify

The task set above involves assigning the appropriate integer to each stressed syllable (and nothing to any unstressed one). You were expected to work out an answer along these lines:

[11.2b]

1	1	1	1
market	water	chemistry	little

1	3	3	1	1	3	1	3
analyse		equality		antagonise		indemnify	

The analysis of English stress presented in [11.2b] might give the impression that stress is a matter of absolute prominence attached to each syllable and that it can be indicated by unambiguously placing the appropriate diacritic on the syllable in question. Disputes, to a large extent sterile, have arisen in the past as to the precise number of degrees of stress which a language like English has. Are all the weak syllables left unmarked (which could be assigned degree 5 of stress) equal in prominence? For instance, is the final syllable of *chemistry* not somewhat more salient than the middle one? And, furthermore, is the final syllable of *chemistry* not stronger than the last syllable of *water*? And are the the vowels of *equality* and *indemnify* which are given degree 3 of stress equal in prominence? Reaching agreement on the exact number of degrees of stress has turned out to be almost impossible. The problem is that the syllable that is most heavily stressed in a word (and is therefore assigned degree 1 of stress) is easy to identify. But there is often some uncertainty as to the degree of stress of the less heavily stressed syllables. It is difficult

to determine whether or not a given non-primary stress is equivalent to some other non-primary stress in prominence.

Fortunately, research has shifted in a more fruitful direction in recent years. Following Liberman and Prince (1977) many linguists today recognise that a theory of stress must take on board the fact that prominence is a RELATIONAL concept. What matters is that a stressed syllable is more salient than its unstressed counterparts.

Examine some familiar noun-verb pairs in [11.3] which are distinguished by stress.

[11.3] *verb*	*Noun*
project	project
reject	reject
conduct	conduct
protest	protest
refuse	refuse

Add three examples of your own to the list in [11.3]. Underline the syllable that receives primary stress in each example in [11.3].

One of the things which these data show is that stress is not an integral part of a vowel. In many disyllabic words in English the location of stress depends on whether the word appears as a noun or as a verb: stress falls on the first syllable when the word is used as a noun and on the second when it is used as a verb. This shows in a simple way that stress is an autosegmental property of the entire word.

The words in [11.3] are in no way extraordinary. There are numerous examples of English words in which stress shows a considerable degree of mobility. Say the following, noting the syllable with the main or primary stress:

[11.4] (a) nation national nationalist nationalise
       (b) nationality nationalistic nationalisation

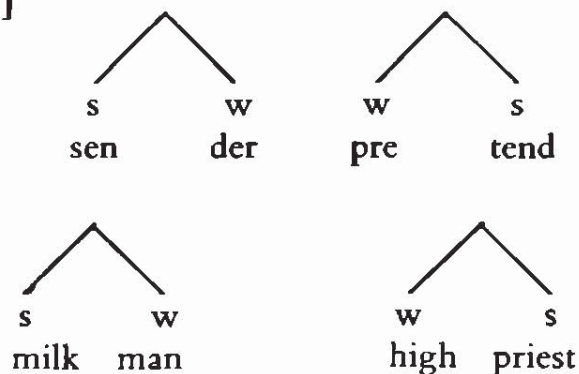Underline the syllable which receives the main stress on each occasion.

This should be enough to convince you that stress is not an inherent property of any vowel. In [11.4a] the first syllable receives the main stress regardless of the presence or absence of suffixes. But when certain suffixes are present, as in [11.4b] stress shifts from the first syllable to the syllable immediately preceding the suffix. Stress is not an inherent vowel feature. It is an autosegmental property of the word. Its location in the phonetic representation of a word may depend on the presence of certain affixes or grammatical information such as whether the word is realised as a noun or as a verb.

11.1.2 Metrical phonology

METRICAL PHONOLOGY is an approach developed within the generative phonology framework in recent years to handle stress phenomena. It complements AUTOSEGMENTAL PHONOLOGY which, as we saw in the last chapter, was primarily designed for the description of tone although it was used later to account for other aspects of phonology.

We have seen that stress is a relational concept: a stressed syllable is more prominent than an unstressed one. This fact is regarded as crucial in metrical phonology. Relative prominence is expressed using BINARY BRANCHING TREES, which are labelled STRONG (s) and WEAK (w). The more prominent syllable is dominated by s (i.e. it lies below s on the tree) and the less prominent one is dominated by w.

[11.5]

```
      /\              /\
     s    w          w    s
    sen  der        pre  tend

      /\              /\
     s    w          w    s
   milk  man        high priest
```

Strong and weak syllables are paired together by a procedure called FOOT FORMATION. What is proposed

is that stress is assigned to strings which have constituent structure consisting of two elements, one of which is strong (i.e. dominant) and the other weak (i.e. subordinate). The dominant one is the HEAD. The head governs its immediate neighbour to the left or right. In [11.5] a number of metrical feet are exemplified, with the head coming first or second.

The structure of metrical feet plays an important role in English poetry. Find examples of poems where right-headed and left-headed metrical feet are used. What are the literary terms for these feet?

This short passage from Shakespeare illustrates right-headed metrical feet:

Hĕ cán | nŏt líve, | Ĭ hópe, | ănd múst | nŏt díe
Till Geórge | bĕ páck'd | with póst-| hŏrse úp | tŏ heáven.
I'll in, | tŏ úrge | his hát | rĕd móre | to Clárénce
With lies | wĕll steél'd | with weígh | tў ár | gŭménts . . .
(William Shakespeare *Richard III*, *I.I.* 145–8)
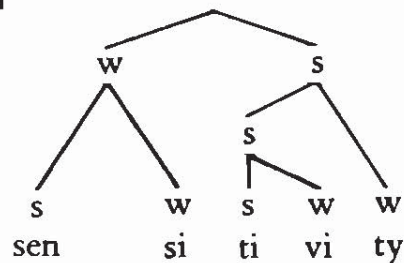(Note: V indicates a weak syllable and V́ a strong syllable.)

The above lines of blank (i.e. non-rhyming) verse typically contain five feet. Each foot in turn tends to contain an unstressed (weak) syllable which is followed by a stressed (strong) one. As you will recall from the discussion of Latin metre in (9.5) this pattern is called IAMBIC METRE. (To be precise, this extract is written in IAMBIC PENTA-METRE i.e. there are five feet in each line.)

A variety of left-headed feet were introduced in our brief account of Latin metre in (9.5). Examine an English example of left-headed metrical feet where a stressed syllable is followed by an unstressed one. As in Latin verse, this verse pattern is called TROCHAIC METRE:

How the | Chimnĕy | sweépĕr's | crý
Évery̆ | bláckn'ing | Chúrch ăp | páls;
Ánd thĕ | háplĕss | sóldier's | sigh
Rúns in | bloód dŏwn | Pálăce | wálls.
(From William Blake *London*, *Songs of experience*)

The account of relative prominence given in [11.5] only deals with disyllabic words. Initially, I was careful to avoid longer words for clarity's sake. But in fact, such words can be comfortably handled by assuming that phonological systems are HIERARCHICAL and that the concept of relative prominence is applicable at various points in the hierarchy. The rank which we considered in [11.5] is that of the FOOT. Adjacent syllables were grouped together and one of them was identified as being more salient than its neighbour. Where a word contains more than two syllables, the same manoeuvre can be repeated, with adjacent feet being grouped together in order to establish which one of them is more salient. Consider
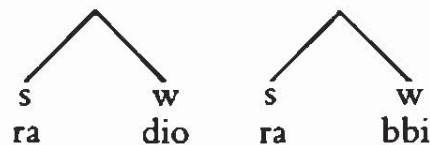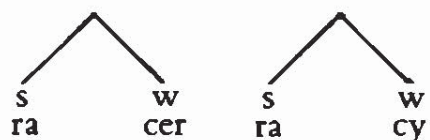
[11.6]


```
            w           s
          /   \       /   \
         /     \     s      \
        /       \    |\      \
       s         w  s  w      w
      sen        si ti vi     ty
```

This procedure is known as WORD-TREE FORMATION. We can identify the antepenultimate syllable -ti- as the one receiving primary stress. By inspecting the tree, we can establish that it is dominated by more s's than any other syllable. Degrees of stress are read off the tree by counting the number of s nodes that dominate a particular syllable: the more s nodes there are above a syllable in the tree, the more heavily stressed that syllable is.

Unfortunately, the model just outlined does not always yield the correct results. It fails to capture some prominence distinctions in English. For instance, it would lead us to construct the following trees for *radio, rabbi, racer* and *racy*:
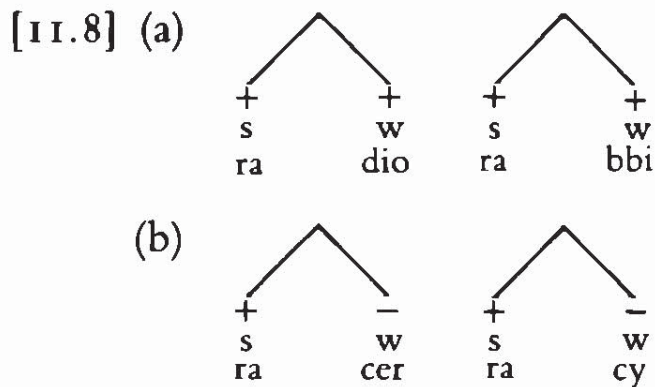
[11.7] (a)

```
     /\          /\
    /  \        /  \
   s    w      s    w
   ra   dio    ra   bbi
```

(b)

```
     /\          /\
    /  \        /  \
   s    w      s    w
   ra   cer    ra   cy
```
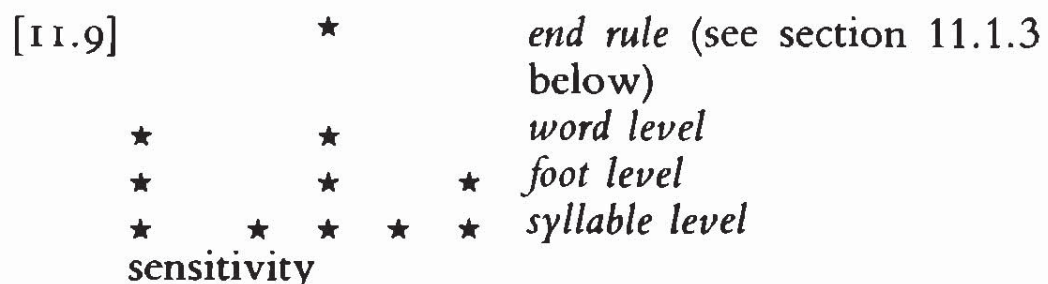
The trees in [11.7] are identical. But we know that the final syllable of the words in [11.7a] is more prominent than the final syllable of the words in [11.7b]. To solve this problem, Liberman and Prince (1977) proposed the retention of the SPE segmental feature [± stress] in their metrical theory of stress. If that is done, [11.7] can be re-written as [11.8], bringing out clearly the differences in the relative prominence of the final vowel:

[11.8] (a)

```
       /\              /\
      +    +          +    +
      s    w          s    w
      ra   dio        ra   bbi
```

(b)

```
       /\              /\
      +    −          +    −
      s    w          s    w
      ra   cer        ra   cy
```

(Here + stands for [+stress] and − stand for [−stress])

There is some understandable unease about a metrical, nonsegmetal theory of stress which sets out to show the relational nature of stress allowing binary segmental feature [±stress] to play a role in metrical trees. A simpler way of showing the relative salience of syllables which overcomes this problem is proposed by Prince (1983). He advocates the construction of a METRICAL GRID. This is done by representing information of the kind contained in a metrical tree as an array of asterisks. One asterisk is assigned to each syllable at the syllable tier, an additional asterisk is assigned to the stronger syllable in each foot, and if necessary, at word level a further asterisk is assigned to the strongest foot which is nearest the beginning or the end of the word, depending on the preference of a particular language.

Using a grid we can show in a transparent way the relative stress of the different syllables of *sensitivity* as in [11.9]

[11.9]

		★			*end rule* (see section 11.1.3 below)
	★		★		*word level*
	★		★	★	*foot level*
	★	★ ★	★	★	*syllable level*

sensitivity

Although trees and grids can convey the same information, grids are preferable because they do so in a more perspicuous manner.

Convert the metrical trees in [11.5] into metrical grids.


11.1.3 Metrical trees and grids

If you cast your eye back to [11.5], you will observe that in words like *sender* the left syllable is stronger than the right one in the same foot while in a word like *pretend* the right-hand syllable is the stronger of the two. Trees like those in [11.5] where one syllable functions as the HEAD and governs the syllable that immediately precedes or follows it are said to be BOUNDED.

In addition to bounded trees, there exist UN-BOUNDED trees where a head governs not just one adjacent syllable, but all the syllables that precede or follow it. This is the situation in a language where primary stress always falls either on the initial or final syllable of a word.

Hayes (1981) provides a typological classification of metrical systems. He shows that in some languages, such as Maranungku (Australia), primary stress falls on the first syllable, and secondary stress on alternate syllables to its right:

[11.10]

tíralk	'saliva'
mérepèt	'beard'
yángarmàta	'the Pleiades'
lángkaràteti	'prawn'
wélepènemanta	'kind of duck'

An unbounded tree with a dominant left node [11.11] is needed to describe the facts of Maranungku:

[11.11]
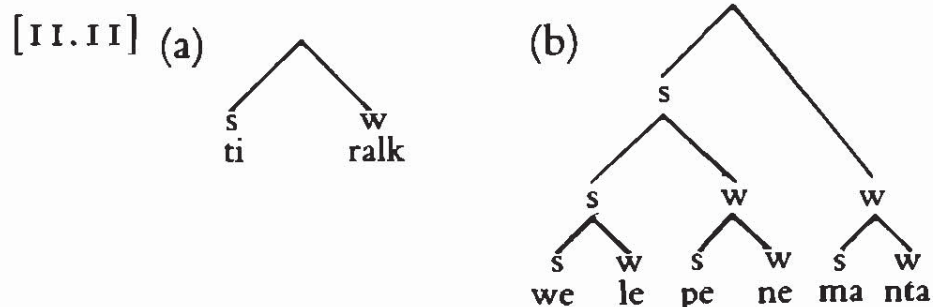
Contrasting with a language of this kind, are languages like French which have unbounded trees with a dominant right node. In French stress falls on the last syllable of a word:

[11.12] pe*tit* 'little'
encoura*ger* 'encourage'
télécommunica*tion* 'telecommunication'

Draw a bounded tree to represent stress in French *télécommunication*.

The tree required is [11.13]

[11.13]

té lé co mmu ni ca tion
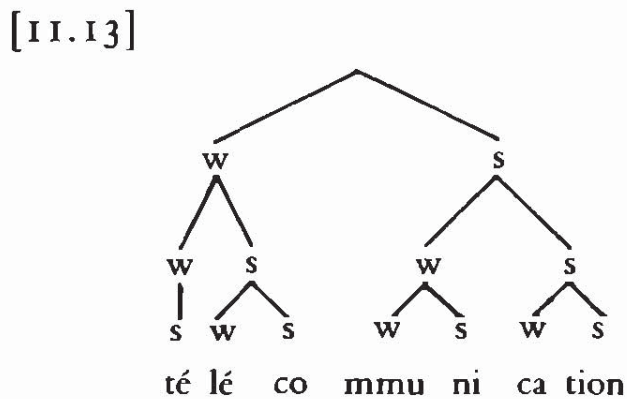
The head is on the right and it can have an indefinite number of subordinate syllables preceding it.

Maranungku and French are not unusual. In many languages, primary stress falls at or near the periphery of a word. Metrical grid theory reflects this fact by incorporating the END RULE convention. This convention is responsible for the addition of extra salience (shown by an extra asterisk on a metrical grid) to the most prominent left-hand or right-hand column of a word, depending on whether a language favours the beginning or the end of the word as the locus of primary stress.

In Maranungku where the left-hand edge of the word is dominant, the first syllable is assigned an extra asterisk by the end rule:

[11.14] ★   end rule
          ★   ★   ★   ★
          ★   ★   ★   ★   ★   ★
         we   le pen   e   man ta
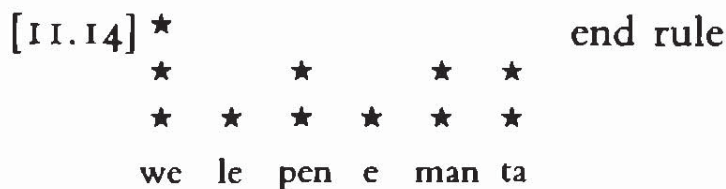
In Weri (Papua-New Guinea) (Hayes 1981) the situation is reversed. The final syllable is dominant and alternating secondary stress is put on the syllables preceding it in a word.

[11.15]

```
            ★
  ★   ★   ★
  ★ ★ ★ ★
  akunetepal   →  àkunètepál      'times'
```

11.1.4 Extrametricality

In some languages, such as Finnish and Hungarian, primary stress normally falls on the initial syllable while in other langauges, such as Cambodian and Modern Hebrew, it is the final syllable that gets primary stress. In systems of this kind all syllables are taken into account in deciding where to put stress.

However, in many other languages syllables at word fringes are ignored by stress assignment rules. Such syllables are said to be EXTRAMETRICAL. They are completely 'invisible' to the rules which assign stress (see extrasyllabicity in (9.7)). The concept of extrametricality is useful in the treatment of languages which have their main stress on the PENULTIMATE syllable of the word. In these languages, the last syllable is 'not seen' by the algorithm which proceeds to put stress on the second last syllable. Swahili is a typical example of such a language (the extrametrical final syllable is put in parentheses):

[11.16] pí(ga)   'hit, beat'
        pigá(na)   'fight, hit each other'
        piganí(sha)   'cause to fight'
        tutawapí(ga)   'we shall beat them'

While in Swahili, which has penultimate main stress, it is the final syllable of a word that is extrametrical, in Native American languages like Dakota, Northern Paiute and Southern Paiute, where main stress falls on the second syllable of the word, it is the first syllable that is extrametrical.

11.1.5 Quantity sensitivity

We have seen above some of the typological parameters used in the study of stress: languages may have bounded as opposed to unbounded trees; the left or the right end of the word may be dominant; either all syllables in a word may be taken into account by stress placement rules or some of them may be extrametrical. Typological considerations of this kind are important because linguistic theory is concerned not only with the description of particular languages, but also with an exploration of the parameters within which languages can differ. For, as I have stressed at various points in the book, differences between languages occur within certain pre-set limits.

In this section we are going to examine a further typological parameter, namely whether stress placement in a given language is sensitive to the internal structure of the syllable that bears it. In particular we shall consider the role of SYLLABLE WEIGHT in stress placement. In the examples discussed above, no mention was made of syllable weight because in the languages which were cited, the internal structure of syllables is not taken into account in determining where to put stress. Syllables are treated in the same way irrespective of whether they are light or heavy.

The languages described in the last few paragraphs have SYLLABLE QUANTITY INSENSITIVE STRESS RULES. You will recall that we broached the subject of SYLLABLE QUANTITY SENSITIVE STRESS rules when examining Latin syllable structure in Chapter 9. Like the Swahili rule, the Latin stress rule treats the last syllable as extrametrical, and ignores it. But there the resemblance ends. While the Swahili rule puts primary stress on any penultimate syllable, the Latin rule is choosy. It puts stress on a penultimate syllable only if it has got a branching rhyme (i.e. it has either a long vowel or is closed by a consonant). The Latin stress rule can be re-stated as [11.17]:

[11.17] (i) ignore the final syllable: it is extrametrical;
(ii) construct an unbounded right-headed tree;
(iii) put primary stress on the first heavy syllable at the right-hand side of the word if it is in penultimate position (excluding the final syllable which is extrametrical);

(iv) if the penultimate syllable is light, put primary stress on the ante-penultimate syllable.

Use [11.17] to predict the syllable which gets primary stress in [11.18]:

[11.18] (a) amō   'I love'
(b) amāmus   'we love'
(c) amābāmus   'we loved'
(d) amābimus   'we shall love'
(e) amāverās   'you had loved'
(f) amābantur   'they will be loved'

Your solution should be along these lines (V́ indicates primary stress):

[11.19] (a) á(mō)
Since the final syllable is always extrametrical and therefore irrelevant for stress placement purposes, in disyllabic words primary stress must be on the first syllable regardless of its structure.

(b) amá(mus)
The penultimate syllable contains a long vowel and therefore counts as heavy. It receives the stress.

(c) amābá(mus)
The penultimate syllable is stressed again because it is heavy.

(d) amábi(mus)
The penultimate syllable only has a short vowel in the rhyme; it is light. Stress skips it and lands on the ante-penultimate.

(e) amáve(rās)
The statement made for (d) above covers this.

(f) amābán(tur)
The penultimate syllable has a branching rhyme consisting of a vowel followed by a consonant. It is heavy. It receives the stress.

11.1.6 English stress

I shall now illustrate the theory of metrical phonology by sketching an outline description of aspects of stress in English. The stress system of English is extremely complex. Here I can only give you a flavour of a metrical analysis of the system. To come to grips with the intricacies of English stress, you will need to study the words cited in the bibliography.[1]

As a rule, unless they are long or complex, grammatical words like prepositions and conjunctions do not receive primary word stress. (But long grammatical words, e.g. the preposition *underneath* and the conjunction *notwithstanding* receive primary word stress.) All lexical words, i.e. nouns, adjectives, verbs and adverbs must have one syllable which receives primary stress; obviously, in monosyllabic words like *dog, look* and *bag*, the only syllable that there is must be stressed. Word stress rules are needed in the grammar to account for the location of stress in words of two or more syllables. Only one syllable receives primary stress and the rest are subordinated to that syllable.

First consider stress placement in a few disyllabic verbs:

[11.20] (a) order   ferry cover   carry   dither copy
        (b) open   lollop hiccup lavish covet pocket

[11.21] (a) compare delay endow   enjoy   survey prefer
        (b) corrode avoid refine   design   amuse presume
        (c) concoct enlist protect attend   assent announce

Suggest a rule (or rules) to account for the placement of primary stress in these words.

Your rule needs to be quantity sensitive. It must make crucial reference to syllable weight. What is needed is an algorithm which constructs a right-headed bounded tree over the word and places main stress on the first heavy syllable, counting from the right-hand end of the word. Where disyllabic verbs contain no heavy syllables, stress falls by default on the first syllable. But otherwise stress falls on the right-handmost heavy syllable.

Thus, in [11.20a] there is no heavy syllable. So, primary stress falls by default on the first syllable in words like *copy* and *ferry*. In [11.20b] the second syllable contains a short vowel and a consonant. On the face of it, the second syllable should count as heavy. But it does not. This is because the last consonant of a verb is extrametrical, i.e. it is 'not seen' by stress rules. A word like *lavish* [lævɪ(ʃ)] is only scanned up to the vowel [ɪ]. Consequently its final syllable is classed as light and primary stress goes on the first syllable.

In [11.21a], on the other hand, in each case the second syllable contains a long vowel or diphthong. This makes it heavy and capable of bearing primary stress. In [11.21b] too the final consonant is extrametrical but this does not prevent primary stress falling on the second syllable. This is because the part of the syllable that is seen contains a long vowel or diphthong (see *avoid* [əvɔɪ(d)]). Finally, in [11.21c] stress once more falls on the second syllable. In these words the second syllable has two consonants following the vowel. Even though the last consonant is extrametrical, it is the second syllable which is nevertheless stressed. This is due to the fact that the part of that syllable which is 'seen' by the stress rule counts as heavy because it contains a short vowel followed by a consonant (see *enlist* [enlɪs(t)]).

Note in passing, however, that the rule stated above is not exceptionless. Words ending in [əʊ] (like *follow* and *sorrow*) are stressed on the first syllable although the second syllable contains a diphthong and 'ought to be' regarded as heavy.

Disyllabic adjectives are subject to the same rule as verbs. Adjectives like *tender, tiny* and *holy* which contain no heavy syllables are stressed on the initial syllable. Adjectives like *evil, timid* and *livid* whose second syllable ends in a consonant and therefore 'ought to be' heavy are, in fact, stressed on the first syllable because the final consonant is extrametrical. The part of the syllable that is 'seen' by the rule is light (a consonant followed by a short vowel). Lastly, adjectives like *robust, morose* and *alive* are stressed on the second syllable because their second syllables are heavy.

Next, let us turn to disyllabic nouns.

Begin by marking the syllable which receives primary stress in the words below:

[11.22] (a) pity   baby   sugar   river
                picture   ferry   panda   butter
         (b) magic   tulip   mason   foetus
         (c) almond   contact   subject   dentist
         (d) canoe   bamboo   bazaar   settee
         (e) police   alert   debate   cartoon

In [11.22a–c] primary stress falls on the first syllable while in [11.22d–e] it falls on the second syllable. As before, a right-headed tree is constructed for each word. Where there is no heavy syllable, a disyllabic word is stressed on the first syllable. But if a word contains a heavy syllable, stress goes on the heavy syllable nearest to the end of the word.

Note, however, this crucial difference between nouns on the one hand and verbs and adjectives on the other: for the purposes of this rule, a heavy syllable in a noun must contain a long vowel or diphthong. While in verbs and adjectives only the final consonant is extrametrical, in nouns, any consonants following the final vowel are extrametrical. This means that the presence of consonants after a vowel does not contribute to syllable weight in nouns.

Thus, in [11.22a] nouns like *pity*, whose second syllable is light are stressed on the first syllable. Similarly, the first syllable is stressed in both [11.22b and c] because of the extrametricality of any consonant following the vowel in the second syllable. Consequently, the part of the second syllable that is 'seen' contains a short (lax) vowel and therefore cannot be stressed.

However, nouns like *police* [11.22e] whose second syllable contains a long vowel (followed by one or more extrametrical consonants), are stressed on the second syllable just like nouns such as *canoe* [11.22d] which end in a long vowel or diphthong. All that matters is whether or not the second syllable contains a long vowel or diphthong. In other words, with regard to the disyllabic noun stress rule, only the nucleus of the second syllable is projected. The noun stress rule only 'sees' the syllable nucleus: if the

nucleus branches (i.e. contains a long vowel or diphthong), stress is on the final syllable. Otherwise, stress is on the initial syllable.

We can now move on to longer words. We shall observe that the stress rule that applies in longer words is reminiscent of the Latin stress rule.

Study the data in [11.23] and work out the rule that determines location of primary stress:

[11.23] (a) *ci*nema   *A*gatha   *eff*igy   *Ma*libu
           *je*opardy   *o*verture   *ca*lumny   *Sa*lisbury
    (b) Ga*la*pagos   An*ti*gone   A*me*rica   rhi*no*ceros
        e*pi*tome
    (c) tor*na*do   rhodo*den*dron   a*ro*ma
        psy*cho*sis   bron*chi*tis   The*re*sa
        bronto*sau*rus

As in Latin, the stress placement algorithm creates a right-hand headed tree, ignoring the final syllable, which is extrametrical. Stress lands on the penultimate syllable if it is heavy, [see 11.23c] but if the penultimate is light, stress goes on the ante-penultimate syllable (see [11.23a, b]).

Up to this point we have only considered stress in simple words. We have not examined yet the problem of stress placement in complex words which consist of a root and one or more affixes, which may be prefixes or suffixes. Interestingly, in English the addition of a prefix tends not to affect the placement of stress. Usually words are stressed in the same way with or without prefixes:

[11.24] write   rewríte   políte   impolíte
        exámine   re-exámine   grátitude   ingrátitude
        political   apolitical   móral   amóral

The effect of the addition of suffixes is much more fascinating because different suffixes affect stress placement in different ways. First, there are suffixes whose presence has no effect on the primary stress of the root to which they are attached. A good example of this can be seen by observing what happens when the suffix *-ment* is added to a verb stem like *góvern* to yield the noun *góvernment*. The

position of stress remains unchanged. Likewise, the suffixes -*ness* as in *kíndness* and -*ful* as in *fáithful* have no effect on stress.

Another class of suffixes attract stress to themselves as though they were magnets. When they are attached to a word they always get the main stress. They include -*étte* as in *maisonétte* and *kitchenétte*, -*ésque* as in *picturésque* and *grotésque*. (These suffixes are borrowed from French and obey the French stress rule.)

Add two more examples to this list.

A third class of suffixes make the primary stress move to the syllable immediately preceding them. That is the case when a suffix like -*ic* is added to a stem like *démocrat* to derive the adjective *democrátic* or when the suffix -*ity* is added to the stem *públic* to produce *publícity*.

(a) Write down three examples of words containing each of the suffixes -*some*, -*hood*, -*ity* and -*ic*.

(b) Contrast the effect on stress placement of the presence of the suffixes -*some* and -*hood* on the one hand and -*ity* and -*ic* on the other.

You will have discovered that -*some* and -*hood* have no effect on stress. A word is stressed on the same syllable with or without these suffixes. However, the suffixes -*ity* and -*ic* do affect stress placement in the base to which they are attached: they attract stress to the syllable immediately before them. Interestingly, the rule, which attracts stress to the syllable before the suffix is a QUANTITY INSENSI-TIVE rule – it puts stress on that syllable regardless of whether the syllable is light or heavy. Suffixes like -*ity* and -*ic* which attract stress to the syllable immediately preceding them are called STRONG MODE SUFFIXES.

There is a fourth category of suffixes which is similar to the strong mode suffixes in that they also affect stress placement in the base form to which they are attached although they are not stressed themselves. But unlike strong mode suffixes, this class contains QUANTITY SENSI-

TIVE suffixes which put stress on the immediately preceding syllable only if it is heavy either because it has a long vowel or a diphthong:

[11.25] adjectíval   arríval   homicídal
        betráyal   refúsal   recítal

or because it is closed by a consonant:

[11.26] departméntal   ornaméntal   detriméntal
        accidéntal

If the preceding syllable is light, stress misses it out and falls two syllables before it:

[11.27] problemátical   práctical   condítional
        municipal   séasonal   proféssional

Sufffixes of this kind which only manage to attract stress to the syllable immediately before them if it is heavy, and otherwise attract stress to the second syllable to their left are called WEAK MODE SUFFIXES.

11.2 Intonation

All languages use pitch. This, in part, is an automatic consequence of the fact that any time a voiced sound is produced, the vocal cords vibrate at a certain rate. The rate of vibration corresponds closely to the pitch perceived by the hearer: the higher the rate of vibration the higher is the perceived pitch. The fact that pitch differences can be observed in the utterances of any language is in itself of no great linguistic interest.

What linguists are interested in are the ways in which pitch differences are functionally harnessed. In broad terms, pitch differences can be exploited in two distinct ways. Within the domain of the word, pitch can be used to contrast lexical meaning or to mark grammatical properties, as we saw in the last chapter. In that case we speak of *tone*. Alternatively, the domain of pitch can be an entire utterance, in which case we speak of *intonation*. It would be wrong to classify languages as either tonal or intonational because all languages have intonation. That includes tone languages, as the discussion of downdrift in Chapter 10

showed. One of the issues that has rightly received a good deal of attention from phonologists is the way in which intonation meshes together with stress in a stress language, and with tone in a tone language.

In the next section we shall outline some of the main features of English intonation. This sketch is not meant to be a comprehensive description. Rather it is merely intended to give us a glimpse at the workings of intonation in a stress language.[2]

11.2.1 The form of English intonation

Just as the syntactician focuses on the sentence as the key unit of grammatical analysis, the phonologist focuses on the TONE UNIT (also called the PHONOLOGICAL PHRASE) as the most significant domain in terms of which intonation contours reflecting the pitch of utterances are assigned.

For the purposes of intonation analysis, the English tone unit has the following internal organisation:

[11.28] *(pre-head) head*   *tonic*
or   *(tail)*
nucleus

The nucleus is the central element in a tone unit. It contains the syllable in an utterance which undergoes significant pitch movement – and is consequently more prominent than the rest. That syllable is the NUCLEUS or TONIC SYLLABLE. The tonic syllable is normally preceded by a HEAD. The head is the part of the tone unit extending from the first stressed syllable to the syllable immediately preceding the tonic syllable. Optionally, a head can be preceded by a PRE-HEAD. This consists of any unstressed syllables that occur in front of the first stressed syllable of the head. Again, optionally, a tonic syllable can be followed by a TAIL. The tail contains any syllables (which may or may not be stressed) following the tonic syllable.

Say the sentence in [11.29] noting the way pitch fluctuates. Produce two analogous examples of your own and state verbally the pitch movements which you observe.

[11.29]

‖ He will │ phone you when │ *all* │ the children are back. ‖
Ph │ *H* │ *Ts* │ *T*

key: *Ph* = pre-head; *H* = head; *Ts* = tonic syllable; *T* = tail

---

Normally pitch is low in the pre-head, more or less level high in the head and falling on the tonic; in the tail the pitch pattern established on the tonic is simply continued.

The most common direction of pitch movement on the tonic is downward. As we saw in section 10.5, linguists talk of DOWNDRIFT in tone languages when they describe the tendency for high tones to be somewhat lowered when preceded by a low tone, a phenomenon which results in falling intonation. In many stress languages like English the same downdrift (also called DECLI-NATION LINE) can be observed. Frequently pitch moves down on the tonic syllable and remains down until the end of the utterance. Pitch tends to be much lower at the end of an utterance than it is at the beginning. FALLING INTONATION, which is exemplified by [10.30], is the unmarked intonation pattern in English.

[11.30]

'James Thurber was born in O`hio.

The widespread tendency to drop pitch as the end of an utterance approaches might have a physiological expla-nation. Possibly, as the speaker gradually runs out of breath, there is less and less air to cause the vibration of the vocal cords and consequently they vibrate more sluggishly and the pitch of the utterance goes down. (At the same time, in some languages like Luganda, the intensity of the signal also declines, so that the end of the utterance is auditorily less salient than the beginning.)

It is reasonable to ask what the functions of intonation are. Does pitch fluctuation serve any linguistic purpose? Some answers to this question are outlined below.

11.2.2 Accentuation function

Word stress interacts with intonation. One of the words in a sentence has a syllable which stands out above the rest. This is the syllable which has SENTENCE STRESS – also called TONIC STRESS. Such a syllable is sometimes referred to as the TONIC SYLLABLE. In unmarked cases, tonic stress goes on the syllable which carries primary word stress in the last lexical item of the tone unit. Such a lexical item is often a noun, an adjective or a verb. The tonic syllable is underlined in the examples below:

[11.31] They are *working*.
         Joan has not *seen* him.
         The children are in the *playground*.

In marked cases, the above rule is superseded by a rule which allows CONTRASTIVE (or EMPHATIC) STRESS to fall on grammatical (function) words such as pronouns, prepositions and conjunctions if the speaker wishes, for some communicative reason, to draw attention to such words or alternatively, contrastive stress may occur on non-final lexical items:

[11.32] (a) *She* is studying linguistics.
              She *is* studying linguistics.
              She is *studying* linguistics.
         (b) *She* travelled from London.
              She travelled *from* London.
              She travelled *to* London.
              She *travelled* to London.

How does the location of the tonic syllable affect the ways in which these sentences can be interpreted?

The accentual function is the most basic function of intonation. In unmarked cases tonic stress is often used to make a syllable in the lexical word containing new information stand out. But in marked cases, the tonic syllable can be the most prominent syllable of virtually any word which the speaker chooses to highlight.

11.2.3 Intonation and illocutionary force

The choice of intonation pattern is not entirely free. In a language such as English certain ILLOCUTIONARY ACTS (= acts of speaking) such as making statements and asking questions, are typically performed using certain intonation patterns. I use the word 'typically' advisedly. The deployment of intonation contours is not determined by rigid, exceptionless rules. A given illocutionary act may be performed without using the intonation pattern indicated here. But nevertheless, certain intonation patterns are much more likely to be used to perform certain illocutionary acts than others.

The tone unit type with a level head and a falling nucleus (' h ` n), which is the only one introduced so far, is unmarked. It is the intonation pattern that is assigned when there is no good reason for doing otherwise. For example, it is normally used in statements, in imperatives and in *wh–* questions (i.e. questions beginning with the words *why, where, when, what, which* etc.). You can verify this by reading the sentences below in a neutral way and observing the intonation contour which you use:

[11.33] (a) *Statements*: ' h ` n
'Mary lives in ` *Lancaster*.
'The shops are ` *closed*.
(b) *WH* questions: ' h ` n
'When did Mary ` *go* there?
'What is your ` *name*?
(c) *Imperatives*: ' h ` n
Just 'eat up your ` *dinner*!
`*Sit*!

Note: the head and tail are both optional. They can both be omitted from a tone unit, as in the last example. Only the nucleus is obligatory.

Besides falling intonation, another common (but somewhat marked) type is the LOW RISE ('h,n) where the head is level and the nucleus rises slightly. This pattern is often found in YES/NO QUESTIONS where the speaker queries an item and expects simple confirmation or denial:

[11.34] Are your 'friends going to the ,*party*?
Will you re'tire next ,*year*?

I will mention just one more tone unit type, HIGH RISE (' ' N). This has a level head and a high rising nucleus. The head may be optionally omitted. This is common in elliptical questions like:

[11.35] ' coming? ('Are you 'coming)
        ' tea anybody?
        ' taxi?

Optionally, the pitch of questions may be raised generally so that the upper range of the speaker's voice is employed.

11.2.4 The grammatical function of intonation

The interpretation of the meaning of a sentence in part involves knowing which words should be syntactically bracketed together. In writing, punctuation is used to group together words which grammatically and semantically form coherent units. In the spoken language intonation serves a similar purpose.

Clear evidence of this can be seen by observing the way in which intonation is used to resolve syntactic ambiguity. Many sentences which are potentially ambiguous on paper are not ambiguous in their spoken form. For a long time linguists have been aware that the syntactic bracketing of potentially ambiguous constructions like *old cars and buses* can be clarified by intonation. The whole phrase is said as one unit if both the *cars* and *buses* are *old*. But it is said with an intonation break after cars if it is only the *cars* that are *old*. Effectively, intonation is used to indicate whether the adjective modifies just the first noun or both nouns.

Say the sentences in [11.36] using in each case the intonation contour which reflects the syntactic bracketing. How do the sentences in each pair differ in meaning?

[11.36] (a) Rioting [young men] and [women] were arrested.
        Rioting [young men and women] were arrested.
    (b) They are [cooking apples].
        They [are cooking] apples.

The syntactic functions of intonation can also be considered from the angle of language processing. We have seen that tone groups usually mark off major syntactic constituents like noun phrases and verb phrases. That is what enables them to disambiguate sentences. In addition, the syntactic units marked by intonation seem to have some kind of psychological relevance in language processing. Thus, it is decidedly odd to place a tone group boundary inside a syntactic constituent. Pauses and any hesitations tend to coincide with syntactic boundaries.

(a) Parse the sentences below and show their major syntactic units.

(b) Where could you hesitate in each one of these sentences? Where are the potential intonation breaks?

[11.37] (a) The man to whom John was talking gave him the book.

(b) Frank and David or Helen went to the party.

(c) When she left the dog started barking.

I hope you have discovered that the natural way of marking intonation boundaries and the places where hesitation is likely to occur involves identifying major syntactic divisions:

[11.38] (a) *subject (noun phrase)*
‖ The man to whom John was talking |
predicate (verb phrase)
gave him the book.‖

(b) *subject (noun phrase)*   *predicate (verb phrase)*
‖ Frank and David or Helen | went to the party. ‖

(c) *subordinate clause*   *main clause*
‖ When she left | the dog started barking. ‖

'GARDEN PATH' sentences like [11.38c], for which one of the most obvious parsings is wrong, are often assigned the wrong intonation before the speaker works out the correct syntactic analysis. You were probably momentarily tempted to parse c. thus:

[11.38] *‖ When she left the dog | started barking.‖

with an intonation break after *dog*, before you realised that the principal division here is between the main clause and the subordinate clause: *dog* is the subject of the verb *started* in the main clause and not the object of the verb *left* in the subordinate clause.

11.2.5 Attitudinal functions

Intonation also has an attitudinal function. Inferences can be drawn from intonation about the speaker's ATTITUDE. We all have heard someone say 'It was not what he said, but the way he said it . . .' or 'It is the tone of voice she used that really upset me'.

We can all mean different things with the same words by modulating our intonation. Utterances may perform different illocutionary acts depending on the speaker's attitude as it is revealed through intonation. An utterance like *sit down* or *come back* can be a command, a polite invitation or a threat.

The meaning of an utterance depends on many factors. Most obviously it depends on the semantic content of the words as well as the grammatical and logical relationships between the words used in an utterance. Less obviously, it depends on the CONTEXT OF UTTERANCE (the linguistic context in which the words are uttered and the background situation known to be relevant by both the speaker and hearer); it depends on the PARALINGUISTIC features, e.g. gestures, facial expression and voice quality employed; and it depends on the intonation used by the speaker. Intonation seems to play a role in conveying attitudinal meaning. But the contribution made by intonation *per se* is not easy to isolate with any certainty. It is therefore not feasible to establish a simple, direct correlation between intonation and attitude.

One area where a clear link has been established is in QUESTION TAGS. Normally, falling intonation in the tag indicates a quest for confirmation:

[11.39] 'George is a ` lawyer, ` isn't he?

But rising intonation indicates a greater degree of uncertainty, with the speaker not merely seeking confirmation but rather wanting to have a real doubt cleared:

[11.40] 'George is a ' lawyer, ,isn't he?

Elsewhere the link between intonation and attitude is obscure. At best what we can do is outline various factors affecting attitudinal judgements. But it would be rash to claim that these factors **determine** attitudinal judgements.

One important factor affecting attitudinal judgements is VOICE QUALITY. Phoneticians have become increasingly aware of the importance of voice quality as a factor influencing attitudinal judgements (Laver 1980; Knowles 1987: 211–14). Some of the properties of a speaker's voice are INDEXICAL in the sense that they convey some information about the speaker to the hearer. Some indexical features are relatively permanent. A speaker's sex, age, membership of a social group, regional origins or social class membership can often be inferred from voice quality. These indexical features cannot be easily changed by the speaker. Other indexical features of voice quality such as laryngitis or a cold or being drunk are more transient. The addressee can make various favourable or unfavourable judgements about the speaker on the basis of voice quality features of the kind that I have listed.

A speaker can also deliberately attempt to convey attitudinal information by combining a voice quality trait with a purposeful use of pitch. We observed above that the commonest intonation contour in English is a level head followed by a falling nucleus. The SLOPE (or gradient) of the fall is variable. In unmarked circumstances the fall is gentle. If a speaker opts for a very steep slope, this is likely to convey a peremptory, abrupt or domineering attitude, especially when accompanied with harsh voice quality.

Try saying '*Come here* !' varying the slope and harshness of the voice quality. Describe the circumstances in which each version of the sentence would be appropriate.

A further variable which has to be considered is PITCH RANGE. There is some correlation between pitch range and emotion.
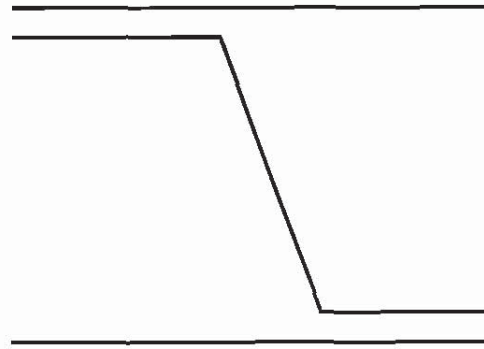
Say this sentence varying pitch range:

[11.41] (a) I am so glad to see you.
(b) Hello!

If a total stranger ran up to you in the street and said

[11.42]

Hello!

You would probably think it was a case of mistaken identity. If, on the other hand, when a long lost friend turns up at your door you say:

[11.43] I am so glad to see you again.

that would be interpreted as a frosty welcome.

When people are excited they use the upper part of their speech range much more than they do normally. This is usually accompanied by an increase in LOUDNESS and TEMPO. When depressed or sad, on the other hand, people tend to use mostly the lower part of their pitch range and to talk more slowly and more quietly.

There are no cast iron rules which govern the use of intonation to signal attitude. There are only tendencies. The right interpretation of an utterance depends only in part on intonation. As we saw above, there are many other variables which need to be considered. It would be naive to attempt to establish a simple, one-to-one correlation between attitude and intonation.

11.2.6 Discourse function

Talk rarely consists of isolated utterances. The norm is for utterances to be strung together, and in conversation for the roles of speaker and hearer to be swopped frequently. Intonation plays a crucial role in the structuring and gluing together of discourse.

Intonation is normally used to indicate NEW INFORMATION (which the addressee is assumed by the speaker

not to already possess) as opposed to GIVEN INFOR-
MATION (which is known or assumed to be already
known to the addressee). Given information is kept in the
background. It is not in FOCUS. But new information is
foregrounded. It is in focus. One of the words conveying
new information is highlighted by making one of its syl-
lables the tonic syllable.

Imagine an exchange like [11.44] in a butcher's shop:

[11.44] John: Do you 'like ` tripe?
        Mary: I ` loathe tripe. (or *I ` loathe it*)

When John asks the question, *tripe* is new information and
receives tonic stress (the word 'information' is being used
in a very broad sense). But when Mary replies, *tripe* is
already established as the topic of the conversation and
needs no highlighting. So, tonic stress falls on *loathe*. It
would be very odd if in Mary's reply tonic stress was on
tripe (* *I 'loathe ` tripe*).

Furthermore, intonation plays an important role in
turn-taking in dialogue. A fall usually indicates a completed
turn, without the expectation of one's interlocutor replying.
But a rise gives a strong indication that the speaker intends
to continue, or that a response from one's interlocutor is
expected. A simple example of this can be seen in VOCA-
TIVES and in YES-NO QUESTIONS:

[11.45] (a) Vocative
            ` ' Janet (in fact the fall rise is often levelled
            to ⁻Ja⁻net)
        (b) Yes-No question
            Have you 'lived here for a long ,time?

It is possible to use falling intonation when calling a
person's name e.g. when a school teacher shouts at a
naughty boy: 'Smith rather than ` ' Smith. What is the
difference between these two utterances?

A fall-rise calling nucleus (coupled with generally raised
pitch) is the intonation pattern normally used to attract the
addressee's attention. However, a falling nucleus can also
be used for this purpose – with somewhat different prag-

matic force. In our example, (especially if the teacher has a stern look and uses loud and harsh voice quality) this 'call' will in fact probably be interpreted as meaning:

[11.46] ' *pay attention* ' *Smith.*

One of the things that have emerged from this chapter is the fact that phonology has to be placed in a wider context. The discussion of the attitudinal functions of intonation showed the way in which phonology overlaps with verbal paralinguistic properties such as voice quality, pitch-range and tempo. These paralinguistic properties are not part of the linguistic system proper although they impinge on it.

The relationship between language and paralanguage (which includes not only verbal non-linguistic properties such as voice quality and pitch-range but also non-verbal features like eye-contact and posture) is an interesting topic and has attracted considerable interest in the literature (see Argyle (1974); Laver and Hutcheson (1972); Laver (1980) and Lyons (1977)). Unfortunately, we do not have the space to pursue it here.

What we shall explore is the relationship between phonology and the other core components of the linguistic system. At several points in the book we have seen that phonology impinges on grammar and meaning. In the concluding chapter we shall focus on this interaction.

Exercises

1.(a) Study the data below and state verbally the placement of stress in Arabic.
  (b) Draw metrical trees to show where stress falls in the following words: *kátab, kátabu, kátabit, katábt, katábti, lamúuna* and *lamunáat.*

kátab	he wrote
kátabit	she wrote
katábt	you (m.) wrote
katábti	you (f.) wrote
katábna	we wrote
katábtu	you (pl.) wrote
kátabu	they wrote

lamúuna	lemon
lamunáat	lemons
móoza	banana
mozáat	bananas
xóoxa	peach
xoxáat	peaches

2. Ngiyamba (Australia) (Based on Donaldson 1980)
Study the data below.

(a) Referring to syllable weight, state in general terms the constraints on stress placement in roots and suffixes in Ngiyamba. Which syllables receive primary stress? Which syllables receive secondary stress? And which syllables are unstressed?

(b) Illustrating your answer with examples show how
   (i) primary stress is assigned in roots;
   (ii) secondary stress is assigned in suffixes;
   (iii) secondary stress is assigned in roots;
   (iv) secondary stress is assigned in monosyllabic suffixes with short vowels.

Note: In the data below, 1 indicates primary stress, and 2, 3 and 4 indicate secondary stress. Unmarked syllables are unstressed.

1
girala   'star'

1   3
giralaŋ-ga   'on star'

1   2
girlam-bidi   'big star'

3   1
gabada:-ga   'on moon'

3   1
gabada:-bidi   'big moon'

   1
girbadja-gu   '(grey) kangaroos'

1   2
girbadja-bidi   'big kangaroo'

1   4   2
yana-wa-y-gara:-dha   'go along all day'

1 2 yana-wa-y-gaː-dha	'go along a bit'
1 2 yana-wa-y-gaː-giri	'(Let's) go along a bit'
1 2 4 yana-buna-wa-dha	'go along back'
3 1 binjdju-binjdjuːri-nji	'(I) half-recovered (my) balance'
1 · 2 girbadja-gu-bagaː-dhiː	'But the kangaroo scented me'
1 budhaːni-nji	'scent-past tense'
1 2 ŋiyam-baː	'Ngiyamba'
1 gadawu-ga	'on large-leaved sandalwood'
1 bayirga-gu	'leech -dative case'
1 maliyan	'eagle hawk'
1 2 mayim-buwan	'with person'

Notes

1. There is a very rich literature on stress in English. SPE is the classic generative work on the subject and any serious student of English stress ought to be familiar with its contents. For an introductory textbook which explores English stress in an accessible way from a non-metrical, non-generative point of view see Knowles (1987). Fudge 1984 is another recent non-metrical, well-exemplified general survey of English stress. Hogg and McCully (1987) is an advanced introductory textbook on metrical phonology. It examines English stress in considerable detail.

The account given here is based on the work of metrical phonologists like Hayes (1982, 1983, 1984) Liberman and Prince (1977) and Prince (1983).

2. Knowles (1987) is an introductory book which deals with English intonation extensively. There are numerous advanced studies of English intonation e.g. Halliday (1967, 1970); Ladd (1980); Pierrehumbert (1980); Cruttenden (1986) which you can consult for more detailed discussion.