9 The Rise and Fall of the British School of Intonation Analysis
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9.1 Introduction

The British school of intonation analysis blossomed in the first half of the twentieth century and continues to be used today, particularly in language teaching. It builds on earlier insights into the way in which patterns of variation in pitch and other dimensions can be used to convey information additional to the meaning of the words in an utterance. Given the era in which it was developed, the British school of intonation analysis relied mainly on auditory phonetic analysis of the patterns and introspection about their meaning. One of its defining characteristics is the use of dynamic pitch elements such as rise and fall-rise as opposed to pitch levels. Its name reflects the fact that, although contributions have been made by scholars around the world, much of the development of the analyses that characterize the school can be attributed to phoneticians working the United Kingdom.

The name has no formal status, but has been used to contrast the kinds of analysis pursued within this particular general framework with those of other traditions, and the label has been well accepted by those working in intonation. In the mid-twentieth century, the contrast was principally with a framework based on pitch levels that was popularized by work in the United States, whereas nowadays the contrast is more commonly with the autosegmental-metrical (AM) framework that predominates in experimental research into intonation. It should not be thought, however, that the British school is a monolithic, invariant framework in terms of methodology and concepts. This chapter will outline its history and show how those working on intonation edged toward the units and structures that are now associated with the British school, and it will discuss some of the variants that coexist within the broad framework. It will also look explicitly at the relation of the British school to AM models to see what they share, how they differ, and whether there are insights that can be usefully adopted in either direction.

9.2 The History of the British School

The history of the British school is one of incremental progress toward an understanding of the nature of intonation and how to analyze it. No phenomenon, particularly in language, yields to analysis without a struggle, but intonation seems to have put up a particularly spirited fight. Seen from the perspective of our current understanding of intonation, the reason for this arguably lies in its multifaceted nature and its interweaving with other prosodic systems. Several crucial features of intonation that are widely agreed today were not self-evident.

First, intonation functions both within the formal linguistic system and outside it. For instance, intonation can signal the boundaries of structural units such as clauses, and it has the potential to change a statement into a question. Conversely, it can be used to convey paralinguistic meaning outside core language—for instance, information about the speaker's attitude. A failure to appreciate such distinct functions has often led to confusion: a rise on an interrogative is because of the interrogativity, if the analyst's starting point is that intonation is determined by grammar, or it is because of the speaker's wish to sound friendly and unthreatening, if the belief is that intonation's work is attitudinal. Only if it is appreciated that intonation is carrying out both tasks simultaneously can its inner workings be laid bare.

Second, and relatedly, intonation imposes on its primary carrier, pitch, both discrete categories and gradient variation. A rise and a fall are (almost certainly) discretely different, while expansion of pitch range to convey shades of enthusiasm is continuous. To the extent that discrete categories are involved, this suggests that intonation is in some measure phonological. It would be neat and simple if the workload were correspondingly divided—categories for linguistic function, and gradience for paralinguistic work—but in reality, things are more complicated. So, as well as using a pattern ending in a fall to ask an English *wh*-question, as is generally considered the default from the grammatical point of view, we can also end it on a different category, a rise, to increase the level of politeness and make it less face-threatening. Conversely, a declarative can be given the discourse status of a question by expansion of the pitch range of the utterance including the final fall. The mix of discreteness and gradience tended to obscure the matter of whether, and to what extent, intonation shares the kind of phonological structure familiar from segments. The idea that intonation is phonologically structured is one that has only relatively recently gained ascendancy and, even now, uncontroversially so more among linguists than among psychologists and speech engineers.

To prepare the ground for one of the themes that will run through this chapter, let me briefly discuss what makes linguistic analyses "phonological." Ladd (2008, 10) suggests:

> At a minimum, a complete phonological description includes (a) a level of description in which the sounds of an utterance are characterised in terms of a relatively small number of *categorically distinct entities*—phonemes, features, or the like—and (b) a mapping between such a description and a physical description of the utterance in terms of *continuously varying parameters*, such as an acoustic waveform or tracks of the movement of the articulators.

To this one might add an expectation that the categorically discrete entities will have a variable relation both to linguistic function (or "meaning") and to their physical realization and that they can be organized in terms of abstract structures (such as, in today's terms, the *prosodic hierarchy*). While Ladd's definition provides a useful guide to what would be phonological today, Ladd admits that the emphasis on quantitative mapping makes it a characterization of a *laboratory*-phonological approach, a definition that is arguably anachronistic when applied to the earlier phases, at least, of the British school. It has to be remembered that the technology with which we conveniently and rapidly capture, visualize, and quantify the acoustic parameters of intonation postdates the development of the British school. The insights achieved were largely the result of careful listening and introspection.

The same is true of segmental analysis. Classical phoneme theory and Firthian prosodic analysis, for instance, were both eminently phonological, but subject to confirmation

largely against impressionistic phonetic judgments rather than instrumental analyses of the acoustic or articulatory events. Ladd concedes that earlier approaches such as the British school and the American structuralist levels framework can be regarded as "proto-phonological," saying "it is important to recognize that the impressionistic descriptions involve phonological categories that could *in principle* be related to instrumentally validated acoustic or articulatory parameters" (12). In this chapter, I will trace the ways in which successive analyses within the British school edged toward a standpoint that can be regarded as fully phonological, judged against the relevant criteria, that is, those appropriate to the contemporaneous methodological state of the art.

A third impediment to insightful analysis of intonation is connected to the earlier lack of clarity about its phonological status and reveals itself in attempts to represent intonation. Intonologists today would generally agree that a fundamental frequency contour does not show intonation, but rather variation in one physical property through which intonation is mapped. The equivalent in impressionistic phonetics would be a wiggly line tracking perceived pitch movement, text meandering up and down the page, or, one might at first suspect, the kind of adaptation of the musical stave frequently used to show relative pitch. All of these succeed in representing one aspect of intonation, the pitch variation, but require considerable ulterior knowledge of other aspects. In particular the first two kinds of representation, and the simplest form of the third, fail to reflect one of the insights that fades in and out of focus in the British school, namely the symbiotic relation between intonation and stress in English. The notion that metrically strong syllables provide anchor points to which intonational landmarks associate is now familiar, but took time to emerge.

The kind of visual representation that evolved during the development of the British school, a generic example of which is shown in (1), reflects a substantial degree of abstract linguistic analysis and understanding of these matters.

(1)   There's ↘no need to inter˅fere with it

The interlinear graph, or "tadpole diagram," relies on a division of the utterance into syllables and a classification of syllables as stressed (here, the filled dots) or unstressed. Pitch is represented impressionistically in the range defined by the stave, and, traditionally, a judgment is made about which syllable or syllables—most often the nucleus—have perceptible pitch movement. As noted by Cruttenden (1997, xv) this kind of representation is similar to a narrow phonetic segmental transcription. In the text, the symbols—often known as "tonetic stress marks"—show both the division of the intonational phrase into structural elements and the phonological categorization of those elements. Phonological categories such as the fall-rise nucleus on the stressed syllable of *interfere* have their phonetic realization made explicit by the tadpole diagram; the fall-rise would be shown compressed onto a monosyllabic nucleus by a tadpole whose tail bends back upward or extended over a relatively flat "valley floor" in the case where several syllables follow the nuclear syllable. We shall see that, as in other areas of phonetics and phonology, the evolution of representations was gradual and went hand in hand with theoretical progress in understanding intonation.

A general point that needs to be borne in mind about the British school is that the aim of the enterprise was overwhelmingly pedagogical. Those who saw intonation as

a vital, but neglected, part of language teaching, mainly in connection with the teaching of English, were discovering the facts of intonation with a view to making them accessible to language teachers and learners. Crystal (1969a), a work that approaches prosodic systems from first principles and aims to give a comprehensive descriptive account of both linguistic and paralinguistic aspects, is a notable exception to this goal-oriented approach, but for most authors there was a tension between the intellectual satisfaction of progressively uncovering complexity in the prosody of language and the need to systematize, simplify, and codify what was emerging for the practical purpose of language teaching.

In next subsections I will give a selective summary of the history of the British tradition, focusing on its zenith in the twentieth century, but first considering its roots in earlier work. Readers who want a comprehensive and wide-ranging account should consult Crystal (1969a); here it is only possible to focus on notable milestones in the development of the framework. Cruttenden (1997) provides a wide-ranging introduction to intonational description and theory grounded mainly within the British framework, and Cruttenden (1990) gives specifically the genesis of the concept of the intonational nucleus. Where appropriate I will refer back to the matters that have already been raised: the phonological status of intonation, its linguistic and paralinguistic roles, the interplay of categories and gradience, and the kinds of representation used by different authors. On the whole, the bias will be toward the identification and representation of intonational form rather than the attempts to pin down the function of the forms identified.

9.2.1 Before the Twentieth Century

The earliest works discussing the intonation of English, according to Crystal (1969a, 20–22), were those of John Hart in the sixteenth century. In *The Opening of the Unreasonable Writing of Our Inglish Toung* (1551), Hart is concerned with the nature of stress and phrasing, offering diacritics to improve the relationship of writing and speaking. His *Orthographie* (1569) discusses intonation in the context of punctuation marks, identifying the common falling intonation pattern of commands, exclamations, and *wh*-questions, and giving a detailed discussion of phrasing. Butler ([1633] 1910) has a brief discussion of "tone" in connection with "points" (punctuation marks), *tone* being "the natural and ordinary tune of the voice: which is to rise, or fall, as the Primary points shall require: and therefore it denominateth the voice, High or low" (54).[1] Butler's observations are few but show insight, for instance: "Erotesis [the question mark], if it be pure, raiseth the common Tone or tenour of the voice in the last word; unless Emphasis draw it: but if it begin with a word interrogative; as, [who, what, how, where, why, &c;] it falleth as a Period, and raiseth the tone in the Interrogative" (61). I am not sure what is meant by "raiseth the tone in the Interrogative"—maybe he is thinking of a rise at the end of echo questions—but Butler has clearly recognized that not all sentences written with ? rise at the end. Having already discriminated (60) three uses of the question mark[2]—"asking," "urging or instance in reprehension," and "earnest avowing the contrary"—Butler suggests that in the latter two (61) erotesis "straineth the voice throughout the whole Interrogation," perhaps a reference to increased overall pitch range and loudness.

Steele ([1775] 1969) argues the case for English actually having intonation; this is in response to Lord Monboddo (James Burnett), whose view was that English "is altogether unmusical, unless we are pleased to call a drum a musical instrument—For it has no melody, that is tones, differing in acuteness and gravity upon different syllables"

(Burnett 1784, 113).[3] Steele's methodology and notation are impressive, albeit he perhaps fails to see some of the phonological wood for the phonetic trees. He used a base viol to capture pitch glides as follows:

> Let a bass viol have paper pasted on the whole length of the finger-board near the 4th string, marking all the chromatico-diachronic stops or frets. . . . Then, while the player draws the bow over the 4th string, let him try, by sliding his left hand on the same string up or down the finger-board, to imitate the rapid turns or flections of the voice in common speech, and he will soon find, that they will have either their beginnings or endings, for the most part, in the interval between the fretts; which intermediate stops, we may call quarter tones: for it will be accurate enough for our purpose, to call every degree of tone a quarter, that does not coincide with any tone or semitone of the chromatico-diatonic. (15–16)

He says in summary that speech is not monotonous like a drum; that rises and falls ("changes of the voice from *acute* to *grave*, and *vice versâ*") do not correspond to musical intervals and need quarter tones for their description; that glides occur not just on words but syllables and monosyllables; and that such glides are in the order of a (musical) fifth.

Steele distinguishes five properties of what we would call prosody (viii): *accent*, *emphasis*, *quantity*, *pause*, and *force*. His notation is exemplified in figure 9.1; this example (51) is in a "bombastic" rhetorical style. Each syllable is represented by a stylized musical note (in this example, minims, as for "now," "need," and "calls," crotchets—the majority of syllables—and quavers, as for the first three syllables of "deliberation," here forming a triplet), the pitch glide (the *accent*) being represented by the sloping line within the stave. The importance of pauses is understood, and it is tempting to attribute to Steele a recognition of final lengthening (for instance, in this example, on "now" and "need"). *Emphasis* contributes to what we would recognize as speech rhythm, with syllables being "heavy" Δ, light ∴, or lightest .., and organized into *cadences*, maybe rather like feet. He distinguishes *emphasis* in this sense from *loudness*, in the latter the "application of the *forte* and *piano* being *ad libitum*," and therefore in contemporary terms not phonologically determined but chosen stylistically. *Crescendo* (and its reverse, *smorzando*, not present in this sample) are shown iconically by wiggly lines, with ' indicating *piano* on a syllable and ' *forte*. Although this notation is both original and unadopted by others, in its principles it clearly prefigures the kind of intonational representation that would become familiar in the twentieth century—and embraces a range of prosodic features that is scarcely matched until Crystal (1969a).

A more immediate precursor to the British school, a century after Steele, is that preeminent scholar of English philology and phonetics, Henry Sweet, whose *Handbook of Phonetics* ([1877] 2013) and *Primer of Phonetics* (1892) include some observations about intonation, despite his declaring, "The whole subject of intonation, especially, requires to be thoroughly investigated by a thoroughly competent observer, which I am very far from being, my natural aptitude and my training being equally defective" ([1877] 2013, x).

Sweet is acutely aware that speech does not segment itself in a way corresponding to its lexical structure, noting "the only division actually made in language is that into 'breath groups'" (86). He suggests that for practical purposes it is sufficient to recognize three degrees of stress, while in reality "the variations of stress are infinite" (92), giving example (2), which almost seems to prefigure the output of the stress cycle of Chomsky and Halle (1968):

Figure 9.1
An illustration of the prosodic representation used by Steele ([1775] 1969).

(2) 2   3   7   5   1   6   4
im – pe – ne – tra – bi – li – ty

As far as intonation is concerned, Sweet recognizes three primary tones, *level*—, *rising* /, and *falling* \, together with *compound rising* and *compound falling* (i.e., fall-rise and rise-fall), and even a rise-fall-rise as a "somewhat more emphatic" version of the fall-rise ([1877] 2013, 94). He is also very aware of the independence of pitch range: "All these tones can be varied indefinitely according to the interval through which they pass. As a general rule, the greater the interval, the more marked the character of the tone" (94). Virtually the same wording is used in Sweet (1892, 66), with the proviso that "for ordinary purposes," it is enough to distinguish between high and low versions of the rise and fall, a solution that is adopted in some later influential works (notably O'Connor and Arnold 1961). In transcription, tone marks "would take the place of the ordinary marks of punctuation at the end of each breath-group, thus serving the double purpose of indicating breath-division and intonation" (Sweet [1877] 2013, 107), as in (3), which is represented (115) in "Broad Romic" and glossed here orthographically for convenience. Spaces precede primary stressed syllables, the raised dot indicates a secondary stress, the low dot a pause (here between interlocutors, I presume) and the colon indicates an initial secondary stress.

(3) :dyuwəb jekt(t)ətə bækos·mouk / . notə taol \
'D'you object to tobacco smoke?' 'Not at all.'

Sweet's inventory of tones would not look out of place in a mid-twentieth-century British analysis, and there is an implicit recognition of the foot. However, in its lack of an explicit association, as we would call it today, between the tone and a metrically strong syllable, the notation leaves phonological detail to the knowledge of the speaker in a way that later notations do not. The "prenuclear" intonation pattern, on the material before the tone, is also left unspecified except insofar as stress is indicated.

We shall see that a significant insight of the British school is the structural analysis of the intonational phrase,[4] as it would be known today, into subelements where

contrastive choices can be made. It is apparent that a degree of structural analysis is implicit in Sweet's focus on what would later be termed the *nucleus*, but the structure is left to his successors to develop, as is set out in more detail by Cruttenden (1990).

9.2.2 The Early Twentieth Century

9.2.2.1 Jones Daniel Jones, the dominant figure in British phonetics in the first half of the twentieth century, published *Intonation Curves* in 1909. This was methodologically innovative, in that he describes a method using gramophone recordings and lifting the stylus because "the ear will retain the impression of the sound heard at the instant when the needle is lifted" (v). The pitch of this impression he would then compare with a tuning fork and mark on a musical stave, in a practice reminiscent of Steele. By comparison with Steele, however, the analysis is less sophisticated, because while stress, vowel length, and segmental quality are recorded in a segmental phonetic transcription, the intonational representation consists merely of a continuous line (dotted for voiceless episodes) meandering up and down a stave, with bar lines separating syllables (see figure 9.2). The result is therefore the auditory equivalent of a fundamental frequency contour, and so a raw pitch curve with no attempt either to make phonological abstractions or group patterns according to function.

A similar line representation is used in early editions of Jones's *Outline of English Phonetics* (e.g., 1918), though the curve is on a stave that has lost all but its top and bottom line, and musical intervals are indicated by a separate musical stave with a lower and a higher note indicating the excursion of the pitch change. Here, there is more analytic discussion, linking examples to both grammatical and attitudinal functions. The numerous examples are organized under rules, such as "IIIrd rule. Direct questions capable of being answered by 'yes' or 'no' generally have a rising intonation at the end" (section 709), and lists of exceptions; but the organization is by function rather than by systematic analysis of the pitch patterns, and as a consequence there is a lack of generalization. After the first two editions in the long life span of the *Outline*, Jones moved to a much simpler representation more in keeping with later practice in the British school. This used interlinear graphs, unusually with one mid-pitch line in addition to the top and bottom lines; larger dots indicated stressed syllables and smaller dots unstressed syllables. A functional analysis in terms of two basic tunes is also adopted, which he explicitly credits to Armstrong and Ward.

9.2.2.2 Armstrong and Ward The first half of the twentieth century saw models being developed that continued to focus on the crucial tonal event toward the end of the intonational phrase, while others began to extend their scope to contrasts elsewhere and move toward a structural analysis of the whole intonational phrase. An example of the first type of model is Armstrong and Ward (1926), a work that is explicitly

Figure 9.2
An illustration of the intonational representation used by Jones (1909, 21).

pedagogical and simplifying. They observe that "English intonation can be reduced to two tunes, with variations of these due to special circumstances" (4). The tunes apply to "intonation groups," which correspond to the "sense-groups [hyphenation thus]" that make up connected speech. In tune I, "the stressed syllables form a descending scale. Within the last stressed syllable, the pitch of the voice falls to a low level." Tune II follows "the outline of [tune I] until the last stressed syllable is reached. This is on a low note, and any syllables that follow, rise from this point. . . . If the last stressed syllable is final, the rise, which is an essential of this tune, occurs within the stressed syllable itself" (20). In the notation used by Armstrong and Ward, the example (3) quoted from Sweet might have been analyzed as shown in (4) (for simplicity I have replaced the segmental phonetic transcription that is used throughout the work by orthography):

(4) D'you ob′ject to to′bac co smoke?   ′Not at   ′all.

In the text, sentence stress is marked by the prime ′ symbol, and in the interlinear representation stressed syllables are shown as lines rather than dots, with any curvature of the line indicating a perceived pitch glide on a syllable. Secondary stress is not marked (Armstrong and Ward 1926, 57; see, e.g., [ˈreɪlweɪ steɪʃn] [79]), though may reveal itself through pitch movement on a final secondary-stressed syllable. In (4), the first part of the dyad carries tune II, the rise being realized as steps over the primary-stressed syllable (-*bac-*) and the following two syllables; and the response carries tune I, with the fall realized as a glide over the final monosyllable. Although it is not discussed in such terms, this insight into the equivalence of patterns over different syllabic material reflects the phonological nature of the analysis, namely that an abstract element in the system (e.g., a rise) can have variable realization depending on the phonetic context.

   This basic analysis is elaborated by a discussion of sentences with special emphasis. This includes the use of expanded pitch range, more complex pitch patterns including fall-rise, rise-fall, and rise-level, and (as we would understand it today) earlier placement of the nucleus with postnuclear deaccenting. In fact, most of the patterns familiar from later work are exemplified. However, the basic categorization into tune I and tune II is maintained throughout, without formal recognition of an inventory of nuclei or an internal structure to the intonational phrase, suggesting priority is being given to a functionally driven analysis of the kind correlating with the final pitch movement. Cruttenden notes of his own inventory of seven nuclear tones, and by implication those of others, that the inventories are generally reduced (or perhaps better abstracted away from) by collapsing a number of nuclear tones under one heading: "Typically, we end up with either a simple distinction between falls and rises, or else we are presented with a threefold distinction between falls, rises, and fall-rises" (1997, 106). In their focus, formally, on a twofold intonational distinction based on the final pitch movement, Armstrong and Ward (1926) are presenting a more broad-brush characterization of English intonational forms than is found later in mid-twentieth-century analyses—albeit one that prefigures the use of boundary tones in current intonation analysis.

9.2.2.3 Palmer   It is with Palmer (1922) that we see a major step toward a conception of intonation as a phenomenon with greater phonological structure. As others had done implicitly, he recognizes explicitly and names the *nucleus*, defining it as "the stressed

syllable of the most prominent word in the Tone-Group" (7), and he also innovates the term *head* for "any syllable or syllables preceding the nucleus in the same Tone-Group."[5] By doing so, Palmer gives the intonational phrase a structure and is able (i) to talk about significant choices—the phonological primes—available at both those places in structure; (ii) to suggest restrictions on co-occurrence between those phonological elements (for instance, "it is doubtful whether the low-rising nucleus (Tone-Group 4) is ever preceded by an inferior head" [28]); and, as we shall see, (iii) to recognize phonologically insignificant variation in the realization of the phonological primes.

He also refers to any syllables in the tone group occurring after the nuclear syllable as the "tail" (10–11), but he makes it clear that the pitch of the tail is determined by the choice of nucleus. The lack of phonological choice in the tail, which most subsequent authors agree on, is an inconsistency if the point of the structural analysis of the intonational phrase is to identify positions at which significant choices can be made. It is, however, useful to have a term to refer to that position because, pedagogically, there is much to learn about the realization of nuclear tones depending on the type of material, if any, in the tail.

Palmer recognizes four "characteristic Nucleus Tones": *falling*, *high-rising*, *falling-rising*, and *low-rising*. Each defines a tone-group type, showing that Palmer adheres to the notion familiar throughout the British tradition that it is the nucleus that gives the intonational phrase its main meaning. It is not made explicit what the criteria are for "high-" and "low-," but it seems from the graphical representation of patterns that it is more to do with the endpoint of the rise rather than the start. It is clear that he regards the two kinds of rise as phonologically distinct, rather than merely being variants of realization, because he comments separately that "the *Range* of a falling or rising tone varies according to the degree of animation of the speech". Perhaps surprisingly Palmer does not distinguish in his inventory between two heights of fall, as some subsequent authors do, yet he employs two distinct symbols (see table 9.1) of different span whose use, to judge from the examples given, is determined by the pitch relationship between the head and the nucleus. He also allows for "Intensification" of the falling nucleus where "the actual fall is preceded by a slight rise of pitch," while it seems that the falling-rising tone in the inventory is "almost invariably intensified" (8) and has a slight leading rise, but occasionally may merely fall and rise. Table 9.1 approximately reproduces Palmer's symbols for annotating texts.

Table 9.1
Palmer's (1922) nucleus tone inventory

Tone group	1	2	3	4
Nucleus	Falling	High-rising	Falling-rising	Low-rising
Nonintensified				
Intensified				

Note: The nonintensified falling tone is the default, whereas the intensified falling-rising tone is the one normally encountered, according to Palmer.

Palmer recognizes four kinds of head: *inferior*, *superior*, *scandent*, and *heterogeneous* (17). The definition of the first three involves the relation of the pitch of the head relative to the nucleus; the pitch of syllables in the inferior head are never higher than the start of the nuclear tone, while that of the superior head is higher. The pitch of the scandent head climbs from a mid pitch to the highest point of the tone group. These relational definitions allow of variation in absolute pitch, and the notation for the head is more phonetic than phonological. For instance, —ai ⌐si: and ⎽ai kæn⌐ʃ both have inferior heads, the horizontal line indicating the pitch of the head relative to the nucleus, while —nekst ⌐ʃwi:k and ⌐nekst ⌐ʃwi:k both have superior heads, the difference being attributed to "the degree of intensity with which the tone group is uttered" (17–18).

In longer heads, there is even more scope for realizational variation: for instance, the superior head involves a general decline in pitch over a sequence of syllables, one that may describe an overall slope, or a stepping pattern with downstep (as it might be described today) on each stressed syllable with unstressed syllables retaining the pitch of the preceding stressed syllable. Realizational variation is particularly striking in the scandent head. Over longer material, there is gradual rise from a mid pitch to the highest pitch of the tone group. However, in longer scandent heads the rise can be *broken* one or more times (46), that is, the pitch is reset to a lower pitch than the initial pitch and another rise begun, giving a kind of sawtooth pattern, as in (5)[6]:

(5) What a re mark ab ly pret ty lit tle house

Heterogeneous heads involve the combination of any of the other three types. Palmer admits that he has little to say about the purpose of such combinations, but suggests "the varying head-curves correspond more or less to the various degrees of prominence expressed by each significative element in the head." His intriguing suggestion is that "many of these heads may perhaps represent embryonic nuclei" (69). This could even be interpreted retrospectively to be an intuition that a lower level of phrasing might be involved. At the very least there is a hint that not only is the tone group decomposible, but also the head. The former point, but not the latter, finds favor generally within later British school approaches.

Having dealt with intonational form, Palmer goes on to deal—albeit somewhat apologetically given, as he says, the (prevailing) state of knowledge—with the "semantic functions" of the four tone groups and the effect of combinations of nucleus and head. He is concerned with grammatical and discourse determinants, such as "general" (yes/no) and "special" (*wh-*) questions, but also offers comments on attitudinal effects, for instance of the combination of tone group 1 with heads: "The significative difference between the Superior and Scandent Heads is difficult to define with precision. As compared with a Superior Head, the Scandent Head generally expresses more animation" (76–77). He is even keen to seek explanations and cites approvingly Coleman (1914) who suggested that general questions have rises (tone group 2) because they are alternative questions in which the second alternative has been suppressed. Palmer is also alert to the balance of prominence within the intonational phrase, pointing out for instance that with the combination of inferior head and falling nucleus, the "prominence is almost always confined to the nucleus-word," whereas

"in a Tone-Group containing a superior head, the prominence is distributed over the head and the nucleus-word, the nucleus (as by definition) having the maximum of prominence" (73, 75). This, whether inadvertently or wittingly, anticipates one of the problems bedeviling the British school, namely the failure of the nucleus or tonic to be self-evidently the most prominent syllable in the intonational phrase (cf. Brown, Currie, and Kenworthy 1980).[7]

I have dealt with Palmer at length because he seems best among the early authors to lay the foundation for a fully phonological approach to intonation modeling, one that, I am claiming, is characteristic of the British school. As noted, he introduces structure to the intonational phrase and recognizes the importance of whether variants found in those positions of structure are "significant" (this is not to say that he has a watertight test for this crucial difference, any more than intonologists today have). He also briefly considers co-occurrence restrictions between choices in the head and at the nucleus—an intonational phonotactics, as it were. In terms of the functions of intonation, he is responsive to attitudinal meanings as well as to the association of intonation with grammatical and discourse functions and, one might venture to claim retrospectively, to information structure when he talks about the balance of prominence in different combinations of head and nucleus. At the same time, he fails to be explicit about one tenet that characterizes the "standard" British model, namely that significant pitch movements are analyzed as beginning on stressed syllables. His nucleus indeed has to be a stressed syllable, but his head symbols are be placed at the start of the sentence, regardless of whether those syllables are stressed or unstressed.[8]

9.2.3 The Heyday of the British School

9.2.3.1 Kingdon If there is a period that could be identified as the one in which the refinement and influence of the British school was at its height, it would be the third quarter of the twentieth century. The postwar period saw the appearance of Kingdon's *The Groundwork of English Intonation* (1958), which the author says "is in part based on one of the systems used by Harold E. Palmer, but . . . contains a considerable number of additions and modifications that I have found it advisable to make" (xviii). The system referred to is the one in Palmer (1922) just discussed, which recognizes the independence of the head, and not that of Palmer (1933), which moves toward a description in terms of whole tunes—the latter being a retrograde step within the overall evolutionary trend described here. Kingdon is critical of the whole-tune approach, attributing the inferior progress of English learners' intonation by comparison with their segmental pronunciation to their being made simply to repeat sentences "after a superficial description of two contrasting tunes. . . . It seemed to me that a book in which the essential elements of intonation were presented and described separately, and then assembled into tunes, might enable a considerable advance to be made in teaching methods, just as the use of phonetic analysis has greatly improved the teaching of pronunciation" (xv).

Kingdon's analysis recognizes five *kinetic tones*. These are most commonly associated with nuclear syllables and in that position will be realized in various ways over the tail following the nuclear syllable; though they can also occur in prenuclear stretches. The *nucleus* is the tone associated with the last fully stressed syllable of a tune, a definition that sidesteps the difficulty encountered by formulations that rely on the nucleus being the most prominent element of the intonational phrase. His definition of *stress*, "force employed in uttering a syllable," is less felicitous, as is his view that stress varies within a syllable, reflected in his idiosyncratic use of a "wedge" in the interlinear

graphs to represent stressed syllables to "suggest the relative degree of stress at different points" (4).

The kinetic tones are *rising*, *falling*, *falling-rising*, *rising-falling*, and *rising-falling-rising*, the first three being considered sufficient for a "straightforward, simple type of English intonation." Slightly confusingly the five kinetic tones are numbered I to V in that order, with the result that a tune ending in a fall is tune II and in a rise, tune I, the reverse of previous tune-based accounts. The reason for this is to be able to group together the three odd-numbered tones ending in a rise and the two even-numbered tones ending a fall, in recognition that "it is the final (not the initial) direction that a tone takes that gives it its principal character" (6), an insight which recurs, and which, as noted in connection with Armstrong and Ward's analysis, chimes with an analysis in terms of high and low boundary tones.

Thus far, the system appears to represent a phonological inventory, with realizational variation arising from the distribution of the pitch movement over different numbers of syllables. However, the picture is somewhat clouded by two cross-cutting dimensions: each of the kinetic tones can occur *low* as well as in its default *high* version, and *emphatic* as well as *normal*. At this point it seems we might be being presented with a twenty-tone inventory, but it is fairly clear that these orthogonal dimensions are largely paralinguistic in function, for instance, "the Low Emphatic tones are used mostly in utterances having an impatient or dramatic nature" (xxxi).

In terms of the structure, Kingdon adopts the term *head* for "the first full stress of a group" (22)—as long as (by implication) the group does not consist merely of the nucleus—and he refers to the remaining syllables, stressed or unstressed, before the nucleus as the *body*. In the case where a prenuclear pattern reduplicates itself, or (in very animated speech) several kinetic tones precede the nucleus, this seems to have the disadvantage of divorcing any unstressed syllables after the "first full stress" and grouping them, in the body, with the following stress. But the basic insight that there are contrasts to be made in the prenuclear part of the intonational phrase independent of those of the nucleus is fully worked out. Kingdon also introduces the term *prehead* for any unstressed or partially stressed syllables before the head. The *normal* prehead is produced level and "a trifle above the bottom of the normal voice range" (12); and alternative choices are *high* or *low level* preheads (31) and *ascending* or *descending* preheads (51), which are also possible *high* or *low*. As with the nuclear tones, it seems that here the descriptive framework is capturing potentially phonological contrasts (most authors would agree that "good-bye" with a high unstressed "good" and a low rise on "bye" is discretely different in its rather friendly affect from the same utterance with a low prehead, which sounds grudging), but beyond that, it is likely in retrospect that stylistic realizational variation is being modeled within the categorical inventory. With Kingdon's work, we have arrived at the maximal structure of the intonational phrase within the British tradition. Subsequent work largely agrees on the following structural positions where choices can be made, listed in order of occurrence: *prehead*, *head* (subsuming "body," a term that fades out), and *nucleus(+tail)*.

The example in (6), which I have constructed for comparison with (5) in the discussion of Palmer's (1922) representations, shows several features of Kingdon's analysis. Importantly, the terms in his inventory can for practical purposes be indicated in texts by *tonetic stress-marks* "indicating stress by [their] presence and tone by [their] form" (xxiii), the latter iconically. The first three syllables in the example, none of them fully stressed, constitute a high ascending prehead, clarifying the relation between stress and the head. Kinetic tones in practice are free to occur in nuclear position and prenuclearly,

which could be argued to weaken the case for a distinction between nucleus and head (head + body in Kingdon's terms), and to speak in favor of the "flat" structure of the intonational phrase adopted in AM following Pierrehumbert (1980). In contrast, the standard view in the British school would be that even if the inventory in both positions is the same, realizational differences may justify a distinction for pedagogical reasons; in particular, a falling head lacks the sharpness of fall associated with a falling nucleus.

(6)   What a re markably pretty little house
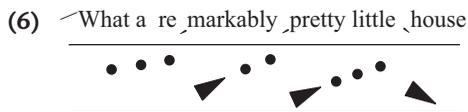
This summary can only give a hint of the complexity of Kingdon's formal analysis, which is related by examples to functions of different types. As I have implied, the analysis is perhaps driven more by detectable differences in intonational form than by a strongly phonological impulse to identify all and only the contrastive patterns, but it nonetheless gives an impressive repertory of forms whose distinctive function could, in principle, be tested. His analysis is clearly influential in later works that seek to constrain the combinatory possibilities with the goal of providing more tractable pedagogical accounts of English intonation.

9.2.3.2 O'Connor and Arnold   O'Connor and Arnold (1961) has perhaps been the most widely used description of intonation aimed at the foreign learner of British (received pronunciation or RP) English. The authors acknowledge (vii) that they are building on the work of Palmer and Kingdon, though developing it in certain ways. They adopt a structural division of the intonational phrase, or *sense group* as they refer to it, into prehead, head, nucleus, and *tail*. Kingdon's distinction between head and body isn't mentioned, and, as is commonly found in such analyses, it turns out that no independent contrasts are available in the tail. The nuclear tone is realized over the tail in ways that are determined by the nuclear type, the number of syllables available, and whether there are stressed syllables in the tail. This contextual variation of the abstract phonological elements is exemplified in detail.

Six contrasting nuclei are recognized: *low fall*, *high fall*, *rise-fall*, *low rise*, *high rise*, and *fall-rise*. Choice in the head is limited to three types: *low*, *stepping*, and *sliding*. The first syllable of the stepping head is high, and if the head is long enough, it manifests a stepping pattern over two or more accented syllables (like a sequence of downstepped H* pitch accents in AM descriptions); equivalently the sliding head may be realized over longer material as a sawtooth pattern. The low head has two contextual variants, one remaining low throughout and the other occurring only before a high fall, interpolating between low and the high start of the nucleus. Preheads may be high or low. Examples in the tutorial sections are represented using interlinear graphs, large dots for stressed syllables, small for unstressed, and tadpole tails on dots for syllables with perceptible pitch movement. Tonetic stress marks, similar to those of Kingdon, are used for the examples where (in considerable detail) the meaning of the different patterns is discussed and in the extensive chapter with drills for the student.

A particular combination of the four structural elements (with minimally just the nuclear slot, which is obligatory, filled) is referred to as a *tune*. Given the optionality of elements other than the nucleus, and given the dominance of the nucleus in

determining the "flavor" of an intonational phrase, the authors group together tunes "all conveying the same attitude on the part of the speaker" (29) into *tone groups*. This is the recognition, in effect, that the intonation pattern is constrained by the amount of phonetic material available. The phonological credentials of the model are supported by the provision (vi) of what is in effect a table of phonotactically permissible combinations in the structural positions, reproduced as figure 9.3. For instance, the sliding head can only occur before a fall-rise nucleus. It is not clear, however, to what extent this statement of co-occurrence restrictions is based on research, on introspection, or is determined by the need to provide a limited set of possibilities to keep the learner's task within bounds.

In their preface, O'Connor and Arnold note:

> In the past, much has been written about English intonation in terms of sentence structure. If, in Chapter II, we appear to have emphasised the relation between intonation and speaker's attitude, it is merely that we have sought to redress the balance and to show that sentence structure and speaker's attitude both play a very important part in determining intonation pattern. (viii)

To that end, they take the four discourse functions *statement*, *question*, *command*, and *interjection*; discuss the effect of each tone group; and exemplify using the constituent tunes of the tone group. For instance, "by using Tone Group 7 with special [i.e.,

	Pre-head		Head				Nuclear tone						Tail
	Low	High	Low	Stepping	Sliding	High fall(s)	Low fall	High fall	Rise-fall	Low rise	High rise	Fall-rise	
Tone Group 1	•		•				✓						•
Tone Group 2	•			✓			✓						•
		✓					✓						•
Tone Group 3	•		•					✓					•
Tone Group 4	•			✓				✓					•
	•					✓		✓					•
		✓						✓					•
Tone Group 5	•				•				✓				•
Tone Group 6	•		•							✓			•
Tone Group 7	•			✓						✓			•
		✓								✓			•
Tone Group 8	•				•						✓		•
Tone Group 9	•			✓								✓	•
	•					•						✓	•
Tone Group 10	•		•					✓		✓			•
	•				•			✓		✓			•

Figure 9.3
Co-occurrence restrictions between different choices at places in the structure of the intonational phrase (after O'Connor and Arnold 1961, vi). A tick (check mark) indicates an essential element of the tone group, and dots indicate optional elements.

wh-] questions the speaker seeks to establish a bond with the listener, to show interest not only in receiving the information asked for but also in the listener himself" (54).

The second edition (1973) of *Intonation of Colloquial English* stays true to the broad descriptive framework of the first, but the details are quite substantially changed. Heads are now subcategorized as unemphatic and emphatic; the kind of reduplicating patterns seen on longer material for the *stepping* and *sliding* heads are now regarded as emphatic versions of a *high* head and a *falling* head, and they are joined by a reduplicated version (the *climbing head*) of a new *rising head*, which is no longer regarded as a contextual variant of the low head. It seems that a structurally anomalous description[9] included in the first edition (1961, 26) of a compound tune consisting of a high fall or fall-rise nucleus preceded by one or more falling nuclei (e.g., "You know `perfectly `well I `never al`low it") can be surreptitiously retired,[10] its work presumably being taken over by the sliding head. However, the compound tune consisting of a high fall and a low rise, which falls and then starts rising on a secondary stress in the tail, is retained (e.g., "My `mother lives in ˌSheffield"). This fall + rise pattern poses a perennial problem for the British school because of its structural exceptionalism, but O'Connor and Arnold (1973) retain it, despite admitting that it is often realizationally neutralized with a fall-rise followed by a tail with a secondary stress, because "the two tunes are very different in their meanings" (28).[11] A new *level* nucleus is also introduced. Because of the difficulty of remembering tone groups designated by number (1–10), these families of functionally equivalent tunes, now somewhat revised, are given iconic names such as the *switchback* (the fall-rise nucleus optionally preceded by the falling head and/or a low prehead) and the *long jump* (a high fall, with optional high head and/or low prehead). Schematic interlinear graphs with lines are used to represent the tunes abstractly, in addition to tadpole diagrams for concrete realizations.

The second edition highlights the difficulty all analysts encounter negotiating the terminological quagmire of stress and accent. In O'Connor and Arnold's first edition (1961), a coherent position is almost achieved—but not quite. Words are made prominent by virtue of an accent, an accent resulting when pitch features are combined with stress[12] on a syllable—except, that is, for the low head, where "words are singled out for attention—or accented—by means of stress alone, with no help from pitch features" (17). Admittedly, the initial discussion of the pitch features is in the context of the nucleus, but the implied definition of accentuation logically extends to all stressed syllables associated with a pitch change (but not to those *without* a pitch change, inside a head or a tail, which are just "stressed"), unless apparently they are in a low head. The water is further muddied in the second edition, where any stressed syllable in the head is defined as accented, and pitch obtrusion is regarded as emphasis (as in the stepping, sliding, and climbing heads). My own view on the best line to take pedagogically is that stress in English is a lexical property, a position in a word susceptible of bearing prosodic prominence when it is placed in an utterance. Minimally such prominence where present is rhythmic, realized by greater duration and amplitude on the stressed syllable and potentially some compensatory shortening of adjacent syllables. Such syllables are *rhythmically accented*; syllables made prominent solely in this way most commonly occur in the tail and are indeed normally the only prominent syllables that can occur in the tail. Further prominence may be, and usually is, lent to stressed syllables up to and including the nucleus by pitch, either a kinetic "tone" or pitch obtrusion whereby the syllable steps out of the prevailing trend (see Bolinger 1958). Such syllables are pitch accented, a status that entails that they are also rhythmically accented.

9.2.3.3 Halliday   Halliday (e.g., 1967) approaches English intonation from the starting point of his *systemic grammar* and is careful not to claim to be providing an exhaustive account of the phonological contrasts of intonation:

> The system used here reflects the general principle that only those distinctions that are shown in the grammatical description to be meaningful are represented in the phonological analysis . . . [however]. . . . In treating intonation grammatically I am not suggesting that the view of it as carrying emotive meanings is to be rejected. (47)

The analysis is explicitly phonological: "We . . . should set up a single independent phonological system irrespective of the very many different roles that are played by [different selections of] its terms in English grammar." For instance, tone 1 will be the exponent of terms in different grammatical systems, and (rather confusingly put, but interpretable as a statement of an allotonic principle) "is phonetically identical—that is, has the same range of phonetic variety—in all its uses" (11). To discuss the intonational exponence of terms in the grammatical systems Halliday introduces (18) the conceptually unimpeachable but terminologically infelicitous[13] distinction between *tonality*, *tonicity*, and *tone*, often referred to as the "three Ts" by later researchers (e.g., Wells 2006). *Tonality*, somewhat opaquely, is the division of speech into intonational phrases; *tonicity* is the location of the *tonic* or nuclear accent; and *tone* is the pitch choice made for the nucleus (and any tail).

There is a clear statement of the phonological structure of the *tone group* (intonational phrase) (13):

(7) $(P_{1...n})T(_{2...n})$ OR $(P_{1...n})T(_{2...n})T(_{2...n})$

The basic structure consists of *pretonic* (P) and *tonic* (T), corresponding to Palmer's head and nucleus. The second alternative accommodates the kind of double or *compound* nucleus already discussed (O'Connor and Arnold's fall + rise compound tune). The subscripts refer to optional feet, and the only obligatory foot is the tonic. As in other accounts, the pitch movement associated with the tonic is distributed over the material after the tonic syllable, and as no contrasts are available post-tonically, no separate element of structure is recognized (14), a view with which I agree. Less persuasive is the lack of a prehead element, though we may presume this to be because it has not been shown to be an exponent of a grammatical system. Also phonological is the recognition of phonotactic restrictions: "There are of course probability restrictions on the combination of tonic and pretonic" (17), some examples of which are given.

There is a fairly conventional inventory of five *primary tones* to which numbers are allocated: 1, *falling* (to low pitch); 2, *rising*, subsuming falling-rising (both rising to high pitch); 3, *rising* (to mid); 4, *(rising-)falling-rising* (to mid); and 5 *(falling-)rising-falling* (to low) (16). Compound nuclei are made up of tones 1 and 3 or 5 and 3. Listing the "terminal tendency" (e.g., to mid) is reminiscent of boundary tones in AM, though evidently with three values in the inventory, but this aspect is not developed. There is then a breakdown, at the next degree of delicacy,[14] into *secondary systems at tonic* and *secondary systems at pretonic*. The latter is basically an inventory of head patterns; while for instance one of two terms relating to tone 5 is a tonic "rising to mid, falling; 'breathy.'" At this point it seems that the phonological analysis is straying into what many would regard as subphonological realizational detail and into paralinguistic uses of phonation quality. It is easy to imagine an incredulous rise-fall-rise with breathy

phonation on "Me!?" but that breathiness is equally possible on an incredulous and shocked fall on "No!"—risking an explosion of "secondary systems" of tone.

Unlike the other approaches we have considered, Halliday's (1967) analysis is clearly theoretically rather than pedagogically oriented. If we take the examples used to illustrate the "tone-expounded [secondary] system" of "commitment" as it applies to clauses in the declarative "mood," we find notations that require considerable decoding (41):

(8) *Commitment:*
    neutral—tone 1   //1 ∧ it's / <u>poss</u>ible // (= "I don't know")
    uncommitted—tone –3   //–3 ∧ it's / <u>poss</u>ible // (= "I don't care")
    committed—tone5   //5 ∧ it's / <u>poss</u>ible // (= "so what?")

// indicates tone group boundaries and / foot boundaries; underlining marks the tonic syllable; and ∧ is the silent *ictus* (salient syllable) of a foot—that is, the pretonic in (8) lacks an initial salient syllable, in a situation that would elsewhere be analyzed as a prehead. Given a pretonic foot, albeit a defective one with no ictus, secondary system 1 means high pitch on the first foot and a fall to low, –3 means a low pretonic and a tonic rising to mid, and 5 means a rising-falling tonic, and puzzlingly no secondary system 5 is specified (17).

From the theoretical point of view, Crystal (1969b, 391–392) sees the fundamental problem in Halliday's analysis being the attempt to extend the concept of system from grammar, where it applies without tension, to intonation:

> Intonation patterns are on the whole far less discrete formally and semantically, are far less finite, are more difficult to identity, and so on, than grammatical patterns. . . . Intonation "systems," in short, are NOT "just as much" grammatical . . . as are those of tense, number, etc.: Halliday is too optimistic about the predictability and stability of intonation contrasts. (392)

9.2.3.4 Wells Wells (2006) is a work very much in the pedagogical tradition established by Kingdon and O'Connor and Arnold, and it draws also on work by Halliday. The modern term *intonational phrase* is used, but its structural "anatomy," to use Wells's term, is that of O'Connor and Arnold, with an obligatory nucleus, and optional prehead, head, and tail, in all of which positions except the tail significant choices can be made. From Halliday's work comes the terminology *tonality*, *tonicity*, and *tone* (the "three Ts").

The exposition concentrates at first exclusively on contrasts arising from the nuclear choice (*tone*), limited in discussion to *fall*, *rise*, and *fall-rise*. Wells's presentation is organized by grammatical type, with mainly attitudinal attributes of the different intonations being exemplified. For instance, "a wh question can also be said with a non-fall: a rise or, less commonly, a fall-rise. This has the effect of making it *more gentle*, kindly, encouraging, sympathetic or deferential, as opposed to the businesslike fall" (43). Tonicity and tonality are then discussed in chapters 3 and 4, and only then does Wells look "beyond the three Ts." This is where the elements of the intonational phrase before the nucleus are considered, in terms of prehead, head (the first accent of which is termed *onset*), nucleus, and tail. Wells's contrasting patterns in the head are *high level*, *high falling*, *low level*, and *low rising* (209). There are complex versions of high level, high falling, and low rising heads, these involving reduplication just as

in the stepping, sliding, and climbing heads of O'Connor and Arnold (1973). Mixed complex heads are possible, but they are outside the scope of the book. A marked high prehead can be chosen rather than the fairly low normal prehead (215). A final point of interest to be mentioned here, redolent of Halliday's (1967) secondary systems, is the refinement of nuclear categories in Wells's chapter 5: *high falls* are distinguished from *low falls*; a *rise-fall* is added; fall-rises are separated into *high* and *mid* types, this apparently defined by the end point of the rise and augmented by a *rise-fall-rise*; the *mid-level* nucleus is introduced; and three types of rise are recognized, namely *high*, *low*, and *wide*. It is a little unclear to what extent all these are full members of the nuclear inventory, merely left until later to present for pedagogical expediency, or are instead implementational variants.

The question of what patterns contrast has always taxed the British school, just as it does the AM framework. Without an equivalent to the knockout phonemic question "Is this the same word?" and with intonation multitasking across grammar, attitude, information structure, and other functions, it really is difficult to decide what is worthy of abstraction as a phonological category (cf. Ladd and Morton 1997) and what can be left to gradient phonetic implementation. Authors such as O'Connor and Arnold have presented inventories that were clearly delineated, though not necessarily objectively correct. Wells, despite the generally clear presentation, gives me the impression of having been (understandably) troubled by this issue of what is phonological and of not having fully resolved it for the reader. Although he provides a usefully updated presentation of the British school, in some ways he seems to have missed a chance to move forward from O'Connor and Arnold—perhaps by stripping out pitch range variation more explicitly as a distinct system and operating with a somewhat reduced inventory of nuclei, or in some other way sharpening up the analysis in the light of the dichotomy between categories and gradience.

9.2.3.5 Crystal   Leaving Crystal (1969a) to last in this whistle-stop tour through the history of the British school is counter-historical, but the unique status and stature of *Prosodic Systems and Intonation in English* make it appropriate. In the preface Crystal notes that despite existing work on intonation and voice quality, "there is a marked reluctance to develop any theoretical perspective, or to provide criteria for evaluating different partial descriptions" (vii). His aim is to provide that theoretical basis by integrating intonational phenomena within a more general theory of nonsegmental phonology. Untrammeled by the need to deliver a minimal description appropriate for language teaching, he approaches prosody from first principles and develops an impressively comprehensive framework. This is based on a corpus of three hours of recordings of thirty university-educated speakers of southern British English (see also Crystal and Quirk 1964).[15] The analysis, by which Crystal means the end product of a structural description, is achieved by careful listening and auditory interpretation, with recourse to the native speaker judgments of others when needed (8) and occasional reference to acoustic correlates (16).

Crystal (1969a) regards *prosodic* features as constituted by variation in pitch, loudness, duration, and silence (128), while *paralinguistic features* are divided into *voice qualifiers*, such as breathiness and creak, and *voice qualifications*, such as giggle and tremulousness; paralinguistic features lie at the least discrete, least linguistic end of a continuum, and function solely to convey attitude. This means that *prosody* encompasses a wide range of phenomena, including some that are gradient, and Crystal's

framework has a degree of complexity that reflects this. He views intonation "not as a single system of contours, levels, etc., but as a complex of features from different prosodic systems. These vary in their relevance, but the most central are *tone*, *pitch-range* and *loudness*, with *rhythmicality* and *loudness* closely related" (195). His is thus what he terms a "parametric" approach, which he acknowledges is at least implicit in previous work by writers such as Sweet and Palmer to the extent that they discuss pitch range as a variable independent of pitch movement. He deals quite extensively with matters such as "tonal subordination" and the grammar and the semantics of intonation, but I will limit my comments to the formal descriptive system.

Crystal agrees with others in the British school on the centrality of the *tone unit* (intonational phrase) and its division into *prehead, head, nucleus*, and *tail*, as well as the importance of nucleus placement. Questionably, he refers to the nucleus as the accentual syllable of the most prominent word (210); as noted in section 9.2.2.3, the notion that the nucleus must be the most prominent element is not always borne out. Where he most clearly innovates in respect of the intonational pitch parameter is in developing a comprehensive mechanism for describing pitch range, applicable to syllables anywhere in the intonational phrase, and thereby removing the dilemma of whether to recognize high and low versions of kinetic tones. His *simple pitch-range system* (144–150) relates the pitch of a syllable to the preceding syllable: by default, stressed syllables are slightly lower (reflecting declination), but they may by choice be somewhat lower again than this default, or very much lower; at the same pitch; or slightly higher, much higher, or very much higher.[16] The complex pitch-range system (150–156) expresses the extent of pitch movement: default, wide, or narrow in the case of the nuclear syllable, with additionally the possibility of *monotone* in polysyllabic sequences. In combination the simple and complex pitch-range systems provide seven times three combinations (or four in the case of polysyllabic sequences), so a paradigm of twenty-one (or twenty-eight) choices (if my understanding and arithmetic are right). With "simple" and "complex" descriptive terms for tempo (e.g., *allegro; rallentando*), loudness (e.g., *forte, diminuendo*), and systems of rhythmicality (e.g., *rhythmic/arhythmic*, with *spiky/glissando* describing pitch movement between syllables and *staccato/legato* alternations of loudness and duration between syllables), tension, and pause, a framework of apparently unbounded power and subtlety is constructed.

From today's perspective, this seems like abandoning phonological principles in favor of an impressionistic surrogate for quantitative description of phonetic implementation, contrary to Crystal's explicit claim to a "phonological" approach (e.g., 200). However, his use of *phonological* is to contrast his own approach, which he insists puts the identification of prosodic units first, with the alternatives of starting from grammar or semantics. And, given his definition of paralinguistic systems in such a way as to, in effect, exclude those parameters that also engage in signaling at the more linguistic end of the intonational continuum, it is inevitable that his prosodic systems allow phenomena to be described that many would regard as outside the remit of intonational phonology. It may seem that Crystal pushes the methodology of the British school to its limits and possibly beyond. Whether one accepts the validity of the approach, it is undeniable that in its attempt to give a comprehensive account of prosody, facing as it does Janus-like toward core language structure and toward gradient paralinguistic signaling, his analysis and his data highlight many phenomena that cannot be ignored if a comprehensive account of prosody is sought.

9.3   Critical Comparison of the British School and AM

In the middle part of the twentieth century, the main alternative linguistic framework of intonation serving as the "other" against which the British school could be compared was the American levels framework. This described intonation not in terms of pitch movements but in terms of pitch levels, usually four, numbered 1 to 4, but without universal agreement as to which end was highest. Because this tradition is largely superseded, I propose not to deal with it and rather to bring the British framework further into focus by contrasting it with the current paradigm dominant in intonation research, namely the bitonal autosegmental-metrical (AM) framework (see Ladd 2008 for an accessible survey; the label itself for this tradition of work is due to Ladd—cf. Gussenhoven 2004, 123). In this I shall take Pierrehumbert's (1980) seminal analysis of American English as a fixed reference point, while acknowledging that many variants and modifications have emerged since then, most prominently the slightly simplified tones and break indices (ToBI) version (Silverman et al. 1992; Beckman and Ayers 1994) that aimed to be a practical standard for intonational analysis and has been widely used for English and implemented for other languages. This diversification, however, does not affect the basic differences between the two broad frameworks.

9.3.1   Common Ground between the British School and AM

The British school and those working in the AM framework share an essentially phonological approach. A phonological approach, to remind ourselves, means allowing a degree of abstraction in the search for connections between the acoustic signal and the meanings conveyed by it; not, for instance, expecting direct mapping between a meaning and a physically constant aspect of the signal, such as a particular curvature and excursion of the fundamental frequency contour and, say, the meaning "interrogativity." Rather, a phonological approach requires the analyst to posit abstract elements—intonational primes such as a rise or fall nucleus—having the potential to be associated with multiple meanings or functions: for instance, a rise may signal a question, but it may also signal sympathetic involvement in a response that requires no answer (e.g., ˈnever ˌmind).

Furthermore, as with segmental phonology, the primes will have variable realizations according to factors in the context in which they occur. We have seen this acknowledged repeatedly by the representatives of the British school discussed in this chapter. The realization is described impressionistically and graphically, but it is unambiguous that the mapping of the intonational prime is sensitive to the context in which it occurs. Ladd (2008, 10), it will be recalled, requires that a fully phonological approach (as opposed to a "proto-phonological" one) be able to state the mapping between the phonological categories and objectively measured physical parameters, but I argued that the relevant domain for mapping for most of the British school era had, perforce, to be auditory impressions, and that in principle the British school adhered fully to a phonological conceptualization of intonation.

AM and the British school both posit an intonational phrase within which coherent melodic patterns can be identified and that is generally regarded as independent from grammatical structure; although the terminology differs, to a first approximation this primary unit is equivalent in the two approaches. AM has grown up in an era when the notion of a "prosodic hierarchy" is prevalent and has correspondingly been more inclined to recognize other phrasing domains, notably the intermediate phrase (ip) following Beckman and Pierrehumbert (1986). However, although most pedagogical

works in the British tradition stuck with a single domain, there was an awareness theoretically that other larger or smaller domains, and relations between domains, would be necessary for a full account. Trim (1959, 28) notes that there can be unifying features across two or more melodically well-formed intonational phrases, such as a progressive descent in the pitch of equivalent intonational events, which imply the operation of a higher-level unit, and he proposes the "major tone-group," which would consist of one or more "minor tone-groups"; for instance:

(9) ˇaid | veri mʌtʃ ˋlaiktuː | bət ˇfɑːðə | wount ˋhiərəvit ‖

Crystal (1969a) develops descriptive apparatus for "tonal subordination": "The primary characteristic of the subordinate tone-unit is that its pitch-contour, while having a complete and independent shape within itself, falls broadly within the total contour presented in the superordinate tone-unit—cf. Trim's 'major' and 'minor' tone-groups" (245). While these proposed units may not be coterminous with the intonational phrase (denoted as IP) and ip, there is a shared recognition of the need for a hierarchical structure of intonational units.

Both frameworks agree, explicitly or implicitly, on the importance of the metrical structure of utterances, at least to the level of distinguishing (in one terminology or another) stressed and unstressed syllables. In Steele ([1775] 1969) we see a lively appreciation of the tight relation between melody and stress-based prominence, and Halliday (1967) very explicitly refers to the foot, represented $I(R_{1 \ldots n})$—that is, initiated by a "salient" syllable at "ictus" and followed by zero or more weak syllables at "remiss." The majority of British analyses and notations reflect the notion that the stressed syllable is the element to which the start of a significant pitch movement is anchored. AM also associates pitch accents with metrically strong syllables, so both frameworks recognize the symbiotic relationship between metrical prominence and melodic choices.

9.3.2 Differences between the British School and AM

An immediately striking difference is that the British school uses abstract pitch changes as its primes and AM uses abstract pitch levels or targets. Relatedly, the favored representations are iconic in the British school (sloping lines and/or arrows), and the letters H (high) and L (low) in the case of AM. This associated difference is not inevitable; it would be possible to devise a notation for the AM analysis using, for instance, high and low horizontal lines instead of H and L; however, matters have evolved as they have. It can be argued that the tonetic stress marks developed in the British framework have greater immediacy and are more accessible to learners. Perhaps those brought up with H and L would disagree.

There is superficially persuasive evidence that the target approach has greater empirical validity. It has been shown that if the length of segmental material, for example, a vowel, is varied experimentally, L and H targets show stable pitch height and stable alignment with (or "anchoring to") segmental or syllabic landmarks, with the result that the slope and duration of the glide joining the targets vary, suggesting that it is the targets and their alignment that are the constants (e.g., Arvaniti, Ladd, and Mennen 1998; Ladd 2008, 172ff). The glide is merely an interpolation between the targets and not the phonological prime.

However, this may not be quite the knockout argument it is usually taken to be. We are quite happy to work with segments such as a voiceless plosive filling slots in structure—for instance, the onset or coda in the syllable. From a phonological point of

view, the plosive is atemporal, whether represented as a unit phoneme or as an array of phonological features, but to realize it phonetically, it must receive exponence in terms of independent phonetic parameters aligned in time, so that, for instance, the glottal opening can be aligned appropriately with the oral closure—co-extensive for an unaspirated stop, persisting after release for aspirated stop, and starting early for preaspirated stop. An abstract rise, equivalently, can be seen as entailing a start parameter and a stop parameter, both of which have to be appropriately aligned. In any case, Hs and Ls are not targets but abstractions whose realization is not unmediated but dependent on contextual interpretation (Pierrehumbert 1980), and it is a little inequitable to demand direct realization from abstract falls and rises. A kinetic tone could be regarded, along the lines of Gussenhoven (1984, 197), as an "intonational morpheme" made up of the "purely formal" elements H and L, it being those latter elements that are phonetically aligned.

That said, the case for glides would be strengthened to the extent it can be shown that perception attends to change rather than targets, and even then, the AM theorist could retort that our well-evidenced perceptual reliance on formant transitions in vowels to determine place of articulation has not deposed a target-based segmental phonology. What is clear is that while realization, in principle, is a matter in AM of mapping from phonological categories by rule to physical dimensions,[17] in the British school realization is dealt with by exemplification using impressionistic representations. This, however, is not an inevitable difference but a consequence of the contemporaneous methodology.

Following Pierrehumbert (1980, 29–30), orthodox AM theory regards the intonational phrase as containing (in addition to boundary tones) a sequence of pitch accents of equal status,[18] whereas the British school developed, in broad outline, an internal structure of prehead, head, and nucleus where different inventories could apply. (I omit the tail, which most writers treat as not contrastive independently of the nucleus.) The extent to which different inventories were posited for different places in the structure varies: for instance, Kingdon (1958) allows all the kinetic tones in the head, whereas O'Connor and Arnold (1961, 1973) have a reduced inventory with distinct symbols. This may reflect a tension between completeness of phonetic description and pedagogical expediency. What I think the structural analysis of the intonational phrase achieves, in general, is greater clarity of description of the semantic and pragmatic function of melodies. The naturalness of reduplicated heads, as for instance in (10), also suggests a unity to the head.

(10) ⤴Why did you ⤴choose to do ˋthat?

Part of the motivation for the structural analysis of the intonational phrase, however, is the special status of the nucleus. Whole tune descriptions were in effect nuclear analyses, and all analyses regard the nucleus as crucial in characterizing the intonational phrase. This, however, brings us to a separate but related difference, namely the recognition in AM of boundary tones. In this, I think, AM has a pretty watertight case. The British school has tended to flounder a bit trying to explain why nuclei tend to group functionally according to their final pitch direction (e.g., rise, fall-rise, rise-fall-rise), and why in a (rise-)fall-rise you can't always get the implementation done and

dusted immediately, but have to plod through a long tail at low pitch before producing an exuberant upward flourish at the last moment. The boundary tone analysis makes sense in both these respects. Boundary tones are not, in principle, incompatible with British-style analyses, as we shall see in section 9.4.

The British school treats pitch accents as left-headed,[19] that is, starting on a metrically strong syllable. Halliday (e.g., 1967) is perhaps the writer who most explicitly links the melodic elements, the tones, to the stress-initial foot (often called "Abercrombian" after, e.g., Abercrombie 1967, 131), but the association is implicit widely across the British framework. In AM models, on the other hand, left-headed pitch accents such as L*+H coexist with right-headed ones such as L+H*, in keeping with the analysis in Bolinger (1958) to whom the term *pitch accent* in this sense can be attributed. On the face of it, the British approach is the more constrained and so constitutes the stronger and more testable theory with fewer ambiguities. For instance, an utterance that could be analyzed in a generic British approach as " ↗How's he ˌcoping?" with a rising head and low-rise nucleus, could be L*+H L* L-H% or L* H+L* L-H%, where the first high target is attributed to the first or the second accent. However, there are patterns that challenge the descriptive adequacy of the British models. In (11), for example, it is hard to accommodate the high *a*.

(11)   He didn't have a clue!

H+L*   H+L* L-L%
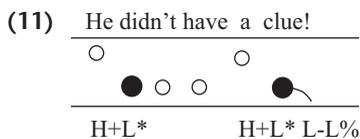
A high prehead followed by a low head captures the first four syllables, but the second high point is not modelable. As always in intonation it is hard to establish a pattern as contrastive; is the pattern in (11) in fact distinct from the same except for a rising head? But even if the melody shown is a free variant of the rising head, the British analysis less well captures the "reduplicative" nature of the melody than the repeated H+L*. It is a shame that, as a result of the polarization of effort between the two intonational frameworks, such matters of equivalence and descriptive adequacy between different frameworks have not been subject to more investigation.

The freedom to have right-headed pitch accents, and in most variants two boundary tones, allows AM to model a larger number of potentially contrasting pitch accents. One such case is shown in figure 9.4, exemplifying pitch accents on the monosyllable *yes* (ToBI representations and typical names for the nuclei are given below the patterns). The British analysis lacks a nuclear tone corresponding to the second pattern (H+L* L-H%).

Interestingly, however, a little-adopted mechanism in Kingdon (1958) can accommodate the second pattern. He suggests that although a syntagmatic contrast in pitch between a prehead and the head appears to require at least one initial unstressed syllable, the contrast can be effected "by pronouncing the beginning of the stressed syllable on a pitch which will contrast with the tone to be used, and delaying the tone and its accompanying stress for a length of time sufficient to allow the initial unstressed contrasting pitch to be felt" (53). This he terms a "homosyllabic prehead."[20]

Not all lexically stressed syllables are pitch accented (i.e., showing pitch obtrusion). Those that are not, but that receive some degree of prominence, are commonly termed *stressed* (as opposed to accented) in the British tradition and often marked in texts by a
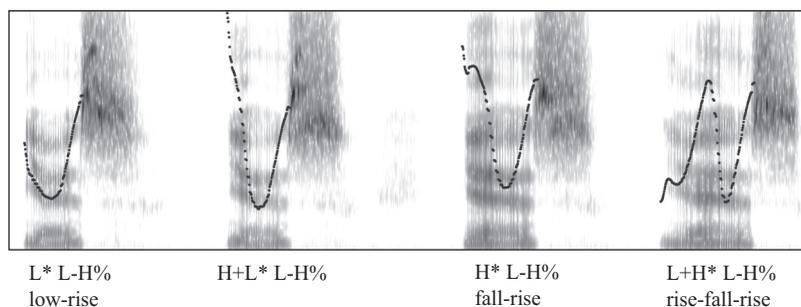
| L* L-H% | H+L* L-H% | H* L-H% | L+H* L-H% |
| low-rise | | fall-rise | rise-fall-rise |

Figure 9.4
Rising nuclei on the word *yes* represented in AM and British notations. The second pattern with a right-headed H + L* pitch accent has no equivalent in mainstream British notation, though it could be accommodated by Kingdon's homosyllabic prehead. The fundamental frequency contour (dots; 50–175 hertz) is shown superimposed on the spectrogram (0–8 kilohertz).

dot or small circle. I suggested (section 9.2.3.2) that a better terminology would be to reserve "stress" for the lexical property of prominence-readiness, while syllables lacking a pitch accent but that are prominent in an utterance might be regarded as being *rhythmically accented*, this term reflecting the timing adjustments that achieve that prominence and implying also cues in intensity and spectral balance. Orthodox AM descriptions have no facility to recognize prominence in the intonational representation[21] other than by pitch accents, which means that in an utterance such as that in (12), with a high fall nucleus near the start marking contrastive prominence on "why," and a long tail, the prominent but low-level syllables "keen" and "sell" would have to be left unmarked or, redundantly and misleadingly (because there is no new pitch movement), be given L* pitch accents—arguably after an L- intermediate phrase tone required to create the sharp nuclear fall. In this respect the British analysis, with rhythmic accents marked by dots, offers the simpler but more comprehensive prosodic interpretation.

(12)   But `why are you so · keen to · sell it?

H*   L-   (L*)   (L*)   L%
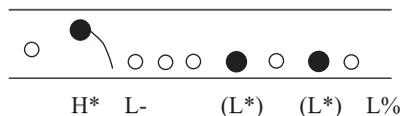
   In summary, the hard-won insights of the British school often tally with the concepts and principles of AM, but there are clear divergences of detail. In some cases the British tradition seems better to capture the facts, and in other cases AM holds the winning hand. In the next section, we explore a model that is the offspring of both traditions.

## 9.4   The British School Meets AM: IViE

IViE (Intonational Variation in English) refers to a collection of audio recordings of young adult speakers of urban varieties of English in the British Isles collected in the years around the millennium (Nolan and Post 2014; Post and Nolan 2012). The name and acronym also refers to a version of the bitonal AM model (Grabe, Nolan, and

Farrar, 1998; Grabe, Post, and Nolan, 2001; Grabe 2001) that is more compatible with the British school than is orthodox AM. IViE draws heavily on the work of Gussenhoven (1984, 1990) who had adapted H/L notation in a way influenced by analyses in the British tradition.

The IViE notation adopts the bitonal H and L mechanism from AM, but by restricting itself to left-headed pitch accents retains a greater degree of interconvertibility with analyses in the British school. On the other hand, the boundary tone insight is adopted in IViE. These features can be seen in figure 9.5, which compares a generic British analysis (panel a) with the equivalent bitonal representation in IViE (panel b) and ToBI (panel c). It can be seen that whereas the ToBI analysis attributes the prenuclear rising and falling patterns to interpolation to a following right-headed pitch accent (H + L* or L + H*), the other two analyses agree on left-headed pitch accents. This requires a high prehead, or equivalently an initial %H boundary tone, to be recognized. Note also that ToBI has two levels of boundary, T% and T-, the latter being the boundary of the lower level "intermediate phrase." IViE only has one, T%; though this could be revised in the light of later empirical evidence from the AM research enterprise and in accord with Trim's (1959) proposal for major and minor tone groups.

Separately, IViE also allows the specification 0%, indicating an intonational phrase boundary where no new pitch movement is evident. Thus the specification of a falling nucleus, with a sharp fall on or shortly after the nuclear syllable, is H* + L 0%,[22] which arguably represents the facts more transparently where a long, low tail follows the nuclear syllables than the ToBI specification of H* L-L% does.[23] There have been objections that 0% violates the bitonal character of AM by introducing a third value, but actually it merely extends the principle to boundaries that not every syllable is marked for pitch. This principle also justifies the practice in IViE, following the British school, of marking syllables that are prominent by means other than pitch obtrusion. These rhythmic accents (see section 9.2.3.2) can be marked by *, with no tonal specification because no new pitch instruction applies, as for instance in the IViE representation in (13) for the example given in (12):

(a) ⁻hɪ ⸝maɪt iːvn əv ˋwʌn ɪt | ɪf ɪ ˋhædnt ɪn ˋsɪstɪd ɒn ˇɑː g jʊ ɪ ŋ ‖

(b) %H L* + _H   H* + L 0%   H* + _L   H* + _L   H* + L   H%

(c) H + L*   H*   L-   H*   L + H*   L + H*   L-   H%

Figure 9.5
A constructed example consisting of two intonational phrases analyzed using (a) a generic British model, (b) IViE, and (c) an orthodox AM model. The fundamental frequency contour (dots; 50–175 hertz) is shown superimposed on the spectrogram (0–8 kilohertz).

(13) But `why are you so · keen to · sell it?

           H*+L   *   *   0%

In fact, IViE complements its phonological tier where the intonological specifications (such as H*+L) are shown, by a separate *prominence tier*; though this is useful primarily as a first stage in the process of analysis where the crucial prominent syllables are to be identified. Also of largely heuristic value in the IViE scheme is a *phonetic tier*, where candidate pitch accents can be labeled as, for instance, mHm, meaning a high turning point on a prominent syllable preceded and followed by syllables on a mid pitch, or lMh-l, which might characterize a "delayed peak"' falling pitch accent (see Grabe 2001 for more examples).

Gussenhoven (1990, 32–34) proposed that "tonal domains" could undergo restructuring, as shown in his example roughly reproduced here as (14). In this example, the sequence HL | HL |—two nuclei, in effect, in two separate tonal domains—could (for instance under faster speech) become H_L HL | in a single tonal domain (a falling head and falling nucleus, in traditional terms, with the first L reassociating as far right as possible), and even H HL | (a high head plus fall) by "tonal linking," that is, deletion.

(14)
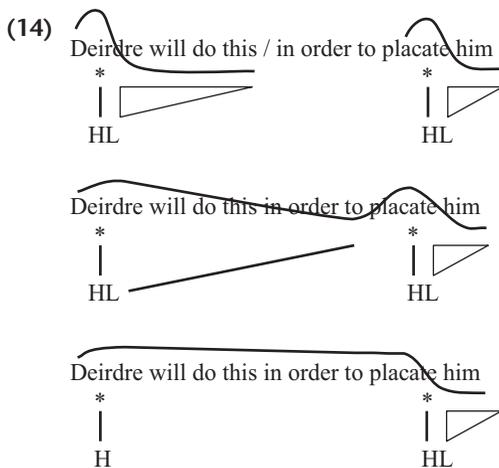
The motivation of this essentially derivational analysis is the perceived "relatedness" of the contours; however, it is not hard to find cases where the phrasing is informationally significant. For instance, the presence of first phrase boundary in "the boys (|) who are bold by nature | are ready to speak up" is crucial for marking the nonrestrictive status of the relative clause, as opposed to its absence for a restrictive reading. Nonetheless, the approach can capture some valid equivalences. The IViE model adopts, in principle, Gussenhoven's notion of restructuring in the sense that the equivalent of a "falling head," H*+_L, is symbolized as a fall with the low target displaced; though in practice the three patterns are usually notated separately as H*+L 0%, H*+_L, and H*.

9.5 Conclusions

I hope to have shown that the British school of intonation analysis in the shape it attained in the mid-twentieth century was the result of incremental development, each step arising from sophisticated introspection and interpretation by scholars from the

seventeenth century onward. The heuristic methods were those of its time, and the British school's most consistent motivation was the need to present intonation in a way that would allow it to be taught explicitly to language learners. As a consequence it does not have the quantitative empirical underpinning of the AM paradigm that is dominant today, with its access to rapid acoustic analyses and its potential applications in speech technology. Nevertheless, studies within the British school were probably the first to recognize, implicitly at least, that phonological principles were needed for the analysis of speech melody; this is evident in the attempt to set up inventories of significantly different pitch patterns at different places in structure, patterns that were abstract and allowed of context-sensitive implementation. The success of the British school is attested, I would suggest, by the fact that some of its essential characteristics—its recognition of intonational phonology, and the centrality of metrical prominences as loci for pitch accents, for instance—match those of AM, and in the majority of cases converting a description in one framework into one in the other is eminently feasible.

The wealth of quantitative research that AM stimulated in the last quarter of the twentieth century and subsequently has not been matched within the British school, and indeed several of the research themes, such as alignment, appear to be crucially dependent on the use of H and L pitch targets or turning points. However, I have suggested, albeit tentatively, that analysis of kinetic primes such as rises and falls into component elements is perfectly coherent within the British framework, parallel either to featural analysis of phonological segments or, as Gussenhoven suggests, to the decomposition of morphemes into segments. The real question, then, would be whether the higher unit—the kinetic element—adds any value to the lower level analysis using H and L, either in terms of psychological plausibility or pedagogical advantage. These are questions that I don't think have been answered, and perhaps are too seldom asked, but they should be amenable to empirical study.

From a pedagogical standpoint, one might hazard a guess that the iconic notation of the British school involves less cognitive load for a learner than the autosegmental notation, whereas the generalizations permitted by the AM boundary tone facilitate the connection of form and meaning. If so, there is no barrier to incorporating a boundary tone into an otherwise traditional iconic notation, as in (15) where the utterance is the one shown in figure 9.5:

(15) ˉhɪ ˏmaɪt iːvn əv ˋwʌn ɪt | ɪf ɪ ˋhædnt ɪn ˋsɪstɪd ɒn ˋɑː g j ʊ ɪ ŋ ↑|

The final fall-rise is indicated not as a unitary fall-rise but as a fall on the nuclear syllable and a rise associated with the major phrase boundary. I did for a while teach intonation to phonetics students using such a notation, but made the mistake of trying to do so simultaneously with an equivalent IViE notation in terms of H and L—which is probably like learning to use chopsticks and a knife and fork at the same time. My prediction would be that such a modified British notation, taught alone, would actually be easier to master than either the no-boundary-tone traditional version (because it would explicitly show those cases where part of the "nuclear" pattern is delayed), or the AM notation (which requires the H and L elements to be composed into pitch movement), but this can clearly only be tested by pedagogical research.

In summary, the British school of intonation has a history that can be traced back several centuries, and it uncovered many of the central insights into the phonological and phonetic structuring of intonation that are common to other frameworks. Its largely pragmatic, pedagogical orientation, in an age when instrumental analysis of

speech was not readily accessible, meant that it did not receive the extensive quantitative validation that AM has triggered; however, its more iconic notation may give it an advantage in its pedagogical function. Its analyses are often compatible with those of AM, and, where they are not, it sometimes has solutions that better do justice to the data, such as the recognition of syllables accented by rhythm alone (often termed "stressed" in opposition to "[pitch-]accented"). On the other hand, further development and application of the British approach to intonation analysis would do well to incorporate insights adopted by AM, such as the boundary tone.

Notes

1. Spelling has been normalized here from the part-phonetic orthography used by Butler. Pages refer to the 1910 reprint.

2. Biblical quotations are used as examples, for instance: *asking*—"How oft shall my brother sin against me, and I forgive him?" (Matthew 18, 21); *urging/reprehension*—"Are ye so without understanding also?" (Mark 7, 18); *avowing the contrary*—"Can the blind lead the blind?" (Luke 6, 39).

3. The debate originally took place in correspondence. Lord Monboddo was won over and graciously accepted Steele's position—see Abercrombie (1965, 37).

4. I shall use the currently widely accepted *intonational phrase* neutrally for the main unit within which intonational patterns are discussed, even though it is anachronistic with respect to most of the work discussed; it allows reference to the concept without having to choose between different terms used by particular authors of the British school such as "breath group," "tone group," "tone unit," and "intonation group."

5. In retrospect, the choice of the term *head* is not ideal, given its current use in linguistics as, roughly speaking, the defining and obligatory element in a construction. Palmer could scarcely have foreseen this usage. In intonation, it is the nucleus that defines the nature of the intonational phrase, with the head potentially unfilled and if filled playing a subsidiary role in the flavor of the intonational phrase.

6. I have replaced the segmental phonetic transcription of the original with orthography and approximated the graphical representation.

7. This devil is, however, conjured by those authors who, for functional reasons, define the nucleus as being "the most prominent" syllable rather than the last pitch-accented syllable; see Ladd (1982) and Nolan (1984). My students tend not to agree that a downstepped falling nucleus after a high head in an utterance such as "ˈreally ˎnice" is the more prominent element. Probably writers have conflated "most prominent" with "most significant for the semantics of the phrase."

8. It will, however, be noted that in the "broken" scandent head reproduced in example (5), the reduplications begin reliably on lexically stressed syllables, so there is an implicit recognition of the bond between pitch pattern and metrical prominence.

9. In that it apparently reduplicates the nuclear position.

10. This is reminiscent of Kingdon's more open combination of kinetic tones. It might have been an infelicitous attempt to accommodate what is simply a more emphatically spoken version of the sliding head or a reluctance to recognize the need for a second, lower level of intonational phrasing allowing multiple nuclear falls in succession.

11. Attitudinally different, in their account; most saliently, in my view, the fall-rise prepares for a "but"—e.g. "but you're wrong to think I live in Sheffield too," whereas the fall + rise

introduces a new topic ("mother") while picking up an old topic (Sheffield), without any implied reservation.

12. Not defined, however.

13. From the point of view of remembering and distinguishing them.

14. I hope I have this usage correct within the systemic framework.

15. They are speakers of RP or near-RP, which Crystal describes as "geographically unmarked." Actually it isn't. Although it may serve as a prestige norm throughout England and to a lesser extent elsewhere in the United Kingdom, it is part of the sociophonetic continuum of the south-east of England, and RP speakers will by default be assumed to be from there.

16. In this last case the "high booster" syllable will be higher than a previous high pitch prominent syllable.

17. Though note interesting exceptions such as the work of Jun on Korean (e.g., 2005, 208–210) which distinguishes a contrastive *phonological* tone tier and a *phonetic* tone tier where the melodies are neither contrastive nor fully predictable.

18. Though as Ladd (2008, 133–134) notes, this position is widely relaxed in practice.

19. This is an example of why the British school's use of *head* for the optional, subordinate, prenuclear element in the structure of the intonational phrase isn't ideal.

20. Classics purists might prefer "tautosyllabic."

21. The "metrical" part of the analysis would represent prominence relations, but this is rarely shown explicitly.

22. The + and the 0 have commonly been omitted; here, for example, H*L %, but at some risk of misreading—in this case as H* L%, which would imply a gradual, not sharp fall if the postnuclear material were longer.

23. H*+L, in orthodox AM following Pierrehumbert (1980), was not available to mark surface falls but was used to trigger downstep.

References

Abercrombie, D. 1965. *Studies in Phonetics and Linguistics*. London: Oxford University Press.

Abercrombie, D. 1967. *Elements of General Phonetics*. Edinburgh: Edinburgh University Press.

Armstrong, L. E., and I. C. Ward. 1926. *A Handbook of English Intonation*. Leipzig: Teubner. Second edition (1931) and subsequent editions, Cambridge: Heffer.

Arvaniti, A., D. R. Ladd, and I. Mennen. 1998. "Stability of Tonal Alignment: The Case of Greek Prenuclear Accents." *Journal of Phonetics* 26:3–25.

Beckman, M., and G. M. Ayers. 1994. *Guidelines for ToBI Labelling*. http://www.speech.cs.cmu.edu/tobi/.

Beckman, M., and J. Pierrehumbert. 1986. "Intonational Structure in English and Japanese." In *Phonology Yearbook 3*, edited by Colin Ewen and John Anderson, 255–309. Cambridge: Cambridge University Press.

Bolinger, D. 1958. "A Theory of Pitch Accent in English." *Word* 14 (2–3): 109–149.

Brown, G., K. L. Currie, and J. Kenworthy. 1980. *Questions of Intonation*. London: Croom Helm.

Burnett, J. 1784. *Of the Origin and Progress of Language*, Vol. IV. Edinburgh; London: Bell; Cadell.

Butler, C. (1633) 1910. *The English Grammar, or, the Institution of Letters, Syllables, and Woords in the English Tung.* Edited by A. Tichler. Oxford: Turner.

Chomsky, N., and M. Halle. 1968. *The Sound Pattern of English.* New York: Harper.

Coleman, H. O. 1914. "Intonation and Emphasis." *Miscellanea Phonetica* 1:6–26.

Cruttenden, A. 1990. "The Origins of Nucleus." *Journal of the International Phonetic Association* 20:1–9.

Cruttenden, A. 1997. *Intonation.* 2nd ed. Cambridge: Cambridge University Press.

Crystal, D. 1969a. *Prosodic Systems and Intonation in English.* Cambridge: Cambridge University Press.

Crystal, D. 1969b. "Review of Halliday, M. A. K. 'Intonation and Grammar in British English.'" *Language* 45 (2): 378–393.

Crystal, D., and R. Quirk. 1964. *Systems of Prosodic and Paralinguistic Features in English.* The Hague, the Netherlands: Mouton.

Danielson, B., ed. 1955. *Works on English Orthography and Pronunciation: 1551, 1569, 1570. Part I, Biographical and Bibliographical Introductions. Texts and Index Verborum.* Stockholm: Almqvist and Wiksell.

Eichler, A., ed. 1910. *Charles Butler's English Grammar.* Halle, Germany: Niemeyer.

Grabe, E. 2001. "The IViE Labelling Guide." Version 3. http://www.phon.ox.ac.uk/~esther /ivyweb/guide.html.

Grabe, E., F. Nolan, and K. Farrar. 1998. "IViE: A Comparative Transcription System for Intonational Variation in English." In *Proceedings of the Fifth International Conference on Spoken Language Processing*, Vol. 4, edited by R. H. Mannell and J. Robert-Ribes, 1259–1262. Sydney, Australia: Australian Speech Science and Technology Association.

Grabe, E., B. Post, and W. F. Nolan. 2001. "Modelling Intonational Variation in English: The IViE System." In *Prosody 2000*, edited by S. Puppel and G. Demenko, 51–57. Poznan, Poland: Adam Mickiewitz University.

Gussenhoven, C. 1984. *On the Grammar and Semantics of Sentence Accents.* Dordrecht, the Netherlands: Foris.

Gussenhoven, C. 1990. "Tonal Association Domains and the Prosodic Hierarchy in English." In *Studies in the Pronunciation of English*, edited by S. Ramsaran, 27–37. London: Routledge.

Gussenhoven, C. 2004. *The Phonology of Tone and Intonation.* Cambridge: Cambridge University Press.

Halliday, M. A. K. 1967. *Intonation and Grammar in British English.* The Hague, the Netherlands: Mouton.

Hart, J. 1551. *Of the Opening of the Unreasonable Writing of Our Inglish Toung.* In Danielsson 1955.

Hart, J. 1569. *An Orthographie, Conteyning the Due Order and Reason, How to Write or Paint Thimage of Mannes Voice, Most Like to the Life of Nature.* London: Serres.

Jones, D. 1909. *Intonation Curves.* Leipzig, Germany: Teubner.

Jones, D. 1918. *An Outline of English Phonetics*. 1st ed. Leipzig, Germany: Teubner. Subsequent editions, Cambridge: Heffer, and Cambridge: Cambridge University Press.

Jun, S-A. 2005. "Korean Intonational Phonology and Prosodic Transcription." In *Prosodic Typology: The Phonology of Intonation and Phrasing*, edited by S-A. Jun, 201–229. Oxford: Oxford University Press.

Kingdon, R. 1958. *The Groundwork of English Intonation*. London: Longman.

Ladd, D. R. 1982. "Review of Brown, G., Currie, K. L. and Kenworthy, J. 'Questions of Intonation.'" *Language* 58:204–208.

Ladd, D. R. 2008. *Intonational Phonology*. 2nd ed. Cambridge: Cambridge University Press.

Ladd, D. R., and R. Morton. 1997. "The Perception of Intonational Emphasis: Continuous or Categorical?" *Journal of Phonetics* 25:313–342.

Nolan, F. 1984. *Auditory and Instrumental Analysis of Intonation*. Cambridge Papers in Phonetics and Experimental Linguistics, 3. Cambridge: Department of Linguistics, University of Cambridge.

Nolan, F., and B. Post. 2014. "The IViE Corpus." In *The Oxford Handbook of Corpus Phonology*, edited by J. Durand, U. Gut, and G. Kristoffersen, 475–485. Oxford: Oxford University Press.

O'Connor, J. D., and G. F. Arnold. 1961. *Intonation of Colloquial English*. London: Longman.

O'Connor, J. D., and G. F. Arnold. 1973. *Intonation of Colloquial English*. 2nd ed. London: Longman.

Palmer, H. E. 1922. *English Intonation, with Systematic Exercises*. Cambridge: Heffer.

Palmer, H. E. 1933. *A New Classification of English Tones*. Tokyo: Institute for Research in English Teaching.

Pierrehumbert, J. B. 1980. "The Phonology and Phonetics of English Intonation." PhD diss., MIT.

Post, B., and F. Nolan. 2012. "Data Collection for Prosodic Analysis of Continuous Speech and Dialectal Variation." In *The Oxford Handbook of Laboratory Phonology*, edited by A. C. Cohn, C. Fougeron, and M. Huffman, 538–547. Oxford: Oxford University Press.

Silverman, K., M. E. Beckman, J. Pitrelli, M. Ostendorf, C. Wightman, P. Price, J. Pierrehumbert, T. Kohler, and J. Wesener Hirschberg. 1992. "ToBI: A Standard for Labeling English Prosody." In *Proceedings of the Second International Conference on Spoken Language Processing*, 867–870. Banff, Canada: International Speech Communication Association.

Steele, J. (1775) 1969. *An Essay towards Establishing the Melody and Measure of Speech, to Be Expressed and Perpetuated By Certain Symbols*. Facsimile ed. Menston, UK: Scolar Press.

Sweet, H. (1877) 2013. *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*. Oxford: Clarendon. Published digitally by Cambridge University Press (2013), http://dx.doi.org/10.1017/CBO9781139854665.

Sweet, H. 1892. *A Primer of Phonetics*. Oxford: Clarendon.

Trim, J. L. M. 1959. "Major and Minor Tone-Groups in English." *Le Maître Phonétique* 112:26–29.

Wells, J. C. 2006. *English Intonation: An Introduction*. Cambridge: Cambridge University Press.