Analysis of tonal sequences in English

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0 Introduction

This paper examines the intonation of English sentences with more than one intonation phrase (IP). I will call these sentences with NUCLEAR TONE SEQUENCES. The data I refer to in my examples are taken from the first edition of *Intonation of Colloquial English* (1961) by O'Connor & Arnold. The corpus contains 436 sentences with two, three, and four (or more) IPs.

However large this data base appears to be, a closer inspection reveals that the authours' analysis is by no means complete. No examples of cases known as problematic issues in the literature are represented in the data (e.g., non-restrictive relative clauses, vocatives, conjuncts in mid-position). Comparing general descriptions in the literature and the results of the detailed syntactic analysis of the data, we can observe that the unbalanced pooling of data (e.g., the relatively high number of tag-questions — 44%) modifies the overall picture of the frequency of nuclear tone sequences in English (see Table 4). Taking this aspect into consideration as well, we will see that the thorough analysis of the data results in generally applicable rules (see section **3**).

The guiding principles in classifying the data were: first, the sample sentences were divided into groups according to the number of nuclear tones, and second, they were further subdivided into groups according to their syntactic type; viz., simple sentences, complex sentences (containing subordinated clauses), and compound sentences (containing coordinated clauses). The next step was to examine what syntactic units aligned with IPs.

The question whether the assignment of IP boundaries corresponds to certain syntactic constituents or it is simply dependent on semantics (or some semantic condition) has been widely discussed in the literature. I will attempt to investigate how the choice of nuclear tones and certain syntactic units reflects various degrees of "informativeness" (see section **2**), i.e., main or subsidiary information, a distinction made by Leech & Svartvik (1975 : 173f).

To sum up, the paper focuses on the following research questions: (i) what nuclear tone sequences are presented in the data, (ii) what nuclear tone sequences occur most frequently, (iii) what syntactic units align with separate tone units, (iv) what relations hold between syntactic units and the sequential properties of nuclear tones?

The study of meaning and discourse function of intonation falls outside the scope of this analysis as there have been several attempts to provide a detailed description of these issues in the literature including the present source book and the reference books in my paper.

For technical reasons, I have adopted the notation system O'Connor & Arnold (1961) use. The summary of the symbols is given in the Appendix.

1 The intonational and syntactic composition of the data

1.1 Before the actual analysis is given, a brief overview of terminology is indispensible to clarify the term TONE-GROUP as it is applied by O'Connor & Arnold (1961) and Halliday (1967). O'Connor & Arnold use the term idiosyncratically and it is defined as a "group of tunes which, though intonationally not identical, all have one or more pitch features in common and all convey the same attitude on the part of the speaker" (1961 : 278). So tone groups are not taken as IPs (i.e., TONE UNITS containing a pre-head, head, nucleus and a tail), they are to characterise the possible combinations of tunes and attitudes accounted for in their description of English intonation. Halliday's use of the term, however, is based on the notion that "utterances are divided into rhythmic segments called FEET, and the first syllable of each foot is SALIENT, while the others are WEAK. [...] one or two salient syllables per tone group (=TUNE) are TONIC: the tonic syllable corresponds to the nucleus of the usual British analysis" (Ladd 1978 : 32). In his treatment tone group is regarded as a structural unit within which a nucleus (in traditional terms) can be defined.

As for IP boundary placement, the symbol (|) indicates IP boundaries, while double bars (||) indicate the boundaries of the whole utterance in O'Connor & Arnold (1961). Each IP contains a nucleus, hence the term nuclear tone, and six nuclear tones (falling, rising etc.) are distinguished to which we will refer in the present study (see Appendix). The need for an exact placement of IP boundaries is questioned by Brazil et al., who claim that no importance should be attached to these boundaries, since "all intonational meaning is carried by the TONIC SEGMENT (=head + tonic syllable), whose boundaries are perfectly clear, [and] it gives us a principled reason for saying that tone unit boundaries are not in fact of great importance" (1980:45f).

1.2 This section examines (a) what nuclear tone sequences are represented in the corpus and attempts to describe the syntactic composition of multiple nuclear tone sequences and (b) to what extent IP boundaries tend to be sensitive to clause boundaries or the boundaries of other syntactic units that are smaller than a clause. In this part of the analysis, samples of simple, compound and complex sentences will be given.

The multiple nuclear tone sequences found in the corpus are summarised in Table 1 below:

Table 1. Summary of nuclear tone sequences

Number of nuclear tones	Number	%
Two	425	97.5
Three	5	1.15
Four or more	6	1.35

As seen above, the utterances containing two nuclear tones constitute the largest group, followed by sequences with three nuclear tones. The smallest group appears to be the "four-or-more" category which contains incomplete utterances as that in (1). Note that the number of high-rise sequences is unlimited when different items are listed.

(1) | I can do ´shorthand | and ´typing ...

The syntactic analysis of double nuclear tone sequences reveal that the sample sentences can be classified as simple and complex sentences with numerous subcategories which are summarised in (2–5) below.

In simple sentences (2a–g), with a total of 305 (70%) examples, it can be observed that the NP subject of the sentence, such as *some people, this jacket,* etc. may be separated from its predicate, as in (2a). Similarly, time adjuncts (*most evenings, rarely*) in (2b), style disjuncts (*frankly, personally*) in (2c), conjuncts (transitional *by the way,* concessive *and besides*) as given in (2d) normally constitute a separate IP at the beginning of the sentence. We also find cases when a prepositional phrase (e.g., *with my father, at the Robinsons'*) and time adjuncts (e.g., *rarely*) occur in fronted position in elliptical simple sentences as in (2e). In *yes–no* short answers, *yes* and *no* are treated as separate tone units as in (2g).

(2) a. **Noun Phrase (subject) + Verb Phrase (predicate)**
ˇClive's amˌbition | is to ˌˌbe the Prime \`Minister.
My ˇfather | was de\`lighted.
ˇThat ˌknife | ˌˌwon't cut at \`all.

b. **Adjuncts in fronted position**
ˇMost evenings | they ˌˌwatch \`television.
ˇSoon | you ˈwon't have \`any.
Well after ˇthat | I ˈlet him get ˈon with it a \`lone.

c. **Disjuncts in fronted position**
In ˇmy ˌview, | it would be \`foolish.
ˇFrankly, |(I ˈdon't \`blame you).
ˇPersonally, | I ˈnever \`touch the ˌstuff.

d. **Conjuncts in fronted position**
In ˊthat ˙case, | I've ˈnothing ˈmore to ˎsay.
ˈBy the \`way , | ˈwhere do you \`live?
And be\`sides, | I \`didn't ˌˌwant to ˌˌgo a ˏlone.

e. **Elliptical sentences**
At the \`Robinson's, | \`last Friday.
With my \`father, | at \`Ipswich.

f. **Tag-questions (also with ellipsis)**
You're in at \`ten, | ˏaren't you?
You ˇwon't ˌgive me aˌway, | \`will you?
But not ˇurgently, | ˏdo you?
ˇRarely, | ˏdoes it.

g. **Yes-No answers**
\`No, | \`this.
\`Yes, | I \`do.
\`Yes, | \`let's.

The occurrence of disjuncts, conjuncts and prepositional phrases in sentence final position can also be observed. They are usually emphatic or express some afterthought as illustrated in (3).

(3) a. **Adjunct**

ˋThere is ˏMarjorie, | ˌˌover ˋthere.
I was ˈpunched in the ˋnose | by a ˋman.
They'll reˇplace it, | ˈfree of ˋcharge.

b. **Disjunct**

We were ˋboth on ˌtime, | ˋsurely.

c. **Conjunct**

They ˇcan't ˌgo, | ˋafter ˌall.

The major types of compound (4) and complex sentences (5) with a total of 132 (30%) examples are represented below.

(4) **Compound sentences**

a. **Disjunctive coordination (questions)**

ˈWas your ˈcar ˏnew | or ˈsecond ˎhand?
Do you ˈreally ˏmean that | or are you ˈjust being ˎnice about it?

b. **Copulative coordination**

Now, you've had a ˋhard ˏday | and you look ˋvery ˏtired.
Well ˋtake it ˋwith you | and ˋfinish it on the ˋtrain.

c. **Adversative coordination**

I ˌˌtried ˋboth ˌmethods | but I ˌˌfound ˋneither to be satisˌfactory.
ˌˌBill ˏwarned her aˋbout them, | but she ˌˌjust took ˌˌno ˋnotice.

(5) **Complex sentences**

a. **Conditionals**

↘If you were ˇlate, | you should aˋpologize.
If ˊyou ˋthink so, | that's ˈall that ˋmatters.

b. **Time clauses**

When you're ˌˌquite ˏready, | I'll ˋphone for ˌone.
But ˌˌafter I'd exˏplained the ˋmatter to ˋhim, | he was ˌˌquite enthusiˋastic.

c. **Clauses of reason or cause**

ˇI ˌliked it | beˌˌcause it was aˋmusing.
Since you're ˈobviously ˈvery ˏbusy, | ˈshall I come back toˎmorrow?

d. **Clauses of concession**

Al ˌˌthough it's not ˌˌvery imˏportant, | we ˌˌmight as ˌˌwell get it ˏright.

Though ˏI'm not going, | there's no ˌˌreason ˌˌwhy ˏyou shouldn't.

e. **Clauses of purpose**

So as to be in ˈplenty of ˏtime, | you'd ˙better ˙leave beˎfore that.

So that he ˈwon't forˏget, | ˈdrop him aˈline to conˎfirm it.

f. **Alternative conditional-concessive clauses**

ˈWhether you ˈtrust him or ˏnot, | we've ˈjust ˋgot to ˌtake his ˌword for it.

g. **Comment clauses**

ˎI'll make it ˇsoon, | I ˋpromise.

The above summary of tone sequences with two nuclear tones (2–5) shows that IP boundaries usually coincide with clause boundaries as in (4) and (5). In simple sentences, units smaller than a clause may also constitute a separate IP. These are normally adverbials, conjuncts, disjuncts (also prepositional phrases) occurring either in a sentence-initial or sentence-final position (in the case of tag-questions) as given in (2) and (3).

Although O'Connor & Arnold's analysis is fairly detailed, it is by no means complete. No examples of non-restrictive relative clauses, vocatives, apposition, conjuncts in mid-position are represented in the corpus. Quirk & Greenbaum (1973), Leech & Svartvik (1975) and Cruttenden (1986) claim that these syntactic units form separate IPs.

Leech & Svartvik propose that non-restrictive relative clauses, medial phrases or clauses, vocatives, linking adverbs, clauses or long noun phrases acting as subjects should be represented in separate IPs, otherwise sentences should be given a single IP. Following their analysis, the examples that are not given any treatment by O'Connor & Arnold (1961) are summarised in (6).

(6) a. **Non-restrictive relative clause**

| The blue <u>wh</u>ˇ<u>a</u>le | which is the world's largest ˇ<u>a</u>nimal | has been hunted almost to exˋ<u>tinc</u>tion. |

b. **Medial phrases or clauses**

| And ˊ<u>that</u> | in ˊ<u>short</u> | is why I reˋ<u>fus</u>ed. |

c. **Vocatives or linking adverbs**
| ˇ<u>Ma</u>ry | are you ˊ<u>co</u>ming? |
| The poˋ<u>lice</u> | howˊ<u>ev</u>er | thought he was ˋ<u>guil</u>ty. |
(Leech & Svartvik 1975 : 170f)

Since the number of sample sentences containing three, four, four or more IPs is by far the smallest, the examples are dealt with separately in (7) and (8) below. The examples in (7) represent IP sequences with three nuclear tones, those in (8) illustrate IP sequences with four or more nuclear tones. The examples (8e–f) demonstrate a particular group, the IPs of which could be further extended to an infinite number of nuclear tones.

(7) **IP sequences with three nuclear tones**

a. ˙No, the ˈsea was as ˈsmooth as a ˋmillpond | but I'm a ˈvery ˙poor ˋsailor | and ˈeasily upˋset.

b. We shall go through ˊBelgium, | and ˊHolland, | and ˎGermany.

c. On ˊTuesday, | or ˊWednesday, | or ˎFriday.

d. You can have ˊmilk, | or ˊtea, | or ˎcoffee.

e. Well ˇI ˌlike it,| but my ˇwife | ˋdoesn't.

(8) **With four or more nuclear tones**

a. ↘Now that I've ˇheard your ˌplans | there are a ˈnumber of ˋquestions I'd ˌlike to ˌask, | for ˋinstance. . .

b. (Is there anything else you need?) ˊButter, | ˊbacon, | ˊcheese, | ˊlard?

c. Well I've got some ˊBach, | or Deˊbussy, | or if you preˊfer it, | I've ˈgot some ˋjazz.

d. You'll need pyˊjamas, | your ˊshaving kit, | and a ˋtoothbrush, | ˌˌthat's ˏall.

e. ˌˌSeventy ˏone, | ˌˌseventy ˏtwo, (sic!) ˌseventy ˏthree, | ˌˌseventy ˏfour, | ˌˌseventy ˏfive, | (ˌˌseventy ˎsix.)

f. I can do ˊshorthand, | and ˊtyping. . .

Examples (7a–e) and (8c–d) are coordinated sentences containing one of the coordinators: *and, but* and *or.* In (8c) *if you prefer it* is taken as a parenthetical phrase (Cruttenden 1986 : 44). Sentences (8b), (8e) and (8f) may be classified as elliptical coordination in which the ellipted element is recoverable from the context, cf. (8b). Example (8a) is a complex sentence containing a time clause (*Now that I've heard...*). As noted earlier, sentences (8b), (8e) and (8f) can be extended into an unlimited number of IPs as long as the enumeration of different items lasts. In sentences (8b) and (8e) no coordinators appear, it is the consecutive nuclear tones (high or low rises) that express listing. As indicated in (8e), when listing is completed a low or high fall indicates the very end of the enumeration, similarly to (7b), (7c) and (7d).

In sum, this overview of the occurrence of different syntactic constituents (clauses and smaller syntactic units, for instance, adjuncts, disjuncts etc.) has shown how they correspond to IPs. The observation that clause boundaries coincide with IP boundaries is supported by Cruttenden who claims that "The most frequent correspondence of intonation groups is undoubtedly with clauses, but similar correspondences with grammatical structures smaller than the clause are regularly reported" (1986 : 145f). He refers to studies of intonation grouping in languages other than English in this statement, which reinforces the view that clause and IP correspondence is not language specific, therefore the examples presented by O'Connor & Arnold follow this general trend.

In the literature, there have been several attempts to account for partitioning utterances into IPs. A different treatment of the issue is given by Selkirk, who claims:

> "... on different utterances, the same sentence may be differently partitioned into intonational phrases. In other words, the syntactic structure of a sentence cannot be said to determine its intonational phrasing" (1984 : 285).

In her view "the relation between syntactic structure and all aspects of intonational structure can be described as a one-to-many mapping" (*ibid.*). She introduces two rules: one, responsible for parsing a matrix sentence (the Syntactic-Prosodic Correspondence Rule for Intonational Phrase) and another, which accounts for the semantic well-formedness of an intonational phrase (The Sense Unit Condition on Intonational Phrasing) as below:

> **The Syntactic-Prosodic Correspondence Rule for Intonation Phrase**
> A matrix sentence must be exhaustively parsed into a sequence of (one or more) intonational phrases
>
> **The Sense Unit Condition on Intonation Phrasing**
> The immediate constituents of an intonational phrase must together form sense unit. (1984 : 286)

By SENSE UNIT, a modifier-head or an argument-head relationship is meant:

> Two constituents C_i C_j form a sense unit if (a) or (b) is true of the semantic interpretation of the sentence:
> a. C_i modifies C_j (a head)
> b. C_i is an argument of C_j (a head). (1984 : 291)

She admits that the Sense Unit Condition cannot account for non-restrictive modifiers and non-restrictive phrases, and claims certain "preposed phrases" (i.e., adjuncts, disjuncts in the present analysis) constitute separate intonational phrases, like vocatives, parentheticals, tag-questions etc. So the same syntactic units pose difficulties in this account as well.

2 Description of nuclear tone sequences

In this section of the paper I describe what nuclear tone sequences occur and how the nuclear tone of a final IP affects the nuclear tones of the IPs before. The different surveys of the data make it possible to define the most characteristic nuclear tone sequences in English. A hypothetical mathematical calculation of all the possible nuclear tone sequences would make us assume that a great number of them is realised in speech, which is not supported by the data, as we will see below.

In this study, we operate with six nuclear tones as in Table 2 below. In sequences with two nuclear tones, the vertical column indicates pre-final IPs, the horizontal column indicates final IPs.

Table 2. Survey of sequences with two nuclear tones

	Low Fall	**High Fall**	**Fall-Rise**	**Low Rise**	**High Rise**	**Rise Fall**
Low Fall	18			3		
High Fall		46	1	25		
Fall Rise		119	3	34		
Low Rise	22	64		31		
High Rise	19	5			8	
Rise Fall		3	2			22

As for the frequency of the six basic nuclear tones in pre-final and final positions, Table 3 represents the subtotals of the column (vertically added) and row (horizontally added) figures. The bold figure in each column indicates the commoner position of occurrence.

Table 3. Frequency of occurrence of nuclear tones in pre-final and final positions in sequences of two nuclear tones

	Low Fall	**High Fall**	**Fall-Rise**	**Low Rise**	**High Rise**	**Rise Fall**
Pre-final	21	72	**156**	**117**	**32**	**27**
Final	**59**	**239**	6	93	8	22
Total	80	311	162	210	40	49

As seen in Table 3, there are certain nuclear tones that predominantly occur finally, namely, low fall and high fall, whereas rises (fall rise, low rise and high rise) usually prefer the pre-final position.

The results of these charts are best interpretable if we consider a few general characteristics of English intonation in terms of informativeness of IPs. According to Leech & Svartvik (1975), there are different degrees of informativeness that can be distinguished and they depend on the choice of nuclear tone. A falling tone gives emphasis to the MAIN information in the utterance whereas a rising tone indicates SUBSIDIARY information as in (9). In Cruttenden's (1986) description, falls give the idea of "finality" and rises express "non-finality" as in (10). In the examples of (9), a low (or high) rise being typical of subordinate clauses and adverbials is followed by a high (or low) fall.

(9) And in ˊsummer | I ˋswim a ˌlot. (subsidiary + main)
As ˈsoon as you ˏsee him | ˈtell him I ˎphoned.
No ˈsooner had we ˈgot our ˈholiday ˈall arˏranged, | than he ˈwanted to ˈcry ˋoff.

(10) On ˊTuesday, | or ˊWednesday, | or ˎFriday.
You can have ˊmilk | or ˊtea | or ˎcoffee.

Cruttenden discusses the phenomenon of lexical focusing. He points out that certain words like *alone, only, especially, even* and *too* "have a fixed relationship with nucleus placement" (1986 : 80). The data contain examples only with *too,* which constitutes a separate IP with a high fall nuclear tone as in (11).

(11) Then ˋyou be ˌobstinate, | ˋtoo.
Toˇday's ˌout of the ˌquestion, | ˋtoo.

In the corpus, tag-questions present one of the largest groups with 191 sample sentences. Consequently, this high number of their frequency will modify the final result as in Table 4. First, tone sequences are ranked according to the total number of examples, then their number without tag-questions can be compared with it in the next column. The final order is set up by substracting the number of tag-questions from the grand total.

Table 4. The most frequent tonal sequences with tag-questions

	Total	Without tag-questions	Final order
1. Fall Rise+High Fall	119	85	**1**
2. Low Rise+High Fall	64	43	**2**
3. High Fall+High Fall	46	23	**3**
4. Fall Rise+Low Rise	34	12	6
5. Low Rise+Low Rise	31	4(!)	7
6. High Fall+Low Rise	25	2(!)	8
7. Low Rise+Low Fall	22	20	4
8. Rise Fall+Rise Fall	22	0(!)	10
9. High Rise+Low Fall	19	19	5
10. Low Fall+Low Fall	18	1(!)	9

As seen above, there are certain nuclear tone sequences—5, 6, 8 and 10—that are typical of tag-questions. In the other cases, however, we can conclude that sequences with rises followed by falls are the most common combinations—1 and 2. The next group is 3 with falls in both IPs. This observation is supported by Cruttenden's description of the most common nuclear tone sequences (1986 : 111f), although in his description a high fall followed by a low rise is the second largest group.

In view of the data, let us examine the first three nuclear tone sequences in English:

(12) **Fall Rise+High Fall**

ˇI say | the scheme's ˈmuch too amˋbitious.

I'm ↘awfully ˇsorry | but it ˌˌisn't ˌˌquite ˋfinished.

If ˇI'm ˌthere, | you can ˌˌtalk to ˋme.

He ↘didn't ˇget ˌhis rise | ˋafter all.

(13) **Low Rise+High Fall**

In ˏthat case, | I should have ˌˌasked to ˌˌsee the ˋmanager.

Beˈfore you desˏtroy it, | ˈshow it to your soˋlicitor.

˙Yes and ˈwhen I arˏrived, | there was ˈno one at ˋhome.

(14) **High Fall+High Fall**

I ˋhate it, | but ˌˌwhat can I ˋdo?

We'd ˈbetter make ˋsure | or ˈelse we'll be ˋlate.

Well ˈthrow it aˋway, | and ˈpick ˙out a ˋbetter ˌone.

In (12), we can observe that subordinate clauses and adjuncts (also disjuncts) take a fall-rise tone, and the final IP takes a high fall. In (13), Leech & Svartvik's claim is justified, i.e., adverbials and subordinate clauses take a low rise when they provide subsidiary information. The data in (14) show that this type of tonal sequence is characteristic of coordinated clauses. Cruttenden points out: "Use of a rise in the first of two coordinate clauses followed by a fall in the second involves two (successive) aspects of a single action, whereas use of a fall in each clause involves two distinct (and parallel) actions,..." (1986 : 104). The examples of (15) represent this successive aspect in coordinated sentences.

(15) **(Low) Rise+(High) Fall**

I ˌˌwent ˏup to him, | and he ˋsnubbed me.

I ˈopened the ˈdoor ˏquietly, | and ˙caught him ˈred ˋhanded.

3 Conclusions

This brief survey of nuclear tone sequences based on O'Connor & Arnold (1961) suggests the following conclusions:

(i) fall-rises almost always occur in non-final IPs,
(ii) a high rise is never followed by a rise,
(iii) a low fall is never preceded by a high fall or fall rise and
(iv) a rise-fall followed by another rise-fall is typical of tag-questions only.

APPENDIX

The notation system of O'Connor & Arnold (1961) is the following:

x │ x	tone unit boundary	Quite good │ really.
ˎx	low fall	ˎMine.
ˋx	high fall	ˋYours.
ˆx	rise-fall	ˆHis.
ˏx	low rise	ˏOurs.
ˊx	high rise	ˊYours.
ˇx	fall-rise	ˇTheirs.
ˌx	before stressed syllables in the tail	ˋTwo, you ˌsilly ˌchap.
˙x	before any stressed syll. higher than the lowest pitch	ˊTwo, did you ˙say?
	before any stressed but unaccented syll.	ˈAre you ˙coming ˈback a˙gain on ˏSunday?
	before stressed syllables in the low pre-head	The ˙man was ˈperfectly ˎright.
ˌˌx	low pre-head	ˌˌHow did you ˌˌmanage to do ˋthat?
ˈx	before each accented syll. (stepping head)	ˈCome and ˈsee me toˎmorrow.
↘x	before each accented syll. (sliding head)	↘No one will ˇknow.

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