

A QUANTITATIVE SURVEY OF NUCLEAR TONE VARIATION IN ENGLISH

TERTTU NEVALAINEN

University of Helsinki, Department of English
Hallituskatu 11, SF-00100 Helsinki, Finland

ABSTRACT

Nuclear tone frequencies were analysed in the London-Lund Corpus of Spoken British English, and compared with five previous RP studies and some regional data. Discourse specific variation can be detected in RP, especially in the distribution of the fall as opposed to the rise and the fall-rise. Some regional differences also appear to be influenced by discourse type.

INTRODUCTION

It is widely held that regional differences in English can be encoded in the distribution of nuclear tones and hence be detected in their relative frequencies in discourse [1]. It seems, however, that more information of the range of variation in standard English is needed before a satisfactory comparison can be made interdialectally. That our generalizations are all too often made on a rather narrow data base is shown by the account of past work on standard British English (RP) in section 2, below.

This study approaches nuclear tone distribution from the point of view of discourse type variation. In order to find out how consistent the distribution of nuclear tones remains in a selection of different discourse types, a quantitative analysis was carried out of the nuclear tones in the main text categories of the London-Lund

Corpus of Spoken English (LLC). The corpus, which comprises c. 435,000 running words, is described in more detail in section 3.

The results of this study are discussed in section 4. They show significant variation e.g. in the frequencies of the simple falling and rising tones between the different discourse types. Bearing this internal variation in mind, a comparison is made in section 5 of the average distribution of nuclear tones in spontaneous conversation in RP and nuclear tone data on Tyneside, Shetland, and General American English.

PAST WORK ON TONE DISTRIBUTION IN R.P.

Table 1 presents the results of five previous studies on nuclear tone distribution in RP. It is arranged according to the frequency of the simple falling tone. Although all the studies in Table 1 are based on a head-plus-nucleus analysis of tone units, the figures are not ideally comparable because in most cases no mention is made of the treatment of subordinate tone units in the study. Nevertheless, all studies distinguish a nearly identical inventory of nuclear tones: three simple tones (fall, rise and level), two complex tones (fall-rise and rise-fall) and two compound ones (fall-plus-rise and rise-plus-fall). When other compounds are distinguished (e.g. fall-plus-level) they are included under the category of others in Table 1.

TABLE 1. Relative frequencies of nuclear tone types in five R.P. studies.

Source/Tone (%)	Fall \ /	Rise /	Fall-Rise \ /	Fall+Rise \ /	Level -	Rise-Fall \ /	Rise+Fall /\ /	Other
Davy (1968 C)	58.7	16.1	7.4	5.1	8.0	4.2	0.4	?
Iivonen (1984)	55.0	13.3	14.6	7.0	4.0	4.4	0.7	1.0
Crystal (1969)	51.2	20.8	8.5	7.7	4.9	5.2	1.7	-
Quirk (1964)	51.0	24.0	6.7	9.0	2.0	3.8	0.6	2.9
Davy (1968 R)	50.2	24.6	11.1	5.5	5.5	2.1	0.6	?
Altenberg (1987)	47.2	26.6	9.8	9.3	4.9	0.8	0.3	1.1

The individual studies in Table 1 can be briefly described as follows. Davy (1968 C) is based on a sample of conversation, but the sample size is not specified [2]. Iivonen et al. (1984) present the average distribution of nuclear tones in the first two text categories of the London-Lund Corpus (c. 140,000 words), which consist of conversations between intimates and distants [3]. Subordinate and incomplete tone units are however excluded from the analysis. The figures given in Crystal (1969) average over c. 30,000 words of conversation [4], while those in Quirk et al. (1964) derive from two panel discussions of about 5,000 words each [5]. The category others in this case also includes doubtful instances. The sample size of the reading data analysed in Davy (1968 R) is not further specified [2]. Lastly, the figures in Altenberg (1987) represent the nuclear tone distribution in a popular lecture (text 12.6 in the LLC) which consists of 4,877 words [6]. Although the distributional differences in Table 1 are not very great, conversations seem to show a higher proportion of the simple fall than the monologue texts. Conversely, the simple rise is slightly favoured in the two monologues studied in Davy (1968 R) and Altenberg (1987).

COMPOSITION OF THE CORPUS

The London-Lund Corpus of Spoken English is a collection of c. 435,000 running words of educated British English (RP) in orthographic transcription with prosodic analysis. It was produced at the Survey of English Usage, University College London, and the computer tape version used in the present study was compiled at the Survey of Spoken English, University of Lund. The prosodic

analysis distinguishes seven basic nuclear tones: fall (\<), rise (/), fall-rise (\
/), rise-fall (/
\<), level (-), fall-plus-rise (\
/+) and rise-plus-fall (/+\<). Pitch range variation is encoded separately in the booster system [7].

The corpus contains twelve text categories which consist of a varying number of individual texts (altogether 87 texts of about 5,000 words each). The present study examines nuclear tone distributions primarily at the main category level. Categories S.5 and S.10 are, however, further subdivided into two parts because there is reason to believe that their tone distributions significantly covary with the subdivisions. Further internal variation may, of course, also occur but a detailed analysis of the individual texts falls outside the scope of the present study. Table 2 presents a brief description of the fourteen text categories examined.

NUCLEAR TONES IN THE CORPUS

The distributions of nuclear tones in the main text categories of the LLC are shown in Table 3. The results were obtained using a computer program which identifies tone unit patterns on the basis of the LLC transcription. The figures presented in Table 3 also include the tones in subordinate tone units, which are counted as independent, as well as those in incomplete tone units and vocalizations (e.g. [m], [/mhm]).

Table 3 indicates a fairly large range of variation in the distribution of the main tones, the simple fall and the simple rise. The maximum frequency of the falling tone (>70% of all tone tokens) occurs in private

TABLE 2. Composition of the London-Lund Corpus of Spoken English.

LLC Text Category/	Characterization and approximate word count
S.1:	Surreptitiously recorded spontaneous face-to-face conversations between intimates and distants; 70,000 words
S.2:	Same as in S.1, 70,000 words
S.3:	Same as in S.1, 30,000 words
S.4:	Mostly non-surreptitious conversations between intimates and equals; 35,000 words
S.5.1-7:	Non-surreptitious public discussions between equals; 20,000 words
S.5.8-11:	Non-surreptitious private conversations between dispartes; 30,000 words
S.6:	Non-surreptitious conversations between personal friends; 15,000 words
S.7:	Surreptitious telephone conversations between business associates; 20,000 words
S.8:	Surreptitious telephone conversations between dispartes; 15,000 words
S.9:	Surreptitious telephone conversations between dispartes; 20,000 words
S.10.1-4:	Spontaneous sports commentary (cricket, football, boxing, horse racing); 20,000 words
S.10.5-8:	Other spontaneous commentary (e.g. a royal wedding, state funeral, launching of a ship, physics demonstration); 20,000 words
S.11:	Spontaneous oration (e.g. a case in court, dinner speech, recordings in the House of Commons); 25,000 words
S.12:	Prepared but unscripted oration (e.g. sermons, university lectures, and political speeches); 30,000 words

TABLE 3. Distribution of nuclear tones in the London-Lund Corpus.

LLC Text/Tone (%) Category	Fall \	Rise /	Fall-Rise \	Fall+Rise \+/\	Level -	Rise-Fall \	Rise+Fall \+/\	Other
S.5.8-11	70.9	7.8	8.8	4.8	4.3	2.4	0.4	0.6
S.4	62.9	11.1	11.7	4.7	4.2	4.2	0.3	0.9
S.3	60.3	11.6	13.8	6.1	4.8	2.5	0.3	0.6
S.7	59.6	17.3	11.8	5.4	2.4	2.7	0.3	0.5
S.2	57.1	12.1	15.4	6.0	3.5	4.4	0.6	0.9
S.1	56.3	13.9	12.5	7.0	4.2	4.4	0.7	1.0
S.5.1-7	56.3	20.9	6.7	8.8	3.4	3.0	0.7	0.2
S.12	53.3	23.0	8.5	6.8	4.7	2.1	1.0	0.6
S.6	52.7	14.9	15.3	7.3	5.3	3.5	0.3	0.7
S.11	51.9	16.6	14.2	9.1	4.3	2.0	0.8	1.1
S.8	50.5	19.9	15.8	6.8	2.6	3.0	0.4	1.0
S.10.5-8	49.6	23.5	13.2	4.5	6.8	0.9	0.4	1.1
S.9	46.0	18.5	20.0	7.0	4.5	2.4	0.3	1.3
S.10.1-4	40.0	32.9	12.1	7.0	5.8	0.8	0.5	0.9

conversations between intimates and equals. The fall is slightly less frequent (c. 55%-60%) in the conversations involving both intimates and distants. Its incidence falls below 50% in radio and TV commentary, and telephone conversations between distants, reaching its lowest point (40%) in sports commentary. Conversely, simple rising tones are most frequent in all kinds of spontaneous commentary, prepared oration and public debates (c. 20%-33%).

With one exception all the broadcasters and commentators in S.10.1-8 are male (N = 23). No women appear in S.12, and male speakers also dominate in the public discussions in S.5.1-7. Hence the data do not support any purely sex-determined motivation for the high frequency of the simple rising tone. This does not, of course, mean that tonal distinctions could not be used to reinforce sexual stereotypes e.g. in comedies [8].

Usually the distribution of a nuclear tone cannot be directly matched with its functions on the basis of mere frequency data. It may however be argued that, in radio and

TV commentaries, rising tones are probably used to promote textual cohesion [9]. Hence the rising tone types may also cooccur with statements and new information. A similar strategy would seem to apply to the lecture examined in Altenberg (1987), and reading intonation. In telephone conversations between distants (e.g. S.9) the rather high proportion of rising tone types could, on the other hand, mark polarity questions and formal politeness.

REGIONAL VARIATION

It has been pointed out in the literature that regional differences can be detected, for instance, in the relative distributions of the rising and level tones [10]. However, any systematic comparison of RP with other varieties of English is complicated by the scarcity and disparity of the quantitative material available. Some highly tentative comparisons are, nevertheless, possible. In Table 4, the RP distribution represents the average of the first three text categories in the LLC (S.1-3), including subordinate tone units and vocalizations (cf. Table 3).

TABLE 4. A comparison of nuclear tone type frequencies in four varieties of English.

Variety/Tone (%)	Fall \	Rise /	Fall-Rise \	Fall+Rise \+/\	Level -	Rise-Fall \	Rise+Fall \+/\	Other
RP Standard C	57.3	12.8	13.9	6.4	4.0	4.1	0.6	0.9
GA Dialogue R	53.7	9.6	15.8	-	20.9	0.0	-	-
Shetland C	52.1	26.5	1.5	5.2	11.3	3.0	0.3	0.1
Shetland N	34.9	33.0	3.1	9.9	10.4	7.0	0.6	1.1
Tyneside I	28.0	17.0	7.0	11.0	21.0	15.0	1.0	-

(C = conversation, R = reading, N = narrative, I = interview)

Oreström's prosodically transcribed corpus (1985) was used to calculate the frequency distribution for Shetland English. The data were divided into two parts because conversation (= C; 2 speakers, c. 770 tone units) differed considerably from narration (= N; 20 speakers, about 3,960 tone units) [11]. The Tyneside figures show the average tone distribution of the data given in Pellowe and Jones (1978) for two sets of interviews (= I; 20 speakers, 4,066 tone units) [12]. The Shetland and Tyneside transcriptions basically follow the LLC notation system, which will facilitate their comparison (but also conceal possible varietal differences in prosodic realization). By contrast, the General American (GA) figures quoted from Pike (1945) are based on a form of notation that does not recognize, for instance, the British notion of compound tones. Pike's figures derive from a detective story dialogue (= R; 1 speaker, 804 contours) [13].

Space only permits some brief comments on Table 4. The simple fall appears to be most infrequently represented in the Tyneside data (28%), but the complex rise-fall most frequently (15%). To what extent they could be functionally equivalent remains an open question. The low frequency of the fall in the Shetland narratives may be partly due to the cohesive function of the rising tone types. In this respect the Shetland conversation sample differs radically from the narrative monologues.

The level tone is remarkably frequent in the regional data, especially in Tyneside and General American. In the American data it could perform a cohesive function: 163 out of the 168 instances of the tone in the sample are found in the middle of sentences [13]. Another factor that might covary with nuclear tone distribution is tone unit length. In Oreström's data, the average length is 5.2 words, in the LLC 4.3 words, and in Pike's General American sample about 3 words. How far the differences are purely discourse specific in a given variety can only be settled when more comparative data become available.

ACKNOWLEDGEMENTS

I would like to thank Visa Rauste and Hannu Hartikka from the Helsinki University Computing Centre for their assistance in the computer processing of the LLC data. Thanks are also due to Bengt Altenberg for kindly making his study of Text 12.6 available to me before it was published.

REFERENCES

[1] J. Wells (1982), *Accents of English*, 1, An Introduction. Cambridge: Cambridge University Press, p. 90-91.

[2] D. Davy (1968), *A Study of Intonation and Analogous Features as Exponents of Stylistic Variation, with Special Reference to a Comparison of Conversation with Written English Read Aloud*. Unpublished MA Thesis, University of London, cited in [4].

[3] A. Iivonen, R. Aulanko, H. Kaskinen, T. Nevalainen (1984), *Intonaatioteorioista* (Publications of the Helsinki University Department of Phonetics, 34b). Helsinki, p. 116.

[4] D. Crystal (1969), *Prosodic Systems and Intonation in English*. Cambridge: Cambridge University Press, p. 225.

[5] R. Quirk, A. Duckworth, J. Svartvik, J. Rusiecki, A. Colin (1964), "Studies in the Correspondence of Prosodic to Grammatical Features in English." *Proceedings of the Ninth International Congress of Linguists*, ed. H. G. Lunt. The Hague: Mouton, 679-691, p. 681.

[6] B. Altenberg (1987), *Prosodic Patterns in Spoken English, Studies in the Correlation between Prosody and Grammar for Text-to-Speech Conversion* (Lund Studies in English, 76). Lund: Lund University Press.

[7] J. Svartvik, R. Quirk (1980), *A Corpus of English Conversation* (Lund Studies in English, 56). Lund: CWK Gleerup, p. 21-25.

[8] C. Gussenhoven (1986), "The Intonation of 'George and Mildred': Post-Nuclear Generalisations." *Intonation in Discourse*, ed. C. Johns-Lewis. London: Croom Helm, 77-123, p. 82-84.

[9] M. A. K. Halliday, R. Hasan (1976), *Cohesion in English*. London: Longman, p. 271-273.

[10] A. Cruttenden (1986), *Intonation*. Cambridge: Cambridge University Press, p. 138-144.

[11] B. Oreström (1985), *A Corpus of Shetland English* (Stockholm Studies in English, 64). Stockholm: Almqvist & Wiksell International.

[12] J. Pellowe, V. Jones (1978), "On International Variability in Tyneside Speech." *Sociolinguistic Patterns in British English* ed. P. Trudgill. London: Edward Arnold, 101-121, p. 109.

[13] K. Pike (1945), *The Intonation of American English* (University of Michigan Publications, Linguistics, 1). Ann Arbor: University of Michigan Press, p. 155.