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Pitch patterns of English and Czech declarative and interrogative sentences

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PITCH PATTERNS OF ENGLISH AND CZECH DECLARATIVE AND INTERROGATIVE SENTENCES

The present paper is a study of the intonation of English and Czech declarative and interrogative sentences. It presents the results of a comparative analysis of the occurrence of different pitch patterns in two English and two Czech dialogues. The prosodic interpretation of the material is based on a simplified version of the framework of the British contour analysis.

1 Prosodic interpretation

The prosodic analysis of spoken texts within this study observes the principles of contour analysis as described by Crystal (1969), O'Connor and Arnold (1973) and Cruttenden (1986). The prosodic approaches of Czech scholars, e.g. Palková (1994), Daneš (1957), Dokulil *et al.* (1986), or Krčmová (1995), differ from the contour analysis in many details (cf. Chamonikolasová 1997: 33–34, 1998: 12–21, and 2000: 33–34) but there seems to be a general agreement among all the scholars mentioned above on the identification of the basic intonation unit through which different melodies are realized and the most prominent prosodic feature within this unit, i.e. the nucleus. The *intonation unit* (also referred to as tone unit, tone group, tune, intonational phrase, breath-group, sense-group, phonological phrase, výpovědní úsek, kólon) is a segment of speech identified phonologically as a unit that contains one peak of prosodic prominence[1] and that is divided from neighbouring units by intonation unit boundaries. The boundaries are indicated by a pitch change following the nucleus and a slight pause. The pitch change takes the form of a step up (after falling tones in the preceding intonation unit) or a step down (after rising tones) at the beginning of a new intonation unit to the natural level of the speaker's voice. The peak of prosodic prominence, i.e. the *nucleus* (primary accent, nuclear tone, větný přízvuk, intonační centrum) is usually the final accented stress in an intonation unit.[2] The nucleus is perceived either as a pitch glide (with nuclei on monosyllabic words) or a pitch jump (with nuclei on words consisting of more syllables). The pitch

jump is functionally equivalent to a glide. A third type of a nuclear tone is the level nucleus, which takes the form of a sustention on the accentual syllable of the most prominent word. Levels are likewise functionally equivalent to glides. A more detailed outline of the properties of the intonation unit and nuclear tones is available in Crystal (1969: 204–235).

The prosodic transcription of most of the material analyzed in this study is a simplified version of the system applied by Cruttenden (1986). Nuclei in the examples are denoted by tonetic marks indicating pitch direction (rising, falling, continuing); pitch range (high, low) is not marked. Below is a list of the tonetic marks used in this study.

\	fall
/	rise
V	fall-rise
Λ	rise-fall
=	level

In addition to marks denoting nuclei, the examples contain the symbols '°' to denote non-nuclear accented stress, and '#' to indicate the end of an intonation unit.

One of the texts contains a more detailed set of tonetic marks, applied in the prosodic version of the London-Lund Corpus (see below). The symbols indicating pitch direction in that transcription are identical to the marks of the simplified system described above. For easy orientation, nucleus-bearing words in all four texts are capitalized.

2 Description of material

The material analyzed consists of a matched pair of scripted and a matched pair of non-scripted texts. For the scripted texts, the Czech play *Protest* by Václav Havel (1992) and its English translation by Věra Blackwell (1990) were used. Their prosodic transcription is based on the spoken versions of the play as broadcast on Czech radio and BBC radio. The speakers in each version are two male middle-aged actors. The analysis covers the first half of the play, consisting of 505 intonation units (2014 words) in the Czech version and 540 intonation units (2562 words) in the English version. The non-scripted texts are one non-surreptitiously recorded dialogue (dialogue JP122) from the Corpus of Spoken Czech (a sub-corpus of the Czech National Corpus compiled at Charles University), and one surreptitiously recorded dialogue (dialogue S.1.6.) from the London-Lund Corpus (the computerized version of *A Corpus of English Conversation*, Svartvik, J. Quirk, R., 1980). The two dialogues share important characteristics: the speakers in each dialogue are a male and a female academic and the topic of conversation is related to university study. Of the non-scripted dialogues, 521 intonation units have been analyzed in each language (2216 words in Czech and

2188 words in English). The individual versions of the examined texts are referred to as *Protest-Cz*, *Protest-En*, *Dialogue-Cz*, and *Dialogue-En*.

The prosodic transcription of *Protest-Cz*, *Protest-En*, *Dialogue-Cz* was carried out by one transcriber (the author of this paper), aided by two consultants. The recordings of the texts were digitalized and then processed by the Cool Edit Pro software. The focus of the prosodic analysis was the segmentation of the texts into intonation units and the location of the nucleus as the most prominent accent in an intonation unit.[3] The material from the London-Lund Corpus contains a more detailed prosodic transcription provided by the publisher.

3 Analysis

The focus of the present analysis is the distribution of different types of nuclei over language units and the relation between the pitch direction of the nucleus and the communicative type of the sentence in which the nucleus occurs. Of the basic communicative types of sentences, i.e. the declarative, interrogative, imperative and exclamatory sentences (cf. Dušková 1988: 309), this study focuses only on the declarative and interrogative sentences; the examined texts do not contain enough instances of the other sentence types. The occurrence of nuclei in declarative and interrogative sentences will be dealt with in sections 3.1 (declarative sentences), 3.2 (yes-no questions), and 3.3 (wh-questions). Table 1 below indicates the overall frequency of nuclei in the examined texts without respect to sentence types. The table covers the occurrence of nuclei in both terminal and non-terminal intonation units, i.e. units closing the sentence and units occurring before the closing unit (as illustrated by examples [1]–[2] in sections 3.1–3.3).

Table 1 Distribution of different types of nuclei

Nucleus Pitch	Protest-Cz		Protest-En		Dialogue-Cz		Dialogue-En	
Direction	Occ.	%	Occ.	%	Occ.	%	Occ.	%
\	284	56.2	361	66.9	199	38.2	322	61.8
/	121	24.0	84	15.6	165	31.7	61	11.7
V	7	1.4	44	8.1	21	4.0	85	16.3
Λ	45	8.9	21	3.9	66	12.7	40	7.7
=	48	9.5	30	5.6	70	13.4	13	2.5
Total	505	100	540	100	521	100	521	100

The most frequent type of nucleus in all four texts is fall (38.2–66.9 percent), followed by rise (11.7–31.7 percent). The other types of nuclei each represent in the individual texts less than 10 percent of all cases with the exception of fall-rise in *Dialogue-En* (16.3 percent), rise-fall in *Dialogue-Cz* (12.7 percent) and level in the same text (13.4 percent). The comparison of the English texts (*Pro-*

test-En and *Dialogue-En*) with the Czech texts (*Protest-Cz* and *Dialogue-Cz)* in regard to the representation of falls and rises suggests that in English, falls are at least four times more frequent than rises (their ratio is 4:1 in *Protest-En* and 5.25:1 in *Dialogue-En*), while in Czech the percentages of falls and rises are more even (their ratio is 2.3:1 in *Protest-Cz* and 1.2:1 in *Dialogue-Cz*). The occurrence of rises in the English texts is comparable to the occurrence of the fall-rises, rise-falls and levels while in Czech, rises form a much larger group than these other types of nuclei.

3.1 Declarative sentences

Declarative sentences are generally the most frequent sentence type. Tables 2 and 3 indicate the distribution of different nuclei within terminal and non-terminal intonation units of declarative sentences in the examined text, as illustrated in examples [1] and [2] below. Intonation units 309, 310, 028, and 031 are examples of non-terminal declarative units; 311, 029, 032, 383, and 384 are terminal declarative units.

Example 1 *Protest-Cz*

309 S: jo °nedávno jsme /ČETLI#
        oh   recently we have READ
310 S: s /ŽENOU#
        me and my WIFE
311 S: °to . °to z toho \PIVOVARU#
        the the (play) about the BREWERY

Example 2 *Dialogue-En*

028 A: ^sure !he'd H/ELP you#
029 A: if you ^got ST\UCK#
030 B: (- - laughs) -
031 A: ^I !I "^I've been a :{fr\iend of} :{M\alcolm's} :M\OTHER#
032 A: for "^D\ONKEY'S *'years#*

383 A: [?@] ^I'm . "!too 'much con:cerned with :W\ORDS# - .
384 A: ^I'm !weak on AES:TH\ETIC as he p/uts it#

Table 2 Nuclei in declarative sentences: terminal intonation units

Nucleus Pitch	Protest-Cz		Protest-En		Dialogue-Cz		Dialogue-En	
Direction	Occ.	%	Occ.	%	Occ.	%	Occ.	%
\	201	84.5	213 (-15)	83.2	140 (-3)	64.2	172 (-20)	68.5
/	7	2.9	16	6.2	14	6.4	19	7.6
V	0	0	11	4.3	13	6.0	32	12.7
∧	25	10.5	14	5.5	41	18.8	23	9.2
=	5	2.1	2	0.8	10	4.6	5	2.0
Total	238	100	256	100	218	100	251	100

Table 3 Nuclei in declarative sentences: non-terminal intonation units

Pitch	Protest-Cz		Protest-En		Dialogue-Cz		Dialogue-En	
Direction	Occ.	%	Occ.	%	Occ.	%	Occ.	%
\	53	28.0	108 (-9)	51.2	36 (-3)	15.6	136 (-23)	56.2
/	78	41.3	44	20.9	125	54.1	32	13.2
V	7	3.7	26	12.3	8	3.5	50	20.7
∧	13	6.9	7	3.3	13	5.6	16	6.6
=	38	20.1	26	12.3	49	21.2	8	3.3
Total	189	100	211	100	231	100	242	100

A clear majority (64.2–84.5) of terminal intonation units of declarative sentences in all four texts contain a falling nuclear accent. The remaining types of nuclei each represent less than 10 percent of all cases with the exception of fall-rises in *Dialogue-En* (12.75 percent), rise-falls in *Protest-Cz* (10.5 percent) and rise-falls in *Dialogue-Cz* (18.8 percent). The comparison of the occurrences of falls in the individual texts indicates a very close correspondence between the Czech and the English scripted texts (84.5 percent and 83.2 percent) and between the Czech and the English non-scripted texts (64.2 percent and 68.5 percent) and it suggests that in both languages, falls have perhaps a slightly less dominating role in non-scripted texts (64.2–68.5 percent) than in scripted texts (84.5–83.2 percent). The distribution of nuclei in non-terminal intonation units of declarative sentences points to certain differences between Czech and English. In the Czech texts, the most frequent type of nucleus is rise (41.3–54.1 percent); other relatively frequent types of nuclei are fall (15.6–28.0 percent) and level (20.1–21.2 percent). In the English texts, the most frequent nucleus type is–like in terminal intonation units–fall (51.2–56.2 percent). Other nuclei display much lower ratios; still relatively frequent are rise (13.3–20.9 percent), fall-rise (12.3–20.7 percent), and level in *Protest-En* (12.3 percent).

Some of the falls and rise-falls in the examined declarative sentences are followed by a rise in pitch carried by a language unit of low communicative impor-

tance. An example of such unit is found in intonation unit 384 (see example [2] above 'puts' in 'as he puts it'). The number of instances of this kind is indicated in parentheses in Table 2 and Table 3. The final rise is interpreted either as a nuclear 'low rise after a fall,' which has a lesser prosodic prominence than the fall (one of the modifications of 'a single nucleus intonation unit' described by Firbas (1972: 86, 1980: 130 and 1985: 19) or Cruttenden (1986: 48)) or as a non-nuclear rise in pitch. Since the final rise in pitch changes the final contour of the intonation unit, data from Tables 2 and 3 have been adapted to a simpler survey of final pitch movement, presented in Figures 1 and 2 in section 3.4. The tables give the overall frequency of final falling pitch (falls and rise-falls not followed by rises) and final rising pitch (rises and fall-rises, and instances of 'low rise after a fall').

3.2 Yes-no questions

In standard conversation, interrogative sentences are much less frequent than declarative sentences. The ratio of yes-no questions in the examined texts is relatively low (especially in *Dialogue-En*), and the results of their prosodic analysis are therefore of limited reliability. Non-terminal intonation units of yes-no questions have been excluded from the statistics completely because the number of their occurrence is negligible. Below are examples of the accentuation of terminal yes-no question intonation units. The results of the prosodic analysis are given in Table 4 below.

Example 3 *Dialogue-Cz*

175 A: ona je z °pedagogickýho ΛÚSTAVU#
     she ↔ is from the teacher-training INSTITUTE

055 A: a °nosíš si svůj /PŘÍBOR#
     and do you bring your own CUTLERY

Example 4 *Protest-En*

033 S: °did you have °trouble /FINDING it#

012 S: @ have you °got MAG\NOLIAS in your °/garden#

Table 4 Nuclei in yes-no questions: terminal intonation units

Nucleus Pitch	Protest-Cz		Protest-En		Dialogue-Cz		Dialogue-En	
Direction	Occ.	%	Occ.	%	Occ.	%	Occ.	%
\	5 (-1)	12.5	14 (-6)	35.9	5	22.7	5 (-2)	45.4
/	30	75.0	20	51.3	9	40.9	4	36.4
V	0	0.0	5	12.8	0	0.0	1	9.1
∧	5	12.5	0	0.0	8 (-1)	36.4	1	9.1
=	0	0.0	0	0.0	0	0.0	0	0.0
Total	40	100.0	39	100.0	22	100.0	11	100.0

Table 4 indicates the distribution of the five nucleus types within the yes-no questions in the examined texts. Rises are significantly more frequent and falls significantly less frequent compared to terminal declarative sentences (cf. Table 2). In all four texts, except *Dialogue-En*, rises (36.4–75.0 percent) are more frequent than falls (12.5–45.4 percent). *Dialogue-Cz* contains a very high percentage of rise-falls (36.4 percent; cf. unit 175 in example [3]). The ratios of fall-rises and rise-falls are otherwise relatively low (0.0–12.8 percent). Like with declarative sentences, some of the falls and rise-falls within the examined questions are followed by a rise in pitch carried by a language unit of low communicative importance. An example of such unit is found in intonation unit 012 (see example [4] above 'in your garden'). The number of instances of this kind is indicated in parentheses in Table 4. Data from Table 4 have been adapted to a simpler survey of final pitch movement, presented in Figure 3 in section 3.4.

3.3 Wh-questions

The number of wh-questions in the material is even lower than the number of yes-no questions. The results of the analysis of terminal wh-question intonation units are presented in Table 5 below. Non-terminal units have not been included in the statistics because of a very low number of occurrences. Examples of wh-question accentuation are given below.

Example 5 *Protest-En*

037 S: °when °when did we last \SEE each other °/actually#
038 V: I °don't ∧KNOW#
039 S: °wasn't it at your °last \PREMIERE#

Example 6 *Protest-Cz*

037 S: °kdy jsme se °vlastně °viděli \NAPOSLED#
       when did we each other actually see   LAST

038 V: já \NEVÍM#
       I   don't KNOW

039 S: °nebylo to . @ °na vaší °poslední /PREMIÉŘE#
       was not it   at   your   last   PREMIERE

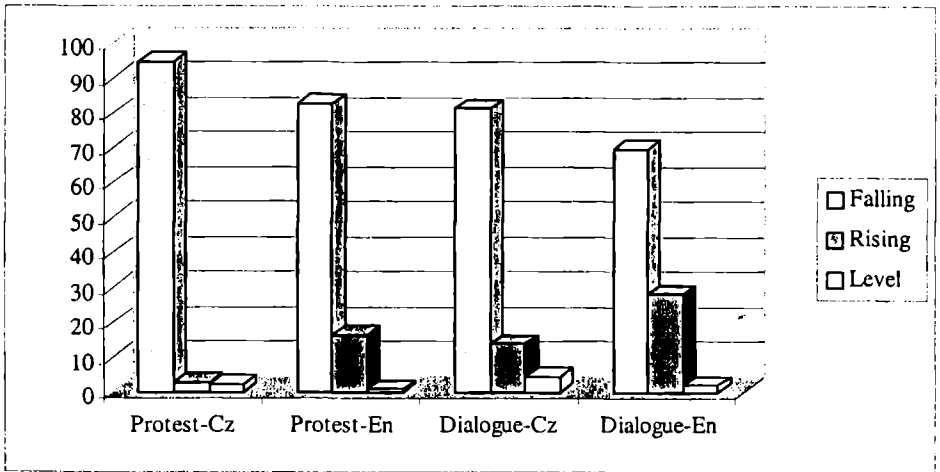**Table 5** Nuclei in wh-questions: terminal intonation units

Nucleus Pitch	Protest-Cz		Protest-En		Dialogue-Cz		Dialogue-En	
Direction	Occ.	%	Occ.	%	Occ.	%	Occ.	%
\	19	76.0	20 (-1)	87.0	8	61.5	7	87.5
/	4	16.0	3	13.0	3	23.1	1	12.5
V	0	0.0	0	0.0	0	0.0	0	0.0
∧	2	8.0	0	0.0	2	15.4	0	0.0
=	0	0.0	0	0.0	0	0.0	0	0.0
Total	25	100.0	23	100.0	13	100.0	8	100.0

Table 5 indicates the distribution of all five types of nuclei within terminal wh-question intonation units. The dominant pitch direction in wh-questions, unlike in yes-no questions, is the falling tone. Falls are clearly the most frequent types of nuclei in all four texts (61.5–87.5 percent). The percentages of rises and rise-falls are relatively low (15.4–23.1 percent). The material contains no fall-rises, no level tones and only one instance of 'low rise after a fall' (in *Protest*-En) within the wh-questions. For a survey of final pitch movement within wh-questions, see Figure 4 in section 3.4.
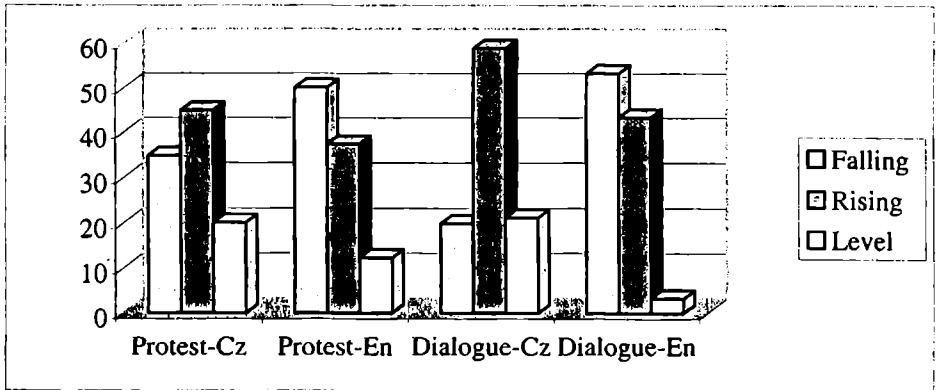
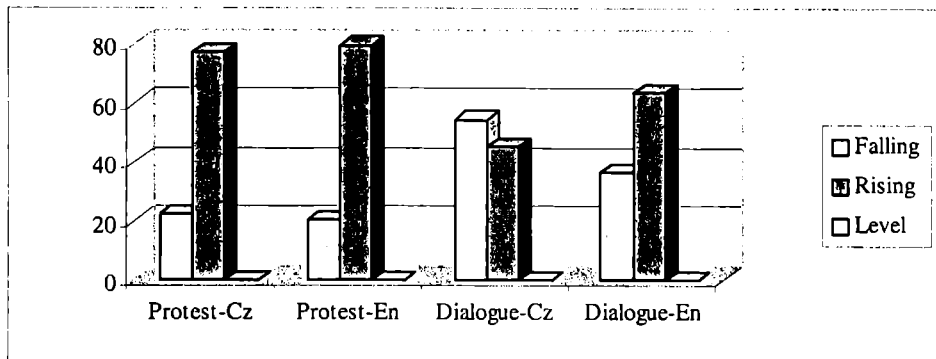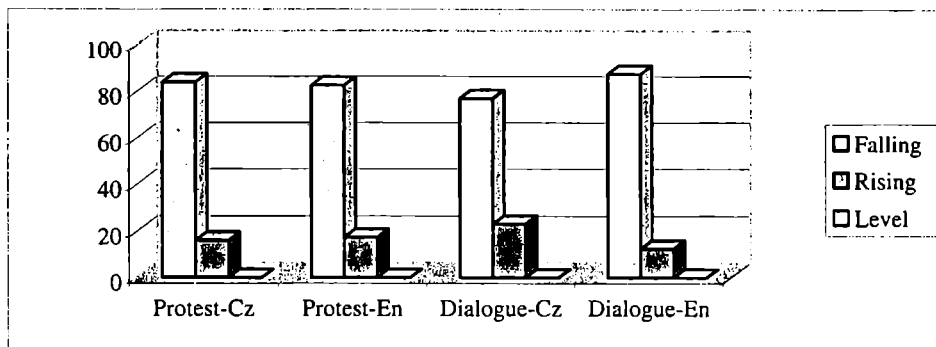## 3.4 Final pitch movement within an intonation unit

Figures 1–4 below indicate the final pitch movement within different intonation unit types in the examined texts. They contain data adapted from Tables 2–5. Falling pitch covers the occurrence of fall and rise-fall, rising pitch includes rise, fall-rise and 'low rise after a fall.'

Figure 1 Final pitch movement in declarative sentences: terminal intonation units

Figure 2 Final pitch movement in declarative sentences: non-terminal intonation units

Figure 3 Final pitch movement in yes-no questions: terminal intonation units

Figure 4 Final pitch movement in wh-questions: terminal intonation units

The survey of final pitch movements provided by Figures 1–4 suggests the following tendencies in accentuation in English and Czech spoken texts: The prevailing final pitch direction in terminal intonation units of declarative sentences in both English and Czech texts is the falling direction (69.7–95.0 percent); rising tones and especially level tones are much less frequent (2.9–28.3 percent and 2.1–4.6 percent). The analysis of non-terminal intonation units, on the other hand, reveals certain differences between English and Czech. Czech non-terminal units contain more often a rising pitch (45.4 percent and 58.9 percent) than a falling pitch (34.0 percent and 19.9 percent) while in English, this ratio is reversed, i.e. the falling pitch is more frequent (50.0 percent and 53.3 percent) than the rising pitch (43.3 percent and 45.0 percent). Level tones are more frequent in Czech (20.1 percent and 21.2 percent) than in English (3.3 percent and 12.3 percent). The prevailing final pitch of yes-no questions in the two English texts and the scripted Czech text (Protest-Cz) is rising (63.6–79.5 percent); the Czech non-scripted text (Dialogue-Cz) has a higher ratio of falling tones (54.5 percent) than rising tones (45.5 percent). This is mainly due to the relatively high

proportion of rise-falls that seem to be quite frequent in natural non-scripted spoken Czech conversation and may also be speaker-specific. Wh-questions in both English and Czech texts most often contain a falling pitch (76.9–87.5 percent); rising pitch is much less frequent (12.5–23.1 percent). Terminal units of yes-no questions and wh-questions in the present material do not contain any level tones. Owing to the low occurrence of interrogative sentences in the examined material, the validity of conclusions concerning the accentuation of questions is limited. Analysis of a larger sample is necessary to verify the present findings.

Notes

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[1] Some authors recognize intonation units containing no peak (e.g. Chafe 1994: 58) or two prosodic peaks (e.g. Chafe 1994: 58, Palková 1994: 290, 305).

[2] Deviations from this pattern are described in Firbas 1972: 86, 1980: 130, 1985: 19, and Cruttenden 1986: 48.

[3] Less prominent accents were noted as well, but only one type, i.e. the low rise after a fall, is discussed in this paper.

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