

Rhythmic Arrangement of English Academic Discourse (in comparison with Armenian)

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Abstract

The article addresses the problem of the rhythmic arrangement of academic discourse and its main units. It is the result of computer-based acoustic investigation of English rhythm (in comparison with Armenian). The contrastive analysis of the rhythmic units helps to reveal the regularities that pass unnoticed in monolingual studies. Basing on the scalar approach to the rhythm, the study defines rhythm as an output of all the gradients participating in its formation with the special accent on grouping and prominence. It is an attempt in modelling the rhythmic organisation of academic prose in English (Armenian) by giving its acoustic profile.

Key words: RS (rhythmic structure), intonation group, accentual-syllabic structure, acoustic modelling, prosodic wrapping, dynamic energy, temporal patterning.

Introduction

The main objective of the study is the prosodic patterning of the main rhythmic units in English academic discourse (in comparison with Armenian). The regular rhythmic arrangement of the academic text, conditioned by its cognitive function, aims at a more transparent transmission of complicated content and intensifies the organizing function of rhythm in speech communication making the study of rhythmicity an important point in the analysis of the phonetic structure of the text.

Speech rhythm has often been studied cross-linguistically to indicate universal and specific differences of the language. As opposed to earlier cross-linguistic studies of rhythm focused on rhythmically similar languages, recent studies consider languages with minimal degree of linguistic affinity. The scalar model of rhythm may serve an example (Grabe 2011). At the same time the scalar models replaced the rigid rhythmic dichotomy by a gradient scale which more precisely indicated the rhythmic tendency of a language and its extent by an index. On the other hand, it attracted a whole array of phonetic and phonological parameters into the study of rhythm. The gradient model of rhythm based on Rhythmic Structure (RS) proved its efficiency on a number of languages (Potapov 2004; Potapova, Potapov 2012; Zlatoustova 1999). The universal character of RS was attested its leading role in psycholinguistic experiments on

sequential memorization (Gilbert 2011). The cognitive base of RS is correlated with its objectively occurring recursive accentual pattern. Due to its universal character RS is employed in typological studies of languages with fixed and free types of stress and polar rhythmic tendencies with the purpose of disclosing the universal and language-specific rhythmic features. The accentual and cognitive base of RS is combined with the semantic one, which determines the unification of nucleus with enclosing clitics. In this sense RS correlates with the terms phonetic/phonological word and differs from the terms foot, tact, clitic/prosodic group, interstress interval, distinguished on a formal basis. The core of RS is the accented syllable encompassing the clitics, their patterns conditioning the temporal, melodic and dynamic characteristics of RS.

Method

The study included auditory-acoustic computer-based analysis with the elements of synthesis of the rhythmic units under study. At the first stage of auditory analysis synthesized RS patterns were suggested for identification to two groups of auditors (professional and non-professional). As a result of auditory analysis of synthesized RS patterns the objectiveness of RS as a minimal unit was proved. Delexicalized reiterate (two-, three-, four- and five-syllabic) stimuli /ba/ were generated. The duration of the stimuli was supplemented with f_0 and intensity values. The algorithm of distribution of prosodic parameters was worked out with the special focus on the prosodic contrast of the elements constituting RS. The generated rhythmic structure samples were presented for identification as regards the language they were encoded in. The prosodic wrappings were supposed to serve sufficient clues to define the significance of RS in language recognition. The quantity of correctly identified stimuli in professional group (82%) slightly exceeded those in non-professional group (70%).

At the next stage of auditory analysis relevant authentic English texts were segmented into rhythmic structures, grouped according to their metrical composition and viewed as to their position in larger units. The same procedure was applied for the study of the Armenian rhythm.

This stage aimed at revealing the acoustic composition of rhythmic structures in terms of fundamental frequency, intensity and duration. The received measurements on English and Armenian were further compared with the view of disclosing general and language-specific characteristics. In this way methods of acoustic and auditory analysis were coupled with those of comparison and observation.

The corpus of the study contained 820 intonation groups selected from authentic English academic prose and read by seven native speakers of Standard English. The analysed texts were related to ethnography, psychology, linguistics, architecture, music, geology, etc.

The same number of intonation groups from Armenian academic prose were read by native Armenian speakers (Literary Eastern Armenian) and further considered by the same scheme of parametric analysis.

The raw acoustic data were analyzed in relative values. The insignificant intralanguage dispersion allowed to generalise the results and reveal the basic rhythmic tendencies of the languages under study.

Results and Analysis

Basic RS types, their syllabic-accentual composition and frequency

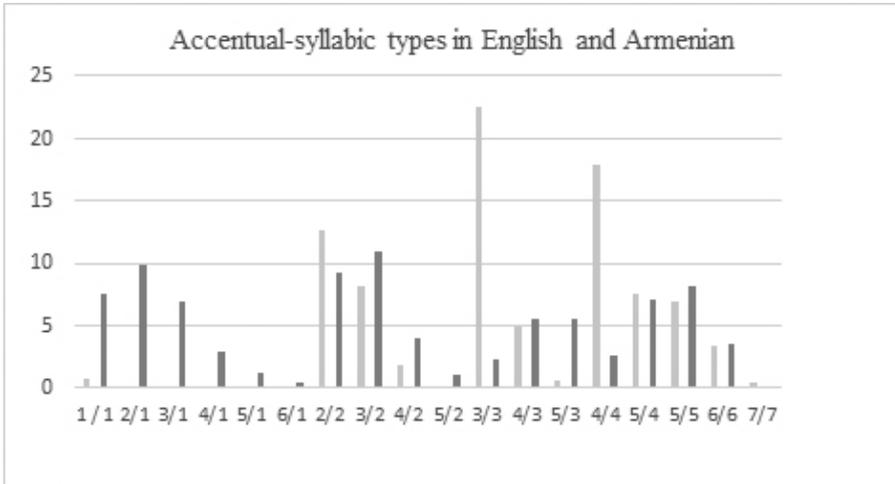
English intonation unit is generally formed by 2 RS (6.6 syl.) (44%), less frequently by 3 RS (9 syl.) (26%), 1 RS (4 syl.) (24%) and 4 RS (13 syl.) (6%). Armenian is primarily expressed by 2 RS (7.4 syl.) and 3 RS (10.3 syl.) intonation units (77%), less frequently by more extensive 4 RS (13 syl) and 5 RS (14-20 syl.) intonation units (12%) and intonation units with 1 RS (4 syl.) (12%). Therefore, in English the number of RS in an intonation unit and the number of syllables in RS is more limited as compared with Armenian. The average intonation unit length is 4-9 syl. in English, average Armenian intonation unit length is 5-12 syl.

The summary chart of the basic RS types shows the basic tendencies of metric constituency of an English RS in comparison with that in ELA.

Table 1: Rhythmic Structures in English and Armenian

Type of RS	1/1	2/1	3/1	4/1	5/1	6/1	2/2	3/2	4/2	5/2	3/3	4/3	5/3	4/4	5/4	5/5	6/6	7/7
in ELA	0.7	2	1	0	0	0	12.6	8.2	1.9	0	22.6	4.9	0.6	18	7.5	7	3.3	0.4
Type of RS	1/1	2/1	3/1	4/1	5/1	6/1	2/2	3/2	4/2	5/2	3/3	4/3	5/3	4/4	5/4	5/5	6/6	
in SE%	7.5	9.8	7	2.9	1.2	0.5	9.3	10.9	4	1	2.3	5.5	5.5	2.6	7.1	8.2	3.5	

Diagram 1



(English - marked in black, Armenian - marked in gray)

The initial RS in English intonation unit are constituted by 2 or 3 syllables with the incidence of the stress on the second syllable, n-syllable RS – on the third syllable, intonation units beginning with the initial stress being rare constituting only 9-13%. Final RSs of the intonation unit include 1/1, 2/1 and 3/2 structures. Thus, the metric scheme may be depicted as 3/2, 2/2, n/3... n/n3/2, 1/1, 2/1.

The metrical scheme of Armenian intonation unit is more homogeneously expressed by two-, three-, and four-syllabic intonation units with an ultimate stress on the initial and medial positions. In the final position it is characterized by 3- and 2-syllable RS, resulting in the following structure: 3/3, 2/2, 4/43/3, 2/2, 4/43/3, 2/2.

The distribution of the types of RS in the intonation unit reveals that the final RS exhibits a tendency to RS with a limited number of syllables in both languages under study. In English it is also characterized by a tendency to encliticism. Therefore, it can be concluded that English is expressed by 1 to 5-syllable RS, while Armenian – by 2 to 6 syllable RS.

%	2-syllable	3-syllable	4-syllable
English	19	30	13
Armenian	15	31	25

The accentual structure of RS in both languages is expressed by rising, falling and mixed structures.

English displays preference towards enclitic (34%) and mixed (28%) RS and it is minimally expressed by proclitic RS (7%) forming the following chart.

Main RS in English	X (8%)	xX (9%)	Xx (10%)	xXx (11%)	Xxx (7%)	xxX (5.3%)	xxXx (6%)	xxXXX (6%)	xxxxX (8%)
Peripheral RS in English	xxxX (3%)	xxX (2%)	Xxxx (3%)	xXxx (4%)	xXxxx (1%)	xxxxxX (3.5%)			

Armenian structures tend to proclitic arrangement (64%) and mixed (18%) RS.

Main RS in Armenian	xX (13%)	xxX (23%)	xXx (8%)	xxxX (18%)	xxxXx (8%)	xxxxX (7%)
Peripheral RS in Armenian	Xx(2%)	xxXx (5%)	xXxx (2%)	xxxxxX (3%)		

Rhythmic structures common to two languages to a different extent:

RS common to both languages	Xx	xX	xxX	xXx	xxxX	xxxXx	xxxxX	xxXx
RS common to English	X	Xxx	Xxxx	xxXxx	xXxxx			
RS common to Armenian	xxxxx X							

This may be illustrated by polysyllabic 3/3 and 4/4 structures in Armenian, which approximately 6-10 times outdo the English analogues.

The rhythmical differences of languages and their rhythmic arrangement arise from rhythmic-dynamic stereotypes of the phonetic structure of a given language, set in its articulatory basis. They depend on the number and position of stresses. There are 11 basic accentual structures and 34 accentual-syllabic realizations in English (Komyagina 2011) that allow a certain degree of variability particularly as regards four-, five and six-syllable types. English basic accentual types include /'-/, /'-'-/, /'--', /'-'-', /'-'-'-/, /'-'-'-', /'-'-'-'-/, /'-'-'-'-', /'-'-'-'-', /'-'-'-'-'. According to the existing data (Abramyan 1978), Armenian has 3 basic accentual types: /'-/, /'-'-', /'-'-'-'. The basic types of accentual structures in Armenian were also received on the basis of words taken from fairy tales (Tokhmakhyan 2009).

The experimental base selected for the study of English academic prose showed the following patterns of distribution of primary and secondary stresses in the Armenian academic prose:

- a. 2/2, 3/3, 4/4 (/'-'-', /--'-', /---'-') with the stress on the ultimate syllable,
- b. 2/1, 3/2, 4/3, 5/4 (/'-'-', /'---', /'---', /'---'-') with the incidence on the penultimate syllable
- c. 3/1, 4/2 types (/'----', /'----') with the incidence on the anti-penultimate,
- d. 4/1, 4, 6/1, 5, 6/2, 5, 5/1, 4, 5/1, 5 (/'----', /'----', /'----'-')

The seven and eight syllable structures with two secondary stresses were also registered in the corpus of the study, the latter being of rare occurrence (7/1, 4, 7; 7/3, 6; 7/1, 4, 6; 8/2, 4, 7).

According to the received data, the high-frequency accentual types in the academic prose were 5/ 3, 5, 5/ 1, 3, 5/ 2s, 4, 5/1, 4, 6/ 2, 4, 6/ 1, 3s, 5, 6/ 1, 5, 6/ 1s, 4 . In compound RS consisting of two or more morphological items in Armenian academic prose, each of the constituents receives a certain degree of stress. This may result in accentual options but the latter do not belong to high frequency types:

- 3/1, 3s, 3/1s, 3, 3/ 2s, 3
- 4/1, 3s, 4/1s, 3, 4/2, 3s, 4/2s, 4, 4/2, 4s,
- 5/1, 4s, 5/2s, 4, 5/3s, 5,
- 6/1, 4s, 6/2, 4s, 6/2, 5s (s – secondary prominence).

This correlates with the findings described by Tokhmakhian (1987, 2009) in the study of the accentual structure of Armenian words.

Prosodic Structure of Intonation Unit and RS Duration

The vocalic percentage in the texts studied is 40, 1% as opposed to 59.9% of intervocalic percentage that reflects strong quantitative compression and prevalence of heavy syllable types added other phonological parameters that determine a stress-timed tendency in English, while in Armenian it is 43% and 57% correspondingly. The ratio of vocalic/intervocalic elements in English and Armenian is an indicator of different phonological tendencies in the mechanism of rhythm-formation in two languages studied.

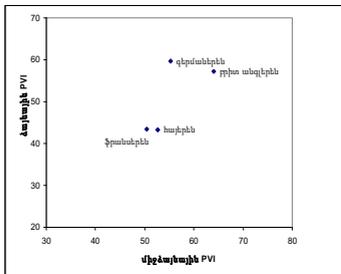


Chart1: Pairwise variability indices Armenian and of English, Armenian, German and French

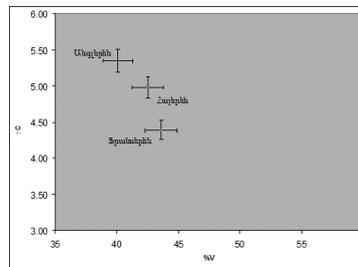


Chart2: Durational profiles for English, French

The average length of an English syntagm in academic prose varies between 0.7-1.8s (80%), its maximal range - 2,3s, minimal range - 0.3s. The length of the syntagm is directly proportional to the number of syllables it contains, since every syllable adds about 0.1-0.2s to the duration of the syntagm.

Table 2: Syllabic and Temporal Length of RS

Syl. structure of Eng.syntagm /70%/	Temporal structure of Eng.syntagm	Syl. structure of Arm.syntagm	Temporal structure of Arm.syntagm
4-syl	0,8		
5-syl	1,	5-syl.	0,9
6-syl	1,1	6-syl	1,1
7-syl	1,2	7-syl	1,3
8-syl	1,4	8-syl	1,5
9-syl	1,5	9-syl	1,6
		10- syl	1,8
		11- syl	2
		12- syl	2.1

As it is seen from the chart, the temporal and syllabic length of most frequent intonation units is 1s (5 syl) and 1,1s (6 syl). The linear temporal growth of intonation units with different syllabic composition, the scale of quantitative fluctuations point to a more compact grouping in case of polysyllabic structures. In contrast, the temporal regularity is not observed in Armenian academic prose.

The temporal contrast of stressed and unstressed syllables in the initial segment in Armenian, both with a marked or unmarked melodic peak, is expressed very slightly or is even absent. The stressed syllable exceeds the unstressed in a limited number of cases.

Armenian intonation units perceptibly exceed its English counterpart in the quantity of syllables and in the linearity and ratio of growth: every syllable often adds 0.2sec to the length of intonation unit on average. Its average duration is 0,9 to 2,1sec, 5-12 syl. (77%), the most frequent types being 1.3sec in a 7-syl. intonation unit and 1.6sec. in a 9-syl. intonation unit. The minimal length of intonation units is 0.5-0.9sec /1-4 syl./ (9-10%), maximal length - 2.2 - 3.1sec. /13-22 syl./ (13-17%).

Table 3. Relative Duration of Stressed and Adjacent Unstressed Syllables in RS

Armenian frequent metrics	RS duration pattern in Armenian	English frequent metrics	RS duration pattern in English
Xx	1,4-1,1	Xx	1,2-1,6
xX	1,1-1,2	xX	0,9-1,7
xxX	1,0-1,0-1,1	xxX	0,8-0,7-1,6
xXx	1,2-0,9-1,0	xXx	0,8-1,0-1,1
xxxX	1,0-0,9-1,0-1,1		
xxXx	1,0-1,1-0,9-0,9	Xxx	1,0-0,9-1,0
		xxXx	0,8-0,7-0,9-1,2
		xXxx	1,0-1,0-0,5-0,8
xxxxX	0,9-0,9-0,9-0,8-1,1		
		xxXxx	0,9-0,8-0,9-0,6-1,1
xxxXx	1-0,9-0,9-1-1		
xxxxXx	0,8-1,0-0,7-1,0-0,8-0,7		

Table 4: Relative Duration of Frequent RS Types

Number of syllables in RS	Duration of RS in English	Duration of RS in Armenian
1	0.4	0.2-0.3
2	0.5	0.4
3	0.5-0.6	0.5
4	0.6-0.7	0.7
5	0.8-0.9	0.8
6	-	0.9

Table 5: Relative Duration of RS According to Their Accentual-Syllabic Constituency

RS of high frequency in Armenian	X	Xx	xX	xxX	xXx		xxxX	xxXx		xxxxX	xxxXx	xxxxXx	xxxXx
Relative duration	0,4	0,7	0,7	0,9	0,9		1,1	1,1		1,3	1,4	1,5	1,4
RS of high frequency in English	X	Xx	xX	xxX	xXx	Xxx		xxXx	xXxx		xxXxx	xxxxXx	
Relative duration	0,5	0,8	0,8	0,9	0,9	0,9		1,1	1,0		1,3	1,4	

Every unstressed syllable adds 0.7-0.9 relative points to the duration of RS in English on average, 0.9-1 in Armenian, in polysyllabic structures - 0.5-0.8 in English

and 0.7-0.9 in Armenian. Compactness and non-linearity of English RS is shaped by compression in the unstressed syllable and final lengthening. In English the contrast between accented and unaccented syllables equals 0.3-0.8 relative points in the final position (0.1-0.3 points in Armenian), since final lengthening adds 0,01-0,03 to the total duration of English intonation unit. In non-final position, this contrast decreases to 0.3-0.5 in English (0-0.3 in Armenian). Thus, English is characterized by a stronger contrast between stressed and unstressed syllables and a higher degree of compression of unstressed syllables that becomes more pronounced in polysyllabic structures and in post-accented non-final position. In the initial position in English there is a higher incidence of temporal contrast of stressed syllable over the unstressed one as compared with the nuclear segment. In the final segment the extent of temporal contrast is significant in case a stressed syllable is located at the end of a final RS and bears final lengthening effect.

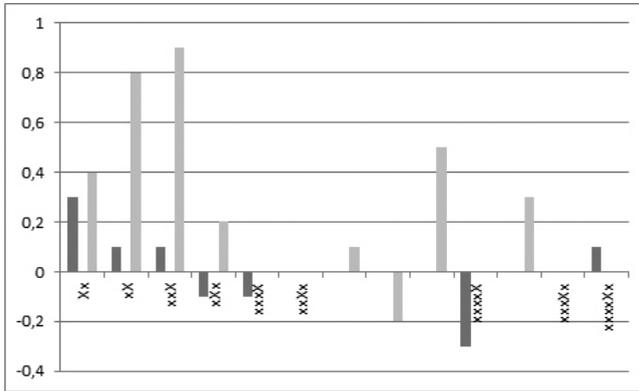
Contrastive temporal relations between accented and non-accented syllables, lengthening of mono- and bisyllabic structures, compression of polysyllabic English structures and absence of 6-syllabic structures determine the tendency to isochrony of English RS (Antipova 1984; Cummins 2008). Meanwhile, Armenian is characterized by linearity, variability and higher average length conditioned by weak syllable weight difference and low degree of compression. This is accounted for by moderate temporal marking of stressed syllables and insignificant final lengthening in Armenian. An interlanguage similarity may be observed in the similar relative duration of three- and four-syllable RS. In Armenian their duration is shaped by equal-timed, full syllables, in English – by temporal compensation between reduced vs. accentually and finally lengthened syllables.

The length of English RS varies within 0.1 and 1.2sec (90%), the average length is 0.6 (± 0.2). The most frequent RS length is 0.4-0.5, 0.3-0.4 and 0.5-0.6s. The average length of Armenian RS coincides with English, however, due to its linearity its temporal range is wider - 0.15 to 1.4s.

Intensity

The average total intensity of RS in the intonation group is characterized by a steady decrease of these parameters from the beginning of the syntagm/phrase to its end, the zone of the minimal dynamic values (for instance, RS 1 = 71db, RS2 = 69db). Maximal intensity is often concentrated at the beginning of the syntagm, minimal values – at the end, conditioned by general physiological universal characteristics of speech production. RS at the beginning and end of intonation unit/phrase is regularly marked by maximal total intensity and minimal total duration in the initial RS and minimal total intensity and maximal total duration in the final. The dynamic parameter may rise in the nuclear RS in the middle or at the end of intonation unit similar to the parameter of f_0 .

Diagram 2: Relative Temporal Contrast of Adjacent Stressed and Unstressed Syllables in the Languages under Study



(English marked in light gray, Armenian marked in black)

Table 6: Relative Intensity of RS

Armenian frequent metrics	RS intensity distribution in Armenian	English frequent metrics	RS intensity pattern in English
Xx	1,02-1,02	Xx	1,05-0,97
xX	1,01-0,99	xX	1,0-1,03
xxX	1-1-0,98	xxX	0,99-1,00-1,03
xXx	1,01-1-0,98	xXx	1,00-1,05-0,99
xxxX	1,01-1-0,99-0,98		
xxXx	1,02-1,01-0,99-0,98	Xxx	1,02-1,01-0,98
xXxx	1,05-1,01-1-0,95	xxXx	0,98-0,99-1,03-0,97
		xXxx	0,97-1,02-0,95-0,98
xxxxX	1-0,99-0,99-0,98-0,97		
		xxXxx	1,02-1,01-1,04-0,98-,99
xxxXx	1,01-1-0,97-0,99-0,97	xxxXx	1,02-1,05-1,00-1,04-0,96
xxxxXx	1-1-0,99-0,96-0,99-0,99		
xxxxxX	1,03-1-0,97-0,96-		

it equals 0,01-0,03 relative units and reflects a tendency to equal prominence of Armenian syllables and weak dynamic marking of the stressed syllable. The accented syllable may slightly exceed in intensity the unaccented syllable as opposed to English in which intensity is a constant marker of English stress, confirming the recent experimental evidence (Kochansky 2011). The received findings correlate with the data acquired by Tokhmakhyan (2009) as regards the distribution of dynamic characteristics in the isolated phrases.

The normalized average intensity diapason is 0.6-0.9 relative points, the maximal diapason – 0.8-1.1 relative points, minimal – 0.8-0.9 relative points. The diapasonal range values of the syntagm edge in English as regards its intensity is equal to 10db, the dynamic range of RS edges – 4db.

Fundamental Frequency

As it is seen, the analysis of the acoustic parameters, including f_0 , requires consideration of the positional factor, which includes the description of the initial RS, that of the medial body and the nuclear. From the discursive point of view the initial RS is highly relevant in the sense that the communicative load is realized on this segment providing the intersentential link. The nuclear segment is of equal significance since it is the carrier of the nuclear tone.

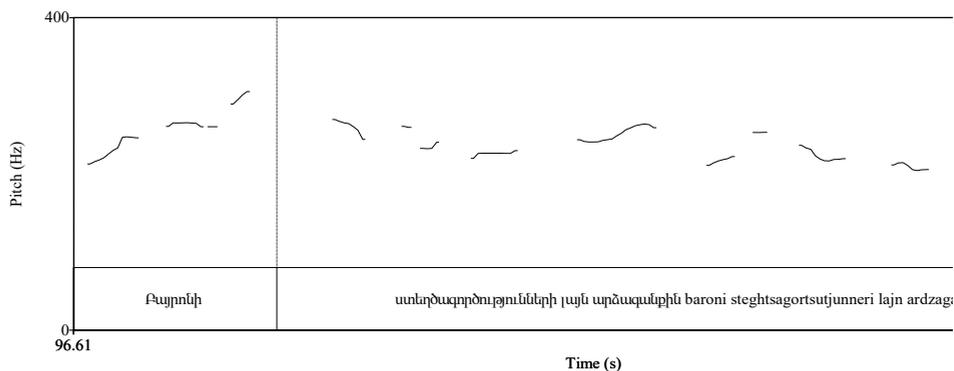
The nuclear RS in English has the greatest degree of prominence that is expressed by pitch contrast of the accented and unaccented syllables. Melodic peaks occurring within the melodic range of the initial RS in the English academic discourse are realized within 2st with the rate of 20st/ msec, exceeding similar parameters of the medial RS (1,75st). The pitch range of the final segment of non-final intonation group is 4,1st, ranging within 3-10st, with the rate of f_0 changes up to 30 (2-47 st/ msec).

The nuclear RS in non-final syntagm has the maximum degree of f_0 contrast. The pitch interval of rise is often equal to that of fall. The configuration of the parameters in the medial RS points to the fact that it bears lesser degree of prominence according to the described parameters as compared with the rightwing and leftwing RS.

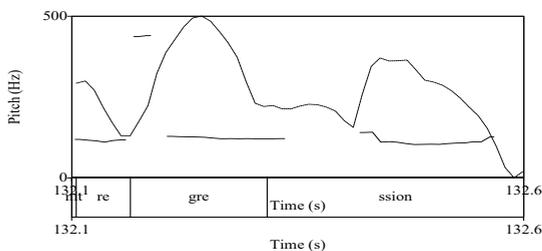
The prosodic structures of RS in Armenian have the following features. The initial RS in the majority of cases bears the maximum degree of prominence as opposed to English in which the maximum pitch values are characteristic of nuclear RS. In a number of cases the prepositive theme in Armenian is marked by a rising contour, which culminates in the melodic peak on the accented syllable, dominating over the unaccented syllable and ranging within 4.4st (1-8) with the rate of 16 st/ msec (5-24). The f_0 range of the unmarked beginning of syntagm is 1,6st, its modification rate being 9st/msec.

The initial RS is terminated by a slight rise in non-final intonation group. It may also have the rising-level movement in the melodic diapason with the f_0 rate of 9st/msec.

Picture 2: Time Course of f_0 of Intonation Group with a Marked Melodic Peak in the Initial RS



Picture 3: Time Course of f_0 and Energy (dotted) of Rhythmic Unit with xXx Metrics “regression”



The nuclear RS of non-final intonation group is marked by the lengthening of the final syllable and the widening of the melodic diapason (4st) and the f_0 , change rate up to 32st/msec.

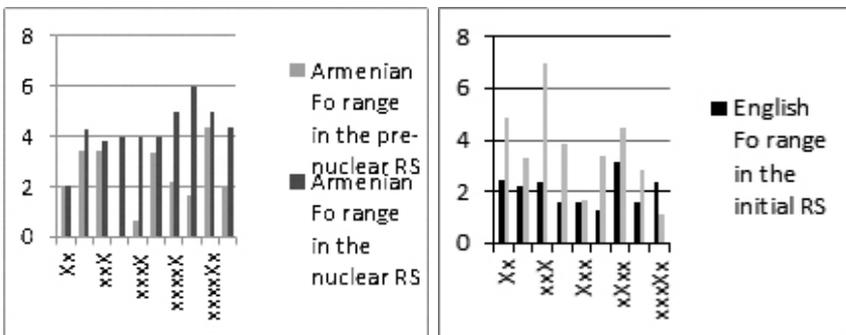
The melodic range of English intonation unit is 0 – 13st, its average range – 3-7 (± 2 –3) st, minimal range – 0-2, maximal range – 7-13st. The pitch range of Armenian intonation unit is similar to that of English (2-12, 6 on average). Average English RS range equals 2-5st, maximal range 13st, Armenian 4st.

Table 7: Relative Frequency Values of RS

Armenian frequent metrics	RS frequency pattern in Armenian	English frequent metrics	RS relative frequency distribution in English
X		X	
Xx	1.4-1.2	Xx	1.3-0.9
xX	1-1.1	xX	1-1
xxX	1-1.1-1.3	xxX	1.01-0.98-1.07
xXx	1.1-1.2-1.2	xXx	1.03-1.09-1.04
xxxX	1-1-1-1.1		
xxXx	1.01-1.02-1.17-1.14	Xxx	0.9-0.9-1
		xxXx	0.99-0.93-1.03-1.02
		xXxx	0.99-1.02-1.03-0.97
xxxxX	0.99-1.03-1.03-1.03-1.26		
		xxXxx	1-1.1-1.1-1-1
xxxXx	0.7-1-0.9-1-1.1	xxxXx	0.88-1.05-1-0.98-1
xxxxXx	1.1-1.1-1.1-1.1-1.1-1		
xxxxxX	1.05-1.02-1.02-1.03-1.02-1.17		

The melodic range of both languages varies between 1-13 semitones in English and 1-12 in Armenian.

Diagram 1: Relative f₀ Contrast of RS in Semitones in English and Armenian



The statistic analysis of the positional distribution of f_0 values reveals concentration of maximal values at the beginning of an intonation unit in both languages. After the initial melodic peak the middle and final part in Armenian exhibit gradual decrease until the end, while the middle and final contour in English may decrease or ascend.

The characteristic features of academic prose are most clearly outlined in the syntagm. These include double-peaked melodic contour, alternation of RS of high and low intensity, relatively slight temporal variation of RS in English. In Armenian a typical contour of syntagm is a wavy movement with rises of different contour and amplitude on the stressed syllables of RS.

The tonal configuration is conditioned by polysyllabic character of Armenian words, tonal structure of enclitics and melodic configurations in the pretonic, tonic and post-tonic segments. The pretonic segment often carries level or rising tone, the tonic segment – rising tone, post-tonic segment – either falling, rising or level. Intonation unit may also have a levelled-out flat contour. The acquired results on the contrastive study of the melodic contour in academic discourse correlate with the results of analysis of prosodic configuration of main melodic types of Armenian received on the isolated phrases (Bagdasarian 1987).

The prosodic distribution in an intonation unit depends on the informational structure of the text as well. The initial RS taken from the informational perspective serves as a base on which interphrasal cohesion is anchored. The main types of intersentential links determine the specific prosodic arrangement of the initial RS: linear or distant, with a lesser degree of retrievability, and conversely contact and parallel with a higher degree of retrievability.

In the studies on syntax-phonology interface, there are different stances on the role of prosodic components in shaping thematic-rhematic relations. In a number of works on academic and fictional prose the focus was on the melodic curves in actualizing thematic-rhematic relations. Autosegmental studies on this problem consider diapasonal data more relevant in conveying the informational structure of the text.

According to Calhoun, a series of production and perception experiments prove that the distinction between theme and rheme nuclear accents is relative pitch height (Calhoun 2006:77-82). Steedman affirms that when speakers of English assign prosodic accent to a word, they do so on the basis of a number of elements of discourse-semantics, of which the most important is contrast. It is surface-syntactic derivation that projects such semantic elements to the level of the intonational phrase (Steedman 2014:3-4).

In English academic style the initial rhythmical structures expressing contact linking are mostly marked by falling-rising, falling + rising, rising-falling + rising, rising + falling movements or also falling and rising movements though in a number of cases the theme may be unmarked as well. In cases of linear or distant links the initial

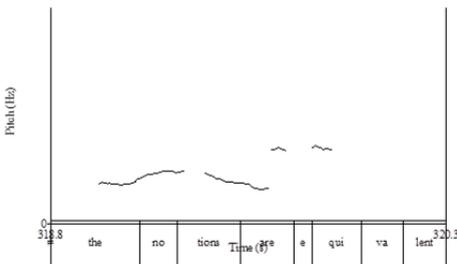
rhythmic structures are either unmarked or expressed by falling and rising-falling movements.

The discourse markers often used in the initial rhythmic structures bear tonal accents.

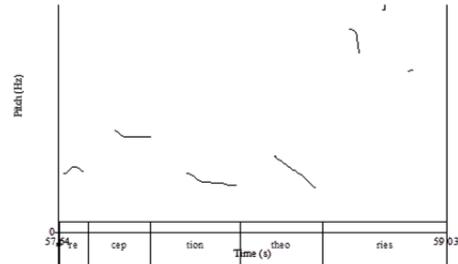
In English the melodic range of marked theme and rheme are more expressed than the range of unmarked theme. The temporal contrast between stressed and unstressed syllable of the rheme exceeds that of the contact and unmarked links. The maximal dynamic range is observed in the linear type of links, in cases of contact linking the theme proper has a less expressed dynamic values. The minimal dynamic range is observed in the thematised base or diatheme.

In Armenian the initial rhythmic structures are marked by high and low rising tones, sometimes falling and level tones, falling and unmarked tones being more typical of contact links. The linear links presenting the rheme are marked by rises. The f_0 range of theme proper and rheme surpasses the range of diatheme and unmarked theme, while temporal contrast between stressed and unstressed syllables is the same in all three types of links. The tendency to the dynamic marking of rheme is also directly proportional to the informational loading.

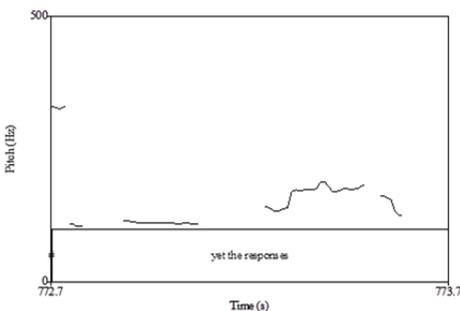
**Picture 4: Falling tone on contact link
“the notions are equivalent”**



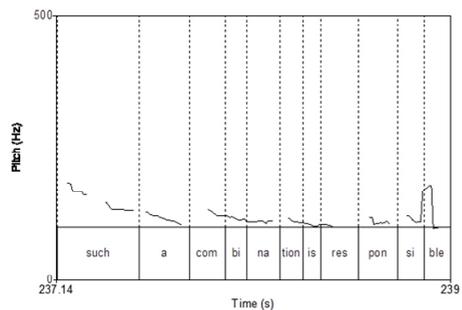
**Picture 5: Falling tone on contact link
“reception theories”**



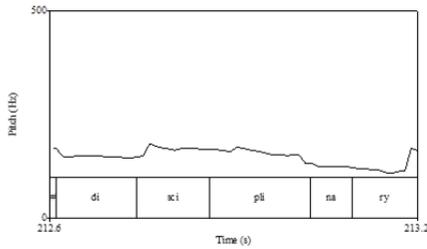
**Picture 6: Contrastive contact link marked with fall-rise
“yet the responses”**



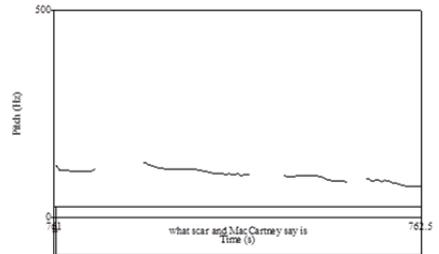
**Picture 7: Unmarked theme
“such a combination”**



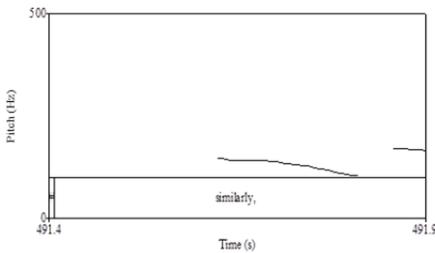
Picture 8: Falling tone on theme “disciplinary”



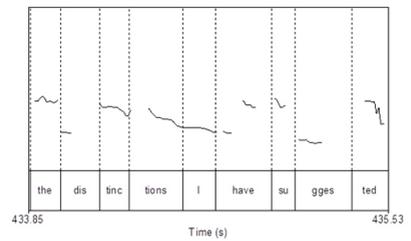
Picture 9: Level tone on contact link “What Scar and MsCatney say”



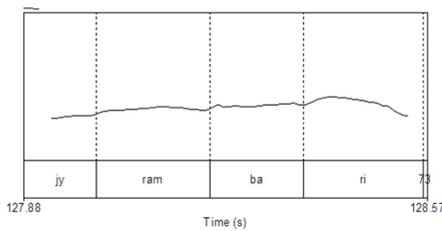
Picture 10: Falling tone on a discourse marker “similarly”



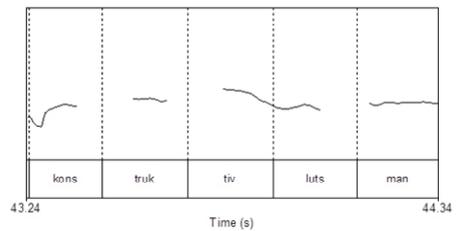
Picture 11: Rising-falling tone on contact link “the distinctions”

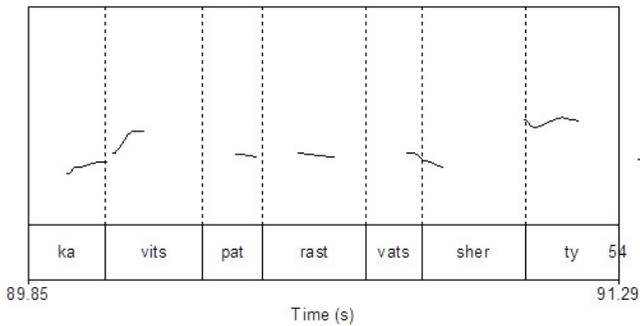


Picture 12: Rising theme “jrambari” - “of the reservoir”



Picture 13: Rising tone on rhematic base “konstruktiv lutsman”



Picture 14: Rising tone on rhyme “kavits patrastvats sherty”

Conclusion

The analysis of metric constituency, acoustic composition and prosodic-informational interface of rhythmic structuring of English academic prose in comparison with Armenian disclosed a number of specific characteristics.

The metric structure shows a tendency to variability of accentual stereotype brought forth by polysyllabic character of English words, a great number of mixed-type structures, and a greater flexibility of accentual transformations.

Basic rhythmic types are distributed evenly; peripheral types are relatively more frequent in the academic prose as compared with the fictional prose. English has 32 accentual-dynamic stereotypes with frequent occurrence of structures with primary and secondary stresses which conditions the variability of rhythmic structures.

Fixed ultimate stress limits quantity of Armenian accentual stereotypes, their variability originating due to secondary rhythmic stress or morpho-phonetic interface. This distinction is caused by polar accentual tendencies which account for a number of language-specific RS.

As regards the acoustic profiles, English rhythmic units are characterized by an expressed compression in academic prose, greater temporal contrast between stressed and unstressed syllables, final lengthening, a higher contour index. Combined with lengthening of mono- and disyllabic structures, qualitative-quantitative reduction conditions the tendency of RS to isochrony in English as compared with linearity of temporal growth of Armenian RS and syntagm.

The prominence in an English RS is invariably marked by intensity, Armenian intensity values have an optional rise on accent, maximum intensity values being attached to the beginning of RS.

As for the prosodic structures of RS the characteristics of fundamental frequency are in close correlation with the position and accentual-syllabic structure in a phrase. The analysis of f_0 points to a wider frequency span of English RS in the initial position than in Armenian unless the RS in Armenian is expressed by the prepositive theme. In the

latter case the RS may be marked by a tangible rising movement or a fall which is though a rare case. In those cases when the theme is unmarked it often starts on a medium pitch level.

The nuclear segment in English academic style is marked by a steep f_0 change in the intonation group, the medial segment bearing more moderate f_0 , and the prenuclear segment – a minimal f_0 change rate. Armenian academic style is characterized by a slight f_0 change in the medial position and by a greater f_0 change in the final segment, but it does not reach the onset pitch. English exhibits wider syntagmatic and RS range as compared with Armenian.

The information layer differently affects intersentential prosody in the languages under study. The informational structure is in complex interrelations with rhythm of the text.

1. In both languages under study the intensity values are directly proportional to the retrievability of the informational constituents, the maximal intensity values are on the rheme, the minimal ones - on the theme.

2. Melodic range is more expressed in the English distant and contact links as opposed to the unmarked theme. The distant links are marked by a greater contrast between the accented vs. unaccented syllables.

2. Distant and contact links do not differ in the direction of pitch movement in both languages, their difference being in the proportion of occurrence. English contact links are predominantly marked by falling, level and unmarked tones, distant links – by unmarked, falling, rising-falling, occasionally by rising tones. In Armenian academic texts contact links tend to rises, high rises and level tone, while distant links do not often receive level tone.

Attributive features of rhythm are interconnected with its functional characteristics. The pragmatic role of rhythm of academic rhythm is mostly implemented through pragmatic accent, distinctive temporal variations, strengthening and weakening of accent and specific structural fluctuation.

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**Անգլերենի գիտական արձակի ռիթմիկ կառուցվածքը
(հայերենի զուգադրությամբ)**

Հոդվածում դիտարկվում է անգլերենի ռիթմը ժանրային հայեցակետում: Ռիթմիկ կառույցի և շարույթի ելակետային միավորների հիման վրա վեր է հանվում դրանց վանկա-շեշտային կազմը, ակուստիկ լցունումը, իրացման հաճախականությունը, դիրքային միտումները և ձայնաշարի առանձնահատկությունները: Համակարգչային վերլուծության միջոցով վեր է լուծվում անգլերենի շեշտային և անշեշտ հատվածների պրոսոդիկ չափորոշումը և համադրվում հայերենի հետ: Հայերենի և անգլերենի ակուստիկ չափորոշման մասին է վկայում նաև ստացված արդյունքների հիման վրա սինթեզված խոսքի ընկալման փորձը: Համակարգչային մեթոդով լուսաբանվում է նաև ռիթմի և ռեմա-թեմատիկ տարբերակման պրոսոդիկ փոխալայնանավորվածությունը:

**Ритмическая организация научной прозы
в современном английском языке
(в сопоставлении с армянским)**

В статье рассматривается ритм английского языка в стилевом ракурсе в сопоставлении с армянским, в частности исследуются акцентно-силлабический строй сопоставляемых языков, их акустическое наполнение, частотность, позиционные тенденции и диапазоновые особенности базовых единиц ритмической структуры и синтагмы. Посредством компьютерного анализа раскрываются особенности просодической параметризации в типологическом аспекте. Результаты получили последующее подтверждение при применении акустических данных в синтезе речи. По ходу компьютерного акустического анализа определяется характер взаимообусловленности ритма и просодической структуры тема-рематической актуализации.