

THE ALLOPHONES OF THE PHONEME /i/ IN ROMANIAN DIPHTHONGS AND TRIPHTHONGS. AN EXPERIMENTAL PHONETICS STUDY

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Abstract: This paper represents an acoustic analysis of the phonological variants that the phoneme /i/ has in diphthongs and triphthongs of standard Romanian such as: ascending diphthongs: [ja], [je], [jo], [ju], descending diphthongs: [ai], [ii], [oi], [ei], [oi], [ui], triphthongs in which the phoneme /i/ is in initial position: [jɔa], [jau], [jeu], [jou], final position: [ɛai], [wai], [wɔi], or in both positions: [jai], [jei]. Different consonantal contexts were also chosen to identify the phonological properties.

Keywords: phonetics, phonology, acoustic analysis, diphthongs, triphthongs, phonemes, vowels, semivowels.

1. INTRODUCTION

The present paper proposes an experimental phonetics study on the realizations of the phoneme /i/, found in the structure of diphthongs and triphthongs in standard Romanian. The corpus was compiled based on the new edition of the *Orthographic, Orthoepic and Morphological Dictionary of the Romanian Language* (DOOM³). Different contexts were selected, contexts in which the diphthongs and triphthongs that contain the phoneme /i/, are in various positions: initial, middle or final, and are preceded by various vowels, consonants or groups of consonants.

This study deals with an acoustic analysis of words containing the ascending diphthongs [ja], [je], [jo], [ju], the descending diphthongs [ai], [ii], [oi], [ei], [oi], [ui], and triphthongs in which the phoneme /i/ is in initial position: [jɔa], [jau], [jeu], [jou], final: [ɛai], [wai], [wɔi], or in both positions: [jai], [jei].

The main objective of the present work is to carry out an acoustic analysis of the phoneme /i/, using the PRAAT program, which will generate information on the duration of diphthongs, triphthongs and component elements, and the level of the two formants, F1 and F2, through which we will determine the variants of this phoneme. For this work, the controlled pronunciation of the selected words by a single speaker was pursued.

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2. THEORETICAL ASPECTS

Traditionally, diphthongs are considered to be sequences of nucleus + semivowel, named descending diphthongs, the most common form of a diphthong. This type of diphthongs is the normal result of the diphthongization process, as this is a process that involves preserving or even increasing the duration of vowels. On the other hand, an ascending diphthong is not a solution for diphthongization, given the fact that it involves shortening (Donegan 1978 [1985]: 101, *apud* Miret 1998: 46). And, in the case of allophonic diphthongs, the same assumption is kept.

The most common evolution within diphthongs is descending > ascending, as in French, for example [ē > eĭ > oi̯ > oĕ > œ > ŷe > ŷa]. The reason is that descending diphthongs are easily reduced, and the evolution from descending to ascending involves temporal diminution. On the other hand, ascending diphthongs have difficulty increasing the duration of semivowels, which would be the only possible way to transform from ascending to descending (Sánchez Miret 1996, *apud* Miret 1998: 47).

Martin Maiden (2016: 647) argues that Romance diphthongs are innovations, and Classical Latin had three diphthongs, AE ([ai̯]), OE ([oi̯]) and AU ([au̯]), the first two have monophthongized as [ɛ] and [e], while AU is preserved in Romanian, in dialects of Sicily and far southern Italy, Romansh, Gascon, and as [oi̯] or [ou̯] in Portuguese, the latter being monophthongized to [o] in modern varieties.

Following Hintze's (1942-1943: 31, *apud* Rosetti 1960: 59) classification of phonemes into open and functionally syllabic phonemes (/i, u, l, m/), open and functionally non-syllabic phonemes (/i, u/) and closed, non-syllabic phonemes (/p, t, k/), Rosetti claims that semivowels (or semiconsonants) are open (semi-open, actually) phonemes from an articulatory acoustic point of view, and closed phonemes from a functional point of view. Thus, semivowels (or semiconsonants) play the role of consonants in the syllable, but from the acoustic-articulatory point of view, they are at the same time vowels.

Andrei Avram (1975: 67-75) pursues how the elements of sequences of two synthetic vowel sounds are perceived as vowels, vowel groups or diphthongs. Since there are no differences in duration and intensity, he proposes the differences resulting from the acoustic structure of the first element, the second element and the phonetic distance between the two. Thus, the acoustic structure represented by the values of F1 and F2 of the vowels that constituted the two elements was realized. [i] has a value of 300Hz for F1 and 2600Hz for F2, both in the first and second element positions. When [i̯] is in the second position, the values are different, 350Hz for F1 and 2400Hz for F2. The structures [ii], [ij] were perceived as a single vowel (Avram 1975: 70).

Calotă (1977: 482) claims that vowels in the closed series can form diphthongs with each other ([i̯u, i̯ɥ, u̯i, u̯ɥ]), although the difference in aperture is one degree, or they can form diphthongs with themselves ([i̯i, u̯u, ɥɥ]), although here the difference in aperture is below one degree. In the open series, this phenomenon is not possible since between the two elements of the diphthong there must be an aperture difference of at least 3 degrees.

3. THE ACOUSTIC ANALYSIS

The acoustic analysis was made up of a selection of 132 words in which the phoneme /i/ appears, recording their pronunciation and manually delimiting the sounds in the PRAAT program. It generated information on the duration of the sounds and the frequency level at which the formants F1 and F2 occur. All these have been grouped in the form of tables that will be analyzed in this study.

3.1. The diphthongs

3.1.1. The ascending diphthongs

In order to better illustrate the behaviour of the semiconsonant /j/, numerous contexts were chosen in which it occupies the first place in ascending diphthongs such as: [ja], [je], [jo], [ju]. We will analyze each diphthong in the following sections to determine the pronunciation variants of the semiconsonant and the vowel that follows it.

3.1.1.1. The diphthong [ja]

The following forms were selected for the diphthong [ja]: *ia* [ja] (he takes), *iad* [jad] (hell), *ia-l* [jal] (take it), *iar* [jar] (again), *iaz* [jaz] (lake) – forms made up of a single syllable, in which the diphthong [ja] appears at the beginning of the word and is followed by different consonants, *iarnă* [jarnə] (winter), *ială* [jalə] (lock), *iapă* [iapə] (mare), *iată* [iatə] (look) – forms that have two syllables, and the diphthong is also in the first position, *crăiasă* [krəjasə] (queen), *amiază* [amjazə] (midday) – forms made up of three syllables, in which the diphthong appears in the middle position, *boia* [boja] (paprika), *abia* [abja] (barely), *deraia* [deraja] (derail), *descuia* [deskuja] (unlock) and *ambreiaj* [ambrejaz] (clutch) – forms made up of two, three or four syllables, the diphthong being positioned at the end.

Table 1 includes the information obtained after analyzing each sound in the PRAAT program, which aims to record the duration of the diphthong, the component elements, and the frequency level at which the first two formants, F1 and F2, appear.

Thus, the duration of the diphthong varies between 320 and 460 ms, the highest value being recorded in the word *ia*, which is not preceded or followed by other sounds. The level at which the two formants occur varies between 498 and 687 Hz for F1, which may illustrate the idea that this diphthong consists of a semiconsonant and an open vowel, while F2 occurs at a level between 1637 and 2222 Hz, values that show the composition of the diphthong, which is a semiconsonant and a central vowel.

The semiconsonant [j], in the composition of the diphthong [ja], has a duration that varies between 110 and 250 ms, the higher values can be observed in the examples where the diphthong occupies the first position in the word, while, with the greater number of syllables, medial or final position, the duration of the semiconsonant is much lower. Differences can also be observed at the formant level. The first formant varies between 275Hz, the lowest value in the word *iad*, and 417Hz, in the word *amiază*. Thus, the semiconsonant [j] has a more closed variant in the word *iad* and in the other words where the diphthong appears in initial position, and a more open variant in situations where the same diphthong appears in medial or final position. At the level of the second formant, F2, the values are between 1653Hz, in the word *amiază*, which shows the fact that the semiconsonant is closer to the central area, and 2631Hz, in the word *crăiasă*, which supports the anteriority of the

semivowel. The very high values of the frequency level at which F2 appears in the other contexts also show that the semiconsonant is a front one.

The duration of the vowel [a] varies between 120 and 250 ms, higher values can be noticed in situations where the diphthong occupies a final position. The values of F1 stand as evidence that the vowel is a central one. However, in the word *ambreiāj*, the vowel is pronounced more closed, approaching the series of semi-open vowels. The second formant captures a different behavior of the vowel when the diphthong occupies the final position, approaching the series of back vowels, with values between 1263 and 1380Hz.

Position	Words	[ja]			[j]			[a]		
		Duration(ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms.)	F1 (Hz)	F2 (Hz)
Initial	ia [ja]	460	549	2011	240	292	2591	210	850	1332
	iad [jad]	380	501	2034	220	275	2330	160	815	1642
	ia-l [jal]	380	504	2140	230	292	2489	140	840	1587
	iar [jar]	400	556	2114	220	317	2514	180	855	1613
	iaz [jaz]	420	521	2155	210	321	2628	200	738	1642
	iarnă [jarnə]	390	498	2207	240	303	2533	150	807	1692
	ială [jalə]	370	550	2145	200	299	2561	160	859	1634
	iapă [iapə]	400	549	2142	250	305	2541	140	971	1451
	iată [iatə]	340	519	2222	210	309	2577	120	886	1600
	crăiasă [krəjasə]	350	593	2127	180	331	2631	170	864	1606
Medial	amiază [amjazə]	320	625	1637	110	417	1653	200	745	1628
Final	boia [boja]	420	635	1768	170	353	2410	240	831	1321
	abia [abja]	320	618	1711	110	373	2475	200	762	1263
	deraia [deraia]	400	687	1815	180	340	2360	220	966	1376
	descuia [deskuja]	370	653	1860	170	319	2445	200	926	1380
	ambreiāj [ambrejajʒ]	390	551	1991	140	370	2591	250	655	1648

Table 1

3.1.1.2. The diphthong [je]

For the diphthong [je], the following forms were selected: *ied* [jed] ('baby goat'), *el* [jel] ('he'), *ele* [jele] ('they') – one or two syllables, the diphthong appears in initial position, *iepure* [jepure] ('rabbit'), *fierăstrău* [fjerəstrəu] ('saw') – three syllables, the position of the diphthong is still initial, *caiețel* [kajetsel] ('little notebook'), *băiețel* [bajetsel] ('little boy') – three syllables, the diphthong is in medial position, *baie* [baje] ('bathroom'), *gutuiie* [gutuje] ('quince'), *greier* [grejer] ('cricket') – two or three syllables, the position of the diphthong is final.

Position	Words	[je]			[j]			[e]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
Initial	ied [jed]	400	354	2535	270	279	2642	130	508	2317
	el [jel]	390	402	2497	280	320	2581	110	604	2290
	ele [jele]	410	372	2465	280	294	2517	130	543	2351
	iepure [jepure]	260	492	2506	200	495	260	60	483	2150
	fierăstrău	130	471	2261	70	375	2469	60	586	2011
Medial	caiețel [kajetsel]	170	414	2369	100	412	2383	70	417	2349
Final	băiețel [bajetsel]	250	376	2394	130	333	2508	110	428	2258
	baie [baje]	320	431	2366	170	324	2452	150	553	2269
	gutuiie [gutuje]	400	434	2387	190	314	2590	200	550	2184
greier [grejer]	290	373	2495	210	286	2615	80	588	2197	

Table 2

Table 2 presents some information on the acoustic characteristics of the diphthong and the sounds that form it. Thus, the duration of the diphthong varies between 170 and 400 ms, the highest values appearing, in particular, in initial position. However, once the number of syllables increases, the duration of the diphthong is shorter, as seen in the word *fierăstrău*. The frequency level at which the two formants appear indicates that the diphthong is composed of two sounds from the front series, one closed and the other mid.

The duration of the semiconsonant [j] ranges between 70 and 280 ms, with very high values in initial position, when not preceded by another sound. Lower values are found in words where the diphthong occurs in initial position, when followed by other sounds, middle and final. At the level of the first formant, the results show that, in initial position, the semiconsonant is more closed than the one in final position, with the exception of the words *iepure* and *fierăstrău*, where it is more open. High values of the second formant show that the semiconsonant is a front one.

The vowel [e] has a shorter duration than the semivowel, the values being between 60 and 200ms. The level at which the first formant occurs shows that the vowel is more open when it occurs in initial or final position, the maximum value being recorded in the word *el*, where the vowel is more open than in all other situations. F2 occurs at a frequency of about 2230Hz, indicating that the semiconsonant is fronter than the vowel.

3.1.1.3. The diphthong [jo]

The words chosen to illustrate the behaviour of the diphthong [jo] are: *ioc* [jok] ('not at all'), *iod* [jod] ('iodine'), *ion* [jon] ('ion'), *iot* [jot] (the semiconsonant [j]), *iorgovan* [jorgovan] ('lilac') – a single syllable or three, the diphthong occurs in initial position, *creiona* [krejona] ('to sketch') – three syllables, middle position, *cleios* [klejos] ('sticky'), *fuior* [fujor] ('wisp'), *creion* [krejon] ('pencil') – two syllables, the diphthong is in final position.

The duration of the diphthong [jo], as shown in *Table 3*, shows high values in initial and final position, except for the word *iorgovan*, where the diphthong, although it appears in initial position, has a low duration due to the larger number of syllables. The median position captures the shortest duration of the diphthong, 240ms. The values of the first formant support the composition of the diphthong, a closed semiconsonant and a mid vowel, while the values of F2 bring us closer to the front series of vowels and semi-vowels.

The semiconsonant [j] has a duration ranging between 140 and 230 ms, with small differences between the three positions. And in this case, once the diphthong is in medial position, its duration decreases. The high values are found in the initial position, while the middle position records the lowest value, 140 ms. F1 shows that in the forms *ion* and *iot*, the semiconsonant is more open than in the others, while in *iorgovan*, where the lowest value, 267 Hz, is recorded, it is more closed. F2 supports the front feature of the semiconsonant.

Position	Words	[jo]			[j]			[o]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
	<i>ioc</i> [jok]	330	372	2002	220	289	2467	100	545	1038
	<i>iod</i> [jod]	360	402	2015	220	299	2541	140	566	1180
	<i>ion</i> [jon]	370	478	1965	230	364	2410	130	668	1221
	<i>iot</i> [jot]	310	418	2032	190	337	2478	120	546	1319
Initial	<i>iorgovan</i> [jorgovan]	280	312	1992	210	267	2309	70	441	1099
Medial	<i>creiona</i> [krejona]	240	381	1972	140	293	2430	90	512	1289
	<i>cleios</i> [klejos]	370	345	1896	210	294	2436	160	411	1188
	<i>fuior</i> [fujor]	330	432	1726	170	303	2259	160	567	1167
Final	<i>creion</i> [krejon]	350	386	1932	210	297	2437	130	522	1153

Table 3

The vowel [o], as in the other cases, has a shorter duration than the semivowel, the values being between 70 and 160 ms. The level at which the first formant appears shows that this vowel is part of the mid series, with a greater degree of openness in the form *ion* and a lesser one in *cleios*. The values of the second formant support the back feature of the vowel, which oscillates in each situation.

3.1.1.4. The diphthong [ju]

To illustrate the behaviour of the diphthong [ju], the following words were selected: *iubi* [jubi] ('to love'), *iute* [jute] ('spicy'), *iubițică* [jubitsikə] ('sweetheart'), *iumie* [junije] ('June'), *iulie* [julije] ('July') – one, three or four syllables, the diphthong is in initial position, *femeiușcă* [femeju[kə]] ('woman'), *aiuri* [ajuri] ('to behave strangely') – three or four syllables, the diphthong is in medial position, *doliu* [dolju] ('mourning'), *dubiu* [dubju] ('doubt'), *mediu* [medju] ('medium'), *geniu* [ɡenju] ('genius'), *fluviu* [fluvju] ('river'), *heliu* [helju] ('helium'), *duium* [dujum] ('a lot') – two syllables, the diphthong is in final position.

As for the diphthong [ju], its duration varies between 200 and 380 ms, with higher values within initial position. The first formant supports the inclusion of the two sounds, the semiconsonant and the vowel, in the closed category by the very small values they record, while the second formant is significant for the front series, in initial position, and for the central series, in medial position and final.

The semiconsonant [j] registers duration values between 70 and 260 ms, the maximum being in initial position. In the word *duium*, where the diphthong registers a duration of 160 ms, longer than in the other examples in the final position, the presence of a sound that follows the diphthong also determines its longer duration. Within the first formant, higher values in final position indicate that the semiconsonant is pronounced more open in these examples. However, the initial position supports the front feature of the semiconsonant through the values at which the second formant appears: 2573 – 2623Hz.

Position	Words	[ju]			[j]			[u]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
Initial	<i>iubi</i> [jubi]	240	228	2143	150	216	2582	80	248	1392
	<i>iute</i> [jute]	330	267	2211	210	230	2602	110	333	1510
	<i>iubițică</i> [jubitsikə]	230	242	2223	140	217	2623	80	285	1516
	<i>iumie</i> [junije]	390	295	2145	260	267	2493	130	347	1489
	<i>iulie</i> [julije]	380	297	2152	240	304	2573	130	283	1409
	<i>femeiușcă</i> [femeju[kə]]	280	270	2158	160	254	2593	110	293	1527
Medial	<i>aiuri</i> [ajuri]	230	281	1796	120	287	2158	110	275	1414
	<i>doliu</i> [dolju]	200	292	1468	70	281	1788	130	297	1293
	<i>dubiu</i> [dubju]	240	257	1795	130	248	2242	100	269	1187
Final	<i>mediu</i> [medju]	210	268	1805	130	261	2204	80	279	1177
	<i>geniu</i> [ɡenju]	220	306	1724	110	250	1894	100	364	1545
	<i>fluviu</i> [fluvju]	250	294	1779	130	281	2317	110	308	1183
	<i>heliu</i> [helju]	220	256	1625	100	269	2158	110	243	1136
	<i>duium</i> [dujum]	300	341	1728	160	323	2183	140	448	1252

Table 4

The vowel [u] has a shorter duration than the semiconsonant, and the values of the two formants support its inclusion in the category of closed, back vowels.

3.1.1.5. Insights into ascending diphthongs

The semiconsonant [j] registers various realizations within the ascending diphthongs, where it occupies the first position. Thus, from the results obtained, the semiconsonant has a longer duration within the diphthong [jo], being followed by [ja], [je], [ju]. At the level of the first formant, the values showed that it is pronounced more openly in the diphthong [je],

followed by [ja], [jo] and [ju], the latter registering a more closed pronunciation of the semiconsonant. And at the level of the second formant we can record the same behaviour, namely: within the diphthong [je], the semiconsonant is pronounced more fronted, being followed by the diphthongs [ja] and [jo], ending with [ju].

3.1.2. The descending diphthongs

For the interpretation of the phoneme /i/, the realizations it can have when it occupies the second position within the diphthong must also be analyzed. Thus, the following descending diphthongs were chosen: [ai], [ii], [əi], [ei], [oi], [ui]. In this section, each diphthong will also be analyzed, along with the component elements.

3.1.2.1. The diphthong [ai]

The interpretation of the diphthong [ai] was based on the following words: *aibă* [ai̯bə] ('have'), *aisberg* [ai̯sberg] ('iceberg') – two or three syllables, the diphthong is in initial position, *drăgaica* [drə̯gaika] (a Romanian celebration) – three syllables, the diphthong is in medial position, *cai* [kaɪ] ('horses'), *dai* [daɪ] ('you give'), *hai* [haɪ] ('come on'), *l-ai* [laɪ] ('you... him'), *mai* [maɪ] ('May'), *n-ai* [naɪ] ('you don't have'), *pai* [paɪ] ('straw'), *rai* [raɪ] ('heaven'), *tai* [taɪ] ('you cut'), *ș-ai* [ʃaɪ] ('and you have...'), *alai* [alaɪ] ('procession'), *copai* [kopaɪ] (a substance) – one or two syllables, the diphthong is in final position.

The duration of the diphthong [ai] is clearly delimited, as can be seen from *Table 5*. Thus, in the middle position, the diphthong registers the lowest duration, 250 ms, being followed by the initial position, where an increase is recorded, culminating in the final position, where the values fall between 330 and 400 ms. Following the frequency levels at which the two formants appear, we can say that they are at the intersection of open and closed, respectively central and front.

Position	Words	[ai̯]			[a]			[i]		
		Duration (ms.)	F1 (Hz)	F2 (Hz)	Duration (ms.)	F1 (Hz)	F2 (Hz)	Duration (ms.)	F1 (Hz)	F2 (Hz)
Initial	<i>aibă</i> [ai̯bə]	290	692	1970	180	856	1611	110	429	2547
	<i>aisberg</i> [ai̯sberg]	270	692	1864	170	841	1469	90	416	2598
Medial	<i>drăgaica</i> [drə̯gaika]	250	617	1991	170	728	1706	80	383	2594
	<i>cai</i> [kaɪ]	370	603	1739	190	861	1595	170	306	1905
Final	<i>dai</i> [daɪ]	390	624	1865	240	804	1694	140	322	2150
	<i>hai</i> [haɪ]	370	613	1751	170	915	1602	190	333	1889
	<i>l-ai</i> [laɪ]	390	604	2040	180	905	1485	200	342	2524
	<i>mai</i> [maɪ]	330	593	2006	170	852	1649	160	311	2349
	<i>n-ai</i> [naɪ]	380	577	2083	150	882	1516	220	366	2474
	<i>pai</i> [paɪ]	380	663	2158	180	877	1639	200	469	2628
	<i>rai</i> [raɪ]	400	618	1939	190	886	1453	210	377	2376
	<i>tai</i> [taɪ]	330	617	1933	200	828	1773	130	298	2176
	<i>ș-ai</i> [ʃaɪ]	400	586	1792	170	897	1563	230	354	1965
	<i>alai</i> [alaɪ]	330	584	2032	160	881	1635	170	303	2408
	<i>copai</i> [kopaɪ]	400	612	1875	230	852	1744	160	280	2056

Table 5

Within the semivowel we can observe a clear delimitation of the duration, which is low within the median position, higher in the initial position and with high values, close to those of the vowel, in the final position. The first formant captures a different behaviour of the semivowel, this time in the second position within the diphthong. Thus, in the initial position, the semivowel is pronounced much more openly, a possible result of being adjacent to an open vowel. And in the middle position, the value is high, and with the final position,

a decrease in the frequency values can be observed. A major difference occurs in the words *pai* and *copai*, where, although the diphthong is preceded by the same consonant, the frequency level at which the first formant appears is very different, 469Hz and 280Hz respectively. So, in the word *copai*, the semivowel is pronounced much more closed than in *pai*. The lowest values of the first formant can be found in final position, but the number of syllables is greater. At the level of the second formant, the values illustrated in the table show that the semivowel is pronounced more fronted if it occurs in situations where the diphthong is in initial or final position.

3.1.2.2. The diphthong [iɨ]

For the diphthong [iɨ], only contexts in which it appears either in initial position, *câine* [kɨine] ('dog'), *pâine* [pɨine] ('bread'), or in final position: *călcâi* [kəlkiɨ] ('heel'), *căpătâi* [kəpətɨɨ] ('head') were identified.

The duration of the diphthong does not show huge differences, with a small exception in *câine*, where it has a duration of 230 ms. The first formant places the diphthong on the border between open and mid, in *pâine* and *călcâi*, the diphthong is pronounced more closed than in *câine* and *căpătâi*. The second formant clearly illustrates the front pronunciation of the diphthong.

At the level of the semivowel, longer values of the duration can be observed, unlike the vowel, these being between 160 and 230 ms. And here, in the words *pâine* and *călcâi*, the semivowel is pronounced more closed, in contrast to *căpătâi*, where the highest value of F1 is recorded, which shows that the semivowel was pronounced much more openly. F2 depicts the front feature of the semivowel, without much difference.

Position	Words	[iɨ]			[i]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
Initial	<i>câine</i> [kɨine]	230	330	2374	70	333	2046	160	329	2517
	<i>pâine</i> [pɨine]	310	273	2123	100	315	1490	210	253	2423
	<i>călcâi</i> [kəlkiɨ]	330	288	2349	100	325	1829	230	271	2575
Final	<i>căpătâi</i> [kəpətɨɨ]	320	415	2353	110	330	1977	200	462	2588

Table 6

As for the vowel, it has a shorter duration than the semivowel, but the two formants, F1 and F2, support the closed and central character of this vowel.

3.1.2.3. The diphthong [əɨ]

The diphthong [əɨ] was analyzed with the help of the words: *dăinui* [dəɨnui] ('to last') – three syllables, the diphthong is in initial position, *defăima* [defəɨma] ('defame') – three syllables, the diphthong is in medial position, *băi* [bəɨ] ('bathrooms'), *căi* [kəɨ] ('ways'), *dă-i* [dəɨ] ('give it'), *fă-i* [fəɨ] ('make it'), *măi* [məɨ] ('you'), *păi* [pəɨ] ('well'), *răi* [rəɨ] ('bad'), *săi* [səɨ] ('his/her'), *tăi* [təɨ] ('your') – one syllable, the diphthong is in final position.

In the words analyzed, the duration of the diphthong differs depending on the position it occupies in the word. Thus, in medial position, the diphthong [əɨ] registers the lowest duration, 120 ms, being followed by the initial position, where the duration is longer, 220 ms, and culminating in the final position where a maximum value of 400 ms is recorded. At the formant level, the first supports the characteristic of the vowel that is in the first position, which is a mid one, while the second formant brings the group of sounds closer to the front feature.

Position	Words	[əi]			[ə]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
Initial	dăinuî [dəinuî]	220	381	2307	120	455	1982	100	287	2717
Medial	de făina [de fəina]	120	437	2141	60	549	1732	60	337	2505
	băi [bəi]	380	374	2132	160	530	1518	210	255	2605
	căi [kəi]	330	384	2300	130	546	1637	200	281	2725
	dă-i [dəi]	380	499	2157	170	550	1639	200	456	2599
	fă-i [fəi]	360	582	2162	160	520	1537	190	635	2687
	măi [məi]	360	441	2098	150	666	1408	200	269	2625
	păi [pəi]	400	373	2196	180	513	1666	210	252	2653
	răi [rəi]	320	416	2320	120	566	1788	200	326	2636
	săi [səi]	370	445	2150	140	532	1723	220	388	2433
Final	tăi [təi]	360	408	2188	140	556	1771	210	310	2466

Table 7

In the case of the semivowel, the duration varies according to the position of the diphthong, with the lowest value being recorded in the middle position. The values of the frequency at which the first formant appears show that the greatest closing of the semivowel is during the pronunciation of the diphthong preceded by the bilabials [b, p], and the greatest opening occurs with the presence of the fricative [f], from the word *fă-i*. A greater opening of the pronunciation of the semivowel also appears in the context of the dental [d], in the word *dă-i*. F2 supports the semivowel characteristic of being a front one by its very high values.

The vowel, although it appears in the first position in the diphthong, has a shorter duration, with higher values in the final position of the diphthong. F1 illustrates that the vowel is a mid one, being pronounced with a greater opening when preceded by the nasal [m], in the word *măi*. The values of the second formant place it in the central category, but here too, the nasal determines a back pronunciation.

3.1.2.4. The diphthong [ei]

The diphthong [ei] was analyzed in initial and final position in the words: *fleică* [fleikə] ('meat loaf') – two syllables, the diphthong is in initial position, *bei* [bei] ('you drink'), *lei* [lei] ('lions'), *mei* [mei] ('millet'), *zei* [zei] ('gods'), *alei* [alei] ('alleys'), *ardei* [ardei] ('pepper'), *condei* [kondei] ('pen') – one or two syllables, the diphthong is in final position.

The duration of the diphthong differs, also in these examples, depending on the position it occupies. The lowest value is recorded in the initial position, while the final position records much higher values. The values of the two formants establish the characteristics of the diphthong. Thus, if for F1, the values indicate a degree of openness close to the vowel that appears in the first position, F2 supports the front feature, determined by both the vowel and the semivowel.

At the level of the semivowel, the duration registers higher values than the vowel, the lowest being identified within the initial position, as we could see in the previous examples. Low values of the first formant indicate a more closed pronunciation of the semivowel, with small exceptions in the forms *bei*, *lei* and *alei*, where the semivowel is pronounced more openly. F2 occurs at a very high frequency level, which confirms the front feature of the semivowel.

The vowel has low duration values, and the two formants, F1 and F2, support the two characteristics, open, front vowel.

Position	Words	[eɪ]			[e]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
Initial	fleică [flejkə]	240	319	2630	100	429	2531	130	238	2703
	bei [beɪ]	380	390	2342	110	482	2141	270	350	2482
	lei [leɪ]	410	423	2565	120	516	2472	290	385	2604
	mei [meɪ]	360	374	2615	150	504	2510	210	279	2691
	zei [zeɪ]	350	340	2247	100	463	2341	250	289	2208
	alei [aleɪ]	380	356	2568	110	452	2432	260	314	2627
	ardei [ardeɪ]	350	303	2473	100	395	2407	250	265	2500
Final	condei [kondeɪ]	340	351	2357	150	446	2292	190	276	2409

Table 8

3.1.2.5. The diphthong [oɪ]

The analysis of the diphthong [oɪ] followed its behavior in all three positions: initial – *doină* [dojnə] ('ballad'), *boiler* [bojɫər] ('water heater'), two syllables, medial – *destoinic* [destoɪnik] ('worthy'), three syllables, and final – *boi* [boɪ] ('oxen'), *doi* [doɪ] ('two'), *foi* [foɪ] ('papers'), *goi* [goɪ] ('naked'), *joi* [ʒoɪ] ('Thursday'), *moi* [moɪ] ('soft'), *noi* [noɪ] ('we'), *roi* [roɪ] ('swarm'), *soi* [soɪ] ('variety'), *voi* [voɪ] ('you'), *convoi* [konvoɪ] ('convoy'), *broscoi* [broskoɪ] ('frog'), *butoi* [butoɪ] ('barrel'), one or two syllables.

At the diphthong duration level, lower values are recorded in medial position and initial position, while final position is characterized by longer durations. Through the values of F1, we can establish that the degree of openness is greater, close to the mid vowel [o]. F2 comprises values that illustrate behavior similar to the central series. Thus, if the composition of the diphthong includes a vowel from the back series and a semivowel from the front series, then the values of F2 approach the central series.

Position	Words	[oɪ]			[o]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
Initial	doină [dojnə]	280	391	1886	150	494	1293	120	265	2622
	boiler [bojɫər]	280	467	1669	140	510	984	130	422	2385
Medial	destoinic [destoɪnik]	250	371	1789	140	475	1167	110	246	2543
Final	boi [boɪ]	400	397	1885	170	492	945	230	326	2580
	doi [doɪ]	360	394	1674	190	457	1055	160	318	2423
	foi [foɪ]	420	341	1763	200	390	878	220	295	2582
	goi [goɪ]	410	356	1670	210	436	946	190	269	2459
	joi [ʒoɪ]	340	338	1806	160	418	1013	180	265	2528
	moi [moɪ]	360	426	1998	180	569	1429	170	273	2605
	noi [noɪ]	360	482	2103	170	686	1499	190	296	2655
	roi [roɪ]	400	437	1876	180	527	1146	210	321	2497
	soi [soɪ]	380	415	1897	180	523	1152	190	318	2576
	voi [voɪ]	380	531	1886	150	521	1102	220	537	2416
	convoi [konvoɪ]	400	402	1557	180	503	883	210	516	1483
	broscoi [broskoɪ]	410	390	1796	170	474	1026	230	327	2365
	butoi [butoɪ]	390	387	1875	190	458	1183	190	315	2565

Table 9

The semivowel shows the same behaviour in terms of duration, shorter in medial and initial position and longer in final position. Through the formant values, the semivowel appears with several realizations depending on the number of syllables, the position occupied by the diphthong and the preceding consonant. Thus, in initial position, when the

diphthong is preceded by the dental [d], the semivowel is pronounced more closed compared to the context in which it appears in initial position, where the semivowel is pronounced more openly. For the situation where the bilabial [b] occurs, the semivowel is pronounced more openly in initial position. The median position registers the highest semivowel closure in the examples analyzed for the diphthong [oi̯]. On the other hand, in the context of the fricative [v], from the examples *voi* and *convoi*, the semivowel presents the greatest opening, the frequency level at which the first formant appears being close to that of the values for the series of mids. The values of the second formant support the front feature of the semivowel, with a small exception, in *convoi*, where the 1483Hz brings it closer to the central series.

The vowel registers values similar to the semivowel in terms of duration, and the two formants support that it's a mid one, from the back series.

3.1.2.6. The diphthong [ui̯]

The diphthong [ui̯] was analyzed in all three positions: initial – *buimac* [bui̯mak] ('giddy'), two syllables, medial – *fițuică* [fitsui̯kə] ('cheat sheet'), three syllables, and final – *cui* [kui̯] ('nail'), *lui* [lui̯] ('his'), *nu-i* [nu̯i] ('it is not'), *pui* [pui̯] ('chicken'), *sui* [sui̯] ('I climb'), *gălbui* [gəlbui̯] ('yellow'), *căprui* [kəprui̯] ('brown'), *destui* [destui̯] ('enough'), one or two syllables.

Position	Words	[ui̯]			[u]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
Initial	<i>buimac</i> [bui̯mak]	150	296	1941	70	333	1191	80	261	2631
Medial	<i>fițuică</i> [fitsui̯kə]	200	277	2227	70	302	1609	120	262	2596
	<i>cui</i> [kui̯]	360	306	2011	110	368	938	240	276	2532
	<i>lui</i> [lui̯]	370	273	1964	140	314	1215	230	248	2416
	<i>nu-i</i> [nu̯i]	330	426	2260	120	387	1267	210	251	2504
	<i>pui</i> [pui̯]	370	287	1984	140	338	1018	230	254	2609
	<i>sui</i> [sui̯]	300	308	2029	100	348	1253	200	287	2426
	<i>gălbui</i> [gəlbui̯]	330	285	1963	130	326	1130	190	257	2556
	<i>căprui</i> [kəprui̯]	250	286	2134	80	350	1220	170	256	2558
Final	<i>destui</i> [destui̯]	300	364	1981	130	354	1252	160	371	2583

Table 10

At the level of duration, a difference can be observed compared to the examples analyzed above, where the initial position is characterized by a shorter duration compared to the others. The characteristic of both sounds to be closed determines the low frequency values of the first formant of the diphthong [ui̯], and the values of the second one approach those of the front series.

The semivowel registers the lowest duration in initial position, followed by medial and then final position. It should be noted that in final position, when there is only one syllable, the duration of the semivowel is longer than in situations where there are several syllables. At the level of the first formant, the closed character of this semivowel can be supported, with a greater opening in *destui*, where F1 occurs at 371Hz. F2 supports the front feature of the semivowel, with some maximum values within bilabials [p, b].

The vowel is characterized by a shorter duration compared to the semivowel, and the frequency level at which the two formants appear convey its closed and back features.

3.1.2.7. Insights into descending diphthongs

For the class of descending diphthongs, we observed the tendency of the semivowel to have a longer duration and the influence of the vowel characteristics that marked the values of the two formants. At the level of duration, a shorter utterance of the semivowel was noted in the diphthong [ai], with small increases for the diphthongs [ui], [oi], [əi], [ii] and a maximum value within the diphthong [ei]. The values of the frequency at which the first formant appears led to the hypothesis that the semivowel is pronounced more closed in the diphthong [ui], followed by the diphthongs [ei, ii, oi] and more open within the diphthongs [əi, ai]. Contrary to expectations, the highest degree of anteriority occurs within the diphthong [əi], followed by the diphthongs [ui, ei, ii, oi], with a minimum value in the diphthong [ai].

3.2. The triphthongs

The analysis of triphthongs is organized according to the place the semivowel/semiconsonant occupies. Thus, structures in which the semiconsonant is the first element within the triphthong, the semivowel is the last element, or situations where the semiconsonant appears as the first element and the semivowel as the last element within the same triphthong will be analyzed.

3.2.1. Triphthongs in which the first element is /j/

The semiconsonant occurs as the first element in the following triphthongs: [jɔa], [jaɪ], [jeɪ] and [joɪ].

3.2.1.1. The triphthong [jɔa]

The following words were selected for the triphthong [jɔa]: *aripioară* [aripjɔarə] ('wing'), *creioane* [krejɔane] ('pencils'), *inimioară* [inimjɔarə] ('little heart') and *foioase* [fojɔase] ('broadleaf'). They contain three or four syllables, and the triphthong is preceded by consonants or vowels.

Following the values in *Table 11*, we can argue that the triphthong has a longer duration when the number of syllables is less. F1 captures an interesting behavior of the triphthong, which is pronounced more openly when preceded by the consonants [m, p], while the preceding vowels contribute to a more closed pronunciation of it. The values of the second formant illustrate the central triphthong quality.

The semiconsonant [j] has shorter durations compared to those we observed in the diphthongs, and here the number of syllables determines a longer or shorter utterance. Within F1, it can be seen that the semiconsonant is pronounced more open when preceded by the bilabial [p] and more closed when preceded by the mid vowel [e]. In the context of the mid vowel [o], the semiconsonant is pronounced more openly than in the context of [e]. The values of F2 support the placement of the semiconsonant in the front series, with a small exception in *aripioară*, where it is pronounced like a central one.

	Words	[jɔa]			[jɪ]			[jə]			[a]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
-əa	<i>aripioară</i> [aripjɔarə]	270	699	1435	50	381	1635	50	605	1173	170	826	1459
	<i>creioane</i> [krejɔane]	390	550	1794	140	256	2520	80	531	1307	160	807	1411
	<i>inimioară</i> [inimjɔarə]	300	692	1616	70	271	2118	60	614	1385	160	909	1485
	<i>foioase</i> [fojɔase]	380	469	1801	130	317	2505	100	415	1146	140	653	1641

Table 11

The semivowel [ɔ] has shorter durations, unlike the vowel, which registers maximum values. For both sounds, the two formants support their inclusion in the category of mid, back, respectively open, central.

3.2.1.2. The triphthong [jaɨ]

The triphthong [jaɨ] was analyzed in the words: *iau* [jaɨ] ('I take'), *trăiau* [trəjaɨ] ('they were living'), *suiiau* [sujəɨ] ('they were climbing'), *voiau* [vojaɨ] ('they wanted'). Unlike the triphthong [jɔa], [jaɨ] has a much longer duration, also due to the initial or final position it occupies. At the formant level, a more closed pronunciation of the triphthong can be observed, determined by the two elements from the closed class.

The semiconsonant [j] has a longer duration compared to the other semivowel and even compared to the vowel. The values of the first formant support the fact that, when not preceded by any sound, the semiconsonant is pronounced the most closed, while vowels in the series of closed or mid ones, in the context of which the triphthong is located, cause a more open pronunciation. The second formant is evidence of the front feature.

The semivowel [ɨ] is characterized by the shortest duration and a larger opening, while the vowel [a] is closer to the back vowel series.

	Words	[jaɨ]			[j]			[a]			[ɨ]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
-aɨ	<i>iau</i> [jaɨ]	600	448	1845	290	276	2573	170	756	1338	130	428	944
	<i>trăiau</i> [trəjaɨ]	520	497	1699	190	315	2517	170	778	1308	150	414	1090
	<i>suiiau</i> [sujəɨ]	430	537	1748	160	347	2514	150	810	1303	110	437	1229
	<i>voiau</i> [vojaɨ]	540	499	1581	170	412	2382	210	611	1324	150	442	1059

Table 12

3.2.1.3. The triphthong [jeɨ]

For the triphthong [jeɨ], only one context has been identified, *eu* [jeɨ] (*I*). The duration of the triphthong has a high value, as we have seen in the previous example, and the values of F1 show the high degree of openness of this triphthong. The duration of the initial and final elements is equal, longer than the vowel.

The semiconsonant [j] is characterized by a higher degree of openness, although it is not preceded by another sound. The level of the second formant places it in the most anterior point.

	Words	[jeɨ]			[j]			[e]			[ɨ]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
-eu	<i>eu</i> [jeɨ]	460	438	2167	190	348	2630	80	549	1838	190	479	1855

Table 13

The vowel [e] registers the lowest duration, F1 maintains the mid vowel quality, while F2 brings it closer to the central series.

The semivowel [ɨ] registers a high duration value, F1 shows a higher degree of openness, while F2 brings it closer to the central series.

3.2.1.4. The triphthong [joɨ]

For the triphthong [joɨ] only one context has been identified: *maiou* [majou] (*tank top*). Its duration is high, although it is no longer in its original position. The first formant shows a lower degree of openness, while the second places it in the central series.

At the level of the semiconsonant [j], a long duration can be observed, but which does not represent the maximum value, the semivowel [ɥ] recording 200ms. And in this example, F1 has a high value, indicating a greater degree of openness, while F2 attests to front series.

	Words	[jəu]			[j]			[o]			[ɥ]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
-ou	maiou [majou]	480	391	1533	180	330	2245	90	471	1005	200	411	1132

Table 14

The vowel [o] registers a lower duration, but the values of the two formants support the mid, back vowel features.

The semivowel [ɥ] has a maximum duration value, the first formant brings it closer to the series of mids, a possible cause being the preceding vowel itself, while F2 maintains its quality as a back semivowel.

3.2.2. Triphthongs where /i/ is the last element

Triphthongs where the semivowel is the last element are: [ɛai], [wai] and [wəi].

3.2.2.1. The triphthong [ɛai]

The words chosen to analyze the triphthong [ɛai] are: *ne-ai* [neai] ('you...us'), one syllable, and *râdeai* [rɛdeai] ('you were laughing'), two syllables. The duration of the triphthong has larger values in the first example, where the number of syllables is also smaller. F1 shows a greater opening when the triphthong is preceded by the dental [d], and F2 illustrates the front position it occupies.

ea-	Words	[ɛai]			[ɛ]			[a]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
	ne-ai [neai]	450	502	2467	130	685	2291	130	612	2403	170	276	2652
	râdeai [rɛdeai]	370	544	2433	110	679	2110	110	712	2373	140	298	2741

Table 15

The semivowel [i] has a longer duration than the other two component sounds, although it is in final position. The values of the frequency at which the first formant is found show that the semivowel is pronounced more openly in the word *râdeai*, where F2 also has higher values, which means that the semivowel is more anterior in the second example than in the first.

The semivowel [ɛ] registers very high values for the first formant, which brings it closer to the open vowel series, while F2 maintains its quality as a front semivowel.

The vowel [a], under the influence of the two sounds, no longer has a high opening in the word *ne-ai*, and the values for the second formant also place it in the series of front vowels.

3.2.2.2. The triphthong [wai]

For the triphthong [wai] only one word has been identified, *înșeuai* [ɪnʃeuai] ('you were saddling up'), where the triphthong is in final position. Its duration is longer than in the previously analyzed examples. F1 shows a higher degree of openness, while F2 places it in the central series.

ua—	Words	[ɥai]			[ɥ]			[a]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
	inseuai [infeɥwai]	590	471	1613	170	310	1068	230	708	1377	180	326	2402

Table 16

The semivowel [ɥ] no longer has the maximum duration within the triphthong, and the frequency value at which F1 appears shows a higher degree of openness. F2 stands as evidence for the fit in the front series.

The semiconsonant [w] has the shortest duration within the triphthong, the value of F1 indicates a slightly greater opening, and F2 supports the classification in the back class.

The vowel [a] registers the longest duration, F1 shows that it is an open vowel, while F2, under the influence of the back semivowel [ɥ] has a lower value, which brings it closer to the back series.

3.2.2.3. The triphthong [wəi]

The triphthong [wəi] is also represented by a single word, *rouăi* [rowəi] ('of the dew'), in which it is in final position. The duration is shorter than in the previously analyzed example, and F1 shows a lower degree of openness. The frequency level at which F2 occurs brings it close to the central series.

wa—	Words	[wəi]			[w]			[ə]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
	rouăi [rowəi]	480	364	1858	150	343	1113	100	484	1663	210	320	2504

Table 17

The semivowel [i] registers the longest duration within the triphthong, a larger opening due to the influence of the vowel [ə], while F2 supports the front series. The semiconsonant [w] has a shorter duration and a longer opening, while the vowel registers the lowest duration. The values of the two formants prove its central and mid features.

3.2.3. Triphthongs where /j/ is the first element and /i/ the last

The Romanian language has two triphthongs in which the semiconsonant appears as the first element and the semivowel as the last element: [jai] and [jei].

3.2.3.1. The triphthong [jai]

For the triphthong [jai], two contexts were chosen in which the phoneme /i/ appears in both initial and final position. In the first example, *ia-i* ('take it') the triphthong has a longer duration, but the degree of openness is lower than in *suii* ('you were climbing up').

—a—	Words	[jai]			[j]			[a]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
	ia-i [jai]	700	417	2410	280	295	2591	180	691	1980	230	347	2528
	suii [sujai]	560	503	2217	170	321	2468	150	775	1724	230	463	2349

Table 18

In the first situation, the semiconsonant [j] occupying the initial position has a longer duration than the semivowel in the final position, pronounced more closed and more anterior. In the second situation, the longer duration is recorded on the semivowel in final position,

which is pronounced much more openly than the examples analyzed above. It is worth noting that, when the triphthong occurs in the context of another syllable, the semivowel is pronounced more openly.

The vowel [a] has shorter durations, but the values of the two formants support the placement in the central, open series.

3.2.3.2. The triphthong [jei]

For the triphthong [jei], two contexts were identified in which it is in initial position, *iei* [jei] ('you take'), without being preceded by other sounds, or being preceded by the nasal [m], in *miei* [mjei] ('lamb'). Differences appear at the level of duration, in the second situation the triphthong recording a lower duration, and at the level of F2, which establishes that, in the initial position, the triphthong is pronounced more to the front.

-e-	Words	[jei]			[j]			[e]			[i]		
		Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)	Duration (ms)	F1 (Hz)	F2 (Hz)
	<i>iei</i> [jei]	580	346	2616	230	370	2628	150	396	2482	190	277	2710
	<i>miei</i> [mjei]	480	349	2423	120	265	1823	160	486	2570	190	287	2691

Table 19

The semiconsonant [j], as the first element, shows oscillations in duration depending on the position occupied by the triphthong. A greater degree of openness can be identified in the word *iei*, while the semivowel in the final position, through the values of F1, can be interpreted as a more closed one. Note the value of F2 in the word *miei*, where the semiconsonant is closer to the central series.

The vowel [e] keeps its duration roughly equal in the two examples, it is pronounced more closed in the word *iei*, while the localization is definitely a front one.

4. CONCLUSIONS

This acoustic analysis captured how the phoneme /i/ is pronounced in various contexts within ascending diphthongs, descending diphthongs and triphthongs. The realizations of the phoneme are varied and depend on the position it occupies and the context in which it appears.

At the level of diphthongs, it is to note that the semivowel tends to have a greater duration and degree of openness when it appears within descending diphthongs. At the same time, the appearance after a vowel causes the semivowel to be pronounced earlier.

Triphthongs, on the other hand, do not cause big differences in the duration of the semivowel or semiconsonant regardless of the place they occupy. The degree of openness is higher when the semiconsonant occupies the first place in the triphthong.

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