

**ON THE ACOUSTIC STRUCTURE AND THE PHONOLOGICAL STATUS OF DIPHTHONGS IN GERMAN ISLAND DIALECTICS (ON THE EXAMPLE OF THE SETTLEMENTS OF SOZIMSKY AND CHERNIGOVSKY IN THE KIROV REGION)**

***SOBRE A ESTRUTURA ACÚSTICA E O ESTADO FONOLÓGICO DOS DITONGOS NA DIALÉTICA DAS ILHAS ALEMÃS (A EXEMPLO DOS ASSENTAMENTOS DE SOZIMSKY E CHERNIGOVSKY NA REGIÃO DE KIROV)***

***SOBRE LA ESTRUCTURA ACÚSTICA Y EL ESTADO FONOLÓGICO DE LOS DIFTONGOS EN LA DIALÉCTICA DE LAS ISLAS ALEMANAS (EN EL EJEMPLO DE LOS ASENTAMIENTOS DE SOZIMSKY Y CHERNIGOVSKY EN LA REGIÓN DE KIROV)***

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**ABSTRACT:** The purpose of this article is to present the results of the study of the phonemic status of diphthongs of the German island dialects spoken in the Kirov region (Russia). The problem of determining the system of vowel phonemes (diphthongs) of the above-mentioned region has been solved in line with Shcherba's phonetics, which recognizes the connection between the sound and semantic sides of the language. During the study, we concluded: the diphthongs studied in the article are monophonemic. This is proved by their specific acoustic characteristics, duration, monosyllabicity, and the absence of strong aspiration of the second component. This study contributes to the German island dialectology, enriching the theory and typology of island dialects, which preserve archaic features. The results of the study may be of interest to scholars involved in the study of German island dialects.

**KEYWORDS:** Island dialects. Phonemic status and acoustic structure of German diphthongs.

**RESUMO:** *O objetivo deste artigo é apresentar os resultados do estudo do status fonêmico dos ditongos dos dialetos insulares alemães falados na região de Kirov (Rússia). O problema de determinar o sistema de fonemas vocálicos (ditongos) da região mencionada foi resolvido de acordo com a fonética de Shcherba, que reconhece a conexão entre os lados sonoro e semântico*

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da língua. No decorrer do estudo, concluímos: os ditongos estudados no artigo são monofonêmicos. Isso é comprovado por suas características acústicas específicas, duração, monossilabidade e ausência de forte aspiração do segundo componente. Este estudo contribui para a dialetologia das ilhas alemãs, enriquecendo a teoria e tipologia dos dialetos insulares, que preservam características arcaicas. Os resultados do estudo podem ser do interesse de estudiosos envolvidos no estudo dos dialetos das ilhas alemãs.

**PALAVRAS-CHAVE:** *Dialetos de ilha. Status fonêmico e estrutura acústica dos ditongos alemães.*

**RESUMEN:** *El propósito de este artículo es presentar los resultados del estudio del estado fonémico de los diptongos de los dialectos isleños alemanes que se hablan en la región de Kirov (Rusia). El problema de determinar el sistema de fonemas vocales (diptongos) de la región antes mencionada se ha resuelto de acuerdo con la fonética de Shcherba, que reconoce la conexión entre los lados sonoro y semántico de la lengua. En el transcurso del estudio concluimos: los diptongos estudiados en el artículo son monofonémicos. Esto se demuestra por sus características acústicas específicas, duración, monosilabidad y la ausencia de una fuerte aspiración del segundo componente. Este estudio contribuye a la dialectología isleña alemana, enriqueciendo la teoría y tipología de los dialectos isleños, que conservan rasgos arcaicos. Los resultados del estudio pueden ser de interés para los académicos involucrados en el estudio de los dialectos de las islas alemanas.*

**PALABRAS CLAVE:** *Dialectos isleños. Estado fonémico y estructura acústica de los diptongos alemanes.*

## Introduction

The most difficult stage in determining the phonological system of vowels is the problem of the phonemic status of diphthongs. This issue currently does not have a definite solution. There are two polar approaches: biphonemic and monophonemic interpretation of diphthongs (BOKK, 1977, p. 6).

The first group of researchers includes Copenhagen structuralists (H. Uldall [1939]), who consider English diphthongs as biphonemic, consisting of two groups of vowels: a group of identical and a group of different vowels. American descriptivists (J. Treiger, B. Block (1941), and others) substantiate their proof of the biphonemic nature of diphthongs based on additional distribution using the substitution method. The substitution method, or the minimum pair method, is used by N. Morciniec (1958). Analyzing quasi-homonyms like [*hais*]– heiss and [*haus*] – Haus, he concludes that the difference between these words is provided by the vowels *i* and *u*; therefore, they are separated from *a* as independent phonemes, and the diphthongs are biphonemes. M. Adamus (1967) and others also use the substitution method to prove the biphonemic nature of German diphthongs.

Most linguists consider the German diphthongs to be monophonemic units. J. Vachek (1933), determining the monophonemic nature of the diphthong, puts forward in this connection such an important argument as the structure of the syllable; B. Trnka (1935) for the first time drew attention to the fact that the monophonemic diphthong always refers to one syllable; N.S. Trubetskoy (1980) pays attention to the duration of the diphthong with regard to the monophthong and considers its indivisibility as a proof of the monophonemic nature of the diphthong, that is, the components of German diphthongs cannot be divided into two syllables in any phonetic conditions; P. Trost (1961) highlights the importance of one-way connection of the second element (p. 147–149).

T. S. Glushak is also against the biphonemic nature of German and English diphthongs and long vowels. Considering that the first components of the diphthongs *ai*, *au* are qualitatively modified under the influence of the second ones and cannot be absolutely identical with the corresponding simple vowels, T.S. Glushak (1966) concludes that in the words *grais - graus* “Greis – Graus” and others there is no substitution of components, but there is the substitution of one diphthong by another or “one known by another unknown” (p. 376–383).

L. R. Zinder and his students approach the issue of determining the phonemic status of diphthongs in an integrated manner. They select several criteria to solve this problem. First of all, it should be emphasized that the question of the monophonemic or biphonemic nature of two-part units is a special case of the problem of the division of the flow of speech. The strongest factor in this division is the presence of a junction of morphemes. We can say that there is not a single case where the components of German diphthongs would be separated by a morphemic border. This fact is enough to prove the monophonemic nature (ZINDER, 1997, p. 115).

Morphological alternations, for example, the umlaut, are another proof of the monophonemic nature of German diphthongs. When forming the plural of nouns using the suffix *-er*, the umlaut is required: there are no exceptions to this rule. However, the diphthong /æ/ is not subject to the umlaut at all (*Kleid - Kleider*), and in the diphthong /ao/ *a*, when using the umlaut is replaced by *o* (*Haus - Häuser*). Of course, nothing of the kind happens, just /ao/ as an indivisible unit *alternates* according to the umlaut with the same indivisible unit /oo/ (ZINDER, 1997, p. 117).

Finally, it should be pointed out that all the noted facts of synchrony are easily explained diachronically. Throughout the entire history of the German language, no German diphthong has ever arisen from a combination of phonemes: modern diphthongs either go back to old diphthongs or are the result of diphthongization of old long vowels: /æ/ from *î*, /ao/ from *û*,

/oø/ from iu (it is the long /y:/ in the Middle High German script) (ZINDER, 1997, p. 118). This approach turned out to be very fruitful and was experimentally confirmed in the works of S. I. Verman (1972) and V. M. Bukharov (1973). The results of their research allow us to interpret German diphthongs as monophonemes.

So, the question of the phonological interpretation of diphthongs is still controversial. No one disputes the position that diphthongs are a combination of sounds, but the opinions of researchers differ greatly with respect to their phonemic nature.

It should be noted that the sum of the duration of each diphthong is longer than the duration of a short monophthong, but it does not exceed the average duration of a long monophthong. The elements of each diphthong are a monolithic sound unity of a monosyllabic character, that is, a syllable or morpheme border does not go between them, and they can only be artificially separated (KOHLENER, 1995, p. 169). The second elements (glides) of these diphthongs are never pronounced with rough glide, which seems to be an important factor in the question of the monophonemic nature of the diphthong, since rough glide is present in the German island dialects of Russian Germans in the Verkhnekamsk district of the Kirov region, although it is less pronounced than in the German literary language. Thus, the diphthongs considered in this research are monophonemic combinations of two vowels in one syllable, which are characterized by sliding articulation from the structure of the first to the structure of the second component.

## Results

From the theoretical premises of this linguistic study, it follows that the description of the sound system of the German settlements of Sozimsky and Chetnigovsky of the Kirov Region should include information on articulation, acoustics, perception and functioning of sounds. The problem of determining the system of vowel phonemes (diphthongs) was solved in line with the Shcherba's phonetics, which is characterized by recognition of the connection between the sound and semantic sides of the language (SVETOZAROVA, 1983, p. 4). Variants of one phoneme was determined as one and the same phoneme not only by means of the distributive analysis, that is, not only by the fact that they cannot be found in the same phonetic context, but also by their common pronunciation properties (ZINDER, 1979, p. 71-73). Not without reason N. S. Trubetskoy (1980) noted the need for the basis for comparing phonemes (p. 74–75).

Based on the acoustic, distributive comparative-comparative and computer analyzes, we have identified diphthongs of the oral resonator, which include *iə*, *uə*, *ui*, *ɛa*, *əi*, *əu*, *oi*, *ou*, *ai*; as well as diphthongs of the nasal resonator *ẽã*, *õĩ*, *õũ*, *ãĩ*, which in terms of their acoustic characteristics are similar to the corresponding oral diphthongs, but differ from them in the nasal timbre, which performs the sense-distinguishing function. In this paper, we consider only diphthongs of the oral resonator.

The diphthong */iə/* is the most common diphthong, its frequency is 1.27%<sup>6</sup>. This diphthong is found in the following examples: *diə* “die”, *biəgə* “biegen”, *ziəs* “süss”, *niərə* “Niere”, *giəsa* “giessen”, *tiər* “Tier”, *fiər* “für”, *hiər* “hier”. The first element (nucleus) is perceived by all auditors as the front upper vowel [i], the second element (glide) is characterized as the middle vowel of the middle rise, it resembles the vowel [ə], fixed in this language material in the unstressed position. The results of the auditory analysis were confirmed by the spectral and formant analyzes of this diphthong. The average values of the formants are: F1 – 380 – 477 Hz, F2 – 2044 – 1785Hz, F3 – 2445 – 2531 Hz. The excursion data are: R2 = 6.4 and R1 = 5.3<sup>7</sup>. The recursion data are: R2 = 5.3 and R1 = 3.7. The presented data allow us to conclude that the first element of the diphthong is close to the vowel [i] (R2 = 7.7, R1 = 5.6), and the second element of the diphthong can be compared with the vowel [ə] (R2 = 4.9, R1 = 3.2) The duration of the diphthong is 251 ms. The considered diphthong as a monophoneme can be opposed to long vowel monophthongs. Cf.:

*/iə – i:/ – tiər – ti:r* “Tier – Tür”

*/iə – u:/ – diə – du:* “die – du”

*/iə – ɛ:/ – tsiəl – tsɛ:la* “Ziel – zählen”

*/iə – o:/ – diə – do:* “die – da”

*/iə – a:/ – hiər – ha:r* “hier – Haar”

It can also be opposed to other diphthongs of the oral resonator. Cf.:

*/iə/ – /uə/ – briədr – bruədr* “Brüder – Bruder”

*/iə/ – /ui/ – niərə – nuir* “Niere – neuer”

*/iə/ – /ɛa/ – miər – mɛar* “mir – Meer”

*/iə/ – /əi/ – viə – vəi* “wie – weh”

*/iə/ – /oi/ – liəd – loid* “Lied – Leid”

<sup>6</sup>To find out the relative frequency of vowels with respect to consonant phonemes in a coherent text, we chose from the language material of three informants-speakers three different everyday language texts with a total of 1463 phonemes, of which 457 vowel monophthongs, 90 diphthongs, 916 consonants.

<sup>7</sup>To evaluate the formant structure, we relied on relative numbers (R), which express the distribution of formants (F1, F2, F3) on the frequency scale of the spectrum.

/iə/ – /ou/ – tiəf – toufaˈ “tief – taufen”

/iə/ – /ai/ – liəd – laid “Lied – Leute”

/iə/ – /əu/ – siə – səu “sieh (Imper.) - Sau”.

The next diphthong /uə/ is found in the following examples: kuə “Kuh”, guəd “gut”, fuədr “Futter”, huəd “Hut”, bruədr “Bruder”, fuəl “Schule”. The frequency of this diphthong is 0.12%. The nucleus is perceived by all auditors as the closed back upper vowel [u], and the glide is marked as the middle vowel of the middle rise, which resembles the unstressed vowel [ə], fixed in this material in the unstressed position. The spectral analysis shows the average values of the formants F1 – 450 – 475Hz, F2 – 749 – 1103 Hz, F3 – 2659 – 2500 Hz. The excursion data are: R2 = 5.9 and R1 = 1.6. The recursion data are: R2 = 5.2 and R1 = 2.3. The presented data allow us to conclude that the first element of the diphthong is close to the vowel [u] (R2 = 6.7, R1 = 2.2), the second element can be compared with the vowel [ə] (R2 = 4.9, R1 = 3.2) The duration of the diphthong is 246 ms. This diphthong as a monophoneme can be opposed to long monophthongs. Cf.:

/uə – i:/ – gruəs – gri:səˈ “Gruss – Grüsse”

/uə – u:/ – fuəl – fu: “Schule – Schuh”

/uə – ɛ:/ – fuəl – fɛ:laˈ “Schule – schälen”

/uə – o:/ – huəf – ho:f “Huf – Hof”

/uə – a:/ – vuəd – va:dəˈ “Wut – Wade”.

The diphthong /uə/ can be contrasted with other diphthongs of the oral resonator. Cf.:

/uə – iə/ – bruədr – briədr “Bruder – Brüder”

/uə – ui/ – tsuə – sui “zu – sie”

/uə – ɛa/ – fuədr – fɛad “Futter– Pferd”

/uə – əi/ – ftuəfəˈ – ftəif “Stufe – steif”

/uə – əu/ – huəd – həud “Hut – Haut”

/uə – oi/ – luədr – loid “Luder – leid”

/uə – ou/ – bruədr – broud “Bruder – Brot”

/uə – ai/ – huəd – haidəˈ “Hut – heute”.

The frequency of the diphthong /ui/ is 0.06% and this diphthong is found in the following examples: dui “die”, buiɫ “Beutel”, uic “euch”, huizr “Häuser”, nui “neu”, nuibərg “Neuburg”. The nucleus is perceived by all auditors as the back upper vowel [u], the glide is characterized as the front upper vowel [i]. The spectral analysis data show the average values of the formants, which are F1 – 497 – 382 Hz, F2 – 978 – 2351 Hz, F3 – 2533 – 2550 Hz. The excursion data are: R2 = 5.0 and R1 = 1.9. The recursion data are: R2 = 6.6 and R1 = 6.1,

which characterize the closeness of the first element of the diphthong to the vowel [u] (R2 = 6.7, R1 = 2.2), and of the second element to the vowel [i] (R2 = 7.7, R1 = 5.6). The duration of the diphthong is 252 ms. This diphthong as a monophoneme can be opposed to long monophthongs. Cf.:

/ui – i:/ – dui – di:ç “die – dich”

/ui – u:/ – dui – du: “die – du”

/ui – ɛ:/ – uiç – ɛ:çtə̃ “euch – echte”

/ui – o:/ – dui – do: “die – da”

/ui – a:/ – nui – na: “neu – nah”.

The diphthong /ui/ can be contrasted with other diphthongs of the oral resonator. Cf.:

/ui – iə/ – nuir – niə̃rə̃ “neuer – Niere”

/ui – uə/ – sui – tsuə “sie – zu”

/ui – ɛa/ – uir – ɛ̃arə̃ “euer – Ähra”

/ui – əi/ – nui – nəi “neu – neu”

/ui – əu/ – huizr – həus “Häuser – Haus”

/ui – oi/ – uiç – oiçə̃ “euch – Eiche”

/ui – ou/ – tuifl – toufã “Teufel – taufen”

/ui – ai/ – dui – daitʃ “die – Deutsch”.

The frequency of the diphthong /ɛa/ is 0.84%; the diphthong is found in the following examples: ɛa “Ehe”, tɛa “Tee”, vɛaç “Weg”, ɛ̃arə̃ “Ähra”, klɛa “Klee”, fɛadr “Pferd”, fɛadr “Feder” The nucleus is characterized by all auditors as the middle e-like vowel of the middle rise [ɛ], and the glide is marked as the back low vowel [a]. The average values of the formants: F1 – 447 – 713 Hz, F2 – 1737 – 1417 Hz, F3 – 2520 – 2414 Hz. The excursion data of are: R2 = 5.6 and R1 = 3.8. The recursion data are: R2 = 3.4 and R1 = 1.9. It allows us to compare the first element with the closed e-sound [ɛ] (R2 = 5.7, R1 = 3.4), and the second element with the unstressed vowel [a] (R2 = 3.5, R1 = 1.7), or the vowel [ã] (R2 = 3.7, R1 = 2.1). The duration of the diphthong is 285 ms. The diphthong /ɛa/ as a monophoneme is opposed to long vowel monophthongs. Cf.:

/ɛa – i:/ – vɛaç – vi:gã “Weg – wiegen”

/ɛa – u:/ – fɛadr – fu:dr “Feder – Futter”

/ɛa – ɛ:/ – ɛabr – ɛ:bə̃ “Eber – eben”

/ɛa – o:/ – vɛa – vo: “wer – wo”

/ɛa – a:/ – nɛabl – na: bl “Nebel – Nabel”.

This diphthong can be opposed to other diphthongs of the oral resonator. Cf.:

/ɛa – iə/ – mɛar – miər “Meer – mir”  
 /ɛa – ui/ – ɛarəː – uir “Ähre – euer”  
 /ɛa – uə/ – fɛad – fuədr “Pferd – Futter”  
 /ɛa – əi/ – bɛazəː – bəizəː “Besen – böser”  
 /ɛa – əu/ – bɛar – bəu “Bär – Bau”  
 /ɛa – oi/ – ɛa – oi “Ehe – Ei”  
 /ɛa – ou/ – brɛat – brout “Brett – Brot”  
 /ɛa – ai/ – hɛad – haidəː “Herd – heute”.

The diphthong /əi/ is found in the following examples: əi “Ei”, əizl “Esel”, vəi “weh”, nəi “neu”, məilr “Mäuler”, məizəː “Mäuse”, bəizəː “böser”, tsəig “Zeug”, rəizəː “Reise”. The frequency of this diphthong is 0.72%. The nucleus is characterized by all auditors as the middle e-vowel of the middle rise, it resembles the vowel [ə], fixed in the studied material in the unstressed position, and the glide is marked as the front upper vowel [i]. The spectral analysis shows the average values of the formants: F1 – 405 – 390 Hz, F2 – 1017 – 2035 Hz, F3 – 2530 – 2600 Hz. The data R1 = 2.5, R2 = 6.2 during the excursion allow us to conclude that the first element is close to the middle vowel of the middle rise [ə] (R2 = 4.9, R1 = 3.2). Based on the data R1 = 5.2, R2 = 6.6 during the recursion, we can compare the second element with the front upper vowel rise [i] (R2 = 7.7, R1 = 5.6). The duration of the diphthong /əi/ is 284 ms. This diphthong as a monophoneme is opposed to long monophthongs. Cf.:

/əi – i:/ – ləid – li:d “leid – Lied”  
 /əi – u:/ – tsəig – tsu:g “Zeug – Zug”  
 /əi – e:/ – əiləː – e:l “Eule – Öl”  
 /əi – ɛ:/ – səil – sɛ:ləː “Seil – Seele”  
 /əi – o:/ – rəizəː – rɔ:s “Reise – Ross”  
 /əi – a:/ – fəiraː – fa:raː “feire – fahre”.

The diphthong /əi/ can be contrasted with other oral diphthongs. Cf.:

/əi – iə/ – vəi – viə “weh – wie”  
 /əi – ui/ – nəi – nui “neu – neu”  
 /əi – uə/ – ʃtəif – ʃtuəfəː “steif – Stufe”  
 /əi – ɛa/ – bəizəː – bɛazəː “böser – Besen”  
 /əi – əu/ – məizəː – məus “Mäuse – Maus”  
 /əi – oi/ – əir – oi “Eier – Ei”  
 /əi – ou/ – brəit – brout “breit – Brot”  
 /əi – ai/ – ləid – laidəː “Leid – Leute”.



The frequency of the next diphthong /əu/ is 0.3%, this diphthong is found in the following examples: əugəˈ “Auge”, bəu “Bau”, əus “aus”, səu “Sau”, həus “Haus”, bləu “blau”, məus “Maus”, kəuʋə “kaufen”, səuga “saugen”, ləudr “lauter”, brəuxaˈ “brauchen”. All auditors marked that the nucleus is a middle e-vowel of the middle rise [ə], fixed in this material in the unstressed position, the glide is characterized as the back upper vowel [u]. The spectral analysis shows the average value of the formants: F1 – 395 – 352 Hz, F2 – 1122 – 816 Hz, F3 – 2336 – 2336 Hz. The excursion data are R1 = 2.8, R2 = 5.9, which allow us to conclude that the first element is close to the middle vowel of the middle rise [ə] (R2 = 4.9, R1 = 3.2). Based on the recursion data R1 = 2.3, R2 = 6.6, we can compare the second element with the back upper [u] (R2 = 6.7, R1 = 2.2). The duration of the diphthong is 313 ms. This diphthong as a monophoneme is opposed to long monophthongs. Cf.:

/əu – i:/ – ləudr – li:d “lauter – Lied”

/əu – u:/ – dəubəˈ – ʃtu:bəˈ “Taube – Stube”

/əu – e:/ – əus – e:sl “aus – Esel”

/əu – ɛ:/ – ləudr – lɛ:dəç “lauter – ledig”

/əu – o:/ – səu – so: “Sau – so”

/əu – a:/ – həuz – ha:zəˈ “Haus – Hase”.

The diphthong /əu/ can be contrasted with other diphthongs of the oral resonator. Cf.:

/əu – iə/ – səu – siə “Sau – sieh(imper.)”

/əu – ui/ – həuz – huizr “Haus – Häuser”

/əu – uə/ – həud – huəd “Haut – Hut”

/əu – ɛa/ – bəu – bɛa “Bau – Bär”

/əu – əi/ – məus – məizəˈ “Maus – Mäuser”

/əu – oi/ – həus – hoisr “Haus – Häuser”

/əu – ou/ – gləubaˈ – loubaˈ “glauben – loben”

/əu – ai/ – ləudr – laidəˈ “lauter – Leute”.

The frequency of the diphthong /oi/ is 0.06% and this diphthong is found in the following examples: oi “Ei”, doig “Teig”, oiçəˈ “Eiche”, ois “Eis”, hoizr “Häuser”, loid “leid”. The nucleus is noted by all auditors as the back middle o-like vowel [o], and the glide is characterized as the front upper vowel [i]. The spectral analysis of the diphthong /oi/ shows: F1 – 480 – 380 Hz, F2 – 965 – 1980 Hz, F3 – 2660 – 2660 Hz. The ratios R1 = 2.0 and R2 = 5.5 during the excursion allow us to conclude that the first element of the diphthong is compared with the back middle vowel [o] (R2 = 5.1, R1 = 1.8), and the ratios R1 = 5.2, R2 = 7.0 allow us to compare the second element with the front upper vowel [i] (R2 = 7.7, R1 = 5.6). The duration

of the diphthong /o/ is 335 ms. This diphthong as a monophoneme is opposed to long monophthongs. Cf.:

- /oi – i:/ – loid – li:d “leid – Lied”
- /oi – u:/ – doig – dugəd “Teig – Tugend”
- /oi – ɛ:/ – loid – lɛ:dəç “leid – ledig”
- /oi – o:/ – hoizr – hɔ:zəˈ “Häuser – Hose”
- /oi – a:/ – doig – da:g “Teig – Tag”.

The diphthong /oi/ can be contrasted with other oral diphthongs. Cf.:

- /oi – iə/ – loid – liəd “leid – Lied”
- /oi – ui/ – oiçəˈ – uiç “Eiche – euch”
- /oi – uə/ – loid – luədr “leid – Luder”
- /oi – ɛa/ – oi – ɛa “Ei – Ehe”
- /oi – əi/ – oi – əir “Ei – Eier”
- /oi – əu/ – hoizr – həus “Häuser – Haus”
- /oi – ou/ – loib – loubəˈ “Leib – loben”
- /oi – ai/ – loid – laidəˈ “leid – Leute”.

The diphthong /ou/ is found in the following examples: ouvəˈ “Ofen”, ouldəˈ “alter”, flou “Floh”, jəʃtouləˈ ‘gestohlen”, kouləˈ” Kohle”, broudˈ Brot”, loubəˈ “loben”, ʃouldəˈ “Schulter”, grous “gross”. Its frequency is 0.3%. All auditors noted that the nucleus is the back middle o-like vowel [o], and the glide is the back middle u-like vowel [u]. The spectral analysis of the diphthong shows: F1 - 483 - 390 Hz, F2 - 1129 - 890 Hz, F1 - 2478 - 3000 Hz. The excursion data R1 = 2.3, R2 = 5.1 allow us to compare the first element of the diphthong with the back middle vowel [o] (R2 = 5.1, R1 = 1.8), the recursion data R1 = 2.2, R2 = 7.6 allow us to compare the second element of the diphthong with the back upper vowel [u] (R2 = 6.7, R1 = 2.2). The duration of the diphthong /ou/ is 294 ms. This diphthong as a monophoneme can be opposed to long monophthongs. Cf.:

- /ou – i:/ – loubəˈ – li:bəˈ “loben – Liebe”
- /ou – u:/ – jəʃtouləˈ – ʃtu:l “gestohlen – Stuhl”
- /ou – ɛ:/ – grous – grɛ:zr “gross – grösser”
- /ou – e:/ – rou – re: “roh – Reh”
- /ou – o:/ – roud – ro:t “rot – Rat”
- /ou – a:/ – grous – gra:s “gross - Gras”.

The diphthong /ou/ can be opposed to other oral diphthongs. Cf.:

- /ou – iə/ – toufaˈ – tiəf “taufen – tief”

/ou – ui/ – toufaː – tuifl “taufen – Teufel”  
/ou – uə/ – broud – bruədr “Brot – Bruder”  
/ou – ɛa/ – broud – brɛad “Brot – Brett”  
/ou – əi/ – broud – brəid “Brot – breit”  
/ou – əu/ – loubaː – gləubaː “loben – glauben”  
/ou – oi/ – loubaː – loib “loben – Leib”  
/ou – ai/ – grous – grais “gross – Greis”.

The frequency of the next diphthong /ai/ is 0.42% and this diphthong is found in the examples: daitʃ “Deutsch”, hais “heiss”, mainə “meine”, kaizr “Keiser”, baizaː “beissen”, haidəː “heute”, laid “Leute”, raiç “reich”, laizəː “leise”. The nucleus is characterized by all auditors as the back low a-like vowel [a], and the glide is marked as the front upper i-like vowel [i]. The spectral analysis of the diphthong /ai/ shows that F1 - 690 - 445 Hz, F2 - 1154 - 1980 Hz, F3 - 2530 - 2632 Hz. The excursion data R1 = 1.6, R2 = 3.6 allow us to compare the first element of the diphthong with the back low vowel [a] (R2 = 3.5, R1 = 1.7), the recursion data R1 = 4.4, R2 = 5.9 allow us to compare the second element of the diphthong with the front upper vowel [i] (R2 = 7.7, R1 = 5.6). The duration of this diphthong is 297 ms. This diphthong as a monophoneme is opposed to long monophthongs. Cf.:

/ai – i:/ – laid – li:d “Leute – Lied”  
/ai – u:/ – baisaː – bu:s “beissen – Bus”  
/ai – ɛ:/ – laizəː – glɛ:zr “leise – Gläser”  
/ai – e:/ – kaizr – ke:z “Keiser – Käse”  
/ai – o:/ – rais – ro:s “Reis – Ross”  
/ai – a:/ – hais – ha:zəː “heiss – Hase”.

The diphthong /ai/ can be opposed to other oral diphthongs. Cf.:

/ai – iə/ – laid – liəd “Leute – Lied”  
/ai – ui/ – daitʃ – dui “Deutsch – die”  
/ai – uə/ – haidəː – huəd “heute – Hut”  
/ai – ɛa/ – haidəː – hɛad “heute – Herd”  
/ai – əi/ – laid – ləid “Leute – leid”  
/ai – əu/ – laid – ləudr “Leute – lauter”  
/ai – oi/ – laid – loid “Leute – leid”  
/ai – ou/ – grais – grous “Greis – gross”.

## Conclusion

Thus, based on the acoustic, distributive comparative-comparative and computer analyzes, we distinguished 9 diphthongs of the oral resonator: iə, uə, ui, ɛa, əi, əu, oi, ou, ai, they are monophonemic, which is manifested in the specific acoustic characteristic, duration, monosyllabicity, that is, the syllable or morpheme border never passes between the components, as well as in the absence of the rough glide in the second component.

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