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Flowing With the Flow: Euphony of Hydronyms From Quantitative and Sociological Perspectives

Abstract

The paper focuses on the euphonic character of hydronyms, which is researched from two perspectives. The corpus comprises two sets of Czech river, pond, and spring names taken from the Ostravice river basin (the Moravian-Silesian Region), and the Morava river basin (the Zlín Region, the Olomouc Region, the South-Moravian Region), respectively. As to the methods, first, euphony values of the water names are computed on the grounds of a formula which is used in analysing poetry. Second, a questionnaire survey was carried out, in which secondary-school and university students were asked to order selected hydronyms according to their own perceptions of euphoniousness. The results of both investigations are compared, and several conclusions are drawn from their interplay.

Keywords

hydronyms, euphony, onomastics, quantitative linguistics, sociolinguistics

1. Introduction

This text focuses on the occurrences of euphony in Czech proper names, especially in hydronyms. The research goal was to compare two approaches to euphony provided in different manners – a formula-based quantification and a questionnaire survey. This way, we also test to what extent the viewpoints of the respondents match with the outcome of the computation. Besides the onomastic contribution, the paper therefore provides material to be studied by methodology of quantitative linguistics.

Traditionally, *euphony* is defined as a sound composition of a word (or a bigger unit) which is somewhat specific to listeners/readers (mostly in the positive sense). It is based on an accumulation of sounds or syllables, or on their repetitions (Carper, 2012; Krčmová, 2017). In our approach, we investigate euphony of all consonants with no distinctions; our concept of euphony is thus very close to simple sound prominence.

In the conventional approach, euphony focused on poetic lines; in the present paper, it covers lists of proper names (see the "Material" section). Proper names could be represented by various groups of named objects – we could classify them into anthroponyms,[1] geographical names (toponyms, hodonyms, hydronyms, etc.[2]), ergonyms/chrematonyms,[3] zoonyms,[4] etc. For our research, we opted for studying hydronyms, as there is little chance people have personal relationships to them; an overview of – for instance – anthroponyms may be, on the other hand, influenced by the personal stances of the respondents (popularity, trendiness, etc.). In the case of hydronyms, it is probable that they will take into account the sound structure of the word only.

Moreover, in the case of hydronyms, onomatopoeia can be a factor of euphoniousness, too. The term *onomatopoeia* refers to the situation when the form of the word is connected to its contents, that is, onomatopoeia relates to the

[1] Names for people or for groups of people (ICOS).

[2] *Toponyms* are names for inhabited and uninhabited places; *hodonyms* are names of routes, *hydronyms* are names of bodies of water (ICOS).

[3] *Ergonyms/chrematonyms* are names for brands or products (ICOS).

[4] Names for animals (ICOS).

meaning of the word, and to an extent, onomatopoeic words imitate real sounds (Novotná & Karlíková, 2017).

2. Material

The water objects have always been very important landmarks, and therefore hydronyms (water names) represent the oldest layer of onymy. This is the reason why in their forms, we can find the roots which refer to the Indo-European, Baltic, and old Slavic origins of water names – in the Czech context, the Pre-Slavic names are represented by, for instance, the rivers *Dyje*, *Jihlava*, *Jizera*, *Labe* (see Blažek, 2003, 2006). Contemporary Czech hydronymy[5] is characterized by a tendency to designate water objects with the names of the neighbouring places (settlement names/oikonyms or microtoponyms/anoikonyms);[6] for example, the river name *Bruzovka* comes from the oikonym *Bruzovice*, etc. After the Second World War, this tendency was proposed as a way to localize water objects easily (Šmilauer, 1957). However, a lot of hydronyms still exist which were motivated by the characteristic nature of the designation objects, including colour (e.g., *Bílý potok* 'white stream'; cf. Štěpán, 2004), the nature of the subsoil (e.g., *Kamenitý potok* 'rocky stream'), the quality of the water (e.g., *Slaná* 'salty water'), and the sound, too (e.g., *Bublava* 'bubbling stream').

The resources for the analysis are two lists of hydronyms. The first one contains 735 hydronyms of the Ostravice river basin (Kovářová, 2021), including both flowing-water names and standing-water names. The research area, the Ostravice river basin, is located in the Moravian-Silesian Region of the Czech Republic. It is near the Polish and Slovak borders. The second one comprises 234 hydronyms of the Morava river basin (Michalová, 2012), and it includes flowing-water names only. The Morava flows into the Danube in Slovakia, and

[5] For the purposes of this study, the term "Czech hydronym" will be used to mean every water name which names a water object in the area of the Czech Republic, regardless of its origin.

[6] *Settlement names/oikonyms* are the names for objects where people live; *microtoponyms/anoikonyms*, on the other hand, denote objects that are uninhabited (e.g., fields or meadows).

part of its riverbed forms the Austrian-Slovak borderline. It is to be noted that in the research, all names are included, regardless of their etymological origin.

3. Methods of the quantitative analysis

The quantitative approach to euphony is based on the probability counts and the effect of the unattended upon the reader (cf. Shklovsky, 1991). In poetry, it is calculated as the sum of the probabilities of the co-occurrence of two or more sounds[7] in a line (cf. Altmann, 1966; Čech et al., 2011); however, as our paper concerns hydronyms, the principle needs to be adjusted to the research conditions. We have therefore decided to consider each hydronym a line of its own, the list of the names thus forming a "free-verse poem" *sui generis*. This way, which we consider to be experimental, we will be able to use the calculation of euphony without limiting it to the sphere of verse.

The aforementioned ideas can be expressed via the formula:

$$E = 0.05 - \sum_{x=x_1}^{n} \binom{n}{x} p^x q^{n-x}$$

where x stands for the frequency of a sound in a name and n for the number of positions that it is theoretically possible to place the sound in (it thus equals the number of consonants which occur in a hydronym); $\binom{n}{x}$, a so-called binomial coefficient, then takes into consideration all placements of the particular x-member group in n number of positions, equalling thus the total of existing combinations; p is the probability of the occurrence of the sound in a reference corpus, or, which is the same, its relative frequency (the ratio of the frequency of the sound in the given corpus and the total of all consonants – $p = \frac{f(x)}{\sum f}$), and q the probability of other cases, that is, $q = 1 - p$. This procedure accounts

[7] There are two notes to be made concerning the definition of euphony. First, in most research, only consonants are taken into account, as vowels occur so frequently that their appearance is not supposed to produce the needed effect upon the reader. Second, two co-occurrences only are the minimal number needed for the count; a euphony investigation may take more sound appearances as its basis.

for all imaginable situations of the co-occurrences of a sound in a hydronym. If the probability of such cases is lower than the widely employed statistical level of significance (5%, or 0.05), such a name is considered euphonic; if not, it is treated as non-euphonic (cf. Místecký et al., 2019).

Given the workings of the formula, it is essential to pay attention to the choice of reference corpus from which the frequencies of the sounds will be taken. Taking into account the fiction-like character of the phenomenon under study, we have opted for SYN-BEL, a subcorpus of Czech literature texts, which was elaborated by the Czech National Corpus institution. In order to process the results in a quick way, we have used the Euphonometer tool, which was devised by the Czech Academy of Sciences' Versification Research Group and is publicly accessible at the corresponding website.[8]

The procedure of counting is shown here, taking the brook name *Ščučí* [ʃt͡ʃutʃ͡i:], which contains two occurrences of the sound [t͡ʃ], as an example. The relative frequency of the sound in the SYN-BEL corpus is, approximately, 0.00876. As in the hydronym, there are, in total, three consonantal positions in which [t͡ʃ] may appear, calculating its euphony value proceeds as follows:

$$E = 0.05 - \left[\binom{3}{2} \times 0.00876^2 \times (1 - 0.00876) + \binom{3}{3} \times 0.00876^3 \right] = 0.05 - 0.00022887 = 0.049771$$

It is visible that the probability of the co-occurrences of two or three [t͡ʃ]'s in the total of three sound positions is 0.0229% (0.000229); this is far below the accepted level of significance (5%), which declares the name to be highly euphonic.

To conclude this section, two points should be emphasised. First, if there are more consonants that occur more than once in a hydronym, and their co-occurrences are found euphonic, the two euphonic values are summed up. Second, for the sake of better visualisation, the counted euphony values will be multiplied by 100; the figure of the *Ščučí* name is thus 4.97.[9]

[8] For more information, see Plecháč, 2017.

[9] In reality, the euphony scores in the research are slightly different, as in the example, the relative frequency of [t͡ʃ] was counted on the grounds of all the sounds in the SYN-BEL corpus, whereas in the Euphonometer calculations, it is the relative frequency of the consonant counted on the grounds of the SYN-BEL consonants only that is taken into account.

4. The results of the quantitative analysis

The quantitative method presented above has been applied to all names – separately to those of the Ostravice river basin and the Morava river basin. The results (the names that were identified as euphonic) are listed in Tables 1 and 2, together with the phonetic transcriptions of the names and the euphonic consonant(s). If there were two names with an exactly identical phonetic structure, they were listed as one only. The names in bold were used in the questionnaire survey (see the following part of the study).

Table 1. Hydronyms of the Ostravice river basin (2 co-occurrences of the sounds per line at least)

Hydronym	Phonetic transcription	Euphonic sound	Euphonic value
Kněhyňka	**[kɲɛɦɪɲka]**	**k (1.7562); ɲ (3.9744)**	**5.73**
Gigulská	**[gɪgulska:]**	**g**	**4.94**
Ščučí	**[ʃt͡ʃut͡ʃi:]**	**t͡ʃ**	**4.93**
Babí	**[babi:]**	**b**	**4.91**
Červíček	**[t͡ʃɛrvi:t͡ʃɛk]**	**t͡ʃ**	**4.78**
U Česnečky	**[u t͡ʃɛsnɛt͡ʃkɪ]**	**t͡ʃ**	**4.78**
Čítalnička	**[t͡ʃi:talɲɪt͡ʃka]**	**t͡ʃ**	**4.68**
Pod Kykulkou	**[pot kɪkulkou̯]**	**k**	**4.61**
U Čechovských	**[u t͡ʃɛxofski:x]**	**x**	**4.55**
Foldynův potok	[foldɪnu:f potok]	f	4.47
Frankův potok	[fraŋku:f potok]	f	4.47
Kněhyně	[kɲɛɦɪɲɛ]	ɲ	4.37
Dudov	[dudof]	d	4.37
Velký Kobylík	[vɛlki: kobɪli:k]	k	4.35
Pramen štěstí	[pramɛn ʃcɛsci:]	c	4.30
Porubský potok	[porupski: potok]	p	4.27
Za Kozlenou	[za kozlɛnou̯]	z	4.27

Hydronym	Phonetic transcription	Euphonic sound	Euphonic value
Bumbalka	[bumbalka]	b	4.19
Dolní Datyňka	[dolɲi: datɪɲka]	d (1.0845); ɲ (2.9393)	4.02
Klučkový potok	[kluʧkovi: potok]	k	4.01
Korabský potok	[korapski: potok]	k	4.01
Kořenský potok	[koɽɛnski: potok]	k	4.01
Kotelský potok	[kotɛlski: potok]	k	4.01
Papežovský potok	[papɛʒofski: potok]	p	3.96
Papežov	[papɛʒof]	p	3.96
Bumbalovice	[bumbalovɪʦɛ]	b	3.80
Nad Blablou	[nad blablóʊ̯]	b	3.80
U Drozdů	[u drozdu:]	d	3.77
Odlehčovací rameno Vlčoku	[odlɛɦʧovaʦi: ramɛno vl̩ʧoku]	ʧ ʃ	3.66
Frejírský rybník	[frɛji:rski: rɪbɲi:k]	r	3.60
Bukovinský potok	[bukovɪnski: potok]	k	3.59
Kotlanský potok	[kotlanski: potok]	k	3.59
Velkovský potok	[vɛlkofski: potok]	k	3.59
Palkovský potok	[palkofski: potok]	k	3.59
Vítkovský potok	[vi:tkofski: potok]	k	3.59
Hraničník	[ɦraɲɪʧɲi:k]	ɲ	3.50
U Huťského potoka	[u ɦucskɛ:ɦo potoka]	h	3.47
Náhon	[na:ɦon]	n	3.45
Gorbovická cesta	[gorbovɪʦka: ʦɛsta]	ʦ s	3.42
U Richterů	[u rɪxtɛru:]	r	3.39
U Rosnerů	[u rosnɛru:]	r	3.39
Papíkova	[papi:kova]	p	3.36
Mlýnský náhon	[mli:nski: na:ɦon]	n	3.31
Kavalčanský potok	[kavalʧanski: potok]	k	3.07
Podolkovický potok	[podolkovɪʦki: potok]	k	3.07
Škorňanský potok	[ʃkorɲanski: potok]	k	3.07
Vítková	[vi:tkova:]	v	3.07

Hydronym	Phonetic transcription	Euphonic sound	Euphonic value
Hodoňovický náhon	[ɦodoɲovɪt͡skiː naːɦon]	ɦ	3.06
Venclovický potok	[vɛnt͡slovɪt͡skiː potok]	t͡s	3.05
Koutňák	[kó͡ut̪ɲaːk]	k	2.97
Kolanka	[kolaŋka]	k	2.97
Kobylík	[kobɪliːk]	k	2.97
Kyčerky	[kɪt͡ʃɛrkɪ]	k	2.97
Skalka	[skalka]	k	2.97
Kobzok	[kobzok]	k	2.97
U korýtka	[u koriːtka]	k	2.97
Horní Datyňka	[ɦorɲiː datɪŋka]	ɲ	2.94
Kaňův rybník	[kaɲuːf rɪbɲiːk]	ɲ	2.94
První rybník	[pr̝vɲiː rɪbɲiːk]	ɲ	2.94
Pod Malým Polčaným	[pod maliːm polt͡ʃaniːm]	m	2.82
Pramen Černé Ostravice	[pramɛn t͡ʃɛrnɛː ostravɪt͡ʃɛ]	r	2.63
Statkový potok	[statkoviː potok]	t	2.54
Košťálovický rybník	[koʃcaːlovɪt͡skiː rɪbɲiːk]	k	2.47
Košťálovský rybník	[koʃcaːlofskiː rɪbɲiːk]	k	2.47
Pod Opálenou	[pot opaːlɛnó͡u]	p	2.37
Hraniční potok	[ɦraɲɪt͡ʃɲiː potok]	ɲ	2.31
Bumbalský potok	[bumbalskiː potok]	b	2.29
Chladná voda	[xladnaː voda]	d	2.11
Vodní nádrž	[vodɲiː naːdr̝ʒ]	d	2.11
Suché vodopády	[suxɛː vodopaːdɪ]	d	2.11
Nové Dvory	[novɛː dvorɪ]	v	1.91
Ve výkapě	[vɛ viːkapjɛ]	v	1.91
Klučkový	[klut͡ʃkoviː]	k	1.76
Kobylník	[kobɪlɲiːk]	k	1.76
Kozlanka	[kozlaŋka]	k	1.76
Křižůvka	[kr̝ɪʒuːfka]	k	1.76
Okrouhlík	[okró͡uɦliːk]	k	1.76
Kožušanka	[koʒuʃaŋka]	k	1.76

Hydronym	Phonetic transcription	Euphonic sound	Euphonic value
Krašický	[kraʃɪt͡ski:]	k	1.76
Kratošek	[kratoʃɛk]	k	1.76
Mořské oko	[moɾ̩skɛ: oko]	k	1.76
U kapličky	[u kaplɪt͡ʃkɪ]	k	1.76
Biologický rybník	[bɪjologɪt͡ski: rɪbɲi:k]	b	1.67
U Bumbalského potoka	[u bumbalskɛ:ɦo potoka]	b	1.67
Hraniční pramen	[ɦrajɪt͡ʃɲi: pramɛn]	ɲ	1.62
Malý Polom	[mali: polom]	m	1.47
Kocuří potok	[kot͡suɾ̩i: potok]	k	1.30
Starý Hurt	[stari: ɦurt]	r	1.25
Pod Čuplem	[pot t͡ʃuplɛm]	p	1.19
Pod Přelačí	[pot pɾ̩ɛlat͡ʃi:]	p	1.19
Pod Řepovým	[pot ɾ̩ɛpovi:m]	p	1.19
Podlipňok	[podlɪpɲok]	p	1.19
Nad Doroťankou	[nad dorocaŋko͡u]	d	1.08
Nad jízdárnou	[nad ji:zda:rno͡u]	d	1.08
Vodopády Satiny	[vodopa:dɪ sacɪnɪ]	d	1.08
Vodopády Mazáku	[vodopa:dɪ maza:ku]	d	1.08
Velký Lipový	[vɛlki: lɪpovi:]	v	0.54
Křivý potok	[kɾ̩ɪvi: potok]	k	0.33
Loucký potok	[lo͡ut͡ski: potok]	k	0.33
Malý Kobylík	[mali: kobɪli:k]	k	0.33
Velký potok	[vɛlki: potok]	k	0.33
Peklovisko	[pɛklovɪsko]	k	0.33
Rykalí potok	[rɪkali: potok]	k	0.33
Skaličník	[skalɪt͡ʃɲi:k]	k	0.33
Doktorská	[doktorska:]	k	0.33
U krále smrků	[u kra:lɛ smɾ̩ku:]	k	0.33
Velký Klauz	**[vɛlki: kla͡us]**	**k**	**0.33**
Josenčany	**[jozɛnt͡ʃanɪ]**	**n**	**0.33**
Nová Olešná	**[nova: olɛʃna:]**	**n**	**0.33**

Hydronym	Phonetic transcription	Euphonic sound	Euphonic value
Na Kamenci	**[na kamɛnt͡sɪ]**	**n**	**0.33**
Na Husinci	**[na ɦusɪnt͡sɪ]**	**n**	**0.33**
Na košarkách	**[na koʃarkaːx]**	**k**	**0.33**
Na kozinách	**[na kozɪnaːx]**	**n**	**0.33**
Nudlárna	**[nudlaːrna]**	**n**	**0.33**
Zanedbaná	**[zanɛdbanaː]**	**n**	**0.33**

Source: the authors' own work based on Michalová, 2012 and Kovářová, 2021.

Table 2. Hydronyms of the Morava river basin (2 co-occurrences of the sounds per line at least)

Hydronym	Phonetic transcription	Euphonic sound	Euphonic value
Fryšávka	**[frɪʃaːfka]**	**f**	**4.80**
Tištínka	**[cɪʃciːŋka]**	**c**	**4.74**
Šišemka	**[ʃɪʃɛmka]**	**k**	**4.70**
Popický potok	**[popɪt͡skiː potok]**	**p**	**4.53**
Bobrava	**[bobrava]**	**b**	**4.50**
Babačka	**[babat͡ʃka]**	**b**	**4.50**
Rozhozná	**[rozɦoznaː]**	**z**	**4.27**
Bobrůvka	**[bobruːfka]**	**b**	**4.19**
Bobrovec	**[bobrovɛt͡s]**	**b**	**4.19**
Křenický potok	[kr̝ɛŋɪt͡skiː potok]	k	4.01
Puklický potok	[puklɪt͡skiː potok]	k	4.01
Kroužský potok	[kro͡uʃskiː potok]	k	4.01
Lukovský potok	[lukofskiː potok]	k	4.01
Kunčický potok	[kunt͡ʃɪt͡skiː potok]	k	4.01
Valová	[valovaː]	v	3.99
Nivnička	[ɲɪvɲɪt͡ʃka]	ɲ	3.97
Okluky	[oklukɪ]	k	3.94
Křeslický potok	[kr̝ɛslɪt͡skiː potok]	k	3.59
Ludkovický potok	[lutkovɪt͡skiː potok]	k	3.59

Hydronym	Phonetic transcription	Euphonic sound	Euphonic value
Držkovský potok	[dr̩ʃkofski: potok]	k	3.59
Býškovský potok	[bi:ʃkofski: potok]	k	3.59
Svitava	[svɪtava]	v	3.07
Pejškovský potok	[pɛjʃkofski: potok]	k	3.07
Klepáčovský potok	[klɛpa:t͡ʃofski: potok]	k	3.07
Ctidružický potok	[t͡sɔcɪdruʒɪt͡ski: potok]	t͡s	3.05
Trkmanka	[tr̩kmaŋka]	k	2.97
Býkovka	[bi:kofka]	k	2.97
Rokytka	[rokɪtka]	k	2.97
Koménka	[komɛ:ŋka]	k	2.97
Kolekač	[kolɛkat͡ʃ]	k	2.97
Hraniční potok	[ɦraɲɪt͡ʃɲi: potok]	ɲ	2.31
Podhrádek	[podɦra:dɛk]	d	2.11
Křetínka	[kr̩ɛci:ŋka]	k	1.76
Markovka	[markofka]	k	1.76
Skalička	[skalɪt͡ʃka]	k	1.76
Křepička	[kr̩ɛpɪt͡ʃka]	k	1.76
Kladenka	[kladɛŋka]	k	1.76
Kotojedka	[kotojɛtka]	k	1.76
Kozrálka	[kozra:lka]	k	1.76
Vyklička	[vɪklɪt͡ʃka]	k	1.76
Kaní potok	**[kaɲi: potok]**	**k**	**1.76**
Mikulůvka	**[mɪkulu:fka]**	**k**	**1.76**
Rokytenka	**[rokɪtɛŋka]**	**k**	**1.76**
Hloučela	**[ɦlo͡ut͡ʃɛla]**	**l**	**0.54**
Fryštátský potok	**[frɪʃta:tski: potok]**	**t**	**0.37**
Štinkovka	**[ʃcɪnkofka]**	**k**	**0.33**
Únanovka	**[u:nanofka]**	**n**	**0.33**
Český potok	**[t͡ʃɛski: potok]**	**k**	**0.33**
Divoký potok	**[ɟɪvoki: potok]**	**k**	**0.33**

Source: own work based on Michalová, 2012 and Kovářová, 2021.

Most euphonic hydronyms contain both consonants with high frequencies in the Czech language ([b], [ɲ], [k], [t͡ʃ], [p], [c], [z], see Bartoň et al., 2009, pp. 30–31), and consonants that are not very frequent in Czech, such as [x], [f], or mostly dialectical [g] (cf. Bartoň et al., 2009, pp. 30–31). Proper names, especially toponyms, tend to keep the older forms of language and various dialectical idiosyncrasies (David & Mácha, 2014, p. 163), both at the lexical and morphological levels (gender, number), and at the phonetic one (these being, for instance, unusual, euphony-provoking sounds in hydronyms).

5. The questionnaire survey

The alternative approach to euphony is based on a questionnaire survey (see the Euphony research section at the end of the paper). We use the selected data of the previous quantitative analysis (see above, in bold) to ask respondents about their opinions on euphony of hydronyms. The questionnaire consists of six tables, the structure of which is given in Table 3. The task for the respondents, who were provided with a short definition of how we understand euphony, was to put the hydronyms in order of descending euphoniousness, with each rank (1–6) being used once only. For details, see the appendix to the study.

Table 3. Structure of the tables in the questionnaire

Table	Content
1	Ostravice, 4th–6th top-scoring hydronyms and 4th–6th lowest-scoring hydronyms
2	Morava, 4th–6th top-scoring hydronyms and 4th–6th lowest-scoring hydronyms
3	Ostravice, 1st–3rd top-scoring hydronyms and 1st–3rd lowest-scoring hydronyms
4	Morava, 7th–9th top-scoring hydronyms and 7th–9th lowest-scoring hydronyms
5	Ostravice, 7th–9th top-scoring hydronyms and 7th–9th lowest-scoring hydronyms
6	Morava, 1st–3rd top-scoring hydronyms and 1st–3rd lowest-scoring hydronyms

The data were collected in May 2020. The target groups were mostly secondary-school pupils (attending Pavel Tigrid Language Grammar School) and

students of Czech Language and Literature at the University of Ostrava. In total, 83 people participated in the survey; these were mostly women, as they form the majority in the selected fields of education. The details on age and sex of the respondents are given in Figure 1.

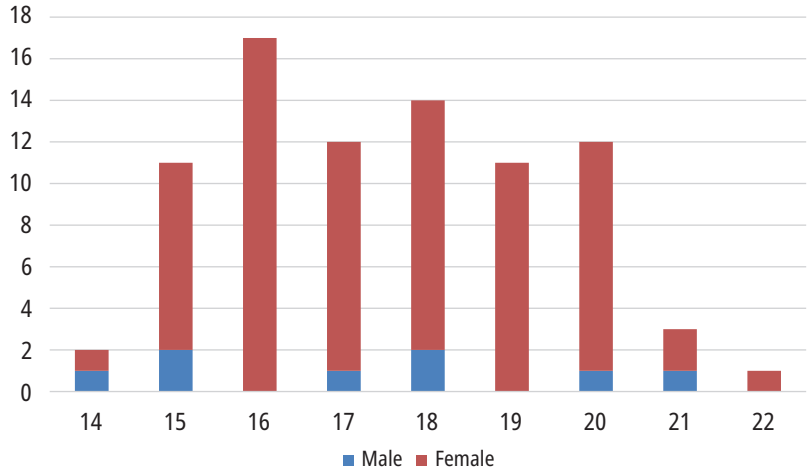

Figure 1. Age and sex of the participants

Source: own work.

As mentioned in Introduction, we expect to see correlations between the results of the quantitative analysis of euphony and t he perceptions of this phenomenon provided by the respondents.

6. The results of the survey

We process the outcomes regarding the top-scoring hydronyms and the lowest-scoring ones as two categories. This way, we calculate the number of respondents who ranked the given hydronym as first, second, or third, and the portion of those who ranked it as fourth, fifth, and sixth. The results are presented in Tables 4a–f, with the mismatches marked in grey.

Table 4a. Ostravice, 4th–6th top-scoring hydronyms and 4th–6th lowest-scoring hydronyms (two categories)

	1–3	4–6	1–3 [%]	4–6 [%]
Červíček	64	19	77	23
U Česnečky	47	36	57	43
Babí	51	32	61	39
Na Kamenci	34	49	41	59
Na Husinci	30	53	36	64
Na Košárkách	46	37	55	45

Source: own work.

Table 4b. Morava, 4th–6th top-scoring hydronyms and 4th–6th lowest-scoring hydronyms (two categories)

	1–3	4–6	1–3 [%]	4–6 [%]
Popický potok	44	39	53	47
Bobrava	39	44	47	53
Babačka	51	32	61	39
Hloučela	60	23	72	28
Fryštátský potok	27	56	33	67
Štinkovka	36	47	43	57

Source: own work.

Table 4c. Ostravice, 1st–3rd top-scoring hydronyms and 1st–3rd lowest-scoring hydronyms (two categories)

	1–3	4–6	1–3 [%]	4–6 [%]
Kněhyňka	52	31	63	37
Gigulská	36	47	43	57
Ščučí	43	40	52	48
Na kozinách	45	38	54	46
Nudlárna	46	37	55	45
Zanedbaná	38	45	46	54

Source: own work.

Table 4d. Morava, 7th–9th top-scoring hydronyms and 7th–9th lowest-scoring hydronyms (two categories)

	1–3	4–6	1–3 [%]	4–6 [%]
Rozhozná	33	50	40	60
Bobrůvka	58	25	70	30
Bobrovec	35	48	42	58
Kaní potok	45	38	54	46
Mikulůvka	58	25	70	30
Rokytenka	49	34	59	41

Source: own work.

Table 4e. Ostravice, 7th–9th top-scoring hydronyms and 7th–9th lowest-scoring hydronyms (two categories)

	1–3	4–6	1–3 [%]	4–6 [%]
Čítalnička	52	31	63	37
Pod Kykulkou	50	33	60	40
U Čechovských	43	40	52	48
Velký Klauz	33	50	40	60
Josenčany	36	47	43	57
Nová Olešná	43	40	52	48

Source: own work.

Table 4f. Morava, 1st–3rd top-scoring hydronyms and 1st–3rd lowest-scoring hydronyms (two categories)

	1–3	4–6	1–3 [%]	4–6 [%]
Fryšávka	51	32	61	39
Tištínka	55	28	66	34
Šišemka	50	33	60	40
Únanovka	45	38	54	46
Český potok	46	37	55	45
Divoký potok	43	40	52	48

Source: own work.

In these categories, the respondents have chosen the computed group of ranks in 61% of the cases (22 out of 36 matches). It thus seems that the calculated values do reflect, at least to a certain extent, the feeling of euphony as it is perceived by the studied portion of population.

The matches can be interpreted as being indicative of which sounds the respondents consider euphonic. In this perspective, [t͡ʃ], [ɲ], and [c] appear to be very salient, as is testified by the results of hydronyms *Kněhyňka* (Table 4c), *Čítalnička* (Table 4e), and *Tištínka* (Table 4f). However, it seems that the respondents consider a broader phonetic context, as the euphonic rank of *Ščučí* (Table 4c) is a matter of dispute, which may have been influenced by the cacophonously-sounding cluster [t͡ʃu]. The same reasoning, together with morphology, may have played a role in the different treatments of hydronyms *Bobrůvka* and *Bobrovec* (Table 4d): whereas *Bobrůvka*, which may be taken as a diminutive and which contains the sound [u:], was considered very euphonic, the *Bobrovec* results go in the opposite direction.

The mismatches concern a mixture of cases behind which there may be various motivations; despite the fact that the conception of the notion was explained at the beginning of the questionnaire, it is probable that some respondents limited euphony to sweet-sounding names only, this being responsible for declaring such hydronyms as *Gigulská* or *Rozhozná* not euphonic enough. The same deliberation may have boosted the feeling of euphoniousness in the names *Únanovka*, *Nudlárna*, or *Mikulůvka*; in the last case, the euphonic potential has increased due to the repetition of the vowel [u/u:], too. Morphological structure, reminiscent of a diminutive, appears to have led to the high rank of *Rokytenka*, and could have played a part in the treatment of the previous names, too.

It also needs to be noted that the mismatches are more frequent in the lower part of the scale; in the first three ranks, 77% of the cases are in harmony with the computed results, whilst it is only 44% in the last three ones. This shows a lot of hesitation in determining the order of the names (especially in Table 4d); in some cases (Table 4f), there is even a tendency to revert the order completely.

7. Conclusions

The goal of our analysis was to research euphony in the proper-names sphere of language, in particular, hydronyms. This class of proper names was chosen in connection to qualitative research, which focused on comparing the counted values of euphony and the respondents' answers. We assumed that when assessing the hydronyms, users of the Czech language would evaluate their sound structures, without being influenced by extralinguistic factors.

The quantitative analysis was carried out with the help of the Euphonometer software, which generated a list of euphonic hydronyms. The top-scoring hydronyms contained two types of repeating consonants – ones which are very frequent in Czech ([b], [ɲ], [k], [t͡ʃ], [p], [c], [z]), and ones which are, in comparison to the preceding groups of sounds, rather rare in standard Czech ([g], [x] or [f]).

In the qualitative part of the research, we employed a questionnaire survey; the questions were formulated on the grounds of the outcome of the quantitative analysis. We used selected top-scoring and lowest-scoring hydronyms, and found that the counts harmonized with the respondents' answers in more than half the cases (61%, 22 out of 36 cases). The difference in euphony perception may have been brought about by dissimilar approaches – Euphonometer worked with consonants only, but the respondents may have taken into account vowels, too, as they reportedly contribute, altogether with sonorants, to the feeling of euphony (Krčmová, 2017). This – together with the diminutive-sounding suffixes – may also explain why the respondents treat the names with the same euphony values differently (e.g., *Bobrovec* and *Bobrůvka*). Another reason behind the differing choices of the respondents may be connected to viewing some names as cacophonic (e.g., *Ščučí*), despite the fact that our neutral conception of euphony is exemplified in the introduction to the questionnaire.

The fact that the relation between the quantitative analysis and the respondents' answers is a complicated one may stimulate a wider discussion about the workings of quantitative measurements. Generally, it has been proved that it is possible to use the euphony count for the proper-names sphere of language, which points to the potential of the studied index in onomastics.

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Appendix

Euphony Research

Dear Sir or Madam,
we would like to ask you to fill in a short questionnaire which seeks to find out which of the following geographical names are considered euphonic (mellifluous) by users of the Czech national language. Euphony is seen as a phenomenon typical of words the sound structure of which is specific one way or another (e.g., chrchlat, ťuňťa, levandule).

The questionnaire will take you 15–20 minutes approximately.

In the introductory part, please, state your age, sex, the school that you attend, and the current year of your studies. These data will help us to compare how perceptions of the names differ from each other.

Thank you for your time, your participation in the questionnaire survey is of high importance for us.

1. Age .....

2. Sex
Help: Choose one option only.

☐	male
☐	female

3. School and the year of study .....
.....

4. Today's date .....

5. Put numbers 1–6 to each name according to its level of euphoniousness. The name with the highest level of euphoniousness – 1, the least euphonious name – 6.
Help: Choose one answer in one line. Within one question, each number can be used only once – it means that each name in the column must have one specific value, which is its own only.

	1	2	3	4	5	6
Na Kamenci						
Červíček						
U Česnečky						
Na Husinci						
Babí						
Na Košárkách						

6. Put numbers 1–6 to each name according to its level of euphoniousness. The name with the highest level of euphoniousness – 1, the least euphonious name – 6.
Help: Choose one answer in one line. Within one question, each number can be used only once – it means that each name in the column must have one specific value, which is its own only.

	1	2	3	4	5	6
Babačka						
Popický potok						
Štinkovka						
Bobrava						
Fryštátský potok						
Hloučela						

7. Put numbers 1–6 to each name according to its level of euphoniousness. The name with the highest level of euphoniousness – 1, the least euphonious name – 6.
Help: Choose one answer in one line. Within one question, each number can be used only once – it means that each name in the column must have one specific value, which is its own only.

	1	2	3	4	5	6
Na kozinách						
Nudlárna						
Ščučí						
Gigulská						
Zanedbaná						
Kněhyňka						

8. Put numbers 1–6 to each name according to its level of euphoniousness. The name with the highest level of euphoniousness – 1, the least euphonious name – 6.
Help: Choose one answer in one line. Within one question, each number can be used only once – it means that each name in the column must have one specific value, which is its own only.

	1	2	3	4	5	6
Rokytenka						
Bobrůvka						
Mikulůvka						
Kaní potok						
Rozhozná						
Bobrovec						

9. Put numbers 1–6 to each name according to its level of euphoniousness. The name with the highest level of euphoniousness – 1, the least euphonious name – 6.
Help: Choose one answer in one line. Within one question, each number can be used only once – it means that each name in the column must have one specific value, which is its own only.

	1	2	3	4	5	6
Pod Kykulkou						
Nová Olešná						
Čítalnička						
Josenčany						
Velký Klauz						
U Čechovských						

10. Put numbers 1–6 to each name according to its level of euphoniousness. The name with the highest level of euphoniousness – 1, the least euphonious name – 6.
Help: Choose one answer in one line. Within one question, each number can be used only once – it means that each name in the column must have one specific value, which is its own only.

	1	2	3	4	5	6
Fryšávka						
Český potok						
Únanovka						
Tištínka						
Divoký potok						
Šišemka						