STRESS SENSITIVITY AND EARLY STUDIES OF SOUTH SLAVIC ACCENTUATION

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Abstract: This paper aims to briefly present an overview of historical conventions for annotating South Slavic accentuation and test one experimentally. It comments on the studies of several descriptive linguists and musicologists who found their inspiration in musical terminology and used notes to describe the complexity of lexical stress in South-West Slavic languages. This contribution examines whether musical notation proves to be an effective means of representing the complexity of tonal features of South Slavic lects by reconstructing the nineteenth-century descriptions of Kajkavian, Čakavian and Štokavian stress patterns developed by Leonhard Gotthilf Masing. In the experimental part, native speakers of these three varieties were asked to identify the stress type after hearing the melody that was proposed as canonical representation of a stress type in the historical studies. The results show that the ability to identify accent type depends on listeners' dialectal affiliation. These findings are further interpreted in light of tri-tonal and quadri-tonal accent inventories that distinguish the tested groups of participants.

1 Introduction

Establishing of standards for annotating the segmental and suprasegmental features of a language has been a cornerstone of linguistic phonetics. Such conventions allowed for coherent descriptive and comparative studies of languages and dialects. A number of systems for annotating suprasegmental features of speech have been proposed such as AM, ToBI or IprA [28, 1, 10]. Some of these conventions have been adapted to accurately describe the suprasegmental features of certain languages. Indeed, the establishment of these conventions has shed light on intonational variability and introduced consistent annotation schemes that have complemented numerous descriptive and experimental studies. Before such standards were accepted and annotation conventions became common in linguistics, scholars attempted to propose divergent systems for prosody annotation, often assuming that terminology borrowed from music, the universal language of mankind, offered the most accurate solution. In early nineteenth-century descriptions, some linguists and musicologists opted for musical notation, while others chose to scribble the intonation contour (often without a reference scale typical of instrumental studies), juxtaposed with graphemes to represent the fluctuation of pitch. The latter approach, with its simple interpretation of sketches, might have appealed to a wider readership, while the former method required a basic musical education. Both practices were common in descriptive works on Slavic intonation in the nineteenth and early twentieth centuries.

South-West Slavic languages provide a fertile ground for the study of accentuation from a diachronic perspective. As a result of the Neo-Štokavian accent shift in the 15th century – which moved the Common Slavic stress placement one syllable to the left and led to the emergence of a rising tone in the new stress position - the prosodic landscape of contemporary Štokavian standards of B/C/M/S (Bosnian, Croatian, Montenegrin, Serbian) is composed of variations in pitch and duration that form a 4-type phonemic stress system. Currently, more than half of the dialects of South-West Slavic languages are based on these two-dimensional realizations of

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lexical stress [12]. Since the four types of lexical stress disambiguate a word's meaning (e.g., *pȁs / pâs* [a dog / a belt or a pass], *pètāk / pétak* [a fifth-grade student / Friday]), the question of accurate notation of segmental and suprasegmental information has been important to descriptive linguists working with South Slavic languages. Their efforts to represent accentuation systems based on qualitative and quantitative types of stress led to several annotation system inspired by musical notation.

This work presents a selection of ideas that were proposed prior to the advent of standards for prosodic annotation in the South Slavic linguistic landscape. The study revisits the conventions proposed by nineteenth-century accentologists summarized by [11] and tests the annotation based on musical notation proposed by Leonhard Masing [21] in a simple auditory experiment. The first sections of this paper introduce the complexity of ideas concerning South Slavic intonation, with a focus on South-West Slavic accent types; the following passages outline the attempts to use musical notation to describe linguistic prosody; while the empirical part of this paper presents an auditory experiment designed to assess the effectiveness of using musical notation to denote South Slavic accents.

2 Pioneering studies of South Slavic accentuation

A prosodic description of South-West Slavic languages reveals alternations along the temporal and frequency axes. The most common type of accentuation in the Slavic area of the Balkan Peninsula, namely Neo-Štokavian, is based on the interaction of qualitative and quantitative features resulting in four pitch accents [11], i.e., short-falling [ȁ], short-rising [à], long-falling [â], and long-rising [á]. Some regional varieties, however, rely on dynamic type of lexical stress without audible differentiation of fundamental frequency, while others, e.g., transitional areas and the Old-Štokavian variety, employ fewer categories and diverge only along the temporal axis showing quantitative stress type [12]. Moreover, another combination of correlates is noted in the Čakavian variety, which is often described as an archaic threefold type with long-falling, short-falling, and long-rising acute. Furthermore, some peripheral realizations of Old-Čakavian accentuation along with the simplified dynamic stress of Old-Štokavian permit a typology that includes six types of stress patterns present in the South-West Slavic territory [18]. Nevertheless, the suprasegmental characteristics of the Slavic varieties have been vigorously contested as early as the first decades of the nineteenth century. Some early voices deserve to be revisited due to their unconventional approaches.

In his grammar *Nova ricsoslovnica iliricska* from 1812, Šime Starčević identifies four types of accents and aurally classifies them as *quite short*, *raised and quickly lowered*, *slightly extended* and *quite extended*, already distinguishing between qualitative and quantitative types of accents [33]. The foundation for the graphemes and diacritics indicating stress type was laid in another work on the nature of the Slavic accent. The invention of symbols used today in South Slavic orthoepic and descriptive works dates back to 1833, when symbols for *accentus elevans*, *superelevans* and *prolongans* to denote three out of four types of emphasis were proposed [26]. Although this development may seem incomplete in the light of contemporary dialectology, it played an important role in the invention of graphemes to denote types of stress. Vuk Karadžić later developed the notation by explaining, for example, that the rising-short type of stress is when a vowel *raises a voice and is pronounced quickly*, and the long type of stress *lingers over a vowel and extends slightly to the following one*. The evolution of conventions as well as diacritics for marking the types of accents is also visible in the editions of Karadžić's Dictionary (1818 and 1852), where in the latter the [â] accent has been replaced by an unaccented lengthening of coda, that refers to the prolonged duration of a post-nuclear vowel while preserving its quality. Karadžić further develops the auditorily-motivated terms and includes other attributes of stress types such as *sharp pronunciation* for short accent types or the description *voice goes round* for the long-falling stress type. The division of accents persists in translations of grammars (e.g., [14]) during the first half of the nineteenth century.

2.1 Quantitative accent and unaccented lengthening

In the era of impressionistic rather than instrumental methods, another perceptually motivated description was provided by Kolarović, cf. [11]. In addition to subtle modifications of the symbols associated with stress types, he introduced a notion of *completeness* for falling type accents. Kolarović's views on accentuation have been commented on by [34]. Although several descriptive works of the time already emphasized the tonal and qualitative dichotomy, Milaković combines two short types of accents, leaving aside the distinction between rising and falling accents [23]. He refers to such pronunciations as *sharp utterances* in contrast to *round accents* [11].

Other studies into the quantitative nature of Slavic stress have emphasized the difference between the duration of the nucleus and the unaccented lengthening of the post-nuclear vowel. The latter, which has a flat pitch contour, was marked by the macron bar [ā], as introduced by Miklošič [22]. He laid the foundation for the temporal quantification of stress and proposed that the duration of the short-falling type equals one temporal unit, that of a short-rising stress corresponds to two units, that of a long-rising type to three units, whereas the long-falling accent lasts four units. Miklošič also attributed the accent types with the modifiers *acute*, *long* and *vowel-doubling*.

This system was later revised by Pacel, who slightly changed the duration intervals [27], and questioned by Karadžić who considered the long-rising type longer than the long-falling pattern [13]. Later, the quantification of temporal dimensions of a syllable nucleus was given by the canonical grammar of Maretić [20]. In his work, he also distinguished the duration of stressed segments from lengthened unaccented vowels and quantified the vowel length on arbitrary scale from 1 to 2 with quarter intervals. Another description of South Slavic stress patterns that took into account the stability of the pitch contour was given by Vujić [37]. Although he initially has only identified three types of accent, he also observed that the voice can stretch over a vowel unchangeably.

2.2 Terminological ambiguity

The majority of terms used to denote stress types originate in Latin *gravis*, *acutus* and *circumflexus*. An alternative derivational strategy has been introduced by Divković who suggested that the accents which constitute the Neo-Štokavian quadripartite are *double-heavy*, *heavy*, *wrapped up* and *sharp* [6]. Certain authors even decided to coin neologisms corresponding to the nature of the stress types or marking a non-uniform tone excursion with a relativizing prefix [36]. An alternative notion of gradual tonal excursion has been expressed by *simpletone* and *dualtone* [32] associated with short and long accents respectively. When describing the types of South Slavic accents, some authors emphasized intensity as the most prominent stress correlate by defining the stress types as *strong*, *drawn out* or *mild,* whereas later studies enriched the repertoire of accent descriptions by introducing the concept of *simple stress* assigned to the short-falling accent type [15]. Additionally, the modifiers *quick* and *slow* were proposed to differentiate between short-falling and short-rising word stress [8].

The attempt to describe this diverse landscape of South Slavic dialects has resulted in a variety of viewpoints, naturally followed by critical opinions. The large number of conventions for the annotation of South West Slavic accents could have resulted from the impressionistic, non-instrumental nature of most methods. A centralized attempt to unify the often ambiguous grammatical terminology was led by Belić and developed standardized terminology for grammar description used by scholars writing in South-West Slavic languages [2]. Before any standardization was widely accepted and the first instrumental studies were published, the terminological liberty has induced many unconventional descriptions of lexical stress and triggered vigorous debates conducted in the style of the scientific epistolar discourse of the ninetieth century. But long before any attempt at standardization was considered, some descriptions of

speech melody were inspired by the system used to denote the most universal language of mankind, that is, music.

2.3 Applying musical notation

The transformation of spoken language into musical compositions has a long tradition. Transitioning from speech to music has inspired composers for centuries, even in the creation of symphonies [9]. In the search for consistent methods of prosodic annotation linguists, dialectologists and musicologists have tried to represent the melodies of South-West Slavic varieties by using musical notation. A pioneering work combining linguistic phonetics with musical terminology was developed by Mariano Šunić [35]. His unconventional distinction between *breviter cum accentu acuto* and *breviter cum accentu gravi*, i.e, acute vs. heavy stress, was accompanied by lyrical remarks in which he personified the voice as climbing the stairs to reach the higher tone and then falling on the following syllables, cf. [11]. His pioneering studies on the description of South Slavic speech are considered the first attempt to apply musical notation to describe accentuation. This inspired the development of a more systematic approach to describing qualitative and quantitative differences in accentuation, which enabled the intensity marking. A similar concept has been adapted by Brlić, who used musical terminology, but only to describe two long accents [5]. Since then, musical terms have been used to annotate Slavic stress types leading to the definition of rising accents as *crescendo* and falling accents as *decrescendo*, cf. [11]. Such nomenclature also appears in later studies by Belić [4].

Although the first steps in adapting musical notation to describe South Slavic accents were taken by Mariano Šunić, after him, Leonhard Masing published a groundbreaking research combining musical terminology and dialectology [21]. He compared the pronunciation of isolated words and used musical intervals to interpret their pitch excursion. The application of musical terminology in the description of South Slavic accents was advocated by Floršic, who used interval notation to distinguish between rising and falling types of stress and chose to name the short-rising type of stress *deep short*, leaving ambiguity with respect to the pitch trajectory [7]. The other line of thought about Slavic accentuation was introduced by Milan Rešetar [29], who supported the earlier studies of Kovačević [16], but he refused to acknowledge the rise of pitch that already starts on a prenuclear syllable and he also denied the disyllabic character of lexical stress. However, his achievements as the author of the first large-scale dialectological survey are unquestionable [17]. Šahmatov summarized these encounters and argued that this controversy could be partially explained if the tested speakers had originated from different dialectal areas, which was neither noted nor refuted in the study [30]. Milas presented an alternative typology of Neo-Štokavian accents [24]. He identified eight distinct types of stress by dividing the nuclei into two sub-segments that can carry the *intensity* regardless of the direction of pitch excursion. This terminologically inconsistent proposal was not well received by linguists and remained marginal in Slavic scientific discourse. Some scholars have tried to address the tonality of South Slavic accents by applying musical scales. For example, Šajković suggested that the voice can move from E major to C and then to D major to denote an intonation contour of the long-rising stress type [31].

As summarized by Lehiste and Ivić [11], the nineteenth-century debate on South Slavic accentuation resulted in polemical opinions that concerned not only the essence of stress, but also the terminology. Moreover, in this dispute several accent types have been assigned attributes that are by no means complementary. In some studies, the graphemes and diacritics used to distinguish lexical stress do not allow for disambiguation of long-falling stress from unaccented coda lengthening. The use of the terms *primary* and *secondary* stress may also confuse a contemporary reader, as some authors use these terms when referring to diachronic accent development. In this context, primary stress is marked with respect to its proto-Slavic position, while secondary stress results from a stress shift [25]. This convention differs from the commonly used approach of indicating prominence at the word level.

In addition, the representativeness of the sample of speakers whose speech has been analyzed remains to be questioned. Some of the previously mentioned works simply omit the data that allows for speaker profiling. Furthermore, the inventory of accent types possessed by the informants, along with the impressionistic, non-instrumental apparatus, suggest that nineteenth-century studies into South Slavic accentuation provide material suitable for contrastive and historical studies. Therefore, in order to assess how accurately suprasegmental characteristics of stress types are represented by nineteenth-century scholars in light of the differences between the stress inventories of the South-West Slavic lects, an experiment was conducted with the purpose of reconstructing and testing their descriptions.

3 Experiment: Nineteenth century stress notation

The historical sources cited above often diverge in the number of accent types identified in South Slavic lects. It is unclear whether the observed classifications are caused by clustering errors or a lack of exposure to a wider range of accents. Furthermore, it should be noted that these works do not always provide detailed information about the specific area of speech they describe. This is significant because several speech communities in the Kajkavian and Čakavian areas are known to have only two to three tones [19], while most of the Štokavian area – on which the current standards of BCMS are based – has a four-tone system.

Working with historical sources and melody reconstructions involves a certain risk in experimental design, namely the lack of ground truth. So the first thing to be tested is the general ability to recognize the types of stress based on the melody that was proposed more than a hundred years ago. The goal is not to question the possibility of qualitative sound change, but rather to assess how accurately the melody of words can be represented by means of musical notation.

3.1 Aims and research questions

The aim of the experiment is to assess whether the stress type can be recognized based on reconstructions of nineteenth-century stress descriptions by native speakers of three South-West Slavic varieties. The objective is to explore how dialect affiliation influences recognition accuracy. The study introduces the dichotomy between the Kajkavian/Čakavian group, with three types of accents in their inventories, and contrasts the results with the Štokavian group, with a total of four accent types.

Therefore, the proposed experiment seeks to answer the following research questions: Do historical descriptions of suprasegmental features of Southwest Slavic languages allow contemporary speakers to identify the accent type, i.e. are the representations accurately perceivable today? And does the stress inventory of a particular variety as L1 influence the accuracy of accent type recognition in the experiment?

3.2 Stimuli

The participants were exposed to reconstructed melodies that correspond to stress types of South-West Slavic languages provided by Leonhard Masing [21] and later reanalyzed by Belić [3]. The stimuli consisted of four types of accents, i.e., short-falling, short-rising, long-falling, long-rising, played as melodies of the stress types on the M-Audio MK3 keystation and synthesized as Steinway grand piano output. To counteract the possible influence of vowel inherent fundamental frequency, the melodies were played at equal intervals starting from the C major scale. In total, participants were exposed to 40 melodies corresponding to four types of lexical stress that are currently common in the Neo-Štokavian variety. On a screen, participants could see four words corresponding to the four accent types and a media control panel to play and repeat the melody.

3.3 Participants

Two groups of participants were tested. The first group comes from the Štokavian areas that exhibit a quadritonal distinction, while the second group consists of participants who are L1 users of the tritonal Čakavian and Kajkavian lects. A total of 35 participants were tested. Before the experiment, the participants were given a questionnaire to identify their dialectal affiliation. In the questionnaire, participants were asked to define their region of origin, which was used to determine their group affiliation.

3.4 Data analysis

The Shapiro-Wilk test was used to assess the normality of the data distributions. To compare differences between the two independent groups, the Welch t-test was employed for numerical variables, and the Pearson chi-squared test was used for categorical variables. The analysis of the objectives was performed by using a generalized linear mixed model (GLMER) fitted by maximum likelihood with Laplace approximation in R. The model specification included interaction terms between accent length, accent type, and group. The estimate was also corrected by demographic variables – age and gender.

The analysis focused on the interaction within the logistic regression, with the outcome variable modeled as a binary indicator of correct responses. The estimated marginal means (EMMs) were calculated for each combination of the factorial design comprising the following structure: 2 (long, short) × 2 (rising, falling) × 2 (Kajkavian/Čakavian group, Štokavian group). The probabilities and the 95\% confidence intervals were back transformed from the logit scale. The analyses of contrasts required two designs. Within accent length and type between groups, contrast aimed to identify significant differences in response probabilities between the Kajkavian/Čakavian and Štokavian groups. In the contrast analysis, the estimated p-values were corrected for multiple comparisons with the Holm method. The p-values were computed by using an asymptotic approximation derived from the statistic of the z-test, performed on the log odds ratio scale.

4 Results

The analysis was conducted on a sample of 35 participants who were tested regarding their ability to recognize accent types from melodies corresponding to historical descriptions of South Slavic stress. The participants were divided into two groups: the Kajkavian/Čakavian group, consisting of 12 individuals (34.3% of the total sample), and the Štokavian group, consisting of 23 individuals (66.7% of the sample). The absence of statistically significant differences in age and gender between the groups suggests that variations in the ability to recognize accents are unlikely to be influenced by either age or gender. Out of a total of 1,327 responses, the Štokavian group accounted for 846 (63.8%), while the Kajkavian/Čakavian group recorded 480 (36.2%) responses. The residuals from the GLMER model indicate that the model adequately captures most of the data points. Examination of the control variables revealed no significant effects for age (OR = 1.00, p = 0.792) or gender (OR = 1.12, p = 0.430). In the total pool of 1,327 responses, 21 questions (1.6%) were not answered, leaving a total of 1,306 complete responses.

4.1 Accent type

The analysis of the EMMs reveals several patterns and discrepancies in accent recognition between the groups. In the Kajkavian/Čakavian group, the OR = 0.40 for the comparison between short rising and long falling accents, with p = 0.030, shows a statistically significant challenge, although less severe than that observed for short-falling accents. The analysis of long-rising versus short-falling accents (OR = 0.36, p = 0.005) suggesting that this type of accents are more easily recognized in this group. In contrasts involving long accents, the odds ratio of OR = 0.59

for long rising versus long falling accents, although not statistically significant (p = 0.255), implies a slight preference for long falling accents. This trend, while subtle, is consistent with the general difficulty observed with rising accents. Finally, the OR = 1.63 for short-falling versus long-falling accents indicates a preference for long-falling over short-falling, but does not reach the threshold of statistical significance (p = 0.255) either.

For short-rising accents, the Štokavian group shows a higher probability of correct identification (0.23) compared to the Kajkavian/Čakavian group (0.13). This reveals that Štokavian speakers are better at recognizing short rising accents than their Kajkavian/Čakavian counterparts. The wider confidence intervals for the Kajkavian/Čakavian group indicate more variability in responses, possibly reflecting less exposure to these accent types. In the case of long-rising accents, both groups show an equal probability of correct response (0.18 for both groups), indicating that the length of the rising accent does not affect the recognition abilities to correctly identify the stress type. The analysis of short-falling accents reveals that the Kajkavian/Čakavian group has a higher probability of correct recognition (0.37) compared to the Štokavian group (0.33). For long-falling accents, the probabilities of correct responses are closer between the groups, with the Štokavian group showing a slightly higher probability (0.31) compared to the Kajkavian/Čakavian group (0.27). In the Štokavian group, the odds ratio of OR = 1.38 for the comparison between short-rising and long-rising accents, although not statistically significant (p = 0.376), suggests a slight preference for a long-rising accent type. The odds ratios of OR = 0.60 and OR = 0.66 for short-rising versus short-falling and short rising versus long-falling, respectively, indicate the difficulty in recognizing these types but the differences are not statistically significant.

4.2 Dialectal affiliation

For short-rising accents, the odds ratio of OR = 0.48 indicates that the probability of correct recognition by the Kajkavian/Čakavian group is approximately half that of the Štokavian group, and this difference is statistically significant (p = 0.024). In contrast, the analysis for long-rising accents shows an odds ratio of OR = 1.00, implying no significant difference in recognition probabilities between the two groups (p = 0.999). This equivalence suggests that both groups perform similarly on long-rising accents. The odds ratio for short-falling accents is OR = 1.19, pointing to a slightly higher probability of correct recognition for the Kajkavian/Čakavian group compared to the Štokavian group, although this difference is not statistically significant (p = 0.480).

Finally, the odds ratio for long falling accents is OR = 0.81, indicating a lower probability of correct recognition by the Kajkavian/Čakavian group compared to the Štokavian group, but this difference lacks statistical significance (p = 0.413). These findings indicate that the Kajkavian/Čakavian group may struggle more with long accents, but the evidence is not robust enough to confirm a clear dialectal disadvantage for this type of stress. In the Štokavian group, the odds ratio of OR = 1.11 for short-falling versus long-falling is not statistically significant (p = 0.618). This reflects that the length of the falling accent does not significantly affect the recognition ability of Štokavian speakers, indicating a uniformity in the processing of falling-stress types regardless of their duration.

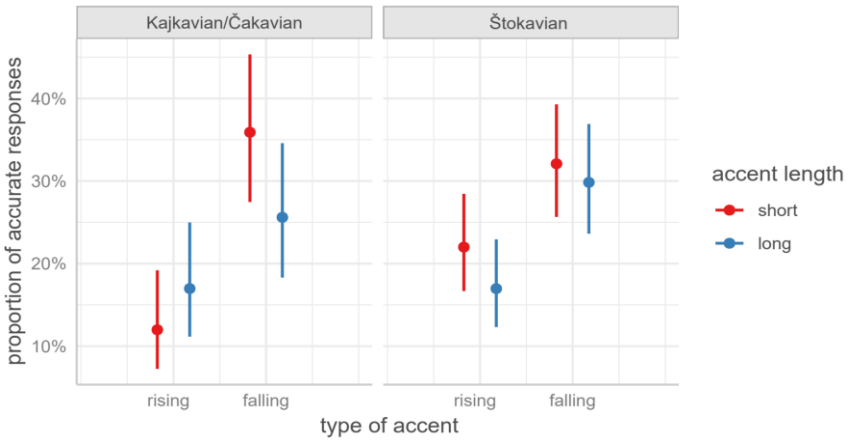

Figure 1. Probability of accent identification between groups

5 Discussion

In the Kajkavian/Čakavian group, OR = 0.67 is found for the contrast between short-rising and long-rising accents, although not statistically significant ($p = 0.267$), suggests a mild difficulty in recognizing short-rising accents compared to long-rising accents. Significantly, the contrast between short-rising and short-falling accents shows an OR = 0.24 with a $p < 0.001$, indicating a substantial difficulty in recognizing short-rising accents over short-falling ones.

In the Štokavian group, the results point to a potential bias in favor of falling accent types. In particular, the contrasts between long rising and the two types of falling accents (short and long) reflect statistically significant preferences. The odds ratios of OR = 0.43 and OR = 0.48 for long rising versus short falling, and long rising versus long falling respectively, with corresponding p-values of $p = 0.002$ and $p = 0.009$, suggest a difficulty with long-rising accents. This indicates a clear processing challenge observed in the Štokavian group. The results of the contrastive analysis show that the accent recognition in the Kajkavian /Čakavian is influenced by length and pitch excursion factors, with a clear difficulty in processing short-rising accent types and a preference for falling accents, especially for long-falling types. These findings also reveal a notable disadvantage for the Kajkavian /Čakavian group in recognizing short-rising accents. The analysis of the data led to the conclusion that Štokavian speakers show an advantage towards accurately identifying falling accents over rising ones.

These findings can be further interpreted in the light of exposure to a standard variety of BCMS or how frequently a particular stress type occurs. The data reveals that pitch excursion and length factors influence recognition accuracy, with notable differences between the two groups tested. The results also indicate that dialect background influences accent recognition, with each group showing strengths in different stress types.

6 Conclusions

A simple forced-choice experiment was designed to test the general ability to recognize the type of accent and to associate it with a lexeme on basis of its historical note description. The study also aimed to assess the possible influence of three- and four-tone L1 lects on the ability to associate the melody with a stress type. Musical notation may show some advantages over currently used annotation conventions. For example, musical notation can accurately address one of the stress correlates and point to the disproportions between them. Since the symbolic representation of accent types has not always been transparent a solution for accurately notating prosody has been sought in the script of the world's universal language. Musical notation may also appeal to a broader readership – since basic musical education is still common, whereas highly specialized annotation conventions are best understood by trained linguists. Possibly for

this reason, many authors believed that musical notation could provide a suitable system for describing accentuation.

What is rarely commented on is that several studies could have generalized to entire dialect areas, even though the profiles of the speakers tested may not have been representative of the large speech communities. Of course, the influence of the author's dialectal zone as well as that of the informants may have influenced the point of view on accentuation. For example, those whose lect of socialization exhibits only three types of accent may have a natural tendency to classify the observed patterns into three types of stress, whereas those who acquired one of the Neo-Štokavian standards may be ready to increase the number of accents and draw the typologies based on a combination of qualitative and quantitative features, resulting in four types of accents.

Perhaps, as suggested by [30], scholars who studied South Slavic accents and concluded that regional varieties have three distinctive stress types, have based their opinions on participants who come from tritonal areas as opposed to Neo-Štokavian with four stress types. Due to the limited circulation of scientific works in the first half of the nineteenth century, a holistic picture of the South Slavic dialects could not be captured. This is in part a possible explanation for the divergent descriptions of South Slavic accents. Furthermore, as shown in the experimental part, a listener's dialectal affiliation can significantly influence the ability to recognize stress type. This phenomenon may also have moderated the historical descriptions of accent types identified in the South Slavic area.

7 Data availability

The data and code are publicly available in the OSF repository (https://osf.io/nepsa/).

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