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A QUANTITATIVE ANALYSIS OF SLOVAK AND CZECH SUPREME COURTS DECISIONS

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Abstract: The paper focuses on the comparison of the quantitative characteristics of the decisions of the Slovak and Czech supreme courts, using publicly available databases of their decisions, which can be analyzed from the point of view of quantitative linguistics and stylometry using the Czech application QuitaUp and further investigated mainly by means of the non-parametric Mann-Whitney U test. The aim of the paper is to identify possible statistically significant differences in the representation of selected quantitative measures in the samples of decisions of both courts and to consider the possibilities of how to interpret these differences in terms of a closer comparative stylistic research aimed at Slovak and Czech legal texts.

Keywords: comparative legal linguistics, quantitative linguistics, legal style, Slovak and Czech law, institutional communication

1 INTRODUCTION

Law and language are deeply intertwined. This relationship is already evident from the fact that communication between the law-making subject and the addressees, the recipients of law, takes place exclusively through language (Knapp 2024, p. 179). Equally intertwined are the cognition of law and the cognition of language, since one of the prerequisites for the interpretation of authoritative texts is the cognition of the peculiarities of the language in which these texts are formulated (Holländer 2012, p. 284). The latter statement can be seen as the background for the emergence of the now well-established domains of legal linguistics (e.g. Cvrček 2016), law and corpus linguistics (Mouritsen 2010), corpus linguistics in legal discourse (Goźdź-Roszkowski 2021) or legal corpus linguistics (Bernstein 2021). This paper follows the line of corpus-based and quantitative investigation of legal texts, namely judicial decisions of the Supreme Court of the Slovak Republic and the Supreme Court of the Czech Republic.

In doing so, it draws on extensive databases of decisions of these courts[1], as well as the Slovak Ministry of Justice[2]. The anonymized decisions in these databases

[1] https://www.nsud.sk/rozhodnutia/; https://sbirka.nsoud.cz/

[2] https://www.justice.gov.sk/sudy-a-rozhodnutia/sudy/rozhodnutia/a štatistiky

are available as PDF files, which are explored in the paper using online calculator *QuitaUp*[3]*. The tool allows the analysis of texts in both Slovak and Czech, as well as other languages* using 16 quantitative measures, including h-point, hapax legomena frequency, entropy or average token length. From these, the following seven were selected: 1. token frequency, 2. type frequency, 3. verb distance, 4. activity, 5. descriptivity, 6. secondary thematic concentration, 7. moving average type-token ratio. The values for the above measures for in samples of Slovak and Czech Supreme Court decisions were then analyzed using freely available statistical calculators from the *Statistics Kingdom* portal[4].

Using these sources and tools, the paper examines the following questions:

a) How can the relationship of the two samples be characterized in terms of these quantitative measures and the statistical significance of any differences in their values?
b) How can these findings be interpreted in terms of stylistic differences between Slovak and Czech Supreme Court decisions?

2 THEORY

Legal texts of various genres (laws, decisions, etc.) are produced in large volumes and are often freely accessible to general public, which makes them an available and potentially interesting object for linguistic research (Smejkalová 2021; Wilfling 2013; Bobek 2010). For example, the open database of the Supreme Court of the Slovak Republic contains a total of 102,072 decisions, with the first ones dating back to 1970. The database of the Supreme Court of the Czech Republic does not indicate the total number of decisions, but the first ones date back to 1956. The database of published anonymised Slovak judicial decisions of courts of all types, published at the portal of the Slovak Ministry of Justice contains a total of 4,447,053 decisions that have been published since 2000[5].

The linguistic investigation of general, quantitative properties may also prove interesting in the field of comparing global and more local, national legal systems of different legal cultures (Fábry, Kasinec and Turčan 2019, pp. 152–158). It can be suggested that the institutional and conceptual differences in the various systems and subsystems should also be reflected in the legal communication and style of legal language within these systems. In terms of the stylistic difference between Civil and Common Law, then, we compare (a) the ratio of the predominance of deductive and analytical approaches in decision-making, (b) the ratio of formalism and value-oriented arguments (Smejkalová 2021, p. 231). While a civil law judge decides with

[3] https://korpus.cz/quitaup/
[4] https://www.statskingdom.com
[5] https://www.justice.gov.sk/sudy-a-rozhodnutia/sudy/rozhodnutia/

regard to a particular situation and retrospectively, a common law judge also prospectively makes future law, as his decision can serve as a precedent. In terms of style, this difference translates, for example, into the style of reasoning, which in common law should be more comprehensive and also such that a general rule can be extracted from it in the future (ibid.).

For an analysis of the Czech style in this regard, we can refer to the work of Matczak, Bencze and Kühn (2010), who compared different types of reasoning in decisions of administrative courts in Poland, Hungary and the Czech Republic in 1999 – 2004. They found that judges in Poland and Hungary tend to apply legal rules in a formal way, and value-based or principled reasoning associated with teleological interpretation remains the domain of mainly higher court instances. Only Czech courts have features of a certain "deformalizing", i.e. not purely formal, reasoning, which, according to the authors of the survey, hints at the stimulating "educational" role of the Czech Constitutional Court (Smejkalová 2021, pp. 232–233). The decisions of the Civil Law and the Common Law can, according to Terezie Smejkalová can be perceived as mutual opposites, while the style of Czech court decisions seems to balance "somewhere in the middle" (ibid., p. 233). Referring to Zdeněk Kühn, a "hybrid" model of "complex sophisticated subsumption" can be applied to Czech judicial decision-making, which is characterized by the fact that the Czech judge tries to support each conclusion with multiple arguments (ibid.).

Here one may ask whether the style of Slovak judicial decisions is similar to the Czech one. On the one hand, given the long and long-studied common history and the period of common statehood, one might expect similarities between Czech and Slovak law, and thus also similarities in the styles of legal texts. On the other hand, differences in the culture and law of the two countries exist and are reflected, whether through scholarly journals or at the institutional level in the form of, for example, regular bilateral contacts between the constitutional courts of the two countries.

The motivation for the analysis of the decisions of, in particular, the Supreme Court of the Slovak Republic[6] and the Supreme Court of the Czech Republic[7] was twofold. On the one hand and given the complexity of law and legal institutions, it was necessary to limit oneself to one type of decision-making body. On the other hand, it can be assumed that the supreme courts, as the highest instances of judicial decision-making in both countries, deal with rather complex cases of law application. This legal complexity may manifest itself even in the complexity of the textual form of the decision, which would make the texts an even more potentially interesting object of linguistic analysis compared, for example, to the more concise and formalized criminal orders of the first instance courts, in cases dealing with, e. g., driving under influence. Furthermore, given the complexity of the various legal

[6] https://www.nsud.sk/postavenie-a-posobnost/

[7] https://www.nsoud.cz/o-nejvyssim-soudu/obecne-informace

domains, it was also necessary to focus on one particular domain. In this case, the fairly prominent domain of criminal law was chosen. According to the number of published decisions in the database of the Ministry of Justice of the Slovak Republic, criminal cases are not among the most numerous. 384,330 of them have been published (as of April 2025), compared to decision count in civil law (1,909,279), family law (514,221) and commercial law (407,388).[8]

3 METHODOLOGY

3.1 Selection of data

The basic sources were the databases of decisions of the Supreme Court of the Slovak Republic (furthermore referred to as SK) and the Supreme Court of the Czech Republic (CZ). Only in the case of the latter court it is possible to filter decisions according to their genre (judgment, resolution etc.). Since each text was to be tested in terms of seven quantitative measures, a smaller size was chosen, n=20 for Slovak and n=20 for Czech decisions. The individual texts to be analyzed using QuitaUp were selected by generating 20 random numbers from the range 1 – 200. The range of randomly generated numbers for the Slovak and Czech decisions then served as a key to identify the decisions in either sample as they are added to the decision database over time (starting with the most recently published decisions). This process resulted in the selecting 19 resolutions and 1 judgment for the Slovak court, and 19 resolution and 1 declaratory judgment for the Czech one. The lengths of texts are specified in this table, while it was found that texts of one genre (at least in the sample) are not necessarily longer than texts of the other genre:

	SK	CZ
Token range	780–13418	1710–14050
Standard deviation	3549	3051
Average token count	4483	7555
Median token count	3426	6575

Tab. 1. Length characteristics of the decisions

3.2 Selection and description of measures

When selecting measures, preference was given to those that are less dependent on text length (with the obvious exception of token frequency) or have other advantages over alternative metrics. Measures dependent on text length (such as type frequency) were interpreted according to this dependency. With reference to their definitions on the application page, the selected measures can be described as follows:

[8] https://www.justice.gov.sk/sudy-a-rozhodnutia/sudy/rozhodnutia/

a) token frequency (abbreviated as N) expresses the length of the text;
b) type frequency (V) tells about the number of different words in the text;
c) verb distance (VD), calculated as the arithmetic mean of the number of tokens between two consecutive verbs in the text (excluding auxiliaries), expresses a certain "density" of verbs in the text;
d) activity (Q), calculated as the ratio of the number of verbs to the sum of verbs + adjectives in the text, expresses the degree of how much activeness there is in the text;
e) descriptivity (D), expresses the degree of descriptiveness of the text. It is thus the inverse of the activity value: D = 1 – Q;
f) secondary thematic concentration (STC) is a modification of thematic concentration (TC), which expresses "the degree to which a text is focused on a central theme or themes" (the central theme is detected using thematic words); STC was chosen since it can be calculated even for shorter texts where TC could not be calculated;
g) moving average type-token ration (MATTR) is one of the measures for analyzing lexical diversity; MATTR is based on the segmentation of the text into the so-called "windows" that overlap each other, where for each window (in this case of size 100 tokens) a type-token ratio is computed; the MATTR is calculated from these windows as their arithmetic mean; the advantage of this measure is its independence from the length of the text, as opposed to the measure of entropy (H).

The obtained samples of 20+20 texts are analyzed by QuitaUp for all 7 quantitative measures and the values were recorded in a summary table (total of 40 texts x 7 measures = 280 values) in 7 columns for each measure and their values in the respective Slovak and Czech sample texts. This table was the basis for statistical testing.

3.3 Selection of tests

The values in all columns are first analyzed using Shapiro-Wilk test for normality. If the normality assumption required for parametric tests was not met, the values for these measures were further tested using the non-parametric Mann-Whitney U test, also due to the small *n* of samples. Because of the directionality of the H_1 hypothesis (*SK has smaller values than CZ*), a left-tailed version of the test was chosen. Where normality has been confirmed in any of the data columns for individual measures, the samples have been further tested using Welch's t-test, which has some advantages over Student's t-test (no assumption of equal variances, more reliable with unequal variances, recommended for small sample sizes). However, outliers were identified in values for each normally distributed measure. Since outliers can distort the mean and inflate variance, making the Welch's t-test less

reliable, the normally distributed samples concerned were tested using the Mann-Whitney U test instead, which is relatively robust to the presence of outliers. When interpreting the results of Mann-Whitney, the shapes of the distributions (skewness, kurtosis) and spread (checked by comparing standard deviations) were also taken into account. If the shapes and spread were similar, it was possible to interpret a significant Mann-Whitney U test result as indicating a difference in medians. If the spread values differed, a significant result could reflect differences in distribution shape, spread[9], or central tendency, and not just the medians. The difference in the shapes of the distribution and spread was then reflected in the different interpretation of the test results. For each test are reported the values of p, U, test statistics Z and standardized effect size $Z/\sqrt{(n1+n2)}$[10].

4 ANALYSIS

4.1 Shapiro-Wilk normality test

Significance level (α): 0.05

Normality assumption violated in at least one data column (SK or CZ): N, V, STC, MATTR

Normality assumed for both SK and CZ columns: VD, Q, D

4.2 Mann-Whitney U test (left-tailed) for individual measures

Significance level (α): 0.05

H_0: SK ≥ CZ

H_1: SK < CZ

4.2.1 Token frequency (N)

p = 0.001605; U = 93; Z = -2.9468; $Z/\sqrt{(n1+n2)}$ = medium (0.46);

p-value < α, **H_0 rejected**.

The randomly selected value in SK sample is considered to be less than the randomly selected value in CZ sample. The distributions differed in skewness shape (asymmetrical for SK; potentially symmetrical for CZ), which means there is a difference in overall rank distribution, rather than a direct comparison of medians.

4.2.2 Type frequency (V)

p = 0.0008834; U = 87; Z = -3.1269; $Z/\sqrt{(n1+n2)}$ = medium (0.48);

p-value < α, **H_0 rejected**.

Test indicated that there was a statistically significant difference in median type frequency between SK (median = 868) and CZ (median = 1795). The distributions

[9] The spread captures the scale differences in data.

[10] This measure indicates that the magnitude of the difference between groups.

were similarly shaped as to skewness (potentially symmetrical) and kurtosis (potentially mesocurtical), as well as they had similar spread (695 vs. 630), so it should be safe interpreting differences as being about central tendency. Since V depends on the length of the text, caution should be exercised when interpreting the strength of this finding.

4.2.3 Verb distance (VD)

p = 0.007149; U = 110; Z = -2.4497; Z/√(n1+n2) = medium (0.38);

p-value < α, **H_0 rejected**.

The randomly selected value in SK sample is considered to be less than the randomly selected value of CZ sample. The distributions differed in at least skewness shape (potentially symmetrical for SK; asymmetrical for CZ).

4.2.4 Activity (Q)

p = 0.9988; U = 311.5; Z = 3.0303; Z/√(n1+n2) = medium (0.48);

p-value > α, **H_0 not rejected**.

The randomly selected value in SK sample is considered to be greater than or equal to the randomly selected value in CZ sample. The distributions were similarly shaped as to skewness (potentially symmetrical) and kurtosis (potentially mesocurtical), but differed significantly as to spread of standard deviations (0.050 vs. 0.026). In this case, the distributions are essentially scaled versions of each other – one is just "stretched" more, but the overall form (shape) is the same. Mann-Whitney U test is still valid, it will test for difference in central tendency (usually median). But it could still be influenced by the fact that one distribution is more variable.

4.2.5 Descriptivity (D)

p = 0.001336; U = 88.5; Z = -3.0033; Z/√(n1+n2) = medium (0.47);

p-value < α, **H_0 rejected**.

The randomly selected value in SK sample is considered to be less than the randomly selected value of CZ sample. As was the case with activity, the distributions were similarly shaped as to skewness (potentially symmetrical) and kurtosis (potentially mesocurtical), but differed significantly as to spread of standard deviations (0.050 vs. 0.026).

4.2.6 Secondary thematic concentration (STC)

p = 0.9291; U = 254; Z = 1.4695; Z/√(n1+n2) = small (0.23);

p-value > α, **H_0 not rejected**.

The randomly selected value of SK sample is considered to be greater than or equal to the randomly selected value of CZ sample. The test indicated that there was a statistically significant difference in STC between SK (mdn = 0.13905) and CZ

(mdn = 0.11755). The distributions were similarly shaped as to skewness (asymmetrical) and kurtosis (leptokurtic); the difference in spread (standard deviations) is noticeable, but not extreme (0.069 vs 0.056), the test should still give a valid result and can be interpreted as comparing medians without too much distortion.

4.2.7 Moving average type-token ration (MATTR)

p = 0.00001144; U = 43; Z = -4.2347; Z/√(n1+n2) = large (0.67);
p-value < α, **H_0 rejected**.

The randomly selected value of SK sample is considered to be less than the randomly selected value of CZ sample. The test indicated that there was a statistically significant difference in MATTR between SK (mdn = 0.7605) and CZ (mdn = 0.8075). Because the distributions differed at least in skewness shape (potentially symmetrical for SK; asymmetrical for CZ), this result should be interpreted as a difference in overall rank distribution, rather than a direct comparison of medians.

4.3 Summary

Measure	H_0 rejected	Shape diff.	Spread diff.	Overall rank diff.	Median diff.	Effect size
N	x	x		x		medium
V	x				x	medium
VD	x	x		x		medium
Q			x		x/?	medium
D	x		x		x/?	medium
STC			x/?		x	small
MATTR	x	x		x		large

Tab. 2. Summary of test results (x = confirmed, x/? = confirmed with some reservations)

5 CONCLUSION

The null hypothesis (SK ≥ CZ) was rejected for measures N, V, VD, D (effect size being medium) and MATTR (effect size being large). Only for measure V is there a genuine difference in medians (although V is dependent of the text length), but the Mann-Whitney test is likely to be valid for measure D as well. In the case of the measures N, VD and MATTR the test is potentially weakened by differences in the shape of the distribution. Thus, we could say that the decisions in the Slovak Supreme Court sample have smaller V and STC values compared to the Czech ones, and to some extent also are shorter (with smaller N), with smaller MATTR, VD and D. The null hypothesis was not rejected for the Q and STC measures (medium and small effect size, respectively). Here we can say that Slovak decisions have larger

median values for STC and with some reservations (and, compared to STC, a bigger effect size) for Q.

On the basis of these quantitative findings, it is possible to interpret with a certain amount of simplification that Czech Supreme Court decisions seem to be generally longer, richer in types, with greater MATTR (effect size being large) and thus a more diversified vocabulary, a greater distance between verbs and a greater descriptivity. This might be seen as consistent with the initial "hybrid" model of Czech judicial decisions of "complex sophisticated subsumption", where value-oriented arguments, requiring more space (greater length), and greater type and lexical richness, have a place. The decisions of the Supreme Court of the Slovak Republic differ from this model in most of the respects used, which on the one hand can be seen as a possible shift from more complex sophisticated subsumption to – speculatively speaking – greater formality. On the other hand, the Slovak decisions show a greater degree of activity and secondary thematic concentration, which relativizes the shift towards greater formalization and – following on the assertion of T. Smejkalová (2021, p. 235) suggests the need for a closer analysis of individual texts as the next step.

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