

Syntactic Complexity in L2 Reading: A Comparison of Adapted and Original Czech Texts

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Abstract

This corpus-based study explores the syntactic complexity of adapted Czech texts designed for learners of Czech as a second language (L2). It investigates how syntactic complexity varies according to learner proficiency levels (A2, B1, B2) as defined by the Common European Framework of Reference for Languages (CEFR) and how these adapted texts differ from their original versions. Quantitative analyses using metrics such as average sentence length (ASL), average clause length (ACL), mean dependency distance (MDD), and mean hierarchical distance (MHD) demonstrate clear systematic simplifications in adapted texts at lower proficiency levels. At A2 and B1 levels, adapted texts were found to be significantly less syntactically complex compared to their original counterparts. However, these differences diminished notably at the B2 proficiency level, indicating a gradual alignment of adapted texts with native-level syntactic complexity as learner proficiency increased. These results underscore the importance of careful syntactic calibration in creating educational materials for language learners, highlighting implications for curriculum design, instructional methodologies, and materials development. The findings offer valuable insights for language educators and textbook authors aiming to optimize reading materials to support language acquisition effectively.

1 Introduction

Reading comprehension is a fundamental component of second language acquisition. Adapted texts are commonly utilized in language education to support learners toward reading authentic, native-level materials. These texts are simplified versions of original works, specifically designed to align with learners' proficiency levels and support reading development. Adaptations typically aim to reduce lexical and syntactic complexity, making the text more accessible while preserving the original

storyline and stylistic value (Goodman and Freeman, 2018; Crossley et al., 2012).

While significant research has examined lexical simplification and vocabulary development in adapted texts (Bahrainian et al., 2024; Štajner et al., 2022; Tručá et al., 2023; Bingel et al., 2018) less attention has been dedicated to the syntactic complexity of their texts and how it is systematically modified according to learner proficiency. For example, Jin et al. (2020) examined syntactic complexity of English foreign language teaching materials for various grade levels in China, using eight syntactic measures. Their findings demonstrated significant differences in syntactic complexity between texts adapted for different proficiency levels. Additional studies have empirically compared simplified and authentic texts, revealing substantial linguistic differences – including lexical variation, syntactic structure, and textual cohesion (e.g. Crossley et al., 2007; Goodman and Freeman, 2018; Davison and Kantor, 1982; Carrell, 1987; Allen, 2009). Tools such as Coh-Metrix have been used to show that simplified texts typically contain fewer complex connectives, simpler syntactic constructions, greater lexical repetition, and enhanced local coherence.

In the Czech research context, adapted texts are most commonly studied in relation to reading literacy. Reading literacy is widely recognized as a crucial competency, enabling learners to understand, interpret, and engage with textual information effectively. However, Czech academia in this area has largely relied on qualitative approaches (e.g. Slavík, 2003; Vondrová et al., 2022), and quantitative methodologies remain underdeveloped. Existing Czech quantitative studies have primarily focused on assessing textual complexity and readability in textbooks (e.g. Pluskal, 1996; Průcha, 1998; Greger, 1999), often analyzing limited textual excerpts. In contrast, research on foreign languages increasingly adopts computational and

large-scale approaches to text analysis (Rupp et al., 2001; Graesser et al., 2011; Benjamin, 2012; Rafatbakhsh and Ahmadi, 2023), highlighting the need for similarly robust methods in Czech language education research.

The present study addresses this gap by investigating the syntactic complexity of adapted Czech literary texts designed for learners of Czech as a second language (L2) across the proficiency levels A2, B1, and B2, as defined by the Common European Framework of Reference for Languages (Council of Europe, 2001, CERF). Using quantitative syntactic metrics, this research compares adapted texts to their original versions, assessing the degree of syntactic simplification employed and how it correlates with learner proficiency.

2 Language Material

The corpus under analysis consists of ten adapted literary texts designed specifically for L2 learners of Czech. These texts represent the complete set of officially published adapted prose publications in Czech for this target group. Each book is aimed at a specific proficiency level according to the CERF, ranging from A2 to B2. These adaptations facilitate reading comprehension and linguistic acquisition by systematically adjusting the syntactic and lexical complexity to match learners' language proficiency. Our study examines how these adapted texts differ in syntactic complexity and compares them with their original Czech counterparts.

All adapted texts belong to the series *Adaptovaná česká próza* "Adapted Czech prose", published by Akropolis, a publishing house specializing in materials for L2 instruction in Czech.

At the A2 proficiency level, the corpus includes three books – *Brněnské legendy* "Brno Legends" (Trchová, 2017), *O pejskovi a kočičce* "A Doggie and a Pussycat" (Čapek et al., 2019) and *Pohádky* "Fairytale" (Holá, 2013).

At the B1 proficiency level, the corpus contains five adapted texts – *Povídky malostranské* "Prague Tales" (Neruda and Holá, 2012), *Pražské legendy* "Prague Legends" (Holá, 2011), *První láska a jiné povídky* "First love and other stories" (Šabach et al., 2014), *Staré pověsti české a moravské* "Old Czech and Moravian tales" (Holá, 2012) and *Báječná léta pod psou* "Bliss Was It in Bohemia" (Viewegh and Šichová, 2021).

Finally, at the B2 proficiency level, two adapted books were analyzed – *Košík plný milenců a jiné*

povídky "A Basket Full of Lovers and Other Stories" (Pawłowska et al., 2015) and *Povídky z jedné kapsy a Povídky z druhé kapsy* "Tales from Two Pockets" (Čapek and Korková, 2010).

The motivation behind the adaptation of literary texts into simplified versions for learners of Czech as a second language stems from a combination of pedagogical, cultural, and practical considerations. According to a recent analysis of author interviews (Šimková, 2019), many of the adaptors were driven by a lack of suitable reading materials for non-native speakers on the Czech market. Their primary aim was to provide accessible texts that would both support language acquisition and introduce learners to Czech literature and cultural heritage. Furthermore, several adaptors emphasized the practical utility of these texts in classroom contexts and found inspiration in similar foreign editions of simplified literature.

The process of selecting titles for adaptation was influenced by a variety of factors, including personal interest, availability of copyright, timelessness, literary value, thematic appeal, and the potential for further language work. While some adaptors favored canonical Czech works, others focused on folklore, legends, or even translations of global literary texts. Importantly, there was no consensus on the primary nature of the adapted text: most authors viewed the pedagogical and artistic dimensions as equally important, striving to preserve aesthetic quality while facilitating language learning. This duality is reflected in the content, structure, and linguistic features of the texts, suggesting a deliberate attempt to bridge literary authenticity with didactic function (Šimková, 2019).

Notably, all the adaptors were also experienced educators, and most identified primarily as teachers in the adaptation process, often combining this role with that of editor, co-author, or translator. Their decisions regarding linguistic simplification – whether in vocabulary, syntax, or discourse structure – were typically informed by their teaching practice, CEFR guidelines, and existing teaching materials. Although no strict methodology was applied, the adaptations exhibit a high degree of consistency in using exercises, audio recordings, and illustrations, all aimed at supporting comprehensive language development. These findings demonstrate a nuanced, intuitive approach to text simplification that balances linguistic accessibility with cultural and literary integrity (Šimková, 2019).

This Czech approach closely mirrors the for-

eigner approach in L2 text simplification. As discussed by Crossley et al. (2011, 2012) or Allen (2009), the majority of adapted materials for L2 learners worldwide are created through an intuitive approach, in which the adaptor’s experience as a teacher, language learner, or material developer plays a central role. Instead of relying on fixed word lists or formal grammatical constraints, adaptors make subjective judgments about what language structures are appropriate for learners at specific proficiency levels. These intuitively simplified texts aim to enhance readability and comprehensibility while maintaining the narrative coherence and stylistic essence of the original work.

In contrast, structural approaches – which rely on pre-defined lexical and grammatical frameworks or readability formulas – are less commonly applied and have been criticized for failing to account for deeper cognitive and discourse – level processing (Davison and Kantor, 1982; Carrell, 1987). Even in graded reader schemes that use controlled language, the goal remains similar: to reduce cognitive load and support language development through extensive reading. Overall, both Czech and international findings suggest that successful text adaptation depends less on rigid simplification rules and more on pedagogical sensitivity, linguistic intuition, and a balanced integration of aesthetic and instructional goals.

In addition to the adapted texts, the corpus also includes parts of three original Czech literary works: *O pejskovi a kočičce* “A Doggie and a Pussycat” (Čapek, 2018a), *Povídky malostranské* “Prague Tales” (Neruda, 2011), *Povídky z jedné kapsy* “Tales from First Pocket” (Čapek, 2018c) and *Povídky z druhé kapsy* “Tales from Second Pockets” (Čapek, 2018b). These texts correspond to the adapted versions used at the A2, B1, and B2 proficiency levels, respectively. Therefore, the built corpus enables a direct comparison between adapted and original texts across all three proficiency levels, providing insight into the syntactic modifications applied during the adaptation process. Table 1 provides an overview of the number of texts, sentences, and tokens analyzed in this study.

3 Methodology

Each text (individual chapter) was analyzed using UDPipe 2.0 (Straka, 2018) with Universal Dependencies (UD) 2.15 models (Zeman et al., 2019), a

material	text_n	sentence_n	word_n
A2	32	1041	8887
B1	46	2215	21307
B2	19	1070	12761
Adapted book A2	10	464	3627
Adapted book B1	6	354	3015
Adapted book B2	9	670	7513
Original book A2	10	676	9868
Original book B1	6	685	8664
Original book B2	9	1085	14032

Table 1: Number of texts, sentences and tokens.

well-established framework for syntactic parsing. Subsequently, the dependency trees were converted into the Surface Syntactic Universal Dependencies (SUD) scheme (Gerdes et al., 2018), which more emphasizes distributional criteria and syntactic relations rather than the content-focused approach of UD.

To maintain data consistency, only sentences that met the following criteria were included in the analysis: (i) they contained a predicate (a finite verb or auxiliary) as the sentence root and (ii) they did not include abbreviations, numerical digits, or special characters. In this paper, four syntactic indices were used to examine syntactic complexity: average sentence length (ASL), average clause length (ACL), mean dependency distance (MDD), and mean hierarchical distance (MHD).

ASL was measured using two methods: (i) the ratio of total words to sentences (words per sentence) and (ii) the ratio of total clauses to sentences (clauses per sentence). The first metric represents overall sentence length, while the second reflects clause density within sentences.

ACL was determined as the ratio of total words to total clauses, serving as an indicator of clause complexity.

MDD, based on Liu (2008), measures syntactic complexity by calculating the average dependency distance (DD) between syntactically related words throughout the text, excluding punctuation and root nodes. The DD of a word corresponds to the absolute difference between its position in the sentence (captured by id of each word) and the position of its syntactic parent. MDD was computed by dividing the sum of all DDs in the text by the total number of dependent words (i.e., total words minus the number of sentences), as shown in Formula 1:

$$\text{MDD} = \frac{\sum_{i=1}^{n-s} |DD_i|}{n-s} \quad (1)$$

where n represents the total token count, s denotes the number of included sentences, and DD_i is the dependency distance of the i -th token.

MHD, introduced by [Jing and Liu \(2015\)](#), was calculated using the same approach as MDD, but instead of dependency distances, hierarchical distances (HDs) were used. The HD of a word indicates the number of dependency edges separating it from the sentence root. MHD offers a broader structural perspective, illustrating the extent to which syntactic elements are embedded within a sentence. Let us illustrate the computation process of the four syntactic complexity indexes using sentence 1 from the adapted version of *O pejskovi a kočičce*.

1. Mám v kuchni myši a nechci je tam mít.
“I have mice in the kitchen, and I do not want to have them there.”

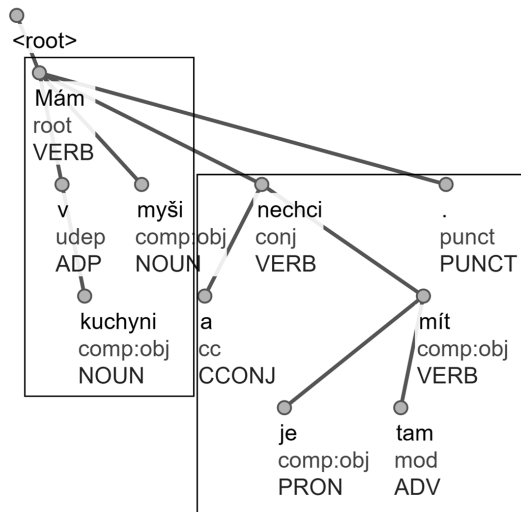


Figure 1: The dependency tree of sentence 1.

Figure 1 presents the dependency tree of sentence 1, rectangles capture individual clauses. The sentence consists of 9 words (excluding punctuation) and contains 2 clauses, as it includes 2 predicates: *mám* “have” and *nechci* “do not want to”. The ASL in terms of words is 9, calculated as 9 words divided by 1 sentence ($9/1 = 9$). The ASL in terms of clauses is 2, 2 clauses divided by 1 sentence ($2/1 = 2$). The ACL is 4.5, calculated as 9 words divided by 2 clauses ($9/2 = 4.5$). The MDD is 2.125, based on the sum of all dependency distances in the sentence: $\frac{1+1+3+1+5+2+1+3}{8} = \frac{17}{8} = 2.125$. The MHD is 1.875, calculated from the sum of all hierarchical distances: $\frac{1+2+1+1+2+2+3+3}{8} = \frac{15}{8} = 1.875$. To

evaluate statistical significance, comparisons were made between the following groups:

1. Adapted texts across proficiency levels A2, B1 and B2.
2. Adapted texts in contrast with their original versions.

Prior to statistical testing, the normality of each dataset was assessed using the Shapiro-Wilk test ([Shapiro and Wilk, 1965](#)). If normality was violated in any group, the Mann-Whitney U test ([Mann and Whitney, 1947](#)) was applied as a non-parametric alternative. In cases where both groups followed a normal distribution, an independent samples t-test was performed.

4 Results

4.1 Adapted texts

The results reveal that adapted texts across proficiency levels (A2, B1 and B2) demonstrated a clear trend of increasing syntactic complexity aligned with higher proficiency. Sentence length, measured in words, shows a clear upward trend from A2 to B2 levels (see Figure 2 and Table 2), with statistically significant differences between all levels ($p < 0.05$).

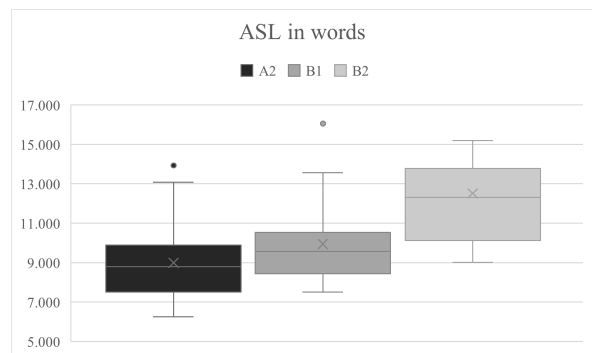


Figure 2: The average sentence length in words.

When measuring ASL in terms of clauses, we observe an overall increasing trend from level A2 to B2. However, the use of clauses within a sentence remains relatively similar between levels A2 and B1 (see Figure 3 and Table 2).

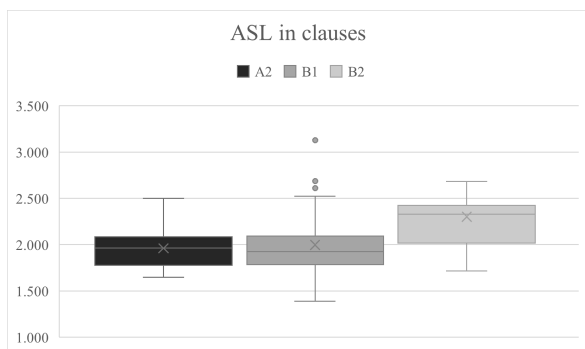


Figure 3: The average sentence length in clauses.

Statistical analysis confirms significant differences only between A2 and B2 ($p < 0.001$), and between B1 and B2 ($p = 0.001$).

level	ASL in words	sd	ASL in clauses	sd
A2	8.991	1.794	1.961	0.202
B1	9.946	2.160	1.996	0.334
B2	12.512	2.882	2.302	0.416

Table 2: Means and standard deviations (sd) of ASL in words, ASL in clauses

The average clause length shows a clear upward trend from A2 to B2 (see Figure 4 and Table 3), with statistically significant differences across all proficiency levels ($p < 0.05$). This increase mirrors the pattern observed in sentence length measured in words, indicating that syntactic complexity grows not only through the expansion of sentence structure but also through the internal development of individual clauses.

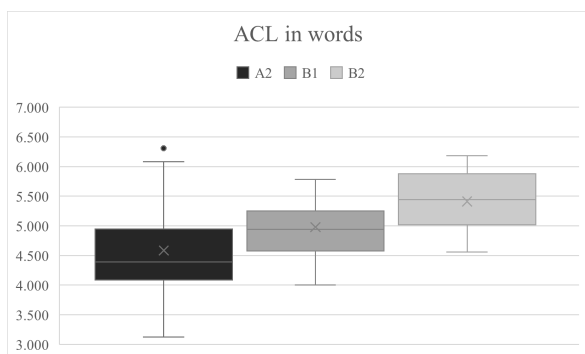


Figure 4: The average clause length.

The alignment between sentence and clause length trends suggests that as learners progress, they are gradually exposed to more elaborated syntactic constructions, both at the interclausal and intraclausal levels. This supports the notion of con-

trolled complexity progression in adapted texts, designed to match learners' growing proficiency and prepare them for authentic language use.

level	ACL	sd
A2	4.583	0.750
B1	4.978	0.530
B2	5.412	0.477

Table 3: Means and standard deviations (sd) of ACL

Both MDD and MHD display a clear upward trajectory from A2 to B2, with consistent and statistically supported increases ($p < 0.05$) across the three proficiency levels (see Figures 5 and 6 and Table 4).

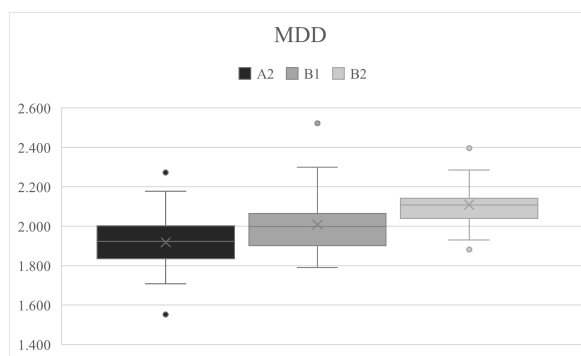


Figure 5: Mean dependency distance.

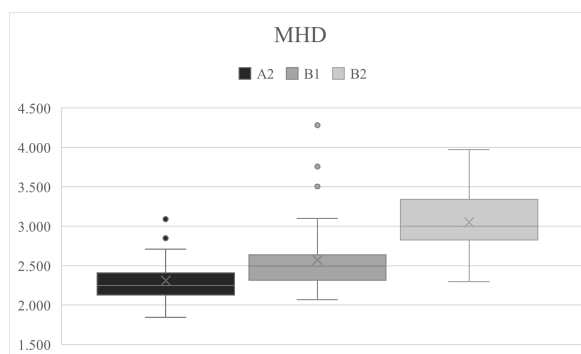


Figure 6: Mean hierarchical distance.

These findings indicate that B2 texts involve greater syntactic depth and longer dependencies, signaling a more complex and layered sentence structure. The rising values of these two measures suggest a shift toward deeper hierarchical embedding and longer syntactic spans, which corresponds to preparing advanced learners for exposure to more complex, native-level language.

level	MDD	sd	MHD	sd
A2	1.919	0.143	2.309	0.301
B1	2.008	0.147	2.573	0.426
B2	2.109	0.120	3.049	0.459

Table 4: Means and standard deviations (sd) of MDD and MHD.

Overall, the results indicate that syntactic complexity in adapted Czech texts increases progressively across proficiency levels, with B2 texts exhibiting the most sophisticated structures. This supports the assumption that higher-level adapted texts are designed to approximate native-level syntax more closely, regarding dependency distance and hierarchical depth. The findings confirm a systematic calibration of syntactic features according to learner proficiency, aligning with pedagogical goals of gradually preparing learners for authentic reading experiences.

4.2 Comparison of adapted and original texts

Regarding ASL measured in words (see Figure 7 and Table 5), statistically significant differences ($p < 0.05$) were found between the adapted and original versions at A2 and B1 levels, while no significant difference was observed at B2 ($p = 0.103$).

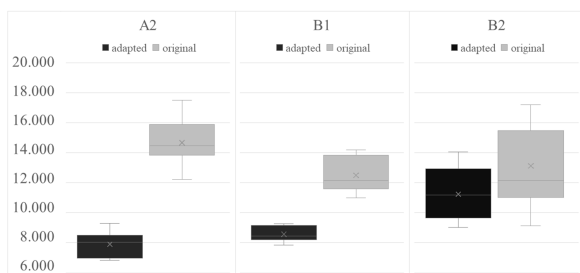


Figure 7: ASL in words of original and adapted texts.

level	adapted		original	
	mean	sd	mean	sd
A2	7.907	0.849	14.669	1.568
B1	8.571	0.531	12.494	1.220
B2	11.244	1.809	13.118	2.705

Table 5: Means and standard deviations (sd) of ASL in words for adapted and original texts.

In contrast, ASL measured in clauses (see Figure 8 and Table 6) showed statistically significant differences across all three pairs ($p \leq 0.05$).

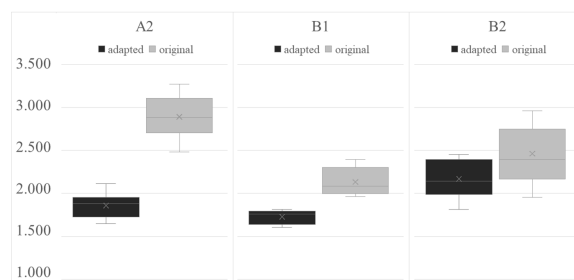


Figure 8: ASL in clauses of original and adapted texts.

level	adapted		original	
	mean	sd	mean	sd
A2	1.858	0.145	2.890	0.256
B1	1.730	0.082	2.133	0.165
B2	2.168	0.231	2.462	0.344

Table 6: Means and standard deviations (sd) of ASL in clauses for adapted and original texts.

Although the adapted B2 text is similar in sentence length (measured in words), it still displays a notably simpler syntactic structure compared to the original. The consistent differences in clause-based measures suggest that adaptations maintain reduced syntactic complexity, even when overall sentence length appears comparable.

In line with the findings on sentence length, further syntactic measures confirmed significant differences between the adapted and original versions of the A2 and B1 texts, whereas the B2 pair showed no statistically significant divergence.

ACL was significantly lower in the A2 and B1 ($p < 0.05$) adapted versions indicating a tendency toward structurally simpler clauses at lower proficiency levels. However, no significant difference ($p = 0.597$) was observed in text adapted for B2 level, suggesting that the clause structure in this adaptation remains relatively close to the original (see Figure 9 and Table 7).

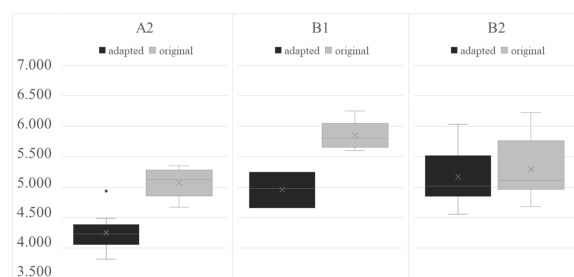


Figure 9: ACL of original and adapted texts.

level	adapted		original	
	mean	sd	mean	sd
A2	4.254	0.305	5.072	0.240
B1	4.960	0.300	5.852	0.240
B2	5.171	0.456	5.294	0.511

Table 7: Means and standard deviations (sd) of ACL for adapted and original texts.

The analysis of structural dependency measures revealed a consistent pattern across both MDD and MHD (see Table 8 and Figure 10 and Table 9 and Figure 11). Significant differences were identified in the A2 and B1 text pairs, reflecting reduced linear distance and syntactic embedding in the adapted versions. At the B2 level, however, these differences were no longer statistically significant, suggesting convergence between adapted and original texts regarding syntactic complexity.

level	adapted		original	
	mean	sd	mean	sd
A2	1.870	0.083	2.364	0.088
B1	1.962	0.061	2.225	0.096
B2	2.065	0.086	2.169	0.131

Table 8: Means and standard deviations (sd) of MDD for adapted and original texts.

level	adapted		original	
	mean	sd	mean	sd
A2	2.168	0.172	3.071	0.219
B1	2.386	0.194	2.910	0.130
B2	2.721	0.332	2.951	0.416

Table 9: Means and standard deviations (sd) of MHD for adapted and original texts.

Taken together, these results highlight a consistent pattern – syntactic simplification in adapted texts is most pronounced at the lower proficiency levels, both in terms of clause structure and dependency complexity. At the B2 level, the adapted texts retain much of the syntactic sophistication of the original works. This suggests that while simplification is a key strategy in materials for beginning and intermediate learners, advanced-level adaptations aim to approximate native-level structures more closely, supporting learners’ transition to authentic reading.

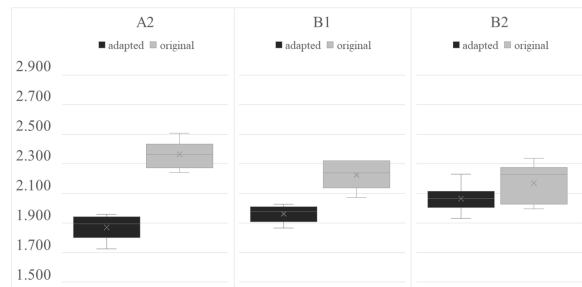


Figure 10: MDD of original and adapted texts.

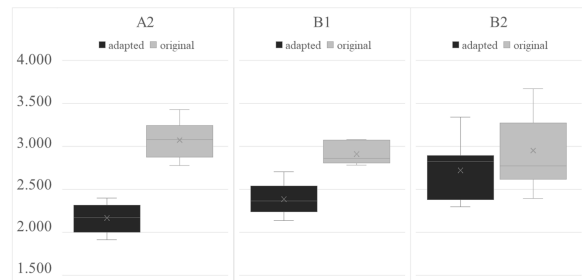


Figure 11: MHD of original and adapted texts.

5 Conclusion

This study investigated the syntactic complexity of adapted Czech literary texts across CEFR proficiency levels (A2–B2) and compared a subset of these texts with their original, non-adapted versions. Using a set of quantitative syntactic measures – including average sentence and clause length, mean dependency distance (MDD) and mean hierarchical distance (MHD) – we observed a clear proficiency-aligned increase in syntactic complexity within adapted texts. Texts intended for B2 learners exhibited significantly higher levels of structural complexity than those aimed at A2 and B1, suggesting deliberate calibration in the design of adapted materials.

The comparative analysis between adapted and original texts further revealed that syntactic simplification is most pronounced at lower proficiency levels. While the A2 and B1 adaptations showed statistically significant reductions in syntactic complexity across all core measures, the B2 adaptation did not differ significantly from its original counterpart. This suggests that adapted texts at more advanced levels tend to retain authentic syntactic structures, thus providing learners with exposure to language that approximates native-level usage.

Together, these findings highlight the role of syntactic adaptation in facilitating reading comprehension and language acquisition, particularly

at the earlier stages of L2 development. At the same time, they confirm that advanced learners are increasingly challenged with structurally complex input – a necessary step in the transition toward full linguistic competence. Future research could extend these findings by incorporating lexical, semantic or discourse-level features and by examining a broader range of genres and adaptation practices.

Beyond highlighting the increasing syntactic complexity across proficiency levels, our findings may serve as a foundation for developing a more systematic methodology for syntactic adaptation of texts. Such a framework could support authors and educators in producing level-appropriate reading materials, especially for L2 learners, by offering evidence-based guidelines for adjusting sentence length, clause structure, and syntactic depth. While current adaptations are largely guided by intuition or pedagogical experience, our data suggest the potential for a more standardized approach to aligning textual complexity with CEFR proficiency levels. This could lead to more effective and transparent practices in textbook design and literary adaptation for language education.

Acknowledgments

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