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Personality markers in text

Application of quantitative psychological-linguistic analysis
of written text in personality description



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Osobnostní markery v textu: Aplikace kvantitativní psychologicko-lingvistické analýzy písemného projevu při popisu osobnosti

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Abstrakt: Publikace je zaměřena na oblast psychologie užívání jazyka – na analýzu a interpretaci mezilidské komunikace pomocí psychologických a lingvistických metod. Kniha seznamuje čtenáře se vztahy, které je možné nalézt mezi verbálním projevem, formou a obsahem slovní písemné komunikace, a osobnostními charakteristikami komunikujícího, a to prostřednictvím aplikace kvantitativních výpočetních postupů. Představena jsou východiska psychologicko-lingvistické analýzy, vybrané metody popisu textu a osobnosti mluvčího, ale také design a výsledky tří původních českojazyčných studií. Cílem publikace je přinést ucelený přehled problematiky, prezentovat dosažené vědecké poznatky a podpořit efektivní využití psychologicko-lingvistických metod ve výzkumu osobnosti.

Klíčová slova: osobnost, jazyk, verbální, analýza, kvantitativní

Abstract: The publication focuses on the area of language use psychology – analysis and interpretation of interpersonal communication through psychological and linguistic methods. The aim of this book is to familiarize the reader with the relationships that may be found between the verbal expression, i.e. the form and content of written communication, and the personality characteristics of the communicator, specifically via the application of quantitative computational methods. The book introduces the theoretical background of psychological-linguistic analysis, selected methods of text and communicator's personality description, and also the design and results of three original studies on the Czech language. The aim of the publication is to offer the reader a comprehensive overview of the matter, to present contemporary research findings, and to support further scientific development of this discipline.

Keywords: personality, language, verbal, analysis, quantitative

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Summary

The publication “Personality markers in text” focuses on the area of language use psychology – analysis and interpretation of interpersonal communication through psychological and linguistic methods. The aim of this book is to familiarize the reader with the relationships that may be found between the verbal expression, i.e. the form and content of written communication, and the personality characteristics of the communicator, specifically via the application of quantitative computational methods. The book introduces the theoretical background of psychological-linguistic analysis, selected methods of text and communicator’s personality description, and also the design and results of three original studies on the Czech language. The aim of the publication is to offer the reader a comprehensive overview of the matter, to present contemporary research findings, and to support further scientific development of this discipline.

The research part of the book is divided into three sub-studies: “Personality characteristics: Agreement in the questionnaire assessment,” “Text specifics in relation to the communicator,” and “Communicator’s personality characteristics in the context of language traits”. The studies are conducted on two primary research samples, CPACT (n=200) and PS (n=1887). The source of textual data is based on four types of research texts (elicited texts in the length of approx. 180–200 words, created based on the assigned scenarios: Cover Letter, Letter from Vacation, Letter of Complaint, Letter of Apology) which are processed by computational analyses describing their lexical, lexical-semantic, morphological and stylistic language features in the form of 47 linguistic variables. Big Five Inventory (BFI-44/BFI-10) and Interpersonal Adjective Scales (IAS/IAS-32) tests are utilized as the source of information about the communicator’s personality, filled in two variants – self-assessment (self-report) and assessment by another person (other-report), providing 13 psychological variables in each variant (i.e. scores of personality characteristics related to the communicator).

The aim of the first study, **Personality characteristics: Agreement in the questionnaire assessment**, is to assess the validity of information about communicators’ personality characteristics with regards to the concordance of the self-report and other-report questionnaire results. The focus of this aim is purely psychological and stems primarily from the need to affirm the validity of our respondent data. In terms of the aforementioned goal, we first performed model testing of several statistical approaches that may be used for ascertaining the agreement between both assessment variants (self-other agreement); subsequently, we applied these approaches to the two research samples, or datasets. The primary finding of this study is that the scores of self-report and other-report exhibit a surprisingly high degree of agreement, especially in the trait of gregariousness-extraversion (IAS questionnaire), extraversion (and especially in women), and openness to experience (BFI questionnaire). The least agreement is then exhibited in the arrogant-calculating trait. Even in the characteristics with the lowest ascertained agreement, the approximate agreement (so-called hit-score) of both variants is at minimum 2.3 times more frequent than if it was random. Overall, we can therefore state that both questionnaire variants provide comparable information about the communicators’ personality characteristics.

The aim of the second study, **Text specifics in relation to the communicator**, is to describe the linguistic specifics of the research texts and their relationship to the communicators in terms of their social classification and idiolect. The first part of the study, focused on the description of the research texts, also indicates that the execution of the research texts corresponds to the nature of texts created in natural environment. The second part of this study addresses the text specifics in relation to the communicators' age and gender, ascertaining differences in the language traits use between the male and female sets, and the relationships between language traits and a communicator's age. These computations resulted in the discovery of numerous relationships between language traits and the communicators' social-classification descriptors. A more frequent use of verbs and more dominant dynamic dimension in women can be considered the most reliable markers of the communicator's gender; a higher use of prepositions in informal texts of older communicators, for instance, can be considered a marker of age. However, the individual results largely depend on the type of the analysed text. The third part of the study focuses on determining which language traits could correspond to the so-called idiolect imprint of the communicator, i.e. such traits that are used by the communicator more or less subconsciously and habitually. The most significant finding of this study is the confirmation of the crucial effect of the text type (genre, register) on the manifestation of language traits. It could be said that in general, language markers of age, gender and idiolect explain only a smaller part of the overall language variability.

The aim of the third study, **Communicator's personality characteristics in the context of language traits**, is a description of the relationships between language traits and personality characteristics of a communicator. The results of the analyses indicate a high number of relationships that can be found between the language traits and personality characteristics. However, no relationships significant for all the text types were discovered in any of the analyses. Considering the text specifics, the most universal personality markers proved to be the frequency of nouns and the static dimension, which relate primarily to the conscientiousness, unassured-submissiveness, and neuroticism personality traits. The texts of communicators who describe themselves as more conscientious, for instance, exhibit lower dynamics (i.e. static dimension), they demonstrate closer correspondence to the popularization register (static polythematic text) and are more retrospective. In terms of other discovered relationships, our study supports the results of studies from abroad, which cite a higher ratio of affirmations, prepositions and conjunctions in relation to the conscientiousness trait, and also a higher frequency of negation in communicators with a lower score of the agreeableness trait, and a lower frequency of nouns in emotionally unstable communicators. All these proven relationships (after Benjamini-Hochberg's FDR Correction) achieve the average value of correlations $\rho=0.18$. i.e. they explain approximately 3% variance. In the female set, these correlations achieve the average value of $\rho=0.26$, i.e. they explain approximately 7% variance. In the male set, the average value is $\rho=0.22$, explaining approximately 5% variance.

All the conducted studies indicate an obvious potential in the use of quantitative psychological-linguistic analysis, and not only in the research of personality. Furthermore, this publication also presents basic principles, proposes challenges that should be the subject of scientific discussion and further research, and poses numerous suggestions related to the issue of research methodology and a higher emphasis on the intercultural perspective of studies.

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1.	Psychology of language use: Study of verbal expression in the context of (not only) psychological disciplines	19
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1.1	Introduction and basic terminology	20
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	<i>This subchapter is dedicated to the basic principles of language use psychology and the issue of verbal expression as a source of psychologically relevant information about a communicator. This section presents fundamental research evidence, especially concerning the relationship between the text and the communicator's classification according to a certain social category, their temperamental and interpersonal characteristics, and their emotional experience. Lastly, the subchapter features several questions which deserve attention and should be the subject of further scholarly discourse.</i>	
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2.1	Selected methods of computational linguistic analysis and their use in psychological research	30
	<i>The subchapter is dedicated to the introduction of certain methods and approaches of mathematical (i.e. computational) linguistics which are promising in terms of their usage in psychological research as well as in social sciences in general.</i>	

2.2	Description of the communicator’s personality: Advantages and limitations in the use of psychological questionnaires	39
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3.	Personality markers in text: Study on the Czech language	46
	<i>The chapter expands on the introduced principles and contextualizes them on the level of documentation and interpretation of research undertaken within three psychological-linguistic studies – the Czech projects of CPACT, Poznejse and JUPSYCOR, which we conducted in the period between 2016 and 2020. The aim of this chapter is to document the application of the presented methods in greater detail and to present the results achieved within the three original studies that are the focus of this book.</i>	
3.1	Introduction of the studies: CPACT, Poznejse, JUPSYCOR projects	47
	<i>This subchapter offers basic information on the projects we will further use in the book. Furthermore, it introduces the aims of the individual studies, the research samples, and methods used. The methods description is divided into parts dedicated to text materials definitions, methods of text analysis, and the administered personality questionnaires.</i>	
3.2	Personality characteristics: Agreement in the questionnaire assessment	60
	<i>The subchapter presents the results of the study that covers the first research goal of our work. The text focuses on the issues related to the personality characteristics description through evaluating the outputs of the self-report and other-report questionnaire variants. Methods allowing comparison of both variants and results achieved within the two research samples are introduced.</i>	
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	<i>The subchapter is dedicated to the description of the research texts, written materials of TXT1–TXT4, and the specifics of these texts in relation to the communicators, specifically their social category and idiolect. The aim of the study is to describe which language traits are related to the age and gender of the communicators, and to present the potential links between language traits and idiolect.</i>	

3.4	Communicator's personality characteristics in the context of language traits	92
	<i>The subchapter is dedicated to the description of relationships between language traits in the research texts (TXT1–TXT4) and personality characteristics of the communicators, their authors. This study considers as key the language traits involving the lexical (lexical-semantic), morphological, and stylistic levels of the communication. When defining personality characteristics, we draw from the results of the BFI (Big Five Inventory) and IAS (Interpersonal Adjective Scales) tests, both in the self-report and other-report variants. The lexical analyses utilize the SEHW (Scales of Emotional Habitual Subjective Well-being) questionnaire.</i>	
4.	Discussion	109
4.1	Summary of the presented studies' results	110
	<i>The first part of the discussion focuses on the summary of the three original studies described in the previous subchapters. The discussion also addresses key findings about personality markers in text, advantages and limitations of the studies, and their potential in current research on language use psychology.</i>	
4.2	Prospects of psychological research on language use	117
	<i>The final part of the text is dedicated to a discussion on the theoretical background of psychological research on language use and its prospects. We focus on the challenges in this discipline in relation to the expansion of scientific knowledge, conduction of quality studies, on cross-linguistic research potential, and on the individual tools and approaches researchers may utilize in their work.</i>	

About the author

Dalibor Kučera is a lecturer and researcher in the fields of general, social, and educational psychology. He earned his Master's degree in Education at the Faculty of Education of the University of West Bohemia, and his Doctoral degree in General Psychology at the Faculty of Arts of the Masaryk University, where he also obtained his PhD in Psychology.

The author devotes his long-term interest to alternative psychodiagnostic and psychometric approaches. His doctoral thesis was dedicated to the issue of graphometrics – the *Emotionality in Handwriting, Interpersonal Characteristics in Handwriting* research focusing on the investigation of relationships between the form of hand-written expression and the writers' personality characteristics, or their emotional experience, specifically via statistic and computer graphometric methods. Since 2012, he has been concentrating on the area of psychology of language use, which is the subject of this book. In 2016-2018, he was a principal investigator in the three-year-long CPACT project, *Computational Psycholinguistic Analysis of Czech Text*, supported by the Czech Science Foundation (GACR). In 2020, the J. W. Fulbright Commission awarded him the Fulbright-Masaryk Scholarship for the *Personality Processes and Oral Communication project*. Apart from the above-mentioned, he focuses on the matter of interpersonal and intrapersonal perception and their social-psychological connections, for example in the *Self- and Other- Agreements and Asymmetries* project.

Dalibor Kučera is the author of numerous academic publications, including the books of *Modern Psychology: Main Fields and Questions of Contemporary Psychological Science* and *CPACT Reserarch: Computational Psycholinguistic Analysis of Czech Text*. Since 2013, he has worked as an assistant professor and researcher at the Department of Psychology at the Faculty of Education of the University of South Bohemia in České Budějovice.



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**Osobnostní markery v textu:
Aplikace kvantitativní psychologicko-lingvistické analýzy písemného projevu
při popisu osobnosti**

Personality markers in text:

*Application of quantitative psychological-linguistic analysis of written text
in personality description*

Odborné recenze:	prof. PhDr. Marek Blatný, DrSc. doc. Mgr. Václav Cvrček, Ph.D.
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