1 Introduction

> Rather than complain about the variable character of the meanings of words, we should recognize the existence of an extraordinary ability of human beings to apply words to the world in a creative way.
>
> William Labov

This book presents interdisciplinary research that lies on the crossroads of psychology, linguistics, psycholinguistics, and sociolinguistics. It is anchored in psychology through the concepts of creativity, creative potential, and creative performance; it is anchored in linguistics through the examination of the influence of creative potential upon creative performance in word formation and word interpretation; it is anchored in psycholinguistics through the examination of language user's preferences for particular naming and interpreting strategies; and it is anchored in sociolinguistics through the examination of the age-based and gender-based differences in the formation and interpretation of new complex words. These interrelated areas indicate the complexity of the present research and the complexity of relations between the examined variables. This intricate complexity, however, is hoped to be productive rather than destructive, because this book provides both a theoretical account of the word formation and word interpretation creativity and an empirical framework with the corresponding results obtained from more than 600 participants.

Although research into creativity has been abundant in the last two decades and the theoretical and empirical endeavour to uncover 'big' questions related to creativity has proliferated (Kaufman & Sternberg 2019; Ward & Kennedy 2017), comprehensive interdisciplinary research interrelating psychology (creative potential), (psycho)linguistics (word formation and word interpretation), and sociolinguistics (the role of age and gender) is still absent. In the present research, in addition to creativity, a few other crucial concepts are at play, notably competition, economy of expression, semantic transparency, and meaning

This research has been implemented with financial support from the APVV-16-0035 research grant.

predictability, all of them examined against the theoretical background of an integrated onomasiological theory of complex words. In sum, the influence of the creative potential upon the formation and interpretation of new complex words in two different age groups and with regard to potential gender differences is studied on the principles of an onomasiological theory of complex words (Štekauer 1998, 2005a, 2005b).

Research into word formation and word interpretation has a long tradition, even though exploration of these two areas has (surprisingly) always been separated from and independent of each other. Since the early 1960s when the fundamental works by Marchand (1960) and Dokulil (1962) set the scene in the semasiological and onomasiological directions, respectively, there has been a dynamic development in the field, manifested in various theoretical frameworks.[1] In spite of the comprehensiveness of this area of research and a large number of publications, there is still an unexplored area that has not yet been studied at all by any morphological or psycholinguistic school. It concerns an interdisciplinary account of creative behaviour of language users as complex word coiners and interpreters. In particular, the present research interrelates

(a) psychology, specifically, its concept of the creative potential represented by six creativity scores, viz. Originality, Fluency, Flexibility, Elaboration, Creative Strengths, and Composite Score, and the concept of creative performance;
(b) linguistics, specifically, word formation focused on the dynamic aspect of the formation of new complex words in terms of an onomasiological theory;
(c) psycholinguistics, represented by a theory of the meaning predictability of potential/new complex words; and
(d) sociolinguistics, in particular, the role of age and gender in the formation and interpretation of complex words.

These areas of research are interrelated through (i) the examination of the potential effects of the psychological concept of creative potential upon the creative performance manifested in the way language users form and interpret new complex words in response to the naming needs of a language community, by taking into account the age and gender of a sample of respondents and through (ii) a proposal of an integrated onomasiological model of complex words that interrelates their linguistic and psycholinguistic aspects of complex words.

[1] For an overview of various theoretical approaches to word formation, see Štekauer and Lieber (2005), Lieber and Štekauer (2009, 2014), and Müller et al. (2015/2016).

The scope of the present research thus establishes a network of relations that makes it possible to examine (i) the extent of the influence of the creative potential on the formation and interpretation of new words; (ii) the extent of the influence of a selected word formation strategy upon word interpretation; (iii) the extent to which word formation and word interpretation strategies are affected by the age and the gender of language users; and (iv) all this in relation to the individual creativity indicators.

Abraham maintains that "[c]reativity refers to the singularly complex human capacity to produce novel ideas, generate new solutions, and express oneself in a unique manner" (2016: 609). Accordingly, in terms of word formation, our approach is based on the postulate that the general creative potential of all language speakers affects word formation creativity as a concrete manifestation (performance) of this creative capacity. We understand word formation creativity as the ability of any and all language speakers to form a new complex word in response to the specific need of a speech community to give a name to a new object of extralinguistic reality or a new name to an already named object. Since giving names to objects is not an automatic process, it is assumed that every act of naming is a creative act that employs a language speaker's cognitive abilities in order to select and employ one of a number of possible naming strategies. The creativity of word formation in this sense is manifested at each level of the naming process, that is, at the conceptual level, the onomasiological level, and the onomatological (morphematic) level.

When dealing with creativity, various hierarchical levels of analysis come into consideration (Jauk 2019). The deepest level of analysis covers neurobiological systems, such as the executive control system and the default mode network. This layer is the basis for various psychological constructs, namely personality dispositions and cognitive abilities. Here, the cognitive creative potential in terms of divergent thinking is crucial and will be the main topic of the present analysis because it can be characterized, according to Runco and Acar (2019: 244), as a "measure of ideation that fuels creative thinking" and consequent creative performance.

In word formation, the main criterion for the evaluation of the creative performance in terms of the individual indicators and subscores is the preferred *naming strategy*, that is, the preference for *formally economical* versus *semantically transparent* coinages. The *competition* between these two contradictory tendencies that are present in every language and manifested at every level of linguistic description is evaluated by means of a set of onomasiological types, each of which represents a different degree of economy and transparency, depending on the naming strategy employed. While a system of onomasiological types that underlies the evaluation of the transparency versus economy tendencies in the examined age-based and gender-based groups of our

respondents is described in detail in Section 3.1.1, Example (1) illustrates the very essence of this aspect of our research:

(1) (a) spider-explore-er
(b) spider-man
(c) explor-er
(d) Explore

Example (1) illustrates four different strategies in the formation of new words. (1a) is semantically the most transparent representation of the concept of 'a person exploring spiders'. At the same time, it is least economical. (1b) misses the expression of what is performed with spiders by a person. There are a high number of options. Hence, while more economical, this complex word is less transparent than (1a). (1c) is as economical as (1b), but it is even less transparent because there are an infinite number of objects that can be explored. Finally, the converted agent noun in (1d) as a potential word is the most economical solution. Example (1) thus illustrates the method for the evaluation of creative performance of our respondents in forming new complex words.

The test used to evaluate word formation creativity includes three sets of tasks. Each of them examines, in a different way, the naming strategy of the respondents in giving a name to a person who performs a particular activity, namely, (i) by multiple choice, (ii) by coining a complex word on the basis of a verbal description, and (iii) by coining a complex word on the basis of the drawing of a situation.

Creative performance in interpreting new/potential complex words is conceived as a manifestation of a speaker's creative potential reflected in the speaker's ability to identify a potential reading or several potential readings for a new/potential complex word, that is, for a complex word encountered by the speaker for the first time. The degree of interpretation creativity is determined by the number of readings and by the originality of the readings a language speaker is able to propose for a given complex word.

The major part of the psycholinguistic research into complex words has been concentrated on the interpretation of Noun + Noun compounds. This is because their interpretation poses problems due to the absence of a morpheme that represents the semantic relation between the two nouns (modifier and head). Consequently, there are ample possibilities for the interpretation of new/potential complex words of this type due to the numerous possible relations between two nominal constituents of a compound. This has also been confirmed in our experimental research: for none of the experimental words and in no cohort the number of proposed original readings of the test words dropped under ten. Example (2) illustrates some of the proposed readings for *flower hat* as one of the words used in our experiment:

(2) *a hat with a flower in it*
a hat made of flowers
a hat with a flower pattern
a hat with a flower shape
a hat full of flowers
a hat for gardening
top of a flower
a person wearing a flower hat
a hat placed on flowers
a pretty hat
a colourful hat
a haircut

This stream of research has, therefore, been aimed at the evaluation of the respective roles of the head and the modifier, the ways of identifying possible semantic relations, the role of word families, the role of the semantic transparency of the compound constituents, etc. Like with word formation, no previous research has examined the influence of the creative potential of language speakers on the interpretation of new complex words.

The main criteria for the evaluation of interpretation creativity and the differences between the two cohorts in terms of the individual creativity indicators and subscores are (i) Predictability Rate, (ii) Objectified Predictability Rate, both in accordance with Štekauer (2005a), (iii) the average number of proposed readings by a cohort member, and (iv) hapax legomena (readings occurring only once in a given cohort).

The interpretation test covers two types of new/potential complex words: Noun + Noun compounds and converted words. These two types of complex words lend themselves very well to the examination of creativity because both of them offer a large number of potential readings due to the incomplete morphemic realization of the prototypically ternary onomasiological structure.

Since general creativity in the sense of creative potential is highly individual, this is necessarily projected onto the formation as well as interpretation of new complex words. Our research, therefore, evaluates the general creative potential using the *Torrance Test of Creative Thinking* (TTCT) (Torrance 1966, 1974, 1987, 1990, 1998) in its most recent locally adapted version (Jurčová & Szobiová 2008). The TTCT has been translated into more than thirty languages and, with its rich research history, is considered as the most widely referenced and used test related to creativity (Kim 2006). The test focuses on divergent thinking abilities that are necessary for situations in which more than one correct answer exists (Runco & Acar 2012, 2019). The TTCT test is based on Guilford's *Structure of Intellect* theory (Guilford 1956, 1986) and enables the measurement of various scores, namely Originality, Elaboration, Fluency, and Flexibility. Originality captures the uniqueness of

answers; Elaboration reflects the number of details provided; Fluency captures the number of answers; and Flexibility covers the diversity among answers. In addition, a Composite Score and a score capturing Creative Strengths can be derived. These scores can be understood as indicators of creative potential and have previously been empirically demonstrated to be predictors of various creativity-related outcomes (see e.g. Cramond et al. 2005; Runco et al. 2010).

By reflecting the essence of TTCT, it is possible to divide respondents into two basic groups: a group of respondents with high scores in the TTCT (H(igh)-cohort) and a group with low scores (L(ow)-cohort). This division makes it possible to evaluate the achievements of the two cohorts in the word formation test and the word interpretation test in relation to the main individual creativity indicators (Originality, Elaboration, Flexibility, and Fluency) and the additional subscores (Creative Strengths and Composite Score) of the TTCT and to assess whether and to what degree the general creative potential is reflected in the word formation creativity and word interpretation creativity of language speakers. The division into two extreme cohorts pursues two objectives: (i) it may be postulated that a comparison of a cohort with the highest TTCT scores with a cohort featuring the lowest TTCT scores for the individual creativity indicators and subscores aptly reflects the influence of creative potential upon creative performance in word formation and word interpretation; (ii) this methodological procedure is necessitated by the nature of the interpretation test's evaluation, which relies on the theory of meaning predictability (Štekauer 2005a). For the sake of, first, the uniformity of the data evaluation across the book and, second, the comparability of the word formation creativity and the interpretation creativity results, we decided to stick to a dichotomized solution in evaluating all parameters.

Certainly, the division of the respondents into an L-cohort and an H-cohort involves certain risks, such as the loss of a considerable amount of information with the consequence of a potentially diminished statistical power. To assess the role of the potential disadvantages of the employed procedure with dichotomized data, in selected cases, we provide a specific form of a sensitivity analysis where several ways of analyzing the data are conducted, and the robustness of the results across the methods of statistical analysis is corroborated. Therefore, instead of dichotomizing the data into an L-cohort and an H-cohort, data are used in a continuous form, a non-parametric correlation analysis is calculated, and the results are compared to the dichotomized solution. Furthermore, in addition to the classical null hypothesis significance testing, the effect size is reported and the Bayesian approach is incorporated in our statistical evaluation. The motivation for including the Bayes factor is to provide a more nuanced interpretation and to distinguish between "evidence for H0 rather than H1, evidence for H1 rather than H0, or not much evidence

either way" (Dienes and McLatchie 2018: 215). This issue is elaborated in Section 4.4.4.

The individual criteria employed in word formation and word interpretation are used to compare two *age groups* of respondents, 323 secondary school students (age group of 16–17) and 309 university undergraduates (age group of 21–22), and two *gender groups* (381 females and 251 males).

Our research pursues the objective of corroboration of the fundamental hypothesis postulating that the TTCT-based differences between the high and low cohorts in the individual creativity indicators (i.e. the differences in the creative potential of language users) will be reflected in the differences in their achievements in the word formation test and the interpretation test (i.e. in their creative performance). It is hypothesized that these differences are manifested differently for the individual creativity indicators and subscores, and that better achievements in the creative performance of the H-cohort compared to the L-cohort will be most striking for those creativity indicators that are directly related to the creative performance tasks specified in the word formation and the interpretation tests. Furthermore, it is hypothesized that the age-based groups and the relevant cohorts differ in their preferences for semantic transparency versus economy of expression. Given the different nature of the formation of new words and their interpretation (different micro-domains within the domain of complex words), it may be expected that the results in word formation creativity will not coincide with the results in the interpretation creativity. A detailed formulation of our hypotheses is provided in Section 4.5.

Following this introduction, Chapter 2 of this book discusses various aspects of creativity as a potential and as a performance. It overviews the latest psychological approaches to this issue, such as the bio-psychological basis of creativity and various methods of creativity examination (Section 2.1). The creative performance is related to the core topics of our research: word formation creativity and interpretation creativity (Section 2.2). An important point in this respect concerns the influence of word formation creativity, projected onto the selected word formation strategy, on interpretation creativity, which gives further support to the assumption of a close relation between word interpretation and word formation (Štekauer 2016). This is reflected in their comprehension as parts of a more general field of complex words and in the conception of creativity in the field of complex words.

Chapter 3 introduces the theoretical foundations of our quasi-experimental research. It starts with a theory of complex word formation (Section 3.1) by introducing a system of onomasiological types (Section 3.1.1). They reflect

different word formation strategies in respect to the scalar opposition between the economy of expression and the semantic transparency (Section 3.1.2) of new/potential complex words. Section 3.2 deals with the theoretical foundations of our research into complex word interpretation. It starts with a brief summary of the basic principles of the theory of meaning predictability (Section 3.2.1) that is a point of departure for our treatment of interpretation creativity. Individual evaluation parameters are presented in Section 3.2.2, in particular, Predictability Rate (Section 3.2.2.1), Objectified Predictability Rate (Section 3.2.2.2), average number of readings proposed by a cohort member (Section 3.2.2.3), and the criterion of hapax legomena (Section 3.2.2.4).

Chapter 4 explains and justifies the principles of the Torrance Test of Creative Thinking (Section 4.1), the word formation test (Section 4.2), and the word interpretation test (Section 4.3). Section 4.4 describes our sample of respondents and the method of data collection (Section 4.4.1), explains the reasons for working with two age-based groups (Section 4.4.2), discusses the relevance of data obtained from non-native speakers (Section 4.4.3), and accounts for the division of the sample of respondents into two cohorts for each of the creativity indicators/subscores (Section 4.4.4). Finally, Section 4.5 presents our hypotheses that are examined and verified in the experimental research.

Chapter 5 is focused on our research, and analyzes and evaluates the data obtained by testing the age-based and gender-based groups of respondents. Section 5.1 discusses the results concerning word formation creativity for the group of secondary school students (Section 5.1.1) and the group of university undergraduates (Section 5.1.2). Their results are compared in Section 5.1.3. Section 5.2 provides an analysis of the results related to interpretation creativity for the group of secondary school students (Section 5.2.1) and the group of university undergraduates (Section 5.2.2). Section 5.2.3 compares the results of both groups. Section 5.3 focuses on creativity in word formation and word interpretation from the perspective of gender. A theoretical introduction to this topic (Section 5.3.1) is followed by an analysis of gender differences in terms of word formation creativity (Section 5.3.2) and interpretation creativity (Section 5.3.3) in both groups.

Finally, Chapter 6 evaluates the creative performance of the individual groups of respondents by relating the data on word formation and word interpretation and by evaluating the results in terms of the individual hypotheses specified in Section 4.5.

2 On the Notion of Creativity

Creativity has been in the foreground of scientific research in various areas of human activity (see Section 2.1) for quite a long time now. Our research directs its focus on two closely interrelated areas of linguistic activities, word formation and word interpretation, areas which represent an untilled field in this respect. It primarily pursues an answer to the following fundamental question: What is the influence of the general *creative potential* upon the *creative performance* in these two specific areas of language, manifested in coining and interpreting new complex words? For obvious reasons, the comprehension of creative performance in linguistics or any other area of research is preconditioned by the comprehension of the fundamental views, theories, and principles of the concept of creativity. A broader introduction to more general questions is important not only because there has been a growing interest in linguistic creativity recently (for example, Bergs 2019; Carter 2015b; Jones 2015a, 2015b; Sampson 2016; Vásquez 2019) but also, and especially, because the relation between creative potential and creative performance has not yet been studied in the fields of word formation and word interpretation at all.

For this reason, and because there are various approaches to the concept of creativity and because creative potential has been studied and evaluated by various psychological methods, we start with a general overview of various aspects of creativity from the psychological point of view (Section 2.1). Following a general introduction (Section 2.1.1), we account for gradual developments and modifications of views of creativity over time (Section 2.1.2) and proceed to the bio-psychological basis of creativity (Section 2.1.3). Since our research relies on the evaluation of the creative potential of the respondents, relevant attention is devoted to various methods used for the study and evaluation of creativity (Section 2.1.4). Here, the Torrance Test of Creative Thinking (TTCT), crucial to our research, is introduced. Section 2.1 thus sets the scene, a theoretical background, for a discussion of linguistic creativity in Section 2.2. This section illustrates two contradictory, or extreme, positions on the concept of linguistic creativity as well as one which understands creativity as a graded phenomenon. The position assumed in our approach to word formation and

word interpretation creativity is presented in Section 2.2.2. It will be shown that our approach relies on (i) an onomasiological theory of word formation (see chiefly Körtvélyessy & Štekauer 2014; Körtvélyessy, Štekauer, & Zimmermann 2015; Štekauer 1998, 2005b, 2016; Štekauer et al. 2005), (ii) an onomasiological theory of meaning predictability (Štekauer 2005a), and (iii) a theory of competition in word formation and word interpretation (Štekauer 2017).

2.1 Creativity from the Psychological Point of View

A quick Google search for the term 'creativity' reveals more than 400 million hits. If the Web of Science is used instead and search criteria are specified to include creativity as a specific research topic, more than 46,000 scientific resources can be identified from the last two decades alone. These are just two brief illustrations of the vast interest in the topic of creativity. When considering the social importance of the topic, creativity could be, as instantiated by Florida (2006) and Kaufman and Beghetto (2009), described as the "most important economic resource in the twenty-first century" (Kaufman & Beghetto 2009: 1). In line with this statement, at least according to some authors, creativity represents "one of the key competencies for the twenty-first century" (Ritter & Mostert 2017: 243). No wonder, therefore, that scientific research reflects this social demand and pursues a broadening of our understanding of creativity in various contexts.

In fact, the number of research topics is abundant, ranging from the role of creativity in the everyday life of individuals (Cotter, Christensen, & Silvia 2019) to a broader socially relevant context, such as organizational (Reiter-Palmon, Mitchell, & Royston 2019), educational (Beghetto 2019; Gajda, Karwowski, & Beghetto 2017), or sociocultural areas (Gabora 2019; Lubart et al. 2019; Simonton 2019c). When mapping specific areas of research, a wide range of themes can be identified, ranging from the corroboration of the relationship between creativity and mood (Baas 2019; Baas, de Dreu, & Nijstad 2008), and intelligence and wisdom (Karwowski et al. 2016; Kim 2005; Silvia 2015; Sternberg, Kaufman, & Roberts 2019), to the role of creativity in well-being, mental health, and psychopathology (Fink et al. 2014; Forgeard 2019; Simonton 2019b). Much attention is paid to the neural basis of creativity (Abraham 2019a, 2019b; Kleinmintz, Ivancovsky, & Shamay-Tsoory 2019; Takeuchi & Kawashima 2019; Vartanian 2019) and related areas such as genetics (Barbot & Eff 2019; Ren, Yang, & Qiu 2019).

In this book, we aim to broaden the understanding of the topic further, especially the psycholinguistic point of view, by focusing on a previously highly neglected topic: the role of creative potential in word formation and word interpretation. However, to accomplish this goal, we need to start more