Delimitation of Participles
in the Manual Morphological Annotation

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Abstract. This paper is concerned with annotation of participles in the manually annotated subcorpus r-mak (1.0–4.0) of the Slovak National Corpus. Passive and active participles are classified as special non-finite verbs by Slovak grammarians, but in the Slovak National Corpus these are classified as a separate part of speech. Boundaries between participles and other word classes are not always clear, thus they sometimes migrate to the categories of adjectives and nouns. Separating participles from adjectives and nouns was one of the most difficult problems in the manual annotation of the subcorpus r-mak. The paper also gives attention to borderline cases (homonyms, word forms created by analogy) and words where we had to modify formal criteria for their classification (words with notable semantic shift from the motivating word; substantivised participles).

1   Participles in General

Participles comprise a specific part of speech class in Slovak, characterised by its hybrid form and content. Active and passive participles are traditionally classified as non-finite verbs[1]. Participles, as well as verbs, exhibit grammatical categories of intention and aspect, but they also have to agree with the noun they modify in gender, number and case. Semantically, participles exhibit dynamic features; their meaning originates in the motivating verb. In many cases they can be shifted semantically, so the direct link between "motivating word" (verb) and "motivated word" (participle) weakens. Thereby, the semantic aspect of a participle may be reduced, or rather the participle may show static properties of entities so that the participle becomes an adjective. The form of participles is identical to the adjectives (corresponding with the adjective-like declension paradigms of *pekný* and *cudzí*) and the syntactic function of participles is identical to the adjectives (they can be used either as an agreeing attribute, predicate nominal or complement). This is the reason that the process of participle adjectivisation is frequent. Some participles may undergo the process of conversion into a substantive (substantivisation). Thus, substantivized participles often denote persons of specific functions or roles, e.g. *cestujúci* (traveler, an active participle of *to travel*), *vedúci* (leader, active participle of *to lead*), *účinkujúci* (acting, active participle of *to act*), *obžalovaný* (accused, a passive participle of *to accuse*), etc. Therefore, boundaries between adjectives and participles are rather unclear.

The classification of participles (most notably, *-n-/-t-*[2], i.e., passive participles) is a perennial problem in Slovak linguistics. The most precise description is given in [13], [8] and [14]. As stated in [13, p. 495], the most appropriate name would be *-n-/-t- príčastie* (-n-/-t-

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[1] neurčitý slovesný tvar
[2] participle derived by -n-/-t- suffix

participle) since the meaning of formally passive participles is often not passive and often they are not used in passive constructions. Based on comprehensive research, J. Sejáková [14] agrees with the term and defines, in addition, the new term *n/t-ová jednotka* (-n-/-t-unit) to refer to the lexemes that are difficult to classify.

A detailed paradigmatic (including lexis, semantics, word-formation and grammar) and syntagmatic analysis is needed to classify the part of speech category of word ending with *-ný (-ený) / -tý, -iaci (-aci) / -úci*. J. Sejáková [14, pp. 31–34] uses the terms *pól adjektívnosti* (pole of adjectivity) and *pól slovesnosti* (pole of verbality), which demonstrated fuzziness of categorization. The authors of monograph [8, p. 209] give examples *ohnutý chrbát* (curved back) that illustrates that the word *ohnutý* may express either an inherent quality (only seemingly a consequence of an action) or an acquired feature (permanent or temporary quality that is caused by an action).

The Slovak vocabulary includes adjectives suffixed by -n-/-t-, which have a similar form as adjectival participles. In some cases, a transformational test has shown that adjectives can be easily differentiated from participles (as stated by Sejáková [14]), e.g. *novopostavený dom* (newly built house), *ukričaná žena* (rambunctious woman), *predpojatý človek* (prejudiced person), *sčítaný študent* (well-read student). Either their assumed motivating verb does not exist (**predpojať*), or the word begins with a prefix or prefixoid that does not occur with its motivating verb (**novopostaviť*) or the word does not correlate with a motivating verb (no aspect congruence, no semantic congruence, etc.).

If it is possible to derive an adverb or an abstract noun from an participle, or the participle can undergo the formation of comparative and superlative, then this indicates its adjectivisation. E.g. from the adjectivised participle *unaven-ý* (tired) we can form an adverb *unaven-e* (tiredly), abstract substantive *unaven-osť* (tiredness), comparative *unaven-ejší* (more tired), superlative *naj-unaven-ejší* (most tired) [see: 13, p. 502]. This is not a general rule (it affects only some adjectivised participles), therefore it cannot be used as a generally valid criterion for delimitation.

2 Participles in the Slovak National Corpus

2.1 Frequency of Participles

Participles are quite frequently used in Slovak written texts. The manually morphologically annotated subcorpus of the *Slovak National Corpus* (SNK) called *r-mak* was created at the Slovak National Corpus Department of the Ľ. Štúr Institute of Linguistics, Slovak Academy of Sciences. The current 4th version contains about 1.2 million tokens and was released in 2013.[3]

The number of participles in the corpus *r-mak-4.0* (1,199,326 tokens) is 16,332 hits (*Query:* `[tag="G.*"]`). They represent 1.36% of all the tokens (including the non-word ones, such as punctuation or numerals). The number of unique participles (word forms) is 8,796 (6.41% of all the unique word forms), which gives 3,675 unique lemmas (6.74% of all the unique lemmas). The subcorpus *r-mak-4.0* contains predominantly fiction and journalistic texts. The portion of professional texts is lower (19.0%), which may affect the

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[3] Further information on the corpus size and text types can be found on the website of the Slovak National Corpus, Department of Ľ. Štúr Institute of Linguistics, Slovak Academy of Sciences (`http://korpus.juls.savba.sk/stats.html`).

statistical results (the greatest concentration of participles was expected in professional texts). The largest corpus of Slovak (at the time of writing) *prim-6.0* contains 1.6% participles in professional texts (subcorpus *prim-6.0-public-prf*), 1.07% in journalistic texts (prim-6.0-public-inf) and 1.05% in fiction (*prim-6.0-public-img*).[4]

In conclusion, when querying the subcorpus r-mak-4.0 we get 13,557 hits of passive participles with the suffixes *-ný/-tý* and only 2,775 hits of active participles with the suffixes *[-ú/-u/-ia]ci*. The number of words belonging to different parts of speech categories in the subcorpus *r-mak-4.0* is illustrated in the Figure 1.[5]
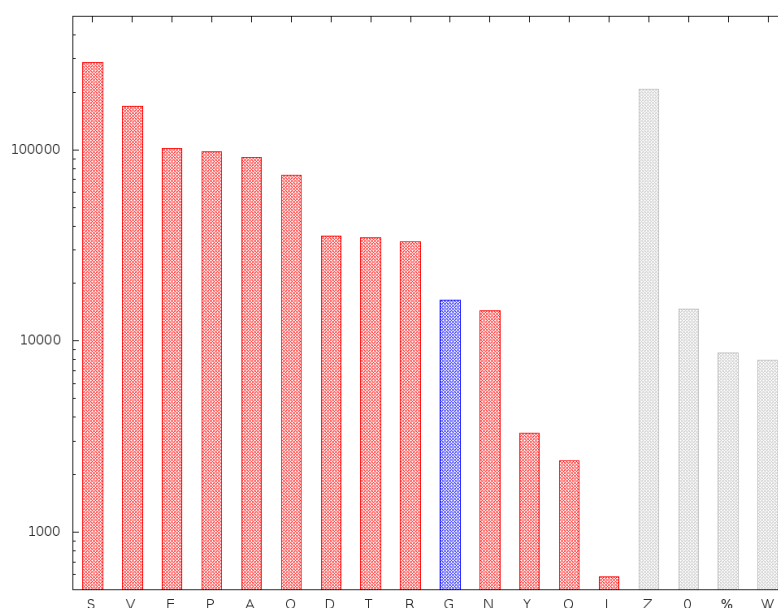

Fig. 1. Total number of tokens in the subcorpus r-mak-4.0 by POS

S – nouns, V – verbs, E – prepositions, P – pronouns, A – adjectives (91 577 hits), O – conjunctions, D – adverbs, T – particles, R – reflexive morphemes *sa/si*, **G – formal participles (16,332 hits)**, N – numerals, Y – conditional morpheme *by*, Q – undefinable part of speech, J – interjections, Z – punctuation, 0 – numbers, % – citation, W – abbreviations

2.2 Annotation of Participles in the SNK

Lemmatization and morphological tagging are an important part of a corpus. In undertaking the corpus research one needs to consider the reliability of a tagger [see: 9, p. 169]. The manually annotated corpus *r-mak* is assumed to be virtually error-free. Errors were kept to

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[4] Corpus *prim-6.0* was annotated automatically, therefore the provided analysis is only approximate.

[5] Шимкова [17, p. 391] gives an overview of the frequency of parts of speech classes in the first three versions of the subcorpus *r-mak (1.0, 2.0, 3.0)*.

a minimum by 3-level control using the semi-automated tools [11]. The corpus has been manually disambiguated by two annotators. Their results were automatically compared and manually corrected [5, p. 61].

Naturally, the variability of participles and their unclear classification affected the way of their manual annotation. There were several possibilities for classifying participles, each of them presenting its advantages and disadvantages: 1. to establish an adjective-like class including adjectives as well as participles (chosen by, e.g. the Czech National Corpus; [7]), not distinguished in any way (with a few minor exceptions); 2. to consider paradigmatic and syntactic features for the *-n-/-t-* and *-iaci-/-úci* units. In this case, the annotation would have taken too long (given the nature and size of the annotation); 3. to establish a special formal class of participles considering their form and derivation only (synchronic approach). "We consider the participles to be a separate part of speech class, not a declined form of a verb – while definitely possible, this would lead up to some singular categorization, e.g. verbs with case" [6, p. 56] Morphological annotation in the SNK is based on formal morphology and the combination of attributive and positional systems of morphological tagging [see 17, pp. 387–388]. The selected criterion follows traditional classification of participles as non-finite verbs. This also allows easy searching for formal participles and gives reasonably precise information on the number of adjectives and formal participles.

During application of the formal approach, we observed that in the heterogeneous group of words suffixed by *-ný (-ený) / -tý, -iaci (-aci) / -úci* there are units that have to be disambiguated and require greater effort when being classified. Delimitation of participles from adjectives and nouns was one of the most difficult problems of the whole manual annotation. Our goal was to further specify the annotation of participles to get unified and more logical system. In the paper we discuss such borderline cases.

The user guide *Tokenizácia, lematizácia a morfologická anotácia Slovenského národného korpusu* ([4]; hereinafter User guide) was designed with a goal to build an annotated subcorpus (the User guide was used for all the subcorpus versions from 1.0 to 4.0). The User guide provides a description of tokenization, lemmatization and morphological annotation. "The tagset is highly functional and pragmatic, although some allowances had to be made to accommodate the traditional analysis of Slovak morphology and part of speech categories" [6, p. 41]. The tags are of various length, but the order of characters is obligatory. The tagset covers the traditional 10 part-of-speech categories and several non-word categories (19 categories in total). There were many borderline cases that had to be specified, e.g. verbal nouns, nouns with adjectival paradigms as well as participles (which are a separate part of speech category).

"The borderline cases are as follows: … 3. Active and passive participles as well as deverbalised adjectives. We classify these cases as separate part of speech category (G) – *písaný, otvorený, obutý, píšuci, hrajúci, stojaci*. Formal participles are distinguished from adjectives on the grounds of their form and origin" [4, p. 5]. This is explained as follows: "Participles (*prestretý, zívajúci* – G) are considered to be a separate part-of-speech category because they are dynamic and often unclear position in between both adjectives and verbs" [4, p. 7].

Following the guidelines, a given participle is marked [k] for active and [t] for passive. The categories for gender, number and case congruence use the same characters as for the adjectives. Participles can also exhibit a degree of comparison. Positive or irrelevant degree is marked [x], whereas comparatives [y] and superlatives [z] occur rather rarely.

category	category type	tag character
part of speech	participle	G
type	active	k
	passive	t
gender congruence	masculine animate	m
	masculine inanimate	i
	feminine	f
	neutral	n
number congruence	singular	s
	plural	p
case congruence	nominative	1
	genitive	2
	dative	3
	accusative	4
	vocative	5
	locative	6
	instrumental	7
degree	positive	x
	comparative	y
	superlative	z

Table 1. Composition of a 'participle' tag

2.3 Cases Requiring Disambiguation

2.3.1 Homonymy of words and word forms

It was difficult to distinguish homonymous lexemes using the formal criterion. To classify the part of speech category of these homonymous lexemes, one should carefully consider the context and origin of a word, e.g. whether a word is derived synchronically from a verb – e.g. the word *rafinovaný*. The expression *rafinovaný cukor* (refined sugar; derived from the verb *rafinovať*) is an -n-/-t- participle, assuming that it was motivated by the verb *rafinovať* (refine). The expression *rafinovaný človek* (cunning man) is an adjective, because the verb *rafinovať* does not exist with corresponding meaning. The surrounding text together with the meaning of the lexeme determine the part of speech classification.

In analogical cases requiring disambiguation, the formal approach classifies lexemes corresponding to the usual conception of Slovak morphology, e.g. (1) *nesúci* človek (unsuitable person) and (2) človek *nesúci* drevo (person carrying wood, derived from the verb *niesť*); (1) *zvrátený* človek (immoral, scrofulous man) and (2) *zvrátený* beh udalostí (reversed action, derived from the verb *zvrátiť*); (1) *rezervovaný* človek (reserved, shy person) and (2) *rezervovaná* vstupenka (reserved ticket, derived from the verb *rezervovať*); (1) *sčítaný* študent (well read, educated student; from the verb *čítať*, the verb *sčítať* does not have this meaning) and (2) *sčítaná* suma (sum in total, derived from the verb *sčítať*). One advantage of the formal approach is that the existence of corresponding verbs can be easily verified, for some compounds and words with prefixoids we get a disparity, e.g.: *pracujúci* (worker) > *pracovať* (to work), *spolupracujúci* (collaborator) > *spolupracovať* (to collaborate), but: *cestujúci* (traveler) > *cestovať* (to travel), *spolucestujúci* (fellow-traveller) > **spolucestovať* (*to fellow-travel).

2.3.2 Delimitation of Active and Passive Participles from Adjectives

During the process of annotation several questions arose. We had to decide how to tag deverbalized words, but which have slightly different meanings. For instance, *vynikať* (be very good, be different from others) > *vynikajúci* (excellent, outstanding), *skúsiť* (to try) > *skúsený* (experienced), *poľahčiť* (to make easier) > *poľahčujúci* (mitigating), etc. Disambiguation also had to be performed on words that either share similar written forms as participles but are not derived from verbs or have either archaic or uncommon verb as their motivating word, e.g. *disciplinovaný* (disciplined) > *disciplinovať* (to discipline), *nadudraný* (sulky) > *nadudrať sa* (to sulk), *okrídlený* (winged) > *okrídliť* (to wing), *livrejovaný* (liveried) > **livrejovať* (to livery), *mrežovaný* (latticed) > **mrežovať* (to lattice), etc. This is a quite natural phenomenon in a language: "There is a group of words in between the motivated and completely demotivated lexemes. Their motivation is rather unclear at present, so there is an inconsistency between the genetic and synchronic motivation" [3, p. 25]. In this case, the diachronic aspect of the language is notably significant because the motivated word can still exist in the language even if its motivating word is an out-of-vocabulary or uncommon word, e.g. *slýchať* (to hear) > *neslýchaný* (outrageous). In certain cases, only a thorough study will show if a motivating word had ever occurred in a language and if a word form was created by analogy (to existing word forms), e.g. *melírovaný* (streaked), *premrštený* (exorbitant), *opodstatnený* (justified).

The formal approach is focused on the synchronic aspect of language, but the decision how to classify word forms with an unclear synchronic motivation had to be made. In ambiguous cases, annotators (including the author) have followed predominantly formal criteria. Generally, we tagged words as participles if there was a clear motivating verb, including any out-of-vocabulary, rarely used or semantically marked verbs which are nevertheless corresponding in meaning. When considering the correspondence between participle and verb, minor discrepancies were allowed. Semantic correspondence was considered crucial. Once the meaning of a lexeme markedly differs from the meaning of the motivating verb, e.g. *skúsiť* (to try) > *skúsený* (experienced) etc., the word was not considered to be a participle, strict formal criteria would have lead to distorted conclusions. But the non-congruence of aspect was admitted, for instance, the word *varený* (meaning *just cooked*, expressing finished action) was considered to be a participle, although the imperfective aspect of the source verb *variť* (to cook) expresses an unfinished action.

Despite many factors influencing the disambiguation, there was only a small number of disagreeing tags. The following active participles were tagged incorrectly: *horiaci* (burning), *raziaci* (punching), *školiaci* (training), *vládnuci* (ruling), *svetielkujúci* (luminous), *vzývajúci* (invoking), *lietajúci* (flying), *jasajúci* (exultant), *žiadajúci* (requesting). Passive participles were more often derived from verbs in perfective aspect: *neoverený* (untested), *nevyriešený* (unresolved), *obnosený* (worn), *prikovaný* (transfixed), *pokrčený* (crumpled), *roztvorený* (unfolded), which seems logical because words with resultative meaning tend to behave like adjectives which denote static features. The errors could have been made accidentally or by analogy. While correcting these cases, formal criteria have been applied. For all these words there exists a corresponding motivating verb with an identical meaning, e.g. *skúmať* (to examine) < *skúmaný* (examined).

2.3.3   Delimitation of Active and Passive Participles from Substantives with Adjective-like Paradigm

Disambiguation of participles and substantives is based on determining the syntactic function of a word in a certain syntagm. Some of the passive and active participles became nouns (in the process of substantivisation) so that they are classified as nouns in lexicographical works such as *Krátky slovník slovenského jazyka* [10], *Slovník súčasného slovenského jazyka* [1], [2], etc. There is an unclear distinction not only between participles and adjectives but also between participles and substantivized participles. Many lexemes have become nouns, e.g. *vedúci/vedúca katedry* (head of department), in both the masculine and feminine gender. There is a group of words classified as participles which are homonymous with substantivized participles most often in the role of an agreeing attributive, e.g. *muž vedúci vozidlo* (a man driving a vehicle). Apart from this, there are several words where the process of substantivization is still ongoing.

The subcorpus *r-mak-4.0* contains words which were sometimes tagged as active participles and at another time as nouns: *neveriaci* (doubting), *trpiaci* (suffering), *veriaci* (faithful), *vidiaci* (sighted), *vedúci* (leading), *kupujúci* (buying), *cestujúci* (traveler), *umierajúci* (dying), *pracujúci* (working), *účinkujúci* (performing), *vystavujúci* (exhibiting). Although it is not large, the overall number of occurrences in the corpus is non-negligible (*r-mak-4.0* subcorpus contains 79 occurrences of the word *vedúci* (head) and 26 for *pracujúci* (worker)). A significant amount of word forms was assigned to substantivized participles, such as: *veriaci* (believer; 40, 14), *vedúci* (head; 35, 44), *cestujúci* (traveler; 14, 4), *umierajúci* (dying; 3, 3) and *pracujúci* (worker; 3, 23).[6]

In most cases, the part-of-speech tagging conformed with the syntactic function of words. Examples include the word *cestujúci* (traveler), used either with a superordinate noun *cestujúca osoba* (traveling person) or as part of a predicate nominal or a complement. The word has been always tagged as a active participle; its usage in the role of subject or object led to its systematic tagging as a noun with an adjective-like paradigm:

Gk:

Osoba *cestujúca* / `Gkfs1x` rýchlosťou blízkou rýchlosti svetla by videla, že farba svetla vpredu …
'A person *traveling* at the speed of light would have noticed that the colour of light ahead...'

Ich kazatelia plnili funkciu *cestujúcich* / `Gkmp2x` spovedníkov a učiteľov
'Their preachers were in the function of *traveling* confessors and teachers)'

SA:

Povedali nám, že ďalej smú len *cestujúci* / `SAmp1`
'They told us that only *travelers* are permitted to go on'

Oslobodenie od dovozného cla v prípade alkoholu a tabakových výrobkov sa neprizná *cestujúcemu* / `SAms3` mladšiemu ako 18 rokov
'Purchase of duty-free alcohol and tobacco products is denied for *travelers* under 18'

There was a tendency to classify word forms in the role of subject or object as nouns, with the same word forms in other roles being classified as participles:

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[6] First number in brackets indicates number of nouns with adjective-like paradigm, second number shows number of participles.

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Gk:
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veriaci moslimovia / ženy / kresťania / katolíci / prírodovedec
'*believing* Muslims / women / Christians / Catholics / biologist'

vedúci predstaviteľ / osobnosť / gól / postavenie
'*leading* representative / person / goal / status'

pracujúci osoba / médiá / mládež / otrok
'*working* person / media / youth / slave'

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SA:
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usmerňoval *veriacich* v zboroch
'he guided the *believers* in choirs'

vedúci katedry
'*head* of department'

pracujúci vyšli z tovární a úradov
'*workers* stepped out of the factories and offices'

The subcorpus *r-mak-4.0* contains 14 pairs of formally the same passive participles and nouns (substantivized participles) which can be classified as participles in a certain context. The words often tagged as nouns are as follows: *nezamestnaný* (unemployed; 10, 16), *obvinený* (accused; 5, 17), *poškodený* (damaged; 5, 11), *ranený* (hurt; 2, 5) and *unesený* (kidnapped; 3, 12)[7].

Both active participles and substantivized passive participles may change their part-of-speech category; derivationally therefore they are considered morphologically motivated lexemes [see 12, p. 20]. Some passive participles have been converted into nouns without any changes in their form. They differ semantically, participles convey state or action, substantivized participles refer to the entity related to the state or action. The words have taken on a new syntactic function. These word forms may adopt behaviour of either participles or substantivized participles.

Some of the morphologically motivated nouns derived from participles can be used only to a limited extent, e.g. *poškodený, obvinený, unesený*. The nouns are usually used in legal texts or historical legal texts. Otherwise, they fulfill the function of a participle.

Examples include:

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Gt:
```
Máš *poškodenú* pamäť
'Your memory is *damaged*'

text je silne *poškodený*
'the text is very *damaged*'

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SA:
```
Kým v predošlom právnom systéme sa *poškodený* / [SAms1], resp. jeho príbuzenstvo
    snažili, …
'While in the previous legal system the *victim* or his relatives made efforts …'

Part-of-speech tagging was influenced by the syntactic function of words. This function reflects semantic shifts and is influential when participles are converted into nouns and vice versa. This retroactively affects the morphological nature of words.

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[7] see footnote No. 6

3 Conclusions

This paper has briefly characterized the word class of participles which are usually classified as non-finite verbs. The class includes words which can adopt either adjective-like behaviour or can behave like nouns with an adjectival paradigm. This frequent POS conversion is assisted by the mutual semantic features of the words, as well as their forms being identical. After conversion, the lexemes also gain the possibilities to form comparative and superlative forms or to have adverbs or nouns derived from them.

We describe the rules of participle annotation in the subcorpus *r-mak*. We have shown several options for tagging participles. With hindsight (after comparing all versions of the morphologically annotated subcorpus *r-mak* 1.1-4.0), we can confirm that the formal approach to various groups of words requiring special treatment (polysemous words, words with unclear POS classification, words with unclear motivation, etc.) has been appropriately selected.

We have given a brief description of special cases, such as homonymous lexemes classified according to semantic features, e.g. lexeme *nesúci* (carrying), or analogically created words that are not participles because their motivating verb does not exist, e.g. *cestujúci* (traveler) > *cestovať* (travel), *spolucestujúci* (fellow-traveler) > **spolucestovať* (*fellow-travel). The formal approach was applied to a limited extend, therefore we separated such cases in which the semantic shift of participle from the meaning of the motivating verb was prominent, e.g. *skúsiť* (try) > *skúsený* (experienced, having an ability).

The aim of this research was to examine words sharing the same form but differing in their POS category. At the boundary between nouns and participles were the following words: *veriaci, vedúci, cestujúci, umierajúci, pracujúci, nezamestnaný, obvinený, ranený, unesený*; and at the boundary between adjectives and participles were: *pokrčený, roztvorený* and *skúmaný*. In delimitation of participles and substantivized participles it was necessary analyse wider context because the syntactic function of words is decisive.

The morphological annotation provides concise information about the morphological features of each words. A word can be classified as a participle if it shares a similar or identical meaning with its motivating verb. The formal approach enabled a logical and precise annotation of this variable part-of-speech category of participles. The obtained results might be used in the further synchronic or diachronic research concerning all functions of words (semantic, word-formation, syntactic, etc.).

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