

NomVallex: A Valency Lexicon of Czech Nouns and Adjectives

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Abstract

We present NomVallex, a manually annotated valency lexicon of Czech nouns and adjectives. The lexicon is created in the theoretical framework of the Functional Generative Description and based on corpus data. In total, NomVallex 2.0 is comprised of 1027 lexical units contained in 570 lexemes, covering the following part-of-speech and derivational categories: deverbal and deadjectival nouns, and deverbal, denominal, deadjectival and primary adjectives. Valency properties of a lexical unit are captured in a valency frame which is modeled as a sequence of valency slots, supplemented with a list of morphemic forms. In order to make it possible to study the relationship between valency behavior of base words and their derivatives, lexical units of nouns and adjectives in NomVallex are linked to their respective base words, contained either in NomVallex itself or, in case of verbs, in a valency lexicon of Czech verbs called VALLEX. NomVallex enables a comparison of valency properties of a significant number of Czech nominals with their base words, both manually and in an automatic way; as such, we can address the theoretical question of argument inheritance, concentrating on systemic and non-systemic valency behavior.

Keywords: valency, lexicon, nouns, adjectives, derivational relation

1. Introduction

Valency is the “capacity a verb (or noun, etc.) has for combining with particular patterns of other sentence constituents” (Allerton, 2006: 301). Exhibited not only by verbs, but also by some nouns, adjectives or adverbs, valency thus forms the syntactic core of the sentence.

While valency of verbs has enjoyed long-standing interest from linguists, the description of valency of nouns (Grimshaw, 1990; Spevak, 2014; Krasikova et al., 2019) or adjectives (Haugen, 2013) has long remained out of their spotlight. Concerning deverbal and deadjectival nouns, legitimacy of inferring their valency properties from their base words is addressed, see the so-called argument inheritance proposed by Booij (2007) and discussed by Allerton (2006), Goldberg (2006), Herbst (1988) or Moravcsik (2009). Being the subject of both theoretical and lexicographic studies, valency of nouns and adjectives is captured in some English valency lexicons (Herbst et al., 2004) and lexical databases created for NLP applications such as FrameNet (Ruppenhofer et al., 2010) and NomBank (Meyers et al., 2008). In lexicons of Slavic languages, valency of nouns or adjectives is only rarely covered, be it valency lexicons (Mel’čuk and Zholkovsky, 1984; Alberski et al., 2018) or general language dictionaries (Ivanová, 2020).

Valency of Czech nouns and adjectives has been studied within various theoretical frameworks, e.g., the modified valency theory (Karlík, 2000), transformational generative grammar (Veselovská, 2001; Dvořák, 2016a,b), and the lexicological and “corpus-driven” approach (Čermák, 1991; Koprivová, 2006; Čermáková, 2009). It is also covered by a printed valency lexicon *Slovník slovesných, substantivních a adjektivních vazeb a spojení* (Svozilová, Prouzová and Jirsová, 2005).

2. Valency of Czech Nouns and Adjectives in the Functional Generative Description

Our approach to valency of nouns and adjectives is based on the valency theory developed in the Functional Generative Description (FGD), primarily designed for verbs (Panevová, 1974–75) and then adopted for deverbal

nouns (Panevová, 2000; Kolářová, 2010) and adjectives (Panevová, 1998). We find this theory useful for describing various language phenomena related to valency as it differentiates between two syntactic layers: the so-called tectogrammatical layer, roughly corresponding to the deep syntactic layer, and the layer of surface syntax. In FGD, valency represents a core component of the tectogrammatical layer (Sgall, Hajičová and Panevová, 1986). It is captured by valency frames consisting of a set of slots, each standing for one valency complementation. Each valency complementation is assigned a functor (a label marking the relation of the valency complementation to its governing word), a set of morphemic forms determining the surface realization of the complementation, and information on its obligatoriness. Valency complementations are distinguished into actants and free modifications.¹ Five actants which combine with verbs, adjectives and nouns are determined based on mostly syntactic criteria: ACTor, PATient, ADDRessee, EFFect, ORIGIn (e.g., *balení dárků_{PAT} rodiči_{ACT}* ‘wrapping of the presents_{PAT} by parents_{ACT}’), while MATerial is a specific actant occurring with nouns only (e.g., *jedno balení léků_{MAT}* ‘one package of medicine_{MAT}’). Free modifications are semantically distinctive (e.g., DIR3, a free modification of direction ‘where to?’ in *chlapců_{ACT} pozdní příchod do školy_{DIR3}* ‘boy’s_{ACT} late arrival to the school_{DIR3}’).

With deverbal adjectives as well as with deverbal and deadjectival nouns, systemic (regular) and non-systemic (irregular) valency behavior is distinguished (Kolářová, Vernerová and Verner, 2019; Kolářová, Vernerová and Klímová, 2020a; Kolářová, Vernerová and Klímová, 2021; Section 4).

Extensive research into valency within FGD resulted in the creation of several valency lexicons: PDT-Vallex, a valency lexicon of verbs, nouns, adjectives and adverbs contained in the Prague Dependency Treebank – Consolidated (PDT-C; Hajič et al., 2020; Uřešová et al., 2021), VALLEX, a valency lexicon of Czech verbs, describing their uses in both active and passive, reciprocal

¹ This distinction roughly corresponds to the argument vs. adjunct opposition in some other linguistic theories.

and reflexive constructions (Lopatková et al., 2020), and NomVallex, a valency lexicon of Czech nominals, i.e., nouns and adjectives (see Section 3 for more details).²

While PDT-Vallex is strictly related to the PDT-C data (it only covers the word senses that were encountered in the corpus; moreover, it only captures their valency frames), VALLEX and NomVallex aim to provide language material and lexicographic software enabling linguistic research into various phenomena related to verbal and nominal valency, for example verbal diatheses, reciprocity or systemic and non-systemic valency behavior. In order to do that, VALLEX and NomVallex are based on larger corpus data (especially on the SYN series of corpora from the Czech National Corpus; Křen et al., 2019), treat all senses of the words included, annotate the formation of multiple syntactic phenomena, and employ facilities enabling not only to annotate the particular verbal and nominal constructions but also to perform complex searches and comparisons.

3. The NomVallex Lexicon

NomVallex is a valency lexicon of Czech nominals, covering several derivational types of nouns and adjectives (for its newest version, NomVallex 2.0, see Kolářová, Vernerová, and Klímová, 2022). It was manually annotated, applying the main principles and annotation guidelines specified in Sections 3.1–3.4. The original data set was created in a simple text format but is publicly available in several standardized formats (Section 3.5).

3.1 Organization of the Lexicon

NomVallex follows in the footsteps of the VALLEX lexicon, adopting its annotation scheme. The lexicon entry in both lexicons is called a lexeme; it is an abstract unit associating lexical forms with their lexical units (LUs; Cruse, 1986), i.e., word senses. The particular lexical meanings are described by synonyms or just roughly paraphrased in a gloss (the *synon* attribute). Aspectual counterparts formed by affixation, such as *vyzývání^{impf}* – *vyzvání^{pf}* ‘appealing’ or *ohrožování^{impf}* – *ohrožení^{pf}* ‘threatened’, are treated within a single lexeme, though some of the lexical units of the lexemes may only be relevant for one of them, usually for the perfective form (e.g., *vyzvání^{pf}* ‘appeal’, Figure 1). Nouns or adjectives that do not express aspect are assigned the flag *no-aspect*, e.g., *výzva^{no-aspect}* ‘appeal’. If relevant, the short form of adjectives is also listed (e.g., *ochoten* ‘willing’ is the shortened version of the adjective *ochotný* ‘willing’; the shortform attribute).³

Valency properties are captured in a valency frame (modeled as a sequence of valency slots, each characterized by a functor and supplemented with a list of morphemic forms; Section 2), and documented by examples. Other attributes are optionally specified, e.g.,

² We use the term *nominals* in the same way as Wiktionary, which in one of its meanings defines it as ‘a part of speech that shares features with nouns and adjectives’, see <https://en.wiktionary.org/wiki/nominal#Noun>.

³ On the one hand, the short forms can be viewed as a pure morphological variation; on the other, not all adjectives form them and the syntactic contexts in which they can be used are restricted.

the class attribute captures a coarse-grained semantic class, if relevant.

In extension of the basic VALLEX annotation scheme, NomVallex employs some new attributes and facilities in order to enable research into phenomena related to part-of-speech specificity of the covered nominals (nouns and adjectives). First, it tries to tackle the fact that various lexical meanings of the nominals may refer to different basic semantic categories, i.e., may denote for example an abstract result of an action in one of their meanings, e.g., *pohled* ‘view’, but a material object in another one, e.g., *pohled* ‘postcard’ (Section 3.2). Second, it aims to document the richness and variability of nominal valency structures in common use, extensively quoting corpus evidence supporting the valency properties described in the valency frames (Section 3.3). Third, so-called non-canonical realization of adjectival valency is also treated (Section 4.1). Finally, its main ambition is to enable an examination of the extent to which nouns and adjectives share valency properties with their base words and thus to verify the valency inheritance hypothesis (Sections 3.2 and 4).

In total, NomVallex 2.0 is comprised of 1027 lexical units contained in 570 lexemes (when considering aspectual counterparts, such as *namítání^{impf}* – *namítnutí^{pf}* ‘expressing objections’ or *ohrožování^{impf}* – *ohrožení^{pf}* ‘threatened’, to be individual lexical units, the number rises to 1209 lexical units covering a total of 639 lemmas); the lexemes can be classified by part-of-speech and derivational categories as shown in Table 1.

Part-of-speech category	Derivational category	Lexical units	Lexemes
Nouns	deverbal	505	248
	deadjectival	247	158
Adjectives	deverbal	179	116
	denominal	28	14
	deadjectival	6	6
	primary	62	28
Total		1027	570

Table 1: The structure of the NomVallex 2.0 lexicon

3.2 Interlinked Lexicon Entries

NomVallex captures all lexical meanings of the nouns and adjectives included in the lexicon. When delimiting lexical meanings of the nominals, we also take into account their basic “categorical” meanings, i.e., meanings corresponding to basic semantic categories such as action (e.g., *žádání (si)* ‘asking’, *dovípení (se)* ‘inferring’), abstract result of an action (e.g., *žádost* ‘request’), property/quality (e.g., *zdvořilost* ‘politeness’, *důvtip* ‘ingenuity’), material object (e.g., *pohled* ‘postcard’, *usedlost* ‘homestead’) and container/quantity (e.g., *počet* ‘number’, *bohatství* ‘large quantities’); the categorial meanings are specified in the *semcategory* attribute (Figure 1). Such approach helps us to describe general valency properties characteristic of nouns or adjectives referring to particular semantic categories and thus to reflect changes in valency associated with some specific shifts in meaning of a noun or an adjective (e.g., action > a material object, as in *člověk přežívší havárii_{Acc}* ‘a man surviving the crash’ > *přežívší havárie_{Gen}* ‘survivor of the crash’, see also Section 4.1).

vyzváni pf

[blu-n-vyzývání-vyzváni-2] 

ACT^{obl}_{2, pos} ADDR^{obl}_{3, k+3} PAT^{obl}_{aby, at, cont}

valency frame of the noun lexical unit

ACT_{1→2, pos} ADDR_{3, k+3, 4} PAT_{aby, at, cont, k+3, na+4, inf, že}

derivedFrom blu-v-vyzvat-vyzývat-1
pdt-vallex v-w8613f1

synon vybídnutí, výzva

difference in valency compared to the valency frame of the base verbal lexical unit

examplerich **ACT+ADDR+PAT** Pamatuji se, jak oba s napětím jsme očekávali úspěch jeho **ACT** projektovaného **vyzváni** ke kamarádům **ADDR**, aby založili **PAT** „českou kolonii anarchistickou“.

ADDR+PAT Ani věčné časy tam nejsou. Ani inflační **vyzváni** proletářům **ADDR** všech zemí, aby se spojili **PAT**. • Pokud tak NATO neučiní, bude to podle Kissingera v jistou chvíli **vyzváni** Rusku **ADDR** a Německu **ADDR**, aby se pokusily **PAT** vyřešit regionální problémy samostatně. • Sestavte **vyzváni** k vojákům **ADDR** bílé armády, aby přešli **PAT** k nám, a dejte rozhodit s aeroplánů.

ADDR Pokud před dvaceti lety nepomohlo **vyzváni** rodičům **ADDR** nebo návštěva učitele, nedostali rodiče přídatky na děti. Memoárové téma dominuje již zcela v Nezvalově básni **Vyzváni** přátelům **ADDR**, v níž Nezval jakoby rekapituluje deset let svého styku se soupeřníky

class communication

semcategory abstraktní výsledek děje

Figure 1: NomVallex: The second lexical unit of the lexeme *vyzývání^{impf} – vyzváni^{pf}* ‘appeal(ing)’. The following attributes are specified in its lexicon entry: the link to the corresponding verbal lexical unit in VALLEX (derivedFrom), the link to the noun entry in PDT-Vallex (pdt-vallex), a gloss (synon), corpus examples classified by documented combinations of valency complementations expressed by morphemic forms listed in the valency frame (examplerich), the semantic class (class), and categorial meaning (semcategory). The valency frame of the noun lexical unit (in the dark green frame) is compared with the valency frame of its base verbal lexical unit in VALLEX and the difference is set off in color (content of the valdiff attribute shown in the gray frame). The numbers in the valency frames stand for particular cases, namely 1 for nominative, 2 for genitive, 3 for dative, and 4 for accusative.

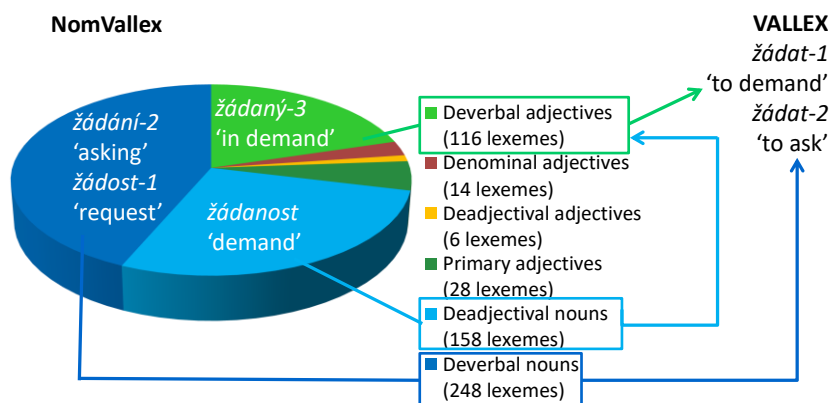


Figure 2: Examples of interlinked lexical units (NomVallex → (NomVallex) → VALLEX). There are several links illustrated in the Figure, one within the NomVallex lexicon (the deadjectival noun *žádání-3* ‘demand’ > the deverbal adjective *žádání-3* ‘in demand’), and three between NomVallex and VALLEX (namely the adjective *žádání-3* ‘in demand’ > the verb *žádat-1* ‘to demand’, and the deverbal nouns *žádání-2* ‘asking’ and *žádost-1* ‘request’ > the verb *žádat-2* ‘to ask’). Proportional representation of part-of-speech categories included in NomVallex is also captured in the Figure.

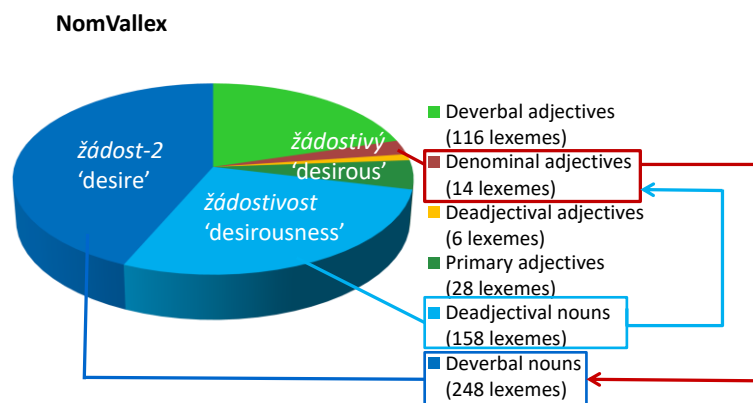


Figure 3: Examples of interlinked lexical units (NomVallex → NomVallex). There are two links illustrated in the Figure, both of them within the NomVallex lexicon, namely the deadjectival noun *žádostivost* ‘desirousness, greediness’ > the denominal adjective *žádostivý* ‘desirous, greedy’, and the adjective *žádostivý* ‘desirous, greedy’ > the deverbal noun *žádost-2* ‘desire’. Proportional representation of part-of-speech categories included in NomVallex is also captured in the Figure.

When selecting individual nominals to be included in NomVallex, nouns and adjectives that in one of their lexical meanings refer to actions, abstract results of actions or quality are preferred as these nominals typically represent non-verbal predicates and thus are likely to be valent.

In relevant cases, deverbal nouns and deverbal adjectives captured in NomVallex mirror the division of lexemes into lexical units of the base verbs captured in the VALLEX lexicon.⁴ In order to make it possible to study the relationship between valency behavior of base words and their derivatives, lexical units of nouns and adjectives are linked to their respective base words (in case of verbs to lexical units of verbs contained in VALLEX), linking up to three parts of speech (i.e., noun – verb, adjective – verb, noun – adjective, and noun – adjective – verb, see Figures 2 and 3 for the links *žádost-1* ‘request’ > *žádat-2* ‘to ask’, *žádanost* ‘demand’ > *žádaný-3* ‘in demand’ > *žádat-1* ‘to demand’, and *žádostivost* ‘desirousness, greediness’ > *žádostivý* ‘desirous, greedy’ > *žádost-2* ‘desire’). The base words are specified in the *derivedFrom* attribute; in case the base lexical unit is an item of the VALLEX or NomVallex lexicons, its *id* is given, e.g., the lexical unit of the noun *vyzvání^{pf}* ‘appeal’ with *id* *blu-n-vyzvání-vyzvání-vyzvání-1* has *derivedFrom* value *blu-v-vyzvat-vyzvat-1* which links it to its base lexical unit of the verb *vyzvat^{pf}* – *vyzývat^{impf}* ‘to appeal’ (Figure 1; *blu* is short for basic lexical unit, letters *v/n/a* differentiate among verbs, nouns, and adjectives). Interlinking relevant lexical units is an important feature of the NomVallex lexicon as it enables us to compare valency properties of the derivationally related lexical units in an automatic way (results of the automatic comparison, describing the difference in valency, are specified in the *valdiff* attribute, Section 4.4, Figure 1).

3.3 Nominal Valency Structures in Common Use

While the core valency properties of nouns and adjectives are captured in the form of a valency frame (Section 2), the particular valency structures are exemplified by sentences manually selected from Czech corpora, in particular the SYN series of corpora from the Czech National Corpus (Křen et al., 2019) and the Araneum Bohemicum Maximum corpus (Benko, 2015). The lexicon aims to illustrate the full range of syntactic structures of noun and adjectival phrases, and thus the syntactic behavior of every lexical unit is exemplified with all combinations of its participants (in all forms specified in the valency frame) which were found in the corpus data. In order to make the examples clearly arranged, they are subdivided into segments according to the given combination of valency slots, e.g., ADDR+PAT: *vyzvání Rusku_{ADDR} a Německu_{ADDR}, aby se pokusily_{PAT} vyřešit regionální problémy* ‘an appeal to Russia_{ADDR} and Germany_{ADDR} to try_{PAT} to solve regional problems’, with the headword (*vyzvání* ‘appeal’) highlighted, see Figure 1.

If a lexical unit of a lexeme has no valency, for example when its categorial meaning is an object with no valency potential (as is the case of the noun *usedlost* ‘homestead’), its valency frame is labeled as EMPTY and corpus examples are introduced by “combination” NONE or are supplemented with a free modification, for example APPurtenance, e.g., *Cesta k jeho_{APP} usedlosti patří obci* ‘The road leading towards his_{APP} homestead belongs to the village’.

3.4 Part-of-speech and Derivational Categories in NomVallex

3.4.1 Nouns

So far, NomVallex has concentrated on deverbal and deadjectival nouns, leaving valent primary nouns such as *šance na přežití* ‘a chance of survival’ aside.

Deverbal nouns were the only part-of-speech category captured in the NomVallex 1.0 version (Kolářová, Vernerová, and Klímová, 2020a,b). The lexicon captures

⁴ In its electronic version, NomVallex also provides links to the valency lexicon PDT-Vallex (Uřešová et al., 2021).

valency of Czech deverbal nouns (in total, 505 lexical units in 248 lexemes) belonging in at least one of their meanings to one of the following semantic classes: Communication (e.g., *dotaz*^{no-aspect} ‘question’, *dotazování* (*se*)^{impf} – *dotázání* (*se*)^{pf} ‘asking’), Mental Action (e.g., *plán*^{no-aspect} ‘plan’, *plánování*^{impf} ‘planning’) or Psych(ological) State (e.g., *nenávisť*^{no-aspect} ‘hatred’, *nenávidění*^{impf} ‘hating’).

In order to be able to compare valency behavior of different types of deverbal noun derivatives, we decided to include both stem nominals (derived from verbs by suffixes *-ní/-tí* and containing a theme suffix, e.g., *žádání* (*si*)^{impf} ‘asking’, *navrhování*^{impf} – *navrhnout*^{pf1} – *navržen*^{pf2} ‘suggesting/proposing’, *namítání*^{impf} – *namítnut*^{pf} ‘expressing objections’) and root nominals (derived from verbs by various suffixes, including the zero suffix, but not containing a theme suffix, e.g., *žádost*^{no-aspect} ‘request’, *návrh*^{no-aspect} ‘proposal’, *námítka*^{no-aspect} ‘objection’).

Deverbal nouns matching the following criteria were included in NomVallex: in at least one of its senses, its semantic class is either Communication, Mental Action or Psych(ological) State, its categorial meaning is action or abstract result of an action, and it exhibits non-systemic valency behavior (especially non-systemic forms of participants, Section 4.3). When both stem nominals and root nominals derived from the same verb are available, both are included if at least one of them satisfies the above criteria.

NomVallex 2.0 also covers **deadjectival nouns** (in total, 247 LUs in 158 lexemes); it captures valency of all nouns derived from adjectives included in the lexicon (cf. Section 3.4.2). Most types of deverbal adjectives and also denominal, deadjectival and primary adjectives in the lexicon may be bases for deadjectival nouns, derived by various suffixes, esp. the most productive suffix *-ost* (e.g., *povinnost* ‘obligation’), and then some other suffixes such as *-ství* (*-c*)*tví* (e.g., *zoufalství* ‘despair’), *-ota* (e.g., *jistota* ‘certainty’), and *-oba* (e.g., *chudoba* ‘poverty’).⁵ Some adjectival bases allow the derivation of multiple nouns, e.g., *bohatost* ‘richness’ and *bohatství* ‘abundance’, both derived from the adjective *bohatý* ‘rich’.

3.4.2 Adjectives

Concerning adjectives, NomVallex focuses on valent deverbal adjectives and primary (i.e., mostly unmotivated) adjectives, capturing also several instances of denominal or deadjectival adjectives.

The largest group of adjectives in the lexicon is represented by **deverbal adjectives** (179 LUs in 116 lexemes). In NomVallex, all Czech deverbal derivatives with adjectival inflection are regarded to be deverbal adjectives, no matter whether they denote an action (e.g., *porota rozhodující o cenách* ‘jury deciding the awards’), a property (e.g., *rozhodující okamžik* ‘decisive moment’) or an object (*můj známý* ‘an acquaintance of mine’). We distinguish nine derivational types of Czech deverbal adjectives (Kolářová, Vernerová and Klímová, 2021),

⁵ However, it is not possible to derive nouns from adjectives derived from past transgressives, e.g., *přeživší*^{pf} ‘having survived’, or from adjectives denoting a purpose, e.g., *zasunovací*^{impf} – *zasouvací*^{pf} ‘sliding’ (i.e., from types (ii) and (vii) in Section 3.4.2).

marking them in the type attribute. The classification is inspired by Rusínová (2016) and slightly adjusted for specific subtypes identified in the data. First five types are characterized by mostly regular derivation from transgressive and participial verbal forms, namely (i) present transgressive, e.g., *rozhodující*^{impf} ‘deciding’, (ii) past transgressive, e.g., *přeživší*^{pf} ‘having survived’, (iii) active participle, e.g., *vzteklý*^{pf} ‘furious’, (iv) passive participle (perfective or imperfective), e.g., *ohrožovaný*^{impf} – *ohrožený*^{pf} ‘threatened’, and (iv’) passive participle of a (typically perfective) reflexive intransitive verb, e.g., *odhodlaný*^{pf} ‘determined’. The other four types reflect what the adjectives mostly denote, namely (v) potential to be affected by an action, e.g., *vnímatelný*^{impf} ‘perceivable’, (vi) property resulting from a tendency to repeat an action, e.g., *vnímavý*^{impf} ‘sensitive’, (vii) purpose, e.g., *zasunovací*^{impf} – *zasouvací*^{pf} ‘sliding’, and (viii) an object, mostly a person, e.g., *přeživší* ‘survivor’. The lexicon focuses on adjectival types (iii)–(vi) (with the most frequent type (vi), i.e., adjectives denoting a property), while the types (i)–(ii) and (vii)–(viii) are only rarely covered in the NomVallex data.

In contrast to deverbal adjectives, **denominal adjectives** are very rare in the NomVallex data (28 LUs in 14 lexemes, usually derived from deverbal root nouns, e.g., *žádostivý* ‘desirous’ < *žádost* ‘desire’, *náročný* ‘demanding’ < *nárok* ‘claim’, *prodejný* ‘saleable’ < *prodej* ‘sale’).

So far, **deadjectival adjectives** in NomVallex are only represented by several adjectives formed by the negative prefix *-ne* which, however, does not change the meaning of the affirmative adjectival lemma from positive to negative, but leads to a semantic shift and thus to a separate lexicon entry (e.g., *nedůtklivý* ‘touchy’, *neohrožený* ‘dauntless’, 6 LUs in 6 lexemes; Kolářová, 2020).

Besides adjectives derived from valent words such as verbs or deverbal nouns, some **primary adjectives** can also be modified by valency complementations. NomVallex contains 62 LUs of primary adjectives in 28 lexemes; they are mostly represented by unmotivated adjectives (at least from the synchronic point of view), e.g., *bohatý* ‘rich’, *hodný* ‘worthy’, *hrdý* ‘proud’, *jistý si* ‘sure’, *lhostejný* ‘indifferent’, *ochotný* ‘willing’, and also by some adjectives whose motivating words are not clear enough to be treated in the lexicon as the bases for derivation, such as various adverbials, e.g., *vstříc* ‘towards’ > *vstřícny* ‘helpful’, and *při tom* ‘at it’ > *přítomný* ‘present’.

3.5 Availability of NomVallex

NomVallex 2.0 is available in an electronic form, both as publicly available web-pages⁶ and as downloadable and machine readable data suitable for further research into valency of Czech nouns or adjectives and for other NLP applications (Kolářová, Vernerová, and Klímová, 2022).⁷ The online version and an offline application allow for formulating specific and complex queries based on a wide

⁶ <https://ufal.mff.cuni.cz/nomvallex>

⁷ NomVallex data comes with the following licence: Creative Commons - Attribution-NonCommercial-ShareAlike 4.0

range of criteria, for example the type of derivation of the noun or adjective (e.g., stem vs. root nominals, particular adjectival types), its aspectual characteristics, categorial meaning, semantic class, types of its valency complementations and their morphemic forms (including their distribution depending on the type of the noun and/or the type of the complementation itself, individually and in combinations), and the relation of the adjective or the noun to its base lexical unit including the differences in valency behavior (Verner and Vernerová, 2020).⁸

4. Systemic and Non-systemic Valency Behavior of Czech Adjectives and Nouns

Valency frames of nominals covered in NomVallex reflect both deep and surface realization of valency, including the phenomenon called non-canonical realization of adjectival valency (Section 4.1). Deep as well as surface realization of valency is also taken into account when distinguishing systemic and non-systemic valency behavior of the nominals (Sections 4.2 and 4.3). A tentative comparison of valency properties of selected derivationally related lexical units contained in the NomVallex lexicon is presented in Section 4.4.

4.1 Non-canonical Realization of Adjectival Valency

According to Boguslavsky (2003), **adjectives** usually have one valency slot which is filled with the noun they modify (so-called passive valency; e.g., *rozpadlý plot* ‘disintegrated fence’), or with the subject of the copula verb they form a predicate with (so-called discontinuous valency, e.g., *plot je rozpadlý* ‘the fence is disintegrated’); in Boguslavsky (2016), both types are also referred to as a kind of **non-canonical realization of valency** (the term adopted here). In case of primary adjectives, the complementation realized in a non-canonical way corresponds to the subject (usually ACT) of the copula verb they form a predicate with, e.g., *Petr_{ACT-sb} je ochotný pomoci* ‘Peter_{ACT-sb} is willing to help’. In case of deverbal adjectives, it corresponds to a valency slot of the base verb (Piřha, 1982; e.g., the ADDR in constructions *podezírat politika_{ADDR} z podvodu_{PAT}* ‘to suspect a politician_{ADDR} of a fraud_{PAT}’ > *politik podezíraný z podvodu_{PAT}* ‘a politician suspected of a fraud_{PAT}’; see (1) for the valency frame of the verb *podezírat* ‘to suspect’).

Though non-canonical realization of adjectival valency implies that it cannot be expressed on the surface as a modification of the adjective, it is still present in its deep valency structure; in NomVallex, we treat non-canonical realization of adjectival valency in the valency frames of adjectives as a form of expression of a valency complementation and mark it by an upward arrow (Vernerová, 2019), see (2) and (3). The annotation of non-canonical realization of adjectival valency allows for a clean comparison of the valency frame of an adjective with the valency frame of its base lexical unit because correspondence between the valency complementations that the two frames share with each other is maintained, see (1) and (2).

⁸ The previous version, NomVallex 1.0, is also available in a book form; it contains lexicon entries of deverbal nouns and a thorough theoretical discussion of their valency (Kolářová, Vernerová, and Klímová, 2020a).

(1) *podezírat* ‘to suspect’

ACT_(Nom) ADDR_(Acc) PAT_(z ‘of’+Gen, zda ‘if’, že ‘that’)

(2) *podezíraný* ‘suspected’

ACT_(Ins, od ‘from’+Gen) PAT_(z ‘of’+Gen, zda ‘if’, že ‘that’) ADDR_(↑)

(3) *ochotný* ‘willing’

PAT_(k ‘to’+Dat, Inf, aby ‘so as’) ACT_(↑)

Adjectives denoting an object (a person), e.g., *přeživší* ‘survivor’, are analyzed as adjectives just due to their adjectival inflection. Their valency behavior reflects their categorial meaning (i.e., a material object) and thus corresponds to valency of nouns rather than to valency of adjectives; as a result, these adjectives lose the actant with non-canonical surface realization present in the valency frames of the lexical units not denoting an object, cf. the valency frames of the adjective *přeživší* ‘having survived’, e.g., *člověk přeživší havárii_{Acc}* ‘a man surviving the crash’ in (4), and the adjective-noun *přeživší* ‘survivor’, e.g., *přeživší havárie_{Gen}* ‘survivor of the crash’, in (5).

(4) *přeživší* ‘surviving’

PAT_(Acc) ACT_(↑)

(5) *přeživší* ‘survivor’

PAT_(Gen, Poss)

In valency frames of **deadjectival nouns**, the valency complementation corresponding to the valency slot of the base adjective with non-canonical surface realization is “reactivated”, being expressed on the surface as an adnominal modification, typically in the form of genitive (Gen) or possessive adjective or pronoun (Poss), see (6) for the valency frame of the noun *ochota* ‘willingness’ derived from the adjective *ochotný* ‘willing’ in (3), e.g., *Petr_{ACT-sb} je ochotný pomoci_{PAT}* ‘Peter_{ACT-sb} is willing to help_{PAT}’ > *Petrova_{ACT}/jeho_{ACT} ochota pomoci_{PAT}* / *ochota Petra_{ACT} pomoci_{PAT}* ‘Peter’s_{ACT}/his_{ACT} willingness to help_{PAT} / willingness of Peter_{ACT} to help_{PAT}’.

(6) *ochota* ‘willingness’

ACT_(Gen, Poss) PAT_(k ‘to’+Dat, Inf, aby ‘so as’, že ‘that’)

4.2 Systemic Valency Behavior

When determining the deep syntactic structure of adjectives or nouns, i.e., especially members of their valency frames, the nominals are expected to inherit all valency complementations that are present in the valency frame of their base lexical unit (concerning valency slots of adjectives of types (i)-(vii), one of them is inherited but realized in a non-canonical way, Section 4.1).

Comparing morphemic forms (i.e., the surface expression) of actants modifying the nominals with those of the respective modifications of their base words, we differentiate two types of forms that can be regularly derived and thus are referred to as systemic:

(a) Morphemic forms which do not change; these include esp. prepositionless cases genitive, dative (Dat) and instrumental (Ins), an infinitive (Inf), prepositional groups, conjunctions or content clauses, and with adjectives also accusative (Acc), e.g., *zanechat studia_{Gen}* ‘to quit the school’ > *zanechání studia_{Gen}* ‘quitting the school’, *dlužít někomu_{Dat} vysvětlení_{Acc}* ‘to owe somebody

an explanation' > *dlužný někomu*_{Dat} *vysvětlení*_{Acc} 'owing somebody an explanation', *ochotný pomoci*_{Inf} 'willing to help' > *ochota pomoci*_{Inf} 'willingness to help', *přesvědčit někoho, že se to skutečně stalo* 'to persuade somebody that it really happened' > *přesvědčený, že se to skutečně stalo* 'persuaded that it really happened'.

(b) Morphemic forms that are subject to systemic changes; they differ depending on the part-of-speech or derivational type of a noun or an adjective but in most cases they concern nominative (Nom), accusative or genitive in the valency structure of the base word.

In valency frames of **deverbal adjectives**, there are two systemic changes. First of them, namely Nom > Ins / od 'from'+Gen, is typical of ACT of adjectives belonging to types (iv) and (v), e.g., *hacker*_{Nom} *vydírá podnikatele*_{Acc} 'a hacker is blackmailing an entrepreneur' > *podnikatel vydíráný hackerem*_{Ins} / *od hackera* 'an entrepreneur blackmailed by a hacker / from a hacker'. The second one, Acc > Gen, is rather rare, e.g., *znát poměry*_{Acc} 'to know the conditions' > *znalý poměrů*_{Gen} 'knowledgeable about the conditions'.

In valency frames of **deverbal nouns**, the following systemic changes of morphemic forms are the most frequent: (i) Nom > Gen / Poss / Ins / od 'from'+Gen, (ii) Acc > Gen / Poss, e.g., *šéf*_{Nom} *kontroluje kolegu*_{Acc} 'the chief controls a colleague' > *kolegovo*_{Poss} *kontrolování šéfem*_{Instr} 'colleague's control by the chief', and (iii) Gen > Poss, e.g., *zanechat studia*_{Gen} 'to quit the school' > *jeho*_{Poss} *zanechání* 'its quitting'.

Concerning **deadjectival nouns**, in addition to the "reactivated" valency slot which corresponds to the adjectival valency complementation with non-canonical surface realization (Section 4.1), esp. the change Gen > Poss is systemic, e.g., *znalý poměrů*_{Gen} 'knowledgeable about the conditions' > *jejich*_{Poss} *znalost* 'their knowledge'.

4.3 Non-systemic Valency Behavior

Non-systemic valency behavior of deverbal adjectives and deverbal or deadjectival nouns involves three phenomena:

(i) A change in the number of slots in the valency frame of the nominals. For example, the adjective *chtivý* 'avid', which is derived from the verb *chtít* 'to want / to demand' (e.g., *chtít od někoho*_{ORIG} *peníze*_{PAT} 'to demand money_{PAT} from somebody_{ORIG}'), keeps PAT, e.g., *chtivý peněz*_{PAT} 'avid for money_{PAT}', but loses the original verbal ORIG, cf. **chtivý od někoho*_{ORIG} '*avid from somebody_{ORIG}'. Another example is the noun *velení* in *vrchní velení* 'the supreme headquarters', which denotes a group of people rather than a process of commanding (as in *jeho*_{ACT} *velení armádě*_{PAT} 'his_{ACT} commanding the army_{PAT}'), and thus loses ACT from its valency frame;

(ii) Non-systemic forms of actants, i.e., morphemic forms that cannot be regularly derived from the forms of complementations of the base word (e.g., Acc > Dat, *vláda poslouchá prezidenta*_{Acc} 'the government obeys the president' > *vláda poslušná prezidentovi*_{Dat} 'government obedient to the president', Acc > nad 'over'+Ins, *kontrolovat území*_{Acc} 'to control an area' > *kontrola nad územím*_{nad+Ins} 'control over an area', and Dat > k 'to'+Dat, *občan oddaný císaři*_{Dat} 'a citizen loyal to the emperor' >

*občanova oddanost k císaři*_{k+Dat} 'citizen's loyalty to[wards] the emperor');

(iii) A change in the nature of a valency complementation to exclusively nominal in case of adjectival type (viii) and some nouns. For example, the adjective-noun *známý* 'acquaintance, friend' denotes a person and its valency frame only contains the nominal complementation Appurtenance (e.g., *můj*_{APP} *starý známý* 'an old acquaintance of mine_{APP}'). Concerning valency behavior of nouns, it can be illustrated by the valency complementation Material modifying nouns denoting quantity, as in *jedno balení léků*_{MAT} 'one package of medicine_{MAT}', in contrast to Patient in the construction with the same noun (*balení*) denoting action, e.g., *balení kufrů*_{PAT} 'packing of bags_{PAT}'.

4.4 Non-systemic Valency Behavior in the NomVallex Lexicon

The fact that lexical units of Czech verbs, nouns and adjectives captured in valency lexicons VALLEX and NomVallex are manually annotated in the same theoretical framework (Section 2) and, if derivationally related, even interlinked to each other (Section 3.2) enables us to draw an automatic comparison between valency frames of the respective lexical units (i.e., between LUs of deverbal adjectives and LUs of verbs, LUs of deadjectival nouns and LUs of adjectives, and LUs of deverbal nouns and LUs of verbs). In the current NomVallex data, all lexical units of adjectives or nouns (both deverbal and deadjectival) that provide a link to their base lexical unit in the derivedFrom attribute, are automatically supplemented with information about the difference between the valency frames of the respective lexical units, comparing both the number and types of valency complementations and their morphemic forms. The changes (if any) are specified in the valdiff attribute and (depending of the application used to display the data) are also set off in color (e.g., the same type of a valency complementation and systemic morphemic forms or systemic changes in grey, non-systemic forms in green, and finally the complementations or forms that only occur in the valency frame of the base lexical unit in red; Figure 1). As the result, we can specify systemic and non-systemic valency behavior of the nominals captured in the NomVallex lexicon.

So far, we have focused on investigation of the differences in valency between deverbal adjectives and their base verbs (covering 164 verb–adjective pairs; Kolářová, Vernerová and Klímová, 2021), and between deverbal nouns and their base verbs (covering 256 verb–noun pairs; Kolářová, Vernerová and Verner, 2019).

We have observed that non-systemic valency behavior of both Czech deverbal adjectives and deverbal nouns is mostly manifested by either a difference in the number of actants or non-systemic forms of actants (points (i)-(ii) in Section 4.3), out of which the non-systemic forms are more dominant (frequent), represented especially by a non-systemic prepositional group. In contrast, change in the nature of a valency complementation to exclusively nominal (point (iii) in Section 4.3) is the least documented type of non-systemic valency behavior of both deverbal adjectives and nouns in the NomVallex data. We expect the same results to come out of an automatic comparison

of valency frames of adjectives and deadjectival nouns, planned to be done in the future.

Differentiating nine types of Czech deverbal adjectives, we have observed that while a difference in the number of actants may affect all types of deverbal adjectives, even those derived from present transgressives but not denoting an action (e.g., *rozhodující okamžik* ‘decisive moment’), non-systemic forms of actants are only characteristic of selected adjectival types, most significantly of adjectives derived from verbs not strictly regularly and denoting various properties (e.g., *podezřivý* ‘suspectful’).

In valency frames of deverbal nouns, the non-systemic forms considerably contribute to a general increase in the number of forms in valency frames of deverbal nouns compared to the number of forms in valency frames of their base verbs. In line with our expectations, the data shows that non-systemic forms are more frequent in valency frames of root deverbal nouns than in valency frames of stem deverbal ones.

5. Conclusion

We have presented NomVallex, a manually annotated valency lexicon of Czech nouns and adjectives, which is created in the theoretical framework of the Functional Generative Description and follows in the footsteps of the VALLEX lexicon. NomVallex quotes rich corpus evidence supporting the valency characteristics described in the valency frames and documents the richness and variability of Czech nominal valency structures in common use. Aiming to be a lexical resource that enables a comparison of valency properties of derivationally related lexical units, partially in an automatic way, the lexicon employs some special attributes and facilities; in particular, it provides links from derived lexical units to their base lexical units and, using an automatic procedure, it specifies the difference in valency between the two lexical units in the valdiff attribute. A careful investigation of such a comparison based on the NomVallex data shows that non-systemic valency behavior of Czech deverbal adjectives and deverbal nouns is mostly manifested by either a difference in the number of actants or non-systemic forms of actants, out of which the non-systemic forms are more dominant (frequent), represented especially by a non-systemic prepositional group. We intend to employ the same method in order to specify to what extent other types of nominals from NomVallex, such as deadjectival nouns, inherit valency properties from their base words. Moreover, the online version of the lexicon and an offline application allow for formulating specific and complex queries based on a wide range of criteria, by far not limited to valency phenomena related to part-of-speech specificity.

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