Non-native roots in derivational morphology – any specifics?

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Nativeness and non-nativeness in derivational morphology

- lexical borrowing intertwined with derivation and other word-formation processes
  (ten Hacken & Panocová 2020)
  - German *Parfüm* from French *parfum*
  - in German:
    parfümieren ($\approx$ Fr. *parfumer*), *Parfümeur* ($\approx$ Fr. *parfumeur*),
    Parfümeurin ($\approx$?), *überparfümiert* ($\approx$?),
    Damenparfüm ($\approx$?), *Parfümzerstäuber* ($\approx$?),
    etc.

- today's talk:
  - borrowed words and members of their morphological families approached as an integral
    part of a language's vocabulary == foreign word-formation
  - based on a dataset from Czech
    – do words with non-native (foreign) roots differ from native (inherited) vocabulary?
    – what role do verbs and action nominals play within families with foreign roots?

Plan of the talk

Borrowing & derivation

Data

Foreign-root verbs

The verbs & typology

Foreign-root nominals

Final remarks

Borrowing & derivation

Adaptation of borrowings

- loanwords undergo adaptation to conform to the structure of the borrowing language
  - English (OED)
    – borrowings from French: *encouragement, reduce*, etc.
  - French (https://www.cnrtl.fr/etymologie)
    – borrowings from English: *management, stopper*, etc.
  - Hebrew (Laks & Namer 2024)
    – borrowings from English: e.g. *kemping* 'camping', *kimpeng* 'to camp'

  - Czech
    – nouns:
    parfém 'perfume', *džíny* 'jeans', *jazz* 'jazz', *déjà vu* 'déjà vu'
    – verbs must adopt a theme and an infinitival marker:
    parfém-ova-t 'to perfume', *jazz-ova-t* 'to jazz', *klik-a-t* 'to click'

Borrowings and related formations

- in West Slavic languages, loanwords participate heavily in derivation and other word-formation (Waszakowa 2003, 2005; Buzássyová 2010)
  - 70% of 4,500 neologisms in Polish (from 1985–2004) were motivated words
    – one third of them were derivatives
    – two thirds were compounds (incl. neo-classical formations)

- lemmas containing *parf[eé]m* in the 6.4-billion corpus of Czech (SYNv13):
  - *archiparfém, autoparfém, bezparfémový, bioparfém, miniparfém, miniparfémový, naparfémovaně, naparfémování, naparfémovanost, naparfémovaný, naparfémovat, neparfém, odparfémovaný, oparfémovat, parfém, parfemace, parfemační, parfémář, parfémářčin, parfémařina, parfémářka, parfémářský, parfémářství, parfémářův, parfémek, parfémík parfemista, parfemistka, parfemizace, parfemizující, parfémovací, parfémovaně, parfémování, parfémovanost, parfémovaný, parfémovat parfémově, parfémovka, parfémovost, parfémový, parfémtéka, poloparfém, protiparfémový, přeparfémování, přeparfémovanost, přeparfémovaný, přeparfémovatelný, připarfémovat, vyparfémovat, zaparfémovaný*

Foreign word-formation

- *parfém, parfémovat, parfemace, naparfémovat, parfémář, parfémářka, parfémařina, parfémka, parfémářský, bezparfémový, přeparfémovaný, ...*
  - which of them are borrowed vs. created in the target language?
    ↪ lexicology   ↪ word-formation

- the concept of foreign word-formation (Eins 2015, among others)
  - borrowings and related words are seen as an integral part of the target language vocabulary
  - vocabulary with loan items is subject of morphology and word-formation
  - described analogously to the native lexicon

Native & foreign word-formation and the directionality issue

- the assessment of directions in derivation (Marchand 1960, 1964, among others)
  - the input to derivation has a simpler morphological structure than the output
  - the input (motivating word) is semantically broader that the motivated one
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  - *léčit* 'to treat' [190k] → *léčba* 'treatment' (425k) but
    kremovat 'to cremate' [0] → *kremace* 'cremation' [5k]

Directions in foreign word-formation: Action nouns as motivators

- Slovak nouns in *-ácia* '-ation' can be assumed to motivate the verbs (Panocová 2017)
    - corpus frequency: the nouns are more frequent than the verbs
    - lexicographic description: the verbs explained by using the action nouns

    – *integrácia* 'integration' → *integrovať* 'to integrate'
    – *komunikácia* 'comunication' → *komunikovať* 'to communicate'
    vs. *skúšať* 'to examine' → *skúška* 'examination'

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    1. nouns with foreign suffixes initially appear in Slovak as unmotivated words
    2. verbs are subsequently derived from these nouns
    3. the genetic relationship is reinterpreted based on pairs with inherited roots, where action, agent, or instrument nouns with dedicated suffixes are considered as derived from verbs

    – *koordinácia* 'coordination' → *koordinovať* 'to coordinate' reanalyzed into
      koordinovať 'to coordinate' → *koordinácia* 'coordination'
      as in e.g. *skúšať* 'to examine' → *skúška* 'examination'
    – *dribling* 'dribbling' → *driblovať* 'to dribble' ⇒
      driblovať 'to dribble' → *dribling* 'dribbling'
    – *skener* 'scanner' → *skenovať* 'to scan' ⇒
      skenovať 'to scan' → *skener* 'scanner'

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  2. the noun preceded the verb
     - *tunelování* 'tunelling' [1995] → *tunelovat* 'to tunnel' [1997]
     - *globalizace* 'globalization' [1991] → *globalizovat* 'to globalize' [1995]

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    3. the noun and the verb appeared in the same year
        – *démonizace* 'demonization' [1992] ↔ *démonizovat* 'to demonize' [1992]

A paradigmatic account of word-formation

- an alternative to directional approaches, which are based on the distinction between motivating and motivated words
- in analogy to the paradigm in inflection
  - where forms of a word convey inflectional meanings (nom.sg, acc.sg, etc.)
- word-formation paradigm (Štekauer 2014, Bonami & Strnadová 2019, Hathout & Namer 2022; Ševčíková, in press)
  - words sharing the same root express derivational meanings (action, agent, etc.)
  - no directions captured

thing added	action.verb	action.noun
parfém	*parfémovat*	*parfemace*
'perfume'	'to perfume'	'perfuming'
sůl	*solit*	---
'salt'	'to salt'	---

instrument	action.verb	action.noun
filtr	*filtrovat*	*filtrace*
'filter'	'to filter'	'filtration'
lék	*léčit*	*léčba*
'medicine'	'to treat'	'treatment'

agent	action.verb	action.noun
pilot	*pilotovat*	*pilotáž*
'pilot'	'to pilot'	'piloting'
král	*kralovat*	---
'king'	'to rule'	---

Data

Compilation of the data

- the dataset extracted from the 100-million corpus of written Czech (SYN2015)
  1. 2,200 pairs of suffixless nouns and corresponding verbs (created through conversion)
     - *rebel* 'rebel' – *rebel-ova-t* 'to rebel'
     - *zim-a* 'winter' – *zim-ova-t* 'to winter'

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    3. inflectional and derivational nominalizations added to the morphological families
        – *rebel* 'rebel' – *rebelovat* 'to rebel' + *rebelování* 'rebelling' + *rebelie* 'rebellion'
        – *zima* 'winter' – *zimovat* 'to winter' + *zimování* 'wintering'

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    4. morphological features and corpus frequencies added
    5. automatic identification of loanwords based on grapheme combinations, counterparts in other languages, etc. – internationalisms (Buzássyová 2010) confirmed manually as foreign items

Semantic annotation: Same categories for both directions

- categories drawn from the discussion about the semantics of conversion in English
  (Cetnarowska 1993, Plag 1999, Bauer et al. 2013)
- related categories that had been discussed separately for the deverbal and denominal direction were merged into a single category:
  - Bauer et al.'s category RESULT listed among the meanings of deverbal nouns
    - *divorce* = "the result of divorcing"
  - and their category RESULTATIVE for denominal verbs
    - *to bundle* = "to make into bundles"),
  - merged into RESULT in the present analysis

Ten → nine semantic categories

SEMANTIC CATEGORY (meaning of the noun wrt the verb)	Example conversion pair
ACTION (noun = action of V-ing)	*atak – atakovat* 'attack' 'to attack'
AGENT (noun = someone who performs V-ing)	*rebel – rebelovat* 'rebel' 'to rebel'
ANIMAL (noun = an animal performing V-ing)	*plaz – plazit (se)* 'reptile' 'to creep'
INSTRUMENT (noun = something used for V-ing)	*telefon – telefonovat* 'phone' 'to call'
OBJ/QUAL-ADDED (noun = something added through V-ing)	*zinek – zinkovat* 'zinc' 'to coat with zinc'
OBJ/QUAL-REMOVED (noun = something removed through V-ing)	*skalp – skalpovat* 'scalp' 'to scalp'
PLACE (noun = a place where something is V-ed)	*garáž – garážovat* 'garage' 'to garage'
RESULT (noun = result of V-ing)	*kompost – kompostovat* 'compost' 'to compost'
STATE (noun = the state of being V-ed)	*šok – šokovat* 'shock' 'to shock'
TIME (noun = the time spent V-ing)	*noc – nocovat* 'night' 'to stay the night'

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TIME (noun = the time spent V-ing)	*noc* – *nocovat*	
	'night'	'to stay the night'

Nouns and verbs annotated in sentence contexts

- the noun-verb relationship assessed based on a random sample of 50 sentences containing the noun and the same-size sample containing the verb

    - *Provedli jsme základní **sondy**.*ACTION *do podlahového souvrství v přízemí s **analýzou**.*ACTION *úrovně založení obvodových stěn.*
      'We carried out basic **probes**.ACTION into the floor layer on the ground floor with **analysis**.ACTION of the foundation level of the perimeter walls.'

    - *Čáp se ale brzo od konstruktérky Lidušky dozví, že takovou **analýzu**.*RESULT *už před časem vypracoval v podniku inženýr Křížek.*
      'However, Čáp soon learns from Liduška, the engineer, that such an **analysis**.RESULT was produced by engineer Křížek some time ago.'

    - *Tiskla mi **sondu**.*INSTRUMENT *na žaludek a pozorovala obrazovku ultrazvuku, která byla obrácená směrem k ní.*
      'She pressed the **probe**.INSTRUMENT to my stomach and watched the ultrasound screen facing her.'

Parallel annotation

- 800 of 2,200 conversion pairs annotated by two annotators in parallel
  - the annotators agreed on 22,461 (74%) out of 30,277 sent. analyzed (Cohen's kappa 0.66)
  - cases of disagreement decided by a third annotator

Annotator B	ACTION (12,427)	RESULT (7,637)	INSTRUMENT (3,089)	STATE (2,153)	ADDED (2,208)	AGENT (1,263)	PLACE (1,396)	TIME (100)	ANIMAL (1)	REMOVED (3)
ACTION (10,958)	9,908	529	162	190	108	30	31	x	x	x
RESULT (7,984)	1,462	5,417	221	298	363	55	168	x	x	x
INSTRUMENT (4,371)	210	657	2,464	53	461	92	432	x	x	2
STATE (2,828)	765	426	6	1,563	17	1	50	x	x	x
ADDED (1,961)	14	403	236	49	1,258	x	x	x	x	1
AGENT (1,093)	58	x	x	x	x	1,035	x	x	x	x
PLACE (882)	10	106	x	x	1	50	715	x	x	x
TIME (100)	x	x	x	x	x	x	x	100	x	x
ANIMAL (1)	x	x	x	x	x	x	x	x	1	x
REMOVED (99)	x	99	x	x	x	x	x	x	x	x

Annotator A

- the remaining data annotated by a single annotator
- manual check to achieve maximum consistency across the entire dataset

Final dataset

- 2,058 partial morphological families containing noun/verb conversion pairs and attested nominalizations
- a single sense-sense relation identified for 1,619 of the conversion pairs, more than one relation (919 in total) for the remaining 439 pairs
- foreign roots in 401 morphological families vs. inherited roots in 1,657 families
  - foreign-root data: 458 relations in 401 pairs (1.14 relations per pair)
  - inherited data: 2,080 relations in 1,657 pairs (1.26 relations per pair)
- the data publicly released in the LINDAT/CLARIAH-CZ repository
  - `http://hdl.handle.net/11234/1-5142`

Foreign-root verbs

Grammatical aspect in verbs with foreign roots

- the thematic suffix is a mandatory part of the verb's structure in Czech
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- aspect changed by replacing the theme (1,082 of 1,657 verbs with inherited roots)
  - typical of verbs that enter conversion to form suffixless nouns (*řezat* 'to cut' → *řez* 'cut')
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- verbs with foreign roots are imperfective in aspect
  - only rarely change the theme (9 foreign-root verbs out of 401)
    – *riskovat* 'to risk.IPFV' → *risknout* 'to risk.PFV'
  - most of them are compatible with a single theme (*-ova-*), add a prefix to perfectivize
    – *telefonovat* 'to call.IPFV' → *zatelefonovat* 'to call.PFV'

Derivational potential of foreign-root verbs

- unmotivated verbs with inherited roots
  - enter prefixation
  - the prefixed verbs enter conversion to form a suffixless noun
    - *řezat* 'to cut' → *vyřezat* 'to cut out' → *výřez* 'cut-out'
      řezat 'to cut' → *ořezat* 'to crop' → *ořez* 'cropping', etc.

      = stolons (Hathout & Namer @ IMM 2022)

- denominal verbs with inherited roots
  - enter prefixation; but the prefixed verbs do not enter conversion
    - *sůl* 'salt' → *solit* 'to salt' → *dosolit* 'to add more salt' → **dosol*

- verbs with foreign roots enter prefixation
  - a single instance of a prefixed verb entering conversion
    - *klikat* 'to click' → *proklikat* 'to click through' → *proklik* 'click-through'
  - otherwise not attested
    - *startovat* 'to start' → *nastartovat* 'to start up' → **nastart*
    - *telefonovat* 'to call' → *zatelefonovat* 'to call' → **zatelefon*

Frequency of verbs and nouns with foreign vs. inherited roots

- corpus frequency ratio values
  - calculated for individual noun/verb pairs
  - the lemma frequency count of a suffixless noun divided by the lemma frequency count of the corresponding verb:

    telefon 'phone' $freq(N) = 18,107$, *telefonovat* 'to call' $freq(V) = 1,480$
    $\frac{freq(N)}{freq(V)} = \frac{18,107}{1,480} = 12.23$

    slib 'promise' $freq(N) = 3,262$, *slíbit* 'to promise' $freq(V) = 5,651$
    $\frac{freq(N)}{freq(V)} = \frac{3,262}{5,651} = 0.58$

- distribution of frequency ratio values
  - within the foreign vs. the inherited part of the data
    – foreign: most values between 3 and 55, median 12.27
    – inherited: between 0.22 and 6.60, median above 1
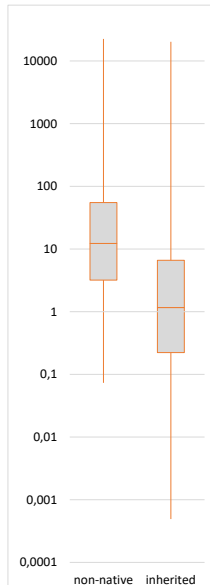
Frequency ratios in each semantic category: non-native vs. native
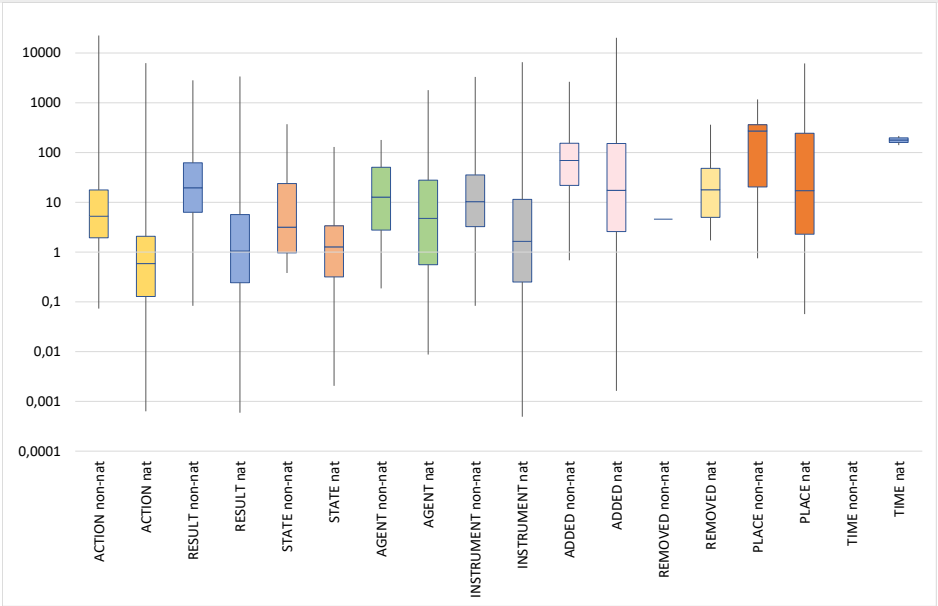
The verbs & typology

Foreign-root verbs in Czech from the typological perspective

- foreign-root verbs in Czech show features of denominal verbs — fit in the typological debate about the difficulty of borrowing verbs as verbs:
- Moravcsik 1975, 1978
  - verbs cannot be borrowed directly as verbs
  - they are borrowed into the part of speech of nouns
    – the English verbs (*start, transfuse*, etc.) appear as nouns in Czech
  - subsequently, the nouns are turned into verbs in the target language by using native morphological means (*start* 'start' → *start-ova-t* 'to start')
- Wohlgemuth 2009
  - verbal borrowings in hundreds of pairs of donor and recipient languages
  - indirect insertion (by means of a suffix) as the most common strategy of the integration of foreign words into the word class of verbs
- Haspelmath & Tadmor 2009
  - it is "much easier to borrow verbs into isolating languages than it is to synthetic languages" due to the extent of morphosyntactic adaptation required to do so

Foreign-root nominals

Nominalizations in families with foreign and inherited roots

- inflectional nominalizations in *-ní* ($\approx$ English *-ing* nominals)
  - attested for verbs with both foreign and inherited roots
- derivational nominalizations with overt suffixes conveying actions
  - rare with verbs with inherited roots
    – *léčit* 'to treat' – *léčba* 'treatment'
  - attested for 40% of foreign-root verbs
    – *filtrovat* 'to filter' – *filtrace* 'filtration'
    – *rebelovat* 'to rebel' – *rebelie* 'rebellion'

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  (a) may not have direct counterparts in other languages

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- in foreign-root families, the action nouns with foreign suffixes
  - (a) may not have direct counterparts in other languages
  - (b) may be the first or main means to convey the action meanings
  - (c) may be the sole means to express the actions

(a) Action nouns with foreign roots & suffixes formed in Czech?

- despite containing a foreign root and a foreign suffix, the action nouns have no direct counterpart in English, German, or French

suffixless noun	freq. (SYN2015)	verb	freq.	action noun	freq.
archiv 'archive'	4,235	*archivovat* 'to archive'	208	<u>*archivace*</u> 'archiving'	247
blok 'block'	6,442	*blokovat* 'to block'	959	<u>*blokace*</u> 'blocking'	550
edice 'edition'	1,314	*editovat* 'to edit'	198	<u>*editace*</u> 'editing'	212
injekce 'injection'	1,314	*injektovat* 'to inject'	23	<u>*injektáž*</u> 'injecting'	115
kompost 'compost'	641	*kompostovat* 'to compost'	52	<u>*kompostace*</u> 'composting'	2
parfém 'perfume'	1,188	*parfémovat* 'to perfume'	5	<u>*parfemace*</u> 'perfuming'	22
profil 'profile'	4,354	*profilovat* 'to profile'	247	<u>*profilace*</u> 'profiling'	65
protokol 'protocol'	2,281	*protokolovat* 'to protocol'	8	<u>*protokolace*</u> 'protocoling'	9
telefon 'phone'	18,107	*telefonovat* 'to call'	1,480	<u>*telefonát*</u> 'phone call'	1,271

nouns without direct foreign counterparts are <u>underlined</u>
action noun's frequency count in orange if higher than the verb's frequency

(b) Action nouns as the first or main means of expressing actions

noun : verb	freq. SYN2000	SYN2005	SYN2010	**SYN2015**	**SYN2020**
anestezie : *anestetizovat*	84 : 0	127 : 0	112 : 0	317 : 0	674 : 2
'anaesthesia' 'to anaesthetise'					
arbitráž : *arbitrovat*	177 : 1	549 : 3	590 : 0	363 : 0	261 : 1
'arbitrage' 'to arbitrage'					
brainstorming : *brainstormovat*	28 : 0	53 : 0	126 : 0	33 : 0	60 : 2
'brainstorming' 'to brainstorm'					
deviace : *deviovat*	186 : 1	515 : 2	96 : 0	133 : 0	145 : 1
'deviation' 'to deviate'					
multitasking : *multitaskovat*	19 : 0	17 : 0	11 : 0	78 : 0	108 : 7
'multitasking' 'to multitask'					
prokrastinace : *prokrastinovat*	0 : 0	1 : 0	0 : 0	37 : 0	156 : 35
'procrastination' 'to procrastinate'					
<u>*archaizace*</u> : <u>*archaizovat*</u>	7 : 1	4 : 1	1 : 1	3 : 0	2 : 1
'archaizing' 'to archaize'					
<u>*chaotizace*</u> : <u>*chaotizovat*</u>	2 : 0	2 : 0	3 : 0	5 : 0	2 : 2
'making chaotic' 'to make chaotic'					

words without direct foreign counterparts <u>underlined</u>

(c) Action nouns as the sole means of expressing the actions

- action nouns without verbal counterparts in Czech (SYN2015 corpus), although the corresponding verbs are available in English

action noun in Czech	and in English	no Czech counterpart to the English verb
aluze	'allusion'	'to allude'
deflace	'deflation'	'to deflate'
demise	'demission'	'to demit'
incidence	'incidence'	'to incide'
inflace	'inflation'	'to inflate'
infuze	'infusion'	'to infuse'
konfuze	'confusion'	'to confuse'
kremace	'cremation'	'to cremate'
relace	'relation'	'to relate'
transfuze	'transfusion'	'to transfuse'

Final remarks

Final remarks

- 401 morphological families with foreign roots vs. 1,657 with inherited roots
  - pairs of suffixless nouns and corresponding verbs as the core of the dataset
  - the paradigmatic approach to derivation as an alternative to the tree-based model

- **foreign-root verbs resemble denominal verbs with inherited roots**
  - in the aspectual strategy: compatible with a single thematic suffix
  - in the word-formation potential: prefixed verbs do not enter conversion
  - in corpus frequency: less frequent than the suffixless nouns
- – in line with the **typological debate** on the difficulty of borrowing verbs as verbs

- **suffixed action nouns** often available as direct competitors to foreign-root verbs
  - the data document a pressure to have a noun to convey the action meaning: can be created without a model in other languages
- – **tendency towards nominal expression of actions in the non-native data** in Czech

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