(DE)COMPOSING THE SLAVIC WORD: A DOMAIN SPECIFIC APPROACH TO AFFIX ORDER

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Structure of the talk

- ☐ What is affix ordering?
- ☐ Preliminaries
  - ◘ Languages analyzed
  - ◘ Looking for affix combinations: sources of data
  - ◘ Theoretical issues: Cognitive Grammar & Natural Morphology
- ☐ Approaches to affix ordering
- ☐ A cognitive approach
- ☐ Additional evidence for the correctness of the analysis
  - ◘ Linguistic
  - ◘ Psycholinguistic
  - ◘ From neuroscience
- ☐ Conclusions

What is affix ordering?

real → *real + -ize* →

→ *real + -iz + -ation* →

→ *real + -iz + -ation + -al*

☐ An alternative ordering of the suffixes is not possible, i.e. **real-iz-al-ation*, **real-al-ation-ize*, etc. do not exist.

☐ Thus, the major goal of this research is to understand the mechanisms behind affix ordering.

Languages analyzed

- Slavic
  - Bulgarian (South Slavic)
  - Russian (East Slavic)
  - Polish (West Slavic)
- Germanic
  - English
  - German
- Romance
  - Italian (recent research and work in progress)

Looking for affix combinations: (possible) sources of data 1

- ☐ Existing studies

  - ◼ Affix ordering is a very popular topic in general linguistics but there is almost no research on Slavic languages.

- ☐ Grammars

  - ◼ Grammars are not focused on affix ordering, a grammar provides information about which bases (derived and non-derived) a suffix takes.

Looking for affix combinations: grammars versus affix-order studies

- ☐ Grammars provide affix-driven analysis, i.e. the direction of derivation is from SUFF → BASE.

  - ◘ A rule from a grammar: the Russian suffix *-tel'* derives agent nouns and takes verbal stems as bases as in *pisa-tel'* 'writer'.

- ☐ Most affix ordering studies are base-driven, i.e. the direction of derivation is SUFF1 → SUFF2, SUFF1 is part of the base.

  - ◘ A rule from an affix-order study: in Russian, the suffix *-tel',* when deriving agents, may be followed by the adjective suffix *-skij* as in *pisa-tel'-skij* 'writer's'.

Looking for affix combinations: (possible) sources of data 2

- Reverse dictionaries
  - Word-formation suffixes in Slavic are not always word-final.
- Corpora
  - The Slavic corpora are not annotated for search of derivational suffixes, thus one searches for phoneme sequences that may represent affixes and then clears the data.
  - Since 2013, the Russian National Corpus has some annotations for word-formation but it is work in progress and still incomplete.
- Native speaker intuition
- Internet (Google)

Cognitive Grammar

(Langacker 1987, 1991; Taylor 2002; Geeraerts 2006)

- ☐ Grammar is an inventory of units (phonological, semantic, or symbolic structure) that have been established, or entrenched, in the speaker's mind through *frequency of previous use.*

- ☐ *Usage-based* (bottom-up) analysis, i.e. from-data-to-theory.

  - ◘ The whole-part relation

  - ◘ The schema-instance relation

  - ◘ The similarity-identity relation

- ☐ Embodied cognition - all aspects of cognition are shaped by aspects of the body.

Natural Morphology (Dressler et al. 1987)

- ☐ A semiotic and cognitively oriented theory of morphology compatible with Cognitive Grammar

- ☐ There are different types of affixation with respect to iconicity (when addition of meaning is mirrored by addition of form).

  - ◘ Only the most iconic type of affixation – affixation by addition – involves affix ordering, e.g.:

    color-ful+-ness

  - ◘ The less iconic affixation by substitution (truncation) does not involve combining of affixes, e.g.:

    Marx-ism → Marx-ist.

(see also Manova 2011a)

Affixes and meaning 1

- ☐ The traditional view

  - ◘ Morphemes are the smallest pieces of linguistic structure that relate form and meaning (or grammatical function). (Affixes are morphemes.)

- ☐ Split morphology (Beard 1995), Realizational morphology (Anderson 1992, Aronoff 1994, Stump 2001) & Construction morphology (Booij 2010)

  - ◘ Affixes are units of structure without semantics, i.e. they receive semantic interpretation in words / constructions.

Affixes and meaning 2

- Distributed morphology (Halle and Marantz 1993)
  - Affixes receive semantic interpretation at an abstract level, i.e. both *-s* in *books* and *-en* in *oxen* are the same morpheme that marks 'plural', cf. **feature geometry**.
- Some of the approaches to affix order are based on the traditional understanding of a morpheme, while others combine affixes without reference to semantics.

Approaches to affix order

☐ Overviews in Muysken (1986), Manova & Aronoff (2010), Rice (2011), Manova (submitted)

☐ According to the type of information used in affix ordering Manova & Aronoff (2010) differentiate eight different approaches to affix order:

    1) phonological
    2) morphological
    3) syntactic
    4) semantic
    5) statistical
    6) psycholinguistic
    7) cognitive
    8) templatic

Affix ordering in well-studied and lesser-studied languages

□ Well-studied languages are primarily analyzed in terms of morphological and psycholinguistic ordering

  ◘ most research is on English

□ There is much research on affix ordering in lesser-studied languages such as African, Australian, Amerindian, the languages of Tibet and Caucasus, etc.

  ◘ phonological, syntactic, semantic and templatic ordering

Morphological ordering

□Depends on morphological information, i.e. the rules are of the type 'if SUFF A - then SUFF B'

Level-ordering or stratal approach

Siegel (1974), Allen (1978), Selkirk (1982), Kiparsky (1982), Giegerich (1999)

☐ Lexical phonology

- ◘ Class I suffixes: +ion, +ity, +y, +al, +ic, +ate, +ous, +ive
- ◘ Class II suffixes: #ness, #less, #hood, #full, #ly, #y, #like

- ◘ Class I prefixes: re+, con+, de+, sub+, pre+, in+, en+, be+
- ◘ Class II prefixes: re#, sub#, un#, non#, de#, semi#, anti#

From Spencer (1991: 79)

☐ Class I affixes do not occur outside class II affixes

- ◘ predicts combinations that do not exist
- ◘ there are many exceptions

Psycholinguistic ordering

☐ This type of affix ordering relies on psycholinguistic information, e.g. about processing constraints.

◼ Parsability hypothesis

◼ Complexity-based ordering (CBO)

Parsability hypothesis 1

☐ Affixes order in such a way that **more parsable affixes do not occur within less parsable affixes** (Hay 2003).

☐ The degree of parsability of an affix depends on different factors, including the **relative frequency** of the base and the derivative.

◻ a **dual-route access** model of morphological processing, i.e. we access derived words either as whole words or as decomposable units.
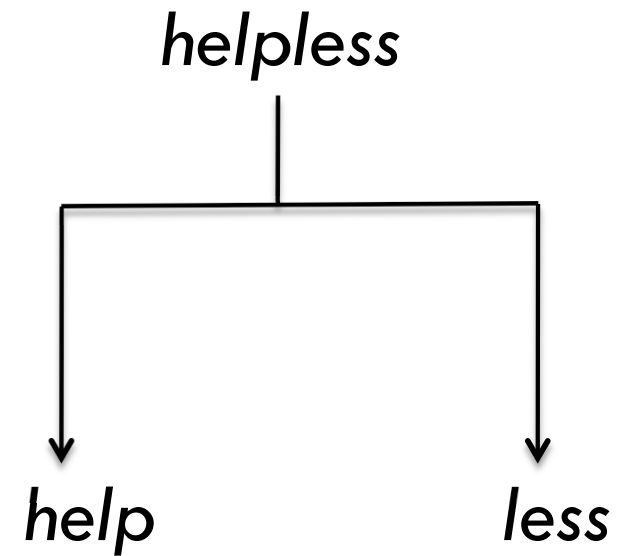
Dual-route access

☐ **whole word route**   **decomposition route**

helpless   *helpless*

helpless   *help*   *less*
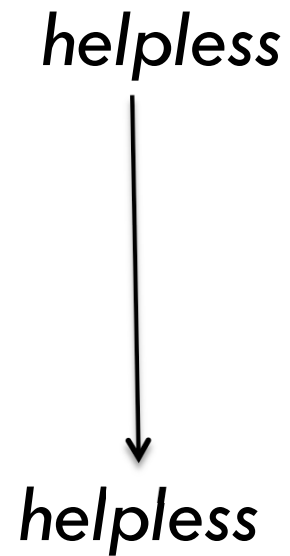
Relative frequency

☐ **Whole word access** is likely when the derivative has a high relative frequency, i.e. when the complex word is more frequent than its base, e.g. in the case of *government* vs. *govern.*

☐ The **decomposition route** is likely if the relative frequency is low, e.g. as in *blue* vs. *blueness.*

Parsability hypothesis 2

☐ ***More parsable affixes do not occur within less parsable affixes,*** since the attachment of a less separable affix to a more separable one is difficult to process.

Problem: Parsability cannot explain all combinations of English suffixes, selectional restrictions (structural constraints) may override parsability (Hay and Plag 2004).

Complexity-based ordering (CBO)

Hay& Plag (2004), Plag & Baayen (2009)

- ☐ English suffixes can be ordered in *a hierarchy of juncture strength*.

- ☐ If the suffixes A, B, C, D and E form a hierarchy, suffixes that follow, let us say, C on the hierarchy can be added to words already suffixed by C, whereas suffixes preceding C on the hierarchy cannot be attached to words containing C, i.e. *CAD should be an impossible combination.

Problem1: If a suffix never combines with all other suffixes in a language, why do we need to relate it to all suffixes in terms of a hierarchy?

Problem 2: CBO cannot account for Slavic data (Manova 2010)
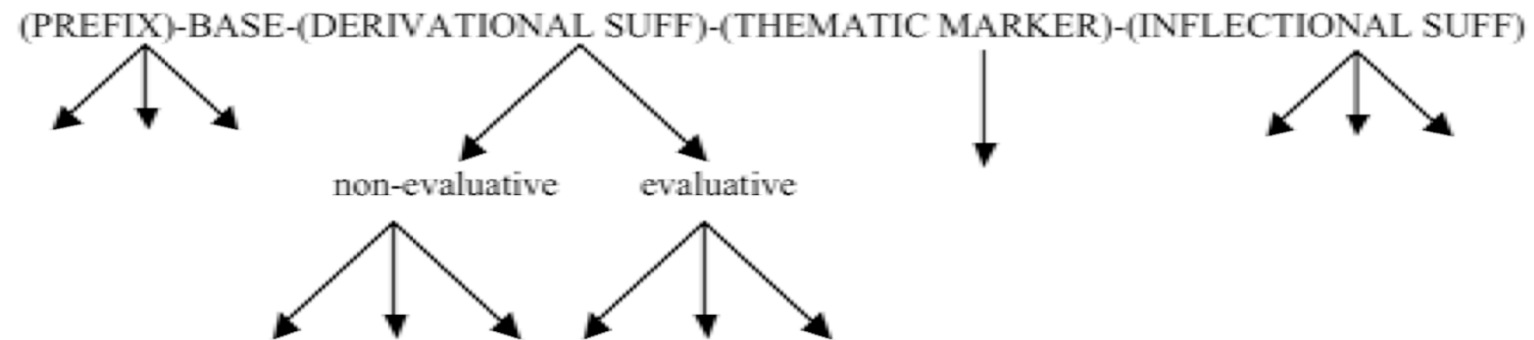
Cognitive ordering (Manova 2011c)

☐ This type of affix ordering is based on general cognitive principles.

☐ Entrenchment plays an important role in cognitive ordering

◨ *Entrenchment*: a unit does not need to be assembled from its parts on each occasion of its use, nor the language users need to refer to its parts in order to understand it.

(cf. Taylor 2002; recall also the dual-route model)

Word domains (Manova 2010, 2011c)

Slavic word

(PREFIX)-BASE-(DERIVATIONAL SUFF)-(THEMATIC MARKER)-(INFLECTIONAL SUFF)

non-evaluative   evaluative

Inflectional domain

- Bulgarian
  - BASE–GEND/NUM–DEF

    krasiv-ø-ø 'beautiful' (masculine)

    krasiv-ø-ijat 'beautiful-DEF'

    krasiv-a-ø 'beautiful-FEM/SG'

    krasiv-a-ta 'beautiful-FEM/SG-DEF'

    krasiv-o-ø 'beautiful-NEUT/SG'

    krasiv-o-to 'beautiful-NEUT/SG-DEF'

    krasiv-i-ø 'beautiful-PL'

    krasiv-i-te 'beautiful-PL-DEF'

- Semantics (semantic scope, Rice 2000) and templates
- Of all languages analyzed, only Bulgarian has more than one suffix in noun, verb and adjective inflection.

Evaluative domain: Bulgarian diminutives

Nouns in	DIM1 suffixes	DIM2 suffixes	DIM3 suffixes
in -C	-ec (unproductive)		
	-le (unproductive) -če	-ence	-ence
	-čica (unproductive)		
in -a	-ica	-ka	
	-ka	-ica	-ica
	-ička (unproductive)		
in -o	-ce	-ence	-ence
in -e	-ence -ice (unproductive)		

Nouns in	DIM1 suffixes	DIM2 suffixes	
		Productive (attach by additon)	Unproductive (attach by substitution of a DIM1 suffix, i.e. do not combine with DIM1 suffixes)
-C	-ek -ik / -yk -uszek (unproductive)	-ek	-uszek, -aszek
	-iszek /-yszek (unproductive) -aszek (unproductive) -ulek (unproductive) -ka (unproductive, selects feminine nouns)		
-a	-ka	-ka	
	-uszka (unproductive) -iczka /-yczka (unproductive)		
-o / -e	-ko	-ko	
	-uszko (unproductive)		

Slavic word versus English word (Manova 2011c)

Slavic word

(PREFIX)-BASE-(DERIVATIONAL SUFF)-(THEMATIC MARKER)-(INFLECTIONAL SUFF)

non-evaluative   evaluative

English word

(PREFIX)-BASE-(DERIVATIONAL SUFF)-(THEMATIC MARKER)-(INFLECTIONAL SUFF)

Ø

non-evaluative
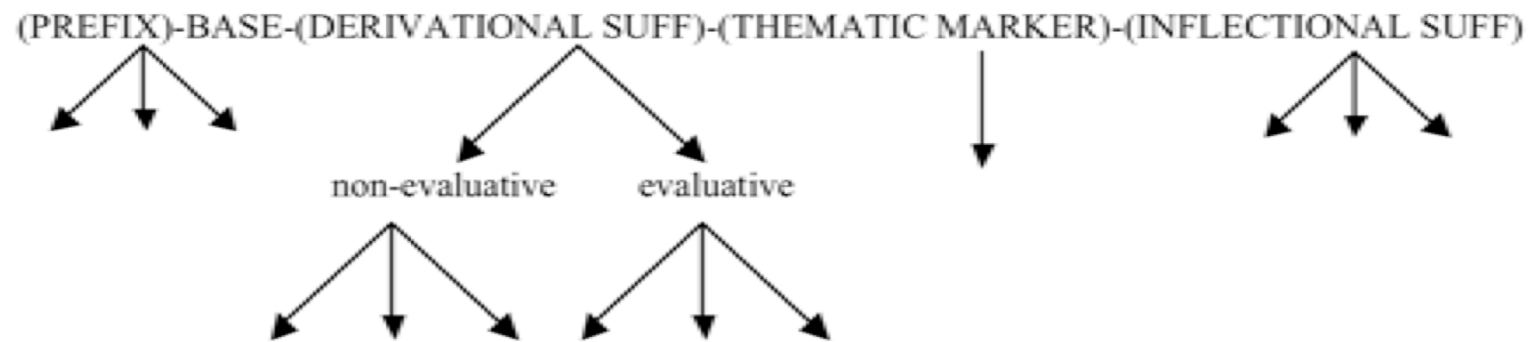
Traditional analyses versus my approach 2

SUFF1 + all SUFF2 that follow it

versus

$$SUFF1 \longrightarrow \begin{cases} SUFF2_N \\ SUFF2_{ADJ} \\ SUFF2_V \end{cases}$$
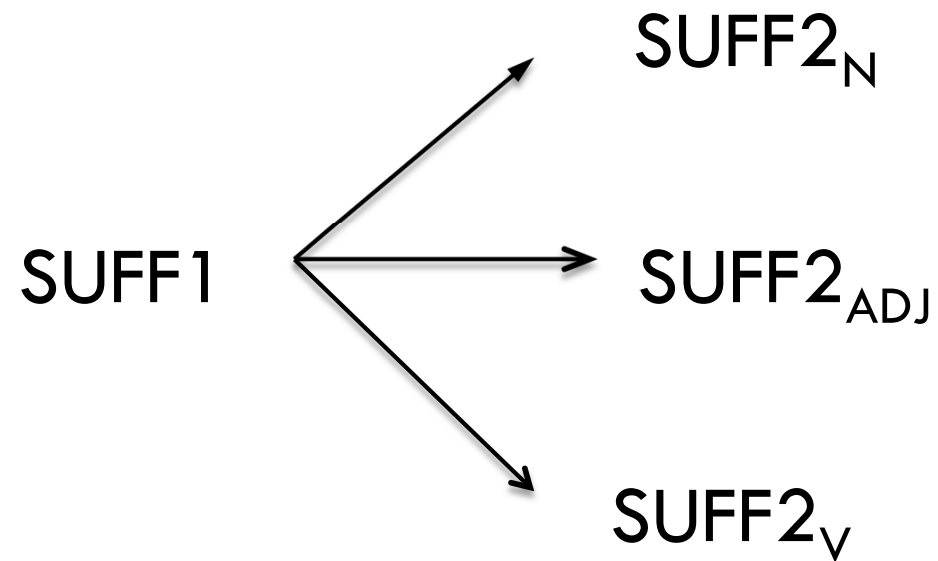
□ Cf. Gauss-Jordan elimination (Manova 2011c)

-ist: A traditional analysis

SUFF1	Word class of SUFF1	Followed by SUFF2
-ist	N	*-dom, -ic, -y, -ize*

Manova (2011c)
Data from Aronoff & Fuhrhop (2002), based on OED, CD 1994

-ist: A cognitive analysis

SUFF1	Syntactic category of SUFF1	SUFF2	SUFF2 suffixes with the same word-class in numbers
-ist	N	N: *-dom* (2) ADJ: ***-ic* (631)**, *-y* (5) V: *-ize* (3)	N: **1** ***ADJ: 2*** V: **1**

Manova (2011c)
Data from Aronoff & Fuhrhop (2002)

Types of SUFF1-SUFF2 combination

- ☐ *Fixed (unique)*
  - ◘ SUFF1 combines with only one particular SUFF2 of a major lexical category, N, V, ADJ

- ☐ *Predictable*
  - ◘ SUFF2 applies by default – the majority of words (types) are derived by this suffix
  - ◘ SUFF2 is semantically determined (based on intentional semantics)

- ☐ *Unpredictable*
  - ◘ very few combinations are of this type

Parts of speech 1

- The lexical-category specification of a suffix can be N, V and ADJ, and it is seen as cognitively defined in terms of semantic concepts

- Langacker's (1987) - conceptual analysis of parts of speech

- Croft (2001) – universal-typological theory of parts of speech

Parts of speech 2

☐ Langacker (1987), based on *relationality* (i.e. +/- relational) and *way of scanning* (whether summarily scanned, i.e. conceived statistically and holistically, or sequentially scanned, i.e. mentally scanned through time), recognizes *things* (N), *processes* (V) and *modifiers* (ADJ).

Parts of speech 3

☐ Croft (2001) defines objects, properties and actions in terms of four semantic properties: ***relationality, stativity, transitoriness*** and ***gradability***. Thus prototypically, nouns name things or objects, verbs denote processes or actions, and adjectives are modifiers and express properties.

Suffix-particular semantics 1

- Semantic rules for selection of SUFF2 can be illustrated with the suffixes *-ful*$_{ADJ}$ and *-less*$_{ADJ}$.
  - If the suffix *-ful*$_{ADJ}$ attaches to a derived noun in English (e.g. *mean-ing*$_N$*-ful*$_{ADJ}$) usually also the suffix *-less*$_{ADJ}$ attaches to that noun (*mean-ing*$_N$*-less*$_{ADJ}$). Thus, we have two SUFF2$_{ADJ}$ that combine with the same SUFF1 (*-ing*$_N$). However, the two SUFF2 $_{ADJ}$ are semantically opposite and are thus semantically assigned, based on intensional semantics (i.e. what the speaker intends to say).

Suffix-particular semantics 2
(current research)

☐ Homophonous suffixes

◼ Russian suffix *-tel'*

No	SUFF1	SUFF1 lexical category & semantics	SUFF2	Examples
1.	*-tel'*	N person	N: *-stvo, -ščina* (2)[1] ADJ: *-skij*	*učitel'stvo* 'being a teacher; teachers (coll.)', *ljubitel'ščina* 'dilettantism', obyvatel'ščina *učitel'skij* 'teacher's'
2.	*-tel'*	N object	ADJ: *-nyj*	*ukazatel'nyj* 'indicatory'

[1]Number of types in the Russian National Corpus

Suffix-particular semantics 3
(current research)

□ Synonymous suffixes (examples from Russian)

No	SUFF1	SUFF1 Lexical category & semantics	SUFF2	Examples
1.	-tel'	N person	N: *-stvo*, -ščina (2)[1] ADJ: *-skij*	*učitel'stvo* 'being a teacher; teachers (coll.)', *ljubitel'ščina* 'dilettantism', *učitel'skij* 'teacher's'
2.	-ač	N person	N: *-estvo* ADJ: *-eskij*	*trubačestvo (Internet)* ‚being a trumpeter; trumpeters (coll.))', *trubačeskij* 'trumpeter's'
3.	-un	N person	N: -stvo, -ec ADJ: *-skij*	*opekunstvo* 'being a guardian; guardianship', *brexunec (= brexun)* 'boaster', *opekunskij* 'guardian's'

[1]Number of types in the Russian National Corpus

Additional evidence for the analysis

☐ Internal (linguistic) evidence

☐ Psycholinguistic evidence

☐ Evidence from neuroscience

Internal (linguistic) evidence

☐ Nouns, adjectives and verbs usually have different morphology, which means that speakers distinguish between them in some way, because in order to attach the right nominal / adjectival / verbal inflection to a word a speaker must identify the lexical category of that word. Verb inflection cannot be attached to nouns and adjectives, etc.

☐ N, ADJ, V also have different syntactic combinability.

Evidence from psycholinguistics

- Children acquire nouns and verbs differently: Germanic, Romance and Slavic nouns are acquired faster.

  - Research on child language carried out in Vienna (Dressler's lab)

  - See their publications in the Walter de Gruyter series *Studies on Language Acquisition (SOLA)*: Bittner, Dressler & Kilani-Schoch (2003) and Stephany, U. & M.D. Voeikova (2009).

Evidence from cognitive neuroscience

- ☐ Nouns and verbs activate different parts of the brain.
  - ◘ Mestres-Missé,Anna; Antoni Rodriguez-Fornells & Thomas F. Münte (2010), among many others

- ☐ The regions in the brain responsible for face recognition (persons in my research) differ from the regions responsible for recognition of objects, locations, etc.
  - ◘ Kandel et al. (2012) and reference therein

Nouns and verbs in the brain
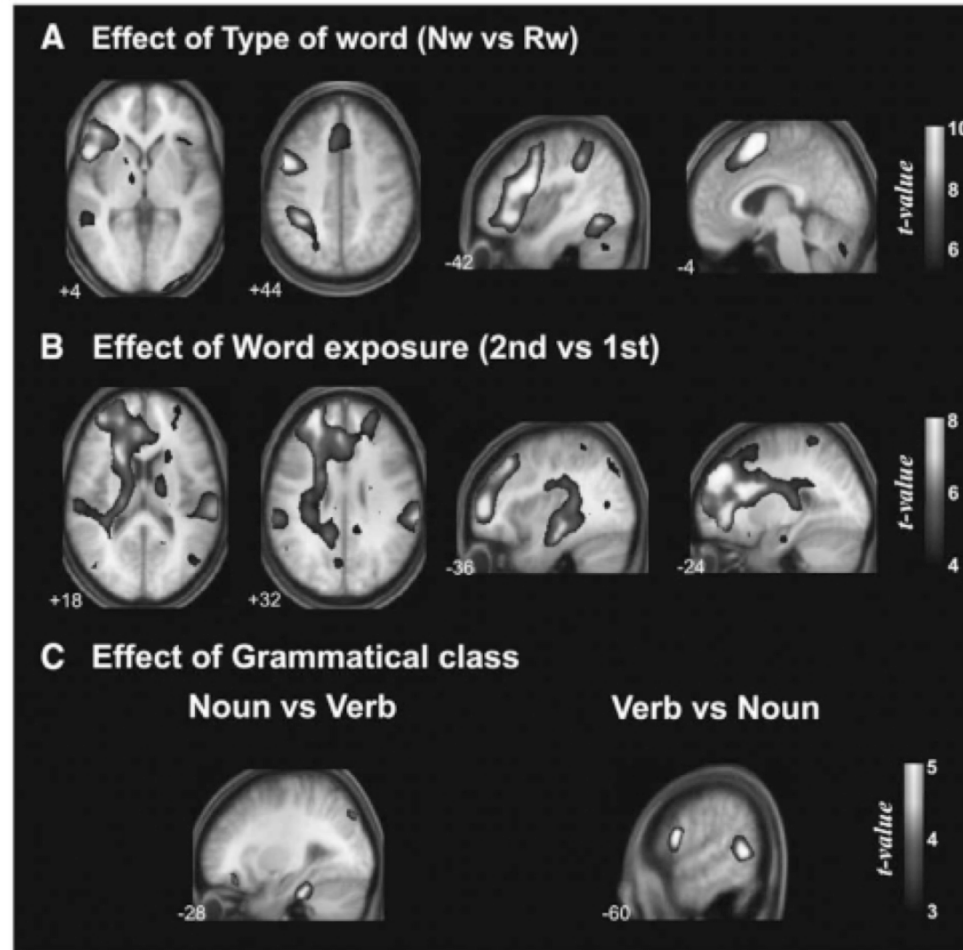
Conclusions 1

- ☐ Affix ordering in Slavic is best analyzed in terms of binary combinations of affixes, of the type SUFF1-SUFF2 in suffixation.

- ☐ With respect to suffixation, the Slavic word has three domains: derivational, evaluative and inflectional.

- ☐ If the lexical-category specification of a suffix and suffix-particular semantics are considered, most suffix combinations in Slavic appear either fixed or predictable, i.e. most probably, speakers do not always produce suffix combinations as compositional pieces of structure (entrenchment, double-route access).

Conclusions 2

- ☐ To understand the nature of suffix combinations in Slavic, it is not necessary to relate them, to lexical bases, as Slavic grammars treat all instances of suffixation.

- ☐ Fixed and predictable SUFF1-SUFF2 combinations appear pieces of purely morphological structure with status of their own. They are constructions between morphemes and words, i.e. the morphological parallel of phrases in syntax.

- ☐ The results of this research also suggest that suffixes should be specified in terms of cognitive (lexical and semantic) categories in the lexicon (cf. Lieber 2005).

Conclusions 3

☐ This research can find a number of practical implementations:

- ◘ The fact that most affix combinations are fixed and predictable can be used for *improvement of speech recognition technologies.*

- ◘ If SUFF1 combines with one $SUFF2_N$, $SUFF2_{ADJ}$ and $SUFF2_V$, i.e. with up to three suffixes, that SUFF1 can be identified in an electronic corpus statistically – on the basis of its combinability. Thus, our results can be used for *automatic annotation of corpora at the level of morpheme.*

- ◘ The observations about fixed and predictable combinations as well as the importance of cognitive categories for the composition of the Slavic word can be easily implemented in *foreign language teaching to facilitate vocabulary acquisition.*

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