WORD-FORMATION IN THE MENTAL LEXICON

MEiCogSci, University of Vienna
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    - Compounding, e.g. Lehrerzimmer ‘teachers’ room’
  - Inflection (production of word-forms)

    e.g. lehre, lehrst, lehrt, etc.

    Lehrbuch, Lehrbücher, etc.

Word-formation techniques

There are five basic morphological techniques:

- Addition, e.g. to teach → teach-er

  -er is an affix, more precisely a suffix

- Substitution, e.g. Marx-ism → Marx-ist
- Modification, to impórt → ímport
- Conversion, to cut → a cut
- Subtraction, e.g. Russian biologija 'biology' → biolog 'biologist'

These techniques represent all possible cognitive operations that can be performed on a morphological form.

Manova (2011) *Understanding Morphological Rules*. Dordrecht: Springer.

Suffixation and suffix ordering

real → real + -ize

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

Explanation of the order of the suffixes

- According to the type of information used in suffix ordering:
    1) phonological
    2) morphological
    3) syntactic
    4) semantic
    5) statistical
    6) psycholinguistic
    7) cognitive
    8) templatic

Manova & Aronoff (2010)

The mental lexicon

- A notion used in linguistics and psycholinguistics
  - Psycholinguistics is about how language works in the brain
- The mental lexicon is something like a mental dictionary where systematic information about language (words and their use) is stored in an easily accessible way
- There are different opinions about what information exactly is stored in the mental lexicon
  - Some linguists believe that only whole words (and no suffixes) are represented in the mental lexicon

Structure of the talk

- Empirical issues
- My approach
- Hypotheses about the organization of the mental lexicon
- Two psycholinguistic experiments
- Discussion of the results of the experiments
- Conclusions about what is stored in the mental lexicon

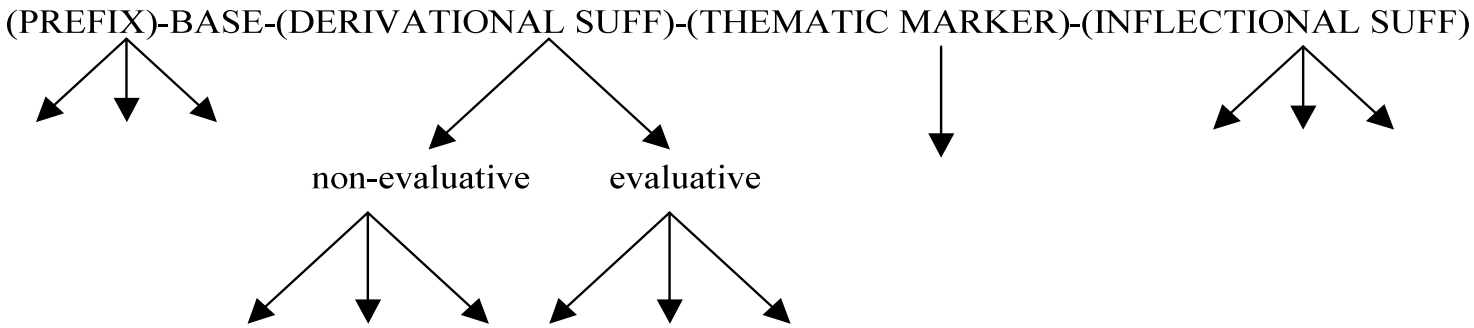
My research: Languages analyzed

- Slavic
  - Bulgarian (South Slavic)
  - Russian (East Slavic)
  - Polish (West Slavic)
- Germanic
  - English
  - German
- Romance
  - Italian

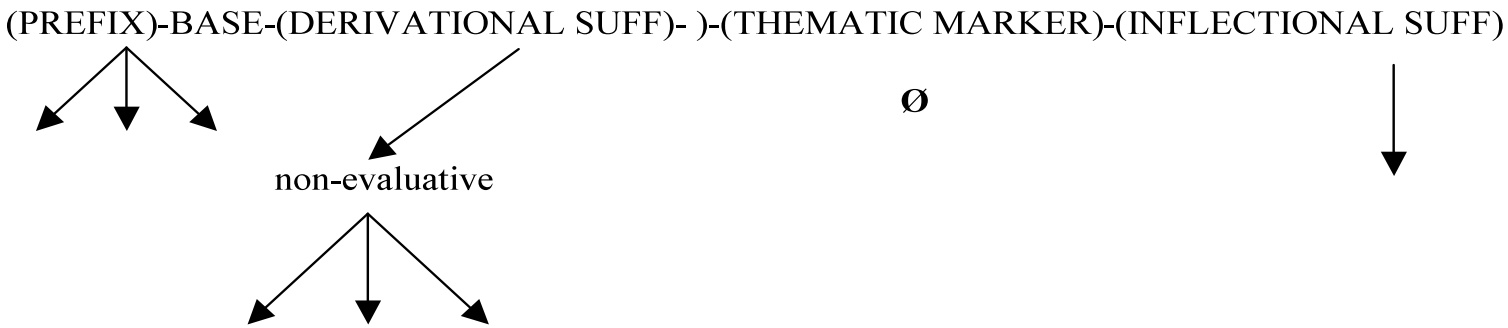
- Editor of papers on about 30 typologically diverse languages

Slavic word versus English word

Slavic word



English word



The combinability of the English suffix *-ist*

SUFF1	Lexical category of SUFF1	Followed by SUFF2
-ist	N	*-dom, -ic, -y, -ize*

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

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English -ist: Our cognitive approach

SUFF1	Lexical category of SUFF1	SUFF2
-ist	N	N: *-dom* (2) ADJ: *-ic* (631), *-y* (5) V: *-ize* (3)

Table from Manova (2011)
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Nouns, adjectives and verbs are seen as cognitive categories, cf. Langacker (1987).

Lexical categories: Noun (N), Adjective (ADJ) and Verb (V)

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).

-ist: Fixed combinations

SUFF1	Syntactic category of SUFF1	SUFF2
-ist	N	N: *-dom* (2) ADJ: *-ic* (631), *-y* (5) V: *-ize* (3)

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Types of SUFF1-SUFF2 combination

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

-ist: Predictable combinations

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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 are derived by that suffix.
    - Suffixes that 'compete' with the default suffix are unproductive and derive no more than 10 words

Hypotheses

- **H1**: If SUFF1 tends to combine with only one SUFF2 of a major lexical category (N, ADJ, V), SUFF1-SUFF2 combinations are unique pieces of structure and speakers should know them by heart.

- **H2**: If speakers know suffix combinations by heart, they should be able to diferentiate between existing and non-exisitng combinations and existing combinations should be recognised with higher accuracy and faster than non-existing ones.

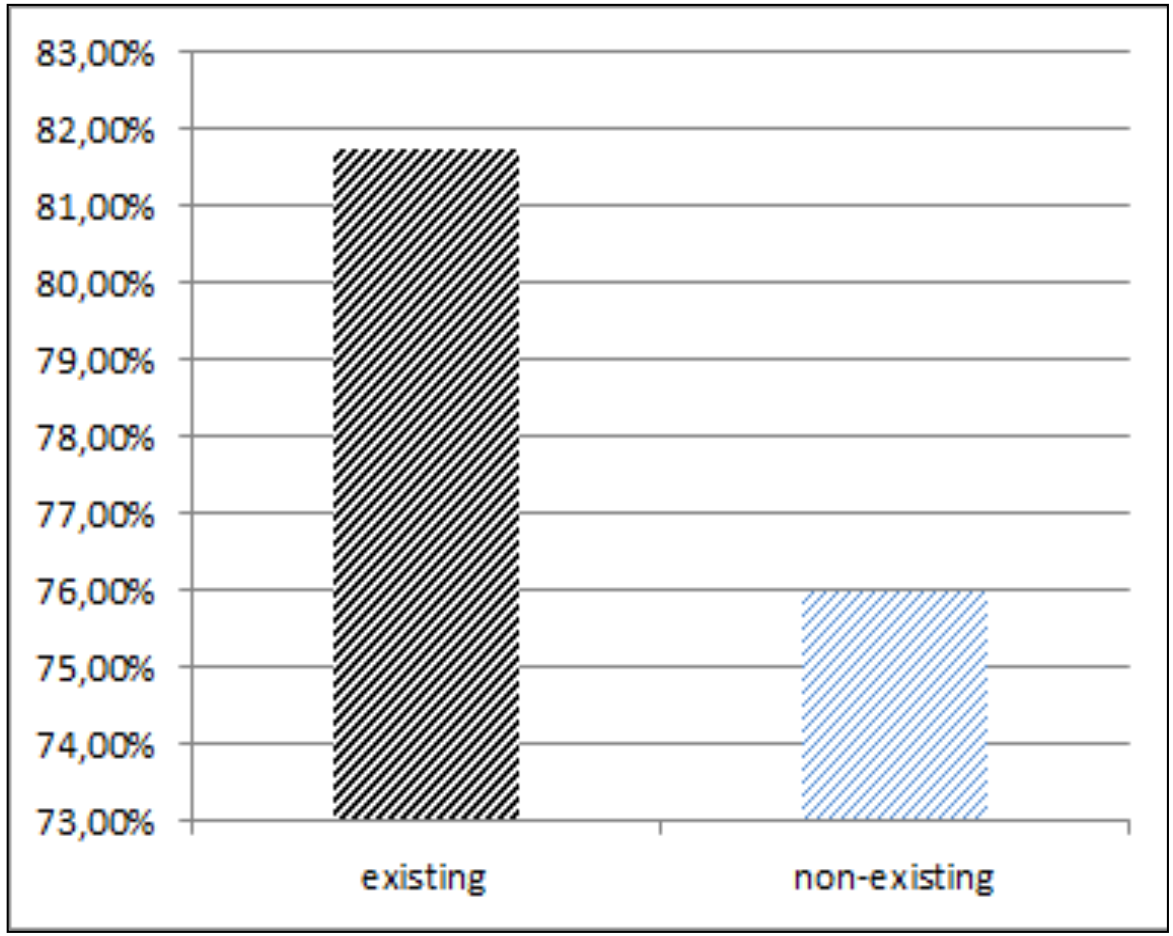
Experiment 1

- **Participants**: 64 native speakers of Polish
  - age: M=23.2, SD=1.76
  - no history of developmental dyslexia or reading disabilities
  - non-linguists
- **Materials**: 60 items
  - 30 existing suffix combinations from Polish, e.g.:
    - *-ar-nia* as in *kawi-**ar-nia*** '*café*'
  - 30 non-existing suffix combinations created by changing the order of the suffixes of the legal ones or by manipulating phonemes, e.g.:
    - from the existing ***-ar-nia*** → ***-ni-ar*** *or* ***-ur-nia***.
  - 2 lists
    - each with the suffixes of the other in reverse order
    - each participant saw all combinations

Experiment 1: Procedure

- **Task**: decide as quickly and as accurately as possible if a combination exists or not
- **Training**: a few examples of derivations of existing and non-existing words with two suffixes in Polish to ensure that the participant understands the task
- **List of items**: participants received a list of existing and non-existing suffix combinations and have to complete the task
- **Maximum time for decision**: 10 minutes

Experiment 1: Accuracy of recognition of existing and non-existing combinations



Acc for existing:
M=81.72%,
SD=0.29

Acc. for non-existing:
M=75.99%,
SD=0.22

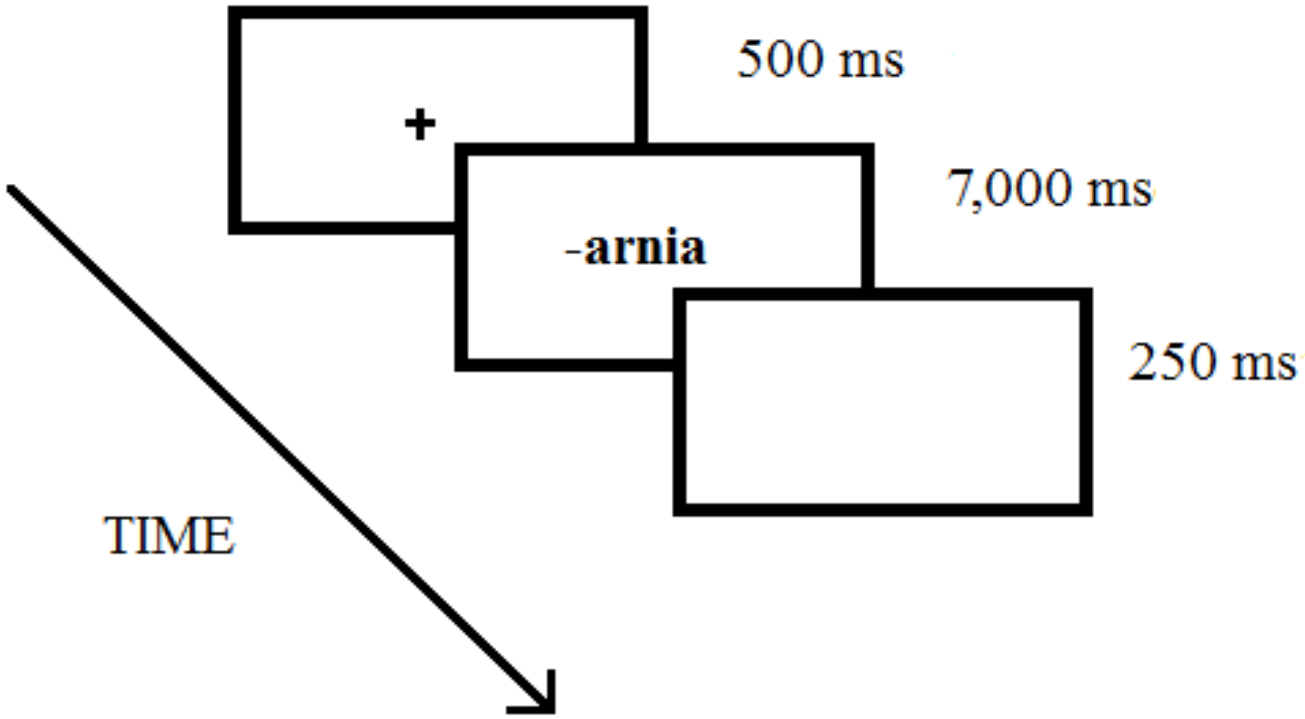
The result is statistically significant:

t(63)=2.34,
p=0.02

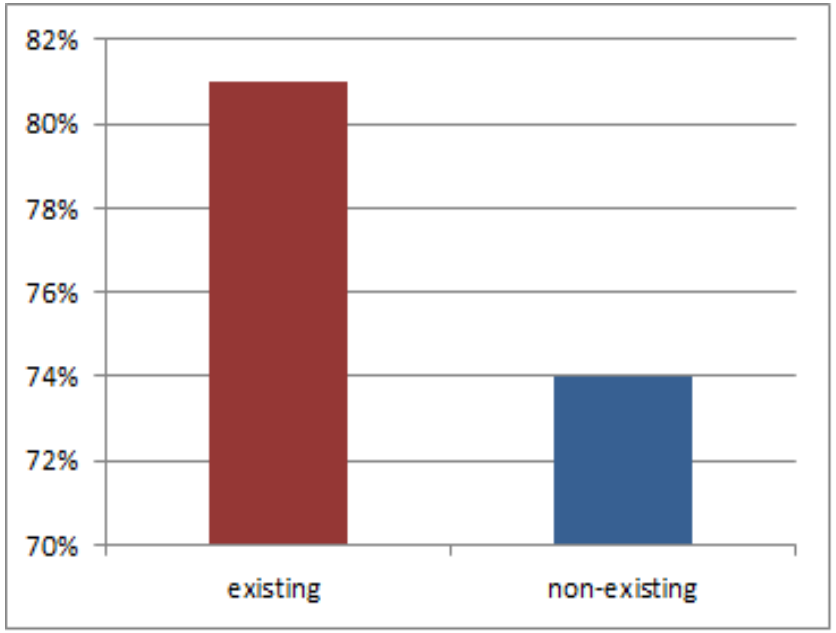
Experiment 2

- **Participants**: 53 native speakers of Polish
  - age: M=21.43, SD=1.83
  - no history of developmental dyslexia or reading disabilities
  - non-linguists
- **Task**: Press the right arrow button if a string of letters is an existing combination or the left CTRL button if it is not. In case of a doubt, behave as if a stimulus does not exist.
- **Materials**: 88 items, randomized with the E-prime 2.0 software
  - 44 existing and 44 non-existing suffix combinations
  - non-existing combinations produced as in Experiment 1
  - 2 lists
    - each with the suffixes of the other in reverse order
    - each participant saw all combinations

Experiment 2: Procedure



Experiment 2: Accuracy



Existing combinations:

M_{ACC}= 81%, SD=.09

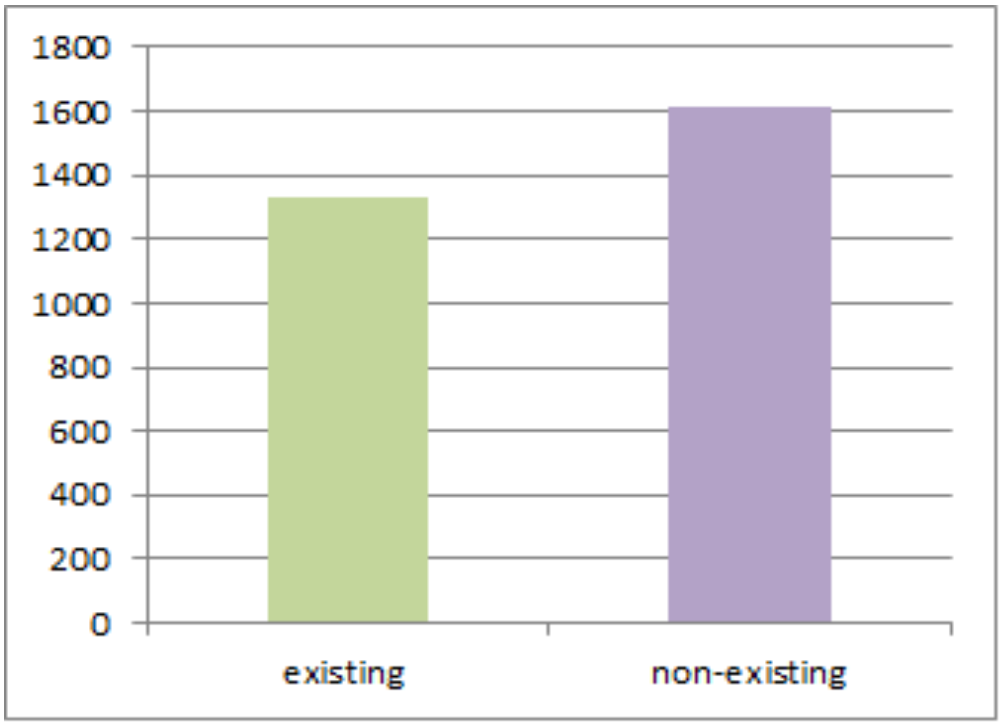
Non-existing combinations:

M_{ACC}= 74%, SD=.12

The result is statistically significant:

t(52)=3.03, p=0.004

Experiment 2: RTs



Existing combinations:

1333 ms

M_{RT}=1333.14, SD=420.57

Non-existing combinations:

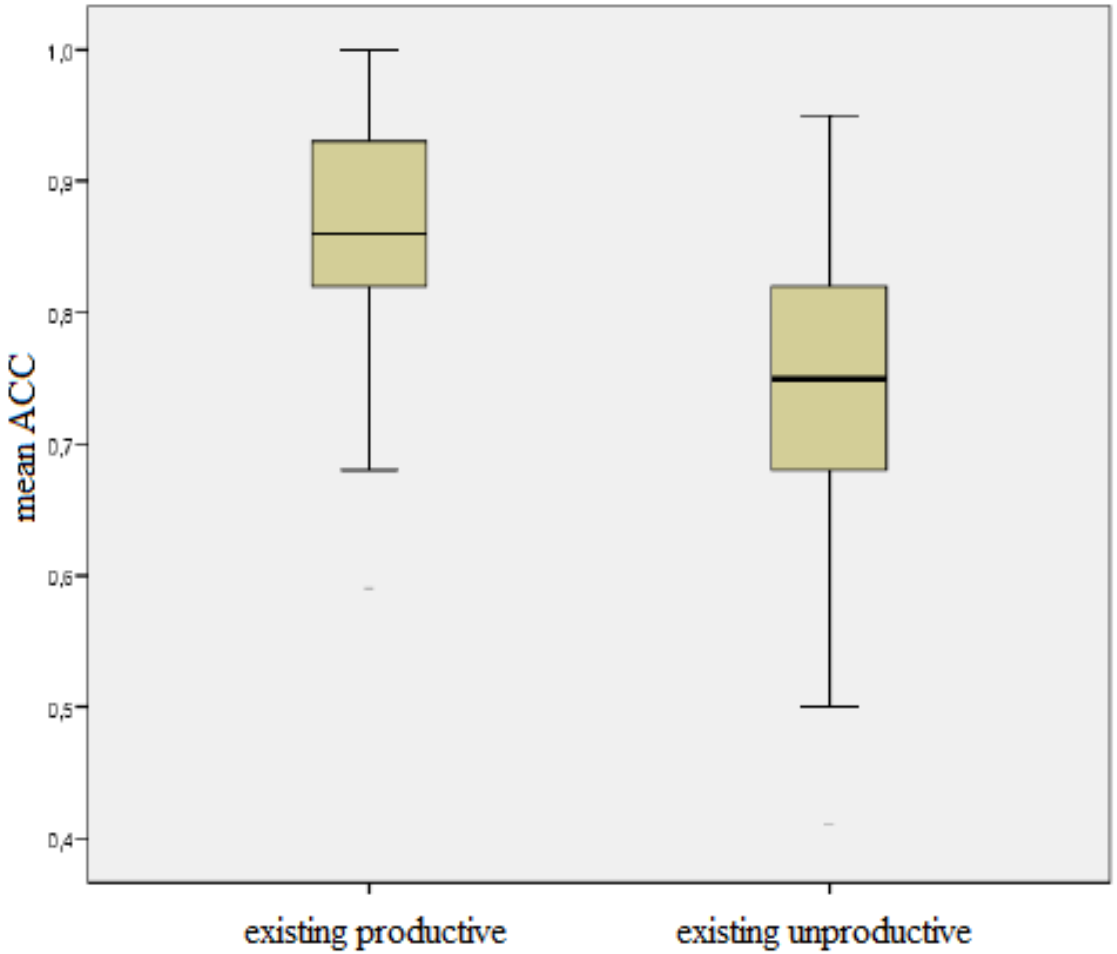
1610 ms

M_{RT}=1610.38, SD=556.02

The difference is statistically significant:

t(51)=-7.53, p<0.001

Experiment 2: Mean accuracy of the productive combinations (derive > 10 words)



Productive combinations:

M_{ACC}= 86%, SD=.09

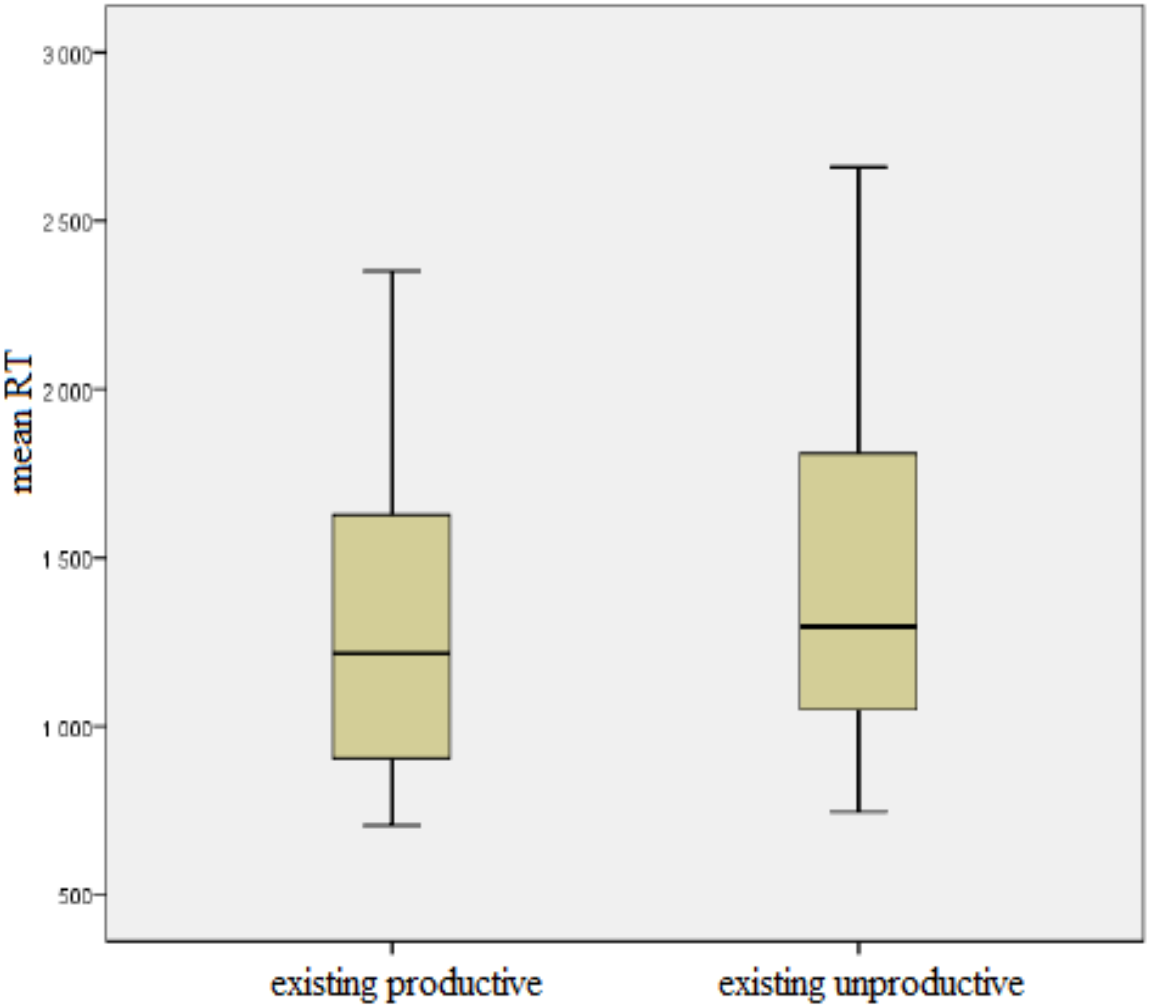
Unproductive combinations:

M_{ACC}= 75%, SD=.11

The difference is statistically significant:

***t*(51)=7.81, *p*<0.001**

Experiment 2: Mean RTs of the productive combinations (derive > 10 words)



Productive combinations:

M_{RT}=1288.44, SD=429.14

Unproductive combinations:

M_{RT}=1421.01, SD=488.41

The difference is statistically significant:

***t*(51)=-4.08, *p*<0.001**

Summing up & Discussion

- The results of the two experiments converge:
  - The accuracy of recognition of the existing combinations is significantly higher than the accuracy of recognition of the non-existing combinations.
  - The reaction times to the existing combinations are significantly shorter than to the non-existing ones.
  - Thus, recognition of suffix combinations seems to resemble recognition of words and non-words in psycholingustics.
  - The productive combinations are recognized more accurately and faster than the unproductive combinations.

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Suffixation in the mental lexicon: Conclusions

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- Our research shows that parts of words such as suffix combinations are stored in the mental lexicon
- When speakers produce complex words, they, most probably, do not attach suffixes step by step but use them as wholes, i.e. as -ization, -ational and, maybe, -izational.

Thank you!

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