Slavische Sprachen für (Computer-) Linguisten

Lexical Functions
Explanatory Combinatorial Dictionary
Meaning-Text Model

LFs

- LFs {***R,*** X, Y} are widely spread linguistically relevant meanings that are expresed differently in different languages.

- These meanings are language-independent.
- Their correlates are language-specific.
- MAGN (*disease*) = *grave*
- MAGN (*rain*) = *heavy*
- MAGN (***болезнь*** 'disease') = ***тяжелый,*** lit. *heavy*
- MAGN (***дождь*** 'rain') = ***сильный,*** lit. *strong*

Substitute LFs

= those which replace the keyword in the given utterance without substantially changing its meaning or changing it in a strictly predictable way.

- Synonyms, hypernyms, antonyms
- Converse terms: *buy – sell, right – left,* …
- Derivatives:
  - encourage – encouragement,
  - to build – builder
  - nominate – nominee
  - teach – student

Paraphrasing with converse terms

- *She **bought** a computer for 500 dollars from a retail dealer*
- *A retail dealer **sold** her a computer for 500 dollars*
- *She **paid** 500 dollars to the retail dealer for a computer*
- *The retail dealer **got** 500 dollars from her for a computer.*

Collocate LFs

= those which appear in an utterance alongside the keyword.

- Adjectival LFs, such as MAGN
- Support verbs of the OPER / FUNC / LABOR family: play a leading role in paraphrasing

Paraphrasing based on collocates

- *He respects* [X] *his teachers*
- *He has* [Oper1(S0 (X))] *respect* [S0 (X)] *for his teachers*
- *He treats* [Labor1-2(S0 (X))] *his teachers with respect*
- *His teachers enjoy* [Oper2(S0(X))] *his respect.*

Rules for the above examples

- $X \Leftrightarrow Oper_1(X) + S_0(X)$
- $X \Leftrightarrow Oper_2(X) + S_0(X)$
- $X \Leftrightarrow Labor_{12}(X) + S_0(X)$

Some other rules

- $X \Leftrightarrow Copul + S_1(X)$

  He taught me at school – He was my teacher at school

- $X \Leftrightarrow Func_0 + S_0(X)$

  They are arguing heatedly – A heated argument between them is on

- $X \Leftrightarrow Func_1 + S_0(X)$

  He is afraid – Fear possesses him

- $IncepOper_1 + S_0(X) \Leftrightarrow IncepOper_2 + S_0(X)$

  He conceived a dislike for her – She caused his dislike

- $FinOper_1 + S_0(X) \Leftrightarrow FinOper_2 + S_0(X)$

  England lost control of this territory – This territory went out of England's control

Some more rules …

- $\text{LiquOper}_1 + S_0(X) \Leftrightarrow \text{LiquOper}_2 + S_0(X)$

  The government deprived the monopolies of control over the prices – The government took the prices out of the monopolies' control

- $\text{LiquOper}_1 + S_0(X) \Leftrightarrow \text{LiquFunc}_1 + S_0(X)$

  We freed him of this burden – We lifted this burden from him

- $X \Leftrightarrow \text{IncepOper}_1 + S_{res}(X) \Leftrightarrow \text{IncepFunc}_1 + S_{res}(X)$.

  He learned physics – He acquired the knowledge of physics.

Some more…

- $X \Leftrightarrow CausOper_1 + S_{res}(X)$ etc.

  He taught me physics – He gave me the knowledge of physics.

- $LiquOper_1 + S_{init}(X) \Leftrightarrow LiquFunc_1 + S_{init}(X)$ etc.

  A sudden bell woke him up – A sudden bell interrupted his sleep.

- $CausFact_0\text{-}M + X$ / $CausFact_1\text{-}M + X$ / $CausReal_1\text{-}M + X \approx$ $IncepFact_0\text{-}M + X$ / $IncepReal_1\text{-}M + X$ etc.

  They sent him on leave for a few days – He went on leave for a few days.

Some more

- $\text{LiquFact}_0\text{-M} + \text{X} / \text{LiquFact}_1\text{-M} + \text{X} / \text{LiquReal}_1\text{-M} + \text{X} \approx \text{FinFact}_0\text{-M} + \text{X} / \text{FinReal}_1\text{-M} + \text{X}$ etc.

  He was deprived of his last chance to win in this event – He lost his last chance to win in this event

- $\text{Anti}_1\text{Fact}_0\text{-M(X)} + \text{X} = \textit{neg}\text{Fact}_0\text{-M(X)} + \text{X}$ etc.

  The plans of pacifying the aggressor failed – The plans of pacifying the aggressor did not succeed;

- $\text{Anti}_1\text{Real}_1\text{-M(X)} + \text{X} \Leftrightarrow \text{negReal}_1\text{-M(X)} + \text{X}$ etc.

  The board of directors declined the compromise – The board of directors did not accept the compromise,

Some more…

- $Anti_1Real_2$-M(X) + X ⇔ $negReal_2$-M(X) + X etc.

  He swallowed up the insult – He did not avenge the insult

- $Anti_1Real_3$-M(X) + X ⇔ $negReal_3$-M(X) + X etc.

  The lecturer ignored the questions of the audience – The lecturer did not answer the questions of the audience, He neglected my advice – He did not follow my advice, Any soldier who violates the order is subject to court martial – Any soldier who does not obey the order is subject to court martial.

- X + Y ⇔ Anti1 + Anti2

  He stopped violating the rules – He began observing the rules

Lexicographic support

- A paraphrasing system of this kind requires a good lexicographic source from which the appropriate LF values of words could be extracted. Such a source is provided by the combinatorial dictionary
- Combinatorial dictionaries of English and Russian: an inventory of 120+ LFs

LFs have a strong potential for NLP applications.

- LFs are used for:
  - *Lexical and syntactic disambiguation*
  - *Adequate word selection in translation and text generation*
  - *Ontology construction*
  - *Reasoning*
  - *Synonymous paraphrasing of utterances*
  - *Anaphora resolution*

Syntactic Disambiguation

- *support of the parliament*
  - *'support by the parliament'*
  - *'support (given) to the parliament'*

  In lexical functional contexts, syntactic links are disambiguated:
- *The president had* [Y=$OPER_2$(X)] *the support* [X] *of the parliament*
- *The president expressed* [Y=$OPER_1$(X)] full *support* [X] *of the parliament*

LFs help establish a semantic relation

- Support verbs of the Oper-Func-Labor family attach one of the arguments of the noun
- Different LFs correspond to different arguments
  - *Father gave me an* ***advice***
  - *The proposal received much* ***attention****:*
  - *In both cases the subject of the verb is an argument of the noun*
  - *Their roles are different:*
    - *father* is the Agent of *advice*
    - *the proposal* is the Recipient of *attention*
- These verbs are LFs of different types.
  - Give = *Oper1(*advice*). Its subject is the 1st argument of the noun, which is the Agent*
  - Receive = *Oper2(*proposal*). Its subject is the 2nd argument of the noun, which is the Recipient*