AUTOMATIC EXTRACTION OF SUBCATEGORIZATION FRAMES FROM CORPORA IN PORTUGUESE

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OUR GOALS

- To present a tool for automatic extraction of subcategorization frames (SCFs) designed specially for Portuguese

- To show some early results of two different studies which use this tool

WHAT IS AN SCF?

- Syntactic representation of a clause or phrase.

CLAUSE REPRESENTATION

- Clause
  - Marcou o gol que deu sobrevida a o time , deu carrinhos e conduziu a equipe com uma qualidade que nenhum outro jogador apresentou – nem=de=longe .

NP_NP

PHRASE REPRESENTATION

- Phrase
  - Privação de liberdade

SN_SP[de]

OUR EXTRACTOR

- Initially developed by Zanette (2010)
- Improved in 2011-2012 (Zanette et al. 2012)
- Extracts SCFs of clauses
- http://143.107.232.109/scf_port/index.html

HOW IT WORKS

1 - Input: corpora annotated with the parser PALAVRAS (Bick, 2000)

- Dependency trees

2 - Processing of all sentences in the corpora

3 - Extraction of all dependencies of main verbs verbs

4 - Analysis of the relevant dependencies (exclusion of adverbs)

5 – Output: Database of subcategorization frames

WORKS IN PROGRESS

Verb Lexicon

VERB LEXICON

- Building of VerbNet.br (Scarton, 2011)

- Grouping verbs according to syntactic patterns - according to Levin (1993)

- Changed the original frame:
  - O homem quebrou a janela com um martelo

    (The man broke the window with a hammer)
  - **SUBJ[NP] V NP PP[com]**

VERB LEXICON

- Corpora:
  - Lácio-Ref (~9 million words) – (Aluisio 2004)
  - PLN-BR (~26 million words) – (Bruckschen 2008)
  - Revista FAPESP (~6 million words) – (Aziz and Specia 2011)

VERB LEXICON

- Two approaches:
  - Validating a semiautomatic method used to build VerbNet.Br (by using others Computational Lexical Resources)
  - Verb clustering (complete automatic method based on Machine Learning)

VERB LEXICON

- VerbNet.Br:
  - Based on VerbNet (Kipper, 2005)
  - Being built through the alignments among VerbNet, WordNet and WordNet.Br
  - The SCFs are used to validate the candidate members identified by the others resources

VERB LEXICON

- Method for building VerbNet.Br:
  - Identify candidate members to VerbNet classes through use of alignments among VerbNet, WordNet and WordNet.Br
  - For each candidate member, identify the SCFs
  - Compare with the SCFs defined manually for each class

VERB LEXICON

- Verb Clustering (Sun et al., 2010):
  - Use of the syntactic patterns to group verbs together → **MACHINE LEARNING METHODS**
  - Trying to validate Levin's hypothesis → "Verbs that fall into classes according to shared (syntactic) behavior would be expected to show shared meaning components"

VERB LEXICON

- Results
  - Identified:
    - 7.252 verbs
    - 17.448 frames (parameterized by prepositions – frequency higher than 1)
- Verb Clustering:
  - The best result: 42.6% of F-measure (using Spectral Cluster algorithm) for the task in a gold standard with 12 classes of VerbNet (translated from English)
    - The best result for English: 63.3% of F-measure (using Spectral Cluster algorithm)

WORKS IN PROGRESS

Semantic Role Labeling

SEMANTIC ROLES

- The butcher cuts the meat.
  - The butcher = **agent**
  - The meat = **patient/theme**

- I opened the door with a key.
  - I = **agent**
  - The door = **patient/theme**
  - With a key = **instrument**

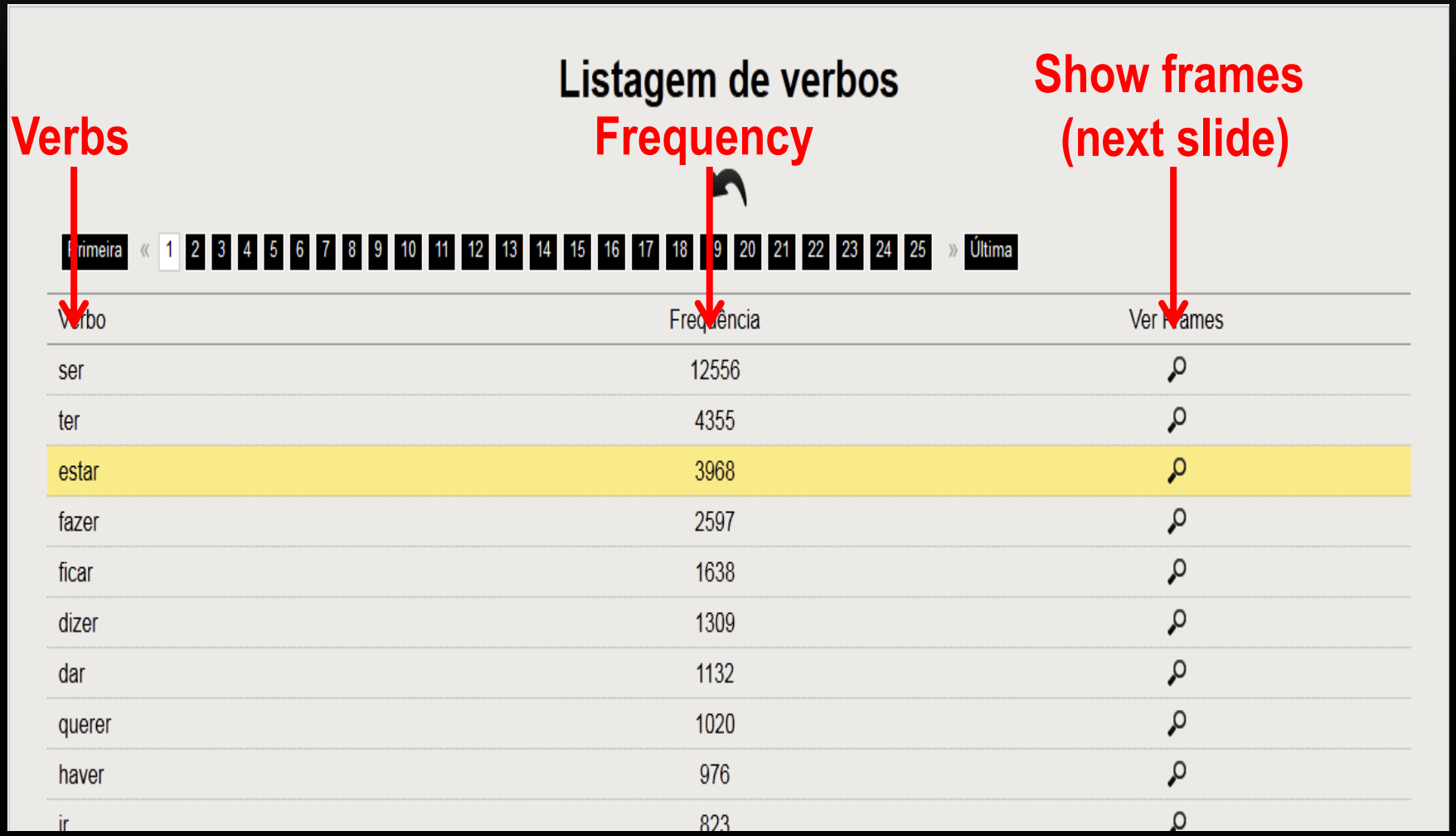
SEMANTIC ROLE LABELING

- Two corpora:
  - Cardiology = 1.5+ million words
  - Newspaper = 1+ million words

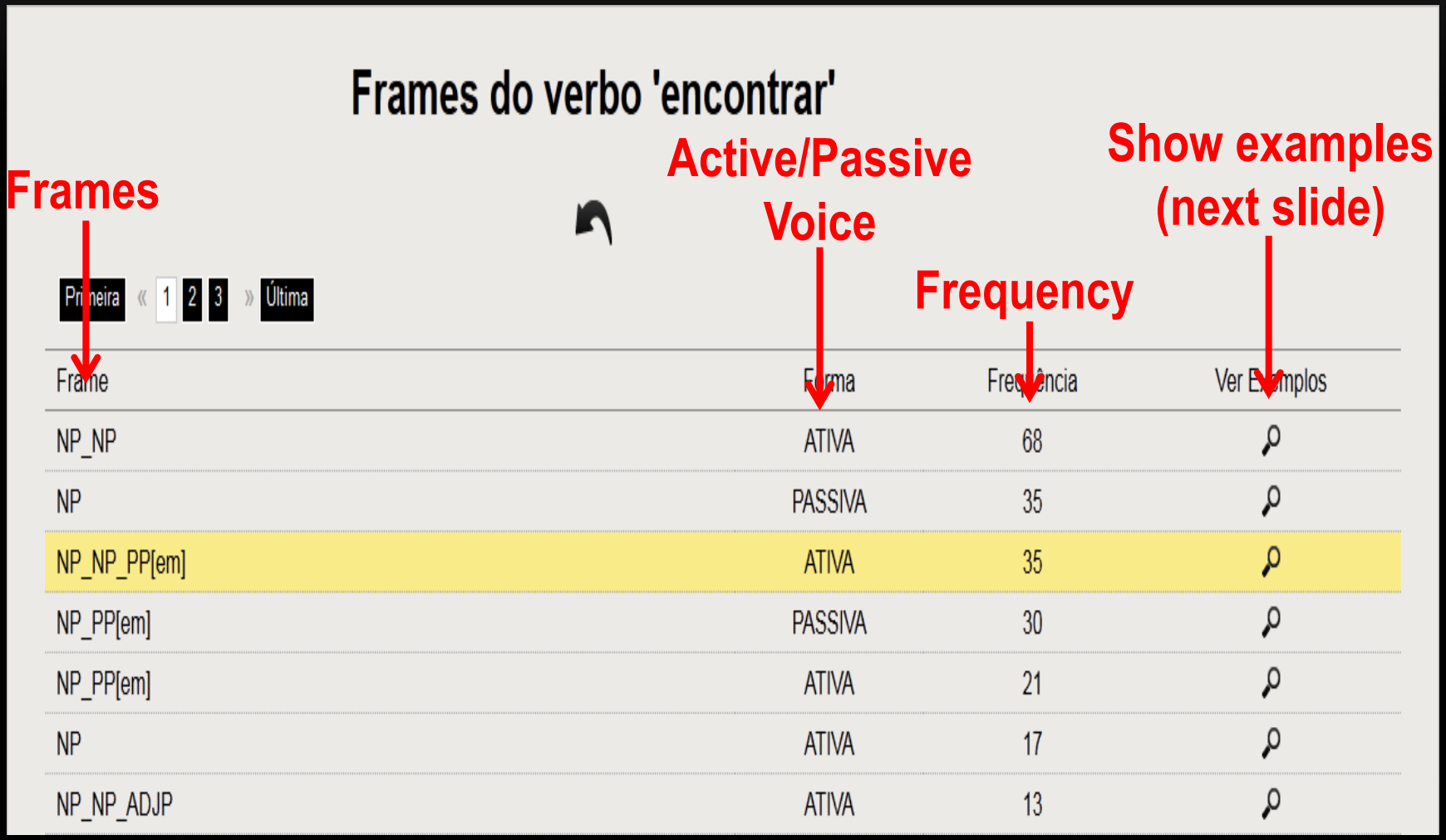
- Semantic roles from the works of Brumm (2008) and Gelhausen (2010)

INTERFACE

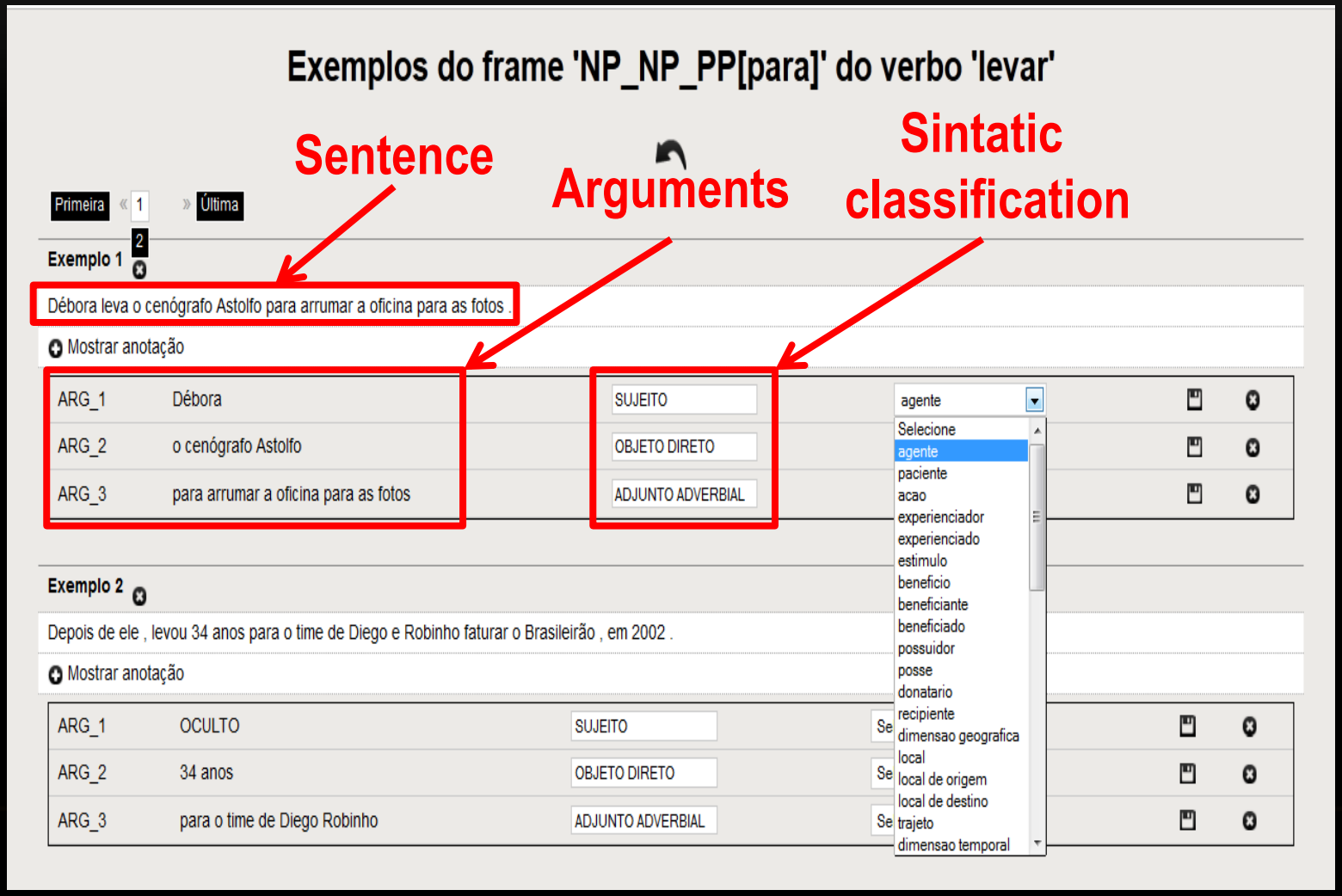
PHP-INTERFACE 1 – LIST OF VERBS



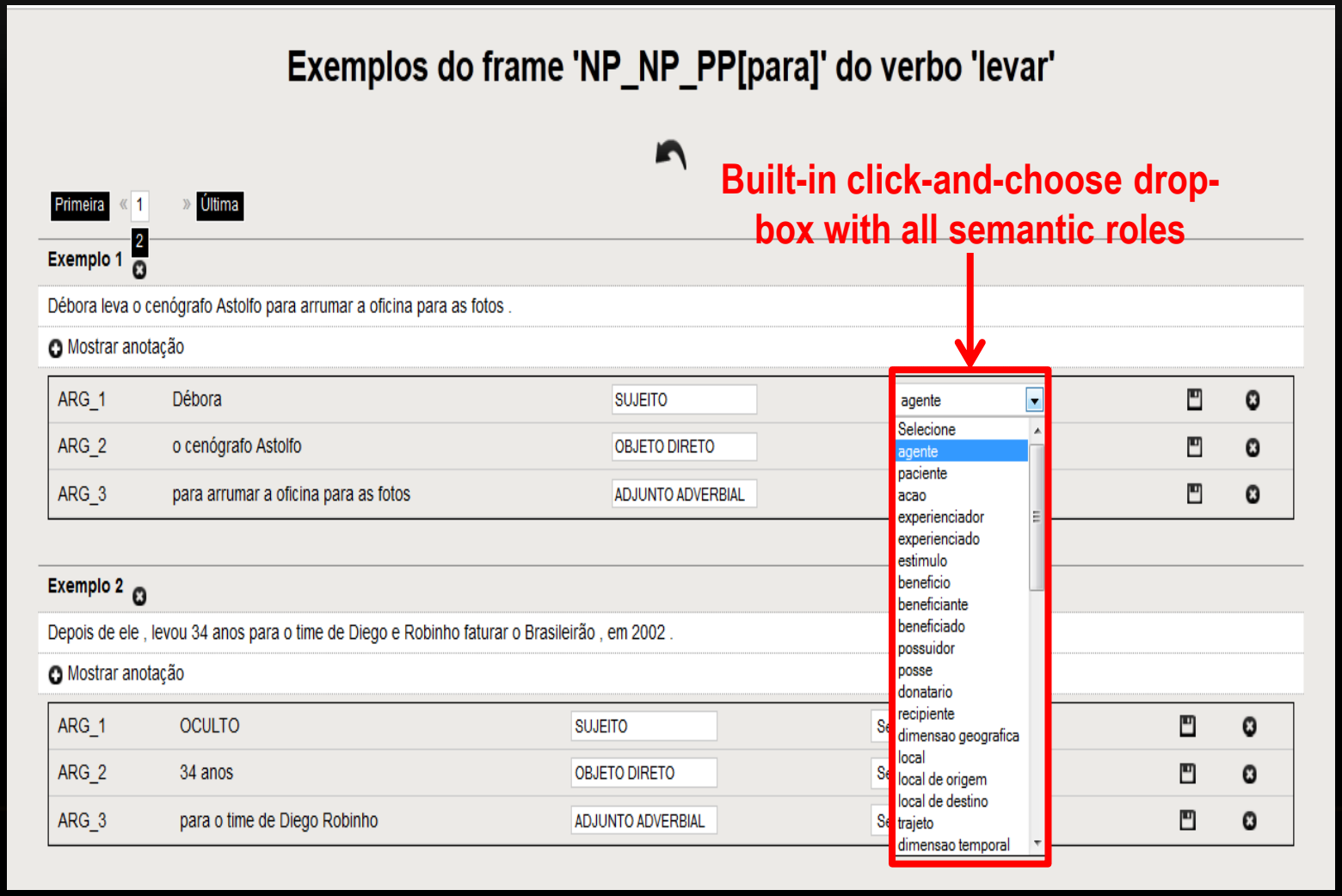
PHP-INTERFACE 2 – LIST OF FRAMES



PHP-INTERFACE 3 – LIST OF EXAMPLES



SEMANTIC ROLE LABELING



CURRENT SEMANTIC ROLE LABELING

- 46 semantic roles (Brumm 2008; Gelhausen 2010)

- Annotation of 4 verbs in both corpora:
  - encontrar [to find]
  - levar [to take/carry]
  - receber [to receive]
  - usar [to use])

- Test in a small set of verbs

RESULTS

- Annotation of 482 frames
- 138 diferent semantic roles configurations

CURRENT DEVELOPMENTS

- Too many roles, some are not used or are too specific
- Change of the semantic roles set
- Testing of the set applied at the VerbNet (Kipper 2005)

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MUITO OBRIGADO!

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