Croatian Idioms Integration: Enhancing the LIdioms Multilingual Linked Idioms Dataset

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2. Background and Motivation
3. Methods and Results

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    3.2. Semantic Representation Model and RDF Generation
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Introduction

- Idioms: conventionalized multiword expressions (MWEs) with figurative meaning– which sometimes is not the sum of its parts.
- Cultural-dependent, with forms based on everyday cultural references.
- However, numerous idioms appear as different language realizations at the level of expressions, but they all convey the same meaning:

piece of cake (EN)

é canja de galinha (PT)

e’ facile come rubare le caramelle a un bambino (IT)

mačji kašalj (HR)

- meaning when some task is effortless.

Introduction

- Understanding the meaning of idioms for non-native speakers is a significant challenge.
- Natural language processing can provide support in overcoming this challenge, especially for low-resourced language as Croatian.
- The aim of this paper is to integrate Croatian idioms into an existing multilingual linked idioms dataset.

Background and motivation

- There is a lack of comprehensive linguistic resources focusing on Croatian idioms in the Linked Open Data (LLOD) format.
- Prominent contributions can be found in Orešković et al. (2018) (CroLLOD) and Škvorc et al. (2022).
- In 2018, Moussallem et al. developed a multilingual linked idioms dataset called LIdioms to support natural language processing applications by linking idioms from various languages.
- LIdioms included idioms from English, German, Italian, Portuguese, and Russian.
- Croatian idioms have recently become accessible through the *Online Dictionary of Croatian Idioms* (Filipović Petrović and Parizoska, 2022) - open access, highly reliable source of lexical data, which is available in XML format.
- However, it presents its contents linearly, limiting its accessibility to human readers, primarily native Croatian speakers.

Methods and Results
The Initial Dataset

Resources: Utilized the Online Dictionary of Croatian Idioms (Filipović Petrović and Parizoska, 2022) for our research.

Version: This is a corpus-driven dictionary, version 1.0 of which was released in October 2022.

Contents: The dictionary currently contains 513 headwords, comprising a total of 1,042 idioms and their variants.

Reliability: It is a highly reliable source of lexical data, meticulously curated by linguists and lexicographers based on real language usage.

Advantages: The dictionary provides pre-evaluated idioms and carefully designed definitions, making them a ready-made resource for this study.

Limitations: While the data is open-source, it lacks the structuring necessary for benefiting NLP applications and its contents are presented linearly, limiting its accessibility to human readers, primarily native Croatian speakers.

Semantic Representation Model and RDF Generation

Goal: convert our XML source file to an RDF Ontolex-Lemon representation.

Challenge: idioms are complex to represent in Ontolex Lemon

Solution: rely on the Ontolex representation for idioms presented by LIdioms (Moussallem et al., 2018):

- Well-established format for representing idioms (a type of MWE) in Ontolex Lemon.
- Potential interoperability of our resource with the existing LIdioms dataset (linked data).

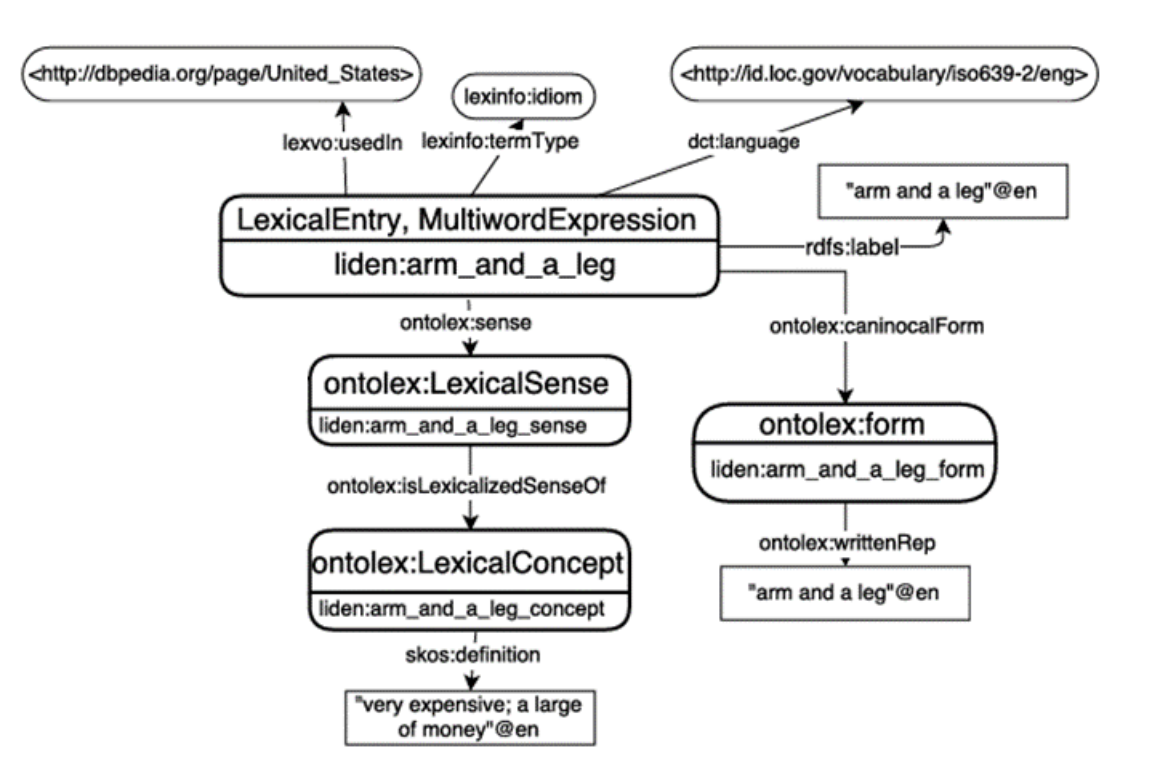

Figure borrowed and adapted from Moussallem et al. (2018), representing an Ontolex Lemon representation for the English idiom ‘arm and a leg’.

Semantic Representation Model and RDF Generation

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  - Additional linguistic information encoded in individual XML entries (e.g. alternative forms and definitions) being difficult to represent in standard Ontolex Lemon. ✗

Semantic Representation Model and RDF Generation

```
<entry>: 'naći se u škripcu'                    <!--'to be in a difficult position'-->
    <other_form>'biti u škripcu'</other_form>                <!--'be in a corner'-->
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  a) List all forms under a single `LexicalEntry`? How do we model these forms under this entry?
  b) Each form is to have its own `LexicalEntry`? How do we represent several individual `LexicalEntry` being part of a same base idiom form?

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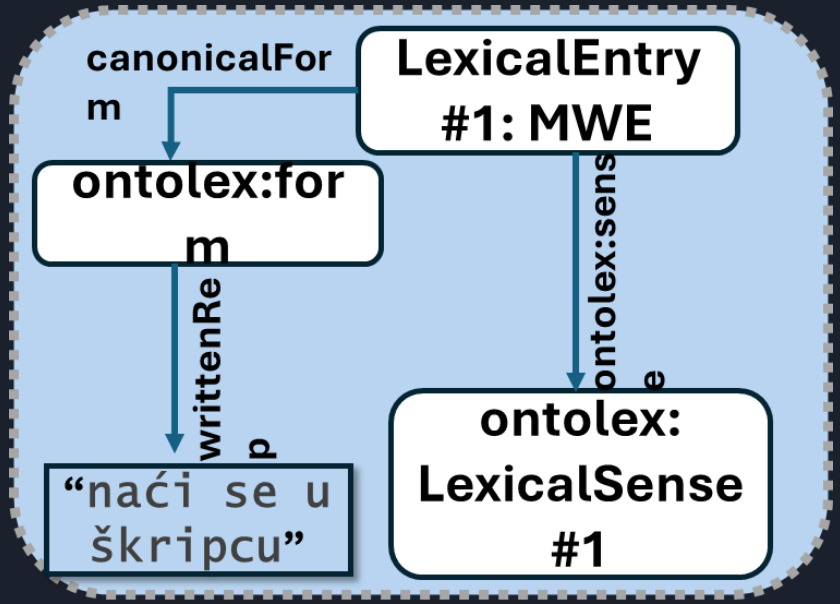
“Main” idiom form



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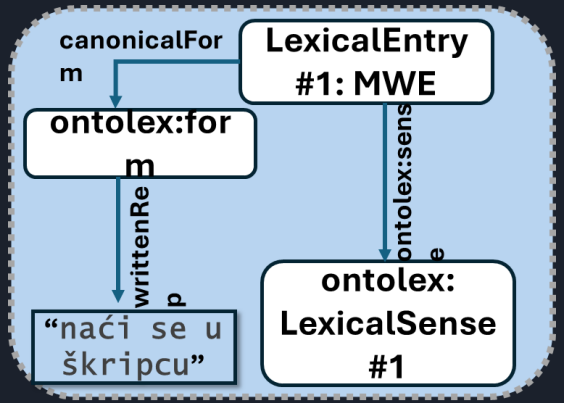

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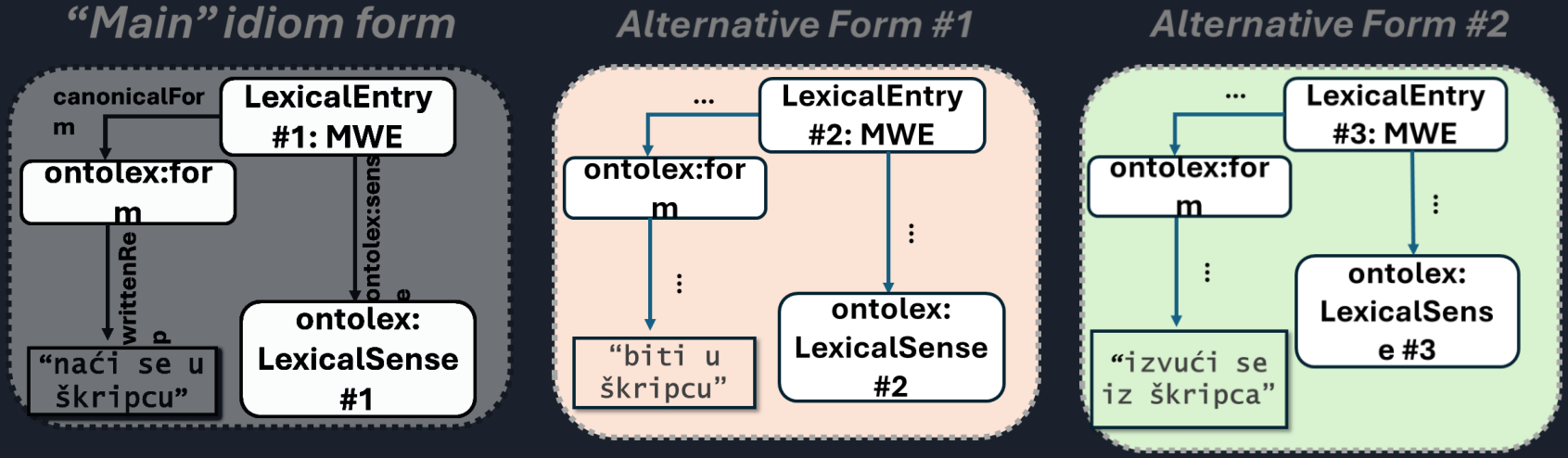

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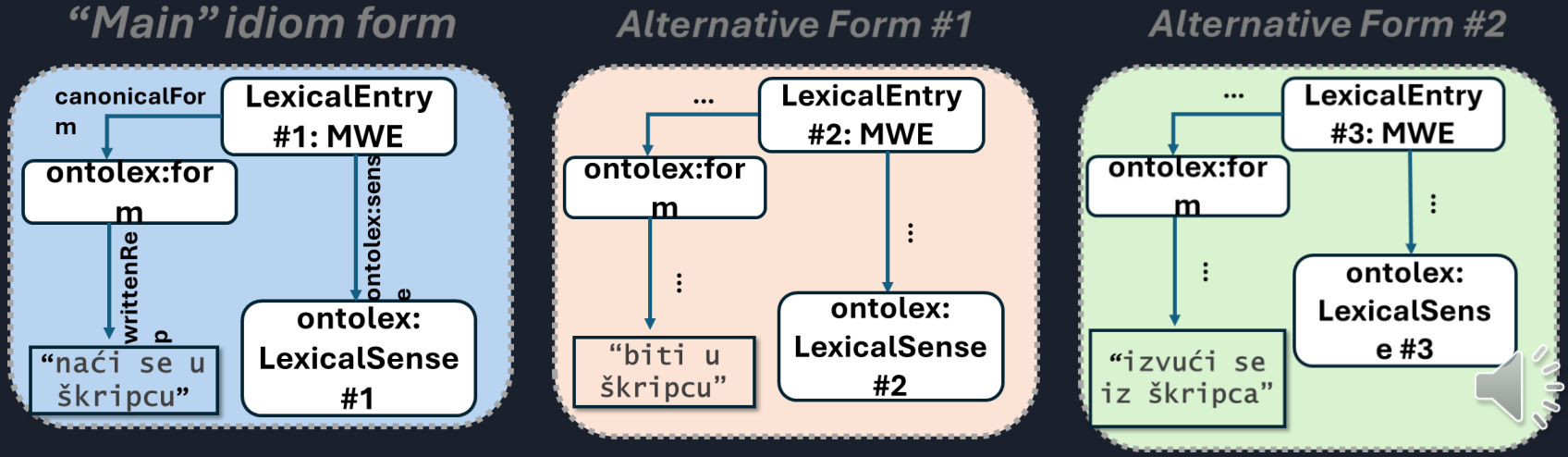

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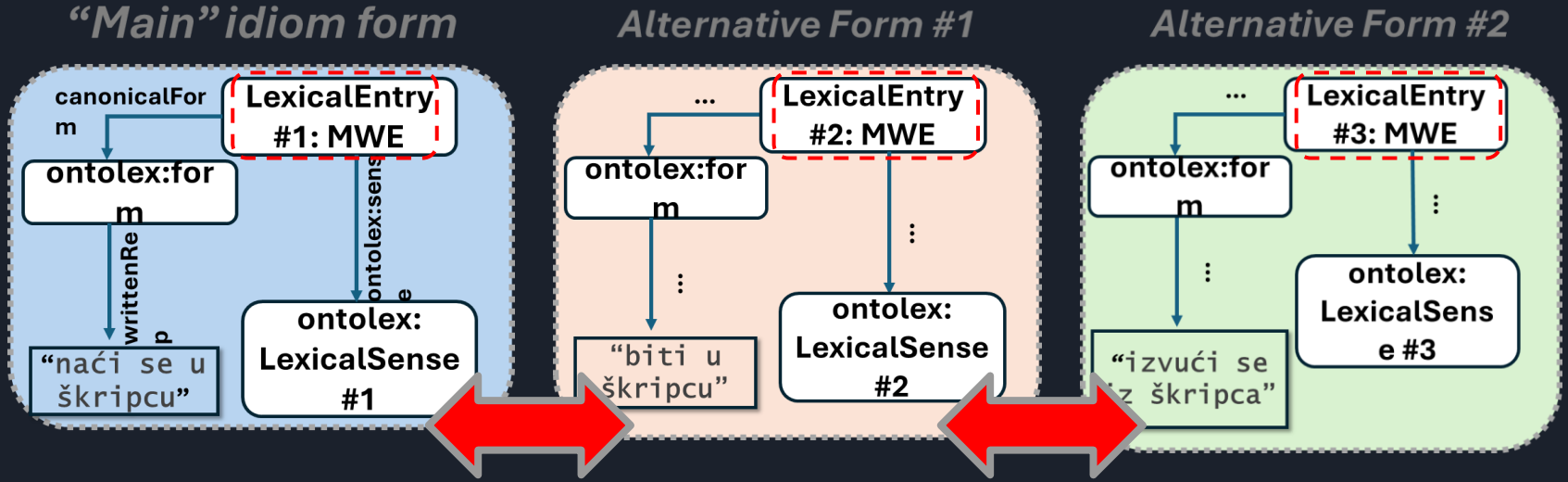
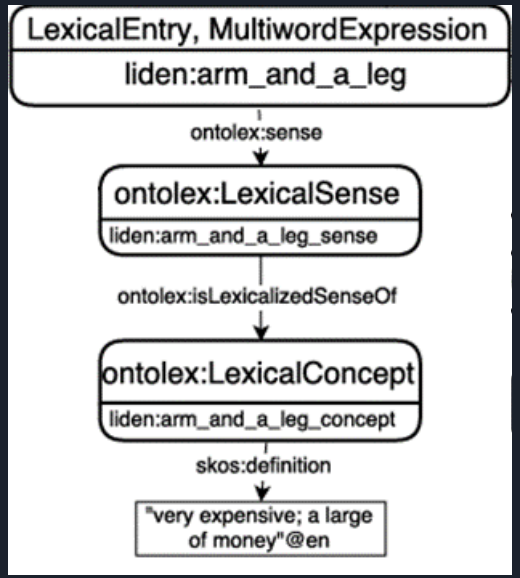
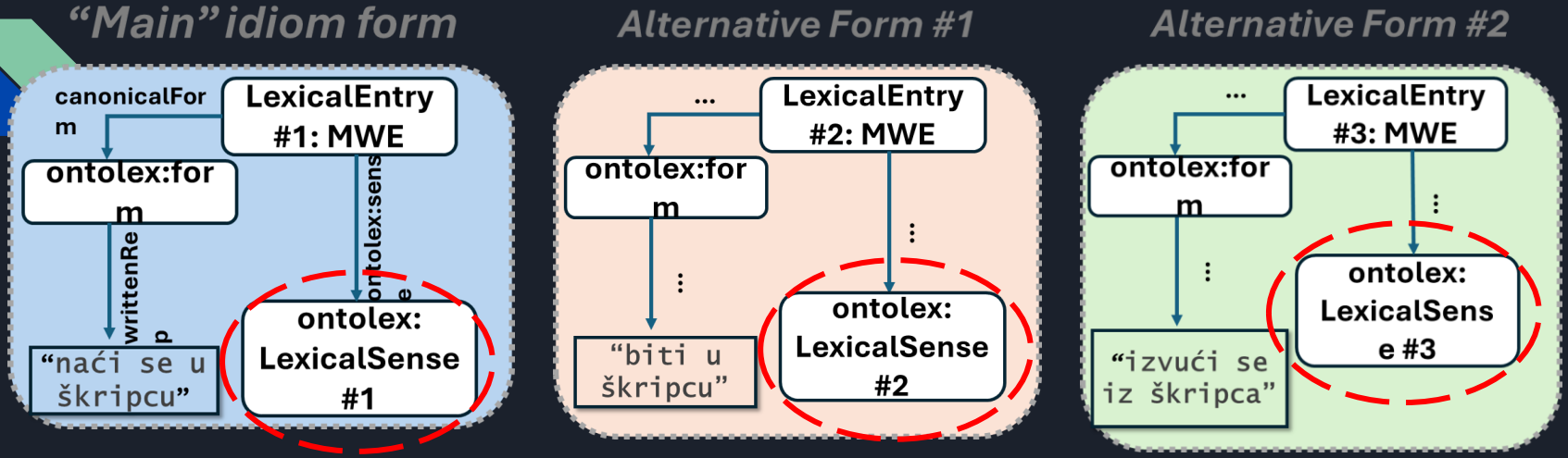
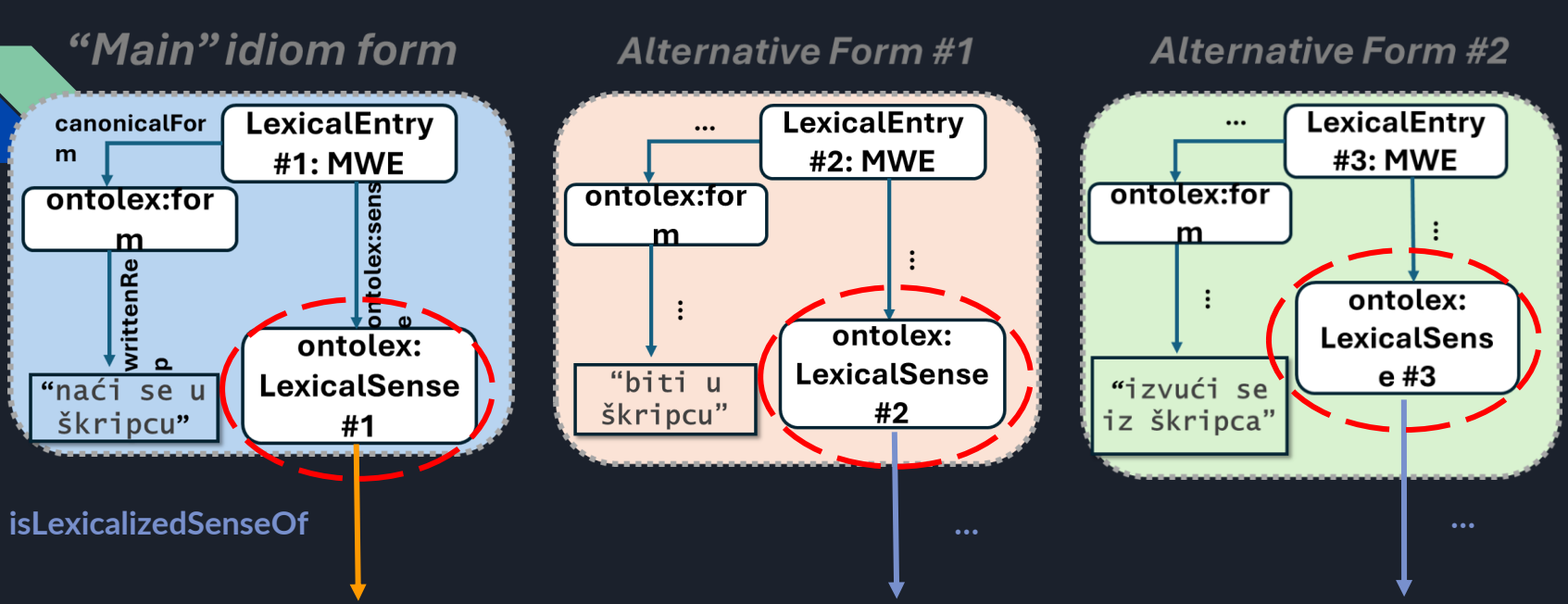




Adapted from Moussallem et al. (2018)


“Main” idiom form
canonicalForm
LexicalEntry #1: MWE
ontolex:form
writtenRep
“naći se u škripcu”
ontolex:sense
ontolex: LexicalSense #1
Alternative Form #1
...
LexicalEntry #2: MWE
ontolex:form
“biti u škripcu”
ontolex: LexicalSense #2
Alternative Form #2
...
LexicalEntry #3: MWE
ontolex:form
“izvući se iz škripca”
ontolex: LexicalSense #3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...
LexicalEntry #3: MWE
ontolex:form
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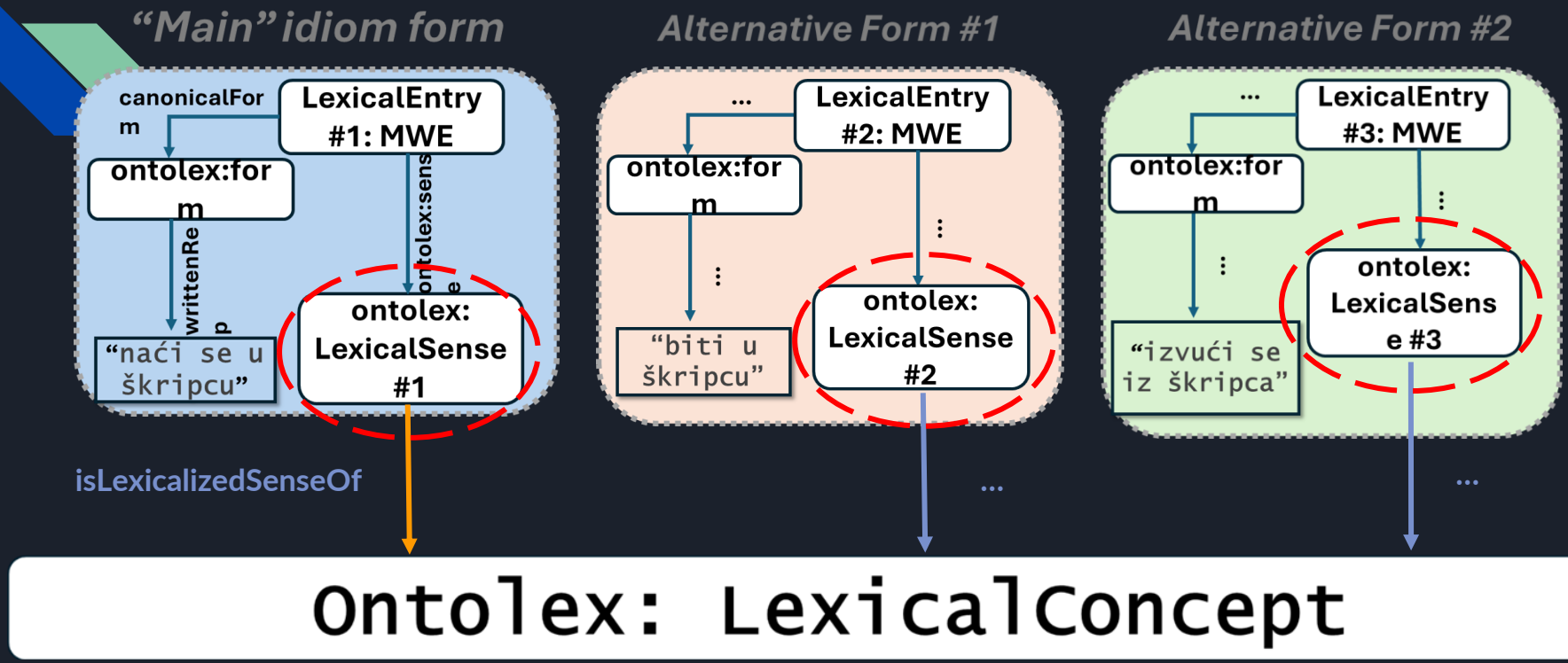
ontolex: LexicalSense #3
...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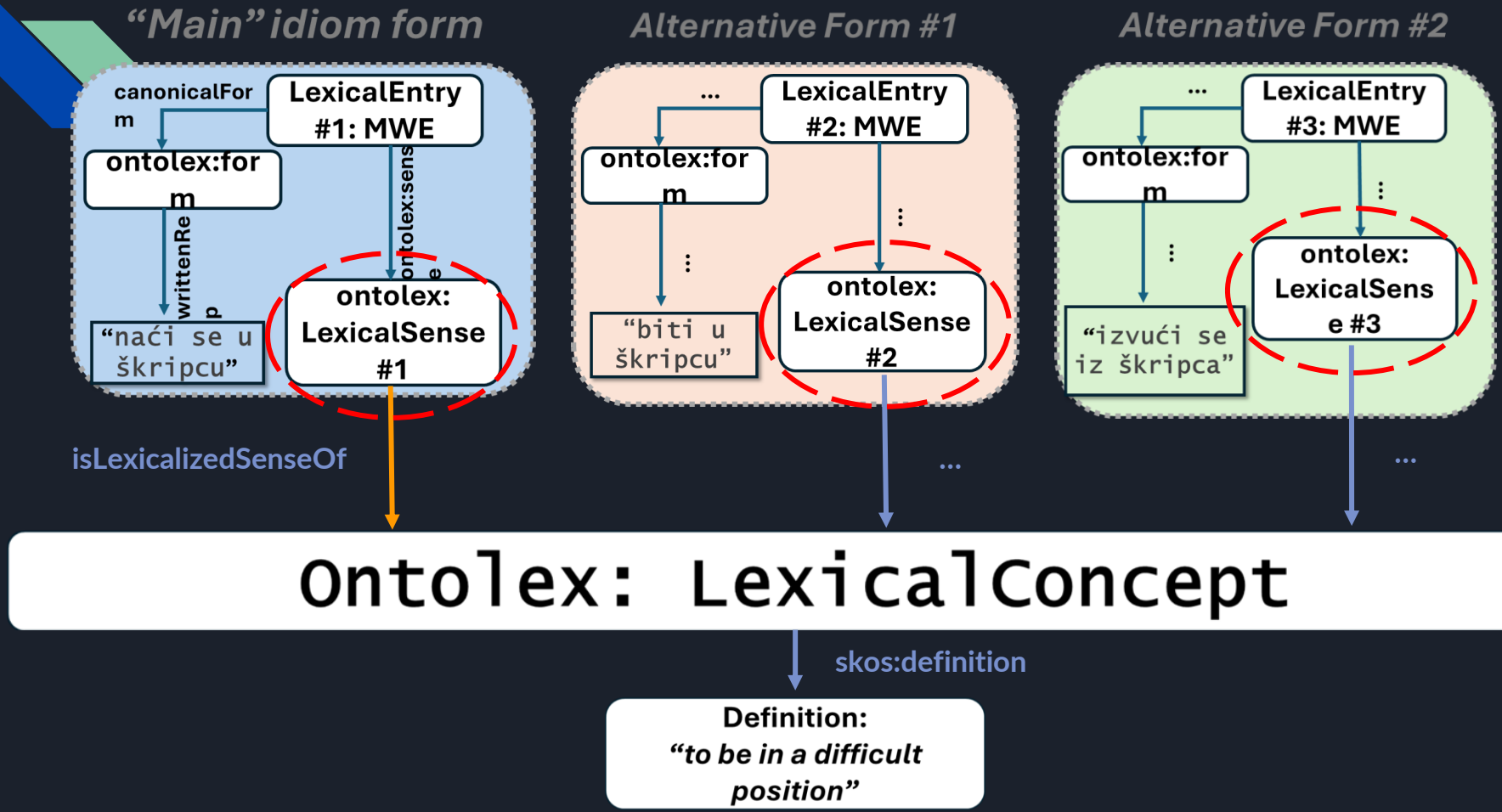
Ontolex: LexicalConcept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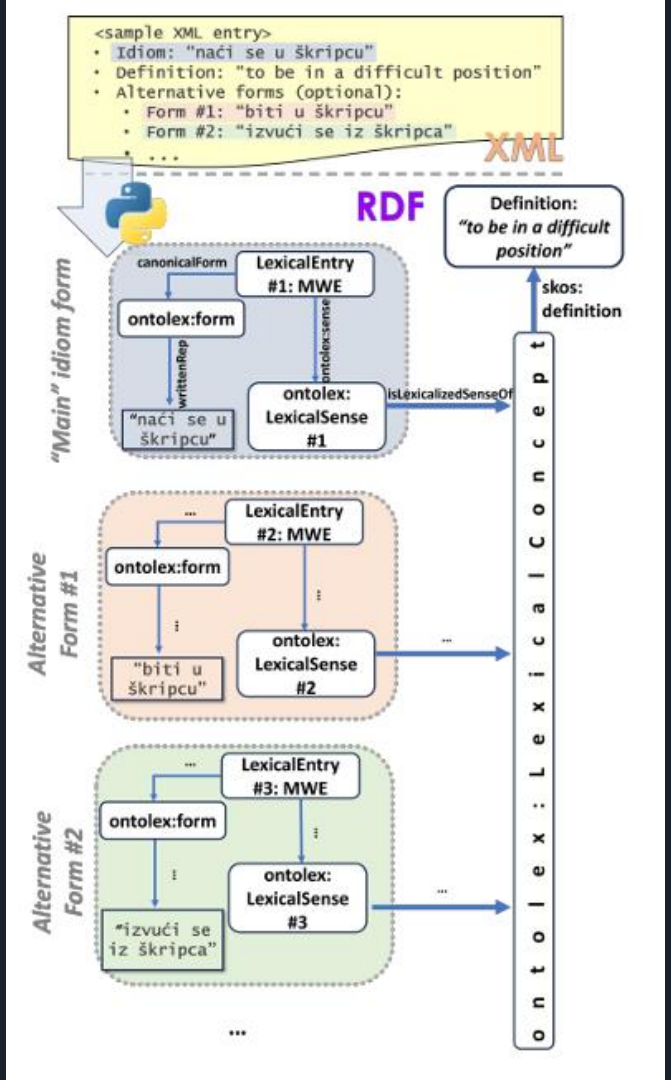
ontolex:form
"izvući se iz škripca"
ontolex: LexicalSense #3
isLexicalizedSenseOf
Ontolex: LexicalConcept
skos:definition
Definition:
"to be in a difficult position"



RESULTS:

- Ontolex Lemon-compliant
- Compatible with LIdioms
- Representing all encoded information from source XML dictionary
- 17,000 triples

Linking Idioms

- Idioms rarely match word per word between languages, **but some idiomatic expressions share the same meaning across several languages → source for interlinguistic data links**
- Basic idea behind LIdioms (Moussallem et al., 2018):
  - create several monolingual Ontolex-based idioms dictionaries (English, French, German, Russian, Portuguese and Italian), and
  - **link some of the idioms from each dictionary to similar entries in other languages**

Linking Idioms

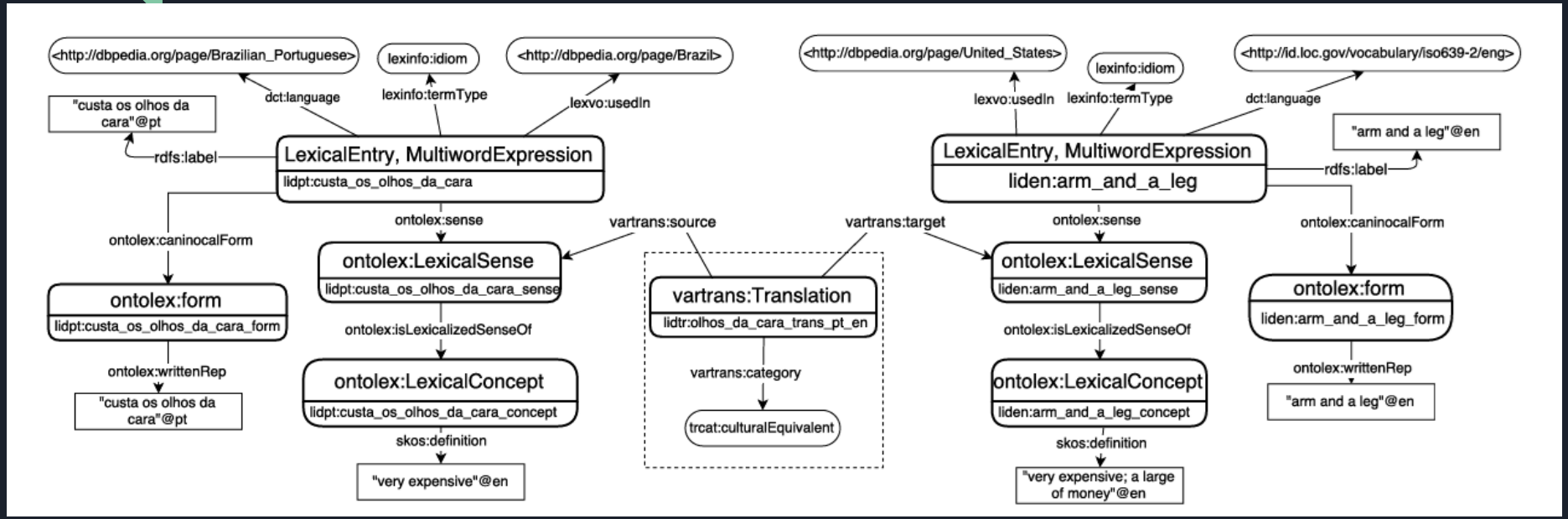


Figure taken from Moussallem et al. (2018), representing the linking convention used between an idiom in Portuguese (‘custa os olhos da cara’) and an equivalent in English (‘arm and a leg’).

Linking Idioms

Croatian idiom

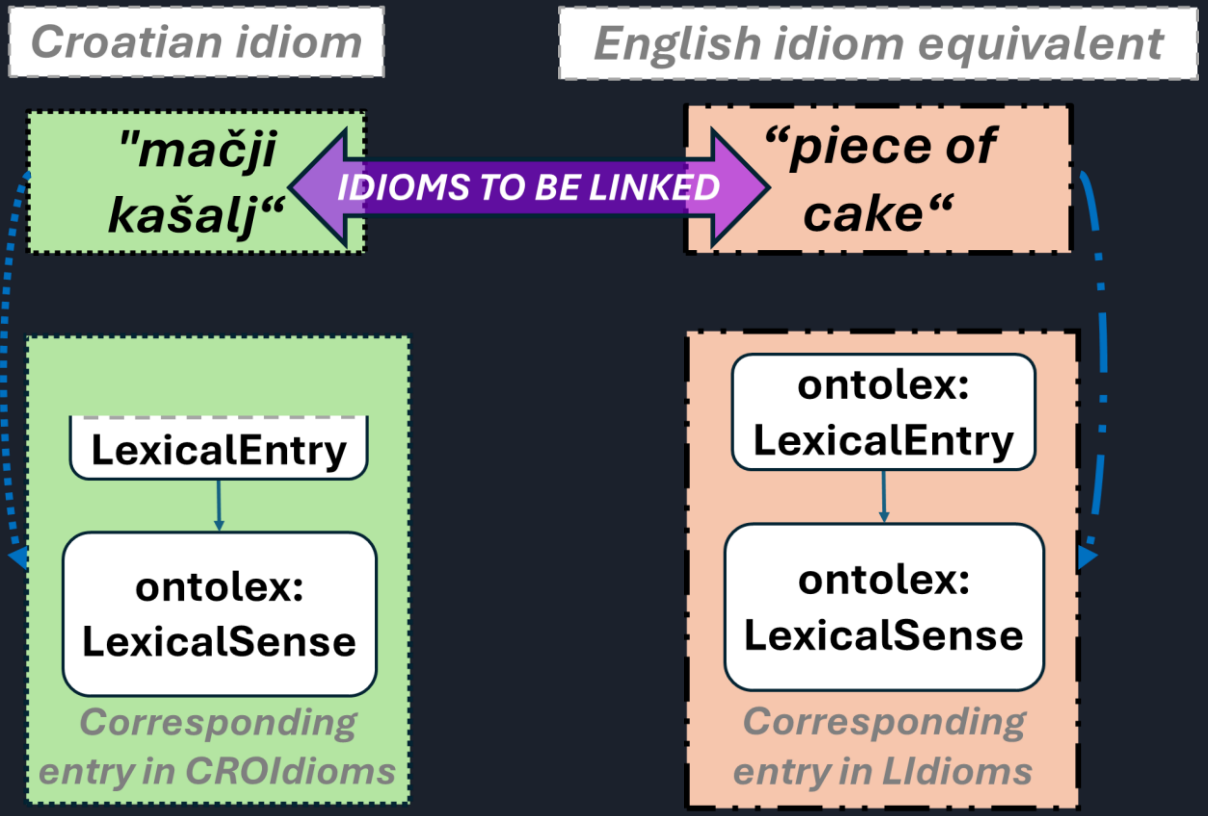
"mačji kašalj“

Linking Idioms

Croatian idiom	English idiom equivalent
"mačji kašalj“	“piece of cake“

Linking Idioms

Linking Idioms



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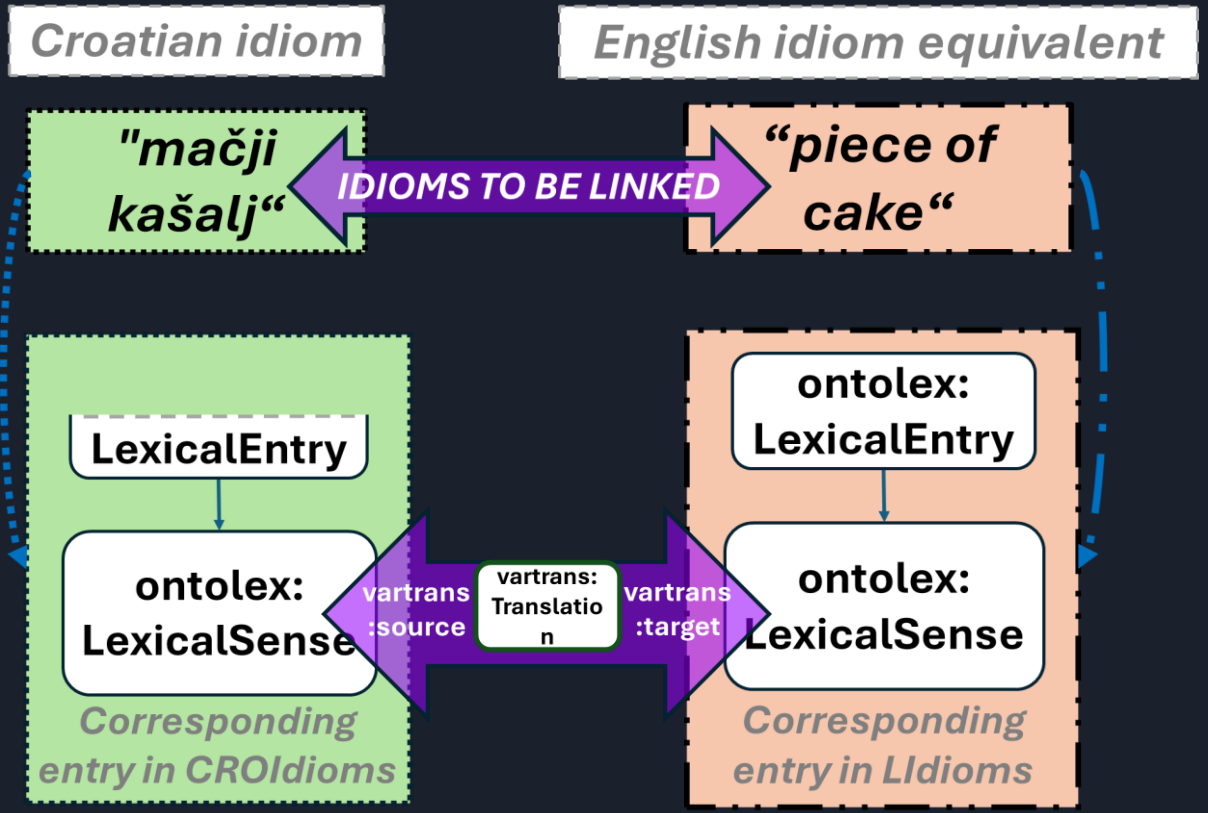

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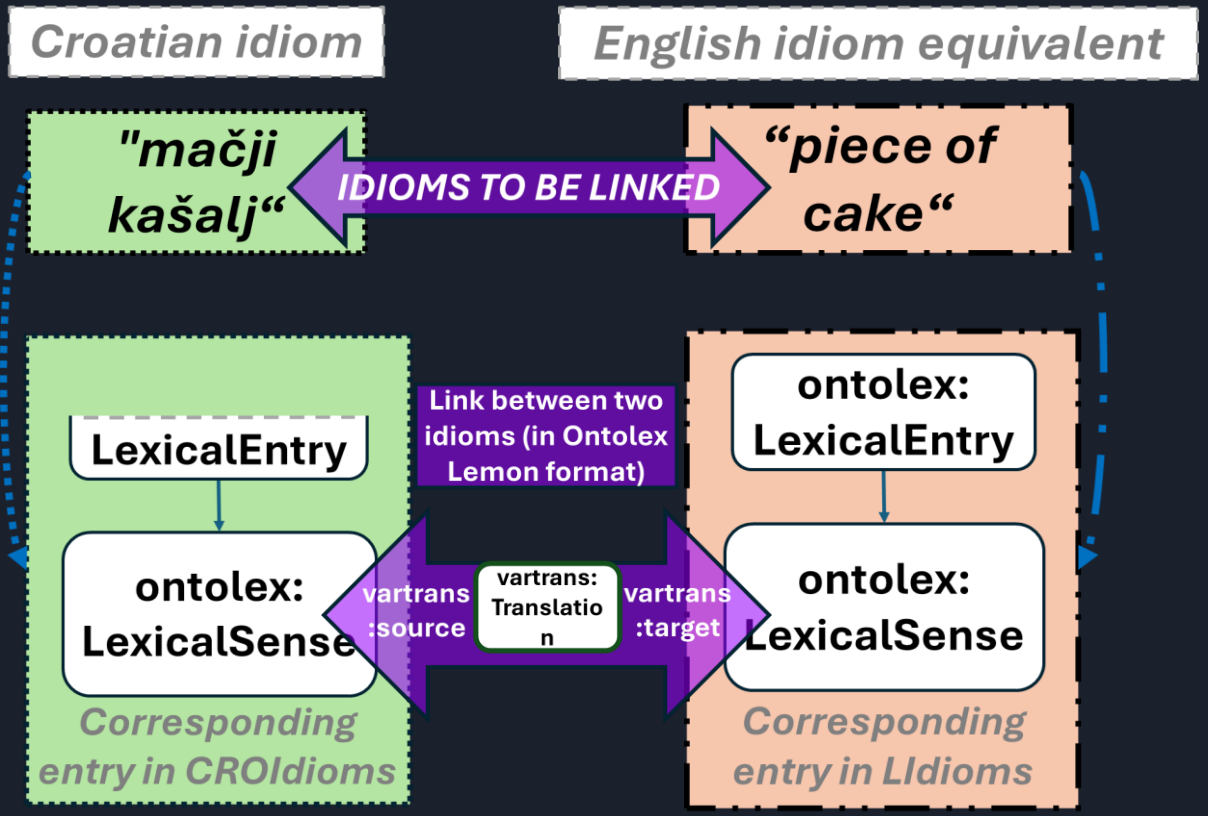

Linking Idioms

- 49 idiom pairs manually identified and linked:
  - 28 English-Croatian pairs
  - 13 Italian-Croatian pairs
  - 8 Portuguese Croatian pairs
- Each corresponding `ontolex:LexicalSense` entry retrieved via SparQL queries and linked with `varTrans` module.
- Additions to existing idiom links in LIdioms dataset

	EN	PT	IT	DE	RU	HR
Idioms	219	114	175	130	105	1,042
Links	192	79	73	60	82	49

Conclusion

This study extends the multilingual linked idiom dataset by adding Croatian idioms to the existing LIdioms dataset.

The aim was to create an enriched resource that can enhance its reusability in language learning and translation and contribute to a broader understanding of universalities and differences between languages and cultures.

Future work and enhancements

- expanding the number of Croatian idioms linked to those of other languages
- enhancements to the CroIdioms dataset can occur in two main directions:
    a. 1. contextual embeddings (like MICE) could be utilized for mining procedures to identify idioms outside our current dataset
    b. 2. building a system for recommending (suggesting) new links between idioms of other languages: calculating semantic similarities between definitions of Croatian idioms and idioms from other languages

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