PARSEME – PARSing and Multiword Expressions within a European multilingual network

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http://www.parseme.eu/

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Multi-Word Expressions

Sequences of words with some degree of non-compositionality:

- semantic: ***to kick the bucket*** ('to die')
- lexical: ***make headway***
- morpho-syntactic: ***[a cross-roads***$_{pl}$***]***$_{sing}$
- syntactic: ***zdechł pies***, **pies zdechł* ('died dog'⇒sth is lost)

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MWE types

- compounds and terms: ***air brake***, ***random access memory***,
- MW named entities: ***European Central Bank***,
- light-verb constructions: ***to take a nap***,
- phrasal verbs: ***to make up for sth***,
- idioms: ***to kick the bucket***,
- proverbs: ***Fortune favors the bold***.

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Multi-Word Expressions

*The **prime time** speech by **first lady** **Michelle Obama** **set** the house **on fire**. She made **crystal clear** which issues she **took to heart**, but she was **preaching to the choir**.*

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Multi-Word Expressions

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Facts

- MWEs are prevalent (40% of text items),
- MWEs show unexpected behavior at different language levels (lexicon, syntax, meaning . . .),
- most MWEs occur very rarely in corpora (data sparseness),
- MWEs are still not sufficiently understood,
- MWEs are less ambiguous than simple words and can, therefore, be useful for information extraction, text classification, etc.
- MWEs are under-represented in language resources and tools,
- MWEs are hard to detect, understand, translate, etc.

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State of the art

Symbolic MWE-aware parsing

- LTAG [Abeillé and Schabes(1989)],
- HPSG [Sag *et al.*(2002), Copestake *et al.*(2002), Villavicencio *et al.*(2004)]
- LFG [Attia(2006)]
- transformational grammar [Wehrli *et al.*(2010)]

State of the art - cont.

Statistical MWE-aware parsing

- pipeline
  - pre-recognition [Cafferkey *et al.*(2007), Korkontzelos and Manandhar(2010), Constant *et al.*(2012), Kong *et al.*(2014)]
  - pre-recognition with a word-lattice [Constant *et al.*(2013)]
  - post-recognition [Seretan(2011)]
- joint approach
  - specific MWE dependency tags [Nivre and Nilsson(2004), Eryigit *et al.*(2011), Seddah *et al.*(2013), Vincze *et al.*(2013), Candito and Constant(2014), Nasr *et al.*(2015)]
  - re-ranking [Constant *et al.*(2012)]
  - dual decomposition [Roux *et al.*(2014)]

State of the art - cont.

Lexical encoding of MWEs

- linguistic encoding of MWEs [Gross(1986), Mel'čuk *et al.*(1988)],
- NLP-applicable encoding
  - continuous MWEs [Savary(2008)] (survey)
  - also discontinuous MWEs:
    - morphosyntactic databases [Grégoire(2010), Al-Haj *et al.*(2014)]
    - valence dictionaries [Hajič *et al.*(2003), Przepiórkowski *et al.*(2014)]
    - ontological approaches with semantic calculus [Marjorie McShane and Beale(2005)]

Treebank annotation with MWEs

See the PARSEME WG4 treebank survey, p. 13 [Rosén *et al.*(2015)]

IC1207 COST Action **PARSEME**

scientific network
30 COST countries
2 non-COST institutions
5 general meetings:
(Warsaw, Athens, Frankfurt, Valletta, Iași)
19 short-time missions
3 workshops (Gothenburg, Málaga, Iași)
1 training school (Prague)

Duration

4 years: 8 March 2013 – 7 March 2017

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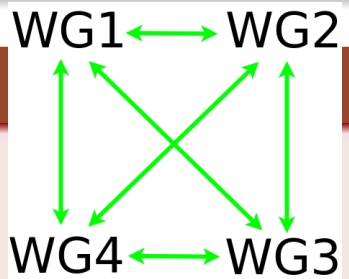
People & Organization

- **200 members**,
- **29 languages** from 10 language families,
- linguists, computational linguists, computer scientists, psycholinguists, industrials, . . . ,
- early-stage researchers ($< PhD + 8$): **58%**,
- female members: **49%**.

Working Groups



WG1: Lexicon/grammar interface,
WG2: Parsing techniques for MWEs,
WG3: Statistical, Hybrid and Multilingual Processing of MWEs,
WG4: Annotating MWEs in treebanks.

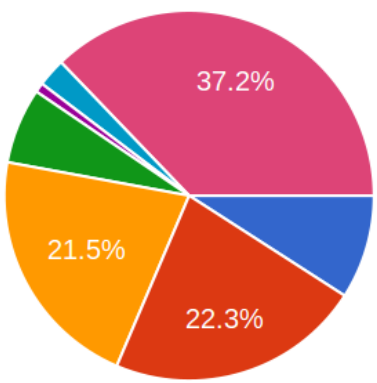
Survey on MWE resources (WG1 & WG4)

Methodology

- ▸ Public **webform** (contributions still welcome)
- Searching infrastructures: META-SHARE, ELRA, SIGLEX-MWE

Results

- Available in a ▸ public table: 100 resources and tools, 28 languages
- Freely available LRs: 45%, available under restrictions: 46%



Treebank with MWE annotations	**11**	9.1%
MWE dictionary or lexicon (MWEs only)	**27**	22.3%
Dictionary or lexicon with MWEs (also includes MWEs)	**26**	21.5%
Monolingual list of MWEs	**8**	6.6%
Multilingual list of MWEs	**1**	0.8%
Multilingual parallel list of MWEs	**3**	2.5%
Other	**45**	37.2%

MWE crosslinguistically (WG1)

Objective

- Develop a **cross-language classification** of MWEs
- Point at universal and language-specific properties of MWE

Method

- ▸ Wiki space with one page per language (8 languages so far):
  - Fixedness/flexibility of MWE parts (NP, PP, VP, AP, . . .)
  - MWEs by syntactic structure (nominal, verbal, . . .)
  - MWEs by idiomaticity (lexical, syntactic, semantic, . . .)

Theoretical result

The strong correlation of **semantic decomposability** of a MWE and its **syntactic flexibility** [Nunberg *et al.*(1994)] is not cross-linguistically valid.

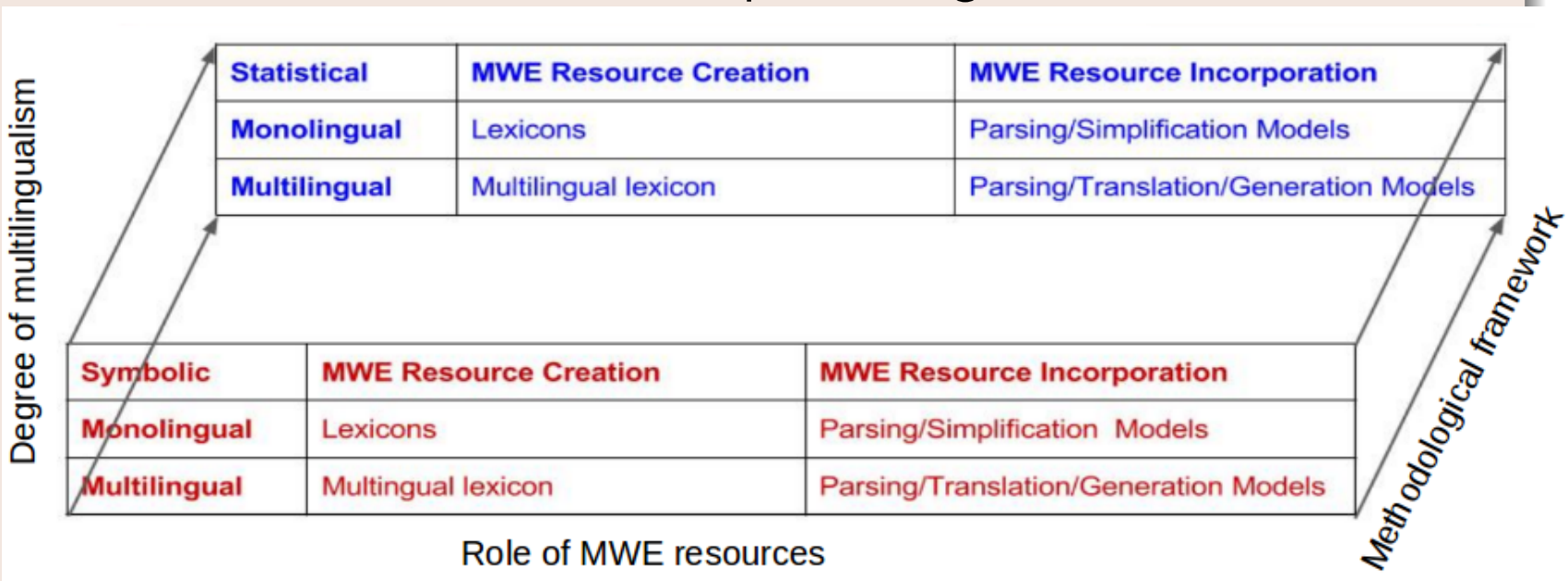
Survey on MWE annotation in treebanks (WG4)

Treebank	Language	Annotation type	Nominal MWEs			Verbal MWEs				Prepositional MWEs	Adjectival MWEs	MWEs of other categories	Proverbs
			Multiword named entities	NN compounds	Other nominal MWEs	Phrasal verbs	Light verb constructions	VP idioms	Other verbal MWEs				
The Estonian Dependency Treebank	Estonian	dep	NO	N/A	NO	YES	NO	NO	NO	NO	NO	NO	NO
The Latvian Treebank	Latvian	dep	YES	YES	NO	N/A	NO	NO	NO	NO	YES	YES	YES
META-NORD Sofie Swedish Treebank	Swedish	dep	YES	N/A	NO	NO	NO	NO	NO	NO	NO	NO	NO
The Prague Dependency Treebank	Czech	dep	YES	YES	YES	NO	YES	YES	N/A	COMP	YES	YES	YES
The ssj500k Dependency Treebank	Slovene	dep	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
The Szeged Dependency Treebank	Hungarian	dep	YES	NO	NO	YES	YES	NO	NO	N/A	YES	YES	NO
The PENN Treebank	English	const	YES	YES	NO	YES	NO	NO	NO	NO	NO	YES	NO
The National Corpus of Polish	Polish	const	YES	NO	NO	NO	NO	NO	NO	YES	NO	YES	NO
SQUOIA Spanish	Spanish	const	YES	NO	NO	NO	NO	NO	NO	YES	NO	NO	NO

- 17 treebanks, 15 languages
- collaborative Wiki interface, **contributions still welcome**

Survey on hybrid processing of MWEs (WG3)

- Classification scheme for MWE processing models



- SOA survey on MWE processing methods and their classification in the scheme
  - discovery, translation, parsing of MWEs

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Other results

Prague training school material

- MWEs in linguistic theory, lexical encoding of MWEs
  - MWEs in HPSG
  - Dependency parsing and MWEs
  - MWEs in the Prague Dependency Treebank
- ▸ Challenging examples of MWEs, lab tools and datasets

Papers

- 44 joint papers,
- book: *Mutliword Expressions: Insights from a Multilingual Perspective* (to appear),
- 109 posters and 20 tutorials at 5 general meetings,
- 2 workshop proceedings.

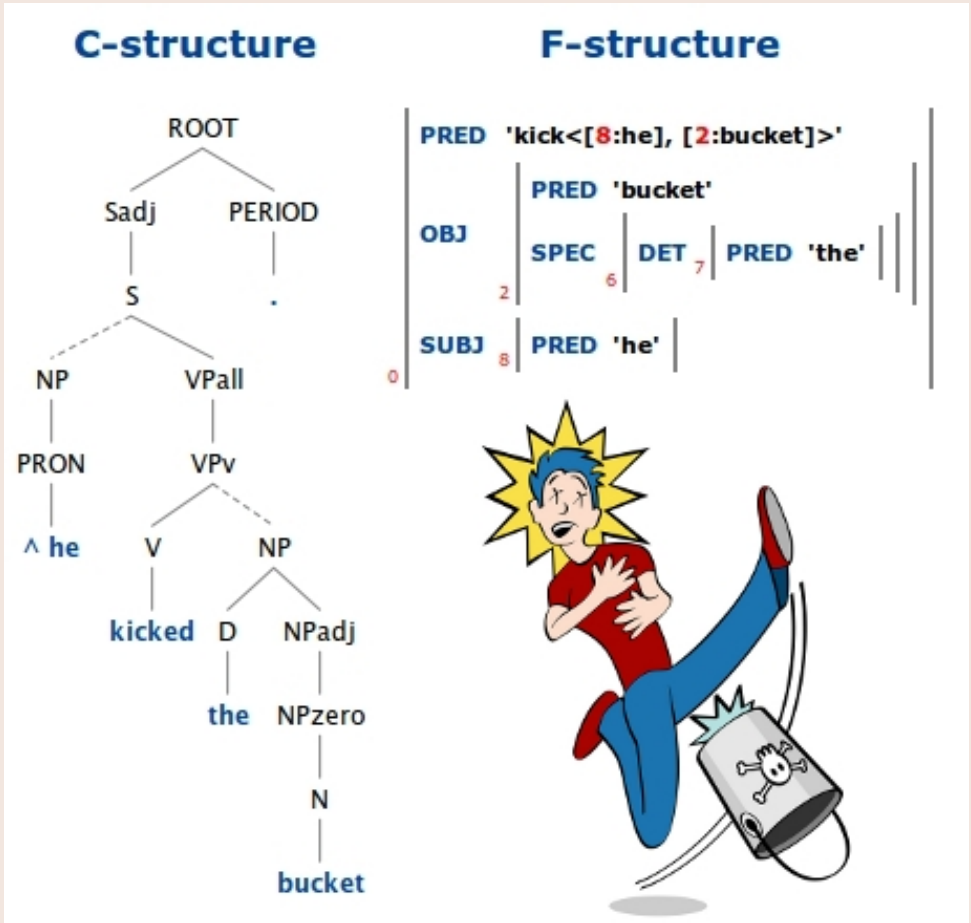
Shared task on automatic detection of verbal MWEs

- Objectives: boost development of MWE-aware NLP tools
- Challenge: highly **multilingual** participation (18 languages)
- Timeline:
  - Corpus annotation (within PARSEME): Jan – Sept 2016
  - Tool training and evaluation (worldwide): Oct 2016 – spring 2017
  - Final workshop: 2017 (EACL, Valencia or CoNLL)

Questions?

- . . .

Thank you



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