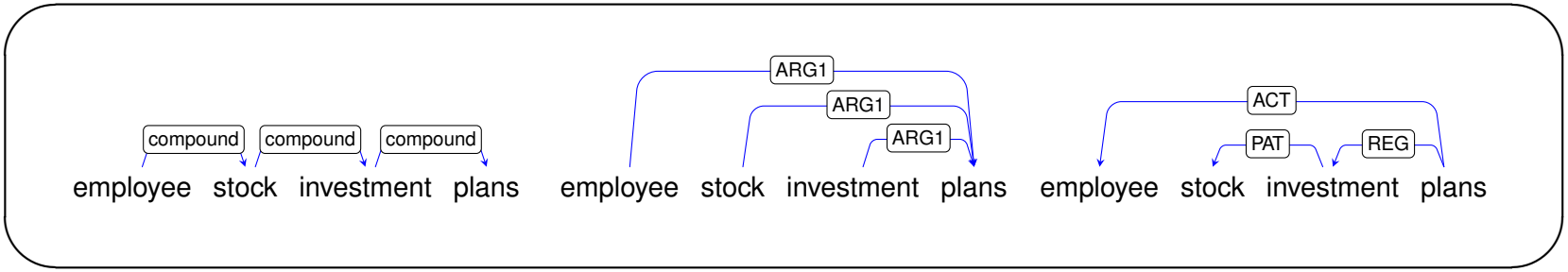

EPE 2017

Building an Infrastructure for Extrinsic Parser Evaluation

Stephan Oepen

Jari Björne, Filip Ginter, Richard Johansson, Emanuele Lapponi, Joakim Nivre, Anders Søgaard, Erik Velldal, Lilja Øvrelid

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Some Near-Authentic Quotes and Reflections

To me, the ultimate goal of our new field of Computational Linguistics is to build machines that, in a suitable interpretation of that term, 'understand' human language.

(Martin Kay, 1960s)

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20 Years of Progress in Statistical Parsing

- Parsing into PTB-style trees has been a crisp task for many years;
- great advances: representations, algorithms, probabilistic models;
- F_1: 0.84 (Magerman, 1994) $\rightarrow$ 0.91 (Charniak & Johnson, 2005);
- some ten years later, neural advances: 93.8 (Choe & Charniak, 2016).

SDP: A Menagerie of Bi-Lexical Dependency Analyses

DM: DELPH-IN MRS (Bi-Lexical) Dependencies

- DeepBank: Fresh HPSG-style annotation, including logical-form semantics;
- 'lossy' reduction of MRS meaning representations to bi-lexical dependencies.

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- Enju Treebank: Projection of (complete) PTB syntax to HPSG derivations;
- semantic analyses take form of lexicalized predicate–argument structures.

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PSD: Parts of the Prague Tectogrammatical Layer

- Include all nodes from Prague *t-trees* that correspond to surface tokens;
- re-attach functors of generated nodes; project dependencies to conjuncts.

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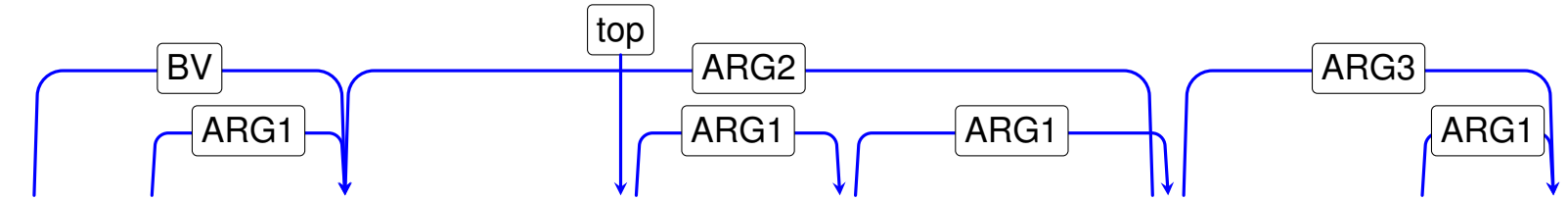
WSJ 00–20 for Training (802,717 Tokens); Section 21 for Testing (31,948).

Linguistic Comparison of Target Representations

DM



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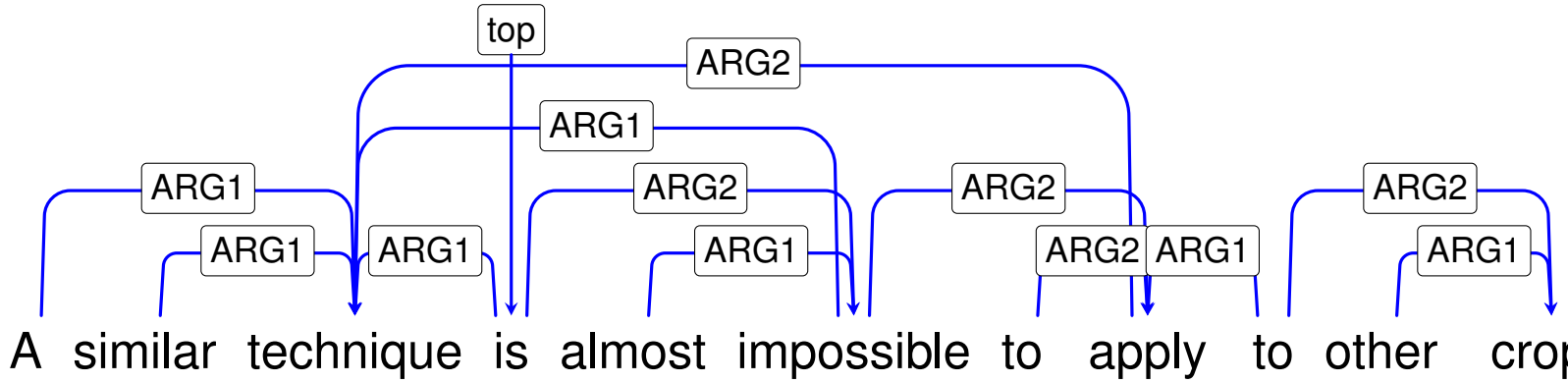

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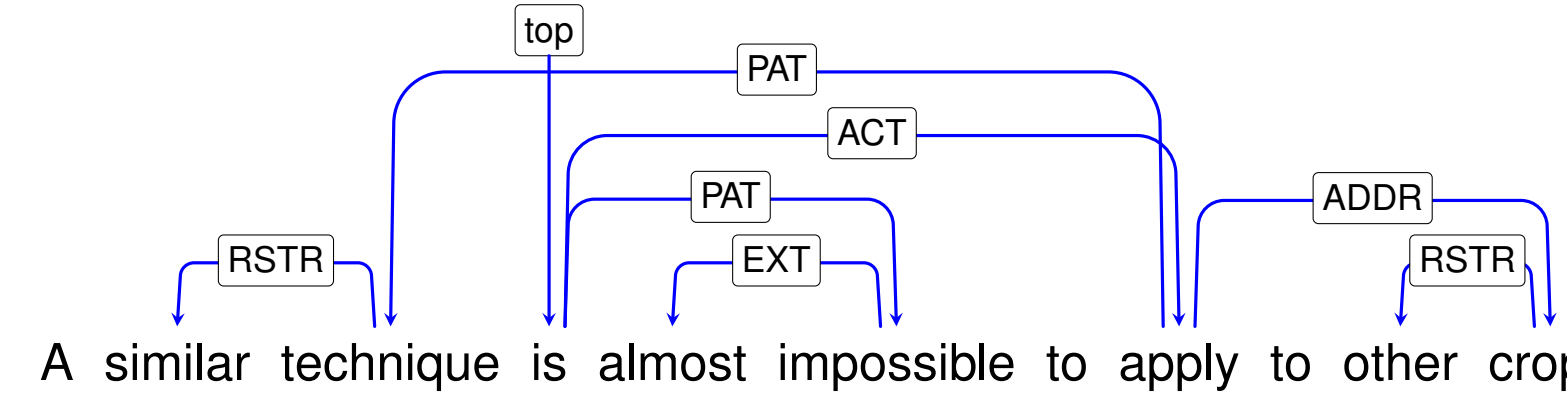

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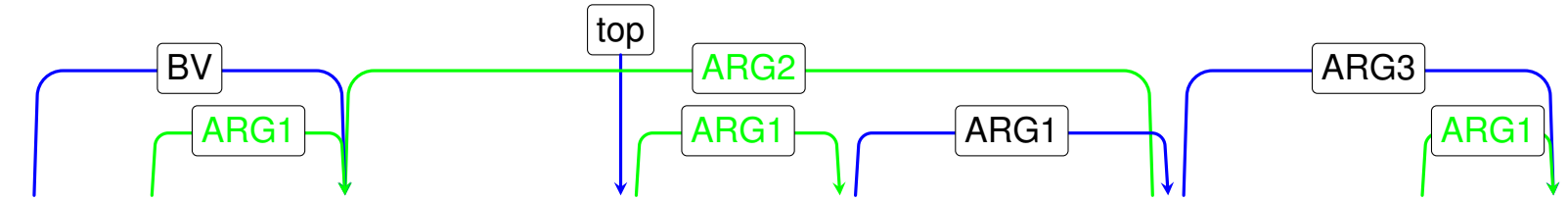

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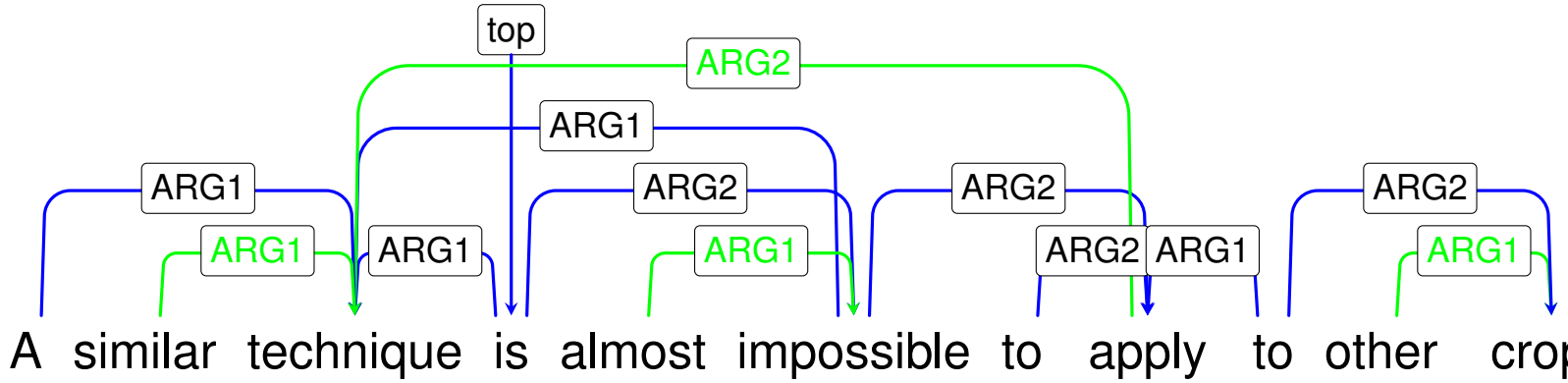

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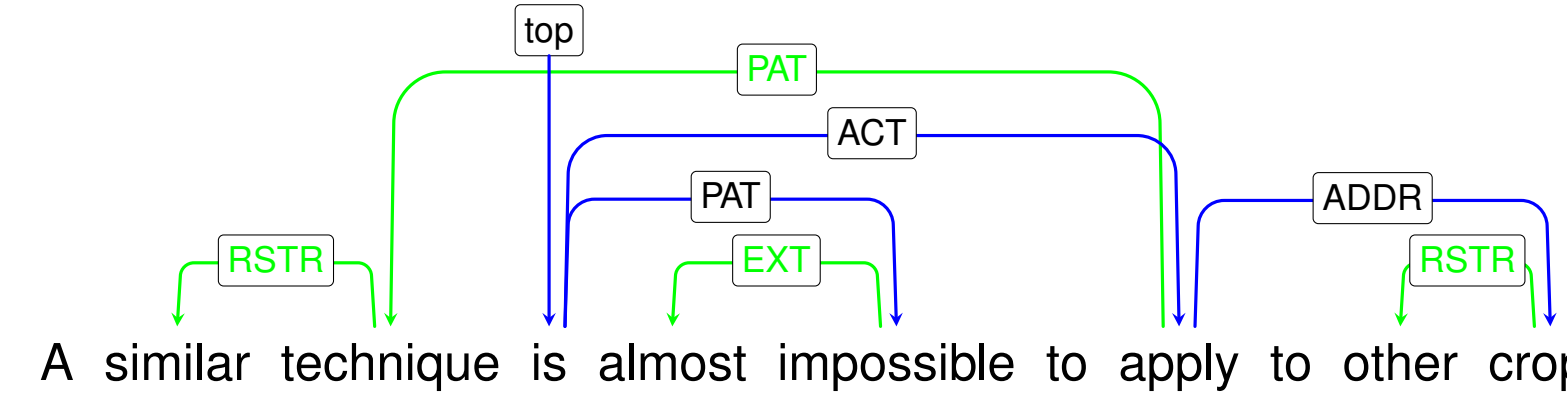

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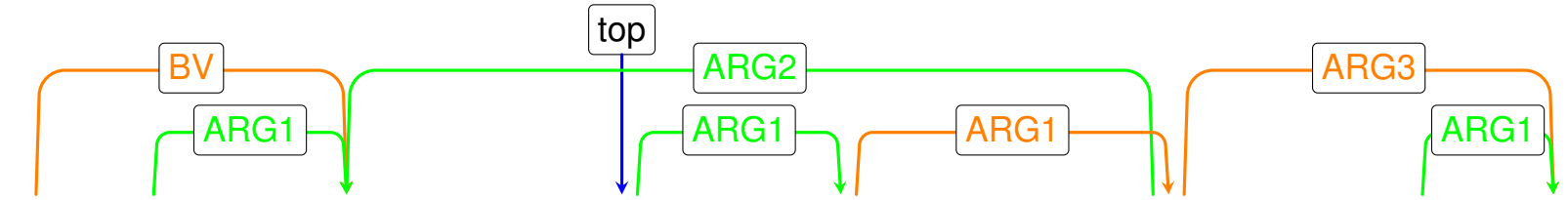

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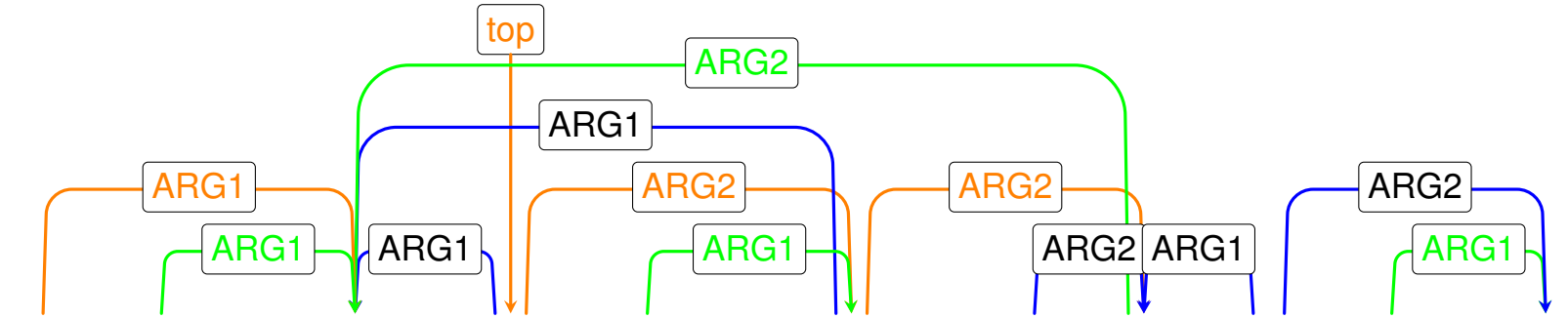

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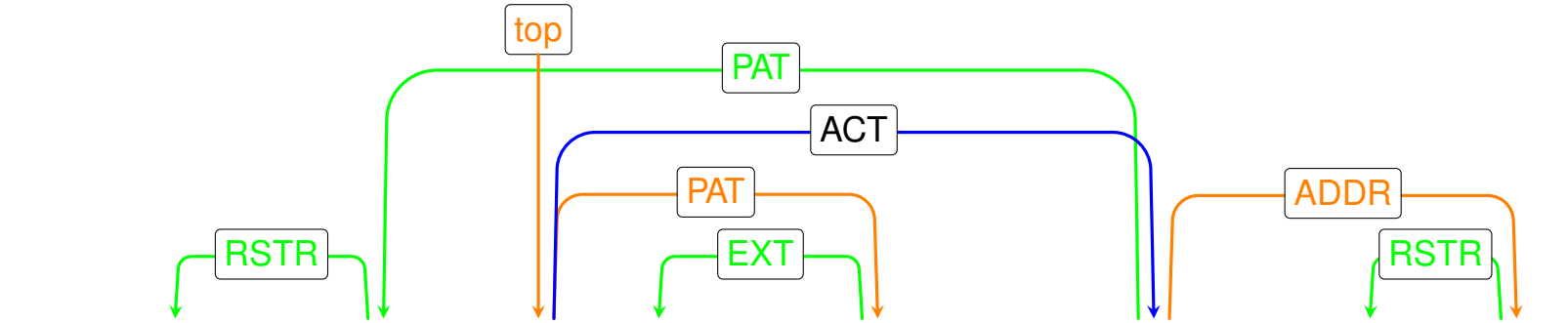

A Glimpse at the SDP State of the Art (in 2015)

		DM				PAS				PSD			
	$\overline{\text{LF}}$	LP	LR	LF	LM	LP	LR	LF	LM	LP	LR	LF	LM
Peking	85.91	90.27	88.54	89.40	26.71	93.44	90.69	92.04	38.13	78.75	73.96	76.28	11.05
Priberam	85.24	88.82	87.35	88.08	22.40	91.95	89.92	90.93	32.64	78.80	74.70	76.70	09.42
Copenhagen-Malmö	80.77	84.78	84.04	84.41	20.33	87.69	88.37	88.03	10.16	71.15	68.65	69.88	08.01
Potsdam	77.34	79.36	79.34	79.35	07.57	88.15	81.60	84.75	06.53	69.68	66.25	67.92	05.19
Alpage	76.76	79.42	77.24	78.32	09.72	85.65	82.71	84.16	17.95	70.53	65.28	67.81	06.82
Linköping	72.20	78.54	78.05	78.29	06.08	76.16	75.55	75.85	01.19	60.66	64.35	62.45	04.01

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Observations

- Ensemble system (including graph parsers) best in ‘closed’ track;

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- PAS overall easiest to parse, (labeling) PSD is noticeably harder;

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Comparison

- graph adaptation of ('syntactic') TurboParser as best 'open' system;

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Priberam	86.27	90.23	88.11	89.16	26.85	92.56	90.97	91.76	37.83	80.14	75.79	77.90	10.68
CMU	82.42	84.46	83.48	83.97	08.75	90.78	88.51	89.63	26.04	76.81	70.72	73.64	07.12
Turku	80.49	80.94	82.14	81.53	08.23	87.33	87.76	87.54	17.21	72.42	72.37	72.40	06.82
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In-House	75.89	92.58	92.34	92.46	48.07	92.09	92.02	92.06	43.84	40.89	45.67	43.15	00.30

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Comparison

- graph adaptation of ('syntactic') TurboParser as best 'open' system;
- (full) 'In-House' systems perform several F_1 points ahead of the field.

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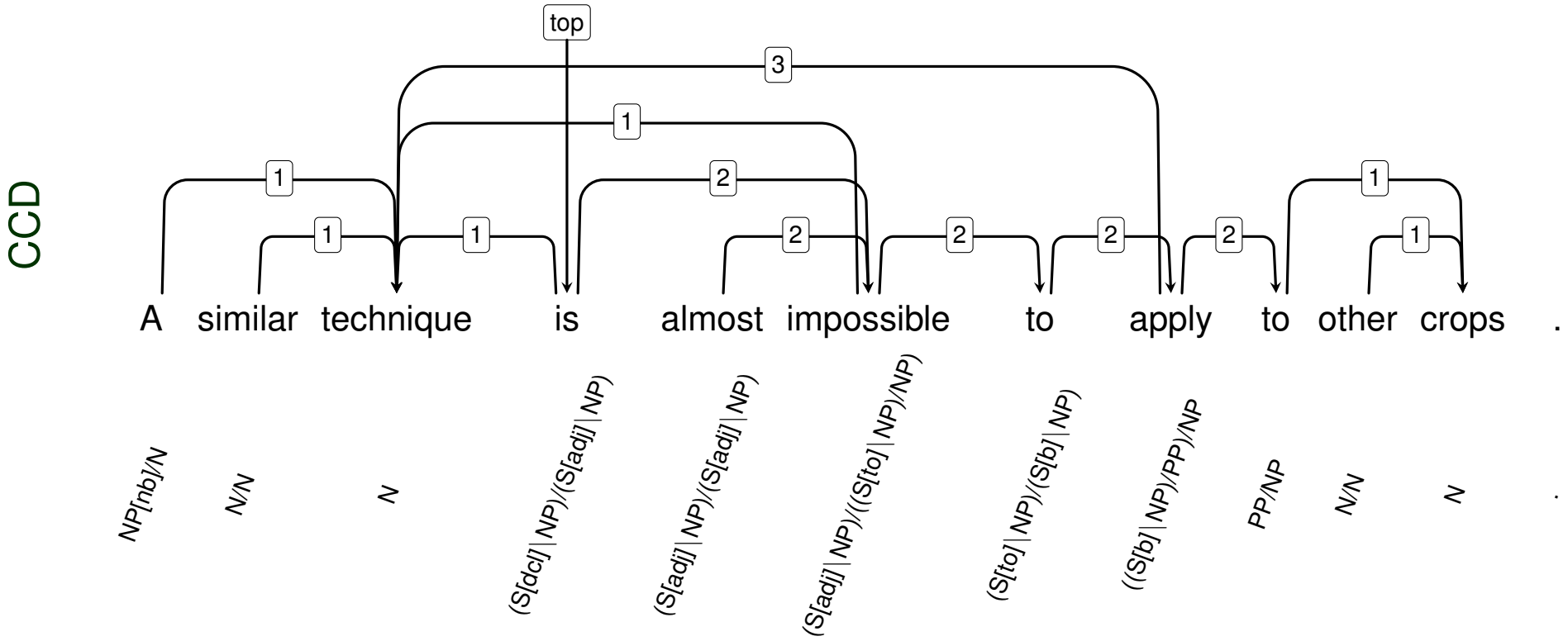
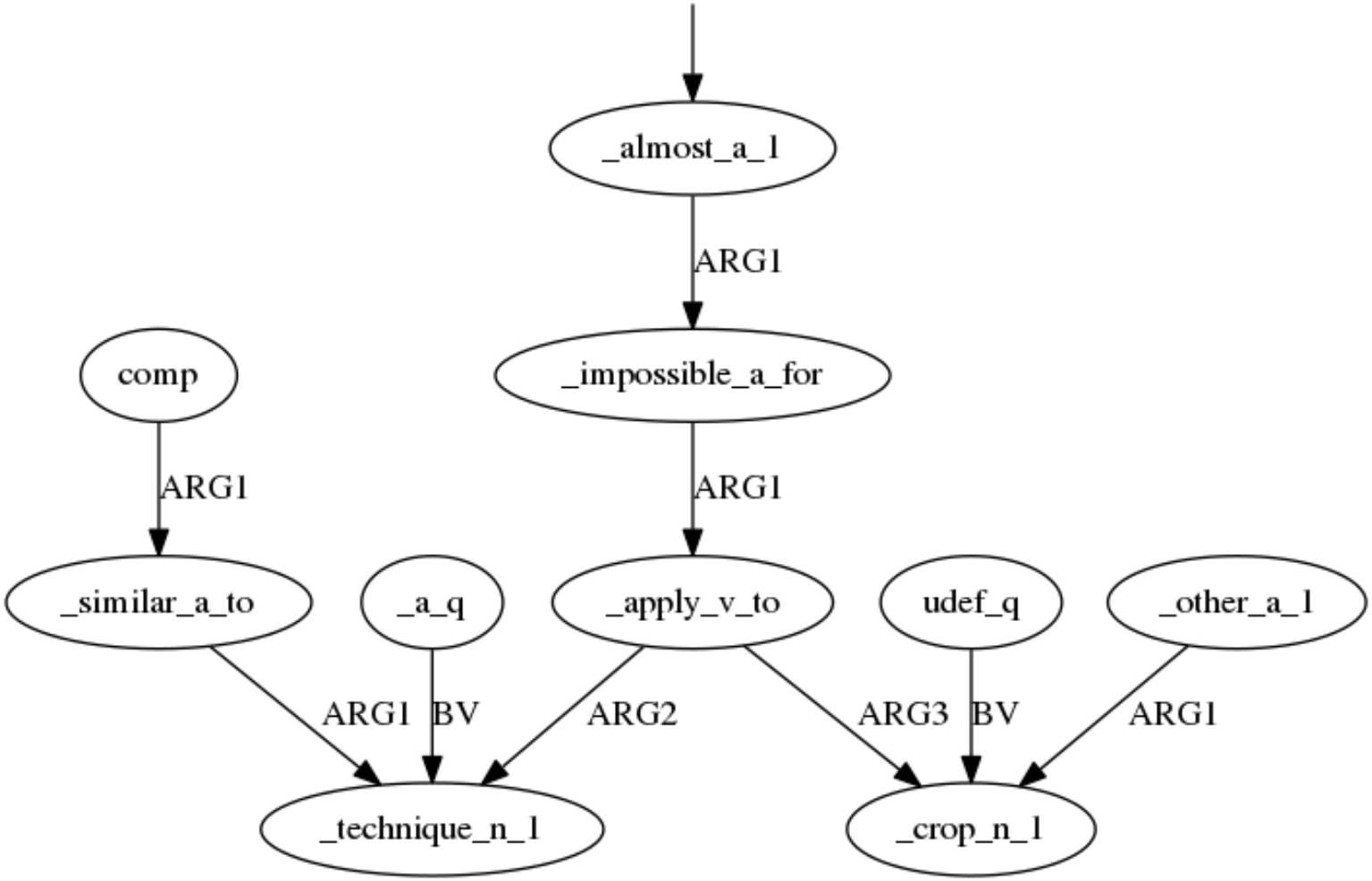
New in 2016: CCG Word–Word Dependencies



CCD: Canonical Conversion from CCGbank

- Connect lexical dependencies with properties from derivation in CCGbank;
- CCG categories as ‘frame’ identifiers; edge labels identify argument position.

Closer to Home: Abstract Semantic Graphs (E.g. EDS)



EPE 2017: Candidate Downstream Applications

Biological Event Extraction (Björne, et al., 2009)

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Initial Set: Three (Nearly) SotA Systems Assumed to Benefit from Parsing.

Zooming In: Resolving Negation Scope (*SEM 2012)

But {*this theory would*} ⟨*not*⟩ {*work*}.

I think, Watson, {*a brandy and soda would do him*} ⟨*no*⟩ {*harm*}.

They were all confederates in {*the same*} ⟨*un*⟩{*known crime*}.

“Found dead ⟨*without*⟩ {*a mark upon him*}.

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Morante et al. (2011); Morante & Daelemans (2012)

- Fresh annotation of negation *cues* and their (possibly discontinous) *scopes*;
- semantics: "Scope of negation is the part of the meaning that is negated [...]"

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Phorbol activation was positively modulated by Ca2+ influx
while {TNF alpha activation was} ⟨not⟩.

Interchange Format for Syntactico-Semantic Graphs

Participating Teams and Approaches

Preliminary Results: Many Dimensions of Variation

Very Much in the Making these Days ...

http://epe.nlpl.eu