NEALT
Northern European Association for Language Technology

NEALT Proceedings Series Vol. 31

Proceedings of the NoDaLiDa 2017 Workshop on Universal Dependencies

22 MAY 2017
GOTHENBURG SWEDEN
CONFERENCE CENTRE WALLENBERG

Edited by Marie-Catherine de Marneffe, Joakim Nivre, and Sebastian Schuster
Series: Linköping Electronic Conference Proceedings No. 135
ISSN: 1650-3686, eISSN: 1650-3740
ISBN: 978-91-7685-501-0

Proceedings of the NoDaLiDa 2017 Workshop on Universal Dependencies
Marie-Catherine de Marneffe, Joakim Nivre, and Sebastian Schuster (eds.)

Cover Photo: Kjell Holmner, Göteborg & Co
Preface

These proceedings include the program and papers that are presented at the first workshop on Universal Dependencies, held in conjunction with NoDaLiDa in Gothenburg (Sweden) on May 22, 2017.

Universal Dependencies (UD) is a framework for cross-linguistically consistent treebank annotation that has so far been applied to over 50 languages (http://universaldependencies.org/). The framework is aiming to capture similarities as well as idiosyncrasies among typologically different languages (e.g., morphologically rich languages, pro-drop languages, and languages featuring clitic doubling). The goal in developing UD was not only to support comparative evaluation and cross-lingual learning but also to facilitate multilingual natural language processing and enable comparative linguistic studies.

After a period of rapid growth since the release of the first guidelines in October 2014 and the release of the second version of the guidelines in December 2016, we felt it was time to take stock and reflect on the theory and practice of UD, its use in research and development, and its future goals and challenges. We are returning to Gothenburg where UD, in its actual implementation, was born in the spring of 2014.

We received 29 submissions of which 24 were accepted. Submissions covered several topics: the workshop feature papers describing treebank conversion or creation, while others focus on resources useful for annotation; some work targets specific syntactic constructions and which analysis to adopt, sometimes with critiques of the choices made in UD; some papers exploit UD resources for parsing or downstream tasks, often in a cross-lingual setting, and others discuss the relation of UD to different frameworks.

We are honored to have two invited speakers: Mirella Lapata (School of Informatics, University of Edinburgh, Scotland), with a talk on “Universal Semantic Parsing”, and William Croft (Department of Linguistics, University of New Mexico, USA), speaking about “Using Typology to Develop Guidelines for Universal Dependencies”. Our invited speakers’ work target different aspects of UD: Mirella Lapata’s talk is an instance of how UD facilitates building downstream applications which can operate multilingually, whereas William Croft will address how UD and typological universals intersect.

We are grateful to the program committee, who worked hard and on a tight schedule to review the submissions and provided authors with valuable feedback. We thank Google, Inc. for its sponsorship which made it possible to feature two invited talks. We also want to thank the organizing committee for their help; in particular Francis Tyers and Sebastian Schuster for their invaluable help with the conference software and these proceedings, as well as Sampo Pyysalo for setting up the website and providing immediate response for updating it.

We tried to set up the program to favor discussions, and we wish all participants a productive workshop!

Marie-Catherine de Marneffe and Joakim Nivre
Workshop Co-Chairs:

Marie-Catherine de Marneffe, The Ohio State University, USA
Joakim Nivre, Uppsala University, Sweden

Organizing Committee:

Filip Ginter, University of Turku, Finland
Yoav Goldberg, Ben Gurion University, Israel
Sampo Pyysalo, University of Cambridge, UK
Sebastian Schuster, Stanford University, USA
Reut Tsarfaty, Open University of Israel, Israel
Francis Tyers, University of Tromsø, Norway

Program Committee:

Çağrı Çöltekin, Tübingen, Germany
Kim Gerdes, Paris III, France
Jan Hajič, Charles University in Prague, Czech Republic
Olga Lyashevskaya, National Research University Higher School of Economics, Russia
Ryan McDonald, Google, UK
Teresa Lynn, Dublin City University, Ireland
Lilja Øvrelid, University of Oslo, Norway
Nathan Schneider, Georgetown University, USA
Amir Zeldes, Georgetown University, USA
Dan Zeman, Charles University in Prague, Czech Republic

Invited Speakers:

Mirella Lapata, University of Edinburgh, UK
William Croft, University of New Mexico, USA
Table of Contents

Universal Semantic Parsing (Invited Talk)
Mirella Lapata ................................................................. xiii

Using Typology to Develop Guidelines for Universal Dependencies (Invited Talk)
William Croft ................................................................. xiv

Cross-Lingual Parser Selection for Low-Resource Languages
Željko Agić ................................................................. 1

Swedish Prepositions are not Pure Function Words
Lars Ahrenberg ................................................................. 11

Increasing Return on Annotation Investment: The Automatic Construction of a Universal Dependency Treebank for Dutch
Gosse Bouma and Gertjan Van Noord ......................................... 19

Converting the TüBa-D/Z Treebank of German to Universal Dependencies
Çağrı Çöltekin, Ben Campbell, Erhard Hinrichs and Heike Telljohann ..................................... 27

Universal Dependencies for Afrikaans
Peter Dirix, Liesbeth Augustinus, Daniel van Niekerk and Frank Van Eynde .................................. 38

Elliptic Constructions: Spotting Patterns in UD Treebanks
Kira Droganova and Daniel Zeman ........................................ 48

Dependency Tree Transformation with Tree Transducers
Felix Hennig and Arne Köhn ............................................... 58

Towards Universal Dependencies for Learner Chinese
John Lee, Herman Leung and Keying Li ............................. 67

Does Syntactic Informativity Predict Word Length? A Cross-Linguistic Study Based on the Universal Dependencies Corpora
Natalia Levshina .................................................................... 72

Estonian Copular and Existential Constructions as an UD Annotation Problem
Kadri Muischnek and Kaili Müürisep ........................................ 79

Universal Dependency Evaluation
Joakim Nivre and Chiao-Ting Fang ....................................... 86

Udapi: Universal API for Universal Dependencies
Martin Popel, Zdeněk Žabokrtský and Martin Vojtek .......................................................... 96

Universal Dependencies for Greek
Prokopis Prokopidis and Haris Papageorgiou .......................... 102

From Universal Dependencies to Abstract Syntax
Aarne Ranta and Prasanth Kolachina .................................... 107

Empirically Sampling Universal Dependencies
Natalie Schluter and Željko Agić ........................................... 117
Gapping Constructions in Universal Dependencies v2
Sebastian Schuster, Matthew Lamm and Christopher D. Manning .......................... 123

Toward Universal Dependencies for Ainu
Hajime Senuma and Akiko Aizawa ................................................................. 133

Automatic Morpheme Segmentation and Labeling in Universal Dependencies Resources
Miikka Silfverberg and Mans Hulden .............................................................. 140

A Systematic Comparison of Syntactic Representations of Dependency Parsing
Guillaume Wisniewski and Ophélie Lacroix .................................................... 146
Workshop Program

Monday, May 22, 2017

9:00–10:15 Opening & Invited Talk

9:00–9:15 Opening Remarks

9:15–10:15 Invited Talk: *Universal Semantic Parsing*
Mirella Lapata

10:15–10:45 Coffee Break

10:45–12:00 Resources and Applications

10:45–10:57 *Studying Consistency in UD Treebanks with INESS-Search* (in TLT14)
Koenraad De Smedt, Victoria Rosén and Paul Meurer

10:57–11:09 *Udapi: Universal API for Universal Dependencies*
Martin Popel, Zdeněk Žabokrtský and Martin Vojtek

Federico Fancellu, Siva Reddy, Adam Lopez and Bonnie Webber

11:21–11:33 *Does Syntactic Informativity Predict Word Length? A Cross-Linguistic Study Based on the Universal Dependencies Corpora*
Natalia Levshina

11:33–11:45 *Automatic Morpheme Segmentation and Labeling in Universal Dependencies Resources*
Miikka Silfverberg and Mans Hulden

11:45–11:57 *Towards Universal Morpho-Syntactic Processing: Closing the Morphology Gap* (non-archival submission)
Amir More and Reut Tsarfaty

12:00–13:30 Lunch & Treebanks (Posters)

*Increasing Return on Annotation Investment: The Automatic Construction of a Universal Dependency Treebank for Dutch*
Gosse Bouma and Gertjan Van Noord

*Converting the TüBa-D/Z Treebank of German to Universal Dependencies*
Çağrı Çöltekın, Ben Campbell, Erhard Hinrichs and Heike Telljohann

*Universal Dependencies for Afrikaans*
Peter Dirix, Liesbeth Augustinus, Daniel van Niekerk and Frank Van Eynde
Monday, May 22, 2017 (continued)

Towards Universal Dependencies for Learner Chinese
John Lee, Herman Leung and Keying Li

Universal Dependencies for Greek
Prokopis Prokopidis and Haris Papageorgiou

Universal Dependencies for Serbian in Comparison with Croatian and Other Slavic Languages (in BSNLP 2017)
Tanja Samardžić, Mirjana Starović, Željko Agić and Nikola Ljubešić

Toward Universal Dependencies for Ainu
Hajime Senuma and Akiko Aizawa

Universal Dependencies for Arabic (in WANLP 2017)
Dima Taji, Nizar Habash and Daniel Zeman

13:30–15:30 Invited Talk & Constructions and Annotation

13:30–14:30 Invited Talk: Using Typology to Develop Guidelines for Universal Dependencies
William Croft

14:30–14:36 Gapping Constructions in Universal Dependencies v2
Sebastian Schuster, Matthew Lamm and Christopher D. Manning

14:36–14:42 Elliptic Constructions: Spotting Patterns in UD Treebanks
Kira Droganova and Daniel Zeman

14:42–14:48 Swedish Prepositions are not Pure Function Words
Lars Ahrenberg

14:48–14:54 Estonian Copular and Existential Constructions as an UD Annotation Problem
Kadri Muischnek and Kaili Müürisep

14:54–15:30 Panel and Discussion
Lars Ahrenberg, Kira Droganova, Kadri Muischnek and Sebastian Schuster

15:30–16:00 Coffee Break

16:00–17:30 Syntax and Parsing & Closing

16:00–16:12 Cross-Lingual Parser Selection for Low-Resource Languages
Željko Agić

16:12–16:24 Universal Dependency Evaluation
Joakim Nivre and Chiao-Ting Fang
Monday, May 22, 2017 (continued)

16:24–16:36  Empirically Sampling Universal Dependencies
              Natalie Schluter and Željko Agić

16:36–16:48  Dependency Tree Transformation with Tree Transducers
              Felix Hennig and Arne Köhn

16:48–17:00  From Universal Dependencies to Abstract Syntax
              Aarne Ranta and Prasanth Kolachina

17:00–17:12  A Systematic Comparison of Syntactic Representations of Dependency Parsing
              Guillaume Wisniewski and Ophélie Lacroix

17:15–17:30  Concluding Remarks
Universal Semantic Parsing

The Universal Dependencies (UD) initiative seeks to develop cross-linguistically consistent annotation guidelines as well as a large number of uniformly annotated treebanks for many languages. Such resources could advance multilingual applications of parsing, improve comparability of evaluation results, and enable cross-lingual learning. Seeking to exploit the benefits of UD for natural language understanding, we introduce UDepLambda, a semantic interface for UD that maps natural language to logical forms, representing underlying predicate-argument structures, in an almost language-independent manner.

Our framework is based on DepLambda (Reddy et al., 2016), a recently developed method that converts English Stanford Dependencies to logical forms. DepLambda works only for English, and cannot process dependency graphs, which allow to handle complex phenomena such as control. In contrast, UDepLambda applies to any language for which UD annotations are available and can also process dependency graphs. We evaluate our approach on question answering against Freebase. To facilitate multilingual evaluation, we provide German and Spanish translations of the WebQuestions and GraphQuestions datasets. Results show that UDepLambda outperforms strong baselines across languages and datasets. For English, it achieves the strongest result to date on GraphQuestions, with competitive results on WebQuestions.

References

Using Typology to Develop Guidelines for Universal Dependencies

1. Linguistic Typology and Universal Dependencies

Language structures are incredibly diverse. Although typologists have discovered many language universals, a common saying in the field is that the only exceptionless language universal is that all language universals have exceptions. There are two major reasons for this diversity. First, language is a general-purpose communication system, and every subtly different thing we want to communicate has to be put into a (relatively) small number of words and constructions. Speakers of different languages do this in many different ways. Second, language change is gradual: constructions change their morphosyntactic properties one at a time, which increases structural diversity and blurs lines between construction types.

This is what typological theory would tell us. But for practical purposes, we have to carve up this continuum of language phenomena, and at any rate, the continuum is lumpy: the space of possible structures is dense in some regions and sparse in others. Hence there are better and worse ways to carve up the continuum.

Universal Dependencies represents one practical task that requires making such choices. UD aims to develop a syntactic annotation scheme used across languages that, if applied consistently, allows for comparison across languages, including languages not yet possessing UD resources (Nivre, 2015; Nivre et al., 2016).

Another practical task that requires making such choices is teaching a typologically-informed syntax course to undergraduates as their first syntax class. In both UD and teaching syntax, the aim is to develop a small set of annotations that can be applied more or less uniformly across languages, to capture similarities as well as reveal differences. This is how I became involved in UD. My focus has been on the syntactic dependency annotation of UD. There are different and more difficult issues in the POS tagging and morphological feature tagging of the UD enterprise, which I will not go into here.

2. Two basic principles for typological annotation of dependencies

Several basic principles guided my effort, and the two most important principles are described here; for more details, see Croft et al. (2017). The first is based on a distinction between constructions and strategies in crosslinguistic comparison. Constructions describe the class of grammatical structures in any language that is used to express a particular function. For example, *Ivan is the best dancer* is an instance of the predicate nominal construction, that is, the construction whose function is to predicate an object category of a referent.

Strategies are particular morphosyntactic structures, defined in a cross-linguistically valid fashion, that are used to express a function. For example, English uses an inflecting copula strategy for predicate nominals, that is, a word form distinct from the object word that inflects for at least some of the grammatical categories that ordinary predicates do. Other languages also use the inflecting copula strategy; but still other languages use an uninflected copula, or no copula at all, or inflect the object word. These are all different strategies.

The principle for designing a universal set of dependencies is that the structure of constructions should form the backbone of the dependency structure; strategies are secondary, although they have to be annotated when they are expressed by independent words, such as the English copula. UD’s content-word-to-content-word principle basically conforms to this principle.

The second important principle is based on the hypothesis that constructions always involve the
information packaging of the semantic content of the sentence, that is, the function of constructions has to be defined in terms of both semantic content and information packaging. For example the predicate nominal construction involves packaging an object concept as a predication.

The principle that emerges from this hypothesis is that universal dependencies are, to a great extent, describing information-packaging relations, not semantic relations. That is, information packaging functions are much more isomorphic to syntactic structures than semantic classes or semantic relations. Information packaging functions are less variable across languages than semantics, especially lexical semantics. UD minimizes reliance on semantics in defining UD dependencies and in applying them to specific languages, so UD basically conforms to this principle as well.

3. UD dependencies: inventory and guidelines

The principles described in the preceding section, and other principles described in Croft et al. (2017), led me to a set of universal dependencies that is quite close but not identical to the set of universal dependencies in UD (version 2). These differences are relatively minor, although I will discuss one of them in this talk. The much bigger issue is the development of guidelines for consistent annotation of the many different constructions and the many different strategies that languages use, both for languages for which there exist UD resources and for new languages which may be added.

What is the best way to do this? Constructions, as defined in the preceding section, are not enough: they are defined by function, whereas we need to carve breaks in the range of strategies used to express function. The basic idea is to find typological universals constraining the distribution of strategies over constructions in such a way that the universals reveal the “cleanest” breaks and the best strategies to use as uniform guidelines across languages.

This will be a “good news, bad news” story. The “good news” is that some current practice, based mainly on Western grammatical tradition and the Western European languages that make up most of the UD treebanks, are justified in a broader typological perspective, and allow for uniform guidelines. The “bad news” is that some current practices, and some distinctions among UD dependencies, are not very well justified typologically. In some of these cases, the dependencies I use in teaching syntax differ from the current version of UD.

I believe that for the most part, the good news exceeds the bad news. The most important conclusion is that detailed guidelines are necessary, and ideally should be typologically justified. An overview of the typological variation and typological universals constraining that variation—and justifying distinctions we need to make—will appear in my forthcoming textbook for the advanced syntax class I teach (Croft, In preparation).

4. Some examples of how typology can be used to develop guidelines for UD

UD distinguishes between core grammatical roles (subj, dobj, iobj) from oblique roles (obl). In practice, however, this is difficult. We cannot rely on semantic roles (patient, instrument, etc.) because voice, argument structure alternations and applicative constructions change the syntactic roles of participants. Hence we must look elsewhere.

There are three strategies used for encoding core and oblique arguments: case marking (adpositions and affixes), indexation (agreement) and word order. The categories of case markers vary a lot, and there are mismatches across strategies. How safe is it to rely on these strategies for annotating core vs. oblique?

Fortunately, there are two universals that support the identification of core vs oblique arguments:

- If case marking is zero, then the argument is overwhelmingly likely to be core.
- If the predicate indexes the argument, then the argument is overwhelmingly likely to be core.
There are exceptions, but the point is that they are rare. So we can assume that if the argument phrase has zero-coded case marking and/or is indexed on the verb, it is core, without having to rely on semantic roles. The universals are one-way conditionals: some core arguments have overt case marking, and others are not indexed on the predicate. But it is usually clear which case-marked arguments are core.

An example which represents not so good news is when there are mismatches in strategies for arguments. Two common examples are so-called “dative subjects”, common in South Asian languages, and “patient subjects” (passives). There is a diachronic typological universal governing the acquisition of subjecthood (Cole et al., 1980; Croft, 2001):

- Nonsubject arguments may become subjectlike, first by word order, then indexation, then case marking.

Unfortunately, this universal implies a gradient of strategies from nonsubject to subject, and does not offer guidelines as to when to decide when an argument is a subject, or still is not a subject. However, it is unlikely that the constructions with mismatches are common. In the case of mismatches, I would suggest that if an argument uses any morphological strategy associated with subject status—that is, case marking or indexation—then it should be annotated as subject. The universal indicates that such mismatches will have subject-like indexation but nonsubject case marking.

Other cases of a gradient of strategies are found in several common paths of grammaticalization (Heine and Kuteva, 2002; Lehmann, 2002). These cases also involve a reversal of headedness in UD, which is problematic in a dependency grammar (heads are in boldface):

- Verb + Complement → Auxiliary + Verb
- Relational Noun + Noun → Adposition + Noun
- Verb + Noun → Adposition + Noun
- Quantity + Noun → Quantifier + Noun

As with the acquisition of subjecthood, it is likely that the intermediate cases are crosslinguistically not that common. I would suggest, as with subject annotation, that once a construction acquires the first typical strategy for the more grammaticalized construction, it should be annotated like the more grammaticalized construction.

Some semantic roles, such as recipient, are sometimes core and sometimes oblique across languages; and they are sometimes both in the same language, in which case they are described as object-oblique alternations: *I showed the policeman my driver’s license/I showed my driver’s license to the policeman*. In typology, these are called different strategies for encoding the recipient, specifically alignment strategies (Haspelmath, 2011).

If they are simply different strategies, then perhaps they should be annotated the same way in a universal scheme like UD. But in fact a construction should be defined by both semantic content and information packaging (Croft, 2016, In preparation). Encoding a participant role as object or oblique arguably does differ in information packaging. In most languages, only one option exists, object or oblique. But the crosslinguistic variation is due to competing motivations: for example, a recipient is a less central event participant, yet it is almost always human and hence of greater salience. So I conclude that one should follow the language’s structure in annotating a semantic role as object or oblique.

In the equivalent German sentence, the recipient role is in the Dative case, while the theme role is in the Accusative case: *Ich zeigte dem Polizisten [Dative] meinen Führerschein [accusative]*. Many Germanists
analyze the Dative as an object, despite the oblique-like case marking. This is justified by the fact that
the dative noun phrase occurs without a preposition. Yet there is a language universal that suggests this
is the right choice, albeit for a different reason (Siewierska, 1998; Levin, 2008):

- Constructions with a dative coding of the recipient distinct from the allative or locative coding
  are crosslinguistically in complementary distribution to constructions with the same coding of
  recipient and theme.

Hence, even a language-specific annotation choice may be typologically justified, though in this case the
rule should be whether the dative is distinct from allative or locative, not whether the dative noun phrase
is accompanied by a preposition.

Modifiers are a more complex case. Modifiers come in many different semantic types: definiteness
(articles), deixis (demonstrative), cardinality (cardinal numerals), quantification (quantifiers), properties
(adjective), actions (relative clauses, participles) and possession (genitive) and other noun-noun relations.
UD distinguishes a subset of those semantic types: det, nummod, amod, nmod and acl. Modifiers also
use a wide range of strategies: gender/number agreement, case marking, classifiers, and linkers (more
grammaticalized, invariant markers of a relation). However, all the different strategies are found across
almost all modifier types, although there is typological evidence that noun modifiers and relative clauses
tend to stand apart. In this case, I have lumped together all modifiers into a single mod dependency,
except for nmod and acl.

Finally, one of the more challenging problems is distinguishing subordinate clauses from nominalizations
(or in the case of participles, adjectivalizations). Constructions using all the structure of main clauses—
tense-aspect-modality (TAM) inflections, indexation of core arguments, main clause-like case marking of
core arguments—such as I am surprised that he fired Flynn are clearly subordinate clauses. But there is
a wide range of constructions lacking some or all of the typical structure of main clauses, as in His firing
Flynn surprised me or Him firing Flynn was surprising. Also, the terminology in grammatical description
here is very confusing: there are special terms such as infinitives, gerunds, masdars, and converbs; but
many descriptions use the term “nominalization” for all sorts of non-clause-like constructions.

Fortunately, there is a reliable grammatical criterion that has two significant typological universals
associated with it, which allows us to consistently distinguish subordinate clauses from nominalizations.
The grammatical criterion is that an event nominalization allows for “reasonably productive” case
marking (Comrie, 1976). The two universals are (Cristofaro, 2003):

- If a verb form can take case affixes or adpositions, then with overwhelming frequency it does not
  inflect for TAM like a main clause verb (it either has no TAM inflections, or uses special TAM
  forms).

- If a verb form can take case affixes or adpositions, then with overwhelming frequency it does not
  express person indexation/agreement like a main clause verb (it either has no person indexation,
  or special person indexation forms different from those in main clauses).

In other words, external case marking of verb forms coincides with non-clausalike TAM inflection
and person indexation. Again, this is a one-way conditional: subordinate clauses may lack the TAM
or indexation of main clauses. Case marking of dependent arguments of the verb, however, does not
conform to these universals and so cannot be used reliably to distinguish subordinate clauses from
nominalizations. But case marking of the verb form can be used reliably and consistently as a guideline
to distinguish subordinate clauses from nominalizations (or adjectivalizations, for participial modifiers).
Deciding whether a verb form allows “reasonably productive” case marking is not always easy, since dependent constructions denoting actions do not take the full range of case forms, and infinitives are often historically derived from allative case marking, such as English I began to work. But case marking of the verb form is a consistent and typologically justified criterion.

Finally, there is an asymmetry in strategies between complement clauses and adverbial subordinate clauses that can be used for guidelines to distinguish complement relations (UD scomp, ccomp, xcomp) from adverbial ones (UD advcl):

- If the subordinating conjunction is relational, that is, expresses contrastively a semantic relation between the matrix clause and the subordinate clause, then the subordinate clause is overwhelmingly likely to be an adverbial clause.
- If the subordinating conjunction is a linker, so does not express a specific semantic relation, then the subordinate clause is overwhelmingly likely to be a complement (or relative clause).

If a verb form that semantically looks like a complement appears to take case marking, then it is likely that either it is part of a paradigm of case-marked verb forms and hence is an event nominal, or the putative case marking no longer contrasts meaningfully with another form, as in English infinitival to, and so should be analyzed as a linker governing a complement clause.

These examples indicate how typological universals about the relationship between functions of constructions—semantic content and information packaging—and the grammatical strategies used to express those functions can help in constructing guidelines for applying Universal Dependencies across languages in a consistent fashion.

References


