Universal Dependencies for Irish

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RÉSUMÉ
Dépendances universelles de l’irlandais

Les ressources linguistiques permettant aux études cross-langues de se développer sont très impor-
tantes pour les langues minoritaires telles que l’irlandais, car elles favorisent le partage des ressources
pour palier au problème du manque de données. Le projet «Universal Dependencies » (UD) a pour
but de faciliter les études cross-langues des arbres syntaxiques, des structures linguistiques et de
l’analyse syntaxique. L’objectif principal de ce projet est de former un ensemble harmonieux d’arbres
syntaxiques en utilisant un schéma d’annotations universelles. Dans cet article, nous présentons
la transformation de l’arbre de dépendance syntaxique irlandais (IDT) (Lynn, 2016) au schéma
d’annotations universelles du projet UD, suivie d’une description claire des changements structurels
nécessaires à cette conversion. Le nouvel arbre est ainsi appelé « Irish Universal Dependency
Treebank » (IUDT).

ABSTRACT
Language resources that enable cross-lingual studies have become increasingly valuable for lesser-
resourced languages such as Irish, as they allow for easier sharing of resources, thus overcoming
the problem of data scarcity. The Universal Dependencies (UD) Project1 is an initiative aimed at
cross-lingual studies of treebanks, linguistic structures and parsing. Its goal is to create a set of
multilingual harmonised treebanks that are designed according to a universal annotation scheme. In
this paper, we report on the conversion of the Irish Dependency Treebank (IDT) (Lynn, 2016) to a
UD version of the treebank which we term the Irish Universal Dependency Treebank (IUDT). We
report on the mapping of the IDT labelling scheme to the UD scheme, along with a clear description
of the structural changes required in this conversion.

MOTS-CLÉS : Analyse syntaxique, irlandais, langue irlandaise, arbre de dépendance syntaxique,
dépendances syntaxiques universelles, conversion, étiquettes.

KEYWORDS: parsing, Irish, dependency treebank, universal dependencies, mapping, labels.

1 Introduction

Dependency treebanks exist for many languages (e.g. Turkish (Oflazer et al., 2003), Czech (Hajič,
1998), Danish (Kromann, 2003), Slovene (Džeroski et al., 2006) and Finnish (Haverinen et al., 2010)).
However, these treebanks vary significantly, with labelling notations and linguistic analyses that are
usually specific to that language, and often influenced by linguistic theories to which the developers

1http://universaldependencies.org/
As a result, cross-lingual research is often hampered by variations that exist across the annotation schemes of treebanks. From a statistical parsing perspective, if the labelled training data for both languages is based on different annotation schemes, parser output in one language cannot be easily compared or transferred to another (Søgaard, 2011; McDonald et al., 2011). McDonald et al. (2013) reported improved results on cross-lingual transfer parsing using 10 uniformly annotated treebanks. Lynn et al. (2014) also reported on similar experiments using the same treebanks to bootstrap parsing for Irish.

In October 2014, the Universal Dependency (UD) Project released guidelines to assist with the creation of new UD treebanks, or mappings and conversions of existing treebanks to a new universal scheme. This new annotation scheme is based on (universal) Stanford dependencies (de Marneffe et al., 2006; de Marneffe & Manning, 2008; de Marneffe et al., 2014), Google universal part-of-speech tags (Petrov et al., 2012), and the Interset interlingua for morphosyntactic tagsets (Zeman, 2008). The UD scheme accounts for varying linguistic differences across languages by providing the option of defining language-specific label sub-types when the prescribed list of labels do not adequately cover all linguistic features of a given language. Nivre (2015) clearly explains the motivation behind the project. Ten treebanks were released in January 2015 including Czech, English, Finnish, French, German, Hungarian, Irish, Italian, Spanish and Swedish. Since then a large number of additional treebanks have been either (i) built from scratch or (ii) converted from existing treebanks to form new UD treebanks. To date\(^2\), there are 54 treebanks representing 40 languages listed in the UD project.

We have mapped the Irish Dependency Treebank (IDT) (Lynn, 2016) to the UD scheme (v1) for purposes of cross-lingual studies and parser improvement. The IDT is a corpus\(^3\) of Irish sentences that have been annotated with information on deep syntactic structure. This paper summarises the conversion and mapping of the IDT to the Irish Universal Dependency Treebank (IUDT), as part of the Universal Dependencies (UD) Project\(^4\).

2 Mapping the Irish POS tagset to the Universal POS tagset

The UD part-of-speech (POS) tagset is an extension of the The Google Universal POS tagset (Petrov et al., 2012) and contains 17 POS tags. The IDT was built upon a gold-standard POS-tagged corpus developed by Uí Dhonnchadha (2009), and is based on the PAROLE Morphosyntactic Tagset (ITÉ, 2002). The IDT’s tagset contains both coarse- and fine-grained POS tags, both of which we map to the Universal POS tags (e.g. Prop Noun $\rightarrow$ NOUN). Note, however, that we only map to 16 of the UD tags as we do not identify auxiliary verbs in Irish to require the inclusion of AUX. We provide a mapping from the Irish POS tagset to the UD tagset in Table 1.

3 Universal Dependency Scheme

The IDT to UD treebank conversion required extensive work on dependency relation renaming, mapping and structural changes. We provide a mapping in Table 2 and describe the changes below.

\(^2\)May 2016
\(^3\)Current treebank size is 1020 trees with 23,684 tokens. See Appendix C of Lynn (2016) for additional statistics.
\(^4\)http://universaldependencies.org
### 3.1 UD labels not used in the Irish UD Treebank

The following is a list of labels in the UD annotation scheme that do not apply to the Irish language:

- **aux**: This label is used for non-main verbs in a clause, i.e. auxiliary verbs. Examples in English are ‘has opened’, ‘will be’, ‘should say’. There are no equivalent auxiliary verbs in Irish.\(^5\)

- **auxpass, nsubjpass, csubjpass**: These labels are used in passive constructions, respectively as: passive auxiliary verbs, passive nominal subjects and clausal passive subjects. There is no equivalent passive form in Irish (see The Christian Brothers (1988, p.120) and Stenson (1981, p.145)).

- **iobj**: In English, an example is ‘Mary gave John the book’. There are no indirect objects in Irish, and constructions like these must follow the normal ditransitive verb structure using a preposition (i.e. ‘Mary gave the book to John’).

Some UD labels are not used in IUDT due to lack of instances observed in the data\(^6\):

- **reparandum**: This label is used to indicate disfluencies in text. The IDT data does not currently contain any disfluencies.

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\(^5\)Stenson (1981, p.86) notes that modal verbs such as *caithfidh* inflect as per regular verbs and are considered the main verb.

\(^6\)This may be related to the well-structured, grammatical nature of the text in the IDT corpus (e.g. newswire, literature).
<table>
<thead>
<tr>
<th>Universal</th>
<th>Irish</th>
<th>Universal</th>
<th>Irish</th>
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<tbody>
<tr>
<td>root</td>
<td>top</td>
<td>foreign</td>
<td>for</td>
</tr>
<tr>
<td>acl:relcl</td>
<td>relmod</td>
<td>list</td>
<td>quant †</td>
</tr>
<tr>
<td>advcl</td>
<td>comp †</td>
<td>mark</td>
<td>subadjunct, toinfinitive</td>
</tr>
<tr>
<td>advmod</td>
<td>adjunct †, advadjunct, advadjunct_q, quant †</td>
<td>mark:prt</td>
<td>advparticle, cleftparticle, particle, qparticle, vparticle</td>
</tr>
<tr>
<td>amod</td>
<td>adjadjunct</td>
<td>name ±</td>
<td>nparticle, nadjunct †</td>
</tr>
<tr>
<td>appos</td>
<td>app</td>
<td>neg</td>
<td>vparticle</td>
</tr>
<tr>
<td>case ±</td>
<td>padjunct †, obl_ag</td>
<td>nmod</td>
<td>aug, pobj †±, relparticle †</td>
</tr>
<tr>
<td>case:voc</td>
<td>vocparticle</td>
<td>nmod:poss</td>
<td>poss</td>
</tr>
<tr>
<td>cc ±</td>
<td>-</td>
<td>nmod:prep±</td>
<td>obl, obl2</td>
</tr>
<tr>
<td>ccomp</td>
<td>comp †</td>
<td>nmod:tmod</td>
<td>advadjunct, padjunct †, pobj †±, relparticle †</td>
</tr>
<tr>
<td>compound</td>
<td>nadjunct †</td>
<td>nsubj</td>
<td>relparticle †, subj, subj_q</td>
</tr>
<tr>
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<td>particlehead</td>
<td>nummod</td>
<td>quant †</td>
</tr>
<tr>
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<td>coord</td>
<td>parataxis</td>
<td>comp †</td>
</tr>
<tr>
<td>cop ±</td>
<td>NEW</td>
<td>punct</td>
<td>punctuation</td>
</tr>
<tr>
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<td>csubj</td>
<td>vocative</td>
<td>addr</td>
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<td>xcomp</td>
<td>xcomp</td>
</tr>
<tr>
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<td>adjunct †</td>
<td>xcomp:pred</td>
<td>adjpred, advpred, npred, ppred ±</td>
</tr>
<tr>
<td>dobj</td>
<td>obj, vnobj, obj_q, relparticle †</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Mapping of Irish Dependency Annotation Scheme to UD Annotation Scheme. † marks one-to-many mappings, and ± marks structural changes. The IUDT uses 26 of the 40 UD labels (and 9 Irish-specific sub-labels).

- **goeswith**: This label links to parts of a word that has been split, due to poor editing. There are no instances of this in the Irish data.
- **dep**: This catch-all label is used for unknown relations. We do not require this in the Irish data.

In addition, there are some UD labels that we have not included in the first release version of this treebank, but which we expect will be included in future releases:

- **expl**: There is no existential ‘there’ in Irish. However, we have not yet fully researched uses of other types of expletives in the IDT data (e.g. tá sé soilléir go.. ‘it is clear that .’).
- **mwe**: Multiword expressions are not marked in the IDT. There is not sufficient linguistic literature on this topic for Irish on which we could base a complete analysis of idioms or multiword units in the treebank. This analysis therefore remains as a future enhancement to the treebanks when such resources are available.
- **remnant**: This label is used for remnants in ellipsis, where a predicate or verb is dropped (e.g. ‘Marie went to Paris and Miriam [] to Prague’). Instances of remnants in Irish are not easily identified. Further study is required to identify cases, if any, including a possible analysis of crossing dependencies.
- **dislocated**: This label is used for fronted or postposed elements that are not core grammatical elements of a sentence. Example, ‘he must not eat it, the playdough’. We have not yet identified such cases in the IDT data.
3.2 Manual label updates

Some of the treebank conversion was automated with straightforward mappings. However, there were a number of one-to-many label mappings that required manual mapping. These instances are marked with † in Table 2 and discussed here.

**relative particles**: In the IDT, the relative particle *a* is attached to a relative modifier verb with the label *relnparticle*. In the UD scheme, this particle is labelled with the syntactic role it plays in the relative clause.\(^7\) The *a* can therefore fulfill the role of *nsubj*, *dobj*, *nmmod* or *nmmod:tmod*.\(^8\)

For example, *an rud deireanach a chonaic sé* ‘the last thing that he saw’ is shown in Figure 1. In this case *a* refers to *rud* ‘thing’, and therefore is labelled as a *dobj* of *chonaic* ‘saw’.

![UD dobj relative particle analysis](image)

**quant → nummod, list, advmod** Numerals and quantifiers are given more fine-grained descriptions in UD than the single IDT *quant* label. In addition, list numbering is represented by *list*.

**comp → advcl, ccomp, parataxis** The tokens labelled in the IDT with the closed complement label *comp* have been divided among three new labels. The UD labels are: *advcl* adverbial clause (normally connected with a subordinator such as *nuair* ‘when’, *má* ‘if’ etc); *ccomp* complement clauses that are normally introduced by the complementiser *go*, *nach*, *gur*, or quoting direct speech; *parataxis* labels two phrases or sentences set side-by-side without explicit linking through coordination or subordination, for example. Sometimes punctuation such as colons or semicolons connects the pairs. *Bhí an cál an-ghann; b’fheidir nach mbeadh i ngach baile ach aon gharrat amháin.* ‘Kale was very scarce; maybe there would only be one garden in every town’.

**nadjunct → compound, name** The compound label is used for nominal modifiers. In Irish this could take the form of compounding (one noun modifying another) such as *deireadh seachtaine* ‘weekend’, or ownership *teach Mhichil* ‘Michael’s house’. Compounding can occur with a string of nouns as per the example in Figure 2.

The new label *name* is explained below in more detail in Section 3.3.

3.3 Structural Changes

Other labels required a manual annotation because they related to structural changes required in the treebank that were not easily automated. The following structural changes were made manually before the dependency labels were mapped to the universal scheme.

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\(^7\)This type of annotation that cannot be automated in the absence of additional data on the semantic properties of the element to which the relativiser refers.

\(^8\)Irish language-specific label for temporal modifiers in nominal form.
Lost she almost eight years arrears pension
‘She lost almost eight years of pension arrears’

**co**ordination Significant changes were required to the analysis of coordination while mapping to IUDT. The IDT follows the Lexical Functional Grammar (LFG) (Bresnan, 2001) coordination analysis, where the coordinating conjunction (e.g. *agus* ‘and’) is the head, with each coordinate as its dependents, labelled as **coord** (see Figure 3). The UD annotation scheme, on the other hand, uses right-adjunction, where the first coordinate is the head of the coordination, and the rest of the phrase is adjoined to the right, labelling coordinating conjunctions as **cc** and subsequent coordinates as **conj** (Figure 4).

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**subordinate clauses** In the IDT, the analysis of the relationship between the matrix clause and a subordinate clause is similar to that of LFG: the subordinating conjunction (e.g. *mar* ‘because’, *nuair* ‘when’) is a **subadjunct** dependent of the matrix verb, and the head of the subordinate clause is a **comp** dependent of the subordinating conjunction (Figure 5). In contrast, the UD scheme marks the head of the subordinate clause as a dependent of the matrix verb, and the subordinating conjunction is a dependent of the subordinate clause (Figure 6).
The labels have also been mapped between examples, but the structural change is of interest here.

Figure 5: IDT subordinate clause analysis

Figure 6: IUDT subordinate (adverbial) clause analysis

cop⁹ In the IDT, the copula is treated similarly to a verb, and can function as the root of a sentence, or as the head of a dependency clause. However, the UD scheme analyses copula constructions differently. Instead, the predicate is regarded as the head of the phrase, and the copula is its dependent, as indicated by the cop label. This also applies to copula use in fronting or cleft structures. See Figure 7 and Figure 8 for comparison.¹⁰

Figure 7: IDT copula analysis

name: The UD relation name is used with compounding proper nouns, typically for names of people,

Note that Irish has two forms of the verb ‘to be’ – the copula and the substantive verb bí. Constructions using the substantive verb are not analysed using the UD cop label and are treated like regular verbs instead. For example, tá sé fuar ‘it is cold’

¹⁰The labels have also been mapped between examples, but the structural change is of interest here.
places, organisations and so on. In Irish, this not only includes surnames, but also surname particles such as Mac, Mc, Ó, de, Uí and Ní. In the IDT, the surname is the head noun, and its dependents can either be first names (nadjunct) or nominal particles (nparticle). See Figures 9 for example. However in the UD analysis, the first word is the head, modified by the rest of the words as name. See Figure 10 for comparison.

\[
\text{a deir Michael D. Higgins}
\]
\[
[] \quad \text{says Michael D. Higgins}
\]
‘says Michael D. Higgins’

Figure 9: IDT name analysis

\[
\text{a deir Michael D. Higgins}
\]
\[
[] \quad \text{says Michael D. Higgins}
\]
‘says Michael D. Higgins’

Figure 10: UD name analysis

**nmod, case, xcomp:** In the IDT, the preposition is the head of a prepositional phrase (PP). UD recognises the head noun of the object NP as the PP head. This affects the Irish treebank in a number of ways:

In the UD analysis, the head of regular preposition phrases (object of the preposition) is attached to the verb as nmod (formerly pobj in IDT). The preposition is a dependent of the object, and this relation is labelled as case. Compare Figures 11 and 12 to observe the difference in analyses.

Irish progressive aspectual phrases are constructed with the preposition *ag* followed by a verbal noun. The IDT regards *ag* as the head of the prepositional phrase, and thus the open complement label (xcomp) marks the relation between the matrix verb and the preposition. In the UD scheme however, the verbal noun is regarded as the head of the prepositional phrase. Compare Figures 13 and 14.
Prepositional predicates are labelled as `ppred` in the Irish Dependency Treebank. In keeping with the other PP analyses, the preposition is the head of the prepositional phrase. The IDT label `ppred` maps to `xcomp:pred` in the UD scheme. In addition, the object of the preposition is now regarded as the head of the phrase. See Figures 15 and 16 for comparison of prepositional predicate analyses.

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11The label `xcomp:pred` is an Irish-specific label, these language specific labels are discussed in Section 3.4.
3.4 Irish-specific relations

The UD scheme provides scope to include language-specific subtype labels. The label naming format is universal:extension, which ensures that the core UD relation remains identifiable, making it possible to revert to this coarse label for cross-lingual analysis. During the conversion of the IDT, we defined some labels required to represent Irish syntax more concisely. These labels are discussed below.

**acl:relcl**: This label is used for relative clause modifiers. We use this subtype label acl:relcl in cases where the head of the relative clause is a predicate (usually a verb), and is dependent on a noun in a preceding clause. It is also used in the English, Finnish and Swedish schemes. An example of this subtype used in the converted IUDT is in Figure 17.

**compound:prt**: We use compound:prt for verbal particle-heads, in order to distinguish them as particles as opposed to nominal compounds (e.g. leagtha amach ‘laid out’).

**cssubj:cop**: The supertype label cssubj indicates a clausal subject (a clause whose role is the subject of another). In English ‘[what she said] makes sense’. However, Finnish uses an additional specific...
subtype label `csubj:cop` to indicate clausal subjects that act as a subject of a copular clause. We observed in the IDT data that clausal subjects in Irish are only ever subjects of copula clauses. For this reason we use only the subtype label `csubj:cop` for clausal subjects (see Figure 18).

![Figure 18: UD copular clausal subject analysis](image)

**mark:prt**: We introduce a new subtype label `mark:prt` for adverbial particles, cleft particles, quantifier particles, comparative/superlative particles, verb particles and days of the week particles.

**nmod:poss**: In Irish, possession is denoted by possessive pronouns (`mo, do, a, ár, bhur`). English, Finnish and Swedish use the subtype label `nmod:poss` to indicate possession, and we also adopt it for Irish. The pronoun is a dependent of the noun to which it denotes ownership. For example, _Chuir mé ceist ar mo mhúinteoir_ ‘I asked my teacher a question’.

**nmod:prep**: 16 of the most common Irish simple prepositions can be inflected to mark pronominal objects (e.g. _le_ ‘with’ inflects as _liom_ ‘with-me’) and are referred to as pronominal prepositions or prepositional pronouns. In the UD scheme, where the object is the head of a PP, these inflected prepositions play nominal roles instead of prepositional roles. We introduce the language-specific label `nmod:prep`, thus retaining information on the presence of the preposition within this synthetic form. An example is given in Figure 19.

![Figure 19: UD prepositional pronoun analysis](image)

**nmod:tmod**: Temporal modifiers specifying time, in nominal form, are labelled as `nmod`. English also uses this subtype label. An example in Irish is _daoine a mhair na milliúin bliain ó shin_ ‘people who lived a million years ago’.

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12Inflected prepositions were most frequently marked as either `obl` or `obl2` in the IDT.
13Their POS-tag remains `ADP`, however.
14Note that in some cases, prepositional pronouns behave like nominal modifiers of noun phrases. E.g. _an bheirt acu_ ‘the two of them’. These cases take the label `compound`.
xcomp:pred: The IDT uses the following fine-grained labels for predicates: npred (nominal), adjpred (adjectival), advpred (adverbial) and ppred (prepositional). These were typically used in copular constructions but are now no longer relevant in the UD, where the predicate heads the copular phrase. However, adjective, adverbial and prepositional predicates can also be arguments of the substantive verb bí. Therefore, we extend the open complement label to include the subtype xcomp:pred. See Figure 20 for an example of an adjectival predicate.

![Figure 20: UD adjectival predicate analysis](https://lindat.mff.cuni.cz/repository/xmlui/handle/11234/1-1699)

4 Summary and Future Work

In this paper, we have summarised the conversion of the Irish Dependency Treebank (IDT) to a UD format (IUDT). We have described in detail the mapping and conversion process, including structural changes required, for the release of the IUDT as part of the Universal Dependencies project. We have also discussed linguistic analyses and motivations for choice of Irish language-specific label types. The Irish UD treebank (IUDT) is available to download under an open-source licence from The Universal Dependencies Project repository. We have not discussed here the inclusion of morphological information in the IUDT as this still requires extensive documentation within the UD project. We plan to report on this at a later stage. In addition, as the IDT grows in size (a work in progress), we plan to extend the IUDT in parallel.

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15 This follows the LFG use of xcomp (open complement) to represent predicates.
16 v1.3 https://lindat.mff.cuni.cz/repository/xmlui/handle/11234/1-1699
References


