

# Improving the Annotations in the Turkish Universal Dependency Treebank

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August 30, 2019

# Improving Turkish UD

## Path

- Previous Studies on Turkish UD
- Process
- Revisions
- Experiments
- Conclusion and Future Work

## Aim

- To unify annotation patterns and decisions within Turkish UD
- To create a basis for future treebanks

# Previous Studies on Turkish UD

	<b>IMST-UD</b>	<b>PUD</b>	<b>GB</b>
<b>Word Count</b>	56.396	16.535	<i>unknown</i>
<b>Copyright</b>	CC-BY-NC-SA	CC-BY-SA 3.0	CC BY-SA 4.0
<b>UD version</b>	v2.2	v2.2	v2.4
<b>Content</b>	Non-Fiction, Newspaper	Newspaper, Wikipedia	Examples from a Grammar book
<b>Method</b>	manual annotation in non-UD, semi-automatic conversion	manual annotation in non-UD, automatic conversion	manual annotation in non-UD, automatic conversion
<b>Syntactic Relation Number</b>	32	41	<i>unkown</i>

Table 1: State of Turkish UD Treebanks

## Timeline

- **MST**: Atalay et al. (2003) and Oflazer et al. (2003)
- **IMST**: Sulubacak, Pamay, et al. (2016)
- **IMST-UD**: Sulubacak, Gökırmak, et al. (2016)

## Problems

- Lack of a linguistic team behind the annotation process
- Failure to check annotations
- As an immediate result, an incoherent picture after the automatic conversion
- Due to morpho-ortographic similarities, the automatic conversion process failed to capture the intriguing nature of Turkish.

Embedded Clause Structure and Possessive marked nominal compounds

Embedded Subjects and Genitive Marking

Core Arguments with lexically-driven case marking

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## Team

3 Linguist and 3 NLP specialist

## Workflow

- Settling on the definitions of UD syntax and providing examples for every possible syntactic relation
- Recording inconsistencies and erroneous tagging in the IMST-UD
- Cross checking reports
- Discussions regarding problematic cases

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# Revisions

- Transparency of **Embedded** Clauses
- Syntactic **Category** Errors
- Representation of **Core** Arguments

Type	IMST-UD	BIMST-UD	$n_{alternations}$
Embedded	NMOD	ADVCL	666
	OBJ	CCOMP	481
	NMOD:POSS	NSUBJ	312
Category	OBJ	NSUBJ	276
Core	OBL	IOBJ	194
	OBL	OBL:ARG	137

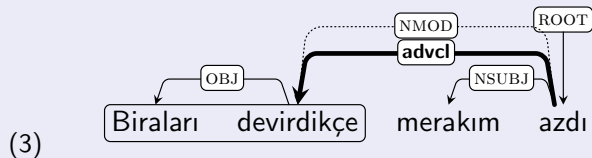
Table 2: The number of alternations for the most frequent changes

## Embedded Structures

Turkish makes use of nominalization processes in all its embedded structures. While embedded structures that are core arguments of a verb show nominal properties, relative clauses are complex adjectival constructions.

- (1) Sen-**in** de bu gösteri-yi izle-me-**ni** iste-r-di-m.  
you-GEN too this show-ACC watch-NMLZ-POSS want-AOR-PST-1SG  
“I would have wanted you to watch this show, as well.”
- (2) Sen-**in** elma-**nı** iste-r-di-m.  
you-GEN apple-POSS want-AOR-PST-1SG  
“I would have wanted your apple.”

## Embedded Structures: NMOD > ADVCL

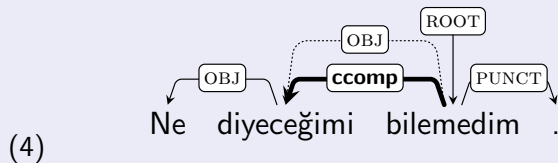


Bira-lar-1 devir-dik-çe merak-ım az-dı.  
beer-PL-ACC topple-NMLZ-CVB curiosity-POSS.1SG get.wild-PST

“As I finished my beers, my curiosity peaked.”



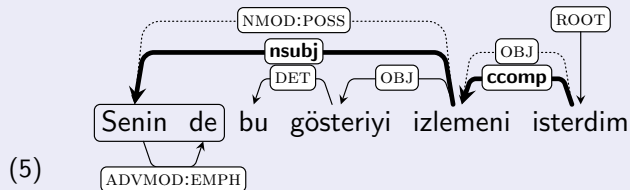
## Embedded Structures: OBJ > CCOMP



Ne di-yeceğ-im-i bil-e-me-di-m.  
what say—FUT-POSS-ACC know--NEG-PST-1SG.

“I didn’t know what to say.”

## Embedded Structures: NMOD:POSS > NSUBJ



Sen-in de bu göste-ri-yi izle-me-ni iste-r-di-m.  
you-GEN too this show-ACC watch-NMLZ-POSS want-AOR-PST-1SG

“I would have wanted you to watch this show, as well.”

## Syntactic Category Errors

- We can group these errors under two headings

- ▶ Effects of bare objects

(6) Çorap ör-dü-m  
sock.ACC knit-PST-1SG  
“I did sock-knitting.”

- ▶ Effects of possessive marker

(7) Göz-ler-i parla-dı.  
eye-PL-POSS sparkle-PST  
“Her eyes sparkled.”

(8) Oje-si parla-dı.  
nailpolish-POSS sparkle-PST  
“Her nailpolish sparkled.”

## Syntactic Category Errors

- We can group these errors under two headings

- ▶ Effects of bare objects

(9) Çorap ör-dü-m  
sock.ACC knit-PST-1SG  
“I did sock-knitting.”

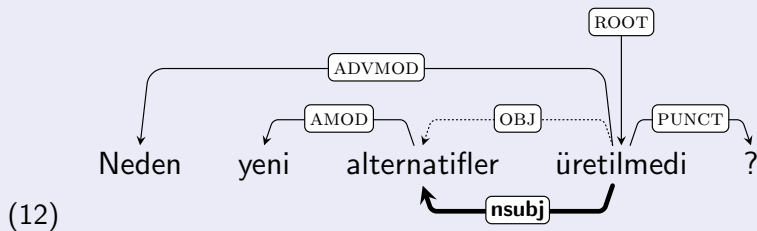
- ▶ Effects of possessive marker

(10) Göz-ler-i parla-dı.  
eye-PL-POSS sparkle-PST  
“Her eyes sparkled.”

(11) Oje-si parla-dı.  
nailpolish-POSS sparkle-PST  
“Her nailpolish sparkled.”

## Syntactic Category Errors

- We can group these errors under two headings
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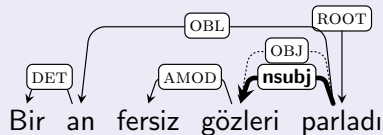


Neden yeni alternatif-ler üret-il-me-di?  
why new alternative-PL produce-PASS-NEG-PST?

“Why weren’t new alternatives produced?”

## Syntactic Category Errors

- We can group these errors under two headings
  - ▶ Effects of possessive marker



(13)

Bir an fersiz göz-ler-i parla-dı.  
one moment dull eye-PL-POSS sparkle-PST

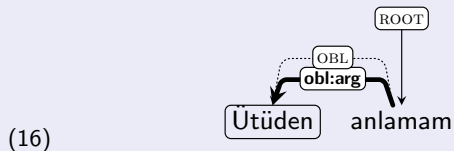
“Her dull eyes sparkled for a moment.”

## Core Arguments

In addition to the accusative case, Turkish can also mark its core arguments with cases that are generally used to mark adjuncts, such as locative, ablative, comitative, dative.

- (14) Ütü-**den** anla-ma-m  
iron-ABL know-NEG-1SG  
“I do not know a thing about ironing.”
- (15) Kitap-**tan** sayfa-lar dökül-üyor.  
book-ABL page-PL fall-PROG.  
Pages are falling out of this book.

## Core Arguments: OBL > OBL:ARG



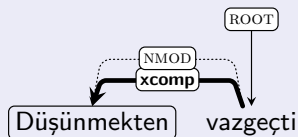
Ütü-den    anla-ma-m.  
ironing-ABL understand-NEG-1SG

“I do not know a thing about ironing.”



## Core Arguments: NMOD > XCOMP

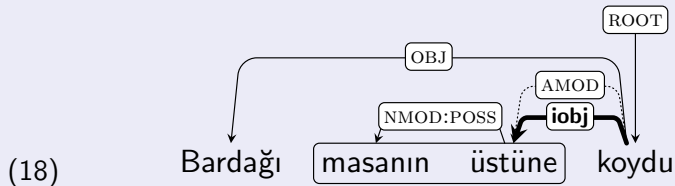
(17)



Düşün-mek-ten      vazgeç-ti.  
thinking-NMLZ-ABL   give.up-PST

“She decided not to think about it.”

## Introduced Dependencies: IOBJ



Bardağ-ı masa-nın üst-ün-e koy-du.  
glass-ACC table-GEN top-POSS-DAT put-PST

“She put the cup on the table.”

## Parser Information

- Training on both a transition-based LSTM dependency parser (Özateş et al., 2018) and a graph-based neural parser (Dozat et al., 2017).
- Both projective and non-projective dependencies were included.
- Turkish word embeddings of the CoNLL-17 pre-trained word embeddings from Ginter et al. (2017) were used.
- We used labeled and unlabeled attachment score metrics.

## Results

		IMST-UD	BIMST-UD
<b>Transition-based parser</b>	<b>UAS</b>	65.91	<b>68.66</b>
	<b>LAS</b>	59.06	58.98
<b>Graph-based parser</b>	<b>UAS</b>	71.55	<b>75.49</b>
	<b>LAS</b>	64.86	<b>65.53</b>

Table 3: UAS and LAS scores of the two parsers on the previous and updated versions of the IMST-UD treebank.

# Conclusion

- Finding correct head-dependent relations ↑
- Labeling efficiency in graph-based parser ↑

• We found the following: (i) a linguistically fine-grained analysis improved parser performance, (ii) making adjustments according to the needs of a specific language does not always compromise parsing performance.

# Thank you!

## Acknowledgement

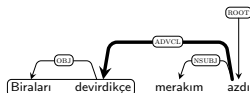
This work was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK) under grant number 117E971 and as a graduate scholarship.

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# Appendix: Introduced Dependencies I

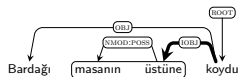
(19) advcl:



Bira-lar-ı devir-dik-çe merak-ım az-dı.  
beer-PL-ACC topple-NMLZ-CVB curiosity-POSS.1SG get.wild-PST

"As I finished my beers, my curiosity peaked."

(20) iobj:



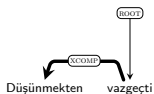
Bardağ-ı masa-nın üst-ün-e koy-du.  
glass-ACC table-GEN top-POSS-DAT put-PST

"She put the cup on the table."



## Appendix: Introduced Dependencies II

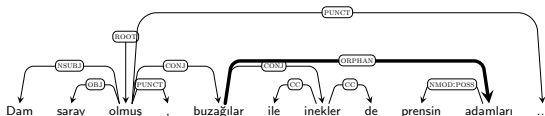
(21) xcomp:



Düşün-mek-ten vazgeç-ti.  
thinking-NMLZ-ABL give.up-PST

"She gave up thinking."

(22) orphan:



Dam saray ol-muş, buzağı-lar ile inek-ler de prens-in adam-lar-ı...  
stable palace be-EVD calf-PL with cow-PL too prince-GEN man-PL-POSS...

"Apparently stables became palaces, and cows with their calves henchman of the prince..."

## Appendix: Introduced Dependencies III

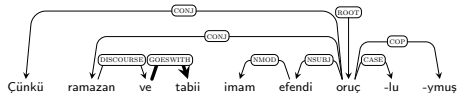
(23) clf:



Bir kez daha oku-ma-sın-ı rica ed-iyor-um.  
one time more read-NMLZ-POSS-ACC request do-PROG-1SG

"I request that he/she reads it one more time."

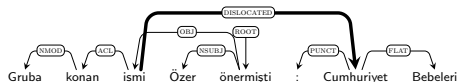
(24) goeswith:



Çünkü ramazan ve tabii imam efendi oruç -lu -ymuş.  
because Ramadan and ofcourse imam mister fast-COM-COP

"Because it is Ramadan and, of course, our dear imam is fasting."

## Appendix: Introduced Dependencies IV



(25) dislocated:

Grub-a kon-an ism-i Özer öner-miş-ti: Cumhuriyet Bebe-ler-i.  
band-DAT put-NMLZ name-POSS Özer suggest-EVD-PST: Republic baby-PL-POSS

"It was Özer who suggested the name for the band: The Children of the Republic."