

UD-English-CHILDES: A Collected Resource of Gold and Silver Universal Dependencies Trees for Child Language Interactions

Xiulin Yang[‡] Zhuoxuan Ju[‡] Lanni Bu[‡] Zoey Liu^{*} Nathan Schneider[‡]

[‡]Georgetown University

^{*}University of Florida

{xy236, zj153, lb1437, nathan.schneider}@georgetown.edu
liu.ying@ufl.edu

Abstract

CHILDES is a widely used resource of transcribed child and child-directed speech. This paper introduces UD-English-CHILDES, the first officially released Universal Dependencies (UD) treebank. It is derived from previously dependency-annotated CHILDES data, which we harmonize to follow unified annotation principles. The gold-standard trees encompass utterances sampled from 11 children and their caregivers, totaling over 48K sentences (236K tokens). We validate these gold-standard annotations under the UD v2 framework and provide an additional 1M silver-standard sentences, offering a consistent resource for computational and linguistic research.

1 Introduction

The Child Language Data Exchange System (CHILDES) (MacWhinney, 2000) has long been a key resource for research in language acquisition, computational modeling of child language, and the evaluation of Natural Language Processing (NLP) tools. However, many analyses rely on different grammatical assumptions (e.g., Pearl and Sprouse, 2013; Szubert et al., 2024; Liu and Prud’hommeaux, 2021; Gretz et al., 2015; Sagae et al., 2007), and therefore adopt divergent annotation frameworks or standards. While most existing annotations use syntactic dependencies—in part due to the relative simplicity of annotation and parsing and the growing adoption of the Universal Dependencies (UD) framework (Nivre et al., 2016, 2020)—annotation practices remain inconsistent across datasets. This is largely due to the lack of a unified guideline for annotating children’s speech, which presents unique challenges not fully addressed by existing UD documentation.

As UD treebanks have become valuable resources in both NLP (e.g., Jumelet et al., 2025; Opitz et al., 2025) and language acquisition research (e.g., Clark et al., 2023; Hahn et al.,

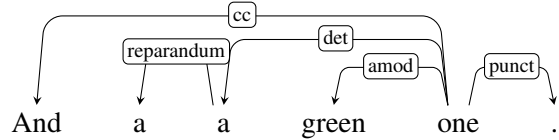


Figure 1: UD tree for a child utterance from Lily (Providence corpus, sentID=16916280)

2020), there have been increasing efforts to parse CHILDES data using tools such as stanza (Liu and MacWhinney, 2024). However, the resulting annotation quality is often inconsistent and cannot be guaranteed. In this paper, we compile, harmonize, and manually correct major UD-style annotations of CHILDES data into a consistent, unified UD format, resulting in a gold-standard treebank of 48K sentences and 236K tokens (including, e.g., the tree in Figure 1). In addition, we construct a larger silver-standard treebank of 1M sentences and 6M tokens produced by stanza¹ and report parser accuracy estimates. We publicly release both datasets.²

2 Related Work

2.1 CHILDES Corpora

CHILDES is a collection of child–adult conversations recorded in naturalistic or laboratory settings. It has played a central role in both language acquisition research and the development of NLP tools. In addition to specialized corpora—such as clinical datasets (Gillam and Pearson, 2004), naturalistic family interactions (Gleason, 1980), and controlled laboratory studies (Newman et al.,

¹stanza 1.9.2 (combined model)

²Official gold UD release: https://github.com/UniversalDependencies/UD_English-CHILDES Note: Due to a postprocessing error, the gold UD release from the main branch is missing approximately 10K sentences. For complete access to the data, please use the dev branch. The main branch will be updated in the next official release scheduled for November 2025.

Silver release: <https://github.com/xiulinyang/UD-CHILDES>.

| Corpus | Children | Speakers | Trees | UPOS | Feats | Utterances | | Tokens | |
|---------------------------|-------------|----------|-------------|-------------|---------|---------------|------------------|----------------|------------------|
| | | | | | | Gold | Silver | Gold | Silver |
| S+24 | Adam | Adults | Gold | Gold | Convtrd | 17,233 | 0 | 91,114 | 0 |
| LP21 | Eve | All | Gold | Silver | Silver | 2,207 | 0 | 8,497 | 0 |
| LP23 | 10 Children | All | Gold | Silver | Silver | 34,530 | 0 | 168,284 | 0 |
| UD-English-CHILDES | 11 Children | All | Gold/Silver | Gold/Silver | N/A | 48,183 | 1,197,471 | 236,941 | 6,892,314 |

Table 1: Overview of CHILDES-based UD treebanks compiled in this paper and our newly-released UD-English-CHILDES treebank. Source corpus labels (S+24, LP21, LP23) are defined in §3. Note that there is overlap in the Adam data: S+24 figures are counts from the original dataset; for our version, these were filtered to avoid duplicates and merged with corresponding LP23 utterances. The heading **Gold** refers to the subset of utterances for which trees and UPOS have been manually corrected according to the UD v2 framework; **Silver** refers to the subset with fully automatic annotations from stanza.

| Child | Corpus | Child age range | Gold sents | Gold toks | Silver sents | Silver toks |
|--------|-------------------------------------|---------------------|------------|-----------|--------------|-------------|
| Laura | Braunwald (Braunwald, 1971) | 1;3-7;0 (1;3-7;0) | 4,622 | 21,079 | 41,862 | 205,427 |
| Adam | Brown (Brown, 1973) | 1;6-5;2 (1;6-5;2) | 16,736 | 84,643 | 93,315 | 452,348 |
| Eve | Brown | 1;6-5;1 (1;6-5;2) | 2,207 | 8,497 | 108,044 | 532,319 |
| Abe | Kuczaj (Kuczaj, 1977) | 2;4-5;0 (2;4-5;0) | 4,167 | 22,437 | 38,630 | 230,489 |
| Sarah | Brown | 1;6-5;2 (1;6-5;2) | 5,347 | 23,233 | 104,926 | 517,654 |
| Lily | Providence (Demuth et al., 2006) | 0;11-4;0 (0;11-4;0) | 1,499 | 6,337 | 79,573 | 422,245 |
| Naima | Providence | 1;3-3;11 (0;11-4;0) | 2,534 | 14,360 | 236,350 | 1,422,543 |
| Violet | Providence | 0;11-4;0 (0;11-4;0) | 721 | 1,857 | 32,801 | 164,975 |
| Thomas | Thomas (Lieven et al., 2009) | 2;0-4;11 (2;0-4;11) | 4,240 | 20,333 | 313,550 | 2,039,132 |
| Emma | Weist (Weist and Zevenbergen, 2008) | 2;2-4;10 (2;1-5;0) | 2,423 | 13,730 | 74,825 | 474,460 |
| Roman | Weist | 2;2-4;9 (2;1-5;0) | 3,653 | 20,557 | 73,595 | 467,633 |

Table 2: Detailed statistics for each child, including counts of gold and silver annotations and their corresponding age ranges in months. Ages in the silver corpus are shown in parentheses. For source corpus URLs see Appendix A.

2016)—CHILDES supports a wide range of approaches to developmental linguistics. Many of its corpora inform foundational theories of language acquisition, particularly the poverty of the stimulus hypothesis (Chomsky, 1976). Researchers frequently use child-directed speech from CHILDES to quantify the distribution of linguistic structures that are central to these theories, such as wanna contraction (Getz, 2019), anaphoric one (Foraker et al., 2009; Pearl and Mis, 2011), auxiliary fronting (Peters et al., 2011), and syntactic islands (Pearl and Mis, 2011). It has also been used in computational models of language acquisition (e.g., Abend et al., 2017).

CHILDES has also emerged as a valuable resource for NLP tool benchmarking and language model pretraining. Following the work of Huang (2016), studies such as Liu and Prud’hommeaux (2023) have highlighted the challenges faced by UD parsers when applied to child-directed speech, showing substantial performance gaps compared to adult data. CHILDES also supports recent research on pretraining dynamics (Feng et al., 2024) and the development of efficient language models, including in initiatives like the BabyLM Challenge (Choshen et al., 2024; Charpentier et al., 2025).

2.2 Spoken Language Treebanks

Overview The development of UD project has fostered the development of spoken language annotations across a wide variety of languages, such as Beja (Kahane et al., 2021) and Japanese (Omura et al., 2023), as documented in Dobrovoljc (2022). For English, the GUM corpus (Zeldes, 2017) incorporates several spoken genres.

CHILDES Dependency Treebanks Early dependency parsing research on English CHILDES data utilized a custom inventory of grammatical relations (GR; Sagae et al., 2004, 2005). These gradually evolved to address CHILDES-specific challenges (Sagae et al., 2007), and were applied to the entire English CHILDES corpus using a supervised parser (Sagae et al., 2010).

More recently, UD-style annotations have been introduced to CHILDES. Liu and MacWhinney (2024) release an automatically parsed version of the English CHILDES corpus, annotated with UD trees using stanza. Liu and Prud’hommeaux (2021) used a semi-automatic method to convert previous GR-based annotations into UD trees, focusing on child-produced speech (ages 18–27 months) from the Eve data within the Brown corpus (Brown, 1973). Subsequently, Szubert et al. (2024)

```
# sent_id = 22497 (normalized sentence ID across corpora; used to avoid
#                   collisions since some corpora share identical sentence IDs)
# original_sent_id = 946255 (original sentence ID from the corpus, as assigned
#                           in childsr)
# childes_toks = who's that (original token string from childsr)
# child_name = Abe
# corpus_name = Kuczaj
# gold_annotation = True
# speaker_age = 43.72369042485472 (child's age in months)
# speaker_gender = male (child's gender)
# speaker_role = Father (speaker role in conversation)
# type = question (sentence type annotation)
# text = Who's that?
1-2   Who's   _      _      _      _      _      _      _
1     Who    who    PRON   WP      _      0      root  0:root  _
2     's     be     AUX   VBZ    _      1      cop   1:cop  _
3     that   that   PRON  DT     _      1      nsubj 1:nsubj SpaceAfter=No
4     ?      ?      PUNCT ?     _      1      punct 1:punct  _
```

Figure 2: Example of a gold-annotated CoNLL-U sentence from the CHILDES-Providence corpus, with added parenthetical explanations of sentence-level metadata. Enhanced UD (EUD) relations are added deterministically by the script at https://github.com/amir-zeldes/gum/blob/master/_build/utils/eng_enhance.ini.

developed gold-standard UD annotations by automatically transforming GR annotations and manually correcting them. Their dataset includes child-directed speech from the Adam data of the Brown corpus and the Hebrew Hagar corpus (Berman, 1990), addressing spoken-language-specific phenomena such as repetitions and non-standard vocabulary, as well as a mapping to semantics.

Building upon these efforts, Liu and Prud’hommeaux (2023) significantly expanded UD annotations to cover utterances from 10 children aged 18–66 months (Adam from the Brown corpus as well as 9 children from other corpora), incorporating both child and caregiver speech. Their work tackles complex spoken-language features, including speech repairs and restarts.

Although Liu and Prud’hommeaux (2021, 2023) provide manually corrected UD trees, their annotations are inconsistent with the UD v2 framework, lack Universal Part-of-Speech (UPOS) tags, and have not been independently verified. Szubert et al. (2024) offer verified data, but they follow the UD v1 annotation guidelines. To date, there is no official UD release for CHILDES speech data.

3 Annotations

3.1 Data Source & Statistics

This work leverages three existing UD treebanks: Szubert et al. (2024) (henceforth **S+24**), Liu and Prud’hommeaux (2021) (**LP21**), and Liu and Prud’hommeaux (2023) (**LP23**), summarized in Table 1. As these treebanks were already annotated, our human annotation efforts focused primarily

on correcting errors and harmonizing annotations across corpora. We present post-compilation statistics in Tables 1 and 2. Table 1 summarizes the full corpus and its source contributions, and Table 2 provides per-child statistics.

In the official UD release, we divide the corpus based on the children’s names and genders. The training and dev splits (90% and 10%, respectively) are constructed from the data of Adam, Lily, Naima, Sarah, Roman, Laura, and Abe. The corpora of Eve, Violet, Emma, and Thomas are reserved for the test split. Details are reported in Table 3.

3.2 Annotation Pipeline

Following Liu and Prud’hommeaux (2023), we collect CHILDES corpora using the R package childsr (Sanchez et al., 2019).³ Sentence normalization can be found in the paper. As the data from LP21 and LP23 are only parsed but not tagged yet, sentences with existing dependency annotations are identified and automatically tagged with UPOS using stanza (Qi et al., 2020), while unannotated sentences are assigned both UPOS and dependency trees. Our current work focuses on correcting previously human-annotated data. To ensure conformity with UD guidelines, we run all processed sentences through the UD validation tool⁴ and manually fix those that fail validation. The correction work is performed by three linguistics graduate students trained in UD annotation. In

³<https://langcog.github.io/childes-db-website/>

⁴<https://github.com/UniversalDependencies/tools/blob/master/validate.py>

| Split | Children | Corpus | Gold Sents |
|-------|---|---|------------|
| Train | Adam, Lily, Naima, Sarah, Roman, Laura, Abe | Brown, Providence, Weist, Kuczaj, Braunwald | 34,732 |
| Dev | Adam, Lily, Naima, Sarah, Roman, Laura, Abe | Brown, Providence, Weist, Kuczaj, Braunwald | 3,860 |
| Test | Eve, Violet, Emma, Thomas | Brown, Providence, Weist, Thomas | 9,591 |

Table 3: Data splits for the official UD_English-CHILDES with associated children, corpora, and gold-standard sentence counts.

total, we made approximately 8,000 corrections.

Many of the errors stem from mismatches between UPOS tags and dependency labels (as LP21 and LP23 used automatic UPOS tagging). In addition, we address format issues such as multiword tokens, spacing mismatches (e.g., SpaceAfter), and deprecated dependency relations not supported by current UD guidelines (e.g., compound:svc, obl:about_like, nmod:over_under). The 5 most common linguistic issues were as follows:

advmod tagged as ADP This error commonly appears with phrasal verbs such as *get up* and *take over*. The original annotation assigns advmod as the dependency relation to phrasal verbs with POS tag ADP. We revise these to compound:prt, in accordance with the UD treatment of phrasal particles.

Auxiliaries tagged as VERB or PART Auxiliaries such as *be* and *have* are frequently misclassified as main verbs or particles. In some cases, lemmas are also mislabeled—most notably, the lemma of contracted forms like *'s* is incorrectly assigned as *'s* rather than the appropriate auxiliary *be*. We correct both the POS and lemma annotations in these cases.

Lexical items tagged as PUNCT The stanza parser often mislabels disfluent word fragments in spontaneous speech as punctuation marks (e.g., *OK/INTJ Adam/PROPN ride/VERB dat/PUNCT /PUNCT*). We reassign these tokens appropriate UPOS labels based on context and speaker intent, often as interjections.

Determiner misrecognition Ambiguous or reduced forms of determiners—such as *de*—are frequently misidentified as proper nouns (PROPN). We manually review these cases and reannotate them as DET when appropriate.

Function word heads with dependents In previous treebanks, words appearing in functional relations such as case, mark, and aux have been assigned children, which violates UD’s constraint that these words should be leaf nodes. We reassign the erroneous dependents to the appropriate content heads, ensuring the structure conforms to UD’s projectivity and function word constraints.

3.3 Harmonization

Each treebank follows its own annotation guidelines, which are largely based on UD but not fully compliant. We performed a series of normalization steps to harmonize them into a consistent format. Our unified format is primarily based on LP23, with several adaptations described below.

Metadata In our normalized CoNLL-U files, we include the following metadata fields with an example provided in Figure 2: *sent_id* (normalized sentence IDs); *original_sent_id* (utterance ID retrieved via the *childevs* R package); *childevs_toks* (tokenized utterance); *corpus_name* (original corpus name); *gold_annotation* (indicates whether the sentence is manually annotated); *speaker_gender*, *speaker_role*, and *speaker_age* (speaker/child metadata); *text* (the text aligned with the tree), and *type* (sentence type). Table 4 summarizes the distribution of the main sentence types and compares them with those in the UD 2.15 release of GUM (Zeldes, 2017), a multi-genre English corpus. Notably, questions occur in the CHILDES conversations at a much higher rate—they are nearly half (45%) as frequent as declarative utterances, as opposed to 9% in GUM.

| Type | CHILDES | | | GUM Overall |
|-------------|---------|--------|---------|-------------------|
| | CDS | CS | Overall | |
| declarative | 16,112 | 15,884 | 31,996 | 7,695 (dec1) |
| question | 2,882 | 11,413 | 14,295 | 716 (q, wh) |
| imperative | 509 | 288 | 797 | 1,326 (imp, intj) |
| emphatic | | | | |
| others | 601 | 494 | 1095 | 2,409 |

Table 4: Sentence type counts in gold CHILDES and GUM corpora. **Question** includes *question*, *self interruption question*, *trail off question*, and *interruption question*. **Others** encompasses less frequent categories: *trail off*, *interruption*, *self interruption*, and *quotation next line*.

Punctuation To bring the transcripts in line with written English conventions, we capitalize the first word of each utterance and infer sentence-final

| Metrics | Children’s speech | Parents’ speech | Overall |
|---------|-------------------|-----------------|---------|
| LAS | 81.2 | 86.3 | 84.2 |
| UAS | 87.2 | 91.0 | 89.5 |

Table 5: LAS and UAS scores for children’s speech, parents’ speech, and overall performance.

punctuation at the end of each sentence based on the sentence type provided in the metadata.⁵

Reparandum Each of the three treebanks defines its own subtypes for the reparandum and parataxis relations. For example, S+24 includes labels such as parataxis:repeat not present in the current UD guidelines. Similarly, LP21 and LP23 annotate reparandum with subtypes such as restart and repetition to mark special utterance features of children’s speech. To ensure consistency across treebanks, we move all such subrelation information to the MISC column.

Others As S+24 was annotated using the UD guidelines version 1.0, we convert the annotation using UD version 2.0 with a script⁶ and manual annotation. For example, we shifted the head-dependent direction of flat in the annotations.

Since S+24 and LP23 overlap in the Adam corpus, we merged the annotations from these two treebanks. 3375 sentences are repetitive in S+24. We removed these sentences from our corpus.⁷

To ensure a more linguistically plausible analysis, we also diverged from Liu and Prud’hommeaux (2023) in our treatment of interjections. Instead of annotating utterances consisting solely of interjections (e.g., *Ha ha ha ha*) as conj, we used the flat relation.

3.4 Silver Data Assessment

To create silver-standard annotations, we apply stanza to the utterances that were not sampled by the previous treebanks (but were from the same CHILDES datasets, i.e. conversations involving the 11 children in Table 2). To estimate the quality of these silver annotations, we evaluate the parser’s performance on the gold-standard data. We report Labeled and Unlabeled Attachment Scores (LAS/UAS) in Table 5. The parser achieves an overall LAS of 83.3. Performance is higher on parents’

⁵The original data transcribes various kinds of prosodic information such as pauses. At present we do not retain this information or attempt to infer corresponding punctuation like commas and parentheses.

⁶<https://github.com/UniversalDependencies/tools/tree/master/v2-conversion>

⁷883 sentences from S+24 could not be merged because S+24 and LP21 are using different data sources, and were therefore removed from our treebank as well.

speech (86.3 LAS) than on children’s speech (81.2 LAS), likely due to the greater syntactic regularity and lower frequency of disfluencies in adult utterances. The overall high-quality data can be more easily verified by human annotators than annotated from scratch. It also provides valuable training data for improving parsers on spoken language.

4 Conclusion & Future Work

In this paper, we present the first harmonized UD treebanks for CHILDES, covering 11 corpora and over 48k sentences from both child-directed and child-produced speech. The three datasets we compiled do not preserve conversational structure, and as a result, the finalized gold-standard treebank lacks coherent dialogue sequencing. Preserving such structure would require additional manual annotation to make sure all sentences are gold. However, since our annotations include the original_sent_id field, reconstructing the conversation structure is straightforward. Furthermore, morphological features have not been annotated or independently verified. Future work will focus on further corrections to the silver-standard data and the continued expansion of the treebanks. We welcome collaboration on this ongoing effort.

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A Sources of the Coprora

In this work, we include the sources from the following corpora:

- <https://chil实现s.talkbank.org/access/Eng-NA/Braunwald.html>
- <https://chil实现s.talkbank.org/access/Eng-NA/Brown.html>
- <https://chil实现s.talkbank.org/access/Eng-NA/Kuczaj.html>
- <https://phon.talkbank.org/access/Eng-NA/Providence.html>
- <https://chil实现s.talkbank.org/access/Eng-UK/Thomas.html>
- <https://chil实现s.talkbank.org/access/Eng-NA/Weist.html>