

Annotation of Relative Forms in the Egyptian-UJaen Treebank

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Abstract

Relative forms are adjective finite verb forms that can be used in an attributive or a nominal function. They pose a challenge when annotating them according to the Universal Dependencies approach, for they have morphological features of both verbs and adjectives, yet they can also be used syntactically as nouns. The aim of this paper is to discuss the morphosyntactic methodology applied to their annotation in the Egyptian-UJaen treebank.

1 Introduction

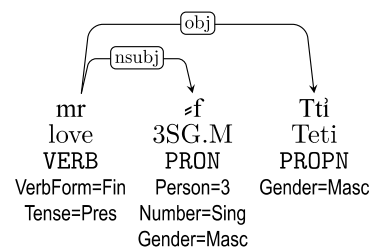
The Egyptian-UJaen treebank in Universal Dependencies (hereafter UD-EUJA treebank) contains 21,945 words and 2,192 sentences,¹ most of which are taken from the Pyramid Texts written in Old Egyptian (ca. 2700–2000 BC).² Since the beginning of this UD treebank in March 2024, the annotation of Egyptian morphosyntactic features according to the Universal Dependencies approach has been a challenge, not only because of the idiosyncrasy of Old Egyptian, but also because of the lack of dependency grammar works by Egyptian philologists.³

The present paper is the first of a series of studies on the annotation of Egyptian

morphosyntactic features in the UD-EUJA treebank. The aim of these studies is to discuss issues arising from the application of the UD approach (De Marneffe, Manning, Nivre and Zeman, 2021) on Egyptian syntax.

The Old Egyptian relative forms have been chosen as the subject of this paper because of their idiosyncratic nature.⁴ They have certainly been described as hybrid forms, half participle, half personal verb forms, which deviate more than any other verb form from the categories we know from the classical languages.⁵ A relative form differs from a verb form in two ways. Firstly, the antecedent of a relative form is the dependent of a verb form, for example the antecedent of a relative form can be the object of a verb form. Secondly, the relative form agrees in gender and number with its antecedent, cf.:

1) Example of a verb form followed by its subject and object, PT 535a T (EUJA-1607):



‘(...) he loves Teti.’

¹ The present paper is based on the latest version of the treebank published in UD release 2.16 (May 2025).

² The Pyramid Texts have been edited by Sethe (1908–22) and by Allen (2013). Both works have been used for the annotation of the Pyramid Texts in the UD-EUJA treebank.

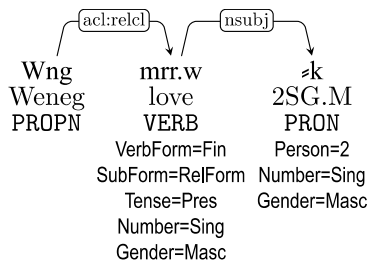
³ For issues related to the inception and development of the UD-EUJA treebank see Díaz Hernández and Passarotti 2024.

⁴ Relative forms disappeared in later stages of Egyptian. In Coptic they were replaced by

constructions with the relative pronoun $\epsilon\tau$ -, $\epsilon\tau\epsilon$ -, $\bar{\eta}\tau$ -, see Loprieno, 1995, 98.

⁵ “... cette forme hybride, moitié participe, moitié mode personnel, et qui s’écarte plus que toute autre des catégories que les langues classiques nous ont rendues familières.” Sottas, 1925, 264, quoted by Polotsky, 1976, 2, footnote 2. English translation: “... this hybrid form, half-participle half-personal form, deviates more than any other from the categories that classical languages have made familiar to us”.

2) Example of a masculine relative form, PT 607d T (EUJA-1771):



‘(...) Weneg whom you love.’

This paper deals with the following issues:

- General features of the relative forms and their annotation in the UD-EUJA treebank (2).
- Morphological features of the relative forms: gender, number and the *i* prefix (also called “prothetic”) (3).
- A semantic classification of four relative verb forms—a past/perfective relative form (or past-2 relative form), a present/imperfective relative form, a future/perfect relative form, and Clère’s past relative form (or past-1 relative form) (4).
- A syntactic analysis (5) consisting of two parts based on the dual function of the relative forms. These can be attributive relative forms, modifying an antecedent, or nominal relative forms that function syntactically as nouns. Special focus will be laid on the change of the dependency relationship in the nominal relative forms.
- A conclusion (6).

2 General features of the relative forms

A relative form is an adjective *finite* verb form (Polotsky, 1976, 4, 13 and Schenkel, 2012, 279). It is adjective-like for it modifies and agrees with a noun, and it is verb-like for it is finite and has a subject. In Earlier Egyptian, which includes Old Egyptian and Middle Egyptian, relative forms contrast with participles, which are adjective *non-finite* verb forms, i.e. they lack a personal inflection.⁶

⁶ A morphosyntactic comparison of relative forms and participles should be taken into account when analysing the annotation of participles in the UD-EUJA treebank.

The UD-EUJA treebank contains currently 190 relative forms. The following features are used to annotate relative forms in the UD-EUJA treebank:

1) UPOS column: VERB.

2) FEATS column:

- Gender of the relative form (Gender=Masc/Gender=Fem).
- Number of the relative form (Number=Sing/Number=Plur).
- Nominal function (Nominal=Yes) (see 5.2, below).
- A prefix *i* (Hebrew *yodh*) occasionally used in relative forms (see Table 3, Appendix). It is annotated with the key “Prefix=Yodh”.
- Verb class to which the verb of the relative form belongs.⁷ As in other languages such as Arabic, the Earlier Egyptian verb system can be classified into verb classes according to the morphology of the verb. There are verbs with 1 to 6 radicals (Schenkel 2012: 183). If all radicals are strong, the abbreviation *lit* (literal) is used, for example *çt* “say” is a 2-*lit.* verb. If the last radical is weak, the abbreviation *inf* (*infirma* i.e. weak) is used, for example *mrj* “love” is a 3*ae-inf* verb. Verbs with a reduplicated radical are labelled *red.* (*reduplicata*) while causative verbs bear the abbreviation *caus.*
- Verb tense to which the Egyptian tense corresponds (see features in MISC column, below). While “Tense=Pres” and “Tense=Fut” usually matches in MISC column and FEATS column, “Tense=Past” in FEATS column can be used for “Tense=Past-1” and “Tense=Past-2” in MISC column.
- The key SubForm=RelForm identifies a relative form.

3) MISC column:

- Egyptian tense indicated by four keys (see section 4, below): Tense=Past-1, Tense=Past-2, Tense=Pres, Tense=Fut.

⁷ See the list of Egyptian verb classes in <https://universaldependencies.org/egy/feat/VerbClass.html#examples>.

3 Morphological features

In its current state the UD-EUJA treebank contains 88 masculine relative forms. 83 of which are singular and 5 are plural. The masculine singular relative forms usually lack an ending. However, a *w* ending referring to a masculine singular antecedent is occasionally added when the tense of the relative form is present (Gardiner, 1957, 297/§ 380; see examples taken from the UD-EUJA treebank in Table 1, Appendix).⁸ In contrast, masculine plural relative forms occasionally feature a *w* in past-2 relative forms (see examples taken from the UD-EUJA treebank in Table 2, Appendix)

2) Example of a masculine relative form, PT 607d T (EUJA-1771, see diagram, above):

<i>Wng</i>	<i>mrr.w</i>	<i>≠k</i>
Weneg-GN	love:REL.PRES-M.SG	=2SG.M

“(…) Weneg whom you love.”

If the antecedent is feminine, the ending of a relative form is *t*. There are 102 feminine singular relative forms in the UD-EUJA treebank. No feminine plural relative form has been annotated so far. The *t* ending is also used in relative forms with a neuter meaning (Gardiner, 1957, 297/§ 380 and Loprieno, 1995, 86; cf. ex. 16, below). The gender of relative forms with neuter meaning is annotated as feminine in the FEATS column, as their morphological gender remains feminine.

3) Example of a feminine relative form, PT 38c W (EUJA-179):

<i>ir.t</i>	<i>Hr.w</i>	<i>šhn.t</i>	<i>≠k</i>
eye-F.SG	Horus-GN	embrace:REL.FUT- F.SG	=2SG.M

“(…) The eye of Horus which you shall embrace (…)”

An *i* prefix, also called “prothetic” (Uljas, 2023 and Stauder, 2014, 256), is occasionally added to the relative forms. The *i* prefix only appears with certainty in past-2 and present relative forms (see Table 3, Appendix).⁹ The causative verb with the second reduplicated radical (caus. 2ae-red.) *š:fkkn*

⁸ The PT column provides the reference to the hieroglyphic text in Sethe (1908–1922) and the EUJA column indicates the id sentence in the Egyptian treebank.

⁹ The instance of *i:nšb.t* annotated as a past-1 relative form is probably another instance of a past-2 relative form with omission of the ending *n* (cf. *i:nšb.tn* in PT 98c).

and the verbs with the fourth weak radical (4ae-inf.) *nšbj* and *hḥmj* occur with the *i* prefix in the past-2 relative form, while the verb with the third reduplicated radical *šh³³* (3ae-red), the verb with two strong radicals (2-lit) *čt* and the verb with the third weak radical (3ae-inf) *šmj* are used with the *i* prefix in the present relative form.

4 Semantic function

Since relative forms are verb forms, they are characterised by verb features. However, there is no general agreement on the terminology and semantic function of relative forms. While some authors emphasise their aspect feature using the terms “perfective”, “imperfective” and “perfect” (Allen 2010: 354, Borghouts 2010: 277–278), others consider them tenses and classify them as past, present and future relative forms (Ockinga 2005: 67–69 and Schenkel 2012: 280). Despite this disagreement, most grammars concur that there are three relative forms:¹⁰

a) A past/perfective relative form (or past-2 relative form) characterised by the ending *n* and annotated with the keys “Tense=Past-2” in the MISC column and “SubForm=RelForm” in the FEATS column of the UD-EUJA treebank, e.g.:

4) PT 77a W (EUJA-1552):

<i>ir.t</i>	<i>Hr.w</i>	<i>ith.tn</i>	<i>≠f</i>
eye-F.SG	Horus-GN	pull out:REL.PAST-2-F.SG	=3SG.M

“(…) the Eye of Horus which he pulled out.”

b) A present/imperfective relative form characterised by the reduplication of the second radical in verbs with a third weak radical (3ae-inf), such as *mri* “to love”. They are annotated with the keys “Tense=Pres” in the MISC column and “SubForm=RelForm” in the FEATS column of the UD-EUJA treebank, e.g.:

5) PT 15 N (EUJA-83):

<i>s³</i>	<i>≠k</i>	<i>mrr.w</i>	<i>≠k</i>
son-M.SG	=2SG.M	love:REL.PRES-M.SG	=2SG.M

“(…) Your son whom you love (…)”

¹⁰ The past/perfective and present/imperfective relative forms are known from Erman’s and Sethe’s works at the end of the 19th century and the beginning of the 20th century, see Erman, 1894, 164–166 (§§ 394–399) and Sethe, 1899, 327 (§ 754 foll.). The future/perfect relative form was discovered later by Gunn (1924, 1–25).

c) A future/perfect relative form characterised by the ending *y* and the absence of a reduplicated second radical in verbs with a third weak radical (*3ae-inf*). They are annotated with the keys “Tense=Fut” in the MISC column and “SubForm=RelForm” in the FEATS column of the UD-EUJA treebank, e.g.:

6) PT 625d T (EUJA-1822):

<i>bw</i>	<i>nb</i>	<i>mr.y</i>	<i>≠k</i>	<i>im</i>
place-M.SG	any	love:REL.FUT-	=2SG.M	there:ADV
	(M.SG)	M.SG		

“(…) any place where you will desire to be (lit: you will desire in it).”

In addition, Clère (1949) and Schenkel (2010) argued for the existence of a fourth relative form with a past tense (past-1 relative form). It occasionally features a *w* ending in verbs with the third weak radical (*3ae-inf*), such as *mšj* “to bear, to give birth” and in verbs with three strong radicals (*3-lit*), such as *šnk* “to suck”. Contrary to the present relative form, the second radical of verbs with the third weak radical is not reduplicated in the past-1 relative form, e.g.:

7) PT 623a T (EUJA-1814):¹¹

<i>ih</i>	<i>mš.w</i>	<i>Nw.t</i>	<i>šnk.w</i>	<i>Nb.t-ḥw.t</i>
spirit-	give	Nut-GN	suckle	Nephthys-
M.SG	birth:REL.		birth:REL.	GN
	PAST-1-F.SG		PAST-1-F.SG	

“(…) The spirit whom Nut bore, whom Nephthys suckled (…)”

This relative form is annotated with the keys “Past-1” in the MISC column and “SubForm=RelForm” in the FEATS column of the UD-EUJA treebank. According to Schenkel, the past-1 relative form is an archaic feature that was gradually replaced by the past-2 relative form with an *n* ending (Schenkel, 2010, 66).

5 Syntactic analysis

5.1 Attributive function

There is a general consensus that adjective relative forms form relative clauses in Earlier Egyptian (Gardiner, 1957, 148/§195, Collier, 1991, 24, Allen, 2010, 353, Schenkel, 2012, 282). As an attributive relative form is used as a relative clause that modifies a nominal antecedent, its dependency

¹¹ See further examples in Schenkel, 2010, 70.

¹² There are other types of Earlier Egyptian relative clauses that are formed without relative forms.

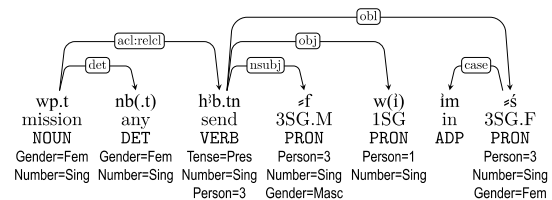
relationship is annotated as “acl:relel” in the UD-EUJA treebank.¹² The UD-EUJA treebank contains 126 relative forms in attributive function, which can be classified into two types according to the syntactic construction:

a) The antecedent corresponds to the object of a relative form, in which no resumptive pronoun is used to refer to the antecedent (Schenkel, 2012, 283, adjective form type II), see examples 2–5 and 6, above.

b) The antecedent corresponds to any other (potential) dependent of the relative form different from its object (Schenkel, 2012, 283, adjective form type III). In this case, the antecedent is referred to by a resumptive pronoun in a non-core (oblique) argument or adjunct governed by the relative form (Polotsky, 1976, 10). The type of argument or adjunct determines the correspondence between antecedent and resumptive pronoun (Polotsky, 1976, 11):

— If the antecedent corresponds to an adverbial adjunct (obl), a resumptive pronoun, attached to a preposition and governed by the relative form, refers to the antecedent:

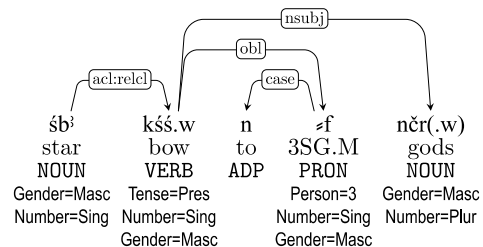
8) Edel 2008 (eds. Seyfried/Vieler): pl. XXXIII–XXXIV, cols. 6–7 (EUJA-33):



‘every mission on which he sent me’

— If the antecedent corresponds to an oblique argument with a dative function (obl:arg), a resumptive pronoun, attached to the preposition *n* “to/for” and governed by the relative form, refers to the antecedent:

9) PT 537b T (EUJA-1611):

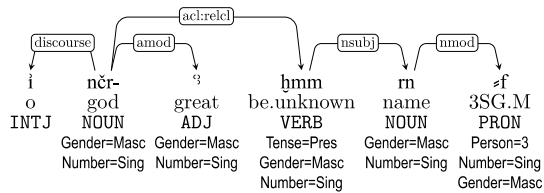


‘a star to whom the gods bow’

However, these are outside the scope of the present paper.

— If the antecedent corresponds to a possessive nominal modifier, a resumptive pronoun referring to the antecedent is attached to a noun governed by the relative form:

10) PT 27a W (EUJA-893):

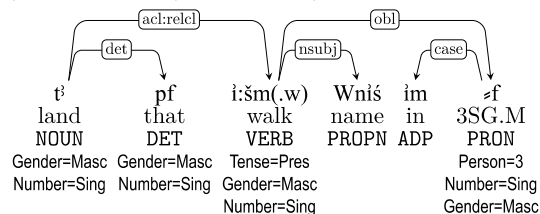


‘o great god whose name is unknown’

Lit.: “O great god that his name is unknown (...)”

Intransitive verbs are used with resumptive pronouns when the antecedent corresponds to any other dependent of the relative form different from its object (Gardiner, 1957, 299/§ 384, Polotsky, 1976, 8, type IIBb):

11) PT 382a W (EUJA-1193):



‘that land in which Unas walks’

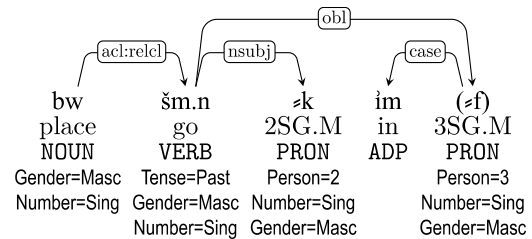
It should be noted that the resumptive pronoun is often omitted after *im* (Gardiner, 1957, 300/§ 385), especially when it is a third person masculine or feminine suffix pronoun, for example:

12) PT 615a–b T (EUJA-1794):

bw *šm.n* *≠k* *im*
 place- go:REL.PAST-1- =2SG.M ?
 M.SG M.SG

“(...) the place where you have gone.”

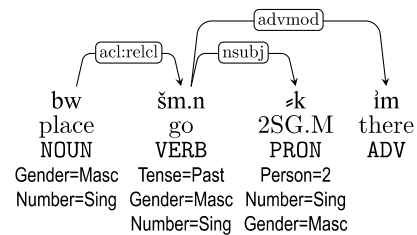
In this case the question arises: Is *im* the preposition *m* “in” in the pronominal state and its suffix pronoun is omitted in the hieroglyphic text, even though it was spoken? If the answer is yes, the suffix pronoun should be added in brackets and linked to the relative form in the tree diagram:



‘the place where you have gone’

Lit.: “(...) the place which you have gone in (it).”

However, if *im* is the adverb *im* “there, thereof” (Allen 2010: 136), then no suffix pronoun should be added and *im* is linked to the relative form:



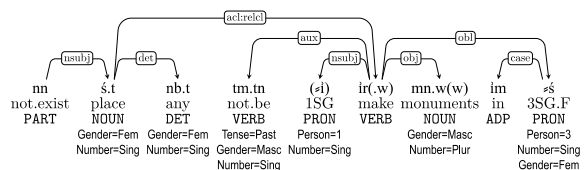
‘the place where you have gone’

Lit.: “(...) the place which you have gone there.”

The second option has been preferred for the annotation of relative forms followed by *im* in the UD-EUJA treebank.

Relative forms are negated in Middle Egyptian by means of the verb *tm* “not be” used as an auxiliary. The following example taken from a Middle Egyptian text has been exceptionally annotated in the UD-EUJA treebank¹³ as no instance of *tm* used to negate a relative form is found in Old Egyptian texts (Edel, 1955/64, 340):

13) Gardiner, 1957, 315/§397, (EUJA-2036):



‘There was not any place in which (I) did not make monuments.’

“There was not any place in which (I) did not make monuments.”

As this example shows, *š.t nb.t* “any place” is the antecedent of the past-2 relative form *tm.tn (≠i)* “(I) did not (lit.: was not).”¹⁴ Since this negative relative form is used as an auxiliary and, following the UD approach, the lexical verb *ir(.w)* “make” used as a

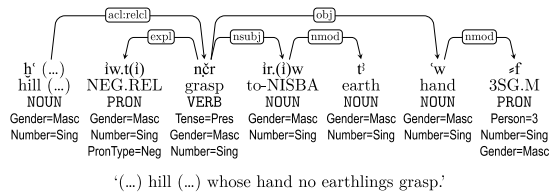
¹³ The systematic annotation of Middle Egyptian texts in the UD-EUJA treebank will begin after having finished annotating the Old Egyptian text corpus.

¹⁴ The “negational complement” is a non-finite adverbial verb form used after negative verbs, see Schenkel, 2012, 272–273.

negatival complement¹⁵ is the head of the relative clause, *ir(.w)* is linked to the antecedent in the tree diagram.

In Old Egyptian the negative relative pronoun *iw.ti*¹⁶ occurs instead of the negative auxiliary *tm* used as a relative form to express a negative relative clause. Although *iw.ti* agrees in gender and number with its antecedent, its relationship to the verb form of the relative clause is unclear, as its syntactic function differs from that of the core arguments (subject, object and indirect object) and an oblique argument. For this reason, *iw.ti* is provisionally annotated as an expletive or pleonastic nominal (expl) in the UD-EUJA treebank, e.g.:

14) PT 1022a P (EUJA-2037):

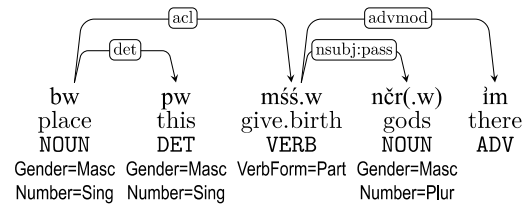


“(...) The hill (...) whose hand no earthlings grasp (lit.: the hill (...) which no earthlings grasp his hand).”

Here the verb form *nšr* “grasp” has its own subject (*ir.(i)w* “earthlings (lit.: those concerning the earth)”) and object (*w šf* “his hand”), while the negative relative pronoun *iw.ti* acts as a negative connector between its antecedent (*h* “hill”) and the verb form *nšr*.

As for the passive, there are no passive relative forms (Polotsky, 1976, 8)¹⁸ because passive participles are used instead, e.g.:

15) PT 353b T (EUJA-1121):



‘this place where the gods are born’

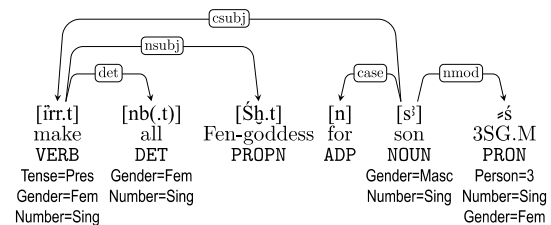
In this sentence *mšš.w* “born” is a present passive participle, *nšr(.w)* “gods” its subject (nsubj:pass) and *im* “there” its oblique argument (obl). The sentence literally means “(...) This place, the gods are born there (...)”.

5.2 Nominal function

As with adjectives and participles, relative forms can syntactically have a nominal function, when they occur in a position where a noun is expected (Sethe, 1899, 328). The hieroglyphic spelling of a relative form features no morphological difference in attributive and nominal functions. There are 61 nominal relative forms in the UD-EUJA treebank.

A nominal relative form can be followed by an adjective, such as *nb* “every” (Sethe, 1899, 328):¹⁹

16) PT 555d T (EUJA-1652):



‘[Whatever the Fen-goddess makes is for] her [son] (...)’

Lit.: “[All what the Fen-goddess makes is for] her [son] (...)”

Although Sethe (1899, 327–329) identified some functions of nominal relative forms, such as subject, predicate (i.e. root), object and nomen

¹⁵ The “negatival complement” is a non-finite adverbial verb form used after negative verbs, see Schenkel, 2012, 272–273.

¹⁶ Although *iw.ti* is originally a nisba adjective (Gardiner, 1957, 152/§ 202), it functions as a relative pronoun (Schenkel, 2012, 342). For the term “nisba” see footnote 17.

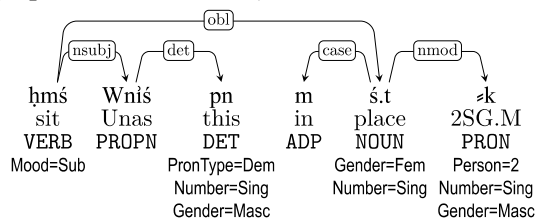
¹⁷ *ir.(i)w* “those concerning” is a nisba derived from the preposition *r* “concerning”. In Semitic languages, such as Arabic, “nisba” is used to label an ending added to nouns, and rarely to prepositions and pronouns, to form

(relative) adjectives and nouns (see Schulz, 2010, 86). The addition of the nisba ending to prepositions to form adjectives and nouns is a common feature in Egyptian, for example the nisba adjective *n.i* “belonging to” derives from the preposition *n* “for”.

¹⁸ Relative forms with *tw* (Old Egyptian *ti*) are used to express a “man-impersonal” active corresponding to “one” in English, see Borghouts, 2010, 283 (79d).

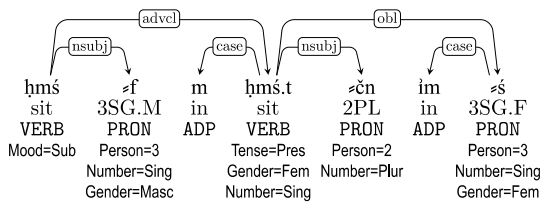
¹⁹ Square brackets ([]) indicate that the text within is restored according to a preserved witness, i.e. a textual variant.

24) PT 367b W (EUJA-1155), an oblique nominal (preposition *m* + a noun):



‘(...) this Unas may sit in your place.’

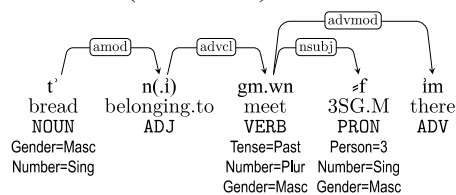
25) PT 129b W (EUJA-422), adverbial clause with a nominal relative form:



‘(...) he may sit on what you sit on (...)’

Likewise, the dependency relationship of a relative form is that of an adverbial clause when it is used as a noun modifying the nisba adjective *n.i* in an “indirect genitive construction”:

26) PT 132d W (EUJA-451):



‘(...) the bread of (lit.: belonging to) those he found there (...)’

“(...) The bread of (lit.: belonging to) those he found there (...)”

In this structure the relative form replaces a noun used as an oblique nominal of an adjective, cf.:

27) PT 242a-b W (EUJA-785):

t' *n(.i)* *it(i)* *ək*
bread-M.SG belonging to-NISBA father-M.SG =2SG.M

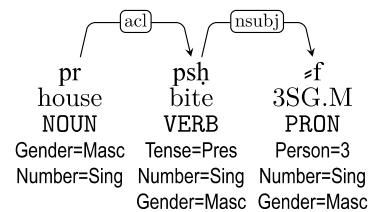
“(...) The bread of (lit.: belonging to) those he found there (...)”

There are 17 relative forms used as adverbial clauses in the UD-EUJA treebank.

5.5 Adnominal clause

The current state of the UD-EUJA treebank contains an instance of a nominal relative form used as an adnominal clause in a “direct genitive”.²²

28) PT 247b W (EUJA-798):



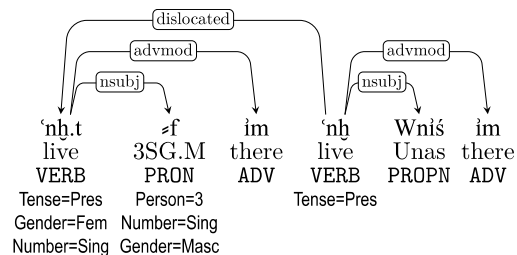
‘(...) the house of the one it should bite (...)’

The nominal relative form *psh əf* is used as a clausal modifier (acl) of the noun *pr* “house” in a “direct genitive”.²³

5.6 Dislocated element

A relative form can be used as a dislocated noun placed in the periphery of the root. There are 10 relative forms used as dislocated elements in the UD-EUJA treebank, e.g.:

29) PT 133d W (EUJA-455):



‘What he lives on, Unas lives on.’

A resumptive pronoun used as a subject or an object may refer to the dislocated nominal relative form, cf.:

30) PT 682d T (EUJA-1976), a resumptive pronoun (*əf*) used as a subject refers to a dislocated nominal relative form (*m^{ββ}*):

m^{ββ} *Ti* *ni* *nh* *əf*
see:REL.PRES- Teti-KN NEG live:FUT =3SG.M
M.SG

“He whom Teti sees, he will not live.”

²² A “direct genitive” is a possessive construction consisting of two nouns—the first is the *nomen regens* and the second is the *nomen rectum*.

²³ Specifically, a relative form is used as a possessive adnominal clause when modifying a noun in a direct genitive. This syntactic dependency should be annotated as *acl:poss*.

31) PT 407c T (EUJA-1271), a resumptive pronoun used as an object (*šw*) refers to a dislocated nominal relative form:

<i>gm.y</i>	<i>šf</i>	<i>m</i>	<i>wʔ.t</i>	<i>šf</i>
find:REL.FUT-	=3SG.M	in:PREP	way-F.SG	=3SG.M
M.SG				

<i>wnm</i>	<i>šf</i>	<i>n</i>	<i>šf</i>	<i>šw</i>
devour:FUT	=3SG.M	for:PREP	=3SG.M	3SG.M

“Whoever he will find in his way, he will devour him (lit. for himself).”

5.7 Vocative

When a dislocated relative form is used as a noun addressing a dialogue participant, it acts as a vocative. There is an instance of a nominal relative form used as a vocative in the UD-EUJA treebank:

32) PT 428a–b W (EUJA-1321):²⁴

<i>nmi</i>	<i>mw.t</i>	<i>šf (...)</i>
turn away:REL.PRES-M.SG	mother-F.SG	=3SG.M

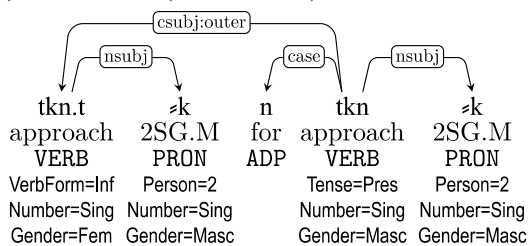
<i>i(w)</i>	<i>šk</i>	<i>rr</i>	<i>m</i>	<i>nn</i>
PART	=2SG.M	PART	like:PREP	DEM:M.SG

“(O) the one whose mother turned (him) away (...), you are really like this.”

5.8 Root

A relative form can be used instead of a noun as a root in an adverbial sentence, e.g.:

33) PT 433b W (EUJA-1334):



‘Your approach is for the one you approach.’

The adverbial predicate of this sentence consists of the preposition *n* “for” followed by the nominal relative form *tkn šk* “the one you approach”.

6 Conclusion

The annotation of Old Egyptian relative forms in the UD-EUJA treebank was challenging due to their morphological particularities and dual syntactic function. There are four types of relative forms according to their tense—past-1, past-2,

present and future relative forms. The dual syntactic function of relative forms has also been taken into account when annotating them in the UD-EUJA treebank. On the one hand, attributive relative forms are defined as “acl:relcl” because they form relative clauses that modify an antecedent. On the other hand, nominal relative forms are annotated as nominal clauses with different syntactic functions.

The morphosyntactic analysis of the Old Egyptian relative forms has demonstrated the effectiveness and accuracy of the UD-EUJA treebank in finding all instances of a given grammatical feature or structure. It contributes to the analysis of morphological particularities, such as the occasional masculine ending *w* in the present relative form (see Table 1, Appendix) or the use of the *i* prefix in relative forms (see Table 3, Appendix). When the annotation of the Pyramid Texts and the historical-biographical texts of the Old Kingdom is completed, it will be possible to carry out a thorough analysis of each Old Egyptian morphosyntactic feature, including the relative forms.

The development of the UD-EUJA treebank will enrich general linguistics, as Egyptian is characterised by idiosyncratic features. A good example of this is the use of relative forms, which are rarely found in other languages, notably Indo-European languages.

Future studies using the UD-EUJA treebank will focus on the dual function of adjective features in Old Egyptian, such as the participles that allow attributive and nominal functions as do relative forms.

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²⁴ For this example, see Allen, 2017, 188 and 345.

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A Appendix: Tables

Lemma	RelForm	EUJA	PT
Tense=Present			
w ^h “lay down”	w ^h .w + SF	1994	685d T
w ^b “be pure”	š:w ^b .{i}w + SF	1406	457b W
pr ⁱ “go out”	pr:r.w + SF	1506	496b W
mri “love”	mrr:w + SF	83 1771	15 N 607d T
nwr “shake”	nwr:w	495	143a W
nwh “rope”	nwh.w	2077	719d T
nč “protect”	nč.w	700	215c W
h ^b “send”	h ^b .w + SF	1256	402c W
hms ⁱ “sit”	hms.w	2077	719d T
šh ³ “row”	š:šš ³ .w + SF	299	82a W
št ³ “tremble”	št ³ .w	495 1611	143a W 537b T
šmi “go”	i:šm.w	1194	382a P
šsp “accept”	šsp.w + SF	1166	372e W
kšj “bend down”	kšs.w	1611	537b T
w ⁱ “put”	ii.w + SF	1993	685c T
čt “say”	čt.w	824	254c W
čt “say”	i:čt.w	1932	665a T

Table 1. PT = Pyramid Texts; SF = Suffix pronoun; W = Unas; T = Teti; N = Pepi II.

Lemma	RelForm	EUJA	PT
Tense=Past-2			
<i>wṭj</i> “put”	<i>wṭ.wn</i> + SF	1428	464b W
<i>gmj</i> “find”	<i>gm.wn</i> + SF	451	132d W
<i>čš</i> “tie”	<i>č(š).wn</i>	768	234c W

Table 2. EUJA = sentence id; PT = Pyramid Texts; SF = Suffix pronoun; W = Unas.

Lemma	RelForm	EUJA	PT
Tense=Past-1 (?)			
<i>nšbj</i> “lick”	<i>i:nšb.t²⁵</i> + SF	347	104b N
Tense=Past-2			
<i>ḥkk</i> “devastate”	<i>i:š:ḥkk.tn</i> + SF	1551	51a W
<i>nšbj</i> “lick”	<i>i:nšb.tn</i> + SF	328	98c W
<i>nšbj</i> “lick”	<i>i:nšb.n</i> + SF	745	228b W
<i>ḥḥmj</i> (unclear meaning)	<i>i:ḥḥm.tn</i> + SF	260 1559 2165	61b W 89c W 89c T
Tense=Pres			
<i>šḥ³³</i> “row”	<i>i:šš³.w</i> + SF	299	82a W
<i>šmj</i> “go”	<i>i:šm</i> + SF	1932	665c T
<i>šmj</i> “go”	<i>i:šm.w</i>	1194	382a P
<i>čṭ</i> “say”	<i>i:čṭ</i> + SF	627	195b W
<i>čṭ</i> “say”	<i>i:čṭ.t</i> + SF	1491	491d W
<i>čṭ</i> “say”	<i>i:čṭ.w</i>	1932	665a T

Table 3. EUJA = sentence id; PT = Pyramid Texts; SF = Suffix pronoun; W = Unas; T = Teti; P = Pepi I; N = Pepi I

²⁵ *i:nšb.t<n>* (?).