

For the Purpose of Curry: A UD Treebank for Ashokan Prakrit

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Abstract

We present the first linguistically annotated treebank of Ashokan Prakrit, an early Middle Indo-Aryan dialect continuum attested through Emperor Ashoka Maurya’s 3rd century BCE rock and pillar edicts. For annotation, we used the multilingual Universal Dependencies (UD) formalism, following recent UD work on Sanskrit and other Indo-Aryan languages. We touch on some interesting linguistic features that posed issues in annotation: regnal names and other nominal compounds, “proto-ergative” participial constructions, and possible grammaticalizations evidenced by *sandhi* (phonological assimilation across morpheme boundaries). Eventually, we plan for a complete annotation of all attested Ashokan texts, towards the larger goals of improving UD coverage of different diachronic stages of Indo-Aryan and studying language change in Indo-Aryan using computational methods.

1 Introduction

Ashokan Prakrit is the earliest attested stage and among the most conservative known forms of Middle Indo-Aryan (MIA), represented by inscriptions in the form of rock and pillar edicts commissioned by the Mauryan emperor Ashoka (*aśōka*¹) in the 3rd century BCE. The Indo-Aryan languages are the predominant language family in the northern (and insular southern) parts of the Indian subcontinent, and constitute a branch of the widespread Indo-European family. They are generally divided into three historical stages: Old Indo-Aryan (OIA; Sanskrit, both the language of Vedic and of later Classical texts, as well as unattested varieties suggested by dialectal variation in later stages), Middle Indo-Aryan (MIA; Ashokan Prakrit, Pali, the Dramatic Prakrits, and early koinés of the Hindi Belt), and New Indo-Aryan (NIA; modern Indo-Aryan languages such as Hindi–Urdu, Assamese, Marathi, Dhivehi, Kashmiri, Khowar, etc.).

Diachronically, Ashokan Prakrit is a descendant of Old Indo-Aryan varieties (some of which are attested through Vedic and Classical Sanskrit) and is a precursor to regional fragmentation of Middle Indo-Aryan into Pali, the Dramatic Prakrits, and eventually the NIA languages. Ashokan Prakrit is a dialect continuum rather than a standardized language, but the three dialect zones are not divergent enough to prove mutually unintelligible (Oberlies, 2003).

Universal Dependencies (Nivre et al., 2016; de Marneffe et al., 2021) is a multilingual formalism for treebanking, including annotation guidelines for dependency relations, morphological analysis, part-of-speech tagging, and other linguistic features. Several New Indo-Aryan languages (Bhatt et al., 2009;

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⁰The example of *sūpār^hāya* ‘for the purpose of curry’ (discussed further in §5.3) inspired the title of this paper.

Glossing abbreviations: 1 = first person, 3 = third person, ACC = accusative, ALTER = alterphoric, CAUS = causative, DAT = dative, DEM = demonstrative, EMPH = emphatic particle, F = feminine, GEN = genitive, IND = indicative, INS = instrumental, LOC = locative, M = masculine, N = neuter, NOM = nominative, PASS = passive, PL = plural, PPP = past passive participle, PRS = present, PST = past, SG = singular.

¹Throughout this work, we use a newly devised transliteration scheme, devised by Samopriya Basu, based on the International Alphabet of Sanskrit Transliteration (IAST) which is standard in Indological work, as well as influences from the IPA and Americanist systems. Divergences from IAST are: 1. indication of aspiration and breathy voice with superscript ⟨^h⟩, 2. explicit marking of ⟨ē⟩ and ⟨ō⟩ as long vowels, 3. overdot for visarga ⟨ḥ⟩ and anusvara ⟨ṁ⟩, instead of the underdot, to avoid confusion with retroflexion.

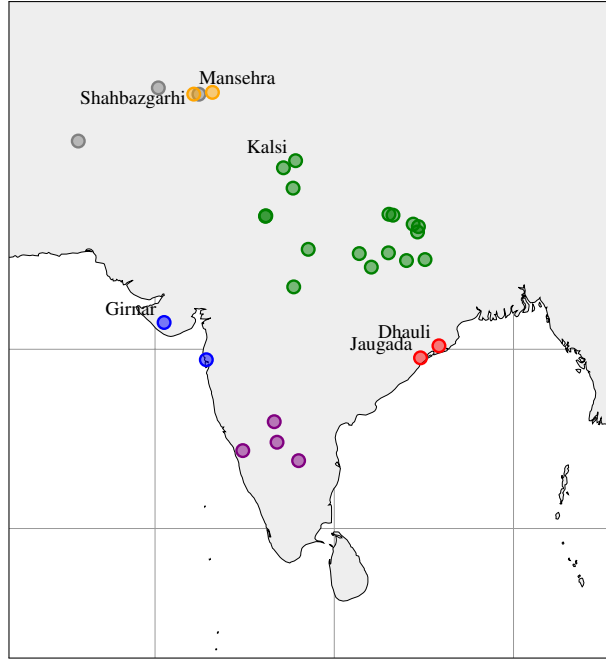


Figure 1: Locations of the various Ashokan inscriptions and edicts in the Indian Subcontinent, coloured by their usual geographic grouping (not by linguistic isoglosses). Points in grey in the northwest are inscriptions that are not in Ashokan Prakrit (instead, Aramaic and Greek).

Tandon et al., 2016; Ravishankar, 2017) and Sanskrit (Kulkarni et al., 2020; Hellwig et al., 2020; Dwivedi and Zeman, 2017) have treebanks annotated using UD or other syntactic formalisms, but thus far there is no treebank for a MIA language, leaving a gap in Indo-Aryan historical corpora. Within MIA, Ashokan Prakrit has an unusual corpus of parallel texts representing multiple geographical dialects, conducive to the study of Indo-Aryan linguistic fragmentation using computational tools.

To this end, we began UD annotation of a digitized Ashokan Prakrit corpus under the **Digitizing Imperial Prakrit Inscriptions (DIPI)**² project. We will present some interesting annotation issues that arose, both in the context of Indo-Aryan comparative linguistics and for the Universal Dependencies annotation scheme, and suggest future directions for historical and dialectological corpus linguistic work in the Indo-Aryan family.

2 Related work

The first Ashokan edicts were deciphered by James Prinsep in the 1830s (Kopf, 1969). Since then, they have played an important role in the historical study of Ashoka and the Mauryan Empire, sociological and religious study on early Buddhism and other heterodox Dharmic sects (Smith et al., 2016; Scott, 1985), and, of course, linguistic work from a historical and social perspective. Figure 1 shows the locations of the known Ashokan inscriptions, with labels on the locations particularly relevant to this paper.

There are several works which attempt a broad comparative study of the inscriptions with reference to Sanskrit (Woolner, 1924; Hultzsch, 1925; Mehendale, 1948; Bloch, 1950; Sen, 1956; Oberlies, 2003). Like most historical linguistic work on IA, these works focus mostly on phonology and, to a lesser extent, morphology to the detriment of syntax and semantics (Varma, 1947).

On the computational side, the only digitized and machine-readable version of the Ashokan edicts is the Ashoka Library (Braarvig et al., 2014), which is sourced from Hultzsch (1925) and thus missing more recently discovered inscriptions.

Other UD corpora and their annotation guidelines were also helpful to our own annotation process, e.g. Scarlata et al. (2020). Hand-prepared Ashokan Prakrit inflectional tables based on data harvested from Mehendale (1948) were of use, in addition to Sanskrit dictionaries (Monier-Williams, 1899; Sircar,

²From Shahbazgarhi, Mansehra *dipi* ‘rescript, writing’, as opposed to the lateralized variant *lipi* attested in other dialects.

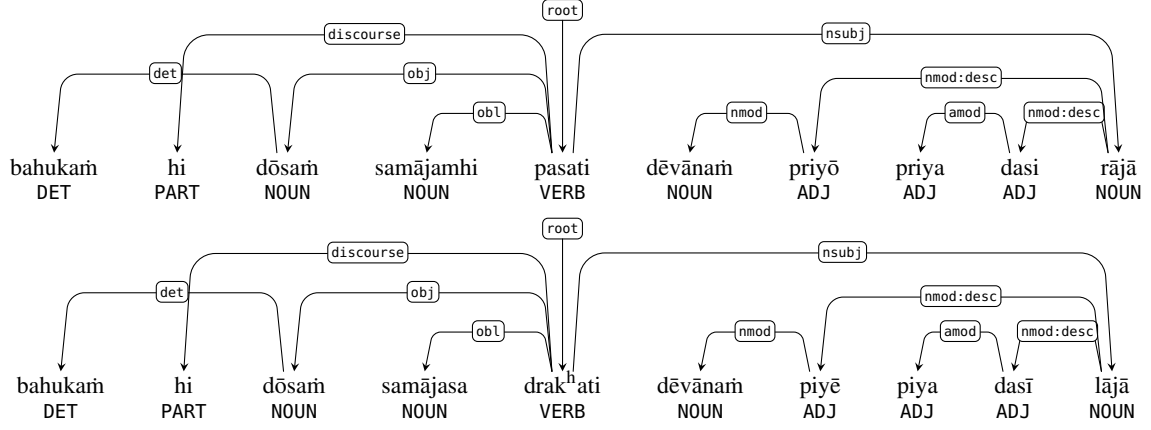


Figure 2: Dependency parse of the fourth sentence of Major Rock Edict 1 as found in two locations. The top is from Girnar, representing the Western dialect, and the bottom is from Jaugada, representing the Eastern dialect.

1966) and morphological analysers (Huet, 2005).³

3 Corpus

The Ashokan Prakrit texts available to us constitute a very limited corpus. They are royal inscriptions concerning the promotion of Buddhist morality, administration of the Mauryan Empire, and records of Ashoka’s magnanimous deeds (such as his conversion to Buddhism). They directly address the public, and all evidence points to Ashokan Prakrit being a semi-standardized but still fairly accurate reflection of vernacular language, given the geographical dialect variation and communicative purpose of the texts.

We began with transcribed edicts from the Ashoka Library (Braarvig et al., 2014). Annotation began in June 2021 and was done in Google Sheets simultaneously by two linguistically-informed annotators with discussions to resolve disagreements. Although Google Sheets is not the conventional choice of tool for such a project, existing UD annotation tools were found to be lacking a convenient means of editing FEATS columns in a CONLLU file, as well as supplying additional columns (e.g. etymologies). Additionally, this allowed us to avoid setting up the server required for collaborative annotation with tools like UD Annotatrix (Tyers et al., 2017) A guidelines document was added to as the analysis of tricky constructions was decided upon.

Given the parallel nature of the corpus, annotations for a particular edict at one location could be transferred with little modification to that of another location. An example of this is given in figure 2, which only shows POS-tag and dependency parse UD annotations of a parallel sentence, glossed below.

- (1) bahukaṁ hi dōsaṁ samājamhi pasati Dēvaṅaṁ-
 very EMPH evil:ACC.M.SG meeting:LOC.M.SG see:PRS.IND.3.SG god:NOM.M.PL
 priyō Priya- dasi rājā
 beloved:NOM.M.SG kindly looking:NOM.M.SG king:NOM.M.SG

‘King Beloved-of-the-Gods Looking-Kindly sees much evil in festival meetings.’ (Girnar 1:4)

Thus, we used the well-preserved edicts at Girnar as the main annotation document, and annotated other editions only after finalising the corresponding Girnar version. Table 1a gives statistics about the annotated corpus.

4 Annotation and analysis

We annotated using the standard Universal POS tag inventory and Universal Dependency Relations from Universal Dependencies v2, with some additional dependency subtypes: acl:relcl, advmod:lmod, advmod:tmod, advmod:neg, nmod:desc (discussed in §5.1.1), obl:lmod, obl:tmod. Overall UPOS counts are given in table 2.

³The Sanskrit Grammarian (Huet, 2005) has a web interface at <https://sanskrit.inria.fr/DICO/grammar.html>.

	Doc.	Sent.	Tok.
Girnar	5	43	534
Shahbazgarhi	3	14	158
Mansehra	1	8	87
Kalsi	1	8	85
Jaugada	1	8	89
Dhauri	1	3	20
Total	12	84	973

(a) DIPI corpus composition, grouped by source location of the annotated inscriptions.

Feature	Measure	Val.
UPOS	Cohen’s κ	0.949
HEAD	UAS	0.857
DEPREL	Label score	0.776
HEAD+DEPREL	LAS	0.673

(b) Agreement scores between two annotators on Girnar Major Rock Edict 7.

Table 1: Metrics about the DIPI corpus.

UPOS	Count	%	UPOS	Count	%
NOUN	345	35.5%	DET	42	4.3%
ADJ	136	14.0%	NUM	35	3.6%
VERB	106	10.9%	PROPN	22	2.3%
ADV	83	8.5%	X	14	1.4%
CCONJ	78	8.0%	SCONJ	11	1.1%
PRON	47	4.8%	ADP	10	1.0%
PART	42	4.3%	–	2	0.2%

Table 2: Top UPOS categories. PUNCT, SYM, and INTJ were not used.

Most of the corpus was annotated collaboratively with continuous revisions to maximize annotation quality given the lack of reliable modern grammars and lexicons for Ashokan Prakrit. Major Rock Edict 7 at Girnar (5 sentences, 49 tokens) was annotated by both authors independently to compute interannotator agreement figures. Agreement scores are reported in table 1b. Agreement on universal POS tagging and head attachment is high. Low labelled attachment score (LAS) reflects the difficulty in analysing the sometimes fragmentary language of the corpus, as is expected in treebanking ancient language corpora (David et al., 2009).

The most common (and thus likely pragmatically unmarked word order, modulo the inscriptional nature of the corpus) in Ashokan Prakrit is subject–object–verb, occurring in half of 24 verbs in the corpus with *nsubj* and *obj* dependents, followed by object–subject–verb with 8 occurrences. SOV is the unmarked word order in most New Indo-Aryan languages as well.

5 Annotation issues

Some of the interesting annotation issues faced include: the POS-tagging and dependency parsing of regnal names in Ashokan Prakrit and cross-lingually (with further discussion on compounds in general), the in-progress transition to split ergativity and its morphological and syntactic analysis within the framework of UD, as well as the relationship between irregular sandhi and the grammaticalization of nouns into adpositions.

A recurring point in the analysis of these issues is that Ashokan Prakrit is transitional between Sanskrit and New Indo-Aryan, still in the process of undergoing many drastic syntactic (from non-configurational to configurational) and morphological (from synthetic to analytic) changes. Given the small size of the corpus and inability to elicit information from native speakers, we faced difficulties annotating features based on a synchronic analysis without looking towards better, and often conflicting, data from Sanskrit or NIA languages.

5.1 Regnal names

A puzzling issue in annotation was Ashoka’s regnal names, such as:

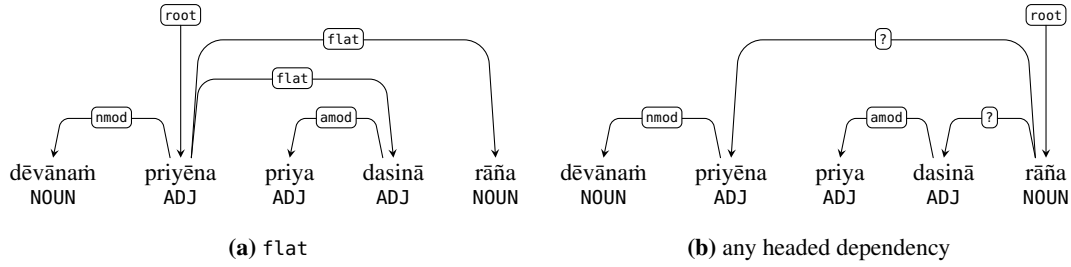


Figure 3: Potential dependency parses (headless and headed) of Ashoka’s regnal names.

- (2) Dēvānam- priyēna Priya- dasinā rāṇa
 god:GEN.M.PL beloved:INS.M.SG kindly looking:INS.M.SG king:INS.M.SG
 ‘King Beloved-of-the-Gods Looking-Kindly’ (Girnar 1:1)

Ashokan Prakrit, like Sanskrit, often constructs chains of nominals and adjectives headed by the last member and with all the members agreeing in case and number with it—here, the instrumental singular. Tokenization, POS-tagging of morphemes in compounds, and dependency relations in regnal names all came up as issues in UD annotation. The decisions in this section were arrived at after much discussion with the UD community.⁴

5.1.1 POS annotation of morphemes in compounds

The first issue was how to POS tag the morphemes in such compounds. In Ashokan Prakrit, like in Sanskrit, “the division-line between substantive and adjective ... [is] wavering” (Whitney, 1889) so any of these titles could be thought of as nominals (‘one who is beloved of the Gods’) or adjectives (‘beloved by the Gods’). Furthermore, syntactic context can blur the distinction; an adjective like *dasin* ‘looking’ can be nominalized into ‘looker’, and a noun in a compound may behave attributively.

Initially, we thought to label all the morphemes in the regnal names as PROPEN given that they refer to a person like a regular name does. However, these morphemes have internal dependency structure, most obviously the genitive-case modifier in *dēvānam-priyēna*. The PROPEN label would obscure what is clearly a genitive-case NOUN, *dēvānam* ‘of the Gods’, that does not refer to a specific individual or entity like a name does.

In regards to differentiating between NOUN and ADJ in Ashokan Prakrit, we settled on the criterion that something with a fixed inherent gender must be NOUN, and anything with fluid gender assignment is ADJ. This makes the POS tag a lexical feature rather than one that is contextually assigned by syntactic properties, which would render it redundant. UD precedent in other languages, e.g. Latin, favours the annotation of dependency structure in proper nouns and the regular POS tagging of nominalized components in such names.⁵

5.1.2 Dependency structure of nominalized titles

There is substantial disagreement among UD corpora on the dependency annotation of regnal names, epithets, and other appellative titles. The current UD guidelines prefer the *flat* relation for “exocentric (headless) semi-fixed MWEs [multi-word expressions] like names and dates”. The head is arbitrarily assigned to be the first nominal in the multi-word expression. This is unacceptable for titles in Ashokan Prakrit, since want to treat this the same way as adjective–noun NPs, with the head always being the last word. Schneider and Zeldes (2021) recently attempted to resolve this issue for a wide range of nominal constructions in English (including *Mr.* and *Secretary of State*, which are similar to Ashokan Prakrit titles), and we build upon that analysis here.

Since we have established that in Ashokan Prakrit such constructions are not headless, we have to decide which headed dependency relation should be used instead. We considered *appos*, *compound*, and *nmod:desc*, and *amod* if we chose to analyse the appellatives as adjectival rather than nominal. The difference between a headed and headless dependency analysis of the regnal titles is shown in figure 3.

⁴Documented in a GitHub issue: <https://github.com/UniversalDependencies/docs/issues/802>.

⁵<https://github.com/UniversalDependencies/docs/issues/777>

The issues, resolved once we came to *nmod* after settling our POS tagging, in the other relations are:

- *appos*: Generally, an appositive is a full NP that can be paraphrased with an equational copula in a relative clause, e.g. *Bob, my friend* implies *Bob, who is my friend*. But in Ashokan Prakrit, given the blurring between nouns and adjectives, it is clear that each title NP is directly modifying the NP *rāñña* ‘king’ rather than paraphrasing an appositional relationship.
- *compound*: Like *f_{lat}*, this indicates a multiword expression forming a single NP rather than relationships between full NPs. Each regnal name is, however, a whole NP that could stand alone.
- *amod*: Our reasoning against the other two relies on analysing each title as an NP. The fact that titles can be dropped, and that *rāñña* ‘king’ can be dropped while retaining grammaticality, supports the assumption that each title is indeed an NP since any one could be the head if phrase-final. Thus, an adjectival relation like *amod* is not preferred.

Realising that the head of each NP title is lexically a nominalized ADJ, we settled on *nmod:desc* as the best dependency relation. Further evidence comes from variation in the components of the titles in different editions of the edicts, e.g. (3) and (4). Given that (4) drops ‘king’ entirely and can have the titles stand alone without another NP head, we are certain that each title is an NP.

(3) Dēvana- priasa rañō
god:GEN.M.PL beloved:GEN.M.SG king:GEN.M.SG
‘King Beloved-of-the-Gods’ (Shahbazgarhi 1:1)

(4) Dēvānañ- piyēna Piya- das[i]nā
god:GEN.M.PL beloved:INS.M.SG kindly looking:INS.M.SG
‘Beloved-of-the-Gods Looking-Kindly’ (Kalsi 1:1)

Now backed with our crosslinguistic evidence, we agree with Schneider and Zeldes (2021) that *nmod* or a subtyped label of it is the best descriptor for nominal epithets. We specifically picked the subtyped label so that we can query instances of the construction for future analysis.

5.2 Predicated *-ta* construction

The *-ta* construction⁶ in Sanskrit forms participles from verbal roots. These participles are morphologically deverbal adjectives, taking gender (without having intrinsic fixed gender like nouns), case, and number marking without marking person (unlike finite verb forms).

(5) rājñā hatañ caurañ
king:INS.M.SG kill:PPP.NOM.M.SG thief:NOM.M.SG
‘a thief killed by a king’ (lit. ‘a king-killed thief’) (Sanskrit)

In Sanskrit, especially in post-Vedic texts, it can also be interpreted with (past) perfect meaning. *-ta* forms agree in case/gender/number with the object, unlike the finite verbs of this stage of Indo-Aryan.

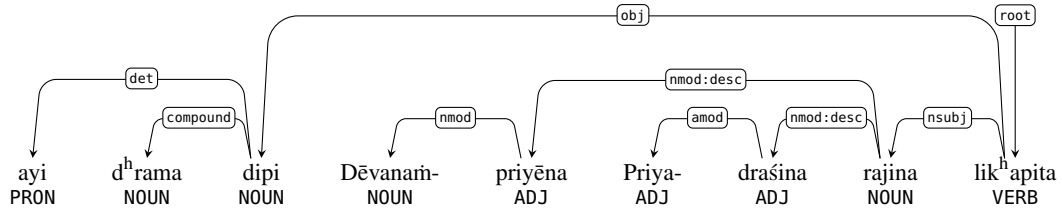
(6) mayā lipī lik^hitā
1SG.INS text:NOM.F.SG write:PPP.NOM.F.SG
‘the text was written by me’ (passive)
‘I wrote the text’ (ergative) (Sanskrit)

This use is extremely common in Ashokan Prakrit and is the point of contention discussed here. According to one view, *-ta* formed resultative⁷ adjectives in early OIA, gradually shifting towards main predicate function in first intransitive and later transitive verbs (the agent receiving case marking) by late OIA (Reinöhl, 2018; Condoravdi and Deo, 2014; Peterson, 1998).

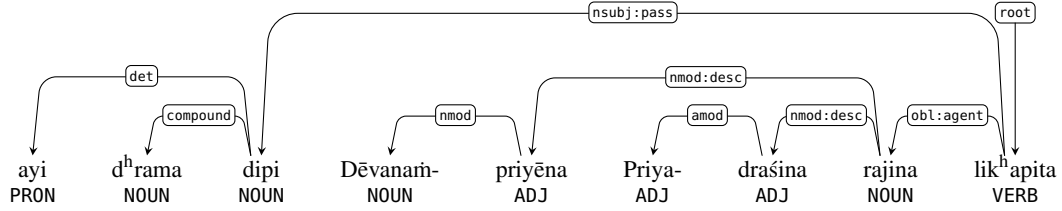
This construction is ancestral to the tense/aspect-based split ergativity observed in many later NIA languages. In such languages, the Sanskrit participle has developed into a perfect verb that agrees with the object, while other inflected forms in the verb paradigm agree with the subject. Since Ashokan Prakrit

⁶Philologically known as the *past passive participle*.

⁷As opposed to stative adjectives, resultatives imply that a prior event occurred to cause the current state conveyed by the adjective. Compare English *is hidden* with *has been hidden* (Condoravdi and Deo, 2014).



(a) The ergative-like analysis, with nsubj and obj



(b) The passive analysis, with obl:agent and nsubj:pass

Figure 4: Two possible analyses of the predicated *-ta* construction in the sentence ‘king Beloved-of-the-Gods Looking-Kindly has caused this rescript on morality to be written’ (Mansehra 1:1). The above was ultimately chosen.

was still undergoing this transition to split ergativity, we could analyze this construction either way: as a resultative predicate adjective or a perfect-aspect verb.

In Ashokan Prakrit, with the loss of the inherited active aorist as a productive category, *-ta* forms have become the unmarked strategy to express the past perfect (Bubeník, 1998). We believe, with some certainty, that this construction is *not passive* at least as late as Ashokan Prakrit (if it ever was). Evidence Casaretto et al. (2020) provide against a passive analysis in Sanskrit also applies here. A key argument is that *-ta* occurs with both transitive and intransitive verbs, and in the case of the latter, does not form an “impersonal passive” as would be expected of a passivized intransitive.

As such, we adopt an ergative-like analysis of the *-ta* construction in Ashokan Prakrit, agreeing with Peterson (1998)’s view of the corresponding construction in Pali (another early MIA lect) as being a periphrastic perfect. Indeed, as exhibited in the example in figure 4a which is glossed in (7), the *-ta* form agrees in number and gender with the object, while the agent receives instrumental marking. The object *d^hrama-dipi* is still in the nominative case.

- (7) ayi d^hrama- dipi Dēvanam- priyēna Priya- draśina
 DEM3:F.SG morality rescript:NOM.F.SG god:NOM.M.PL beloved:INS.M.SG kindly looking:INS.M.SG
 rajina lik^h apita
 king:INS.M.SG write:CAUS.PPP.NOM.F.SG
 ‘King Beloved-of-the-Gods Looking-Kindly has caused this rescript on morality to be written’
 (Mansehra 1:1)

With respect to UD annotation, our ergative-like analysis translates to the agent *rajina* receiving the DEPREL nsubj and the object *dipi* obj (instead of obl:agent and nsubj:pass of the passive analysis in figure 4b).

5.2.1 Differential agent marking

Cross-dialectally as well as dialect-internally, Ashokan Prakrit varies with respect to how the agent phrase is marked in *-ta* constructions. Agents may receive either **instrumental** or (with lesser frequency) **genitive** case marking, though the basis for this alternation is not wholly clear.

- (8) sē mamayā bahu kayānē kaṭē
 now 1SG.INS many good_deed:NOM.N.SG do:PPP.NOM.N.SG
 ‘Now, I did many good deeds.’ (Kalsi 5:4)
- (9) Dēvanam- piyaśa Piya- daśinē lājinē Kaligyā
 god:NOM.M.PL beloved:GEN.M.SG kindly looking:GEN.M.SG king:GEN.M.SG Kalinga:NOM.M.PL
 vijitā
 conquer:PPP.NOM.M.PL

‘... king Beloved-of-the-Gods Looking-Kindly conquered the Kalingas.’ (Kalsi 13:1)

Anderson (1986)’s analysis suggests discourse-pragmatic factors may be at play; the genitive agent conveys old (i.e. contextually given and/or definite) information while the instrumental agent conveys new information. On this basis, he also claims these represent two *separate* constructions, a passive and an ergative respectively, though this proposal has some flaws (see (Bubeník, 1998) for criticisms).

We tentatively follow Dahl and Stroński (2016) in analyzing the situation as one of **differential agent marking (DAM)** (Arkadiev, 2017), whereby two agent-marking cases are distributed along (potentially irrecoverable) semantic/pragmatic lines. Thus we stuck with standard morphological analysis of the case features in these agents, i.e. Case=Gen/Ins rather than explicitly proposing Case=Erg as an Ashokan Prakrit feature.

DAM seems to affect both the agents of the ergative-like *-ta* construction as well as the oblique agents of finite passives in Ashokan Prakrit. Of the source constructions in Vedic, Bubeník (1998) explains there is a broad tendency for ‘active’ verbs to favor instrumental agents, and ‘ingestive’ verbs (perception, consumption, etc.) to favor the genitive, but the instrumental becomes default in later stages of Old Indo-Aryan. Further annotation of the Ashokan Prakrit corpus will allow us to probe into these hypotheses with statistical tools.

Additionally, the influence of Ashoka’s administrative language, an eastern dialect from which other dialectal edicts were likely translated (Oberlies, 2003), should not be neglected. If the choice between instrumental and genitive marking is at least partially a function of dialect, direct translation from Ashoka’s variety could leave relic forms⁸ (otherwise inconsistent with the internal distribution of cases) in other edicts.

5.3 Sandhi

Sanskrit texts (which in written form all post-date the Ashokan edicts) generally orthographically indicate *sandhi*, a kind of phonological assimilation at morpheme boundaries (Allen, 1962). Some examples from Sanskrit are given in (10).

- (10) a. gacc^hati arjunah̄ → gacc^hatyarjunah̄ (Sanskrit)
b. saḥ aham → sō’ham
c. brahma asmi → brahmāsmi

Middle Indo-Aryan has more haphazard orthographic indication of sandhi rules (Dočkalová, 2009), even though these assimilations likely persisted in speech. For example, Pali shows sandhi in compounds (especially those inherited directly from Old Indo-Aryan and then subject to normal sound changes), some function words (emphatic *ēva*, preverbs, etc.), pronouns, and sometimes in nominal arguments to verbs, noun–noun relations, and vocatives (Childers, 1879). That is, Pali optionally indicates sandhi only between syntactically related words (Oberlies, 2001, p. 116).

We observed similar occurrences in the Ashokan Prakrit corpus. We think certain rare cases of sandhi in Ashokan Prakrit may be examples of grammaticalization (the development of a postposition with case-like properties) and lexicalization (compounds that are no longer as transparent). These pose issues for UD annotation.

5.3.1 Grammaticalization of *at^hāya ~ at^hāya*

One case where sandhi may give us clues about morphological change is occurrences of *at^hāya* ‘for the purpose [of]’, the dative of *at^ha* ‘purpose’ (< Sanskrit *ārt^ha*). In the prototypical example below, sandhi with the preceding nominal stem causes vowel lengthening.

- (11) tī ēva prāṇā ārab^harē sūp- āt^hāya
three EMPH animal:NOM.N.PL kill:PASS.PRS.IND.3PL curry purpose:DAT.M.SG
‘Only three animals are being killed for the purpose of curry.’ (Girnar 1:7)

⁸One such example of dialectal interference is NOM.M.SG *-ē*, a non-western isogloss, attested in place of the expected *-ō* in Girnar (a western dialect)

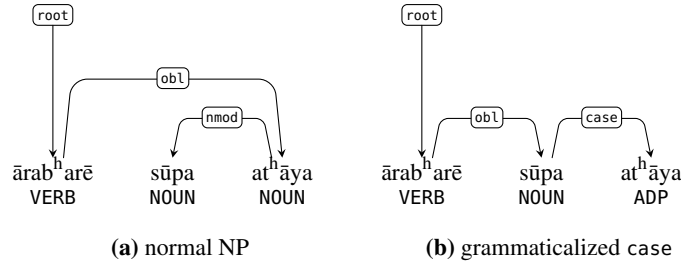


Figure 5: Two potential analyses of the *at^hāya* construction in Girnar 1:7.

While the Ashokan Prakrit construction we are dealing with is a compound,⁹ not a genitive noun modifier, Reinöhl (2016) describes a potentially related phenomenon based on Classical Sanskrit and Pali corpora: the **post-Vedic genitive shift**, wherein many adverbs and adjectives were analysed as taking the genitive and periphrastically replacing case relations, e.g. *-asya art^hāya* ‘for the purpose of ...’. Sanskrit generally uses the dative case by itself to indicate PURPOSE, so this compounded construction in Ashokan Prakrit may be an intermediate phase in the genitive shift.

For UD, this is a tricky situation. We were stuck between describing *at^hāya* as a case complement to *sūpa*, or as instead the head of an NP, both shown in figure 5. Given similar constructions with ending-less nouns in compounds, *at^hāya* would usually be analysed as the head here, but if it has been grammaticalized then case would be a better DEPREL as is used for case markers and clitics in New Indo-Aryan UD, and UD prefers content heads. Girnar 4:10 also has *ētāya at^hāya* ‘for this purpose’ which lacks sandhi or stem-compounding, but this may be exceptional since *ētad* can take the det DEPREL as a modifier to nouns and so does not behave like a true nominal. Pending better evidence supporting either analysis, we settled on the latter.

An interesting data point is that a similar construction is the etymological source of the dative case in the Insular Indo-Aryan languages, Dhivehi and Sinhala.

- (12) *mamma e=ge-aṣṭ diya*
 mother DEM3=house-DAT go.PST.ALTER
 ‘Mother went to that house.’ (adapted from Lum, (2020): 118) (Dhivehi)

- (13) *ammā ē gedərə-tə giyā*
 mother DEM4 house.SG-DAT go.PST
 ‘Mother went to that house.’ (Sinhala)

The Sinhala *-(ə)tə* and Dhivehi *-aṣṭ* datives are both reflexes of Sanskrit *art^hāya* (or, possibly, the accusative case *art^ham*) (Fritz, 2002) and have expanded their semantic domains to include other roles such as GOAL. Ashokan Prakrit’s compounding of *at^hāya* may represent an early stage towards a similar grammaticalization, though its precise synchronic status is unclear. Future UD annotation of MIA corpora will allow us to better track such phenomena from a comparative perspective.¹⁰

5.3.2 Other cases

Another unexpected sandhi was observed in Girnar 2:2, *manusōpagāni ca pasōpagāni ca* ‘beneficial to man and beneficial to animal’. The form *pasōpagāni* is underlying *pasu* ‘(domestic) animal’ + *upagāni* ‘benefits’, wherein the sandhi of *u + u* gives *ō* rather than expected *ū* (as in Sanskrit) or *u* (as in Pali). This sandhi is found in every other edition of the edict; Jaugada even has *pasu-ōpagāni*. Like the previous

⁹ A similar construction involving “compounded” *art^hāya* also occurs in certain Sanskrit texts, cf. *harṣaṇār^hāya* [*harṣaṇa + art^hāya*] ‘for the purpose of protection’ (Fritz, 2002).

¹⁰ It is worth noting that an inscriptionally-attested Middle Indo-Aryan ancestor of Sinhala, roughly contemporaneous with the Ashokan edicts, formed a periphrastic dative of purpose with *aṭaya* (cf. *śagaśa aṭaya* ‘for the benefit of the sangha’) (Premaratne, 1969; Paranavithana, 1970). Here, as is also observed with Pali’s *at^hāya* construction (Reinöhl, 2016; Fahs, 1989), the nominal *śaga* ‘sangha’ takes genitive case marking. In contrast, Ashokan Prakrit employs either a dative dependent (e.g. *etāya*) or the stem-compounding strategy described above. It cannot be ruled out, however, that the modern Sinhala and Dhivehi datives originate in a similar compound-like use of *art^hāya* (Fritz, 2002).

example, we could claim that *upagāni* is undergoing grammaticalized to a benefactive postposition here, but we feel it is too speculative to claim that, and instead believe it to be phonological analogy with *manusōpagāni*. We analysed it as a noun compound with DEPREL nmod.

6 Future work

The main task ahead of us involves completing annotation, which will require gathering and critical editing of Ashokan texts discovered in the past century that are yet to be digitally compiled. What has been annotated already will be included within the next annual UD corpus release.

After a good selection of annotated inscriptions from several dialects is available, we will make use of computational methods to analyze the corpus. Automatic word-level alignment between dialectal variants of the same edict will enable us to compare dependency structure, case marking, sound change outcomes, along with other dialectal features. On the technical side, we would also like to see if training data from Sanskrit with finetuning on the smaller Ashokan corpus could be used to automatically perform UD annotation of texts in other Middle Indo-Aryan languages.

More broadly, we would like to continue UD annotation of texts in earlier Indo-Aryan languages in order to have data to better address historical linguistic questions. Given the value already demonstrated by corpus data for Indo-Aryan historical linguistics (Stroński and Verbeke, 2020), open-access corpora annotated using Universal Dependencies, with fine-grained analyses of morphology and syntax beyond individual glossed examples, will surely help put some of the controversial issues in the field to rest. Comparisons of Ashokan Prakrit with other stages of Indo-Aryan will help us study language change, e.g. the development of configurationality in Middle Indo-Aryan (Reinöhl, 2016). Dialectal variation (and possible substrate influence) in Ashokan Prakrit should also be studied in comparison with regional NIA data. Other recent work in computational approaches to this area (Cathcart and Rama, 2020; Cathcart, 2020; Arora et al., 2021; Arora and Farris, 2021) encouraged us to pursue the study of South Asian historical linguistics from a similar angle.

Some texts we hope to treebank in the future include: the Pāli Canon, plays in the various later Dramatic Prakrits (e.g. *Gāhā Sattasāī*), the *Lōmāfānu* documents (Old Dhivehi), the *Bāṇāsarakat^hā* (Old Kashmiri), the *Gurū Grant^h Sāhib* (Sant Bhāṣā, Old Punjabi), the *Caryāpada* (Old Bengali), the *Šāh jō Risālō* (Sindhi), and epics and poetry from the Hindi Belt and Maharashtra. Serious work on typology in South Asia will also require treebanking for Dravidian (which has a long historical attestation), Munda, and other language families of the region.

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