

# “Appling *Paninian* Dependency Framework for Marathi”

Author : Yogesh Vijay Umale, Assistant Professor  
Department of Linguistics, Banaras Hindu University

## Abstract

*This paper describes the theory of Dependency Grammar. Dependency grammar is one kind of grammar formalism, which is an analysis and find out the syntactic category of natural language sentences. Grammar formalism is useful to developing parser. The parser is one kind of tool of natural language processing which is automatic analysis, find out syntactic category and generate the syntactic tree of natural language. in this paper I find out 30 relations of dependency relation and that relation base on Panini dependency grammar. The Panini dependency relation divided three parts, one is a Karaka relation (K1 to K7), second is non-karaka(rs) and third is other relation(relative clause .the divided three parts are one kind of a dependency framework. this kind of theoretical research useful to developing a dependency parser for Marathi.*

## Introduction

The Dependency grammar is one kind of grammar formalism which is an analysis and find out the syntactic category of natural language sentences. The dependency grammar, main aim is to find out how words are connected to each other in sentences. The sentences are made of words, every word has their own meaning and function, but when those words are made a sentence than those words meaning and functions are different. The verb is the head word in sentences and other words, are dependent to verb. Dependency grammar has find out which word is head and how other words dependent to head word. in this process dependency grammar said this relation is an asymmetrical relation(J. Nivre..2005). the Panini dependency grammar is suitable for morphological rich languages. most of the Indo-European language has morphological rich (A. Bharathi 1995)

This paper road map is divided three parts,

- A. karaka relation
- B. non- karaka relation
- C. other relation

## A Karaka Relation

### 1.1.2 Karta (k1) Nominative Subject

Karta is play a major role in sentence which is doing or performing the action, consider the following example,

*surēśapustakavācatō*

*suresh-nom book-accu read-pres-3msg*

Suresh reads book

Here Suresh is *karta*, Suresh performing to action *vācatō* and *pustakais* karma or object, now *vācatōis* transitive verb, so here verb has two argument one *karta*and second is karma.

Nominative subject came with transitive and intransitive verbs, and nominative subject take zero suffix (*vibhakati*), consider the following example,

*sacinakrikēṭakhēḷatō*

*sachin- nom. cricket play-pres-3msg*

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Sachin plays cricket

sacinabasalā

sachin- nom sat-past-3msg

Sachin sat

Here first is transitive and second is intransitive verb. Both subjects are nominative form with zero suffix (zero *vibhakati*) both subjects are agreement with verb like gender, number and person.

### 1.1.2 Ergative Subject

Ergative subject occur with *ne* or *nipostposition* in Marathi, in this construction ergative subject does not show agreement feature with verb, consider the following example,

surēśanēcēṇḍūphēkalā

Suresh-erg ball-3msg throw-past-3msg

Suresh throws the ball

Here ergative subject construction which is takes a *ne* case marker but agreement feature show with karma which is *cēṇḍū*.

### 1.1.3 Subject in Passive Construction

Subject in passive construction show by *kadun* and *dvaracase* marker in Marathi, in this construction subject take *kadun* and *dvaracase* marker or *dvara* case marker block agreement feature with verb, consider the following example,

surēśakaḍuna/Dvārēāmbākhāllāgēlā

suresh- by mango-msg eat-ptcp-pass-past

Mango was eating by Suresh

Here *surēśa* is subject but that subject does not agree with verb.

### 1.1.4 Clausal karta

tyācaugīcarāgavānamalāāvaḍata nahī

he-poss-3sm without reason get-angry- inf I-datlike-pres not

I do not like him getting angry without reason

above the construction is non-finite noun complement and this kind of noun also clausal karta use for this sachem

### 1.1.5 karta with genitive marker

In this construction *karata* came with genitive marker and non finite noun complement consider the following example,

tōpaḷūnajāṇyācīaphavākharīnavhatī

he run-conj- part go-ger-poss-3sf rumor-3sf true not

the rumor that he ran away is not true

### 1.1.5 Dative Subject (k4a)

Dative subject come with *laa* postposition or case marker in sentence of Marathi, dative subject call also *Anubhavakartain* Marathi, dative subject are found with psychological such as verb of knowledge, belief, desire, perception and mental and physical state. Unlike ergative subject, dative subject may be animate or

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inanimate, dative as is the case with ergative never show any agreement with verb, consider the following example.

surēśalāāmbāāvaḍatō

suresh-datmango-msg like- impf-msg

suresh likes mango

Jhāḍālāphūlayētātā

tree-dat fruit-npl come-impf-npl

A tree bears fruit

### 1.1.6 Causer and Mediator- Causer Subject (pk1 mk1)

Causative in Marathi are realized through a morphological process. Marathi has few causative verbs, *kar-karvili*, in this construction consider the following example,

a'ṭnēlilēkaḍūnakavitāpāṭhakarāvalī

mother-erg lilA-by poem-fsgreadcaused – do

Mother reads poem by lilA

### 1.1.7vidhayakarta (noun complement of copula construction Subject) k1s

The complement of the copula is a noun phrase in the nominative case in all context and occupies verbal position in the sentence consider the following example,

surēśabudhdimānāhē

suresh-nom intelligent is

Suresh is intelligent

### 1.2 Karma (Object/Patient) k2

Object is important element and the locus of the result implied by the verb root in the sentence and come with transitive verbs in Marathi, consider the following example,

surēśapustakavācatō

suresh-nom bookread-pres-3msg

suresh reads book

### Type of object

#### 1.2.1 object in Active voice sentences

Active voice construction talk about subject- verb agreement feature, means subject come with gender, number and parson and verb also agree with those feature in the sentence. now in the construction subject is active agent and verb change dependant on the subject, consider the following example,

sacinakrikēṭakhēlatō

sachin-nom. cricket play- pres-3msg

sachin plays cricket

surēśanēcēṇḍūphēkalā

suresh-erg ball throw-past-3msg

Suresh throws the ball

pōlisacōralā/samāratō

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policeman thief-acc beat-pres-3sm  
The policeman beats the thief

### 1.2.2 Karma in Passive Sentence

In passive construction karma (object) control agreement with verb, and karma come with zero *vibhaktior IA* and *nAvibhkati*, consider the following example,

pōlisānkaḍūnacōrapakaḍalāgēlā  
policeman-by thieves- 3mpl catch –past-3mpl go-pass-past-3mpl  
The thieves were caught by policeman

pōlisānkaḍūnacōrānāmpakaḍalēgēlē  
policeman- by thieves-acc catch- past- 3nsg go-pass-past-nsg  
the thieves were caught by the policeman

### 1.2.3 vakya-karma (Sentential object – complement clauses)

Finite clauses come with sentential object with verb the subordinate clause is attached to the main clause, it is a embedded sentence in Marathi., consider the following example,

tīmhaṇatēkīmīticimulagīāhē  
sheconsider-pres-3fsg that- comp I her-3fsg daughter is  
she considers that I am her daughter

### 1.2.4 Object with Goal or Destination (K2p)

Goal or destination may be karma in this framework, it is subtype of object and mostly come with motion verbs now consider the following example,

surēśagharīgēlā  
suresh-nom home-3nsg went-past-3msg  
suresh went home

### 1.2.5 object complement (karma *samanadhikarana*) K2s

The object complement is come with accusative case which is expressed with zero *vibhakti* and give information about object consider the following example,

tīmalāmulagīmānatē  
she I-acc daughter consider- pres-3fsg  
she consider me (to be her) daughter

surēśasacinalābud'dhimānasamajhatō  
suresh-nom sachin-acc intelligent consider-pres-3msg  
suresh consider sachin as intelligent

### 1.3 karana (Instrument)

karana karaka denotes the instrument of action expressed by verb root. Instrumentality is expressed by the case marker *ne* which is also mark cause. Additionally the postposition *kaduna*, *cyAdvarecyAmarPawa*, *cyAhAwi* are used to express instrumentality, consider the following example,

surēśanēcākunēāmbākāpalā  
suresh-erg knife-inst mango-3msg cut-past-3msg

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suresh cut mango with a knife

Lilānēmadhucā/dvārē/cyāmārfatapaisēpāṭhavalē  
lilaa-erg madhu by/through/through/ money send-past-3fsg  
lila sends money by/through/at the hands of madhu

### 1.4 Recipient/Beneficiary (*sampradana*)

*sampradan* karaka expressed beneficial or recipient meaning of the verb in sentence, in the other words, the person or object for whom the karma is intended for is *sapradana*. Beneficiary case take dative case suffix *IA* or by postposition *cyAkariwA*, *cyAsATi* in sentence consider the following example,

surēśanēsacinalāpustakadilē  
suresh-erg sachin- datpustak gave-past-3msg  
suresh gave book to sachin

tyānēdēsāsāṭhījīvadilā  
he-ag country-for life- give-3-msg  
He gave (his) life for his country

### 1.5 apadana (source)

*apadana* karaka talk about the source of the activity or verbs, it is a point of departure. a noun denoting the point of separation for verb expression an activity which involves movement away from is *apadana*. *apadana* is primarily expressed ablative case *hunand* postposition *pAsuna* see the following example,

malāsuresākāḍhunabātāmīkādhalī  
I-datsuresh from newfindout/get-psat-3fsg  
I got new from suresh

surēśamumba'ihūnāālā  
suresh Mumbai-from come-past-3msg  
suresh came from Mumbai  
tēmumba'icēāhē  
they Mumbai-poss be-pres-pl  
they are from Mumbai

#### 1.5.1 Source of material (*prakruti apadana*)

In this construction verb denoting source of material meaning in the sentence, now see the following example,  
kapaṛēkāpasāpāsūnabanatāta  
kapadhe cotton-from make-hab-be-presp-pl  
the cloth are made of cotton

Above the sentence *kApusha* is natural source and give the source indication by postposition *pAsuna*.

#### 1.6 location of time (*kaaLaadhikaran*) K7t

Time expressed without marking like, *kaala*, *udhya*, *aataa*etc and dative marker *IA* or locative *i* added to noun. *Adhikarana* karaka is the locus of karta or karma. The participant denoting the time of action is marked by K7t. consider the following example,  
ma'ikālamumba'ihūnāālō

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I yesterday Mumbai-abl come-past-3msg  
Yesterday, I came from Mumbai

### 1.6.1 location of space (deshadhikarana) K7p

Space location expressed by locative suffix of *i* or *wa* and postposition of *cyAmadhe*, *cyA Awa*. It will be marked as K7p consider the following example,

tōājagharī/gharātanāhī  
he todayhome-loc-at/home-loc-in neg-3sg  
he is not at home/in the house today  
tyānērastāta/madhyēgāḍīthāmbavalī  
he-ag street(poss) in the middle of car-3sgf stopast3sgf  
he stopped the car in the middle of the street

### 1.6.2 location of elsewhere (vishayadhikarana) K7

*vishayadhikarana* expressed the mental place and take same locative suffixes *ior wa* which is follow by noun of location, consider the following example,

mājhyāmanātarāgaāhē  
my mind in anger is  
I am angry

mājhēmānamumba'itaāhē  
my mind Mumbai-in is  
I am mentally in mumabi

## B Non karaka relation

### 1 genitive /possessive (shashthi) r6

The genitive or possessive relation which hold between two nouns has to be marked as r6 consider the following example,

mulācēnāka  
boy-of nose  
Nose of boy

līlācībahina  
lilaa- of sister  
Sister of lilaa

### 2 Karta or karma with conjunct verb (r6-k1, r6-k2)

A conjunct verb is composed of noun or adjective followed by verbalize. some time the argument (karta or karma) come with genitive case. Whenever the argument of conjunct verb is in genitive case it will have a dependency relation with the noun of conjunct verb. The class of conjunct verb (a noun+verb sequence which function as a single verb unit) is very large in Marathi, consider the following example,

kālamandiracēudaghāṭanajhālē  
yesterday temple-of inauguration happed  
yesterday the temple got inaugurated

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ma'irōjarātriparīcīpratīkṣā karatō  
I everyday night-loc pari-poss waiting do-1msg  
I wait for pari everyday night

### 3 adverbs only manner (adv)

Adverbs manner expressed which is placed immediately preceding the verb. Adverbs of manner are marked as adv, consider the following example.

surēśabharābharacālatō  
suresh fast walk-pres-3msg  
suresh walks fast

### 4 Purpose (rt)

Purpose is expressed by dative case marker *lA* and postposition of *kariwA* or *sAtI* use in sentence consider the following example,

tōamērikētaśīkanyāsāthī/lāgēlā  
he America-datstudy-int-dat go-past-3msg  
He went to America to study

tōkuṭumbāsāthīkaṣṭakarātī  
he family-for hard work do-pres-3msg  
He work hard for the sake of (his) family

### 5 rd(relation-prati/direction)

The participant indicating 'direction' of the activity has marked as 'rd'. The label rd stands for relation direction

surēśagāvakaḍējāṭahōtā  
sureshvillage- of direction go-prog be-past  
suresh was going towards his village

### 6 rh (hetu 'reason')

The reason or cause of activity is to be marked as rh, consider the following example,

surēśanēmōhanamuḷēpustakavikataghētalē  
suresh-erg mohan of because book bought- past-3msg  
suresh bought book because of mohan

### 7 ras\_k\* (associative)

in sentence where two participants perform the same action but syntactically one is express as primary and other as associate than marked the ra\_k\* consider the following example,

surēśaāpalyāvaḍilābarōbaragārīgēlā  
suresh ownfather with home went-past-3msg  
suresh went to home with his father

### C Other Relation

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### Relative clauses (jo-wo construction)

Marathi has two type relative clause construction 1 sentential relative clause and 2 participle relative clause. in this framework we would mark them mod....relc, in this construction jo is relative element clause and wo is correlative marker, which is the homophonous with control the demonstrative or third person pronoun. in this framework we find out two type of relative clause.

#### 1 Pre-nominal relative clause

in this construction relative clause came with left of head noun and it take a relative pronoun *jo* as a demonstrative marker wo along with noun, consider the following example,

**Jōmāṇūsayēthēśīkavatōtōmājhyābhā'ūāhē**

rel manhere teach-pres-3-sm cor I-poss-3-sm brother is

the man who teaches here is my brother

above the construction is pre-nominal and wo is modifying of main clause. wo itself refer to mANus which came with relative subordinate clause and clause along with the relative pronoun wo.

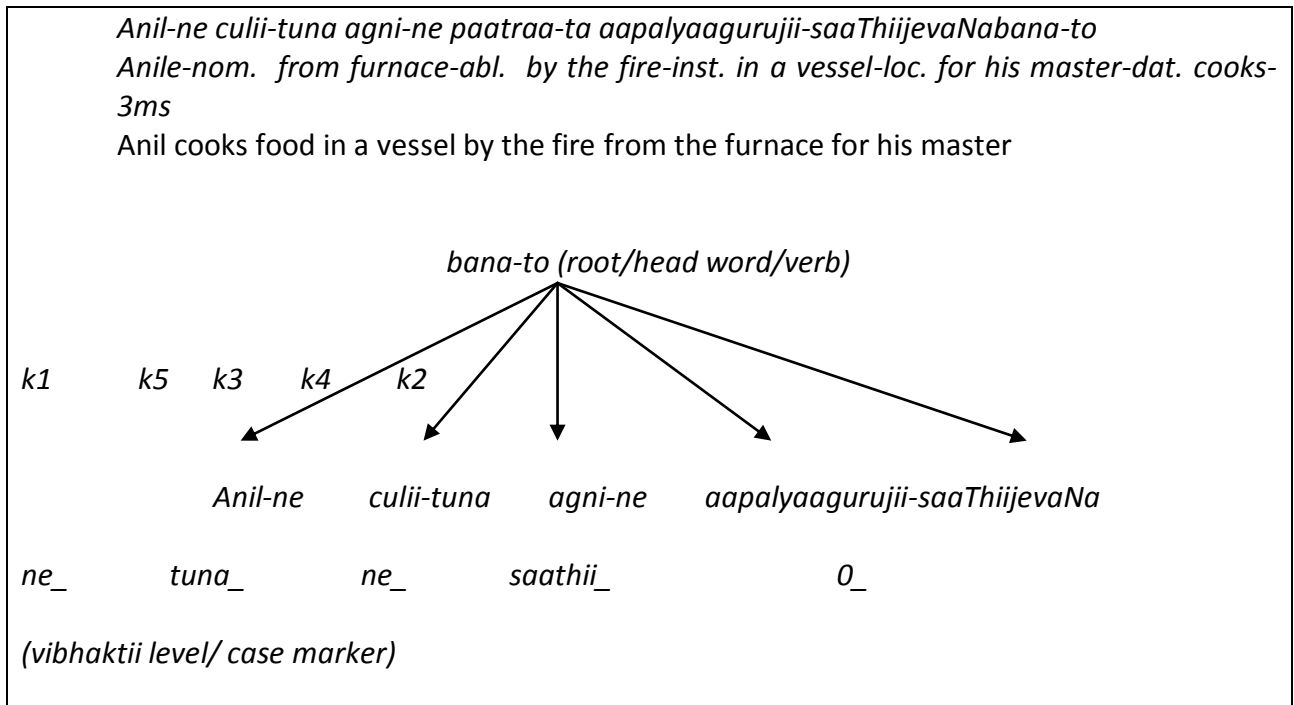
#### 2 Pronominal relative clause

in this construction the relative clause come to the right of head noun and relative pronoun in such case behaves like a full-fledge pronoun consider the following example,

**jōmāṇūsayēthēśīkavatōtōmājhyābhā'ūāhē**

cor man relhere teach-pres-3sm I-poss-3sm brother is the man who teaches here is my brother

### Tree of Dependency Framework of Marathi



### Feature work and conclusion

This kind of small theoretical work is useful for developing a Parser and other Natural Language Processing application for Marathi. for feature work will look at theoretical issue of compound and complex Marathi sentences.



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### References

1. Bharathi, Chitanya, and Sangal,R. 1995. *Natural language processing: a paninian perspective*. New Delhi: Prentice-hall of India.
2. Damale, M.K. 1911. *Shastriya Marathi vyakaraN* . Pune: Deshmukha and Company.
3. Fillmore, C.J. 1985. *The case for case*. In E.bach and R.T. Harms (ed). *Universal linguistics theory*. New York: Holt Rinehart and Winston.
4. Navalkar, G.P. 2001. *The student Marathi grammar*. New Delhi: Asian education Service.
5. Nivre, J. 2013. *Dependency grammar and dependency parsing*.  
<http://stp.lingfil.uu.se/~sara/kurser/5LN455-2013/lectures/5LN455-2013-12-11.pdf>.
6. Pandharipande, R. 1997. *Marathi*. Ladoan and New York: Rutledge.
7. Uma, Maheshwar R. and Kulkarani, A. 2007. *Natural language and computing*. PGDCAIL. vol.411. CDE: University of Hyderabad.
8. Uma Maheshwar Rao G., K. Rajya Rama, A. Srinivas. 2012. *Dative case in telugu: a parsing perspective.Proceedings of the Workshop on Machine Translation and Parsing in Indian Languages. Mumbai: (MTPIL-2012), pages 123–132, COLING 2012.*
9. Valanbe, M.R. 2012 *Sugam Marathi vyakaraN*. Nitin. Pune: Nitin Prakashan.
10. Wali, K. 1997. *Marathi : a study in comparative south asian languages*. Delhi: Indian institute of language studies.