

THE ARGUMENT STRUCTURE OF TELUGU VERBS

Submitted for the degree of

Doctor of Philosophy

in

Applied Linguistics

by

M. CHENNA KESAVA MURTHY



Centre for Applied Linguistics and Translation Studies

School of Humanities

University of Hyderabad

Hyderabad 500046.

2003

CENTRE FOR APPLIED LINGUISTICS AND TRANSLATION STUDIES
SCHOOL OF HUMANITIES
UNIVERSITY OF HYDERABAD
HYDERABAD - 500046 (A.P.) INDIA

CERTIFICATE

Dated: 31.07.03

This is to certify that **I, M. Chenna Kesava Murthy** have carried out the research embodied in the present thesis entitled **THE ARGUMENT STRUCTURE OF TELUGU VERBS'** for the full period prescribed under Ph.D. ordinances of the University.

I declare to the best of my knowledge that no part of this thesis was earlier submitted for the award of research degree of any University.



(Signature of the candidate)

Name: M. Chenna Kesava Murthy
Enrollment No. 96HAPH01

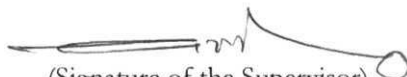


(Signature of the Co-Supervisor)

Dr. N. Krupanandam

READER

Centre for A. L. T. S.
University of Hyderabad
HYDERABAD-500 134




(Signature of the Supervisor)

Dr. G. Uma Maheshwara Rao

READER

Centre for A. L. T. S.
University of Hyderabad
HYDERABAD-500 134



Head of the Department:
Prof. P.R. Dadgaonkar

Probald. 12.9.03

Dean of the School:
Prof. Probal Dasgupta

Acknowledgments

I thank my supervisor Dr. G. Uma Maheswara Rao for giving me the opportunity to work in a stimulating research atmosphere. I am indebted to my supervisor for his enthusiasm, encouragement and for sharing of his deep insights with incredible applications to further research. This research would never have completed with out the inputs from the “Anusaaraka” and “Language Technology” projects.

Thanks are due to my co-supervisor Dr. Krupanandam, who pushed me to work in the NLP field; to Prof. Dadegaonkar, HoD, CILTS, and the Coordinator, SAP ‘Language Technology’ for providing me the fellowship which enabled me to complete the present project, and Prof. Panchanan Mohanty for his encouragement, support in all means. I take this opportunity to thank Prof. Probal Dasgupta, Prof. Bapuji, Dr. Shivaram Padikkal and Prof. Prabhakar Rao for their constant encouragement.

Thanks to Prof. Udaya Narayana Singh, who made me realize the necessity of the Ph.D in the present day situation and for his constant encouragement.

Special thanks are due to Prof. Rajiv Sangal for allowing me to attend many useful workshops on NLP training.

My admirable seniors and good friends Ambedkar, Arul and Anita who have supported me throughout their stay on campus and later. They really put me back into seat to complete my research. They lent me valuable discussions, good research materials and their immense energies. Special thanks to their families, who have taken care of me at times.

Thanks to Santosh for the finishing touch with his technical hands. My sweet and lively juniors in the lab Vaishnavi, Bhuvaneswari, Chaithra, & Udaya, Rajani and Kalyani who made my research and my days enjoyable.

I am grateful to my very understanding juniors Satya Rao, Venku (Venkateswarlu) and Rathnam for their concern in the need of hour. I wish them a beautiful life ahead. They made me forget the fact that I am away from my family.

Thanks to Dr. Rajendran for his valuable advices and discussions on this topic. Thanks to Bangalore Srinivas, for his advice to follow Beth Levin's classifications. Thanks are due to AUKBC, Chennai, and friends for providing me resources whenever I wanted and for their concern. I am also indebted to many linguists and other related NLP researchers from whose work I have drawn in preparing this work.

Aneel for innumerable reasons-- especially for lending me his ATK 760, Ali, Nandu, Sowmya, Bhasker, Ajantha, Durga Srinivas, Sukku, Pavan and Thiru. I always feel the loss of Narayana Reddy, a very good friend and classmate.

I owe a special thanks to Murthy, Appa Rao, Anand, Mallesh, Srinivas and Avinash who stand out to deserve special appreciation for efforts above and beyond what I could possibly expect.

A crucial debt is owed to my family: My Mother, for being a voice of reason for this research; my siblings Chiranjeevi, Raju, Minerva and brother-in-law Vijay Kumar and my sisters-in-law, finally my wife Sashi and son, Hemanth (Indra) and Chintu, Rangavalli, Dolly, Appu, Gowri, Teddy and Vasu and my cousins for their consistent loving support, and just for being themselves. I am also deeply grateful to the memory of my father.

And my thanks to many others whom I might have unwittingly missed.

(Murthy MC Kesav)

Abbreviations Used

a	Animacy
Abl	Ablative
ACC/Acc	Accusative
Ag	Agent
ani	Animate
Be	Benefactive/Beneficiary
bp	Body part
c	Concrete
ca	Combustive article
CAUSE/Cause	Causative
DAT/Dat	Dative
DO	Direct Object
ed	Edible
ERG/Erg	Ergative
Ex	Experiencer
GEN/Gen	Genitive
Go	Goal
h	Human
hum	Human
In	Instrumental
INST/Inst	Instrumental
LOC/Lo	Location
msc/masc	Masculine
N	Noun
nm/nmsc	Non Masculine
NOM/Nom	Nominative
O	Objective
Obj	Object
P	Pronoun
pl	Plural
Pt	Patient
Rc	Recipient
sg	Singular
So	Source
Sub	Subject
Subj	Subject
Th	Theme
V	Verb

Transliteration Scheme

(WX-Notatioii / Telugu Orthography / Roman Script)

a	అ	a
A	ఆ	ā
i	ఇ	i
I	ఈ	ī
u	ఉ	u
U	ఊ	ū
q	ఋ	r̥
eV	ఎ	e
e	ఏ	ē
E	ఐ	ai
oV	ఒ	o
o	ఓ	ō
O	ఔ	au
z	ఋ	m̐
M	ం	m̐
H	ః	h̐
k	క	k
K	ఖ	kh
g	గ	g
G	ఘ	gh
f	ఙ	ṅ
c	చ	c
C	ఛ	ch
j	జ	j
J	ఝ	Jh
F	ఞ	ñ
t	ట	t̐

T	థ	th
d	ధ	ḍ
D	ధ్	ḍh
N	ణ	ṇ
w	త్	t̐
W	థ్	th̐
x	ద్	d̐
X	ధ్	dh̐
n	న్	n̐
p	ప్	p̐
P	ఫ్	ph̐
b	బ్	b̐
B	భ్	bh̐
m	మ్	m̐
y	య్	y̐
r	ర్	r̐
rY	ఱ్	r̐
l	ల్	l̐
lY	ళ్	l̐
v	వ్	v̐
S	ష్	s̐
R	ష్	s̐
s	స్	s̐
h	హ్	h̐

Contents

Certificate	
Acknowledgements	
Abbreviations	
Transliteration Key	

1. Introduction

1.1. Aim and Scope of the Study	1
1.2. The Significance of the Study	2
1.3. Methodology	4
1.4. limitations and Future Work	8
1.5. An Outline of the Work	9

2. An Introduction to Telugu Morphology and Syntax 11

2.1. Introduction	11
2.1.1. The Nominal System	11
2.1.2. The Verbal System	12
2.1.2.1. Agreement in Telugu verb	16
2.1.2.2. Agreement marking on finite verbs	18
2.1.2.2.1. According to unmarked order	19
2.1.2.2.2. According to alternate order of a sentence	20
2.1.2.3. Rules to show agreement marking	20
2.1.2.4. Procedure for appropriate Case markings	22
2.1.2.4.1. Post-positions in Telugu	25
2.1.2.5. Case in Telugu	25
2.1.2.5.1. Theoretical approaches	26
2.1.2.5.2. Argument and Case	26
2.1.2.6. Word Order	27

3. Argument Structure and the Conceptual Framework 28

3.1. Argument Structure	28
3.2. Semantic Structure	38
3.2.1. Valency and Relative Prominence	41
3.2.1.1. Valency Changing operations in Telugu	43
3.2.2. Thematic Hierarchy	47
3.2.3. Mapping between Semantic Structure and Argument Structure	48
3.3. Grammatical Function Structure	48

3.3. Grammatical Function Structure	48
3.3.1. The Internal ordering of Grammatical Function Structure	49
3.4. Grammatical Category Structure	49
4. Preliminaries in the Argument Structure of Telugu Verbs	51
4.1. Introduction	51
4.1.1. Arguments and Argument Structure	51
4.1.1.1. Predicates and Arguments	51
4.1.1.2. Arguments and Thematic roles	54
4.1.1.3. Types of Arguments	61
4.1.1.4. Argument, Adjunct and Complement	64
4.1.1.5. Argument position and Theta-position	66
4.1.1.6. Argument and case	66
4.1.1.7. Thematic Hierarchy and Argument Structure	67
4.2. Argument Structure and Telugu Verbs	70
4.2.1. Unergative verbs	71
4.2.2. Unaccusative verbs	74
5. Argument Structure and Verb Sense Disambiguation in Telugu: A Computational Implementation	77
5.1. Introduction	77
5.2. Early Word Sense Disambiguation in NLP	79
5.3. The Role of the Context	82
5.4. An Overview of the concept, data and the function	84
5.5. Methodology	85
5.6. Algorithm	86
5.7. Test sentences database	89
5.8. Verb's data structure	89
5.9. Noun data structure	90
5.10. Display of meaning/Sense resolution function	92
5.11. The Result	94
6. Conclusion	95
Appendices	100
1. Test Sentences Database	100
2. Verb's Lexical Entries Data	107
3. Semantic Feature Lexicon of Nouns	115
4. Display of meaning/sense resolution function	120
References	162

1.1. Aim and Scope of the Study

The nature of lexical **entries** of verbs has been the most sought after issue for research among Generative **Morphologists**. What is interesting in these works is the investigation with **respect** to representation and the role of argument structure in the linguistic description of the **morphosyntax** of the respective languages. The relationship between syntax and semantics can best be captured through investigations on argument structure and through various mechanisms underlying it. Besides attempting a partial description of the argument structure of Telugu verbs, this work probes the relevance of the syntactic valency to **find** what extent it can be predicted from the lexico-semantic representations associated with individual predicates in Telugu when they involve in derivation or compounding. One of the major goals of this study is to come up with a proposal and illustrate by a practical implementation of the argument structure to know that it is aptly relevant and it is very crucial *in* the disambiguation of different uses of the same verb form involving a number of senses. Though the registered title of the thesis is broad in its scope, it could not be maintained for various academic and non-academic reasons. Firstly, there is a sea change in the attitudes of people towards linguistics, and the goals of research in Applied Linguistics at the Centre during the last five years. While working at the Language Technology Laboratory of the Centre, I have been constantly reminded of the discussions centering around word sense disambiguation and particularly the verb sense disambiguation.

This has been the major problem in the development of machine aided translation systems (a number of such systems are being developed at the Centre). This has led to the change in the focus of the thesis. This dissertation centers around the verb sense disambiguation using argument structure. One of the chapters which focuses on **this** issue is Chapter-5 –“**Argument Sturucture and Verb Sense Disambiguation in Telugu: A Computational Implementation**”. The basic idea in writing this thesis is to develop a prototype application of verb sense disambiguation where argument structure figures as the main issue. The thesis is an out come of various efforts in understanding the theoretical concepts underlying the argument structure, understanding the argument structure of Telugu verbs, mainly the representation of the argument structure and the computational implementation and testing. The study reports here at least two tangible results, viz. a near exhaustive study of the argument structure of Telugu verbs and a tool for computer applications involving verb sense disambiguation in Telugu This thesis does not claim to be a **contribution** to the theory of argument structure directly or indirectly but it can claim to be a precaution in the development of Natural Language processing tools in the area of word sense disambiguation involving argument structure.

1.2. Significance of the study

The grammatical information of a lexical entry of a predicate may be analyzed through various ways viz. semantic structure, argument structure, grammatical function structure, and grammatical category structure. In this work, valency of predicates *in* terms of argument slots

and their semantically determined relative prominence has also been attempted. Semantic patterns of arguments are captured through thematic roles. This information may be expressed in a variety of ways; appealing directly to grammatical functions such as subject and object; (as in Lexical Functional Grammar (Bresnan 1996) or Relational Grammar (Blake 1990)), or to syntactic configuration (as in Principles and Parameters Theory (Chomsky 1981)), or to some combination of grammatical functions and category labels (as in Head-Driven Phrase Structure Grammar (HPSG, Pollard and Sag 1994)) (cf Louisa Sadler and Andrew Spencer. 1998) It is empirically tested that there is a semantic level of representation characterized by the argument structure of a verb and the **specific** properties of the arguments. Note that the marking of verbs exhaustively using linguistically standardized thematic roles is beyond the scope of this work. However, it is recognised that agent, patient, theme, experiencer, locative, instrumental, goal and source are the roles needed to be marked in each lexical entry. An exhaustive identification and marking of thematic roles requires a greater effort, and precision which is not the main goal of the thesis.

The present work, thus focuses on the identification of the semantic **functions** of the arguments i.e. the thematic roles assigned by a verb to its arguments and the way *in* which the relational semantics of the verb is represented at syntax level. Argument structure is the most crucial and relevant level of representation for verbs. Argument structure is manifested distributionally in syntactic alternations giving rise to differences in subcategorization frames or in the properties of the

arguments of a verb. The **subcategorization** frames within and across classes can disambiguate the usages of a verb **with** more than one sense.

1.3. Methodology

Through the work presented here, it is intended to clear the ground for a later larger scale attempt to develop a system for verb sense disambiguation based on argument structure. In other words, the intention of the work here to show by demonstrate that the argument structure of verbs can be **profitably** exploited to construct an application which should be part of a machine translation system and similar other natural language processing applications requiring word sense disambiguation. In a Telugu root word dictionary containing approximately 64,614 words, we have extracted 11,629 verbs and studied them for their meanings. From this list, verbs with more than one distinct sense have been extracted which numbered around 1,427 (12.27%). Again, these verbs were **subjected** to a critical scrutiny to eliminate such cases wherever the so-called multiple senses are because of the choice of the target language equivalent rather than the distinct meanings of the verb. For this purpose we have used a **Telugu-Hindi** anusaraka Machine Translation Dictionary developed at CALTS, University of Hyderabad (**Electronic** version, 1999) and **Gwynn's** **Telugu-English** Dictionary (1991). Finally, screening a total of 1000 verbs which include simple monomorphemic underived plus derived through **affixation** and compounding remained. During the initial phase of the work, every such verb with multiple meanings were provided with argument Structure manually. Since every distinct meaning/sense of the

verb required a distinct but corresponding argument structure, in practice the number of verbs with distinct argument structure have increased to more than two fold. The thematic roles that we have selected for this purpose include mainly Agent, Patient, Theme, Experiencer, **Goal**, Source, Location and Instrument. It was found later that during the implementation of a verb sense disambiguation, not all of them play the same **role**. The first four Agent, Patient, **Theme** and Experiencer play a key role in verb's sense disambiguation. Verbs have also been categorized on the basis of their argument structure. I have also studied the criteria for the predictability of argument structure in verb alternation or derivation. Whenever a new verb is derived through the processes of affixation or compounding, it is not always possible to predict the verb's argument structure. There is not a single process in Telugu verb derivation which facilitates the prediction of the new verb's argument structure.

Eg. *kAlu* 'to be burnt', 'to be toasted'

kAlu 'to burn', 'to fire(as a gun)', 'to toast'

velu 'to be floated' (as on water and air), 'to be decided'

velu 'to lift (make less heaviness), to decide'

iru 'to be relieved', 'to be resolved'

iru 'to relieve, to resolve', 'to arrange', 'to satisfy'

saMwoRaM 'happiness'

saMwoRiMcu 'to be felt **happy**'

saMwoRapeVitu 'to make some one **happy**'

kaRlaM 'difficult'

kaRtiMcu 'to labour/to do hard **work**'

kaRtapeVitu 'to make s'one feel bad'

pagulu intr 'to be broken'

pagalagoVitu '**tr**' 'to break'

wirugu 'to be turned, to be rotated'

wiragagoVitu 'to return'

ciwuku 'to be crushed'

ciwakagoVitu 'to crush, to beat s'one'

As illustrated above, many such derivations are not always regular-both *in* the alternation or in semantics. **This** forces us to list all such verbs in the dictionary rather than **deriving** them through morphology.

A dictionary containing 64,614 words of different categories with paradigmatic information is used to obtain the correct analysis of these nouns and verbs from the test sentences. I have selected about fifty verbs, each of which have more than one argument structure frame. In other words, ambiguous verbs are selected from the verb list along with their multiple argument structures. For each such frame one or two

exemplary sentences are constructed. From these sentences, nouns are extracted and listed in a dictionary with the necessary semantic features. In terms of +/- human, +/-**animacy**, +/-**concrete**, +/-combustible article, +/-edible, +/-body part etc. As part of the argument structure of the verbs, arguments are also provided with similar semantic features of ontological relevance.

Ex.

<i>aw/anu</i> , P(+h)	'he, distant, masc'
<i>AmeV</i> , P(+h)	'she, distant, fm
<i>Aku</i> , N(-a, +c)	'leaf'
<i>goda</i> , N(-a, +c)	'wall'
<i>katteV</i> , N(-a, +ca)	'stick'
<i>kAlu</i> , N(+bp)	'leg'
<i>noru</i> , N(+bp)	'mouth'
<i>annaM</i> , N(+ed)	'cooked rice'
<i>paMdu</i> , N(+ed)	'fruit'

After arriving at a fairly good number of verbs whose argument structure frames are more or less available, I took to the issue of developing a procedure for Verb Sense Disambiguation.

An algorithm which lays out a step by step procedure for the implementation and working of the system is constructed. As a part of this procedure, sentences containing ambiguous verbs are fed to the program. The program reads each word and calls a sophisticated Telugu

morphological analyzer, which analyses each word form and lists root/stem forms plus their morphological categories. Then the program picks up the verb and matches it with one of the argument structure frames, where it picks up the predetermined number of arguments, which will be later matched and conformed based on their semantic features from a dictionary of nouns for disambiguation by narrowing down on a specific argument structure frame.

1.4. Limitations and future work

Several important topics related to argument structure, for reasons of focus and practical implementation, we have also side lined from including deverbal nominals and deverbal adjectives. The main aim of the present work is to investigate the argument structure of Telugu verbs and show by implementation that argument structure can be used **efficiently** to disambiguate verb senses. However, the present work does not address the problem of each and every verb in Telugu that have different senses exhaustively. It is assumed that a classification of lexical entries for verbs can be captured with the notion of an argument structure frame introduced in this work, if the thematic properties reflected in the alternations of argument structure and corresponding to the features of individual verb senses are predicted. The major limitation of this work is that the nouns in Telugu must be exhaustively analysed and marked for their semantic features. It is certainly a stupendous work but will have greater gains in the long run particularly **in** the area of Natural Language Processing.

1.5. An outline of the work

The work reported in this thesis is organized into six Chapters followed by a Reference and an Appendix; Chapter-1 is an Introduction where aim and scope of the thesis is stated and the significance of the work in the current scenario is discussed. The discussion on methodology regarding the development of database of verbs and nouns and their semantics referring to certain large and standard dictionaries, procedures for the implementation of the algorithm and testing are discussed. Towards the end, certain limitations of the current work and of the possible future work are mentioned Chapter two deals with Telugu Morphology and Syntax. It also examines the Telugu nominal structure, verb structure, finite verb agreement and word order which are relevant to the argument structure. The third chapter deals with the valency of verb and conceptual frame work that is necessary for grounding any study with reference to the argument structure. It is a study that touches the semantic structure, the argument structure and their inter relationships in terms of layers. This chapter provides the reader an over all view to situate the argument structure in terms of its functions and manifestations in syntax and semantics. Chapter four is a description of the preliminaries in the argument structure of Telugu verbs. It takes into consideration of the earlier works on Telugu. It starts with the standard definition of arguments and argument structure and other related areas like the classification of the verbs with reference to the argument structure and valency. The Fifth Chapter is the main chapter of the thesis and it is conceived as an exercise in computational implementation of argument structure to disambiguate verbs. It

discusses the need and the studies in word sense disambiguation in natural language processing. It then describes the model proposed based on an algorithm of implementation and testing. The chapter demonstrates that an application based on argument structure for the purpose of verb sense disambiguation can be built The **chapter-VI** is a concluding note on the thesis.

CHAPTER-2

Introduction to

Telugu Morphology and Syntax

2.1. Introduction

It is an accepted view that all grammatical operations in language are structure dependent which in turn require that these grammatical operations are category based. In other words, words in a language are grouped into certain categories as nouns, verbs, adjectives, adverbs etc. These in turn form longer syntactically relevant categories as word groups or phrases such as nominal and verb phrases. Here are some basic properties of the nominal system, the verbal system and word order in Telugu.

2.11. The Nominal System

The noun group or nominal phrases are composed of a single noun or a sequence of nouns other than the head nouns that are in a genitive **construction** or a noun modified by one or more adjectives. Every noun group or noun phrase has an **identifiable** head, a noun. Pronouns are a functional category which substitute a noun or a noun group or a noun phrase. Consider the following examples:

1. *(A((eVMwə) aMxamEna)) ammAyi nAkuweVlusu.*

(That ((very) beautiful) girl to me is known.

I know that very beautiful girl

2. *AmeVnAkuweVlusu*

She to me is known. 'She is known to me'.

Only quantifiers can be optionally be placed in the post nominal (head) position. The head of every noun group noun phrase must be marked for case. A noun group or noun phrase in nominative (explicitly unmarked) is the subject of the clause or sentence. A finite verb of the clause or a sentence shows agreement only with the noun group or noun phrase in nominative. It is possible to place more than one nominative in a sentence or clause in which case the verb shows agreement with the nominal that is in the highest in the order of the ontological hierarchy. Telugu has an extremely interesting phenomenon with regard to the noun group or noun phrase *in* a clause or a sentence. The entire sentence or the clause may be reduced to a nominal and used as a modifier of one of the noun groups or noun phrases in the sentence or clause as a head of the clause with a focus. The verb will be in the participial adjectival form in that construction. This phenomenon is studied, in detail, in Telugu by Prof Ramarao (1970). His studies brought out many hitherto unobserved facts about the Telugu sentence in general and the noun group or noun phrase in particular. He has established a hierarchy among noun groups or noun phrases in a clause or a sentence interfacing in the process called nominalization.

2.1.2. The Verbal System

Simple verbs in their finite forms are inflected for tense followed by PNG endings or states. In order to indicate aspectual, modal and

voice distinctions in the actions or states denoted by the verbs, various auxiliaries are employed (rf. UmaMaheswara Rao 2001). In Telugu, simple past, **future/habitual** and progressive or present tense forms of verbs are derived by affixing "A", "wA", and "wunnA", to the **root/stem** directly as illustrated below:

3. *rAmudu pAta pAdAdu* lIama sang a song'

rAmudu pAta pAdu~~w~~Adu 'Rama will sing a song'

rAmudu pAta pAdu~~w~~unnAdu Tlama is singing a song'

rAmudu pAta pAdAlanu~~k~~oV~~n~~nAdu 'Rama wished to sing a song'

rAmudu pAta pAdaga~~l~~adu 'Rama can sing a song'

rAmudu pAta pAda~~n~~ArA~~m~~Bi~~m~~cAdu Tlama started to sing'

rAmudu pAta pAde~~s~~Adu 'Ram has sung a song'

rAmudu pAta pAda~~b~~oyAdu 'Ram was about to sing a song'

rAmudu pAta pAda~~x~~alucuk~~u~~nnAdu 'Ram wanted to sing a song'

rAmudu vAdini pAta pAda~~m~~annAdu lIama told him to sing a song'

rAmudu vAdini pAda~~n~~iccAdu 'Rama permitted him to sing a song'

rAmudu vAdiki pAta pAdipeVilAdRam sang a song for him/his sake'

rAmudu pAta pAdukunnAduRam sang a song for himself

rAmudicewa pAta pAdabadiMxi 'A song was sung by rama'

A verb in Telugu, besides taking the simple inflectional tense marking affixes can also take derivational affixes which change the valency of the verb as illustrated below:

- | | | |
|-----------------------|------|----------------------|
| 4. <i>kAlu</i> | intr | 'to be burnt' |
| <i>kAlu/ kAluvu</i> | tr | 'to burn' |
| <i>kAlpiMcū</i> | caus | 'to cause to burn' |
| 5. <i>mAru</i> | intr | 'to be changed' |
| <i>mArcu</i> | tr | 'to change' |
| <i>mArpiMcū</i> | caus | 'to cause to change' |
| 6. <i>virugu</i> | intr | 'to be broken' |
| <i>viruvu/ virucu</i> | tr | 'to break' |
| <i>viripiMcū</i> | caus | 'to cause to break' |

Beside above illustrated examples of intransitive, transitive and causative alternations bringing changes in the argument structure (or to the valency) of the verb, there are also certain periphrastic mechanisms by which simple verbs can be converted to their respective counter parts

such as intransitives into transitive and transitive into causatives (of various types) by the use of certain class of verbs mostly transitives which lack semantic content (Krishnamurti 1990, UmaMaheswara Rao 2002). Consider the following examples.

7. (a) *virugu* intr 'to be broken'
viragagoVttu tr 'to break'
viragaxiyyi intr 'to break it by force/intentionally'
- arugu* intr 'to be grounded'
aragagoVttu tr 'to ground'
aragaxiyyi tr 'to ground forcibly/intentionally'
- pagulu* intr 'to be broken'
pagulagoVttu tr 'to break'
pagalaxiyyi tr 'to break/split forcibly'
- (b) *murugu* intr 'to be decompose'
murugabeVttu tr 'to decomposed'
- Aru* intr 'to be dried'
ArabeVttu tr 'to dry'
- cAru* intr 'to die'
cAragoVttu tr 'to kill'
cAvabeVttu tr 'to send s'one away'

In the following cases, auxiliary verbs are employed to derive causatives from corresponding intransitive and transitive verbs:

(c) <i>po</i>	'to go'
<i>poV'mmanu</i>	'to say s'one go' (to cause s'one go by asking/requesting)
<i>ponivvu</i>	'to let s'one go' (to ask s'one go by permission)
<i>racu</i>	'to come'
<i>rummanu</i>	'to say s'one come' (to cause s'one come by asking)
<i>rAnivvu</i>	'to let s'one come' (to cause s'one come by permitting)

Considering above examples, it can be said that in the Telugu verbal system, auxiliary verbs are concatenated to the verb stem on a special base to be followed by different inflections form to yield various distinctions of aspect, mood and voice.

2.1.2.1. Agreement in Telugu Verb:

Telugu is a nominative-accusative language with subject (nominative) verb agreement. Agreement in Telugu can be defined in the following way. A finite verb in Telugu exhibits agreement in number, gender, and person with its subject nominal, which is always in the nominative (See Krishnamurti, 1992; Subbarao, 2002). When there are

more than one noun in the nominative then the verb agrees with the noun having the feature [+masculine] but not [-masculine] or [+human/-masculine] and not [-human,-masculine] irrespective of their order in a sentence or a clause i.e. an ontologically higher ranking order noun has a over riding power to percolate it's features to a finite verb.

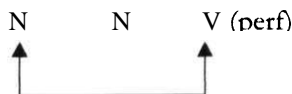
If a sentence has two nouns, *in* the nominative form but both are associated with feature [-masculine], then the GNP of the verb agrees with the noun, which is associated with the feature [+animate] and not with feature [-animate].

NOTE: There do not generally occur sentences or clauses in Telugu consisting of two or more nominative nouns sharing the features [+masculine] or [-animate] when the verb is non reciprocative (Rajini Reddy, 1998). In other words there exists a constraint in Telugu Syntax that no two nouns shall occur in the nominative that share identical semantic features or that share identical ontological hierarchical order.

8. (a) *vAdu puvakaM caxivAdu* 'He read the book'



(b) *rAmudu peVnnukoVnnAdu* 'Rama bought the pen'



**rAmudu krishnudu koVilAdu* 'Rama Krishna beat'

**sIwa glwa koVitiMxi* 'Sita Gita beat'

**peVnnu puswakaM rAsiMxi* 'Ten book write'

2.1.2.2. Agreement Marking on Finite Verbs:

In Telugu, a finite verb exhibits agreement with the nominative form of a noun in gender, number and person i.e. with a noun that is not marked by any case marker (vibhakti).

9. *annaM udikiMxi* 'Rice boiled'

N	V
[-msc]	[-msc]
[+sg]	[+sg]

10. *vAdvaccAdu* 'He came'

N	V
[+msc]	[+msc]
[+sg]	f+sg]

11. *varRaM kurisiMxi* 'I trained'

N	V
[-msc]	[-msc]
[+sg]	[+sg]

12. *pilli pAluwAgiMxi*. 'Cat drank the milk'

N N V

[-msc] [-msc] [-msc]

[+sg] [+sg] [+sg]

If there is more than one noun in the nominative form, then the verb agrees with the noun that occupies a higher node in the ontological hierarchy irrespective of their order in a sentence or within a clause i.e. a higher ranking order noun has a over riding power to percolate its features to a finite verb. In other words, nouns identified as having [+msc] have over riding capabilities with respect to nouns that have features. Similarly a noun with [-ani] features has over riding power with respect to the noun with [-ani] feature. The following examples illustrate this distribution:

2.1.2.2.1. According to unmarked order:

13. *vAdu puswakaM caxivAdu* He read the book'

N N V

[+nom] [+nom]

[+msc] [-msc] [+msc]



14. *pilli pAluwAgiMxi*. 'Cat drank the milk'

N N V

[+nom] [+nom] [+ani]

[+ani] [+ani]

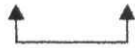
2.1.2.2.2. According to alternate order of a sentence:

15. *puswakaM vAdu caxivAdu* 'The book he read'

N1 N2 V

[+nom] [+nom]

[-msc] [+msc] [+msc]



When a sentence has two nouns in the nominative **form**, and both are associated with the feature [-msc], then the GNP of the verb agrees with the noun, which is associated with the +animate [+ani] and not with the feature -animate [-ani].

16. *AmeV annaM winiMxi* 'She ate the food'

N1 N2 V

[+nomj] [+nom]

[-msc] [-msc] [-msc]

[+ani] [-ani]



2.1.2.3. Rules to show agreement marking:

Agreement hierarchy

[+msc] > [-msc] > [-msc]
 [+ani] [-ani]

(1) Unmarked

- | | | | |
|------|---------|-----------|---------|
| 17). | N | N | V |
| | [+nom] | [+nom] | [+msc] |
| | [+msc] | [-msc] | |
| | [+ani] | [-ani] | |
| | abbAyi | boVm̩malu | cesAdu. |
| | The boy | toys | made. |
-
- | | | | |
|------|---------|--------|---------|
| 18). | N | N | V |
| | [+nom] | [+nom] | |
| | [-msc] | [-msc] | [-msc] |
| | [+ani] | [-ani] | [+ani] |
| | p̩illi | p̩Alu | wAgiMxi |
| | The cat | milk | drank. |
-
- | | | | |
|------|---------|----------|---------|
| 19). | N | N_nu | V |
| | [+nom] | [+acc] | [+nom] |
| | [+msc] | [+msc] | [+msc] |
| | abbAyi | ammAyini | gillAdu |
| | The boy | thegirl | pinched |
-
- | | | | |
|------|---------|-----------|----------|
| 20). | N | N | V |
| | [+nom] | [+acc] | [+nom] |
| | [+msc] | [-msc] | [+msc] |
| | | [+ani] | |
| | abbAyi | pulini | caMpAdu. |
| | The boy | the tiger | killed. |

21).	N	N	V
	[+nom]	[+acc]	[+nom]
	[-msc]	[-msc]	[msc]
	[+ani]	[+ani]	[+ani]
	pilli	eVlukani	pattiMxi.
	The cat	the rat	caught.

Note there are no sentences or clauses in Telugu consisting of two or more nominative nouns sharing the features [+msc] or [-ani] when the verb is noun reciprocative.

2.1.2.4. Procedure for Appropriate Casemarking:

Case markers show the relation between a noun and a verb in a clause. In most of the Indian languages a case marker may stand for one of the following cases:

1. Nominative
2. Accusative
3. Instrumental
4. Dative
5. Ablative
6. Genitive
7. Locative
8. Vocative

In Telugu there are large numbers of case markers and post-positions are employed to mark any one of the above cases. There are different case markers to represent accusative and dative cases denoting direct object nouns and *indirect* object nouns. Case markers may depend upon the verb or the noun or both the verb and the concerned noun.

22). *vAdiki peVnnuxoVrikiMxi*. 'He found a pen'.

23). *gAliki xlpam AripoyiMxi*. 'The light was put off due to wind'.

The following table depicts the correspondences between cases, case markers and syntactic and semantic relations in Telugu:

Case	Case Marker	Semantic Ontological categories	Thematic Role	Syntactic Category	Example sentence
Nom	0	[+msc] [+ani]	Agent	Subj	<i>abbAyvaccAdu</i> The boy came
Nom	0	f-msc] [+ani]	Agent	Subj	<i>pilli pAlu vAgiMxi</i> The Cat drank the milk
Nom	0	[-msc] [-ant]	Patient	Subj	<i>gLAsu pagiliMxi</i> The glass broke
Nom	0	[+msc] [+ani]	Causer	Subj	<i>vAdu AmeVnuvoSAdu</i> He pushed her
Acc	Ni	[+msc] [+ani]	Causee Agent	Obj	<i>nenu vAdini caMpamannAnu</i> I have asked him to kill
Acc	Ni	[+ani]	Patient	Obj	<i>nenu vAdini koVttAnu</i> I hit him
Dat	Ki	[+ani]	Experiencer	Obj	<i>vAdiki juvaM vacciMxi</i> He has fever

Dat	Ki	[-ani]	Purpose	Obj	<i>vAdu snAnAniki veVlAdu</i> He went for a bath
Dat	Ki	[+ani]	Receipient	Obj	<i>AmeV'ku awAdu</i> <i>xoV'nikiMxi.</i> She received an award
Dat	Ki	[+ani]	Possessor	Obj	<i>vAdiki dabbulu unnAyi</i> He has money
Dat	Ki	[-ani] [+space]		Obj	<i>vAdiki pillalu unnAru.</i> He has children
Dat	Ki	[-am]	Locative	Obj	<i>godaki kitikluMxi</i> There is a window in the wall
Dat	Ki	[-ani]	Instrumental	Obj	<i>gAdiki ceV'ttu kUliMxi</i> The tree fell due to wind
Inst	Wo	[+hum]	Sociative	Obj	<i>nenu AmeV'wo veVlAnu</i> I went along with her
Inst	Wo	[+ani]	Agent	Obj	<i>viSvAmiwrudu rAmudiwo</i> <i>wAtakini caMpiMcAdu.</i> Visvamitra got Rama to kill Wataki
Inst	Wo	[-am]	Instrument	Obj	<i>nenu paMdunu kawwiwo</i> <i>kosAnu</i> I cut the fruit with a knife.
Inst	Wo	[+ani]	Patient		<i>nenu vAdiwo ceVppAnu</i> I told to him
Abl	NuMdi	[+ani]	Source	Obj	<i>awanu nAnuMdi dabbulu</i> <i>wIsukoV'nnAdu</i> He took money from me
Abl	NuMdi	[-ani]	Theme	Obj	<i>AmeV'DillInuMdi vacciMxi.</i> She came from Delhi

Table. 1

2.1.2.4.1. Post positions in Telugu

The following are some post-positions which function as case markers in Telugu:

1. *guriMci* 'about (s'one/s'th)'
2. *xvArA* 'through'
3. *valana* 'because of'
4. *batti* 'accordingly'
5. *patla* 'towards, about'
6. *varaku* 'till, untill'
7. *guMdA* 'through'
8. *ceva* 'by (agentive)'
9. *kosam* 'for (s'one/s'th)'
10. *vaxxa* 'at'
11. *xaggara* 'near'
12. *nuMdi* 'from'
13. *nuMci* 'from'
14. *lonuMci* 'from' etc..

The choice of the case marker is dependent on the context besides the semantic properties of arguments and the predicates..

2.1.2.5. Case In Telugu:

Argument Structure and case assignment are thus topics, which are closely related to each other. Case expresses the relation between a

predicate and its thematic dependents. The thematic roles assigned via case are selected by the predicate.

2.1.2.5.1. Theoretical approaches:

To give an account of case assignment let us first list some general observations on the Case.

- Case is a means for linking items in utterances. In particular, it is a marking of syntactic argument structure.
- Case is closely connected with thematic structures.
- Languages differ in their realization of case (morphologically, positionally and lexically)
- Some cases vary according to their syntactic environment, others do not

2.1.2.5.2. Argument and Case:

Arguments are closely related to case. Case is assigned to NP. But an NP, which is not an argument, is not assigned case. And a verb with external argument can assign an accusative case.

It is also observed that an NP with case can be assigned a theta-role. That is, case renders an NP argument visible to theta role assignment.

A verb case-marks its object if and only if it theta -marks its subject – (Chomsky 1986b: 139) (cf. Taegoo Chung, 2000).

When a verb assigns a theta role to its subject, it can assign accusative case, or when a verb assigns accusative case, it assigns a **theta-role** to its subject.

2.1.2.6. Word order

Telugu is a free word order language like most other South Asian languages (Dravidian and Indian). The word order of grammatical functions like subjects and objects is largely free. Internal changes in the sentences or position swap between various word group or phrases will not affect grammatical functions of the nominals but an asserted change of forms of the word groups might be a consequence of such movement.

24. (a) *rAmudu slwaku hArAnni paMpiMcAdu*

Ram sent Sita a necklace

- (b) *rAmudu hArAnni slwaku paMpiMcAdu*

Ram sent Sita a necklace

- (c) *hArAnnirAmudu slwaku paMpiMcAdu*

Ram sent Sita **a/the** necklace

- (d) *rAmudu paMpiMcAdu slwaku harAnni*

Ram sent Sita a necklace

CHAPTER-3 Argument Structure and the Conceptual Framework

3.1. Argument Structure

This chapter deals with the level of argument structure associated with the number of arguments a predicate takes, and their semantically determined and syntactically relevant relative prominence.

According to Grimshaw (1988:1) the central assumptions of argument structure **are...**

- (a) It contains information about the syntactic valency of a predicate.
- (b) It represents prominence relations among arguments
- (c) It contains no thematic role information

According to Grimshaw (1990), argument structures are constructed in accordance with thematic hierarchy. The argument structure expresses prominence relations determined by the thematic information of the verb. The thematic hierarchy proposed by him specifies that the theta role assignment takes place from the least to the most prominent argument; it follows that the external argument will be the last to be theta marked. Since prominence is **specified in** the argument structure, and the reference to theta role labels is no longer necessary, Grimshaw states that thematic roles do not project into the

grammatical **representation**, but they are just tools to describe lexico-**semantic** problems. Internal organization of argument structure is not stipulated for each predicate but is projected from lexical semantic representation.

A verb may have a certain number of optional or obligatory syntactic dependents or elements. The latter refer to the set of arguments present in any given clause. In other words, the set of arguments of a verb is called the valence of that verb. The lexicon and the grammar of the language must therefore include information about these valency requirements. It is said that these issues of valency raise the question of alternation, i.e., where two morphologically related or even identical predicates differ in their lexical semantics in the way participants are realized in the **morpho-syntax** and, in particular, in morphology. According to Sadler and Spencer (1998), this facet of the **morphology-syntax** interface has come to be referred as '**Argument Structure**'. This reminds us of the hypothesis of lexical projection in the form of Universal Alignment Hypothesis (Perlmutter and Postal (1984)) which is reproduced below:

- i) The Universal Alignment Hypothesis (UAH):
 "Principles of Universal Grammar (VG) predict the initial relation borne by each argument in a given clause from the meaning of the clause".

Similar to the above, from the perspective of the interaction of syntax and lexical semantics, Baker (1988) formulates the Uniformity of Theta Assignment Hypothesis (UTAH).

- ii) The Uniformity of Theta Assignment Hypothesis:
 "Identical Thematical relationships between items are represented by identical structural relationships between these items at the level of **D-Structure**".

Intuitively, the UTAH predicts that every lexical item has a unique D-Structure and verb alternations in active-passives, causatives non-causative source verbs and other morphological derivations that must preserve the basic argument structure. However, there are complex phenomena involving the derivation of verbs which do not preserve the argument structure of the source.

With this background two crucial issues need to be addressed here:

1. To what extent is syntactic valency idiosyncratic or predictable from the lexico semantic representation.
2. It is said that between two kinds of changes viz. meaning changing and meaning preserving operations, the former alters the semantic content of predicates and is often called morpho-lexical operation; whereas, the latter which usually preserve the sense is manifested in the form of a syntactic operation that assign the mapping of the grammatical relations otherwise known as **morpho** syntactic operations. This difference neatly corresponds

to the well known distinction, the derivation (lexeme-creation) and inflections (paradigmatic forms of the lexeme). This sort of distinction between **morpho-lexical** and **morpho** syntactic operation is also perceived as a necessary phenomenon motivated by an important conceptual level called "argument structure level" otherwise known as Predicate Argument Structure (PAS).

This makes clear that the argument structure is essentially a syntactic representation — a reflection of the predicate's semantic properties. These properties determine the arity of the predicate. Notice that the identification of semantic properties of the predicate and matching them against the available arguments in a clause *give* us the clue to the correct semantics or meaning *of the* predicate (see Chapter 6).

Every predicate has an argument structure. The argument structure specifies the predetermined number of the arguments the predicate can support. These arguments are essentially being the participants which are minimally required for the activity or state described by the predicate to be understandable. However, this minimality is subject to debate. Argument Structure is a syntactic level of representation at which the number and relative prominence of arguments of a predicate are expressed; i.e., an Argument Structure specifies the arity of a predicate. A verb such as *give* is arity of 3, exemplified in '**X** give Y to Z', and the verb '**mix**' is arity of 2, where the mixed elements are all included into a single argument, which have the form of a set of conjoined NPs, and this argument is said to be '**plural**'.

It is argued that the argument structure in a language is dependent on the semantic properties of the verb. It is a bridge between deeper, conceptual representations and surface forms. These conceptual structures are postulated to be universal, and therefore, language independent.

The term argument structure meant different types of realization and different types of alternations to different authors. The argument structure information is presented in different ways, appealing directly to grammatical functions such as Subject and Object facilitated by syntactic structures, as in Lexical Function Grammar (LFG) (Bresnan, 1996) or Relational Grammar (Blake, 1990), or to Syntactic configurations, as in Principles and Parameters Theory (Chomsky, 1981), or to some combination of grammatical functions and category labels, as in Head-Driven phrase structure Grammar (HPSG) (Pollard and Sag 1994). In addition, there must be a semantic level of representation of arguments of predicates as a level of lexico-semantic representations describing the nature, structure and vocabulary concerned (cf. Sadler & Spencer, 1998).

The information regarding the argument structure representation may well be used for syntactic well-formedness. The verb 'to give' has three arguments, which are represented as variables (X, Y, Z). Argument Structure is concerned with the number of participants expressed by the conceptual representation. The verb 'to give' requires three participants, a giver, a receiver and a given object as is represented in the example below:

{**The boy** X} [gives {**the girl** Y} {**the book** Z}]

The arguments that fall within the domain of the verb (Y, Z) are internal arguments, where as (X), falling outside the domain is an external argument. Verbs requiring three arguments are called three place verbs. Apart from these, one place (ex: to run), two place (to grind) and four place verbs (exchange) exist. All arguments must be specified in a sentence in order to make it well-formed.

According to Ken Hale and Jay Keyser (1991), the argument structure is used to refer to the Syntactic Configuration projected by a lexical item. It is the system of structural relations holding between heads (nuclei) and arguments within the syntactic structures projected by nuclear items. Any argument structure configuration associated with an actual predicate in sentential syntax will be interpreted in terms of one or another aspectual type (achievement, accomplishment, etc.) and its arguments will be associated with one or the other aspectual role (measure, path, terminus etc. (Tenny, 1992). But, the argument structure is distinct and a separate component of grammar.

The verbs of natural languages, generally ‘rich’ in this regard, but are extremely limited in the variety and complexity of argument structure they display, conform to a highly restricted typology. Few verbs have more than three arguments and the range of generally recognized thematic (or semantic) roles associated with verbal arguments is rather small, numbering half a dozen or so.

It is observed that this impoverishment is in striking contrast to the syntactic structures of sentences, whose complexity is essentially without limit. It is also in the proper interest of linguistic research to explain this fact as a matter of fact that it is a true fact of natural languages.

A similar view is held by Rappaport and Levin (1988) who argue that predicate decomposition at the lexical-conceptual level makes the properties of the predicate argument structure predictable from the meaning of the verb, thus making theta role labels superfluous. This observation gains evidence from our current application.

Merlo and Stevenson (2001) in their paper on Statistical Verb Classification presented machine learning techniques for automatically classifying a set of verbs into classes determined by their argument structures. They have taken three major classes of intransitive verbs in English, which cannot be discriminated by their sub categorization, and therefore require distinctive features that are sensitive to the thematic properties of the verbs. Argument structure is both a highly useful and learnable aspect of verb knowledge. The relevant semantic properties of verb classes such as causativity or animacy of subject may be successfully approximated through countable syntactic features. The important contribution of the work is the proposed mapping between the thematic assignment properties of the verb classes and statistical distributions of their surface syntactic properties.

In Beth Levin's (1993) work on English Verb Classes **and** Alternations, the classificatory distinctions involve the expression of arguments of verbs, including alternate expressions of arguments and special interpretations associated with particular expressions of arguments of the type that are characteristic of diathesis alternations. Certain morphological properties of verbs, such as the existence of various types of related nominals and adjectives have been used as well, since they are also tied to the argument-taking properties of verbs. The verb classes that are identified in this work should be handled with care since there is a sense in which the notion of Verb **class**' is an artificial construct. Verb classes arise because a set of verbs with one or more shared meaning components show similar behavior. Some meaning components cut across the classes identified here as attested by the existence of properties common to several verb classes. For instance, the meaning components *contact* and *motion* are common to *hit* verbs and *cut* verbs, as manifested by their participation in the alternation. However, the meaning component *contact* alone would also have picked out the *touch* verbs as well as the *hit* and *cut* verbs. Thus, since most verbs are characterized by several meaning components, there is potential for **cross-classification**, which in turn means that the other, equally valid classification schemes might have been identified instead of this classification.

Taegoo Chung (2000) in his work on Arguments structure and English Grammar introduces the basic concepts about the argument and argument structure, argument and thematic roles and argument and case. A verb may belong to more than one type of verbs. For instance, the

verb ‘**break**’ can be either a passive or middle or an ergative. But which verbs can be a particular type of verbs is an issue to be investigated.

Adele. E. Goldberg (1995) proposes that grammatical constructions play a central role in the relation between form and meaning in simple sentences. She demonstrates that the syntactic patterns associated with simple sentences are imbued with **meaning**, and that the constructions themselves carry meaning independently of the words in a sentence. Goldberg provides a comprehensive account of the relation between verbs and constructions, offering ways to relate verb and constructional meaning and to capture relations among constructions and generalizations over constructions. Prototypes, frame semantics and metaphor are shown to play crucial roles. In addition, Goldberg presents specific analyses of several constructions, including the **ditransitive** and the resultative constructions, revealing systematic semantic generalizations.

Through a comparison with other current approaches to argument structure phenomena, this work narrows the gap between generative and cognitive theories of language.

Generalized Phrase Structure Grammar is a sophisticated variety of context free Phrase Structure Grammar. Its major innovation is that permissible structures are not characterized ostensibly but indirectly by techniques which allow the grammar definition to capture significant generalizations but which also make it much more compact than simple context free grammar listings.

The influences of the work of late Richard Montague on GPSG is considerable. The theory falls within the range of syntactic theories that have been usefully characterized as Extended Montague Grammar. Some hitherto neglected aspects of English grammar are discussed, but many of the facts the authors deal with have been at the center of recent controversies in generative grammar.

Givon's (1984) approach to language and syntax within the proper historical perspective therefore has various strands reaching out from it all the way to the present, as the first systematic attempt within the western tradition to deal with language structure and language diversity in both phonology and morphosyntax. Word classes, Subject/Direct object, typology of case marking, word order typology are the very relevant topics in the sentence structure contributed by Givon, which deals **with** the methodological preliminaries to the **functional–typological** approach to syntax. Givon presents a sketch of lexical categories (word classes) and is also implicitly a treatment of lexical semantics. Givon deals separately with three fundamental aspects of propositional semantics and syntactic organization. 1. Semantic structure of propositions, predications and case roles. 2. Morpho syntactic typology of case marking systems. 3. Word order typology.

Gruber's (2001) work on thematic roles and grammatical arguments in a sentence are commonly described in terms of their relations. **Thematical** relations are **basically** conceptual, but they are necessary for determining grammatical arguments. The linking problem of argument projection and regularities have been propounded and

described in terms of Universal Alignment Hypothesis (Perlmutter & Postal 1984), the Uniformity of Theta Alignment Hypothesis (Baker 1988, 1996), linking rules and hierarchies (Carter 1988, Jackendoff 1990 b) and projection asymmetries (Gruber 1994, 1997) (cf. Gruber, 2001).

Around the argument structure of predicate is built a rich collection of information, partly predictable and partly idiosyncratic. For example, take a verb like *ṁṁṁ* 'eat' in Telugu. It comes with the information about grammatical category structure. Being a transitive verb it takes two arguments. That way it provides information about Argument Structure. One argument is *eater* – it's about who eats, and the other argument *atee* is about which is eaten. This is the information about the Semantic Structure. In a proposition that contains this verb, the 'eater' argument is the Subject and the 'atee' argument the Object. This provides the information about the Grammatical Function Structure.

The information about the predicate in a representation is distributed over four Levels of structure called Semantic **Structure**, Argument **Structure**, Grammatical Function Structure, and Grammatical Category Structure.

3.2. Semantic Structure:

The Semantic Structure information can be accessed by principles that govern syntactic and morphological regularities. It is the representation of all and only those meanings that describe the

association/relationships between the predicate and the arguments. In other words it is the representation of all and only those meanings that can condition syntactic and morphological regularities. The entities represented at this grammar-internal level of structure are accessible to principles of grammar that regulate syntactic and morphological structure. It is distinct from meanings in the real world **entailments**, and non-linguistic representations of concepts, situations, and so on.

Lexical Conceptual Structure (LCS) (cf. Jackendoff 1986; Hale and Keyser 1987), denotes that *meaning* which expresses all elements of meaning that the speaker of a language associates with a word. The other alternative can be the *grammaticalisable* meanings (Pinker, 1989) which govern morphological and syntactic regularities in a language, as it is distinct from LCS (cf. Tara Mohanan, 1994).

Lexical semantic representation in lexical mapping theory of Lexical **Functional** Grammar uses a set of thematic roles including Agent, Patient, Theme, Experiencer etc. For the lexical entry for '**break**', the lexical representation otherwise known as the argument structure as used in the LFG will be, break: < **Agent**, Patient >.

Hale and Keyser (1993) propose that argument structure be deserved in terms of lexical argument structures or lexical relational structures (LRS) as a short cut of Lexical conceptual structure (LCS).

Usually argument structure does not contain any explicit lexical semantic information about the verb and its arguments. Explicit

semantic information or representation of verb meaning is usually achieved by semantic role lists and predicate decomposition. In a representation of semantic role lists the meaning of the verb is reduced to a list of the semantic roles that its arguments bear -as in

dry: < Agent, Patient>

Alternatively, the predicate decomposition involves the representation of a verb's meaning in terms of a fixed set of primitive predicates together with constants. The constants usually fill in the argument positions associated with these predicates which are also known as modifiers of predicates.

dry [[x ACT] Cause [y Become DRY]]

Where DRY is a constant representing the state associated with the verb *dry*, and x **and** y represent the verbs arguments. The semantic role listing in argument structure representation can be associated and extracted from the predicate decomposition representation (see Gropen **et al** 1991).

dry: <Agent>, <Patient>

dry: [[x ACT] CAUSE [y become DRY]]

If the principle that associated a case to an argument is conditioned by semantic structure of the predicate, the case is semantic.

The following is **the** distinction between semantic and non semantic cases.

Direct non-semantic case: NOM, ACC, GEN - Assigned by non-finite verbs.

Direct semantic case: ERG

Indirect non-semantic case: Assigned by **Nominals**

Indirect semantic case: DAT, INST, GEN, LOG

3.2.1. Valency and Relative Prominence

Based on the number of arguments that can be taken, predicates are grouped into various sub-classes, that is in terms of their valency. Verbs like *Adu* 'to play', *koVttu* 'to beat' and *paMpu* / *paMpiMc* 'to send' belong to the sub class of monadic, diadic and triadic verbs respectively. The valency information in argument structure is represented in terms of argument slots, with which the elements of semantic structure, grammatical function structure, and grammatical category structure are associated.

In theta role representations the relative prominence is expressed as **thematic hierarchy** (Gruber 1965; Jackendoff 1972).

1. *ravivana* *kArunu* *Arjiki* *paMpiMcAdu* 'Ravi sent his car to the
garriage'

N	A	D	V
Arg1	Arg2	Arg3	predicate

The argument structure in the above sentence expresses that the predicate has three arguments. Here the terms like *agent*, *patient*, *goal* and such other labels are used to refer to the semantic relations that arguments bear to their predicates and have been widely called case relations (Fillmore 1968), semantic relations (Katz 1972)(cf. Tara Mohanan, 1994), thematic relations (Gruber 1965; Jackendoff 1972), and currently the most familiar thematic roles or theta roles. This thematic role information is expressed in the predicate argument structure of a verb.

The different theories about argument structure argue that representations of argument structure of a predicate include...

1. the number of arguments the predicate takes,
2. the semantic relations they bare to it; and,
3. their relative prominence.

The relative prominence of thematic roles is also called **thematic hierarchy**. Researchers agree that such a hierarchy plays a role in governing syntactic regularities; another crucial function is to identify the default associations between meanings and grammatical functions such as subject and object. The hierarchy is also relevant to characterize the asymmetries in idiom formation (Kiparsky 1987). In many languages it also crucially serves to constrain word order (Uszkoreit 1984, 1986) (cf. Tara Mohanan, 1994).

3.2.1.1. Valency Changing Operations in Telugu

Languages often have operations that change the relationship between semantic roles and grammatical relations in clauses. Such devices are some times referred to as alternative voices. For example the passive operation in English when applied to most transitive verbs place the *patient* (active voice) in the *subject* role and the *agent* in an *oblique* role. Generally for transitive verbs, the *agent* bare the *subject* relation and the *patient* the *object* relation.

In terms of valence, these operations change the structural relationship between grammatical relations and semantic roles. Valence can be thought of as a semantic notion, a syntactic notion or a combination of these two. Semantic valence refers to the number of participants expressed by the verb.

The notion of valence is closely associated with the traditional **idea** of transitivity. That is a transitive verb is one that describes a relation between two participants such that one participant acts towards or upon other. An intransitive verb is one that describes a property, state or situation involving only one participant These valence-changing operations are very **common** in verb morphology. Most of the languages have morphological manifestation of valence marked on the verb. This is the most common category of verbal morphology, even surpassing tense, aspect and subject agreement In Telugu this is achieved through derivational and compounding operations.

3.2.1.1.1. Valency increasing operations:

Causatives	<i>-iMc<u>u</u></i>	Those that add a controlling participant
Applicatives/processor raising	<i>+/-cu, +/-pu, +goV<u>ttu</u>, beV<u>ttu</u>, xiyi, veV<u>yyi</u></i>	Those that upgrade a peripheral participant

Table. 2

3.2.1.1.2. Valence decreasing operations:

Reflexives Reciprocals Middles	<i>-koV<u>nu</u></i>	Those that "merge" controlling and affected participants
Subject omission passives Inverses	<i>badu</i>	Those that downplay a controlling participants
Object omission antipassives Object demotion Object incorporation	—	Those that downplay an affected participants

Table. 3

Causatives can be divided into three types. Lexical, morphological and periphrastic/analytic. A causative verb is one which has a lexical VP structure headed by a V slot Causee is an agent of the caused event.

Causer is an agent of the predicate of cause **and** so normally also of **the** causative situation. Causative construction is formed based on intransitive and transitive events. Causative predicates always involve one more **predicate** than the caused predicate. Therefore if the caused event is intransitive, **the** causative is transitive. If the caused event is transitive, then the causative is bitransitive.

Lexical causatives are these that do not surface formal change in the verb or else they may exhibit some idiosyncratic change in the verb.

a) Morphological causatives

Morphological causatives involve a productive change in the form of the verb. If there is any change in the stem then it is considered as a morphological causative. Telugu has a very productive morphological causative. The suffix **-iMcu** can be applied to virtually any transitive verb to form a causative of the verb. However, in case of intransitives only unergatives can take **-iMcu** to get converted to causativised but unaccusatives [+ sudden change] cannot be converted to causatives.

Ex.

Transitives:

- | | | | |
|----|-------------------|------|---|
| 2. | <i>kalupu</i> | tr | 'to mix s'th with s'th |
| | <i>kalipiMcu</i> | caus | 'to cause to mix s'th with s'th /to cause to meet s'one with s'one' |
| | <i>nnu</i> | tr | 'to eat' |
| | <i>•nnnipiMcu</i> | caus | cause s'one to eat' |

Unergatives:

3. *Adu* 'to play'
AdiMcu caus 'to cause/make s'one to play'

uruku 'to run'
urikiMcu caus 'to cause s'one run'

Unaccusatives:

4. *padu* 'to fall'
**padipiMcu*

virugu 'be broken'
**virigiMcu*

karugu 'to melt'
karigiMcu

murugu 'to rot'
murigiMcu

pagulu 'to break'
**pagiliMcu*

ceru 'to reach/to join'
**ceriMcu*

cerpiMcu 'to cause s'one join' (*cerpu+iMcu*)

<i>mAru</i>	‘to change’
<i>*mArīMcu</i>	
<i>mArpiMcu</i>	‘to cause s’t change’ (mArpu+iMcu)

b) Analytic periphrastic causatives

Periphrastic or Analytic causatives are not normally considered to be valence-increasing operations. These analytical causatives consist of a matrix verb, whose sentential complement refers to the caused event. In Telugu *-nivvu* and *-manu* are two productive auxiliaries, which involve in the derivation of periphrastic causatives.

Ex.

5. <i>koVyyanivvu</i>	‘to cause to cut by allowing it’
<i>koVyyamanu</i>	‘to cause to cut by prompting s’one’
<i>nīnanivvu</i>	‘to cause to eat by allowing it’
<i>nīnamanu</i>	‘to cause to eat by prompting s’one’

3.2.2. Thematic Hierarchy

Every lexical representation of a predicate has an ordering relation among arguments expressed at the argument structure, called Argument Hierarchy. As a result of thematic hierarchy, the relative prominence among semantic entities result in mapping into argument structure, yielding an ordering of arguments.

Agent < beneficiary < goal < instrument < patient / theme < locative

3.2.3. A Mapping between Semantic Structure and Argument Structure

A causative morpheme in Telugu adds a causer to the semantic structure, which may be associated with an independent argument, in which event, there is an increased **valency** when it is compared to a non-causative sentence or it may be associated with an argument that already has an entity in the embedded semantic predicate associated with **it**. In that event there is no change in the valency.

Ex.

6. *ravi waluṭulu weVricAdu* 'Ravi opened the door'

N<Ag> N<Th> V<tr>

7. *ravi mohannu waluṭulu weVripMcAdu* 'Ravi made Mohan to
open the door'

N<Caus>N<Ag> N<Th> V

3.3. Grammatical Function Structure

Argument structure represents the number of syntactic arguments dependent on a predicate, whereas grammatical **function** structure represents the grammatical functions of these dependents.

Grammatical function structure information forms a sub **system** of grammatical features such as inherent verbal features like tense, aspect, mood, and so on; and inherent nominal features like number,

gender, and person and case features such as nominative, accusative, dative, locative, instrumental and the like.

The principles that associate a case to an argument is conditioned by grammatical functions of the argument.

33.1. The internal Organization of Grammatical Function Structure

In a lexical proposition of a predicate at the level of word grammar, all elements in the grammatical function structure of a predicate are associated **with** arguments, whereas at the level of a sentence, grammar GF structure must also include all arguments and adjuncts.

According to Kiparsky (1987) — The Terms are grammatically linked and **Non-Terms** are semantically linked

The Grammatical Function distinctions are:

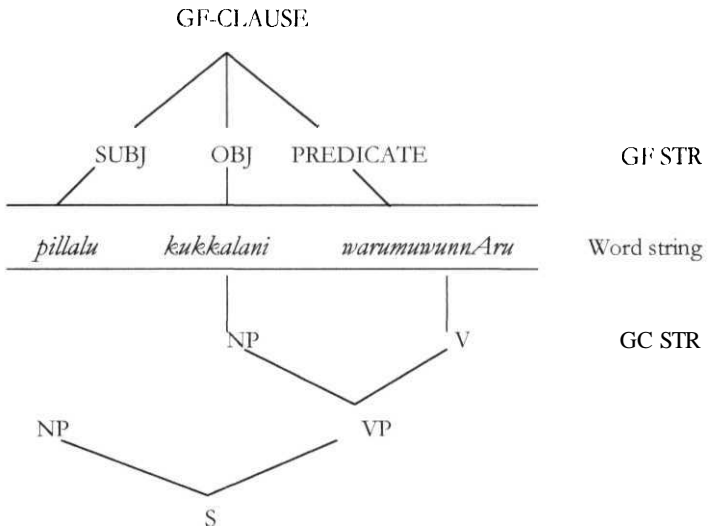
- a) Term Vs Non-Term
- b) Unrestricted Vs Restricted functions
- c) Object Vs Non-Object

3.4. Grammatical Category Structure:

It contains the information about the grammatical categories such as noun, verb, adjective and the like, besides the constituency. It is

roughly equivalent to surface structure as illustrated by the following diagram: (cf. Tara Mohanan, 1994).

Grammatical Category Structure



CHAPTER-4 Preliminaries to the

Argument Structure of Telugu Verbs

4.1. Introduction:

4.1.1. Arguments and argument structure

The concept of argument structure is borrowed from logic. It generally concerns with relations between predicate and a set of arguments. A quick review of the basic concepts about the nature of the arguments and argument structure and related aspects with respect to Telugu will be presented in the following. The crucial element of a sentence in Telugu is Predicate, which is usually a Verb or a Noun. The discussion will be limited to verbal predicates only. The predicate determines the presence or absence of other crucial elements in a sentence. In the following examples all sentences have an NP in the nominative, showing agreement with the predicate and is considered as the subject of the sentence and Predicate. Some sentences have only a subject and some have subject and object. Let us take the sentence in (1b). We may see the elements or constituents like Subject *rAju*, Adverb *ninna*, Object *annaM* and Verb *winnAdu*. Among these some elements are obligatory and others are optional.

4.1.1.1. Predicates and Arguments

1.a. *pApa eduswoMxi*

Baby {3nm.sg.nom} is crying {3nm.sg}

b. *rAju ninna annaM winnAdu*

Raju {m.sg.nom} ate {3m.sg} food yesterday

c. *rAju pulini caMpAdu*

Raju {3m.sg.nom} killed {3m.sg} a tiger {3nm.sg.acc}

2. a. *ninna annaM winnAdu* (Explicit Subject is missing)

yesterday (he) ate food

b*. *rAju ninna annaM.* (Verb is missing)

Raju yesterday food

c. *rAju ninna winnAdu.* (Object is missing)

Raju yesterday ate

(Raju ate yesterday)

d. *rAju annaM winnAdu.* (Adverb is missing)

Raju food ate

(Raju ate food)

Among the sentences in example (2) only the sentence (2b) is ungrammatical and all others are grammatical. With this example we can show that only the verb in the sentence (1b) is obligatory and other elements are optional. Whether an element is optional or obligatory is dependent upon the semanticosyntactic property of the predicate. By this statement we mean that the obligatory element is that which holds maximum amount of information in that sentence. It is the verb in

Telugu (and in many languages) that carries the maximum amount of information by way of **semanticsyntactic** properties it is endowed with. In the sentence (1b) the verb *winu* ‘eat’ requires two elements, subject and object. The elements, which are required by the predicate, may be called Arguments. As the verb *eduvu* ‘cry’ supports only one argument, it is called one-place argument, the verb *winu* ‘eat’ which supports two arguments is called two-place predicate, and the verb *innu* ‘give’ which supports three arguments, subject, object and indirect object is called three-place predicate.

In Telugu, as mentioned earlier, we can say that only the lexical categories like Nouns and Verbs can be predicates. A subject in Telugu is usually a noun *in* nominative and shows agreement with the main verb of the clause. By way of agreement, the verb carries the information with regard to the subject of the clause. There are various proposals in recent years about the existence of, non-nominative subjects in Telugu (Subbarao, 2001; Usha Devi, 2001; Vijayanarayana, 2002), Nominal predicates usually occur in sentences with equative constructions.

Every predicate has its own set of arguments defined by its semantic properties. The syntactic structure of the sentence or the clause of which the predicate is the head is determined by the semantic property and its argument structure.

4.1.1.2. Arguments and Thematic roles

Various elements in a sentence exhibit distinct relationships with each other. Particularly, the verbs of the predicate occupy a salient position in the sentence differing relationships such as who is doing the action and who or what is being affected by the action denoted by the verb as in the sentence:

3. *abbAyi annaM winnAdu*. 'The boy ate the food'

In the above sentence *abbAyi* 'boy' functions as the agent of the action denoted by the verb and the *annaM* 'food' as the object affected. Such relations are generally known in the literature as thematic relations in the western tradition and as *karka* relations in the Indian tradition. These relations are semantic relations and are different from the kind of relations we see in the surface structure (or S- Structure) of the languages often known as syntactic or grammatical functions like subject of the verb and the object of the verb. Within the Principles and Parameters of language Theory, these kinds of relations that are discussed here are generally treated under θ -Theory (Theta theory). θ -Theory describes such relationships by bringing forth these as part of the specifications of a lexical entry. Every lexical entry for a verb must specify a set of θ -role that occur with it. The relationship between the θ -roles and predicate is captured by the logical expression as in the following:

4. *winu (abbAyi, annaM)* 'eat (boy, food)'

abbAyi annaM winnAdu 'Boy ate food'

which indicates that the two arguments *abbAyi*, 'boy', *annaM* 'food' are related by the the predicate's semantic property. The number of arguments **is** dependent on the semantic property of the predicate as in (5) one place predicate, and (4) a two place predicate (6) a three place predicate.

5. *uduku* (*annaM*) 'boil (rice)'

annaM udikiMxi. 'Rice has boiled'

6. *ivvu* (*abbAyi*, *ammAyi*, *puswakaM*) 'give (boy, girl, book)'

abbAyi ammAyiki puswakaM iccAdu. The boy gave the book to
girl/The boy gave the girl a **book**'

The predicate argument relationships as represented here are part of formal logic which when represented in natural languages by various mechanisms acquire specific morpho-syntactic notation.

The well-known distinction of verbs into transitives and intransitives is based on the argument structure of the predicate. If a verb takes one argument it is called an intransitive verb and there is no provision for object. Whereas if the verb takes two or more arguments then it forms a transitive construction where the subject and object are **provided**. It is said that arguments contain semantic information that is specific and relevant for the predicate. In other words, predicates characteristically determine pattern of arguments they qualify in a sentence. For example, the English verb *pay* supports three arguments, *payer*, *payee* and *the paid-thing*. With this we know that the predicate itself

does not **contain** any semantic information explicitly about the arguments but is considered to be a placeholder. It is argued that arguments may contain semantic information, which is determined by the predicate. Semantic patterns of arguments are captured through thematic roles. In the following, a list of thematic roles, is discussed, which is assigned to each argument. The theta roles like *agent*, *patient*, *theme*, *experiencer*, *locative*, *instrumentally goal*, and *source* are assigned to each argument. And their definitions and examples are as follows:

- (1) **Agent** The entity, which intentionally instigates the event or an action described by the predicate.

7. a. *ɬɬcaru pATaM ceVppiMxi*

Teacher taught the lesson

b. *amma nAku annaM peVttiMxi*

Mother served me food

- (2) **Patient:** The entity, which undergoes the effect of or affected by the event or an action described by the predicate.

8. a. *vAdu paMduo VlicAdu*

He peeled the fruit

b. *ravi rAyini pelcAdu*

Ravi blasted the stone

c. *ravi* *annaM* *vaMdAdu*

Ravi cooked the food

- (3) **Theme:** The entity, which is moved in the event or an action described by the predicate.

9. a. *vAlYlu* *virahAnni* *sWApiMcAru*

They erected the statue

b. *caMxu* *bAlunu* *visirAdu*

Chandu threw the ball

- (4) **Experiencer:** The entity, which experiences some psychosomatic state described by the predicate.

10. a. *pidugup* *Atuki* *pilla* *BayapadiMxi*

The thunder frightened the baby

b. *nenu* *vAdini* *saMwoRapeVttAnu*

I made him happy

c. *vAdiki* *jvaraMgA* *uMxi*

He has a fever.

- (5) **Instrument.** The entity, which is used to realize the action or the event or an action described by the predicate.

11. a. *nenu paMdunu kanwipo koSAnu*

I cut the fruit with a knife

b. *awanu gunapaMwo rAyini eVwuAdu*

He lifted the stone with a crowbar

(6) **Locative:** The place in which the event or an action described by the predicate takes place.

12. a. *eVskimolu erInLAMdulo uMtAru*

Eskimos live in Greenland

b. *bukku tekukpEnapeVttAnu*

I kept the book on the table

(7) **Goal:** Entity toward which something moves in the event or an action described by the predicate. In some **classifications** Goal is distinguished from Beneficiary or Recipient.

13. a. *rAmudu mohanku o puswakaM iccAdu*

Ram gave a book to Mohan

b. *pnVsideVMtu pollsuka pawakAnni babukariMcAru*

President presented the award to the police

(8) **Source:** Entity from which some thing moves in the event or an action described by the predicate-

14. a. *aSoku keVnadAnnuMdi vaccAdu*

Ashok came from Canada

b. *koV^{liminu}Mdivedi seVgalu vasuAyi.*

Fumes comes from the kiln

Table shows the correspondences of the thematic roles and the semantic properties of the nouns.

S.No.	Thematic properties →	Animacy	Motion	Affected (change) State	Psychosomatic state	Goal (destination)	Source(Place)	Means	Concrete
	Thematic Roles ↓								
1	Agent	+	-	-	-	-	-	-	+
2	Patient	-	-	+	-	-	-	-	+
3	Theme	-	+	-	-	-	-	-	+
4	Experiencer	+	-	-	+	-	-	-	+
5	Instrument	-	-	-	-	-	-	-	+
6	Locative	-	-	-	-	-	+	-	-
7	Source	-	+	-	-	-	+	-	+
8	Goal	-	+	-	-	+	-	-	-

Table. 2

If only with reference to the verbs of motion, defines the property that really moves the arguments of **Theme**, then the distinction is not inherent to the theme here and one may combine both under the *theme*.

Thematic Roles	Experiencer	Theme	Patient
Semantic Event	Psycho-somatic	Movement	Affected
Condition feature	[+ani]<Ag>	<N>	<N>

Table. 5

There are certain thematic roles used by other linguists which are not mentioned in the above list. In certain cases it is very difficult to identify one from the other.

15. a. *nenu vAIYIYanu maMciivAIYIYu am anuko VMtAnu.*

I think they are good people.

b. *koVdukunnaMdrini poliunnAdu*

Son resembles father

Singh (1972) observes that “Panini seems to have been motivated to set up the karaka categories to account for facts of grammar at various levels. For instance, at the syntactic level transformations of a sentence structure into another, and nominalization of a sentence in embedded constructions is stated in terms of karakas”. In the Indian grammatical tradition, Panini's ashtadhyayi provides a detailed account of thematic roles in the name of karaka relations, viz. karta, **karma**, **karana**, sampradana, apadana and adhiakarana. Panini describes these karakas in the order of a hierarchy karta, karma, **adhiakarana**, karana, sampradana, and apadhana

The below mentioned table shows the rough correspondence between the theta roles of the modern western languages and the Indian karakas.

Karaka	Theta Roles
Karta	Agent , Experiencer , Force
Karma	Theme, Patient, Content, Result, Goal
Karana	Instrument
sampradaana	Beneficiary
apaadaana	Source
adhikarana	Time, Place

Table. 6

4.1.1.3. Types of Arguments

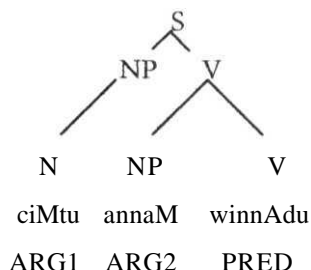
It is generally considered that there are three different types of arguments as given below from the point of syntax.

16. **a.** External argument and internal argument
 - b. Direct argument and indirect argument
 - c.** Implicit argument and Semantic argument

The argument, which is associated with the position outside the maximal projection of the predicate, is called the external argument, whereas the argument to be associated with the position which is inside

the maximal projection of the predicate is called internal argument (Williams 1981).

17. ciMtu annaM winnAdu 'Chintu ate food'



The argument (ARG1), which is outside VP, is called external argument and the argument (ARG2), which is inside the VP, is called internal argument

In English the external argument is always associated with the subject. Further if a verb does not have an external argument, an internal argument of the verb should move to the subject position since the subject position should be filled obligatorily. If a verb has an external argument then the construction does not need any movement. Only the verb with an external argument can assign accusative case. In Telugu the external argument is defined not as 'external to VP*' or directly dominated by 'S' rather than VP. But, the NP in nominative is external and moves out of VP to be singled out (on ontological hierarchy) to which the verb would show the agreement inflection. In Telugu, however, the external argument will be defined so that NP which is nominative and the verb shows agreement with it.

In other than external arguments if an argument is realized with a post-position it is called indirect argument. However in English **the** direct argument is realized without a preposition unlike in Telugu.

18. a. *giwa slwaku pusuwakaM icciMxi.* 'Gita gave the book to Sita'

ARG ARG ARG PRED

InDO DO

b. *slwa pillavAdiki annaM peVttiMxi.* 'Sita served the food to the Kid'

DO InDO

All other internal arguments are realized with relevant post-position endings except the direct argument in case it is inanimate, and other with certain exceptions (adverbs of time and place names).

Structurally, arguments that we conceptualize are realized overtly i.e. the arguments are pronounced in our speech or they surface in our written language. However, there are arguments, which are not overt or not pronounced in speech. This covert argument is called the implicit argument. The external argument is suppressed in the passive sentences. The suppression indicates the loss of the argument status (Where it receives a post position). Suppressed argument **maynot** appear in the argument position. This suppressed argument is called implicit **argument**. It does not play any role in overt syntax.

4.1.1.4. Argument, Adjunct and Complement

It is **defined** that Argument is required by the predicate as a participant in the event or situation described by the predicate and thus its presence is usually obligatory. Whereas adjunct is not required by the predicate and its presence is **optional**.

Ex:

19. rAmudu pusuwaM Anni raviki ninna *iccAdu*.

Rama gave the book to Ravi yesterday.

The predicate *iccu* (gave) supports three arguments, *rAmudu* (Ramudu), *puswakaM* (book) and *ravi* (Ravi). For the sentence to be grammatical, the adverb *ninna* (yesterday) is not required by the verb and its presence is optional. The number of arguments of a predicate is fixed, but the number of adjuncts is not fixed. If possible adjuncts can be added semantically.

Ex.

20. *swapna palleV lo oV kanavalanu* cAlAroJulugA nixAnaM vArAswoMxi.

Swapna is writing a novel in the village very slowly over many days.

While Argument is based on semantic requirements of the predicates, complement is based on syntax. Complement appears on a sister node of a head. Complements are words or phrases that complete the sentence. Without the **complement**, the sentence is not complete.

Adjunct is an optional a constituent in a clause and is typically a spatio temporal noun or a manner adverb in which an event takes place.

21. *vAIYYu pillavAdini cAlAnIcaMgA cUswArn.* 'They treat the boy
badly'

The following is the comparative table illustrating the difference between arguments, adjuncts and complements.

S.No.	Category →	Arguments	Adjuncts	Complements
	Relevance ↓			
1	Grammatical function feature	Semantic property of predicate	Syntactic property.	Semantico-Syntactic property (of its head).
2	Syntactico-Semantic relevance	Naturally obligatory	Optional.	Optional
3	Valence coding of verb	Number is fixed	Number is not fixed	Functional Category
4	Lexical representation	Lexical predicate	--	--
5	Others	Saves referential function	--	--

Table. 5

4.1.1.5. Argument position and Theta-position

The syntactic positions which can be associated with arguments are called **A(rgument)-positions**, whereas those **which** are not are called **A[`](A-bar)-positions**. Thus subject and object positions (Complements of verb) are A-positions, whereas the adjunct positions are **A[`]-positions**. That is, arguments appear in A-positions, but adjuncts may not.

The position very similar to but different from A-position is Theta-position. A Theta-position is a position occupied by an argument, which is assigned a Theta-role. The complement positions of the transitive verbs are theta-positions since the verbs **will** assign theta-roles to these positions. All theta-positions are A-positions, but all A-positions are not theta-positions.

4.1.1.6. Argument and Case

Arguments are closely related to Case. Case is assigned to NP. But an NP, which is not an argument, is not an assigned case. Only **finite** verb can assign case. Case filter applies to argument NP only. An NP with a case can be assigned a **theta-role**. That is, Case renders an NP argument visible to theta-role assignment. When a verb assigns a theta-role to its subject, it can assign an accusative case, or when a verb assigns an accusative case, it assigns a theta-role to its subject. A passive verb cannot assign an accusative case to its complement since its external argument is suppressed.

22. *annaM vAdicewa winabadiMxi*. 'food was eaten by him'

4.1.1.7. Thematic Hierarchy and Argument Structure

An interesting phenomenon observed about these thematic roles is that there is a hierarchy among the roles. A well-known universal phenomenon is that Agent of an active is associated with the subject position. This indirectly indicates that this agent is higher than theme since the subject position is higher than the object position in the syntactic structure. The hierarchy of thematic roles is called Thematic Hierarchy. Jackendoff (1972) observed that in the passive sentence the thematic role of the NP in the 'by' phrase should be higher than that of the surface subject in the thematic hierarchy. There are several versions of Thematic Hierarchy proposed by several linguists:

Thematic Hierarchy:

- a) <Agent, Location/source/ goal, Theme> (Jackendoff 1972)
- b) < Agent, Theme, goal, Oblique> (Larson 1988)
- c) < Agent, Theme, Goal/Benefactive/Location> (M. Baker 1989)
- d) <Agent, Benefactive, Experiencer/Recipient, Instrument, Theme/Patient Location> (Bresnan & Kanerva 1989)
- e) <Agent, Experiencer, Location/Source/Goal, Theme> (Grimshaw 1990)

Among the hierarchies mentioned above, Agent is higher than Location (or Source or Goal) and the Experiencer is higher than theme. Although there are variations in the versions above, one common hierarchy is the following:

< Agent, Experiencer, Theme, **Location** >

The reason for variation in hierarchy is due to the difference in the realization of theta roles of different languages or due to the default or universal treatment of animate object over inanimate object in theta-**role** assignment and syntactic treatment. One of the consequences of the hierarchy of thematic roles is the syntactic hierarchy to which the thematic roles are linked. For instance, Agent is linked to the subject position, and theme to the object position. The subject position is higher than the object position and thus we can say that Agent is higher than Theme. Experiencer is higher than Theme since Experiencer is linked to Subject and Theme to Object.

23. ravi cinnapillani BayapeVilAdu.

Ag Ex

Ravi frightened the kid.

24. kamalaki mAmidipalYlu iRtaM

Ex Th

Kamala likes mangoes

25. saMtoRku camatalu patt.Ayi

Ex Th

Santosh is sweating

Among these alternate proposals on hierarchies, thematic roles do not have one to one correspondence except Agent and Locatives. In all other thematic roles they occur under combined cover terms or split into more than one. Therefore it is difficult to compare. For example, Jackendoff has Locative, Source and Goal into one unit and includes Experiencer, Patient and Benefactory, which includes animate human objects and theme as an inanimate object hence the hierarchy. Whereas in the case of Larson, Theme may include Experiencer, Patient, Benefactory, so next in the hierarchy to **Agent**. so similar is Bakers. In case of Bresnan and Kanerva, Benefactive **Receipient/Experiencer** are higher in the hierarchy and next to Agent and followed by Theme and Patient because these three may include animate/human objects, where as theme is not So is the case in **Grimshaw**(1990)

On the whole, in the hierarchy above mentioned, Agent is higher than the Location (or Source or Goal) and the Location is higher than the Theme. Although there are variations in the versions above, and a hierarchy common to most languages can be presented as in

<Agent, Experiencer, Theme>

The hierarchy serves to order the arguments in a predicate argument structure in terms of a semantically determined prominence

scale. Some linguists avoid using thematic roles because of their unclear definitions. They proposed variables such as X, Y & Z. The variables represent arguments but they keep the hierarchy.

26. John fixed his computer.

Fix: x <y>

In the above sentence we can see that the predicate 'fix' takes two arguments 'x' and 'y', where V is higher than 'y' in the hierarchy. Here we can see the hierarchy or structure among arguments. This is similar to a thematic hierarchy. Argument structure is a general term for argument hierarchy or structured arguments.

"The number of thematic roles embraced by various theories varies considerably. Some people use half-dozen thematic roles. Others use three or four times as many. The exact number does not matter much as long as there are enough to expose natural constraints on how verbs and thematic role instances form sentences."— Winston (1984, p.314) (cf. Sylvie Ratte 1994).

4.2. Argument Structure and Telugu Verbs

In Telugu, intransitive verbs do not form a homogenous group. We can have distinct subtypes based on their semantic features. For example, we can broadly divide the intransitives into unergatives and

unaccusatives. Again cutting them across the above distinction, we may have **+sudden** change of state verbs and **–sudden** change of state verbs. Relevant features identified in morphosyntactic alternations involving these verbs.

4.2.1. Unergative verbs

They form a special group of intransitive verbs. Semantically, Unergative verbs have a subject perceived as actively initiating or actively responsible for the action expressed by the verb. Thematically, these verbs take an Agent, which is an external argument. The following are the unergative verbs identified in Telugu (ref. Uma Maheshwar Rao, 2001).

..contd..

Ex:

Adu 'to play'

Agu 'to stop'

aluvu 'be tired'

aluvu 'to grumble'

Anu 'to rest on'

aMtu 'to touch'

aracu 'to shout'

axuku 'to stick'

awuku 'to stick'

imudu 'to fit'

Ixu 'to swim'

uruku 'to jump'

uyy 'to spit'

Uru 'to become fat'

eV'kku 'to rise'

eV'guru 'to fly'

eV'nnu 'to count'

ftafoy 'to cry'

educu 'to cry'

egu 'to go'

oV'luvu 'to be peeled off'

uMdu 'to be'

kAcu 'to boil/wait/guard'

kaxulu 'to move'

kuxuru 'to be settled'

*kakku** 'to vomit'

kuMtu 'to limp'

kuluku 'to move gracefully'

kUdu 'to be associated with'

goV'Nugu 'to murmur'

*geV'Mtu** 'to push'

geV'Mwu 'to jump'

cku 'to suck'

jaduvu 'to be scared'

jarugu 'to slip'

xaduvu 'to tremble/shiver with fear'

xaggu 'to cough'

xAgu 'to hide'

xigu 'to go down'

wadiyu 'to become wet'

wagulu 'to come in contact with'

wappu 'to move'

warugu 'to cut'

waralu 'to move'

wummu 'to sneeze'

welu 'to float/result'

wocu 'to be sensed'

wAku 'to touch'

wirugu 'to turn/rotate'
weVMcu 'to pluck/cut'
wUlu 'to stagger'
ɣumuku 'to jump'
nAnu 'to become wet*'
naduvu 'to walk'
navvu 'to laugh'
nakeu 'to hide'
nadacu 'to walk'
nasugu 'to murmur/hesitate'
nigudu 'to stretch'
niluvu 'to stand'
*nllugu** 'to stretch'
*paluku** 'to respond'
pAdu 'to sing'
pAku 'to crawl'
puttu 'to be born'
*pUnu** 'to undertake'
bawuku 'to live'
maralu 'to turn'
mAru 'to be changed'
mUgu 'to swarm'
mukeu 'to moan'
munugu 'to drown'
murryu 'to be pleased'
muruvu 'to be delighted'

musuru 'to collect'
meVlugu 'to behave'
meVxalu 'to stir'
meVxulu 'to move'
mepu 'to graze cattle'
meyu 'to graze'
moVrugu 'to bark'
moVlacu 'to sprout'
moVluvu 'to sprout'
rAyu 'to write'
reVccu 'to be stirred up'
le 'to rise/get up'
/ecu 'to rise/get up'
loVMgu 'to surrender'
vaMgu 'to bend'
vaccu 'to come'
vAdu 'to use'
vAlu 'to lean'
vidu 'to separate'
vlcu 'to blow'
vaxulu 'to leave'
veVIYlu 'to go'
*vedu** 'to pray'
vegu 'to be fried'

4.2.2. Unaccusative verbs

There exists a group of intransitive verbs, characterized semantically, where the subject does not actively initiate or is not actively responsible for the action of the verb, rather it has properties which it shares with the direct object of a transitive verb (or better, with the grammatical subject of its passive counterpart). Thematically, these verbs take Theme, which is an internal argument in terms of argument structure. (cf. UmaMaheshwar Rao, 2001).

Ex.

<i>avvu</i> 'to become'	<i>oV'rugū</i> 'to lean'
<i>anugu</i> 'to be pressed'	<i>kaMxu</i> 'be inflamed'
<i>axaru</i> 'to shake/tremble'	<i>karugu</i> 'to melt'
<i>axuru</i> 'to shake/tremble'	<i>kalug</i> 'to happen/occur'
<i>amaru</i> 'to fit into'	<i>kAgu</i> 'to boil'
<i>arugu</i> 'to be abraded'	<i>kAru</i> 'to leak'
<i>Aru</i> 'to dry'	<i>kuMgu</i> 'to stoop/shrink'
<i>iMku</i> 'be absorbed'	<i>kuruvu</i> 'to rain/to fall'
<i>(guru</i> 'to dry up'	<i>kUlu</i> 'to collapse'
<i>inuku</i> 'be absorbed'	<i>kuYlu</i> 'to decay'
<i>ubbu</i> 'to well'	<i>gadvu</i> 'to pass/elapse'
<i>uduku</i> 'to boil'	<i>gadvu</i> 'to pass'
<i>urumu</i> 'to thunder'	<i>cAvu</i> 'to die'
<i>Ugu</i> 'to swing'	<i>caccu</i> 'to die'
<i>U du</i> 'to slip/be lost'	<i>cikku</i> 'be caught up'
<i>eV'Mdu</i> 'to dry'	<i>cinugu</i> 'to be torn'
<i>eV'xugu</i> 'to grow'	<i>cirugu</i> 'to be torn'

ceru 'to reach'
cllu 'to split/crack'
ceVdu 'to cry'
ceVxuru 'be scattered'
ceVllu 'to settle'
xoVllu 'to roll'
rf<?/^ 'to vomit'
waggu 'be reduced'
wunugu 'to cut'
nUgu 'to weigh'
weVgu 'to be cut'
weVmulu 'to stir/start'
woVNaku 'to gleam'
wuYlu 'to frisk'
xakku 'be obtained'
xoVrlu 'to roll'
xoVruku 'to be found'
niMdu 'to be filled'
neVruvu 'to learn'
pagulu 'to break'
padu 'to fall'
paMdu 'to ripe'
pAru 'to flow'
pagulu 'to break'
puyyi 'to flower/ apply'
peVruvu 'to grow'
pelu 'to explode'

poVku 'come to light'
poVMgu 'to boil over'
poVrlu 'to over flow'
puccu 'to rot/take'
puluvu 'to ferment'
*fea&w** 'to become stout'
beVxuru 'to be frightened'
biguvu 'to tight*'
maggu 'to go mouldy'
marugu 'to boil'
mAgu 'to ripe'
maMdu 'to burn/blaze'
masulu 'to boil/mix'
mAnu 'be cured'
mAru 'to change'
mAyi 'become dirty'
migulu 'be left over'
murugu 'to rot/decay'
muxuru 'to coarsen'
mUdu 'to end'
meVruvu 'to flash'
moVggu 'to lean'
ragulu 'to be kindled'
regu 'to be aroused'
vaNuku 'to shiver'
vAcu 'to swell'
viccu 'to open'

visuŋu 'to get irritated'

viruŋu 'to break'

viruvu 'to break'

veVluvu 'to come into
existence'

veVluŋu 'to shine'

sAgu 'to stretch'

However, it is difficult to draw a clear distinction between the two groups of the intransitives in some cases. The two types of verbs are represented differently in the argument structure and in the syntactic structure as in the following:

Unergative: $x < >$

Unaccusative: $< x >$

CHAPTER-5 Argument Structure and **Verb Sense Disambiguation in Telugu;** **A Computational Implementation**

5.1. Introduction:

In recent years the lexicon has gained increasingly greater attention than any other modules of grammar from the Linguists. In any language words seldom have one sense. This fact is not restricted to a particular category and found to be more or less common among different parts of speech. Among all lexical categories, Verbs, in particular have been the focus of research in pursuit of a theory of lexical knowledge particularly in the area Natural Language Processing. Levin (1985,1989) focused on verbs argument taking properties in terms of their semantic components. Since verbal predicates are the crucial elements in a sentence, this study has been carried out only on verbs. When there are more than one possible reading for a given verb, dictionaries usually list different senses for that verb. Verb's predicate-argument structure (or sub-categorization frame) specifies the possible syntactic structure of the sentence in which it occurs. The linking of arguments/nouns with thematic roles such as **Agent**, **Patient**, **Theme**, **Experiencer**, **Benefactive**, **Goal**, **Source**, **Location** etc. determines different meanings or senses of the event or action described by the predicate. This syntactic and semantic information is generally thought to be the verb's lexical property. In other words, it is the part of that information in the image of the verb that is stored in a speaker's mental lexicon. Among all categories, verb seem to exhibit high ratio of

1. **Information** Retrieval and Hypertext Navigation
2. Content and Thematic Analysis
3. Grammatical Analysis
4. **Speech** Processing
5. Machine Translation

A verb's Thematic analysis requires a set of senses provided with each main entry along with a list of arguments with their features sample dictionary containing all arguments which occur in the argument structure of each sense of the main verb, marked for their semantic features. The dictionary uses features like +/-Human, +/-Animacy and + /-Concrete + /-Combustible articles, +/-Edible, +/-Bodypart etc. A set of arguments along with semantic features and thematic roles encoded to signal a specific sense of a verb.

5.2. Early WSD work in NLP:

Early attempts in the word sense disambiguation area were mostly in the context of machine translation. Weaver (1949) discusses the need for word sense disambiguation in machine translation. Weaver's text outlined the statistical approach to language analysis prevalent then. Several authors followed this approach in the early days of machine translation (rf. Richards, 1953; Yngve, 1955; Parker-Rhodes, 1958). The estimation of polysemy in texts and dictionaries was made. Harper, working on Russian texts, determined the number of polysemous words in an article on Physics to be approximately 30% (Harper, 1957a), and 43% in another sample of scientific writing (Harper, 1957b). He also found that Callaham's Russian-English Dictionary provides, on an

semantic ambiguity. Each verb has a finite number of distinct senses corresponding to the distinct argument structure frames. Because of the complexity of this information, verbs are probably the single most lexical category that is most difficult to study. Verbs can change their meanings depending on the alternations that they get into, through various morphological processes, reflecting various kinds of arguments/nouns, which they can support.

In a study conducted on a Telugu dictionary (A **Telugu-Hindi** dictionary for machine translation developed at CALTS, University of Hyderabad), out of a total 11,629 verbs in **Telugu**, 1427 verbs have more than one distinctly different sense. They include the most frequently used verbs in Telugu like *koVttu* 'to cut', 'to beat'; *vinu* 'to eat', 'to suffer/to undergo*'; *peVMcu* 'to grow', 'to increase', 'to raise'; *Adu*, 'to play', 'to move', 'to display/enact'; *aMtiMcu*, 'to spank', 'to stick/paste', 'to fire', 'to pass on'; *kattu* 'to tie/bind', 'to build', 'to weave (as a nest)', 'to dress up'; *kuttu* 'to stitch', 'to pierce/pock, 'to bite/sting' etc. which have more number of senses. Their meanings often heavily depend on the nouns/arguments that they support. To disambiguate verbs i.e. to select the right choice in the context we need to provide different argument structures for each of these senses. This part of word sense disambiguation using argument structure is largely **helpful** in selecting the right choice out of a number of possible senses.

Word Sense Disambiguation (WSD) is needed in a number of applications involving natural language processing. The following are the areas where Word Sense Disambiguation is necessary:

average, 8.6% English equivalents for each Russian word, of which 5.6% are quasi-synonyms, thus yielding approximately three distinct English equivalents for each Russian word. Bel'skaja (1957) reports that in the first computerized Russian dictionary, 500 out of 2000 words are polysemous. Pimsleur (1957) introduced the notion of levels of depth for a translation: level 1 uses the most frequent **equivalent**, producing a text where 80% of the words are correctly translated; level 2 distinguishes additional meanings producing a translation which is 90% correct; etc. Although the terminology is different this is very similar to the notion of *baseline tagging* used in modern work (Gale *et al.*, 1992b), a technique similar to that applied in much later work yielded a similar 90% correct disambiguation result.

The dictionary of Telugu developed at CALTS, University of Hyderabad (Uma Maheswara Rao, 2001) lists 64,614 words belonging to seven lexical categories consisting of 18% verbs. The percentage of polysemy among verbs is found considerably higher than nouns, but less than adjectives.

Table. 8 follows:

S.No.	Category	Total no. of entries	% to the total entries	No. of polysemous words	% of polysemy with in the same category	% of polysemous words to the total entries
1	Nouns	48,493	75.05	4,201	8.66	6.50
2	Verbs	11,629	17.99	1,427	12.27	2.20
3	Adjectives	1,394	2.15	245	17.57	0.37
4	Indeclinables	2,150	3.32	134	6.23	0.20
5	Pronouns	180	0.27	7	3.88	0.01
6	Adverbs	148	0.22	17	11.48	0.02
7	Numerals	620	0.95	—	—	—
Total		64,614		6031		

Table. 8

This high scores of polysemy with verbs is an indication of how important verbs are in developing natural language applications. Frequently used verbs in Telugu *vaccu* 'to come', *po* 'to go', *winu* 'to eat', *Adu* 'to play' etc. are also the most polysemous. Some of these function as verbalizers when used with nouns.

The problem of WSD (Word Sense Disambiguation) has been described as AI- Complete. In other words, it is the most **difficult** of all the problems encountered by Artificial Intelligence (Ban-Hillel, 1960). The emergence of semantic net-works has given a new boost to WSD with in **AI-based** NLP research. The task of WSD involves identification of all distinct senses for every word in the given text and the means to assign each occurrence of the word to the appropriate sense. WSD models, during the later part of the AI research in WSD often involved

the use of detailed knowledge about syntax and semantics. In the seventies, AI based approaches used ‘frames’ containing information about words and their roles and relations to other words in individual sentences. Hayer (1976, 1977 & 1978) uses a combination of semantic net-work and case frames. It involves nodes representing noun senses and links representing verb senses. Wilk’s (1973,1975) use of preference semantics employs primitive semantic notions within a case based approach to WSD in NLP. Many of the AI based approaches of 1970’s and 80’s were theoretically interesting and psycholinguistically appealing but less practical in natural language word sense disambiguation and were often used in extremely limited domains. There is a clear correspondence between the shift away from methods based on linguistic theories and the failure of the methods used for WSD. In NLP several authors (Krovetz and Croft, 1989; Slator 1992) have attempted to improve the methods in AI-based approaches for WSD by using semantic features on nouns and adjectives, and on agreement of verbs. We have already discussed various methods employed in WSD and their efficiency. Context is the reliable means of identifying the intended sense of a polysemous word. Most methods involve identifying the context of the target word providing information to be used for its sense resolution.

5.3. The role of the context:

Context is the only means to identify the meaning of a polysemous word Therefore all work on sense disambiguation relies on the context of the target word to provide information to be used for its disambiguation. Here the context is considered as arguments and their relationship with the verb in a sentence.

disambiguation. Here the context is considered as arguments and their relationship with the verb in a sentence.

As mentioned in the early part of this chapter, out of 11,629 verbs listed in a Machine Readable dictionary of Telugu, 1427 verbs are ambiguous. Many of these verbs are the most frequently used verbs. In order to achieve high quality translation output in Machine Translations, word sense disambiguation is one of the most important problems to be solved.

In the case of a polysemous **verb's** sense disambiguation, it is the argument structure that is discussed in the earlier chapters that provides the contextual information. Here context or contextual information is defined in terms of some relations to the target and the syntactic and semantic properties of the verb. A method often cited and discussed in syntactic and semantic descriptions of language, that verbs with many senses often correspond to its many argument structure frames is also proposed here. In other words, for every distinct sense that a verb has, there is the corresponding argument structure frame. Identifying the corresponding nouns with the relevant features gives a clue to the identification of the particular sense of the verb is used in the context. The procedure envisages the identification of the categories such as nouns and verbs in a given sentence and **further**, the nouns are required to be identified with their semantic features. A match with a relevant cluster of nouns and the argument structure frame of the verb results in the identification of the correct sense.

The present description is all about the computational implementation of using the verb's argument structure to resolve its ambiguity. This essentially involves **identifying** and matching the predetermined set of arguments corresponding to a given set of thematic roles, encoded with clusters of semantic features intended to signal a specified sense out of many senses of a verb. This information is encoded in a specific format in terms of specific bracketing provided for each sense. Every argument will be encoded with its relevant features in the given boxes. The features assigned for the arguments are primitives like **+/-human**, **+ /-animate**, **+ /-concrete**, **+/-combustible article**, **+/-edible**, **+/-bodypart** etc. This is the eminence of Yarowsky's (1993) observation, that verbs derive more disambiguating information from its complements, like adjectives deriving almost all disambiguating information from the nouns they modify, and nouns are best disambiguated by directly adjacent adjectives or nouns. Evidence suggests that different kinds of disambiguation procedures are needed dependent on syntactic category and the **characteristics** of the target word.

5.4. An Overview of the Concept, Data and the Functions

A verb used in a specific sense has arbitrarily a specified number of arguments and these arguments have specific semantic features. Such a verb has one and the only one sense. A verb, which often found to be ambiguous have different argument frames i.e. verb's meanings correspond to the number of argument frames of the verb. A procedure can be laid out to disambiguate a verb's semantics by comparing

ontological categories of the nouns and matching them with the arguments of the verbs listed in a dictionary.

The present work supplements the applications that improve the results of WSD. The information regarding the NOUN arguments in terms of features like +/-h (HUMAN), +/-a (ANIMATE), c (CONCRETE), ca (COMBUSTIBLE ARTICLE), +/-ed (EDIBLE), +/-bp (BODY PART) etc. are encoded in boxes. Each sense of the verb and their arguments occurring in the example sentences along with their feature codes in the boxes and their meanings are given as a frame. Each argument with its set of features arranged in the frame looks like {[N<>()]} or {[P<>()]}.

The first element inside the brackets can be either N (Noun) or P (Pronoun), the second element enclosed in the <> brackets is the Thematic Relation of the argument with the particular sense of the verb, the next element in the () brackets is a set of features like (+h) which are assigned to that argument. The number of arguments in any frame is dependent on the verb sense. Finally, the meaning or the sense of the verb in “”s has been provided at the end of the frame. The input information is divided into three files. All the Verb information is stored in the **v_arg.dat** file, all the noun information is stored in the **n_arg.dat** file and the test sentences are stored in the **sent.dat** file.

5.5. Methodology

The procedure involving actual implementation requires that specific information with regard to verbs and its complement Nouns to be collated, analysed and presented in a distinct format specifically selected to suit the argument needs. The four major steps involved are

preparing data files for verb's argument structure frames and the semantic feature encoded lexicon for the verb's arguments. The relevant information is represented in a predetermined format and is provided in the files named **v_arg.dat** and **n_arg.dat**. Besides these two files, there is yet another file containing test sentences representing a specific sense for the verb which is ambiguous. A total of fifty most frequent verbs which are ambiguous and many of them having more than two senses are carefully selected for this purpose. There are about one hundred and eighty sentences used for testing against the program using the above information. Test sentences fed to the program are first analysed by the morphological analyser engine, which identifies verbs and nouns from other categories. The next step involves picking up the verb in the **morph** output and **identifying** its possible argument frames in the **v_arg.dat** file. In the next step, the number and the features of arguments are matched in the morph output to decide on a particular possible match of the argument frame. For this, each noun in the argument structure frame is searched in the **n_arg.dat** file, **repeatedly** by the requisite number of nouns; and if a match is found, the answer is returned with a corresponding sense displayed on the screen (see the flowchart for more details). The following algorithm is constructed to implement the program, which is written in Perl – a powerful text processing language which uses regular expressions for pattern matching.

5.6. Algorithm:

The algorithm used by the application program is specifically designed for this purpose and is based on the description in 5.5. The

implementation module as illustrated by the flowchart and the algorithm work is as follows.

Working Environment: PERL

Operating System: Linux

1. Read input from the file.dat
 2. Run Morph on the file.dat and store the output in morph.dat
 3. Read morph.dat and store in LINE.
 - a) Split the LINE with '/'
 - b) If the LINE matches with the verb store in verb
 - c) If the LINE matches with the N/P store in NOUN
 - d) If the LINE is not equal to EOF (End of the File) then repeat line a, b, c.
 4. Open v_arg.dat and search VERB.
 5. If it matches with VERB
 - a) (Line, meaning) = split (/ ; /, in)
 - b) Extract the argument and concatenate with NOUN
 - c) Submit this to n_arg.dat file for a match
 - d) If (found) then count ++
 - e) Repeat it for all the nouns (arguments)
 6. If (count = # of NOUN) then reply with the meaning.
- ELSE GOTO line 4

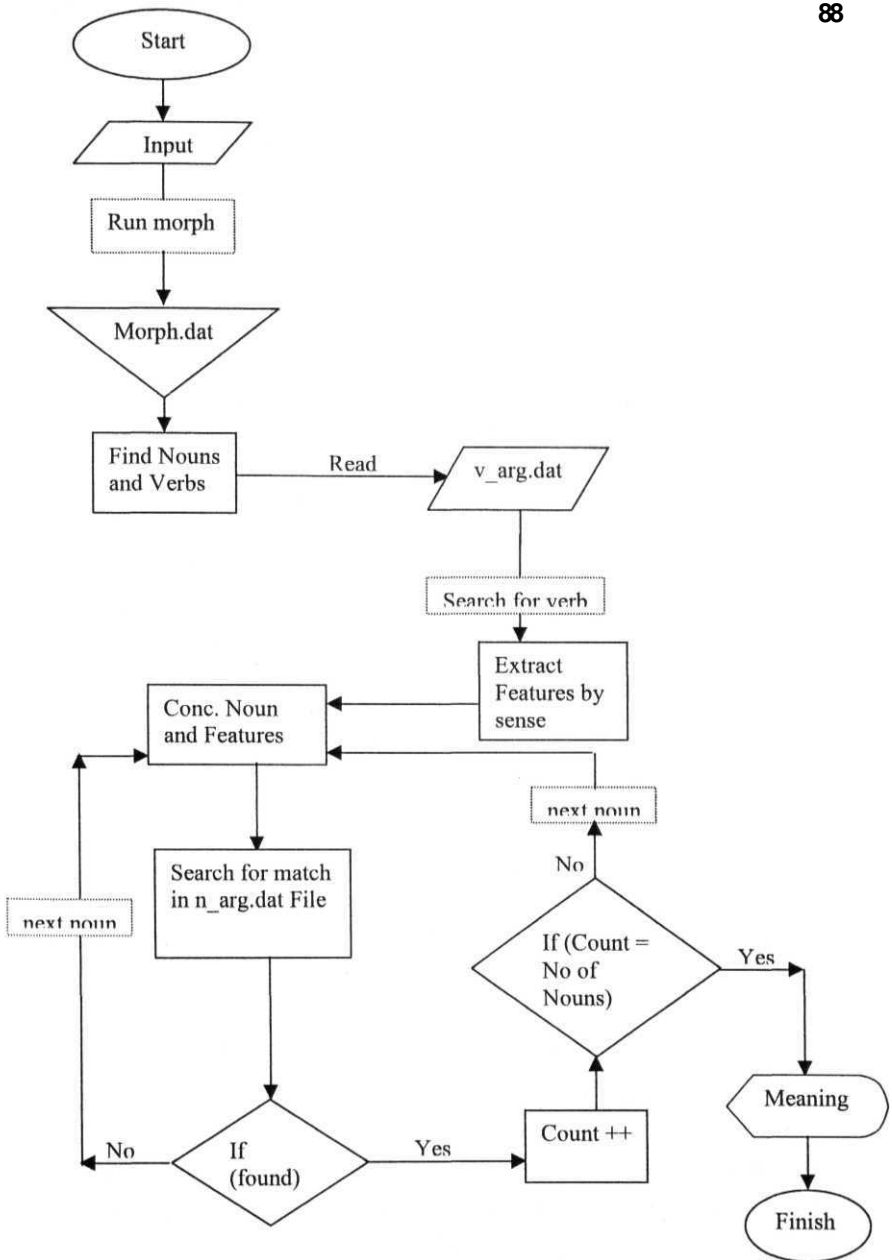


Fig. 1. Flowchart for illustrating the implementation of Disambiguation procedure.

5.7. Test Sentences database:

It is a pure text file stores carefully selected sentences with verbs of ambiguity. Each sentence has also the gloss provided in English. Only a small set of example sentences are provided here. A total of fifty most frequent verbs which are ambiguous and many of them having more than two senses are **carefully** selected for this purpose. There are about one hundred and eighty sentences used for testing against the program based on the above information. The test **sentences** fed to the program are first analysed by a morphological analyzer.

1. AmeV Ata AduwoMxi. 'She is playing a game'
2. gAlikI Akulu AduwunnAyi. 'Leaves are moving due to the air'
3. awanu kateVlu koVttAdu. 'He cut the firewood'.
4. ciMtu kukkapillanu koVttAdu. 'Chintu beat the puppy.'
5. kodalu awwagariMtlo adugu peVttiMxi. 'Daughter-in-law stepped into in-laws house'
6. amma wammudiki annaM peVttiMxi. 'mother served food for younger brother'
7. vAIYIYu koVttukoVMtunnAru. They are fighting each other'
8. vAdiki guMdeV koVttukoVMtuMxi. 'His heart is beating'.

5.8. Verb data Structures

The lexical data structure defined here stores the argument structure data provided for the verbs. The application program extracts chunks as described in the **algorithm**. The other details need not concern

us here since the functions of the relevant part of data extraction, processing and matching are exactly executed as specified in the flowchart

Adu, v, [to play, to move, to telecast]

Adu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "play"

Adu, {[N<Th>(-a, +c)]#[N<Ins>(-a, +c)]}; "move"

Adu, {[N<Th>(-a, -c)]}; "To Screen"

koVttu, v, [to cut, to suffer]

koVttu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "to cut"

koVttu, {[N<Ag>(+h)]#[N<Ex>(+a)]}; "to beat"

peVttu, v, [to step, to deposit, to serve]

peVttu, {[N<Ag>(+h)]#[N<Th>(+h)]#[N<Lo>(-a, +c)]}; "to step"

peVttu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Lo>(-a, +c)]}; "to
deposit"

peVttu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Ex>(+h)]}; "to serve"

5.9. Noun data Structures

The lexical data structure for verbs is a part of the lexicon and stores the semantic features more or less the ontological category features. The application program concatenates the semantic features stored here against a specific noun with that of the matching noun from

the morphological analyzer and tries to match against the argument in an argument structure frames in **v_arg.dat** file. The following are some nouns with semantic features for illustration.

AmeV, P(+h)

Ata, N(-a, -c)

Akulu, N(-a, +c)

sinimA, N(-a, -c)

awanu, P(+h)

katteV, N(-a, +c)

ciMtu, N(+h)

kukkapilla, N(+a)

kodalu, N(+h)

fillu, N(-a, +c)

awwa, N(+h)

adugu, N(+h)

srInu, N(+h)

dabbulu, N(-a, +c)

byAMku, N(-a, +c)

wammudu, N(+h)

annaM, N(-a, +c, +ed)

5.10. Display of Meaning/Sense resolution function:

This involves picking the verb and match it for its possible argument frames in the **v_arg.dat** file. Next, the number of arguments in the **morph** output are matched to decide on a particular possible match of the argument frame. For this each of the noun in argument structure frame is searched in the **n_arg.dat** file, repeatedly by requisite number of nouns; and if a match found, the answer is returned with a corresponding sense displayed on the screen. Here is an illustration of the **display** result along with the **morph** output.

```
3_ammAyi{abbAyi n eka *0* } /3_ammAyi{abbAyi n eka *obl*} /
3_ammu{pannu v *A* 3_na_ba } /3_naxi{gaxi n eka *nu*} /
3_naxi{gaxi n eka *ni* } /2_Ixu{pannu v *A* 3_non_pu_e } /
```

verb=ammu

verb=Ixu

noun=ammAyi

noun=naxi

Verb => Ixu ### Meaning=> "swim"

10. awanu saMsArAnni IxuwunnAdu. 'He is leading the life'

Morph Analysis Of The Telugu Sentence ==>>

```
3_awanu{ awanu P eka *0* } /1_saMsAraM{puswakaM n eka *nu*
} /1_saMsAraM{puswakaM n eka *ni* } /2_Ixu{pannu v *wunn*
3_pu_e } /
```

verb=Ixu

noun=awanu

noun=samsAraM

Verb => Ixu ### Meaning=> "lead"

11. vAdu peparnu godaku aMtiMcAdu. 'He pasted the paper on the wall'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjFArWa* 2_e } / 3_vAdu{vAdu P eka *0* } /
 1_pepar {kalcar n eka *nu* } / 1_pepar {kalcar n eka *ni* } /
 } / 3_peparu {nOkaru n eka *ni* } /
 3_goda {kota n eka *ki* } /
 2_aMtiMcu {cUpiMcu v *A* 3_pu_e } /

verb=vAdu

verb=aMtiMcu

noun=vAdu

noun=pepar

noun=goda

Verb => aMtiMcu ### Meaning=> "stick"

12. awadu jabbu iwarulaku aMtiMcAdu. 'He passed on the infection to others'

Morph Analysis Of The Telugu Sentence ==>>

3_awadu {vAdu P eka *0* } /
 2_jabbu {meku n eka *0* } / 2_jabbu {meku n eka *obl* } /
 3_iwarulu {pAlu n bahu *ki* } /
 2_aMtiMcu {cUpiMcu v *A* 3_pu_e } /

verb=aMtiMcu

noun=awadu

noun=jabbu

noun=iwarulu

Verb => aMtiMcu ### Meaning=> "to pass on"

13. vAdini wAduwo baMXiMcAru. 'They tied them with ropes'

Morph Analysis Of The Telugu Sentence =>>

1_vAdi{gaxi n eka *nu* } / 1_vAdi{gaxi n eka *ni* } / 3_vAdu{vAdu P eka *nu* } / 3_vAdu{vAdu P eka *ni* } /

2_wAdu{gUdu n eka *wo* } /

2_baMXiMcu{cUpiMcu v *A* 23_ba } /

verb=baMXiMcu

noun=vAdi

noun=wAdu

Verb => baMXiMcu ### Meaning=> "to tie"

5.11. The Result:

The computational implementation of verb sense disambiguation based on the argument structure of Telugu verbs demonstrates that one can build an exhaustive system with greater coverage basing on this **prototype** system. The prototype system is based on the most frequently used ambiguous verbs each with an average of three distinct senses. Any sentence with one of these verbs is unambiguously resolved for its possible sense in the context of the arguments in the sentence. The **efficiency** of the program proved to be reliable and extendable. Currently, Centre for ALTS is trying to apply this idea to the development of a working system to be used in the **Telugu-Hindi** anusaaraka Machine aided Translation System.

This conclusion is a summary of previous chapters, and the overview of the outcome of the current work is presented. I will briefly speculate on the possible extension of the current work and related applications. Argument Structure is not only one of the most crucial and learnable aspects of verbs but is also the most significant component of grammar that forms an interface between syntax and semantics. The importance of the functional aspect of argument structure of verbs in any language makes it the most important and favorite choice of researchers in the field of semantics and syntax. Of late, studies on the argument structure of verbs and its lexical representation has received a great deal of attention from various scholars, since a knowledge of the argument structure and the thematic roles assigned by the verb to its arguments solely contributes to the understanding of sentences by way of verb sense disambiguation.

The focus of the present work is on the Argument Structure of verbs and thematic roles assigned by the verb to its arguments and the way in which the relational semantics of the verb is represented at the syntactic level. Knowledge of the argument structure captures fundamental participant/event relation, which is crucial in parsing and generation (Srinivas and Joshi 1999). This dissertation proposes to use Argument Structure for the verb sense disambiguation. This proposal illustrates by a practical implementation of the argument structure to show how it is aptly relevant and it is very crucial in the disambiguation of different uses of the same verb form involving a number of senses.

This work is an outcome of various efforts in understanding the theoretical concepts underlying the argument structure, understanding the argument structure of Telugu verbs and mainly the representation of the argument structure and the computational implementation and testing.

This work is an attempt to study the argument structure of Telugu verbs and is an effort to present a usable knowledge for computer applications involving problems like verb sense disambiguation in Telugu. This thesis does not claim to be a contribution to the theory of argument structure, directly or indirectly. But it can claim to be a practical exercise in demonstration of the relevance and significance of the importance of argument structure in the area of word sense disambiguation and the necessity of the incorporation of this knowledge in the development of various applications and tools in natural language processing (NLP). It is difficult to imagine the development of NLP applications without the involvement of argument structure. In this thesis we make a preliminary effort to **bring forth** the available knowledge and bringing together other relevant information with regard to Telugu to **build** a usable system for verb sense disambiguation. This thesis is probably, as far as our knowledge goes, is first of its kind for any Indian language to make use of such knowledge in a systematic way to create and demonstrate the practical use of this in the area of natural language **processing**- an important but latent sub-discipline in Linguistics involving practical implementation and testing of linguistic knowledge.

However, all the ambiguous verbs in Telugu that have different senses were not studied in this present work. It will be of course easy and effortless to resolve verb sense disambiguity if the thematic properties reflected in the alternations of argument structure correspond to the features of individual verb senses predictable. The major limitation of this work is that nouns in Telugu must be exhaustively analysed and marked for their semantic features. Verb sense disambiguation is certainly a very useful work in the area of Natural Language Processing. Using argument structure information of the verb for verb sense disambiguation is the **first** of its kind for Indian language applications, which will deliver greater gains in the long run, particularly in the area of Natural Language Processing.

This study has actually grown from the ambiguity resolution problems that have remained challenging task in Telugu-Hindi anusaaraka machine translation efforts. In the machine translation, of all the lexical categories, verbs have been the most frequently appearing ambiguous items. Even among these verbs, the frequently used verbs are the most ambiguous and the most ambiguous verbs are the most frequently used verbs. Therefore, it was considered that the resolution of the ambiguity of these verbs would greatly enhance the quality of the output.

The thesis mainly focused on two aspects, viz. understanding the nature and the structure of argument structure representation of verbs in Telugu and the actual implementation and testing. The first aspect mentioned, required the necessary ground work in the **theory** of

argument structure as applied to Telugu. It required the analysis of Telugu verbs from the point of valency and argument structure frames, culminating into the development of lexical entries for verbs with arguments and their semantic feature properties and the thematic roles. This exercise evidently establishes different argument structure frames for every distinct sense in case of ambiguous verbs. Two points emerge from this: (i). The need for the semantic lexicon i.e. lexical items, **particularly** nouns, must be represented in the lexicon besides their conventional **phonological** form with a set of semantic features which enable the recognition and the assignment of **thematic** roles by the verb; (ii) Transitive, Intransitive and Causative marking of verbs in the lexicon is a poor representation that cannot really be used as a substitute for argument structure frame. Any meaningful use of verbs in NLP applications should use the argument structure. The second aspect that the thesis focuses is on the actual implementation and testing. Based on the theoretical assumptions discussed in the previous chapters, and using the resources that exist at CALTS, the necessary data bases are created for use in the implementation. The algorithm, a calculational procedure is devised, which **actually** draws input, and uses different sorts of information such as verbs argument structure frames and the semantic lexicon besides calling on the Telugu morphological analyzer for the **lexical** analysis of the word forms in the test sentences. The program, that is based on this algorithm, is implemented and tested on fifty verbs which are ambiguous and the argument structure frames on average running into three per verb were used as the database for running or evaluating the resolution of the verb sense's ambiguity. The resolution of the ambiguity of sentences proved to be valid and effective. The same

thing can be extended to all verbs which are ambiguous in order to have a greater coverage and fidelity for practical use.

1. Test Sentences Database

AmeV Ata AduwoMxi. 'She is playing a game'
gAlikI Akulu AduwunnAyi. 'Leaves are rustling due to the wind'
sinimA AduwoMxi. 'Movie is being screened'
battalu ArAyi. 'clothes have dried'
vAdi gAyaM AriMxi. 'His wound has healed'
gAlikI xIpaM AriMxi. 'The lamp has been put off due to the wind'
sEnikudu Sirassu CexiMcAdu. 'The soldier cut the head'
awanu samasyanu CexiMcAdu. 'He has solved the problem'¹
ammAyi naxini IxiMxi. 'She swam the river'
awanu saMsArAnni IxuwunnAdu. 'He is leading the life'
AmeV vAdiki curaka aMtiMciMxi. 'She gave him a spank'
vAdu peparnu godaku aMtiMcAdu. 'He pasted the paper on the wall'
xuMdagulu gudiseVlaku nippu aMtiMcAdu. 'Thieves torched the huts'
awadu jabbu iwarulaku aMtiMcAdu. 'He passed on the infection to
others'
polIsulu xoVMganu baMXiMcAdu. 'Police arrested the thieves'
vAdini wAduwo baMXiMcAdu. 'They tied them with ropes'
vadraMgi boVmmalu ceSAdu. 'Carpenter has made the dolls'
amma kUra cesiMxi. 'Mother prepared the curry'
awanu vAIYlaku peVIYli ceSAdu. 'He has performed their marriage'¹
maMwri saBalo vAgXAnaM ceSAdu. 'Minister made a promise in
kowi ceVttu eVkkiMxi. 'Monkey climbed the tree'
awanu lAyargA praxisXiki eVkkAdu. 'He has become famous as a
lawyer'

vAdu cewwo kArunu eVwwAdu. 'He lifted the car with a single hand'
 pAmu padaga eVwwiMxi. 'Snake raised its **hood**'
 vAdiki peVIYli jarigiMxi. 'he married / his marriage tookplace'
 kAlaM jarigiMxi. '**time** has passed'
 AmeV pakkaku jarigiMxi. 'She moved **aside**'
 paMwulu peVIYli jaripAdu. 'The priest has performed the marriage'
 awanu pAvulu jaripAdu. 'He moved the pawns'
 eVMda kAswuMxi. 'The sun is **bright**'
 AmeV snAnAniki nIlYlu kAciMxi. 'She boiled water for bath'
 nenu vAdikosaM vIWicivara kAcAnu. 'I waited for him the end
 ceVttuku kAyalu kAcAyi. 'The tree bore fruits'
 awanu rojaMwA goVrreVlu kAswAdu. 'He guards the sheep whole **day**'
 Ayana wupAkiwo pakRini kAlcAdu. 'He shot the bird with a gun'
 pillalu kAgwAlu kAlcAru. 'Children burnt the papers'
 vAdu roVtteV kAlcAdu. 'He roasted the bread'
 ravi sigareVttu kAlcAdu. 'Ravi smoked the cigarette'
 eVMda kAswuMxi. 'sun is shining **well**'
 AmeV snAnAniki nIlYlu kAciMxi. 'She boiled the water for bath'
 nenu vAdikosaM vIWicivara kAcAnu. 'I waited for him at the end
 ceVttuku kAyalu kAcAyi. 'The tree bore fruits*'
 awanu rojaMwA goVrreVlu kAswAdu. 'He guards the sheep whole **day**'
 awanu saMKyalanu kUdAdu. 'he added all the numbers'
 gudixaggara janaM kUdAru. 'People gathered near
 vAIYlaku pillalu kaligAru. 'They had kids'
 vAdiki bAXa kaligiMxi. 'he had pain'
 AmeVku lABaM kaligiMxi. 'She gained **profit**'
 vAdu hExarAbAxulo illu kattAdu. 'He has built a house in Hyderabad'

vAlYlu praBuwvAniki pannu kattAru. 'They paid tax to the government'
 AmeV vAdiki rAKI kattiMxi. 'Sunitha tied Rakhi to him'
 awanu katteVlu koVttAdu. 'He cut fire wood'
 awanu kukkapillanu koVttAdu. 'Chintu beat the puppy'
 vAlYlu ko VttukoVMtunnAru. 'They are fighting'
 gAliki walupulu koVttukoVMtunnAyi. 'The windows shuttered'
 vAdu samAXAnaMkosaM koVttukoVMtunnAdu. 'He floundered for an
 answer'
 vAdiki guMdeV koVrtukoVMtuMxi. 'His heart is **beating**'
 awanu ceVttunuMdi paMdu koSAdu. 'He plucked the fruit from the tree'
 awanu kawwiwo paMdu koSAdu. 'He cut the fruit with a knife'
 vAdu uxyogaMguriMci kowalu koSAdu. 'He was exaggerating
 xoVMgaku **welu** kuttiMxi. 'Scorpion stung the thief'
 tElaru pillalaku battalu kuttAdu. 'Tailor stitched the kids cloths'
 vAlYlu pillaku ceVvulu kuttAru. 'They pierced the ears of the baby'
 eVMdalu maMduwunnAyi. 'It is scorching hot'
 poVyyilo katteVlu maMduwunnAyi. 'the fire wood in the kiln is burning'
 kalYlu maMduwunnAyi. 'My eyes are smarting'
 awanu maMxunu marigAdu. ' He is used to liquor'
 poVyyimIxa pAlu maruguwunnAyi. 'The milk is boiling on the stove'
 aXikAri panivAdipEna neraM mopAdu. 'The officer put the blame on
 the **servant**'
 vAdu APiSulo pAxaM mopAdu. 'SukumAr stepped into our office'
 awanu snehiwudipEna BAxyawa mopAdu. 'He laid the responsibility on
 a friend'
 pApa ceVMbu nIlYlu muMciMxi. 'Baby dipped the tumbler into the
 water'

xalYari vyApArasWulanu muMcAdu. '**Broker** duped the merchants'
 AmeV nIlYlalo munigiMxi. 'She drowned in the water'
 awanu pani guriMci Alocanalo **munig**Adu. 'He is pondering about the
 work'

vAlYYu vyApAraMlo munigAru. 'They have lost in business'
 vAdiki dabbu muttiMxi. 'He had received the money'
 awanu enugunu muttAdu. 'He touched the elephant'
 vAlYlu sawraM nadupuwunnAru. 'They run an **inn**'
 AmeV kAru nadupuwuMxi. 'She is driving a **car**'
 AmeV annaM namiliMxi. 'She is chewing food'
 vAdu nIlYlu namilAdu. 'He is pondering'
 awanu **roddum**lxa baMdi nilipAdu. 'He stopped the vehicle **on** the road'
 AmeV panimlxa **manasu** nilipiMxi. 'She concentrated her mind **on work**'
 vAdu peVxxala peru nilipAdu. 'He maintained his elder's honour'
 vAlYYu pArtI aByarXigA rAmayyanu nilipAru. 'They made Ramayya as
 their party candidate'.

teVMdulkar crikeVtlo awyaXika parugula rikArdu nilipAdu. 'Tendulkar
 has scored the most runs in cricket'.
 peVxxalu gudimuMxu XvajaswaMBaM nilipAru. 'Elders erected the
 pillar'

maMxAra ceVttuku puwulu pUsAyi 'The Hybiscus plant has flowered'
 rameR oVllaMwA nUneV pUsAdu 'Ramesh applied oil to his **body**'
 vAdu nIlYlalo paddAdu. 'He slipped into the **water**'
kamala raviwo premalo padiMxi. '**Kamala** fell in love with **Ravi**'
 vAdi kannu nA peVnnu pE padiMxi. 'His eyes are on my pen'
 AmeV wupAkI pattiMxi. 'She held a pistol'
 battalu **muriki** pattAyi. 'clothes have become dirty'

walli biddaku pAlu pattiMxi. 'Mother is feeding milk to the **child**'
 vAdiki maMxu pattiMxi. 'The medicine suited him'
 vAdiki coVkkA pattiMxi. The new shirt **fit** for him'
 rAmudu pulini peVMcAdu. '**Ramudu** reared a tiger'
 meswrl goda eVwwunu peVMcAdu. The mason increased the height of
 the **wall**'
 kodalu iMtlo adugu peVttiMxi. 'Daughter in law stepped into the **house**'
 SrInu dabbulu byAMkulo peVttAdu. 'Srinu deposited the money in the
 Bank'
 amma wammudiki annaM peVttiMxi. 'Mother served food to younger
 brother'
 polIsu wupAkI pelcAdu. 'Police **fired** a shot'
 wIvravAxulu bAMbu pelcAru. 'Terrorists blasted the bomb'
 awanu joku pelcAdu. 'He cracked a joke'
 caliki oVIYlu peliMxi. 'Body cracked due to **cold**'
 sinimAhAlulo bAMbu peliMxi. 'There was a bomb blasted in the cinema
 hall'
 siliMdar peliMxi. 'The gas cylinder has **burst** '
 poVyyimIxa pAlu poVMgAyi. 'The **milk** is boiling over the stove'
 alpapIdanaMvalla samuxraM poVMgiMxi. 'River over flow due to
 eVMdaku kaYIYu poVMgAyi. 'His eyes have swollen due to heat'
 vAdinuMdi A mAta poVrliMxi. 'He uttered that word'
 kuMda poVrliMxi. 'The pot **rolld** over'
 paMxi buraxalo poVrliMxi. 'Pig wallowed in the mud'
 vAlYlaku ammAyi puttiMxi. 'Baby girl has born to them'
 ArneVku walanoVppi puttiMxi. 'She is having head ache'
 vAdiki sinimAku dabbulu puttAyi. 'He got the money for a movie'

pAwabaswIlo **allarlu** regAyi. 'Clashes flared in the **oldcity**'
 gAliki juwwu regiMxi. 'her hair was dishelved due to the **air**'
 vAdiki picci regiMxi. 'He was **filled** with rage/he has gone **mad**'
 awanu kApuraMlo kalawalu repAdu. 'he incited problems in the family
life'

AmeV awanilo ASa repiMxi. 'She raised hopes in **him**'
 kAki godapEna vAliMxi. 'The crow perched on the wall'
 goda wU**rpuvEpu** vAliMxi. 'The wall leant towards east'
 beVllaMmIxa Igalu vAlAyi. 'Flies have swarmed around jaggery'
 awanu peVxxalaku **wala vaMc** Adu. 'He abided by his elders'
 AmeV kuMda **vaMci**Mxi. 'She bent the **pot**'
 AmeVku xAhaM vesiMxi. 'She felt thirsty'
 vAdu sIsA nIlylalo veSAdu. 'He threw the bottle into the water'
 AmeV **muggu** vesiMxi. 'She drew a diagram with flour'
 AtagAdu baMwini **visir**Adu. 'The player threw the ball'
 AmeV visanakarrawo **visuruwu**Mxi. 'She is fanning with a hand fan'
 vAlYlu millulo piMdi visirAru. 'They grind the flour in the **mill**.
nuvvu walupu wiyyi. 'You open the door'
 nuwu ballapEna ceVyiyi wiyyi. 'Take your hand **from** the **table**'
 xoVMga jebulo dabbulu wISAdu. 'The thief has picked money from the
 pocket'
 vExyudu **kAllo** mullu wISAdu. 'Doctor removed the thorn in the leg'
 pApa annaM winiMxi. 'Baby ate the food'
 xoVMga wannulu winnAdu. 'The thief was flogged'
 AmeV kArulo wiruguwoMxi. 'She is going around in a car'
kamalaki kaLYlu wiruguwunnAyi. 'Kamala is feeling giddy'
 ravi veVnukaku **wirig**Adu. 'Ravi turned **back**'

cakraM wiruguwoMxi. Wheel is **rotating**'

hamAllu lArlnuMdi saruku xiMcAru. 'The porters unloaded the goods'

snehiwudu nannu hARtallo xiMcAdu. 'A friend dropped me in the hostel'

sEnikulu **heVlikAptarnuMdi** xigAru. 'Soldiers alighted from the

helicopter'

nAyudu rAjaklyAlalo xigAdu. 'NAyudu joined in **politics**'

awanu **bAvilo** xigAdu. 'He climbed down the well'

kAllo mullu xigiMxi. 'A thorn pricked the foot'

vAdu hotallo xigAdu. 'He checked in a hotel'

2. Verb's Lexical Entries Data

Adu, v, [play, move, telecast]

Adu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "to play"

Adu, {[N<Th>(-a, +c)]#[N<Ins>(-a, +c)]}; "to rustle"

Adu, {[N<Th>(-a, -c)]}; "to screen"

Aru, v, [to dry, to heal, to put off]

Aru, {[N<Th>(-a, +c)]}; "dry"

Aru, {[N<Ex>(+h)]#[N<Th>()]}; "heal"

Aru, {[N<So>(-a, +c)]#[N<Pt>(-a, +c)]}; "put off"

CexiMcu, v, [behead, solve]

CexiMcu, {[N<Ag>(+h)]#[N<Pt>(+bp)J]}; "behead"

CexiMcu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "solve"

Ixu, v, [to swim, to lead]

ixu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "swim"

ixu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "lead"

aMtiMcu, v, [to spank, to stick/paste, to fire, to pass on]

#aMtiMcu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]#[N<Ex>(+h)]}; "spank"

aMtiMcu, {[N<Ag>(+h)]#[N<Th>(-a, +c, +ca)]#[N<Lo>(-a, +c)]}; "stick/paste"

aMtiMcu, {[N<Ag>(+h)]#[N<Th>(-a, +c, -ca)]#[N<Pt>(-a, +c)]}; "fire"

aMtiMcu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]#[N<Ex>(+h)]}; "to pass on"

baMtiMcu, v, [put/to arrest, to tie]

baMXiMcu, {[N<Ag>(+h)]#[N<Th>(+h)]#[N<Go>(-a, +c)]}; "put/to arrest"

baMXiMcu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "to tie"

ceVllu, v, [out dated, valid]

ceVllu, {[N<Pt>(-a, +c)]#[N<Th>(-a, -c)]}; "out dated"

ceVllu, {[N<Th>(-a, +c)]}; "valid"

ceVyyi, v, [to make, to prepare, perform, to render]

ceVyyi, {[N<Ag>(+h)]#[N<Pt>(-a, +c)]}; "make"

ceVyyi, {[N<Ag>(+h)]#[N<Th>(-a, +c, +ed)]}; "Prepare"

ceVyyi, {[N<Ag>(+h)]#[N<Th>(-a, -c)]#[N<Ex>(+h)]}; "perform"

ceVyyi, {[N<Ag>(+h)]#[N<Th>(-a, -c)]#[N<Lo>(-a, +c)]}; "render"

eVku, v, [to climb, to become]

eVku, {[N<Ag>(+a)]#[N<Lo>(-a, +c)]}; "to climb"

eVku, {[N<Ag>(+h)]#[N<Th>(-a, -c)]#[N<Ex>(+h)]}; "to become"

eVwu, v, [lift, raise]

eVwu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<In>(+bp)]}; "lift"

eVwu, {[N<Ag>(+a)]#[N<Th>(+a)]}; "raise"

jarugu, v, [to take place, to pass, move]

jarugu, {[N<Ex>(+h)]#[N<Th>(-a, -c)]}; "happen"

jarugu, {[N<Th>(-a, -c)]}; "pass"

jarugu, {[N<Ag>(+h)]}; "move"

jarupu, v, [perform, move]

jarupu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "perform"

jarupu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "move"

kAcu, v, [to shine, boil, wait, bore/grow, guard]

kAcu, {[N<Th>(-a, -c)]}; "shine"

kAcu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Go>(-a, -c)]}; "boil"

kAcu, {[N<Ag>(+h)]#[N<Th>(+h)]#[N<Lo>(-a, +c)]}; "wait"

kAcu, {[N<So>(-a, +c)]#[N<Th>(-a, +c)]}; "bore/grow"

kAcu, {[N<Ag>(+h)]#[N<Th>(+a)]}; "guard"

kAlcu, v, [to fire a shot, to bum, roast, smoke]

kAlcu, {[N<Ag>(+h)]#[N<Pt>(+a, -c)]#[N<In>(-a, +c)]}; "to fire"

kAlcu, {[N<Ag>(h)]#[N<Th>(-a, -c)]#[N<Pt>(-a, +c)]}; "to burn"

kAlcu, {[N<Ag>(h)]#[N<Pt>(-a, +c)]}; "roast"

kAlcu, {[N<Ag>(h)]#[N<Th>(-a, +c)]}; "smoke"

kUdu, v, [to add, to gather]

kUdu, {[N<Ag>(h)]#[N<Th>(-a, -c)]}; "to add"

kUdu, {[N<Lo>(-a, +c)]#[N<Th>(h)]}; "to gather"

kalugu, v, [born, had, to get]

kalugu, {[N<Rc>(h)]#[N<Th>(h)]}; "born"

kalugu, {[N<Ex>(h)]#[N<Th>(-a, -c)]}; "have"

kalugu, {[N<Be>(h)]#[N<Th>(-a, +c)]}; "to get"

kattu, v, [build, pay, tie]

kattu, {[N<Ag>(h)]#[N<Th>(-a, +c)]#[N<Lo>(-a, +c)]}; "build"

kattu, {[N<Ag>(h)]#[N<Th>(-a, +c)]#[N<Be>(-a, +c)]}; "pay"

kattu, {[N<Ag>(h)]#[N<Ex>(h)]#[N<Th>(-a, +c)]}; "tie"

koVttu, v, [to cut, to beat]

koVttu, {[N<Ag>(h)]#[N<Pt>(-a, +c)]}; "cut"

koVttu, {[N<Ag>(h)]#[N<Ex>(a)]}; "beat"

koVttukoVnu, v, [fighting, move/shutter, flounder, beat]

koVttukoVnu, {[N<Th>(h)]}; "fighting"

koVttukoVnu, {[N<So>(-a, +c)]#[N<Th>(-a, +c)]}; "move/shutter"

koVttukoVnu, {[N<Ag>(h)]#[N<Th>(-a, -c)]}; "flounder"

koVttukoVnu, {[N<Ex>(h)]#[N<Th>(bp)]}; "beat"

koVyyi, v, [to pluck, to cut, exaggerate]

koVyyi, {[N<Ag>(h)]#[N<So>(-a, +c)]#[N<Th>(-a, +c)]}; "to pluck"

koVyyi, {[N<Ag>(h)]#[N<In>(-a, +c)]#[N<Pt>(-a, +c)]}; "to cut"

#koVyyi, {[N<Ag>(h)]#[N<Th>(-a, -c)]#[N<So>(-a, -c)]}; "exaggerate"

kuttu, v, [sting, stitch, pierce]

kuttu, {[N<Ag>(+a)]#[N<Pt>(+h)]}; "sting"

kuttu, {[N<Ag>(+h)]#[N<Go>(+h)]#[N<Th>(-a,+c)]}; "stich"

kuttu, {[N<Ag>(+h)]#[N<Ex>(+h)]#[N<Pt>(+bp)]}; "pierce"

maMdu, v, (scorch, to burn, smarting)

maMdu, {[N<Th>(-a,-c)]}; "scorch"

maMdu, {[N<Lo>(-a,+c)]#[N<Pt>(-a,+c)]}; "fire"

maMdu, {[N<Ex>(+bp)]}; "smarting"

marugu, v, [used to, boil]

marugu, {[N<Ag>(+h)]#[N<Th>(-a,+c)]}; "used to"

marugu, {[N<Lo>(-a,+c)]#[N<Pt>(-a,+c)]}; "boil"

mopu, v, [blame/charge, step, lay/impose]

mopu, {[N<Ag>(+h)]#[N<Ex>(+h)]#[N<Th>(-a,-c)]}; "blame/charge"

mopu, {[N<Ag>(+h)]#[N<Lo>(-a,+c)]#[N<Th>(+bp)]}; "step"

mopu, {[N<Ag>(+h)]#[N<Th>(-a,-c)]#[N<Ex>(+h)]}; "lay/impose"

muMcu, v, [to dip, to dupe]

muMcu, {[N<Ag>(+h)]#[N<Th>(-a,+c)]#[N<Lo>(-a,+c)]}; "to dip"

muMcu, {[N<Ag>(+h)]#[N<Ex>(+h)]}; "to dupe"

munugu, v, [drowned, ponder, lost]

munugu, {[N<Ex>(+h)]#[N<Lo>(-a,+c)]}; "drowned"

munugu, {[N<Ag>(+h)]#[N<Go>(-a,-c)]#[N<Ex>(-a,-c)]}; "ponder"

munugu, {[N<Ex>(+h)]#[N<Th>(-a,-c)]}; "to lose"

muttu, v, [receive, touch]

muttu, {[N<Rc>(+h)]#[N<Th>(-a,+c)]}; "receive"

muttu, {[N<Ag>(+h)]#[N<Th>(+a)]}; "touch"

nadupu, v, [run/maintain, drive]

nadupu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "run/maintain"

nadupu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "drive"

#namulu, v, (to eat, to ponder)

namulu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "to eat"

namulu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]} "to think over"

nilupu, v, [stop, concentrate, maintain, propose, set, erect]

nilupu, {[N<Ag>(+h)]#[N<Io>(-a, +c)]#[N<Th>(-a, +c)]}; "stop"

nilupu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]#[N<Go>(-a, ~c)]}; "concentrate"

#nilupu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "maintain"

nilupu, {[N<Ag>(+h)]#[N<Go>(+h)]#[N<Th>(+h)]}; "propose"

nilupu, {[N<Ag>(+h)]#[N<Go>(-a, -c)]#[N<Th>(-a, +c)]}; "achieve/mark"

nilupu, {[N<Ag>(+h)]#[N<Io>(-a, +c)]#[N<Th>(-a, +c)]}; "erect"

pUyi, v, [to flower, to apply]

pUyi, {[N<Ex>(-a, +c)]#[N<Th>(-a, +c)]}; "to flower"

pUyi, {[N<Ag>(+h)]#[N<Pt>(+h)]#[N<Th>(-a, +c)]}; "to apply"

padu, v, [to slip, to experience, to eye]

padu, {[N<Ag>(+h)]#[N<Lo>(-a, +c)]}; "to slip"

padu, {[N<Ag>(+h)]#[N<Go>(+h)]#[N<Th>(-a, -c)]}; "to experience"

padu, {[N<Th>(+bp)]#[N<Go>(-a, +c)]}; "to eye"

pattu, v, [to hold, to become, feed, to suit, fit]

pattu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "hold"

pattu, {[N<Pt>(-a, +c)]#[N<Th>(-a, +c)]}; "become"

pattu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Ex>(+h)]}; "feed"

pattu, {[N<Ex>(+h)]#[N<Th>(-a, +c)]}; "suit"

pattu, {[N<Pt>(+h)]#[N<Th>(-a, +c)]}; "fit"

peVMcu, v, [to rear, increase, raise the voice]

peVMcu, {[N<Ag>(+h)]#[N<Th>(+a)]}; "rear"

peVMcu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "increase"

peVttu, v, [step, deposit, serve]

peVttu, {[N<Ag>(+h)]#[N<Th>(+bp)]#[N<Lo>(-a, +c)]}; "step"

peVttu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Lo>(~a, +c)]}; "deposit"

peVttu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Go>(+h)]}; "serve"

pelcu, v, [to fire, to blast, to crack/say]

pelcu, {[N<Ag>(+h)]#[N<In>(-a, +c)]}; "to fire"

pelcu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "to blast"

pelcu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "crack/say"

pelu, v, [prickle, blast, burst]

pelu, {[N<So>(-a, -c)]#[N<Pt>(+h)]}; "prickle"

pelu, {[N<Lo>(-a, +c)]#[N<Th>(-a, +c)]}; "blast"

pelu, {[N<Lo>(-a, +c)]#[N<Pt>(-a, +c)]}; "burst"

poVMgu, v, [biol over, overflow, to swell]

poVMgu, {[N<Lo>(-a, +c)]#[N<Pt>(-a, +c)]}; "boil over"

poVMgu, {[N<So>(-a, -c)]#[N<Pt>(-a, +c)]}; "over flow"

poVMgu, {[N<So>(-a, -c)]#[N<Pt>(+bp)]}; "swell"

poVrlu, v, [to utter, to roll over, to wallow]

poVrlu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "utter/break your word"

poVrlu, {[N<Lo>(-a, +c)]#[N<Th>(-a, +c)]}; "overflow"

poVrlu, {[N<Ag>(+a)]#[N<Lo>(-a, +c)]}; "roll"

puttu, v, [to take birth, to have, to get]

puttu, {[N<Ex>(+h)]#[N<Th>(+h)]}; "take birth"

puttu, {[N<Ex>(+h)]#[N<Th>(-a, -c)]}; "have"

puttu, {[N<Rc>(+h)]#[N<Go>(-a, +c)]#[N<Th>(-a, +c)]}; "get"

regu, v, [to flare, disturbed, rage]

regu, {[N<Lo>(-a, +c)]#[N<Th>(-a, -c)]}; "flare"

regu, {[N<Pt>(+bp)]#[N<So>(-a, +c)]}; "dishelved"

regu, {[N<Th>(-a, -c)]#[N<Ex>(+h)]}; "rage"

repu, v, [to flare, to raise]

repu, {[N<Ag>(+h)]#[N<Lo>(-a, +c)]#[N<Th>(-a, -c)]}; "flare"

repu, {[N<Ag>(+h)]#[N<Lo>(+h)]#[N<Th>(-a, -c)]}; "raise"

vAlu, v, [to perch, lean, to swarm]

vAlu, {[N<Ag>(+a)]#[N<Lo>(-a, +c)]}; "perch"

vAlu, {[N<Th>(-a, +c)]#[N<Lo>(-a, -c)]}; "lean"

vAlu, {[N<Th>(+a)]#[N<Lo>(+ed)]}; "swarm"

vaMcu, v, [to abide, to bent]

vaMcu, {[N<Ag>(+h)]#[N<Go>(+h)]#[N<Th>(+bp)]}; "abide"

vaMcu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "bent"

veyi, v, [to feel, throw, draw/put]

veyi, {[N<Ag>(+h)]#[N<Ex>(-a, -c)]}; "feel"

veyi, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Lo>(-a, +c)]}; "throw"

veyi, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "draw"

visuru, v, [to throw, to fan, to grind/to mill]

visuru, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Lo>(-a, +c)]}; "throw"

visuru, {[N<Ag>(+h)]#[N<In>(-a, +c)]}; "to fan"

visuru, {[N<Ag>(+h)]#[N<Lo>(-a, +c)]#[N<Pt>(-a, +c)]}; "gring/mill"

wIyi, v, [to open, to take/move, to pick, to remove]

wIyi, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "open"

wIyi, {[N<Ex>(+h)]#[N<Th>(+bp)]#[N<Lo>(-a, +c)]}; "take/move"

wIyi, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<So>(-a, +c)]}; "pick"

wIyi, {[N<Ag>(+h)]#[N<Th>(-a, +c)]#[N<Lo>(+bp)]}; "remove"

winu, v, [to eat/to consume, to suffer/to undergo]

winu, {[N<Ag>(+h)]#[N<Th>(-a, +c)]}; "eat/consume"

winu, {[N<Pt>(+h)]#[N<Pt>(-a, -c)]}; "to suffer/to undergo"

wirugu, v, [to go, giddy, turn, rotate]

wirugu, {[N<Ag>(+h)]#[N<In>(-a, +c)]}; "roam"

wirugu, {[N<Pt>(+h)]#[N<Th>(+bp)]}; "giddy"

wirugu, {[N<Ag>(+h)]#[N<Th>(-a, -c)]}; "turn"

wirugu, {[N<Th>(-a, +c)]}; "rotate"

xiMcu, v, [unload, to drop]

xiMcu, {[N<Ag>(+h)]#[N<So>(-a, +c)]#[N<Th>(-a, +c)]}; "unload"

xiMcu, {[N<Ag>(+h)]#[N<Th>(+h)]#[N<Go>(-a, +c)]}; "drop"

xigu, v, [to alight/land, to join, to climb down, ran into /pricked, to check]

xigu, {[N<Ag>(+h)]#[N<So>(-a, -c)]}; "alight"

xigu, {[N<Ag>(+h)]#[N<Go>(-a, -c)]}; "join"

xigu, {[N<Ag>(+h)]#[N<Lo>(-a, +c)]}; "climbed down"

xigu, {[N<Pt>(+bp)]#[N<Th>(-a, +c)]}; "ran into/pricked"

xigu, {[N<Pt>(+h)]#[N<Lo>(-a, +c)]}; "check"

3. Semantic Feature Lexicon of Nouns

adugu , N(+bp)	iMglIRuCAnal , N(-a, +c)
awadu , P(+h)	iwarulu , N(+h)
awanu , P(+h)	ippu , N(~a, +c, -ca)
awwagArillu , N(-a, +c)	fllu , N(-a, +c)
aXikAri , N(+h)	Iga , N(+a)
annaM , N(-a, +c)	uxyogaM , N(-a, -c)
annaM , N(-a, +c, +ed)	Uru , N(-a, +c)
annaM , N(-a, -c)	eVMda , N(-a, -c)
appArAvu , N(+h)	eVnnikalu , N(-a, -c)
aByarWi , N(+h)	enugu , N(+a)
amma , N(+h)	oVMtillu , N(-a, +c)
ammAyi , N(+h)	oVllu , N(+h)
alpapIdanaM , N(-a, -c)	oVIYlu , N(+h)
allari , N(-a, -c)	kaMpyUtar , N(-a, +c)
Aku , N(-a, +c)	katteV , N(-a, +c)
Ata , N(-a, -c)	kawwi , N(-a, +c)
AtagAdu , N(+h)	kannu , N(+bp)
AtasWalaM , N(-a, +c)	kamala , N(+h)
APIsu , N(-a, +c)	kalawa , N(-a, -c)
AmeV , P(+h)	kaLYIYu , N(+bp)
AmeVjuwwu , N(+bp)	kAki , N(+a)
Ayana , P(+h)	kAgiwaM , N(-a, +c, +ca)
Alocana , N(-a, -c)	kApuraM , N(-a, +c)
ASa , N(-a, -c)	kAya , N(-a, +c)

kAru, N(-a, +c)
 kAlaM, N(-a, -c)
 kAl, N(+bp)
 kuMda, N(-a, +c)
 kukkapilla, N(+a)
 kunuku, N(-a, -c)
 kUra, N(-a, +c, +ed)
 kUli, N(+h)
 koVttu, N(-a, +c)
 kodaLu, N(+h)
 kowaLu, N(-a, -c)
 kowi, N(+a)
 krikeVtcariwra, N(-a, -c)
 gAyaM, N()
 gAli, N(-a, +c)
 guMdeV, N(+bp)
 guMdeV, N(+h)
 gudi, N(-a, +c)
 gudiseV, N(-a, +c)
 guNapaM, N(-a, +c)
 goVMwu, N(+bp)
 goVMwu, N(+h)
 goVrreV, N(+a)
 goda, N(-a, +c)
 cakraM, N(-a, +c)
 curaka, N(-a, -c)
 ceVMbu, N(-a, +c)

ceVttu, N(-a, +c)
 ceVyyi, N(+bp)
 ceVvi, N(+bp)
 ceVvvu, N(+bp)
 ceyi, N(+bp)
 coVkkA, N(-a, +c)
 janaM, N(+h)
 jabbu, N(-a, -c)
 juwwu, N(+bp)
 jebu, N(-a, +c)
 jElu, N(-a, +c)
 joku, N(-a, -c)
 jFANoxayaM, N(-a, -c)
 tapAkAya, N(-a, +c)
 tElaru, N(+h)
 dabbu, N(-a, +c)
 dabbulu, N(-a, +c)
 drEvar, N(+h)
 wadi, N(-a, -c)
 wannu, N(-a, -c)
 wammudu, N(+h)
 wala, N(+bp)
 walanoVppi, N(-a, -c)
 walupu, N(-a, +c)
 walli, N(+h)
 wAdu, N(-a, +c)
 wirupati, N(-a, +c)

wIvraVAXi, N(+h)	paMduga, N(-a, -c)
wupAki, N(-a, +c)	paMwulu, N(+h)
wupAkI, N(-a, +c)	paMxi, N(+a)
wUrpu, N(-a, -c)	paMpu, N(-a, +c)
welu, N(+a)	pakRi, N(+a)
xalYArI, N(+h)	padaga, N(+a)
xAhaM, N(-a, -c)	pani, N(-a, -c)
xIpaM, N(-a, +c)	panivAdu, N(+h)
xuMdagaM, N(+h)	pannu, N(-a, +c)
xuMdagudu, N(+h)	parugu, N(-a, -c)
xoVMga, N(+h)	paruvu, N(-a, -c)
XvajaswaMBaM, N(-a, +c)	pAwabaswi, N(-a, +c)
nagaraM, N(-a, +c)	pAxaM, N(+bp)
naxi, N(-a, +c)	pApa, N(+h)
nan, N(+h)	pAmu, N(+a)
nA, N(+h)	pAlu, N(-a, +c)
nixxara, N(-a, -c)	pAvu, N(-a, +c)
nIru, N(-a, +c)	piMdi, N(-a, +c)
nIllu, N(-a, +c)	picci, N(-a, -c)
nIlYlYu, N(-a, +c)	pilla, N(+h)
nuvvu, P(+h)	pillalu, N(+h)
nUneV, N(-a, +c)	pillavAdu, N(+h)
nenu, P(+h)	pilli, N(+a)
neraM, N(-a, -c)	puli, N(+a)
nela, N(-a, +c)	puvvu, N(-a, +c)
notu, N(-a, +c)	peVxxalaperu, N(-a, -c)
paMdu, N(-a, +c)	peVxxalu, N(+h)

peVnnu, N(-a, +c)
 peVIYli, N(-a, -c)
 pepar, N(-a, +c, +ca)
 peru, N(-a, -c)
 poVyyi, N(-a, +c)
 polIsu, N(+h)
 polIsulu, N(+h)
 prawijFa, N(-a, -c)
 praXAnamaMwri, N(+h)
 praBuwvaM, N(-a, ~c)
 prayAnikudu, N(+h)
 prasixXi, N(-a, -c)
 prema, N(-a, -c)
 baMdi, N(-a, +c)
 baMwi, N(-a, +c)
 batta, N(-a, +c)
 battalu, N(-a, +c)
 balla, N(-a, +c)
 bAMbu, N(-a, +c)
 bAXa, N(-a, -c)
 bAwi, N(-a, +c)
 bidda, N(+h)
 buraxa, N(-a, +c)
 beVllaM, N(+ed)
 boVmma, N(-a, +c)
 byAMku, N(-a, +c)
 BAxyawa, N(-a, -c)

BAraM, N(-a, -c)
 maMcaM, N(-a, +c)
 maMwri, N(+h)
 maMxAraM, N(-a, +c)
 maMxu, N(-a, +c)
 manasu, N(-a, -c)
 maMsaMkoVttuvAdu, N(+h)
 maAta, N(-a, -c)
 maAtalu, N(-a, -c)
 millu, N(-a, +c)
 mIgada, N(-a, +c)
 mIru, N(+h)
 muKyamaMwn, N(+h)
 muggu, N(-a, +c)
 muriki, N(-a, +c)
 mullu, N(-a, +c)
 meswrl, N(+h)
 rameR, N(+h)
 ravi, N(+h)
 rAKI, N(-a, +c)
 rAjakIyaM, N(-a, -c)
 rAjaSeKar reVddi, N(+h)
 rAwri, N(-a, -c)
 rAbaMxu, N(+a)
 rArma, N(+h)
 rAmayya, N(+h)
 rikArdu, N(-a, +c)

rijistAru , N(+h)	saMsAraM , N(-a, -c)
roVtteV , N(-a, +c)	sawraM , N(-a, +c)
roju , N(-a, -c)	saBa , N(-a, +c)
roddu , N(-a, +c)	samaSya , N(-a, -c)
lABaM , N(-a, +c)	samasya , N(-a, -c)
lAyar , N(+h)	samAXAnaM , N(-a, -c)
lArA , N(+h)	samuxraM , N(-a, +c)
lArI , N(-a, +c)	saruku , N(-a, +c)
vadraMgi , N(+h)	sAna , N(~a, -c)
vAgXAnaM , N(-a, -c)	sigareVttu , N(-a, +c)
vAdi , P(+h)	sinimA , N(-a, +c)
vAdu , P(+h)	sinimA , N(-a, -c)
vAlYlu , P(+h)	sinimAhAlu , N(-a, +c)
vAlYlYu , P(+h)	siliMdar , N(-a, +c)
visanakarra , N(-a, +c)	sIsA , N(-a, +c)
vIWicivara , N(-a, +c)	sEkilu , N(-a, +c)
veVnuka , N(-a, -c)	sEnikudu , N(+h)
veVnneVla , N(-a, -c)	sWalaM , N(-a, +c)
vExya , N(+h)	snAnaM , N(-a, -c)
vyApAraM , N(-a, -c)	snehiwa , N(+h)
vyApArasWudu , N(+h)	snehiwudu , N(+h)
Sawqvu , N(+h)	hARtal , N(-a, +c)
Sirassu , N(+bp)	heVlikAptar , N(-a, +c)
Siva , N(+h)	hExarAbAxu , N(-a, +c)
SrInu , N(+h)	hotal , N(-a, +c)
saMKya , N(-a, -c)	

4. Display of meaning/Sence resolution function:

In the following we illustrate the examples obtained by running the test sentences.

AmeV Ata AduwoMxi. 'She is playing a game'

Morph Analysis Of The Telugu Sentence ==>>

```
3_AmeV{AmeV P eka *0* } / 3_AmeV{AmeV P eka *obl* } /  
3_Ata{kota n eka *0* } / 3_Ata{kota n eka *obl* } /  
2_Adu{Adu v *wunn* 3_non_pu_e } /
```

```
verb=Adu  
noun=AmeV  
noun=Ata  
Verb => Adu ### Meaning=> "play"
```

gAliki Akulu AduwunnAyi. 'Leaves are rustling due to the wind'

Morph Analysis Of The Telugu Sentence ==>>

```
3_gAli{gaxi n eka *ki* } /  
3_Aku{meku n bahu *0* } / 3_Aku{meku n bahu *vu* } /  
2_Adu{Adu v *wunn* 3_na_ba } /
```

```
verb=Adu  
noun=gAli  
noun=Aku  
Verb => Adu ### Meaning= > "rustle"
```

sinimA AduwoMxi. 'Movie is being screened'

Morph Analysis Of The Telugu Sentence ==>>

```
1_sinimA{rikRA n eka *0* } / 1_sinimA{rikRA n eka *obl* } /  
2_Adu{Adu v *wunn* 3_non_pu_e } /
```

```
verb=Adu  
noun=sinimA  
Verb => Adu ### Meaning= > "to be screened"
```

battalu ArAyi. 'clothes have dried'

Morph Analysis Of The Telugu Sentence ==>>

3_batta{kota n bahu *0* } / 3_batta{kota n bahu *vu* } /
3_Aru{kAlu v *A* 3_na_ba } /

verb=Aru

noun=batta

Verb => Aru ### Meaning=> "dry"

gAliki xIpaM AriMxi. 'Lamp has been put off due to the wind'

Morph Analysis Of The Telugu Sentence ==>>

3_gAli{gaxi n eka *ki* } /
1_xIpaM{puswakaM n eka *0* } /
3_Aru{kAlu v *A* 3_non_pu_e } /

verb=Aru

noun=gAli

noun=xIpaM

Verb => Aru ### Meaning=> "put off"

sEnikudu Sirassu CexiMcAdu. 'The soldier beheaded the enemies head'

Morph Analysis Of The Telugu Sentence ==>>

3_sEnikudu{snehiwudu n eka *0* } /
2_Sirassu{meku n eka *0* } / 2_Sirassu{meku n eka *obl* } /
2_CexiMcu{cUpiMcu v *A* 3_pu_e } /

verb=CexiMcu

noun=sEnikudu

noun=Sirassu

Verb => CexiMcu ### Meaning=> "behead"

awanu samasyanu CexiMcAdu. 'He has solved the problem'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{awanu P eka *0* } /

3_samasya{kota n eka *nu* } /3_samasya{kota n eka *ni* } /
 2_CexiMcu {cUpiMcu v * A* 3_pu_e } /

verb=CexiMcu

noun=awanu

noun=samasya

Verb => CexiMcu ### Meaning=> "solve"

ammAyi naxini IxiMxi. 'She swam the river'

Morph Analysis Of The Telugu Sentence ==>>

3_ammAyi {abbAyi n eka *0* } /3_ammAyi{abbAyi n eka *obl* } /3_ammu{pannu v
 A 3_na_ba } /

3_naxi{gaxi n eka *nu* } /3_naxi{gaxi n eka *ni* } /

2_Ixu{pannu v *A* 3_non_pu_e } /

verb=ammu

verb=Ixu

noun=ammAyi

noun=naxi

Verb => Ixu ### Meaning=> "swim"

awanu saMs ArAnni IxuwunnAdu. 'He is leading his life'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{awanu P eka *0* } /

1_saMsAraM{puswakaM n eka *nu* } /1_saMsAraM{puswakaM n eka *ni* } /

2_Ixu{pannu v *wunn* 3_pu_e } /

verb=Ixu

noun=awanu

noun=sams AraM

Verb => Ixu ### Meaning=> "lead"

vAdu peparnu godaku aMtiMcAdu. 'He pasted the paper on the wall'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjFarWa* 2_e } /3_vAdu{vAdu P eka *0* } /

1_pepar{kalar n eka *nu* } /1_pepar{kalar n eka *ni* } /3_peparu{nOkaru n eka *ni* } /

3_goda{kota n eka *ki* } /

2_aMtiMcu{cUpiMcu v *A* 3_pu_e } /

verb=vAdu

verb=aMtiMcu

noun=vAdu

noun=pepar

noun=goda

Verb => aMtiMcu ### Meaning=> "stick/paste"

awadu jabbu iwarulaku aMtiMcAdu. 'He passed on the infection to others'

Morph Analysis OfThe Telugu Sentence ==>>

3_awadu{vAdu P eka *0* } /

2_jabbu{mekun eka *0* } /2_jabbu{mekun eka *obl* } /

3_iwarulu{pAlu n bahu *ki* } /

2_aMtiMcu{cUpiMcu v *A* 3_pu_e } /

verb=aMtiMcu

noun=awadu

noun=jabbu

noun=iwarulu

Verb => aMtiMcu ### Meaning-> "to pass on"

vAdini wAduwo baMXiMcAru. They tied him with ropes'

Morph Analysis OfThe Telugu Sentence ==>>

1_vAdi{gaxi n eka *nu* } /1_vAdi{gaxi n eka *ni* } /3_vAdu{vAdu P eka *nu* } /3_vAdu{vAdu P eka *ni* } /

2_wAdu{gUdu n eka *wo* } /

2_baMXiMcu{cUpiMcu v *A* 23_ba } /

verb=baMXiMcu

noun=vAdi

noun=wAdu

Verb => baMXiMcu ### Meaning=> "to tie"

vadraMgi boVmmlu ceSAdu. 'Carpenter has made the dolls'

Morph Analysis OfThe Telugu Sentence ==>>

2_vadraMgi{gaxi n eka *0* } /2_vadraMgi{gaxi n eka *obl* } /
 2_boVmmlu{kota n bahu *0* } /2_boVmmlu{kota n bahu *vu* } /
 3_ceVyyi{ceVyyi v *A* 3_pu_e } /

verb=ceVyyi

noun=vadraMgi

noun=boVmmlu

Verb => ceVyyi ### Meaning=> "make"

amma kUra cesiMxi. 'Mother prepared the curry'

Morph Analysis OfThe Telugu Sentence ==>>

3_amma{kota n eka *0* } /3_amma{kota n eka *obl* } /3_ammu{pannu v *an* any } /
 2_kUra{kota n eka *0* } /2_kUra{kota n eka *obl* } /2_kUru{kAlu v *an* any } /
 3_ceVyyi{ceVyyi v *A* 3_non_pu_e } /

verb=ammu

verb=kUru

verb=ceVyyi

noun=amma

noun=kUra

Verb => ceVyyi ### Meaning=> "prepare"

awanu vAlYlaku peVIYli ceSAdu. 'He has performed their marriage'

Morph Analysis OfThe Telugu Sentence ==>>

3_awanu {awanu P eka *0* } /
 3_vAlYlu{vAlYlu P bahu *ki* } /
 3_peVIYli{rAwri n eka *0* } /3_peVIYli{rAwri n eka *obl* } /
 3_ceVyyi{ceVyyi v *A* 3_pu_e } /

verb=ceVyyi

noun=awanu

noun=vAlYlu
 noun=peVlYli
 Verb => ceVyyi ### Meaning=> "perform"

maMwri saBalo vAgXAnaM ceSAdu. 'Minister made a promise in the meeting'

Morph Analysis Of The Telugu Sentence ==>>

3_maMwri{gaxi n eka *0* } /3_maMwri{gaxi n eka *obl* } /
 1_saBa{kota n bahu *0_o* } /1_saBa{kota n eka *lo* } /
 1_vAgXAnaM{puswakaM n eka *0* } /
 3_ceVyyi{ceVyyi v *A* 3_pu_e } /

verb=ceVyyi
 noun=maMwri
 noun=saba
 noun=vAgXAnaM
 Verb => ceVyyi ### Meaning=> "render"

kowi ceVttu eVkkiMxi. 'Monkey climbed the tree'

Morph Analysis Of The Telugu Sentence ==>>

3_kowi{gaxi n eka *0* } /3_kowi{gaxi n eka *obl* } /
 2_ceVttu{koVttu n eka *0* } /2_ceVttu{koVttu n eka *obl* } /
 2_eVkku{pannu v *A* 3_non_pu_e } /

verb=eVkku
 noun=kowi
 noun=ceVttu
 Verb => eVkku ### Meaning=> "to climb"

awanu lAyarA praxiXiki eVkkAdu. 'He has become famous as a lawyer'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{ awanu P eka *0* } /
 1_lAyar{kalar n eka *gA* } /
 3_praxiXi{gaxi n eka *ki* } /
 2_eVkku{pannu v *A* 3_pu_e } /

verb=eVkku
 noun=awanu
 noun=lAyar
 noun=prasixXi
 Verb => eVkku ### **Meaning=** > "to become"

vAdu cewwo kArunu eVwwAdu. 'He lifted the car with a single hand'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{ Adu v *AjFArWa* 2_e } / 3_vAdu{ vAdu P eka *0* } /
 3_ceyi{goyi n eka *wo* } /
 3_kAru{kAlu v *uxu* 3_e_3_na_ba } / 3_kAru{nOkaru n eka *nu*
 } / 3_kAru{nOkaru n eka *ni* } /

3_eVwwu{pannu v *A* 3_pu_e } /

verb=vAdu

verb=kAru

verb=eVwwu

noun=vAdu

noun=ceyi

noun=kAru

Verb => eVwwu ### **Meaning=>** "lift"

pAmu padaga eVwwiMxi. 'Snake raised its hood'

Morph Analysis Of The Telugu Sentence ==>>

2_pAmu{meku n eka *0* } / 2_pAmu{meku n eka *obl* } / 2_pAmu{pannu v
 AjFArWa 2_e } /
 2_padaga{kota n eka *0* } / 2_padaga{kota n eka *obl* } /
 3_eVwwu{pannu v *A* 3_non_pu_e } /

verb=pAmu

verb=eVwwu

noun=pAmu

noun=padaga

Verb => eVwwu ### **Meaning=** > "raise"

vAdiki peVIYli jarigiMxi. 'he married / his marriage tookplace'¹

Morph Analysis Of The Telugu Sentence ==>>

1_vAdi{gaxi n eka *ki* } / 3_vAdu{vAdu P eka *ki* } /
 3_peVIYli{rAwri n eka *0* } / 3_peVIYli{rAwri n eka *obl* } /
 3_jarugu{poVg²du v *A* 3_non_pu_e } /

verb=jarugu

noun=vAdi

noun=peVIYli

Verb => jarugu ### Meaning=> "happen"

kAlaM jarigiMxi. 'A lot of time has passed'

Morph Analysis Of The Telugu Sentence ==>>

3_kAlaM{puswakaM n eka *0* } / 3_kAlu{kAlu v *a* l_ba } / 1_kaM{puswakaM n
 bahu *nu* } / 1_kaM{puswakaM n bahu *nu* } /
 3_jarugu{poVg²du v *A* 3_non_pu_e } /

verb=kAlu

verb=jarugu

noun=kAlaM

Verb => jarugu ### Meaning—> "pass"

AmeV jarigiMxi. 'She moved aside'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } / 3_AmeV{AmeV P eka *obl* } /
 3_jarugu{poVg²du v *A* 3_non_pu_e } /

verb=jarugu

noun=AmeV

Verb => jarugu ### Meaning=> "move"

paMwulu peVIYli jaripAdu. 'Priest has performed the marriage'

Morph Analysis Of The Telugu Sentence ==>>

3_paMwulu{kIlLu n eka *0* } /3_paMwulu{kIlLu n eka *obl* } /
 3_peVIYli{rAwri n eka *0* } /3_peVIYli{rAwri n eka *obl* } /
 2_jarupu{poVg?du v *A* 3_pu_e } /

verb=jarupu

noun=paMwulu

noun=peVIYli

Verb => jarupu ### Meaning=> "perform"

awanu pAvulu jaripAdu. 'He moved the pawns'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{ awanu P eka *0* } /
 2_pAvu{meku n bahu *0* } /2_pAvu{meku n bahu *vu* } /
 2_jarupu{poVg?du v *A* 3_pu_e } /

verb=jarupu

noun=awanu

noun=pAvu

Verb => jarupu ### Meaning=> "move"

eVMda kAswuMxi. 'sun is shining'

Morph Analysis Of The Telugu Sentence ==>>

3_eVMda{kota n eka *0* } /3_eVMda{kota n eka *obl* } /2_eVMdu{pannu v *an*
 any } /

2_kAyi{rAyi v *wA* 3_non_pu_e } /

verb=eVMdu

verb=kAyi

noun=eVMda

Verb => kAyi ### Meaning=> "shine"

Ayana wupAkiwo pakRini kAlcAdu. 'He shot the bird with a gun'

Morph Analysis Of The Telugu Sentence ==>>

3_Ayana{Ayana P eka *0* } /3_Ayana{Ayana P eka *obl* } /

2_wupAki{gaxi n eka *wo* } /
 1_pakRi{gaxi n eka *nu* } / 1_pakRi{gaxi n eka *ni* } /
 2_kAlcu{pannu v *A* 3_pu_e } / 3_kAluvu{eduvu v *A* 3_pu_e } /

verb=kAlcu

verb=kAluvu

noun=Ayana

noun=wupAki

noun=pakRi

Verb => kAluvu ### Meaning=> "to fire"

pilialu kAgiwAlu kAlcAru. 'Children burnt the papers'

Morph Analysis Of The Telugu Sentence ==>>

3_pilla{kota n bahu *0* } / 3_pilla{kota n bahu *vu* } /
 2_kAgiwaM{puswakaM n bahu *0* } / 2_kAgiwaM{puswakaM n bahu *vu* } /
 2_kAlcu{pannu v *A* 23_ba } / 3_kAluvu{eduvu v *A* 23_ba } /

verb=kAlcu

verb=kAluvu

noun=pilla

noun=kAgiwaM

Verb => kAluvu ### Meaning-> "to burn"

vAdu roVtteV kAlcAdu. 'He Roasted the bread'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjF'ArWa* 2_e } / 3_vAdu{vAdu P eka *0* } /
 2_roVtteV{peVtteV n eka *0* } / 2_roVtteV{peVtteV n eka *obl* } /
 2_kAlcu{pannu v *A* 3_pu_e } / 3_kAluvu{eduvu v *A* 3_pu_e } /

verb=vAdu

verb=kAlcu

verb=kAluvu

noun=vAdu

noun=roVtteV

Verb => kAluvu ### Meaning=> "roast"

ravi sigareVttu kAlcAdu. 'Ravi smoked the cigarette'

Morph Analysis Of The Telugu Sentence ==>>

1_ravi{gaxi n eka *0* } / 1_ravi{gaxi n eka *obl* } /
 1_sigareVttu{koVttu n eka *0* } / 1_sigareVttu{koVttu n eka *obl* } /
 } / 1_sigareVttu{meku n eka *0* } / 1_sigareVttu{meku n eka *obl* } /
 2_kAlcu{pannu v *A* 3_pu_e } / 3_kAluvu{eduvu v *A* 3_pu_e } /

verb=kAlcu

verb=kAluvu

noun=ravi

noun=sigareVttu

Verb => kAluvu ### Meaning=> "smoke"

eVMda kAswuMxi. 'sun is shining'

Morph Analysis Of The Telugu Sentence ==>>

3_eVMda{kota n eka *0* } / 3_eVMda{kota n eka *obl* } / 2_eVMdu{pannu v *an* any } /

2_kAyi{rAyi v *wA* 3_non_pu_e } /

verb=eVMdu

verb=kAyi

noun=eVMda

Verb => kAyi ### Meaning=> "shine"

awanu saMKyalanu kUdAdu. 'he added all the numbers'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{awanu P eka *0* } /
 3_saMKya{kota n bahu *ni* } /
 3_kUdu{Adu v *A* 3_pu_e } /

verb=kUdu

noun=awanu

noun=samKya

Verb => kUdu ### Meaning=> "to add"

gudixaggara janaM kUdAru. 'People gathered near the temple'

Morph Analysis Of The Telugu Sentence ==>>

2_gudi{gudi n eka *xaggara* } /
 1_janaM{puswakaM n eka *0* } /3_jana{SreRTa n *adj_xi_na* } /
 3_kUdu{Aduv *A* 23_ba } /

verb=kUdu

noun=gudi

noun=janaM

Verb => kUdu ### Meaning=> "to gather"

vAlYlaku pillalu kaligAru. 'They had kids'

Morph Analysis Of The Telugu Sentence ==>>

3_vAlYlu{vAlYlu P bahu *ki* } /
 3_pilla{kota n bahu *0* } /3_pilla{kota n bahu *vu* } /
 3_kalugu{poVg?du v *A* 23_ba } /

verb=kalugu

noun=vAlYlu

noun=pilla

Verb —> kalugu ### Meaning™> "born"

vAdiki bAXa kaligiMxi. 'he had pain'

Morph Analysis Of The Telugu Sentence ==>>

1_vAdi{gaxi n eka *ki* } /3_vAdu{vAdu P eka *ki* } /
 3_bAXa{kota n eka *0* } /3_bAXa{kota n eka *obl* } /
 3_kalugu{poVg?du v *A* 3_non_pu_e } /

verb=kalugu

noun=vAdi

noun=bAXa

Verb => kalugu ### Meaning=> "had"

AmeVku lABaM kaligiMxi. 'She gained profit'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *ki* } /
 3_lABaM{puswakaM n eka *0* } /
 3_kalugu{poVg?du v *A* 3_non_pu_e } /

verb=kalugu

noun=AmeV

noun=lABaM

Verb => kalugu ### Meaning=> "to get"

vAdu hExarAbAxulo illu kattAdu. 'He built a house in Hyderabad'¹

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjFARWa* 2_e } /3_vAdu{vAdu P eka *0* } /
 1_hExarAbAxu{meku n bahu *0_o* } /1_hExarAbAxu{meku n eka *lo* } /
 3_illu{illu n eka *0* } /
 3_kattu{peVttu v *A* 3_pu_e } /

verb=vAdu

verb=kattu

noun=vAdu

noun=hExarAb Axu

noun=illu

Verb => kattu ### Meaning=> "build"

vAlYlu praBuwvAniki pannu kattAru. 'They paid tax to the government'

Morph Analysis Of The Telugu Sentence ==>>

3_VAlYlU{VAlYlU P bahu *0* } /3_vAlYlu{vAlYlu P bahu *vu* } /
 3_praBuwvaM{puswakaM n eka *ki* } /
 3_pannu{bonu n eka *0* } /3_pannu{bonu n eka *obl* } /3_pannu{kannu n eka *0* } /
 3_pannu{kannu n eka *obl* } /3_pannu {pannu v *AjFARWa* 2_e } /
 1_pan {kalcar n eka *nu* } /1_pan {kalcar n eka *ni* } /
 3_kattu{peVttu v *A* 23_ba } /

verb=pannu

verb=kattu

noun=vAlYlu

noun=praBuwvaM

noun=pannu
Verb => kattu ### Meaning=> "pay"

AmeV vAdiki rAKI kattiMxi. 'Sunitha tied Rakhi to him'

Morph Analysis OfThe Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } /3_AmeV{ AmeV P eka *obl* } /
1_vAdi{gaxi n eka *ki* } /3_vAdu{vAdu P eka *ki* } /
1_rAKI{rikRA n eka *0* } /1_rAKI{rikRA n eka *obl* } /
3_kattu{peVttu v *A* 3_non_pu_e } /

verb=kattu
noun=AmeV
noun=vAdi
noun=rAKI
Verb => kattu ### Meaning=> "tie"

awanu katteVlu koVttAdu. 'He cut fire wood'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{ awanu P eka *0* } /
3_katteV{peVtteV n bahu *0* } /3_katteV{peVtteV n bahu *vu* } /
1_koVttAdu{Adu v *AjFARWa* 2_e } /2_koVttu{peVttu v *A* 3_pu_e } /

verb=koVttAdu

verb=koVttu
noun=awanu
noun=katteV
Verb => koVttu ### Meaning=> "cut"

awanu kukkapillanu koVttAdu. 'Chintu beat the puppy'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{awanu P eka *0* } /
2_kukkapilla{kota n eka *nu* } /2_kukkapilla{kota n eka *ni* } /
1_koVttAdu{Adu v *AjFARWa* 2_e } /2_koVttu{peVttu v *A* 3_pu_e } /

verb=koVttAdu
 verb=koVttu
 noun=awanu
 noun=kukkapilla
 Verb => koVttu ### Meaning=> "beat"

vAIYlu koVttukoVMtunnAru. 'They are fighting'

Morph Analysis Of The Telugu Sentence ==>>

3_VAIYIU{VAIYIUP bahu *0* } /3_VAIYIU{VAIYIUP bahu *vu* } /
 2_koVttuko{kUrco v *wunn* 23_ba } /

verb=koVttuko
 noun=vAIYlu
 Verb => koVttuko ### Meaning=> "fighting"

gAliki walupulu koVttukoVMtunnAyi. 'The windows shuttered'

Morph Analysis Of The Telugu Sentence ==>>

3_gAli{gaxi n eka *ki* } /
 2_walupu{meku n bahu *0* } /2_walupu{meku n bahu *vu* } /
 2_koVttuko{kUrco v *wunn* 3_na_ba } /

verb=koVttuko
 noun=gAli
 noun=walupu
 Verb -- > koVttuko ### Meaning= > "move/shutter"

vAdu samAXAnaMkosaM koVttukoVMtunnAdu. 'He floundered for an answer'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjF'ArWa* 2_e } /3_vAdu{vAdu P eka *0* } /
 3_samAXAnaM{puswakaM n eka *kosaM* } /
 2_koVttuko{kUrco v *wunn* 3_pu_e } /

verb=vAdu

verb=koVttuko
 noun=vAdu

noun=samAXAnaM

Verb => koVttuko ### Meaning=> "flounder"

vAdiki guMdeV koVttukoVMtuMxi. 'His heart is beating'

Morph Analysis Of The Telugu Sentence ==>>

1_vAdi{gaxi n eka *ki* } / 3_vAdu{vAdu P eka *ki* } /
 3_guMdeV{peVtteV n eka *0* } / 3_guMdeV{peVtteV n eka *obl* } /
 2_koVttuko{kUrco v *wA* ^

verb=koVttuko

noun=vAdi

noun=guMdeV

Verb => koVttuko ### Meaning=> "beat"

xoVMgaku welu kuttiMxi. 'Scorpion stung the thief'

Morph Analysis Of The Telugu Sentence ==>>

1_xoVMga{kota n eka *ki* } / 2_xoVMga{kota n eka *ki* } /
 2_welu{kAlu v *AjFArWa* 2_e } / 2_welu{kllu n eka *0* } / 2_welu{kllu n eka *obl* } /

2_kuttu{peVttu v *A* 3_non_pu_e } /

verb=welu

verb=kuttu

noun=xoVMga

noun=welu

Verb => kuttu ### Meaning=> "sting"

tElaru pillalaku battalu kuttAdu. 'Tilor stitch the kids cloths'

Morph Analysis Of The Telugu Sentence ==>>

3_tElaru{nOkaru n eka *0* } / 3_tElaru{nOkaru n eka *obl* } /
 3_pilla{kota n bahu *ki* } /
 3_batta{kota n bahu *0* } / 3_batta{kota n bahu *vu* } /
 2_kuttu{peVttu v *A* 3_pu_e } /

verb=kuttu
 noun=tElaru
 noun=pilla
 noun=batta
 Verb => kuttu ### Meaning=> "stich"

vAIYlu pillaku ceVvulu kuttAru. 'They pierced the ears of the baby'

Morph Analysis OfThe Telugu Sentence ==>>

3_vAJYlu{vAIYlu P bahu *0* } /3_vAIYlu{vAIYlu P bahu *vu* } /
 3_pilla{kota n eka *ki* } /1_pil{kalcara n bahu *ki* } /
 2_ceVvi{gaxi n bahu *0* } /
 2_kuttu{peVttu v *A* 23_ba } /

verb=kuttu
 noun=vAIYlu
 noun=pilla
 noun=ceVvi
 Verb => kuttu ### Meaning=> "pierce"

eVMdalu maMduwunnAyi. 'It is scorching due to heat'

Morph Analysis OfThe Telugu Sentence ==>>

3_eVMda{kota n bahu *0* } /3_eVMda{kota n bahu *vu* } /
 2_maMdu{pannu v *wunn* 3_na_ba } /

verb=maMdu
 noun=eVMda
 Verb => maMdu ### Meaning=> "scorch"

poVyyilo katteVlu maMduwunnAyi. 'the fire wood in the kiln is burning'

Morph Analysis OfThe Telugu Sentence ==>>

3_poVyyi{abbAyi n bahu *0_o* } /3_poVyyi{abbAyi n eka *lo* } /
 3_katteV{peVtteV n bahu *0* } /3_katteV{peVtteV n bahu *vu* } /
 2_maMdu{pannu v *wunn* 3_na_ba } /

verb=maMdu
 noun=poVyyi

noun=katteV

Verb => maMdu ### Meaning=> "burn"

kalYlu maMduwunnAyi. 'My eyes are smarting'¹

Morph Analysis Of The Telugu Sentence ==>>

3_kannu{kannu n bahu *0* } / 3_kannu{kannu n bahu *vu* } /

2_maMdu{pannu v *wunn* 3_na_ba } /

verb=maMdu

noun=kannu

Verb => maMdu ### Meaning=> "smarting"

awanu maMxunu marigAdu. 'He is used to liquor'

Morph Analysis Of The Telugu Sentence - >>

3_awanu{awanu P eka *0* } /

3_maMxu{meku n eka *nu* } / 3_maMxu{meku n eka *ni* } / 3_manu{koVnu v *uxu* 1_e } /

2_marugu{poVg?du v *A* 3_pu_e } /

verb=manu

verb=marugu

noun=awanu

noun=maMxu

Verb -> marugu ### Meaning=> "used to"

poVyyimlxa pAlu maruguwunn Ayi. 'The milk is boiling on the stove'

Morph Analysis Of The Telugu Sentence ==>>

3_poVyyi{abbAyi n eka *mIxa* } /

3_pAlu{pAlu n bahu *0* } / 3_pAlu{pAlu n bahu *vu* } /

2_marugu{poVg?du v *wunn* 3_na_ba } /

verb=marugu

noun=poVyyi

noun=pAlu

Verb => marugu ### Meaning= > "boil"

aXikAri panivAdipEna neraM mopAdu. 'The officer put the blame on the servant'

Morph Analysis Of The Telugu Sentence ==>>

3_aXikAri{xAri n eka *0* } /3_aXikAri{xAri n eka *obl* } /

3_panivAdu{pillavAdu n eka *pE* } /

2_neraM{puswakaM n eka *0* } /

2_mopu{pannu v *A* 3_pu_e } /

verb=mopu

noun=aXikAri

noun=panivAdu

noun=neraM

Verb => mopu ### Meaning=> "lay/impose"

vAdu APisulo pAxaM mopAdu. 'SukumAr stepped into our office'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjfArWa* 2_e } /3_vAdu{vAdu P eka *0* } /

1_APIsu{meku n bahu *0_o* } /1_APIsu{meku n eka *lo* } /

1_pAxaM{puswakaM n eka *0* } /

2_mopu{pannu v *A* 3_pu_e } /

verb=vAdu

verb=mopu

noun=vAdu

noun=APisu

noun=pAxaM

Verb => mopu ### Meaning= > "step"

pApa ceVMbu nIYlalo muMciMxi. 'Baby dipped the tumbler into water'

Morph Analysis Of The Telugu Sentence ==>>

2_pApa{kota n eka *0* } /2_pApa{kota n eka *obl* } /2_pApaM{puswakaM n eka *obl* } /2_pApu{pannu v *an* any } /2_pApudu{snehiwudu n eka *obl* } /

2_ceVMbu{meku n eka *0* } / 2_ceVMbu{meku n eka *obl* } /
 3_nIru{goru n bahu *0* } / 3_nIru{goru n bahu *vu* } /
 2_muMcu{pannu v *A* 3_non_pu_e } /

verb=pApu

verb=muMcu

noun=pApa

noun=ceVMbu

noun=nIru

Verb => muMcu ### Meaning=> "to dip"

xaLYAri vyApArasWulanu muMcAdu. 'Broker duped the merchants'

Morph Analysis Of The Telugu Sentence ==>>

2_xaLYAri{xAri n eka *0* } / 2_xaLYAri{xAri n eka *obl* } /
 1_vyApArasWudu{snehiwudu n bahu *ni* } /
 2_muMcu{pannu v *A* 3_pu_e } /

verb=muMcu

noun=xaLYAri

noun=vyApArasWudu

Verb => muMcu ### Meaning=> "duped"

AmeV nIlYlalo munigMxi. 'She drowned in the water'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } / 3_AmeV{AmeV P eka *obl* } /
 3_nIru{goru n bahu *lo* } /
 2_munugu{poVg?du v *A* 3_n

verb=munugu

noun=AmeV

noun=nIru

Verb => munugu ### Meaning=> "drowned"

vAdiki dabbu muttiMxi. 'He had received the money'

Morph Analysis Of The Telugu Sentence ==>>

1_vAdi{gaxi n eka *ki* } / 3_vAdu{vAdu P eka *ki* }

3_dabbu{meku n eka *0* } /3_dabbu{meku n eka *obl* } /
 2_muttu{peVttu v *A* 3_non_pu_e } /

verb=muttu

noun=vAdi

noun=dabbu

Verb => muttu ### Meaning=> "receive"

awanu enugunu muttAdu. 'He touched the elephant'¹

Morph Analysis Of The Telugu Sentence =>

3_awanu{awanu P eka *0* } /

3_enugu{meku n eka *nu* } /3_enugu{meku n eka *ni* } /

2_muttu{peVttu v *A* 3_pu_e } /

verb=muttu

noun=awanu

noun=enugu

Verb => muttu ### Meaning=> "touch"

vAIYlu sawraM nadupuwunnAru. 'They run an inn'

Morph Analysis Of The Telugu Sentence =>>

3_VAIYIU{VAIYIU P bahu *0* } /3_vAIYlu{vAIYlu P bahu *vu* } /

1_sawraM{puswakaM n eka *0* } /

2_nadupu{poVg?du v *wunn* 23_ba } /

verb=nadupu

noun=vAIYlu

noun=sawraM

Verb => nadupu ### Meaning=> "run/maintain"

AmeV kAru nadupuwuMxi. 'She is driving a car'

Morph Analysis Of The Telugu Sentence =>>

3_AmeV{AmeV P eka *0* } /3_AmeV{ AmeV P eka *obl* } /

3_kAru{kAlu v *AjFArWa* 2_e } /3_kAru{matuku n *avy_0* } /3_kAru{nOkaru n eka *0* } /3_kAru{nOkaru n eka *obl* } /3_avvu{avvu v *a* 23_ba } /

2_nadupu{poVg?du v *wA* 3_non_pu_e } /

verb=kAru

verb=avvu

verb=nadupu

noun=AmeV

noun=kAru

Verb => nadupu ### Meaning=> "drive"

AmeV annaM namiliMxi. 'She is chewing food'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } / 3_AmeV{AmeV P eka *obl* } /

3_annaM{puswakaM n eka *0* } /

2_namulu{poVg?du v *A* 3_non_pu_e } /

verb=namulu

noun=AmeV

noun=annaM

Verb => namulu ### Meaning=> "to eat"

vAdu nIlYlu namilAdu. 'He is podering'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjFArWa* 2_e } / 3_vAdu{vAdu P eka *0* } /

3_nIru{goru n bahu *0* } / 3_nIru{goru n bahu *vu* } /

2_namulu{poVg?du v *A* 3_pu_e } /

verb=vAdu

verb=namulu

noun=vAdu

noun=nIru

Verb => namulu ### Meaning=> "to eat"

awanu roddumIxa baMdi nilipAdu. 'He stopped the vehicle on the road'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{awanu P eka *0* } /

1_roddu{guddun eka *mlxa* } /
 2_baMdi{baMdi neka *0* } / 2_baMdi{baMdin eka *obl*
 2_nilupu{poVg?du v *A* 3_pu_e } /

verb=nilupu
 noun=awanu
 noun=roddu
 noun=baMdi
 Verb => nilupu ### Meaning=> "stop"

AmeV panimlxa manasu nilipiMxi. 'She concentrated her mind on work'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } / 3_AmeV{AmeV P eka *obl* } /
 3_pani{pani n eka *mlxa* } /
 3_manasu{meku n eka *0* } / 3_manasu{meku n eka *obl* } /
 2_nilupu{poVg?du v *A* 3_non_pu_e } /

verb=nilupu
 noun=AmeV
 noun=pani
 noun=manasu
 Verb => nilupu ### Meaning=> "concentrate"

peVxxalu gudimuMxu XvajaswaMBaM nilipAru. 'Elders erected the pillar

Morph Analysis Of The Telugu Sentence ==>>

3_peVxxalu{pAlu n bahu *0* } / 3_peVxxalu{pAlu n bahu *vu* } / 3_peVxxa{kota n
 bahu *0* } / 3_peVxxa{kota n bahu *vu* } /
 2_gudi{gudi n eka *muMxu* } /
 1_XvajaswaMBaM{puswakaM n eka *0* } /
 2_mlupu{poVg?du v *A* 23_ba } /

verb=nilupu
 noun=pe Vxxalu
 noun=gudi
 noun=XvajaswaMBaM
 Verb => nilupu ### Meaning=> "erect"

vAdu nIlYlalo paddAdu. 'He slipped into the water'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjFArWa* 2_e } / 3_vAdu{vAdu P eka *0* } /
 3_nIru{goru n bahu *lo* } /
 3_padu{padu v *A* 3_pu_e } /

verb=vAdu

verb=padu

noun=vAdu

noun=nIru

Verb => padu ### Meaning=> "to slip"

kamala raviwo premalo padiMxi. 'Kamala fell in love with Ravi'

Morph Analysis Of The Telugu Sentence ==>>

2_kamala{kota n eka *0* } / 2_kamala{kota n eka *obl* } / 2_kamulu{poVg²du v
 an any } /
 1_ravi{gaxi n eka *wo* } /
 3_prema{kota n bahu *0_o* } / 3_prema{kota n eka *lo* } /
 3_padu{padu v *A* 3_non_pu_e } /

verb=kamulu

verb=padu

noun=kamala

noun=ravi

noun=prema

Verb => padu ### Meaning=> "to experience"

AmeV wupAkI pattiMxi. 'She held a pistol'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } / 3_AmeV{AmeV P eka *obl* } /
 2_wupAki{gaxi n eka *0_V* } /
 2_pattu{peVttu v *A* 3_non_pu_e } /

verb=pattu

noun=AmeV

noun=wupAki

Verb => pattu ### Meaning=> "hold"

battalu muriki pattAyi. 'clothes have become **dirty**'

Morph Analysis Of The Telugu Sentence ==>>

3_batta{kota n bahu *0* } /3_batta{kota n bahu *vu* } /

2_muriki{man?Ri n eka *0* } /2_muriki{man?Ri n eka *obl* } /2_muri{xAri n eka *ki* } /

2_pattu{peVttu v *A* 3_na_ba } /

verb=pattu

noun=batta

noun=muriki

Verb => pattu ### Meaning=> "become"

walli biddaku pAlu pattiMxi. 'Mother is feeding milk to **the** child'

Morph Analysis Of The Telugu Sentence ==>>

3_walli{gaxi n eka *0* } /3_walli{gaxi n eka *obl* } /

2_bidda{kota n eka *ki* } /

3_pAlu{pAlu n bahu *0* } /3_pAlu{pAlu n bahu *vu* } /

2_pattu{peVttu v *A* 3_non_pu_e } /

verb=pattu

noun=walli

noun=bidda

noun=pAlu

Verb => pattu ### Meaning=> "feed"

vAdiki maMxu pattiMxi. '**The** medicine suited for him'

Morph Analysis Of The Telugu Sentence ==>

1_vAdi{gaxi n eka *ki* } /3_vAdu{vAdu P eka *ki* } /

3_maMxu{meku n eka *0* } /3_maMxu{meku n eka *obl* } /

2_pattu{peVttu v *A* 3_non_pu_e } /

verb=pattu

noun=vAdi

noun=maMxu

Verb => pattu ### Meaning=> "suit"

vAdiki coVkkA pattiMxi. 'The new shirt fit him'

Morph Analysis Of The Telugu Sentence ==>>

1_vAdi{gaxi n eka *ki* } / 3_vAdu{vAdu P eka *ki* } /

2_coVkkA{rikRA n eka *0* } / 2_coVkkA{rikRA n eka *obl* } / 2_coVkkA{pannu v *i_A* any } /

2_pattu{peVttu v *A* 3_non_pu_e } /

verb=coVkkA

verb=pattu

noun=vAdi

noun=coVkkA

Verb => pattu ### Meaning=> "fit"

rAmudu pulini peVMcAdu. 'Rama reared a tiger'

Morph Analysis Of The Telugu Sentence ==>>

1_rAma{SreRTa n *adj_vAdu* } /

3_puli{puli n eka *nu* } / 3_puli{puli n eka *ni* } /

2_peVMcu{pannu v *A* 3_pu_e } /

verb=peVMcu

noun=rAma

noun=puli

Verb => peVMcu ### Meaning=> "rare"

kodalu iMtlo adugu peVttiMxi. 'Daughter in law stepped in the house'

Morph Analysis Of The Telugu Sentence ==>>

2_kodalu{velu n eka *0* } /

3_illu{illu n eka *lo* } /

3_adugu{meku n eka *0* } / 3_adugu{meku n eka *0* } / 3_adugu{meku n eka *obl* } / 3_adugu{meku n eka *obl* } / 3_adugu{poVg?du v *AjfArWa* 2_e } /

3_peVttu{peVttu v *A* 3_non_pu_e } /

verb=adugu

verb=peVttu

noun=kodalu

noun=illu

noun=adugu

Verb => peVttu ### Meaning=> "step"

SrInu dabbulu byAMkulo peVttAdu. 'Srinu deposit the money in the Bank'

Morph Analysis Of The Telugu Sentence ==>>

1_SrInu{meku n eka *0* } /1_SrInu{meku n eka *obl* } /3_SrI{nkRA n eka *nu* } /3_SrI{rikRA n eka *ni* } /
 3_dabbu{meku n bahu *0* } /3_dabbu{meku n bahu *vu* } /
 1_byAMku{meku n bahu *0_o* } /2_byAMku{meku n bahu *0_o* } /1_byAMku{meku n eka *lo* } /2_byAMku{meku n eka *lo* } /1_byAMki{gaxi n bahu *0_o* } /
 3_peVttu{peVttu v *A* 3_pu_e } /

verb=peVttu

noun=SrInu

noun=dabbu

noun=byAMku

Verb - > peVttu ### Meaning=> "deposit"

amma wammudiki annaM peVttiMxi. 'Mother served food for younger brother'

Morph Analysis Of The Telugu Sentence ==>>

3_amrna{kota n eka *0* } /3_amma{kota n eka *obl* } /3_ammu{pannu v *an* any } /
 2_wammudu{pillavAdu n eka *ki* } /
 3_annaM{puswakaM n eka *0* } /
 3_peVttu{peVttu v *A* 3_non_pu_e } /

verb=ammu

verb=peVttu

noun=amma

noun=wammudu

noun=annaM

Verb => peVttu ### Meaning=> "serve"

pollsu wupAki pelcAdu. 'Police fired a shot'

Morph Analysis Of The Telugu Sentence ==>>

1_pollsu{meku n eka *0* } / 1_pollsu{meku n eka *obl* } /

2_wupAki{gaxi n eka *0_V* } /

2_pelcu{pannu v *A* 3_pu_e } / 2_peluvu{eduvu v *A* 3_pu_e } /

verb=pelcu

verb=peluvu

noun=pollsu

noun=wupAki

Verb => peluvu ### Meaning=> "to fire"

wIvraxAxulu bAMbu pelcAru. 'Terrorist blasted the bomb'

Morph Analysis Of The Telugu Sentence ==>>

1_wIvraxAxi{gaxi n bahu *0* } /

1_bAMbu{meku n eka *0* } / 1_bAMbu{meku n eka *obl* j /

2_pelcu{pannu v *A* 23_ba } / 2_peluvu{eduvu v *A* 23_ba } /

verb=pelcu

verb=peluvu

noun=wIvraxAxi

noun=bAMbu

Verb -> peluvu ### Meaning=> "to blast"

awanu joku pelcAdu. 'He cracked a joke'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{awanu P eka *0* } /

1_joku{meku n eka *0* } / 1_joku{meku n eka *obl* } /

2_pelcu{pannu v *A* 3_pu_e } / 2_peluvu{eduvu v *A* 3_pu_e } /

verb=pelcu

verb=peluvu

noun=awanu

noun=joku

Verb => peluvu ### Meaning=> "say"

eVMdalaku oVIYlu peliMxi. 'Body prickled due to heat'

Morph Analysis Of The Telugu Sentence ==>>

3_eVMda{kota n bahu *ki* } /

2_oVIYlu{matuku n *avy_0* } / 2_oVllu{illu n bahu *0* } /

2_pelu{kAlu v *A* 3_non_pu_e } /

verb=pelu

noun=eVMda

noun=oVIYlu

Verb => pelu ### Meaning=> "prickle"

sinimAhAlulo bAMbu peliMxi. 'There was a bomb blast in the cinema hall'

Morph Analysis Of The Telugu Sentence ==>>

1_sinimAhAlu{cillu n bahu *0_o* } / 1_sinimAhAlu{cillu n eka *lo* } /

1_bAMbu{meku n eka *0* } / 1_bAMbu{meku n eka *obl* } /

2_pelu{kAlu v *A* 3_non_pu_e } /

verb=pelu

noun=sinimAhAlu

noun=bAMbu

Verb => pelu ### Meaning=> "blast"

siliMdar peliMxi. 'The gas cylinder has burst '

Morph Analysis Of The Telugu Sentence ==>>

1_siliMdar{kalcara n eka *0* } / 1_siliMdar{kalcara n eka *obl* } / 3_siliMdaru{nOkaru n eka *0* } /

2_pelu{kAlu v *A* 3_non_pu_e } /

verb=pelu

noun=siliMdar

Verb => pelu ### Meaning=> "burst"

poVyyimIxa pAlu poVMgAyi. 'The milk boiled over the stove'

Morph Analysis OfThe Telugu Sentence ==>>

3_poVyyi{abbAyi n eka *mIxa* } /

3_pAlu{pAlu n bahu *0* } /3_pAlu{pAlu n bahu *vu* } /

noun=poVyyi

noun=pAlu

vAdinuMdi A mAta poVrliMxi. 'He uttered that word'

Morph Analysts OfThe Telugu Sentence ==>>

1_vAdi{gaxi n eka *niMci* } /3_vAdu{vAdu P eka *niMci* } /

3_A{AVY Avy } /

3_mAta{kota n eka *0* } /3_mAta{kota n eka *obl* } /

2_poVrlu{pannu v *A* 3_non_pu_e } /

verb=poVrlu

noun=vAdi

noun=mAta

Verb => poVrlu ### Meaning=> "utter"

paMxi buraxalo poVrliMxi. 'Pig wallowed in the mud'

Morph Analysis OfThe Telugu Sentence ==>>

2_paMxi{gaxi n eka *0* } /2_paMxi{gaxi n eka *obl* } /

2_buraxa{kota n bahu *0_o* } /2_buraxa{kota n eka *lo* } /

2_poVrlu{pannu v *A* 3_non_pu_e } /

verb=poVrlu

noun=paMxi

noun=buraxa

Verb => poVrlu ### Meaning=> "wallow"

vAIYlaku ammAyi puttiMxi. 'A baby girl is bom to them'

Morph Analysis Of The Telugu Sentence ==>

3_vAIYlu{vAIYlu P bahu *ki* } /

3_ammAyi{abbAyi n eka *0* } / 3_ammAyi{abbAyi n eka *obl* } / 3_ammu{pannu v *A* 3_na_ba } /

3_puttu{peVttu v *A* 3_non_pu_e } /

verb=ammu

verb=puttu

noun=vAIYlu

noun=ammAyi

Verb => puttu ### Meaning=> "take birth"

AmeVku walanoVppi puttiMxi.'She is having head ache'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *ki* } /

2_walanoVppi{gaxi n eka *0* } / 2_walano Vppi {gaxi n eka *obl* } /

3_puttu{peVttu v *A* 3_non_pu_e } /

verb=puttu

noun=AmeV

noun=walano Vppi

Verb - > puttu ### Meaning=> "experience"

vAdiki sinimAku dabbulu puttAyi.'He got the money for a movie'

Morph Analysis Of The Telugu Sentence ==>>

1_vAdi{gaxi n eka *ki* } / 3_vAdu{vAdu P eka *ki* } /

1_sinimA{rikRA n eka *ki* } /

3_dabbu{meku n bahu *0* } / 3_dabbu{meku n bahu *vu* } /

3_puttu{peVttu v *A* 3_na_ba } /

verb=puttu

noun=vAdi

noun=sinimA

noun=dabbu

Verb => puttu ### Meaning=> "get"

pAwabaswIllo allarlU regAyi. 'Clashes were raised in the oldcity'

Morph Analysis Of The Telugu Sentence ==>>

2_allari{paMxiri n bahu *0* } /2_allari{paMxiri n bahu *vu* } /
2_regu{pannu v *A* 3_na_ba } /

verb=regu
noun=allari

gAliki juwwu regiMxi. 'her hair was dishelved due to the wind'

Morph Analysis Of The Telugu Sentence ==>>

3_gAli{gaxi n eka *ki* } /
3_juwwu{mekun eka *0* } /3_juwwu{mekun eka *obl* } /
2_regu{pannu v *A* 3_non_pu_e } /

verb=regu
noun=gAli
noun=juwwu
Verb => regu ### Meaning=> "dishelved"

vAdiki picci regiMxi. 'He was filled with rage'

Morph Analysis Of The Telugu Sentence ==>>

1_vAdi{gaxi n eka *ki* } /3_vAdu{vAduP eka *ki* } /
2_picci{gaxi n eka *0* } /2_picci{gaxi n eka *obl* } /2_picci{maMci n *adj_0* } /
2_regu{pannu v *A* 3_non_pu_e } /

verb=regu
noun=vAdi
noun=picci
Verb => regu ### Meaning=> "rage"

awanu kApuraMlo kalawalu repAdu. 'He flared problems in the family life'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{awanu P eka *0* } /
2JkApuraM{puswakaM n eka *Io* } /

1_kalawa{kota n bahu *0* } /1_kalawa{kota n bahu *vu* } /
 1_repu{pannu v *A* 3_pu_e } /2_repu{pannu v *A* 3_pu_e } /

verb=repu

verb=repu

noun=awanu

noun=kApuraM

noun=kalawa

Verb => repu ### Meaning=> "flare"

AmeV awanilo ASa repiMxi. 'She raised hopes in him'

Morph Analysis Of The Telugu Sentence =>

3_AmeV{AmeV P eka *0* } /3_AmeV{AmeV P eka *obl* } /
 3_awanu{awanu P eka *lo* } /3_awadu{vAdu P eka *lo* } /
 3_ASa{kota n eka *0* } /3_ASa{kota n eka *obl* } /
 1_repu{pannu v *A* 3_non_pu_e } /2_repu{pannu v *A* 3_non_pu_e } /

verb=repu

verb=repu

noun=AmeV

noun=awanu

noun=ASa

Verb => repu ### Meaning=> "raise"

kAki godapEna vAliMxi. 'The crow perched on the wall'

Morph Analysis Of The Telugu Sentence =>>

3_kAki{gaxi n eka *0* } /3_kAki{gaxi n eka *obl* } /
 3_goda{kota n eka *pE* } /
 3_vAlu{kAlu v *A* 3_non_pu_e } /

verb=vAlu

noun=kAki

noun=goda

Verb => vAlu ### Meaning=> "perch"

goda wUrpuvEpu vAlIMxi. 'The wall leant towards east'

Morph Analysis Of The Telugu Sentence ==>>

3_goda{kota n eka *0* } / 3_goda{kota n eka *obl* } /
 3_wUrpu{meku n eka *vEpu* } /
 3_vAlu{kAlu v *A* 3_non_pu_e } /

verb=vAlu

noun=goda

noun=wUrpu

Verb => vAlu ### Meaning=> "lean"

beVilaMmlxa Igalu vAlAyi. 'Flies swarm around jaggery'

Morph Analysis Of The Telugu Sentence ==>>

2J>eVllaM{puswakaM n eka *mIxa* } /
 2Jga{kota n bahu *0* } / 2_Iga{kota n bahu *vu* } /
 3_vAlu{kAlu v *A* 3_na_ba } /

verb=vAlu

noun=beVllaM

noun=Iga

Verb => vAlu ### Meaning=> "swarm"

awanu peVxxalaku wala vaMcAdu. 'He was abided by his elders'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{ awanu P eka *0* } /
 3_peVxxalu{pAlu n bahu *ki* } / 3_peVxxa{kota n bahu *ki* } /
 3_wala{kota n eka *0* } / 3_wala{kota n eka *obl* } / 3_walaM{puswakaM n eka
 obl } / 2_wa{kota n bahu *obl* } /
 2_vaMcu{pannu v *A* 3_pu_e } /

verb=vaMcu

noun=awanu

noun=peVxxalu

noun=wala

Verb => vaMcu ### Meaning=> "abide"

AmeV kuMda vaMciMxi. 'She bent the pot'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{ AmeV P eka *0* } / 3_AmeV{ AmeV P eka *obl* } /
 3_kuMda{ kotan eka *0* } / 3_kuMda{ kota n eka *obl* } / 3_kuMdaM{ puswakaM n eka *obl* } /
 2_vaMcu{ pannu v *A* 3_non_pu_e } /
 verb=vaMcu
 noun=AmeV
 noun=kuMda
 Verb => vaMcu ### Meaning=> "bend"

AmeVku xAhaM vesiMxi. 'She felt thirsty'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{ AmeV P eka *ki* } /
 1_xAhaM{ puswakaM n eka *0* } /
 3_veVyyi{ ceVyyi v *A* 3_non_pu_e } /
 verb=veVyyi
 noun=AmeV
 noun=xAhaM
 Verb => veVyyi ### Meaning=> "feel"

vAdu sIsA nIlYlalo veSAdu. 'He threw the bottle into the water'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{ Adu v *AjFarWa* 2_e } / 3_vAdu{ vAdu P eka *0* } /
 2_sIsA{ rikRA n eka *0* } / 2_sIsA{ rikRA n eka *obl* } /
 3_nIru{ goru n bahu *lo* } /
 3_veVyyi{ ceVyyi v *A* 3_pu_e } /
 verb=vAdu
 verb=veVyyi
 noun=vAdu
 noun=sIsA
 noun=nIru
 Verb => veVyyi ### Meaning=> "throw"

AmeV muggu vesiMxi. 'She drew a diagram with flour'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } /3_AmeV{AmeV P eka *obl* } /

2_muggu{meku n eka *0* } /2_muggu{meku n eka *obl* } /

3_veVyyi{ceVyyi v *A* 3_non_pu_e } /

verb=veVyyi

noun=AmeV

noun=muggu

Verb - > veVyyi ### Meaning=> "draw"

AtagAdu baMwini visirAdu. 'The player threw the ball'

Morph Analysis Of The Telugu Sentence ==>

3_AtagAdu{pillavAdu n eka *0* } /3_Ata{kota n eka *gAdu* } /

3_baMwi{gaxi n eka *nu* } /3_baMwi{gaxi n eka *ni* } /

1_visuru{poVg?du v *A* 3_pu_e } /2_visuru{poVg?du v *A* 3_pu_e } /

verb=visuru

verb=visuru

noun=AtagAdu

noun=baMwi

Verb => visuru ### Meaning=> "throw"

AmeV visanakarrawo visuruwuMxi.'She is fanning with hand fan'

Morph Analysis Of The Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } /3_AmeV{AmeV P eka *obl* } /

2_visanakarra{kota n eka *wo* } /2_visanakarra{kota n eka *wo* } /

1_visuru{poVg?du v *wA* 3_non_pu_e } /2_visuru{poVg?du v *wA* 3_non_pu_e } /

verb=visuru

verb=visuru

noun=AmeV

noun=visanakarra

Verb => visuru ### Meaning=> "to fan"

vAIYlu millulo piMdi visirAru. 'They grind the flour in the mill.'

Morph Analysis Of The Telugu Sentence ==>>

3_vAIYlu{vAIYlu P bahu *0* } /3_vAIYlu{vAIYlu P bahu *vu* } /
 1_millu{meku n bahu *0_o* } /1_millu{meku n eka *lo* } /
 2_piMdi{piMdi n eka *0* } /2_piMdi{piMdi n eka *obl* } /2_piMdu{pannu v *t*
 any }/

1_visuru{poVg²du v *A* 23_ba } /2_visuru{poVg²du v *A* 23_ba } /

verb=piMdu

verb=visuru

verb=visuru

noun=vAIYlu

noun=millu

noun=piMdi

Verb => visuru ### Meaning=> "grind/mill"

nuvvu walupu wiyyi. 'You open the door'

Morph Analysis Of The Telugu Sentence ==>>

2_nuvvu{meku n eka *0* } /2_nuvvu{meku n eka *obl* } /3_nIvu{nIvu P eka *0*
 }/

2_walupu{meku n eka *0* } /2_walupu{meku n eka *obl* } /

3_wiyyi {wiyyi v *AjFArWa* 2_e } /

verb = wiyyi

noun=nuvvu

noun=walupu

Verb => wiyyi ### Meaning—> "open"

nuvvu ballapEna ceVyyi wiyyi. 'Take your hand from the table'

Morph Analysis Of The Telugu Sentence ==>>

2_nuvvu{meku n eka *0* } /2_nuvvu{meku n eka *obl* } /3_nIvu{nIvu P eka *0*
 }/

3_ballap{kota n eka *pE* } /1_bal{kalcar n bahu *pE* } /

3_ceVyyi{ceVyyi v *AjFArWa* 2_e } /3_ceVyyi{goyi n eka *0* } /

3_wiyyi{ wiyyi v *AjFArWa* 2_e } /

verb=ceVyyi

verb=wiyyi

noun=nuvvu

noun=balla

noun=ceVyyi

Verb => wiyyi ### Meaning=> "move/take"

xoVMga jebulo dabbulu wISAdu. 'Thief has picked the money from the pocket'

Morph Analysis Of The Telugu Sentence =>>

1_xoVMga{kota n eka *0* } /2_xoVMga{kota n eka *0* } /1_xoVMga{kota n eka

obl } /2_xoVMga{kota n eka *obl* } /

2_jebu{meku n bahu *0_o* } /2_jebu{meku n eka *lo* } /

3_dabbu{meku n bahu *0* } /3_dabbu{meku n bahu *vu* } /

3_wiyyi{ wiyyi v *A* 3_pu_e } /

verb=wiyyi

noun=xoVMga

noun=jebu

noun=dabbu

Verb => wiyyi ### Meaning=> "pick"

vExyudu kAllo mullu wISAdu. 'Doctor removed the thorn in the leg'

Morph Analysis Of The Telugu Sentence =>>

1_vExya{SreRTa n *adj_vAdu* } /

1_kAl{kalcara n eka *lo* } /3_kAlu{velu n eka *lo* } /1_kam{puswakam n bahu *lo* } /

2_mullu{illu n eka *0* } /

3_wiyyi{ wiyyi v *A* 3_pu_e } /

verb=wiyyi

noun=vExya

noun=kAl

noun=mullu

Verb => wiyyi ### Meaning-> "remove"

pApa annaM winiMxi. 'Baby ate the food'

Morph Analysis OfThe Telugu Sentence ==>>

2_pApa{kota n eka *0* } /2_pApa{kota n eka *obl* } /2_pApaM{puswakaM n eka *obl* } /2_pApu{pannu v *an* any } /2_pApudu{snehiwudu n eka *obl* } /
3_annaM{puswakaM n eka *0* } /
2_winu{koVnu v *A* 3_non_pu_e } /

verb=pApu

verb=winu

noun=pApa

noun=annaM

Verb => winu ### Meaning=> "cat/consume"

xoVMga wannulu winnAdu. Thief was flogged'

Morph Analysis OfThe Telugu Sentence ==>>

1_xoVMga{kota n eka *0* } /2_xoVMga{kota n eka *0* } /1_xoVMga{kota n eka *obl* } /2_xoVMga{kota n eka *obl* } /
2_wannu{peVnnu n bahu *0* } /2_wannu{peVnnu n bahu *vu* } /
2_winu{koVnu v *A* 3_pu_e } /

verb=winu

noun=xoVMga

noun=wannu

Verb => winu ### Meaning=> "to suffer/to undergo"

AmeV kArulo wiruguwoMxi. 'She is going around in a car'

Morph Analysis OfThe Telugu Sentence ==>>

3_AmeV{AmeV P eka *0* } /3_AmeV{AmeV P eka *obl* } /
3_kAru{nOkaru n bahu *0_o* } /3_kAru{nOkaru n eka *lo* } /3_kAri{xAri n bahu *0_o* } /
2_wirugu{poVg?du v *wunn* 3_non_pu_e } /

verb=wirugu

noun=AmeV

noun=kAru

Verb => wirugu ### Meaning=> "going around"

kamalaki kalYlu wiruguwunnAyi. 'Kamala is feeling giddy'

Morph Analysis Of The Telugu Sentence ==>>

2_kamala{kota n eka *ki* } /

3_kannu{kannu n bahu *0* } /3_kannu{kannu n bahu *vu* } /

2_wirugu{poVg?du v *wunn* 3_na_ba } /

verb=wirugu

noun=kamala

noun=kannu

Verb => wirugu ### Meaning=> "giddy"

ravi veVnukaku wirigAdu. 'Ravi turned back'

Morph Analysis Of The Telugu Sentence ==>>

1_ravi{gaxi n eka *0* } /1_ravi{gaxi n eka *obl* } /

3_veVnuka{kota n eka *ki* } /

2_wirugu{poVg?du v *A* 3_pu_e } /

verb=wirugu

noun=ravi

noun=veVnuka

Verb => wirugu ### Meaning=> "turn"

cakraM wiruguwoMxi. 'Wheel is rotating'

Morph Analysis OfThe Telugu Sentence ==>>

1_cakraM {puswakaM n eka *0* } /

2_wirugu{poVg?du v *wunn* 3_non_pu_e } /

verb=wirugu

noun=cakraM

Verb => wirugu ### Meaning=> "rotate"

snehiwudu nannu hARtallo xiMcAdu. 'A friend dropped me in the hostel'

Morph Analysis Of The Telugu Sentence ==>>

2_snehiwa{SreRTa n *adj_vAdu* } /

1_nan{kalcar n eka *nu* } / 1_nan{kalcar n eka *ni* } / 3_nenu{nenu P eka *ni* } /
 1_hARtal{kalcar n eka *lo* } /
 2_xiMcu{cUpiMcu v *A* 3_pu_e } /

verb=xiMcu

noun=snehiwa

noun=nan

noun=hARtal

Verb => xiMcu ### Meaning=> "drop"

sEnikulu heVlikAptarnuMdi xigAru. 'Soldiers alighted from the helicopter'

Morph Analysis Of 'The Telugu Sentence ==>>

3_sEnikudu{snehiwudu n bahu *0* } / 3_sEnikudu{snehiwudu n bahu *vu* } /
 1_heVlikAptar{kalcar n eka *niMci* j } /
 2_xigu{pannu v *A* 23_ba } /

verb=xigu

noun=sEnikudu

noun=heVlik Aptar

Verb => xigu ### Meaning=> "alight"

awanu bAvilo xigAdu. 'He climbed down the well'

Morph Analysis Of The Telugu Sentence ==>>

3_awanu{ awanu P eka *0* } /
 2_bAvi{gaxi n eka *lo* } /
 2_xigu{pannu v *A* 3_pu_e } /

verb=xigu

noun=awanu

noun=bAvi

Verb => xigu ### Meaning=> "climbed down"

kAllo mullu xigiMxi. 'Thorn pricked the foot'

Morph Analysis Of The Telugu Sentence ==>>

1_kAl{kalcar n eka *lo* } / 3_kAlu{velu n eka *lo* } / 1_kaM{puswakaM n bahu *lo* } /

2_mullu{illu n eka *0* }/
 2_xigu{pannu v *A* 3_non_pu_e }/

verb=xigu

noun=kAl

noun=mullu

Verb => xigu ### Meaning=> "ran into/pricked"

vAdu hotallo xigAdu. 'He checked in a hotel'

Morph Analysis Of The Telugu Sentence ==>>

2_vAdu{Adu v *AjIʔArWa* 2_e }/3_vAdu{vAdu P eka *0* }/
 1_hotal{kalcara n eka *lo* }/1_hotalu{kIlLu n eka *lo* }/
 2_xigu{pannu v *A* 3_pu_e }/

verb=vAdu

verb=xigu

noun=vAdu

noun=hotel

Verb => xigu ### Meaning=> "lodged"

References

- Adela, E. Goldberg. 1995. A Construction Grammar Approach to Argument Structure. London. The University of Chicago Press.
- Allerton, D. J. 1979. Essentials of Grammatical Theory A Consensus view of Syntax and Morphology. London. Routledge and Kegan Paul Publishers.
- Alsina, Alex. 1992. On the Argument Structure of Causatives. Linguistic inquiry; Vol.23.
- Alsina, Alex and S. Joshi. 1991. "Parameters in Causative Constructions" To appear in papers from the Twenty-Seventh Regional Meeting. Chicago/Illinois. Chicago Linguistic Society. University of Chicago.
- Baker, M. 1988. A Theory of Grammatical Function Changing. Chicago. The University of Chicago Press.
- Baker, M. K. Johnson and I. Roberts. 1989. 'Passive arguments raised'. Linguistic Inquiry 20: 219-51.
- Bel'skaja, Izabella K. 1957. Machine Translation of Languages. Research, 10(10).
- Benjamin, Elson and Velma Picket. 1983. Beginning Morphology and Syntax. Printed in Mexico.
- Bharati, Akshara. Vineet Chaitanya & Rajiv Sangal. 1999. Natural Language Processing- A Paninian Perspective. New Delhi: Prentice Hall of India Private Limited.
- Blake, J. Barry. 1994. Case. Cambridge University Press.
- Bobaljik, J. D. 1995. 'Morpho Syntax: the Syntax of verbal inflection'. Ph.D Dissertation. MIT.

- Bowers, J. 1993. "The syntax of predication". *linguistic Inquiry*. 24: pp 591-656
- Bresnan, J. (ed). 1982. *The Mental Representation of Grammar Relation*. London. Cambridge. MIT press.
- Brody, Michael. 1993. 6-Theory and Arguments. *Linguistic Inquiry*. Volume 24. Number 1.
- Brown, E.K and J.E. Miller. 1985. *Syntax; Generative Grammar*. Australia. Hutchison publishing Group.
- Carlson, G. and T. Roeper. 1979. Morphology and Sub categorization: Case and the Unmarked complex verb in T. Hockstra and M. Moortgat (eds) *Lexical Grammar*. *Glott*, 3/4, 123-64.
- Carrier, J & J.H Randall. 1992. 'The argument structure and syntactic structure of Resultatives'. *Linguistic Inquiry* 23: 173-234.
- Chomsky, N. (1965) *Aspects of the Theory and Syntax*. Cambridge. Massachusetts: MIT Press.
- Comrie, B. 1976. "The Syntax of Causative Constructions: Cross-Language Similarities (2nd ed). Oxford Blackwell. PP 159-163 and Divergences "in M. Shibatani, ed., *The Grammar of Causative Constructions*. *Syntax and Semantics* 6, 261-312. New York: Academic press.
- Comrie, Bernard and Maria Polinsky. (eds) 1993. *Studies in Language Companion Series*. Vol.23. Amsterdam/ Philadelphia. John Benjamin publishing Company.
- Cook V.] and Mark Newson. 1996. *Chomsky's Universal Grammar: An Introduction* (2nd ed). Oxford Blackwell. PP 159-163.
- Dieter, Wunderlich. 1997. Cause and the Structure of Verbs. *Linguistic Inquiry*. Vol.28. Number 1.

- Dixon, R.M.W. 1994. *Ergativity*. Cambridge. Great Briton. Printed in University Press.
- Dowty, D. 1991. "Thematic proto-Roles and argument Selection". *Language*, Vol. 67-3, 547-619.
- Felser, C. 1995. 'The Syntax of Verbal Compliments: A study of perception verbs in English'. PhD diss: University of Gottingen.
- Fillmore, Charles J. 1968. The Case for Case. In Bach, E. and R.T. Harms, eds., *Universals in Linguistics Theory*. 1-88. New York. Holt Rinehart and Winston.
- Gale, William A., Church Kenneth W. & Yarosky, David. 1992b. "Estimating Upper and Lower bound on the performance of Word Sense Disambiguation programs." *Proceedings of the 30th Annual meeting of the association for computational Linguistics*, 28 June -July 1992, University of Delaware, 249-256.
- Givon, T. 1984. *Syntax. A Functional -Typological introduction*. Vol.1: Amsterdam. John Benjamins Publishing Company.
- Grant, Goodall. 1987. *Parallel Structure in Syntax (co-ordination, Causatives, Restructuring)*. Cambridge University Press.
- Grimshaw, J. and A.Mester (1988) "Light Verbs and 'Theta-Marking". *Linguistic Inquiry* 19: 205-232.
- _____. 1990. *Argument Structure*. Cambridge. Massachusetts. MIT Press.
- Griffin, William Earl. 1999. *UTAH and Verbal Argument Structure*. Austin. University of Texas. <http://www.utexas.edu>
- Gruber, J. 1967. *Lexical Structures in Syntax and Semantics*, North Holland.

- Gruber, S. Jeffery. 2001. Thematic Relations in Syntax. In *The Handbook of Contemporary Syntactic Theory*. (ed) Mark Baltin and Chric Collins. Massachusetts. Blackwell Publishers.
- Gwynn, J.P.L. and Sastry, J.V. 1991. *A Telugu English Dictionary*. Delhi: Oxford University Press.
- Hale, K and S. J Keyser. 1991. 'On the Syntax of Argument Structure'. Lexicon project Cambridge: Working papers. MIT. Center for Cognitive Science.
- _____. 1993. 'On Argument Structure and the Lexical expression of Semantic Relations'. In K. Hale & S.J. Keyser (eds.) *The View from Building 20*. Cambridge: MIT Press. pp. 53-109.
- _____. 1994. 'Constraints on Argument Structure'. in B. Lust, M. Suner & J. Whitaman (eds) *Heads. Projections and Learnability*. Hillsdale. N.J., Erlbaum. vol.1; pp.53- 71
- _____. 1998. "The Basic elements of Argument Structure". Pp 73-118. In papers from the Upenn/MIT Round Table on Argument Structure and Aspect. MIT working Papers in Linguistics: Vol. 32. Cambridge. MITWPL.
- _____. 2001. *Aspects and The Syntax of Argument Structure*. MIT Press.
- Hook, E. 1974. *The Compound Verb in Hindi*. CSSEAS. Ann Arbor: The University of Michigan.
- Jackendoff, R.S. 1972. *Semantic Interpretation in Generative Grammar*. Cambridge. MIT Press.
- _____. 1987. *The Status of Thematic Relations In Linguistic Theory*. Linguistic inquiry: Vol. 18.
- Jackendoff. R. 1990. *Semantic Structures*. MIT Press.

- Kay, Mc Sandra 1982. Verbs for a specific purpose. N.J. USA: Prentice-Hall, Inc. Englewood Cliffs
- Kayne, R.S. 1982. Tredicates and Arguments, Verbs and Nouns'.
GLOW Newsletter; 8:24.
- Kenneth C. Litkowski. 1992. A Primer on Computational Lexicography.
- Kiparsky, P. 1987. Morphology and Grammatical Relations. California.
Stanford University.
- Krishnamurti, Bh. 1961. Telugu Verbal Bases: A Comparative and
Descriptive Study. Berkeley. UCPL: Vol. 24.
- _____. 1968. Compound Verbs in Telugu. Indian Linguistics
(Supplement): 27. Pp. 7-17.
- _____. 1990-1991. Stative Expressions in Indian Languages (Some
semantic and syntactic aspects) Osmania Papers in Linguistics:
Vol 16-17. Pp. 39-72.
- _____. (1991-92). Complex Predicates in Telugu. In Bulletin of the
Deccan College Post Graduate and Research Institute, Prof.
S.M. Katre Felicitation Vol. 314-27.
- Levin, Beth and Malka Rappaport Hovav. 1990a. The Lexical semantics
of verbs of Motion: The perspective from Unaccusativity. In
I.M. Roca, ed., Thematic Structure: its role in grammar. 247-269.
Berlin de gruyter.
- Levin, Beth. 1993. English verb Classes and Alternations —A Preliminary
Investigation. Chicago/USA. University of Chicago Press.
- Lieber, R. 1983. Argument Linking and Compounds in English.
Linguistic Inquiry; 2:251 — 285.
- Masayoshi, Shibatani. 1976. Syntax and Semantics. The Grammar of
Causative Construction. New York: Academy Press Inc.

- Merlo, Paola. Suzanne Stevenson. 2001. Automatic verb classification based on Statistical distribution of Argument Structure Association for Computational Linguistics. Vol.23; Number 3. Pp. 373-408.
- Mohanan, Tara. 1994. Argument Structure in Hindi. Stanford: CSLI.
- Murthy M.C. Kesava. 2002. Argument Structure of Telugu Verbs. (ICOSAL-4). (mimeo) Annamalai University: Annamalainagar.
- Nancy, Ide and Veronis, Jean. 1998. Word Sense Disambiguation; The State of the Art. Computational linguistics: 24 (1).
- Narayan, Deepak Kumar and Pushpak Battacharya. 2002. Using Verb-Noun Association for Word Sense Disambiguation. In Rajiv Sangal and Bendre S.M. (eds.): Recent Advances in Natural Language Processing. Proceedings of the International Conference ICON-2002. pp 185-195. New Delhi. Vikas Publishing House Pvt.Ltd.
- Nick Cipollone. Morphologically Complex predicates in Japanese and What they tell us about Grammar architecture. OSU. Department of Linguistics. (Electronic Version).
- Perlmutter & C. Rosen (eds). 1984. Studies in Relational Grammar 2. Chicago. University of Chicago Press.
- Pimsleur, P. 1957. "Semantic Frequency counts". Mechanic Translation. 4(1-2), 11-13.
- Pollock, J.Y. 1981. 'Verb movement, Universal grammar, and the structure of IP'. Linguistic Inquiry 20: 365-424.
- Poser, W. 1981. Lexical rules may Exchange Internal Arguments. The Linguistic Review. 2; 97-100.

- Prakasam, V.** 1985. *The Linguistic Spectrum*. Patiala. Publication Bureau. Punjabi University.
- Radford, Andrew.** 1992. 'The Acquisition of Morphosyntax of Finite Verbs in English'. In J. M. Meisel (ed) *The Acquisition of Verb placement: Functional Categories and V2 phenomena in language acquisition*. Kluwer: Dordrecht. pp.23-62.
- _____. 1997. *Syntactic Theory and the structure of English*. Cambridge. University Press.
- Rajini Reddy, K.** 1998. *Developing Post-Editing Strategies for Different Applications with Reference to Telugu-I iindi Anusaaraka*. CALTS. University of Hyderabad. M.Phil. Dissertation (mimeo).
- Rajyarama, K.** 1998. *A study on Some Aspects of Derivational Morphology in Telugu: A comparison with English (With special reference to compounds)*. CALTS. University of Hyderabad. Ph.D. Dissertation (mimeo).
- Ramachandrarao.** 1988. *English grammar and composition*. Hyderabad. Commonwealth Publishing House.
- Ramarao, Chekuri.** 1975. *Teluguvakyam*. Hyderabad: Andhra Pradesh Sahitya Akademi.
- _____. 2002. *Telugu Vākyam padavarna sahitam*. Hyderabad. Published by Chirunavvu Books.
- Rappaport, M & Levin, B.** (1988). What to do with θ -Roles. In W. Wilkins (ed). *Syntax and Semantics 21: Thematic Relations*. New York: Academic Press.
- Roberts, I.** 1993. *Verbs and Diachronic Syntax*. Kluwer. Dordrecht.

- Rosen, S. T. 1989. Argument Structure and Complex Predicates. Doctoral dissertation. Waltham/Massachusetts. Brandeis University.
- Louisa, Sadler and Spencer, Andrew. 1998. The I land book of Morphology. U.K: Blacmi Publishers.
- Saint-Dizier, Patrick. 1997. Multilingual Applications and Lexical Semantics. Toulouse France. route de Narbonne.
- Scalice, Sergio. 1984. Generative Morphology. N.j/ USA. Foris Publications.
- Singh J. D. 1972. Panini's Theory of karakas. IJDL, III. 2; pp 287-320.
- Spencer, A. J. 1991. Morphological Theory. Oxford. Blackwell.
- Srinivas, Bangalore and Joshi. K. Aravind. 1999. Supertagging: An Approach to Almost parsing. Computational Linguistics 25(2): 237-265.
- Sridhar, S.N. 1990. Kannada, Descriptive Grammars. London and New York: Routledge.
- Steever, Standford B. 1993. Analysis to synthesis: The development of complex verb Morphology in Dravidian Languages. New York: OUP.
- _____. 1998. (Ed). The Dravidian Language. London.
- Subbarao K V. 2001a. EPP, Agreement and Non-Nominative Subject in Telugu. Paper presented at Tokyo, Japan.
- _____. and Peri Bhaskeraro. 2001b. Pro-Drop, Agreement And Argument Structure. Tokyo/Japan. Tokyo University of Foreign Studies.
- Subrahmanyam, P.S. 1971. Dravidian Verb Morphology. Annamalainagar: Annamalai University.

- Sylvie Ratte. 1994. A brief note on thematic roles. MIT.
- Taegoo Chung. 2000. Argument structure and English Grammar. Korea University-Waseda University.
- Tenny, C. (1992) "The Aspectual Interface Hypothesis". In LA. Sag and A. Szabolcsi, (eds). *Lexical Matters*. CSLI Lecture Notes 24. Centre for the Study of Language Information. Stanford. Stanford University.
- UmaMaheswara Rao.G. 2000. Morphological Complexity in Telugu. (mimeo). University of Hyderabad.
- _____. 2002. Compound Verb Construction in Telugu. In Swarajya Lakshmi (ed.). *Case for Language Structures. Papers in Honour of Prof. B. Laxmi Bai*. 157-178. Hyderabad/India: CAS in Osmania University.
- _____. 2002. Computational Grammar of Telugu [Vol. 1:(Morphology)]: (mimeo) University of Hyderabad.
- Usha Devi.A. 2001. On Nominative Subjects in Telugu. *Indian Linguistics*; 89 – 102,
- VijayaNarayana, B. 2002. An Additional Argument in support of Predicative Adjectives in Telugu. ICOSAL-4. (mimeo) Annamalainagar. Annamalai University.
- Williams, E. 1981b. Argument Structure and Morphology. *The Linguistic Review*; 1, 81-114.