A LEXICO-SEMANTIC STUDY OF TELUGU NOUNS:
A COMPUTATIONAL APPROACH

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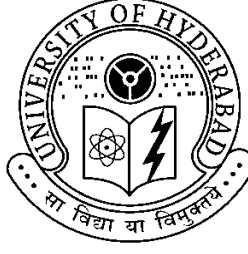

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This is to certify that the thesis entitled "*A Lexico-Semantic Study of Telugu Nouns: A Computational Approach*" submitted by SAMPATH BABU TOKALA bearing Registration number 08HAPT02 in partial fulfillment of the requirements for the award of Doctor of Philosophy in Translation Studies is a bonafide work carried out by him under our supervision and guidance.

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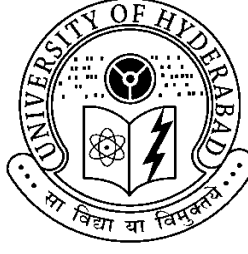
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Approaches to Lexico-Semantic Studies

ABBREVIATIONS

MT	Machine Translation
PLD	Primary Language Data
LLLR	Language Laboratory Lexical Repository
OBS	On-Board Software
MRD	Machine Readable Dictionary
NLP	Natural Language Processing
AI	Artificial Intelligence
ETMT	English Telugu Machine Translation
WSD	Word Sense Disambiguation
nom.	Nominative Case
acc.	Accusative Case
dat.	Dative Case
instr.	Instrumental Case
abl.	Ablative Case
NER	Named Entry Recognition
TDIL	Technology Development for Indian Languages
DEIT	Department of Electronic and Information Technology
MCIT	Ministry of Information and Communication
ILMT	Indian Language Machine Translation
AS	Argument Structure
ES	Event Structure
QS	Qualia Structure

IS	Inheritance Structure
Onto. Feat.	Ontological Feature
Set.	Sentence
Sg.	Singular
Pl.	Plural
obl.	Obligatory
opt.	Optional
spa.	Specification
dur.	Duration
hum.	Human
pt.	Past
3p	Third person
nm.	Non-masculine
C. M.	Case Marking
Them. Role	Thematic Role
Syn. Cat.	Syntactic Category
mand.	Mandatory
nat.frc.	Natural Force
soc.	Sociative
Ag.	Agent
inst.	Instrumental
pat.	Patient
obj.	Object

caus.	Causer
measr.	Measure
act.	Action
stat.	State
subj.	Subject
lit.	Literature
coll.	Collocation
conc.	Concrete
liv.	Living
ani.	Animate
rol.	Role
rac.	Race
cst.	Caste
ocu.	Occupation
prof.	Profession/Designation
reln.	Relation
kin.	Kinship
qul.	Qualities
myth.	Mythological
dev.	Divine
masc.	Masculine
infan.	Infancy
adul.	Adult

adol.	Adolescence
deth.	Death
fau.	Animal
terr.	Terrestrial
dom.	Domestic
herb.	Herbivores
avi.	Aviate
insc.	Insects
mic_org.	Micro-organs
flr.	Flora
gras.	Grass
edi.	Edible
slf.	Self
flwr.	Flower
aro.	Aromatics
med.	Herbal/Medicine
narc.	Narcotics
poi.	Poisonous
gnrl.	General
herb.	Herbs
prod.	Products
med.	Medicine
shu.	Shrubs

cli.	Climbers
plan.	Plant
tre.	Tree
specs.	Species of moss
antm.	Anatomical parts
org.	Body part
humrel.	Human related
levs.	Leaves
grn.	Grains
veg.	Vegetable
frts.	Fruits
relg.	Releases
usfl.	Useful
excre.	Execration
obj.	Object
plc.	Place
nat.	Natural
resi.	Residential
his.	Historical
edu.	Educational
chart.	Charitable
relgs.	Religious
recre.	Recreational

bus.	Business
gov.	Government
insti.	Institution
bur_gro.	Burial ground
wys.	Ways
flw.	Flow
loc.	Location
con.	Constructed
sol.	Solid
bio.	Biological
phe.	Phenomena
min.	Mineral
chem.	Chemicals
cons.	Consumables
bok.	Books
cul.	Cultural
accs.	Accessories
clo.	Clothes
orn.	Ornament
hos_hol.	Household
sta.	Stationary
ins_agr.	Instruments used in the agriculture
mus_ins.	Musical instruments

mac.	Machine
wep.	Weapon
veh.	Vehicles
fir.	Fire works
rit.	Rituals
chem.	Chemical
abs.	Abstract
cogn.	Cognition
skil.	Skill
idl.	Ideals
tem.	Temporal
prd.	Period
seas.	Seasons
qun.	Quantifiers
num.	Numerals
mea.	Measurement
dis.	Distance
ev.	Events
pla.	Planned
soc.	Social
accd.	Accidental
pos.	Positive
phyc.	Physical

com.	Communication
cel.	Celebration
cul.	Cultural
per.	Personal
hpy.	Happy
relg.	Religious
fes.	Festival
spo.	Sports
indo.	Indoor
per_dev.	Personality development
proc.	Process
phy.	Physical
onm.	Onomatopoeic
tit.	Titles
term.	Terminology
met_exp.	Metaphorical expression
gra.	Grammar
subj.	Subject
humn.	Humanities
tel.	Telugu
eng.	English
hin.	Hindi
soc_sci.	Social science

eco.	Economics
pol.	Political science
sci.	Science
mat.	Mathematics
phys.	Physics
chem.	Chemistry
tech.	Technology
nat.frc.	Natural Force
ent.	Entity
sci.	Science
poi.	Poisonous
aro.	Aromatics
med.	Medicines
pro.	Products
pros.	Prosody

CHAPTER – 1
Introduction

1. 0 Introduction

The semantic characterization of nouns has been one of the most sought after pursuit of research in language analysis and generation. The intriguing nature of these works in the exploration with high esteem to depict the role of lexical items especially nouns in the linguistic account of the morpho-syntax of the relevant language is extremely challenging. The exploration of lexico-semantics of nouns and the computational approach may capture through the overall nature, function and the mechanisms underlying it. In any case, it is a modest attempts in undertaking of a partial depiction of the lexico-semantic study of Telugu nouns. It involves the investigation and the significance of the ontological characterization to see what degree it could be reflected from the lexico-semantic representations correlated with respective nouns in Telugu. The most important goal of this work is to come up with an accurate proposal to demonstrate by a convenient implementation of the lexico-semantic representation of the nouns. It will also be shown that it is rightly significant and is extremely essential in the process of disambiguation of diverse uses of the same noun concerning a number of senses in a particular language. The scope of the topic is broad in the area of computational applications in linguistics and the thesis is carefully organized within the limitations which permit us to demonstrate the knowledge representation of the lexicon in this area. While working in the centre's laboratory, I have been continuously reminded of the debates around word sense disambiguation mostly. This is one of the most important problems in the improvement of Machine Translation Systems being developed by the Centre in UoH. These debates have paved the way to undertake the current research at the Centre. The

thesis focuses about the ontological representation of nouns and their disambiguation in particular. The main chapters, Chapter-5 and Chapter-6focus on the primary issues viz., "Hierarchical organization of the structure of nouns" and "Computational Implementation". The essential theme underlying this thesis is to evolve a prototypical application of ontological representation of Telugu nouns in the analysis and generation, as a major issue in MT.

The present work is a result of several attempts in understanding the analytical concepts implicit in the lexico-semantic study of Telugu nouns involving primarily the representation of the lexico-semantic properties and the computational implementation and testing. This study addresses two palpable results, a comprehensive analysis of the lexico-semantics of the Telugu nouns and the development of a tool for computational applications involving word sense disambiguation in Telugu, specifically in language analysis and generation. The present work does not claim directly to be an input to the theory of the lexico-semantic study but it claims to have a significant role in the ontological representation of the Computational applications in the area of language analysis and generation particularly concerning the lexico-semantics.

Lexical semantics or lexico-semantics is the sub-field in the areas of linguistic semantics. In the present, studies in the lexico-semantics have increased because of its relevance to the computational linguistics. Lexical items are the objects of this study. They are analyzed in terms of their semantic features. In the analysis of nouns, verbs, adjectives, adverbs and other minor categories are also taken into consideration as and when required. Among the lexical categories, nouns are the most important category as they are the ones that carry syntactico-semantic relation with the predicate in a sentence. The classification of nouns based on semantic categories will provide us

with a better understanding of the nouns in a given language. This kind of classification also helps in disambiguating the word's ambiguity. A native speaker will have the competence or full knowledge over the nouns but a machine will not have such kind of competence or knowledge of nouns in a particular language. While developing a machine translation system for a particular language, one needs to provide in other words, the necessary semantic information to the machine to assign the appropriate equivalent in the target language. This kind of analysis also helps the second language students to learn the particular language very easily. At present, conventional dictionaries are not in a position to give all the particular details about a particular noun but a lexico-semantic study will be able to provide all the necessary information about the nouns in a particular language without ambiguity. Therefore, it is necessary to develop a lexico-semantic study for most of our Indian languages to provide accurate semantic information about the nouns of a particular language. In the present study, Telugu language is selected for the lexico-semantic study of nouns. An attempt is made to provide the semantic analysis for the selected nouns and their paradigms, in order to resolve the ambiguity and increase the accuracy of the machine translation by getting the exact equivalence.

The principle goal of the study is to provide full semantic information and analysis of the selected nouns based on ontological features. This kind of study will enrich the lexicon of the Telugu language concerning the information retrieval, computational lexicography, language generation, machine translation, disambiguation of nouns, classification, sub-categorization of the texts etc. Along with the above advantages, it also helps in studying the Telugu nouns from a theoretical point of view. It also helps in predicting the morpho-syntax especially in the context of the nouns of ±abstract, ±animacy, ±human, etc. The recent trend in the

study of lexico-semantics is WordNet. It is considered to be the best resource for the semantic analysis from the natural language point of view. It is an outcome of the lexico-semantics and psycholinguistics.

1.1 Lexical Semantics

Lexical-semantics, a study of words is a common, imperative and most desirable concept in linguistic studies. Thus, lexical semantics is the study of word and its meaning i.e. when these two concepts, lexical and semantics are put together. Though they are two different entities in language study, yet they deal with the meanings of words with respect to their relation to human understanding of words in linguistic form. As regards to the meanings of lexical and semantics, 'lexical' concerns itself relating to words or of relating to contents of dictionaries and 'semantics concerned with the meanings of word, phrase, a sentence or a text. Going into the analysis, lexeme is a word in general usage in language system at the level of our cognizance with reference towards and their abstraction. Each entry in the dictionary or a lexicon comes with a distinct meaning explained or defined by a set of words or features in terms of meanings called semantics either in everyday usage of the language system or in the formal linguistic study. But words as lexemes and their meanings are absolutely contextual and connotative based on region and culture. But words and their meanings are understood by people in a society. Language shapes the society what is presently right at our sight and at the same time society nurtures the language for its communication and emotive content with changing trends.

Language itself is ambiguous in its nature because of the syntactic and semantic structures of words in a sentence, where they never form permanent meanings and the words never provide with same meanings always as words are

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contextual and cultural. The conception of 'word' is itself exceptionally problematic and ambiguous. Human beings used words where they always exist in precise contexts and their meanings are applied according to the effect of meaning and they are vital irrespective of linguistic context, cultural and of social norm. Language is never understood by individuals intuitively, it is a learning experience. In uttering a word *'tree'*, it is not understood automatically by an individual unless the person knows about the *tree* or unless he understands the concept of a *tree*. The word *'tree'* does not carry anything like the 'real' meaning of it when it is uttered. First, it is important for individuals to know (experience) the concept of a *tree* and its usage or why it is called a *tree*. Then, when individuals re-listens the utterance of word *'tree'* every individual can connote with the meaning and can understand the word *'tree'*. Again, it is understood when it is expressed in English language only. When the same is expressed in Telugu by the word *'ceVttu'* to the English speaking individual, again it becomes impossible for him to understand. Though both speakers from English and Telugu know the concept of *'tree'*, or *'ceVttu'* respectively in their native languages but they need to understand the denotation of uttered word in particular context. Both the speakers need to exchange with one another the meaning of both words and its effect of usage. So, the words *'tree'* and *'ceVttu'* are lexemes in its nature of language. But the experiences of their meanings belong to the realm of semantics in the language. The main striking point is that lexico-semantic nature of words and their meanings in the language comes with ambiguity in its actual operation. Noam Chomsky (2002: 107) observes in his On *Nature and Language* expresses that:

> "The natural approach has always been: Is [language] well designed for use, understood typically as use for communication? I think that's the wrong question. The use of language for communication might turn out to be a kind

of epiphenomenon. If you want to make sure that we never misunderstand one another, for that purpose language is not well designed because you have such properties as ambiguity. If we want to have the property that the things that we usually would like to say come out short and simple, well, it probably doesn't have that property".

In a way, languages have inherited the property of ambiguity. Any lexeme in a language system can be ambiguous and its meanings are obviously ambiguous. However, in certain structured syntactic constructions, certain words are not ambiguous. For example in a sentence *'The boy hit the girl with a ball'*, there lie two meanings as in the following:

1. The boy used a ball to hit the girl.
2. The boy hit the girl who has the ball in her hand.

The prepositional phrase 'with the ball' is added to modify by both the subject and the predicate here. In the sentence 'the boy hit the girl with a ball' almost all words are same, word order is same, but the sentence is ambiguous according to the possible structure assigned. Suppose, observe the word *'fire'*, it has several meanings. Primarily, the word *'fire'* is a verb and as well as a noun when referred to in terms of parts of speech. In syntactic structure, the word could be used according to the grammatical demands either as an argument or a predicate. When the word goes with verb, the meaning of the word is *'Start firing a weapon!', 'Terminate the employment off!', 'Destroy by fire!'* and several other meanings as well. But they are used in relation to context and effect. The same word as a noun form displays the meanings like *'the event of burning something', the act of firing a weapon or artillery at an enemy', 'feelings of great warmth and intensity'* and *'fuel that burns and is used as*

means for cooking'. Assuming the sentence '*they are ready to fire',* what does it represent? Does it bring any intuitive meaning with it? The word fire may carry with it the lexical sense '*fire'* and here in the context of the other words in the sentence, the meaning is expressed. The meaning of the sentence is related entirely to the compositionality of the dictionary words or display an idiomatic meaning. But the word *fire* does not carry any representation though it is lexical-semantically meaningful. In a sentence, *they are ready to fire*, meaning could be, '*they are ready to fire at opposing soldiers'* or '*they are ready to light the fire using it for cooking'* or it could be 'they are in some competition so they are ready to show their talent and intensity'. Even the equivalent to this word in Telugu as in *'nippu'* means *'fire'* and it is in the noun form and the other meaning is displayed by the verb form*'kAlcu'.* In Telugu *'nippu'* and *'kAlcu'* are two distinct words with respect to the word category and express the meaning contextually. There is the possibility to use two words accordingly. The word *'fire'* or *'nippu/kAlcu'* are ambiguous but the meaning distinction is contextually realized every time in its usage. Here, we may recall Jacques Derrida (2000: 297) in his article *Sending: On Representation* states that

> "Is translation of the same order as representation? Does it consist in representing a sense, the same semantic content, by a different word of a different language? If so is it a question of the substitution of one representative structure for another?"

Further, he also says that:

> "Language, every language, would be representative, a system of representatives, but the content represented, what is represented by this representation (a meaning, a thing, and so on) would be a presence and not a

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representation. What is represented would not have the structure of representation, the representative structure of the representative." (Derrida, 2000: 303)

So, every time, while using words in communication, their meanings are represented contextually but they are not representations for permanent meaning. The contextual meaning is not representative of the conceptual meaning of the word. Representation of the conceptual meaning is the denotative description of a referent by a particular word. Suppose, uttering a word *'canal'*, the word triggers a conceptual meaning. 'Canal' is a collection of water which flows from one place to another place. There are many words used for such a collection of water, 'bores' which flow from place to place. Words like 'pond', 'lake', 'sea' and 'ocean' the given meanings in understanding the collection of water in size, and again the state of water in relation to still waters or moving. Now the collection of water is a conceptual meaning common to these but based on the size they are given different names in the language. Though all the words represent certain kind of meaning in relation to collection of water in natural sense, yet the words' meanings are contextual. Replacing one word with another is impossible when expressing our idea in context. So, reading the meaning from among many existing meanings, the actual description of a more wide-ranging logical contextualized meaning does not contain all the features of the usual meaning. The system of lexical words is normally arbitrary, and this arbitrariness of the sign and signifier of the word and meaning urges the linguist to describe language as a conventional system of rules. There are certain questions in language system to confirm the reading of certain meaning or understanding it. The following questions are relevant for understanding the meanings of words in utterance of variant kinds:

1. What does 'meaning' imply in language?

2. What is the relation between 'words' and their 'meanings'?

3. What is the relation between 'lexemes' and 'semantics'?

4. How are meanings of 'words' learnt and applied in everyday usage?

5. How are meanings of 'words' communicated and understood by language users?

6. How and why do 'meanings' of words change?

A number of studies have dwelt upon the subject and tried to understand it from the linguistic to literary to philosophical backgrounds. The study of meaning in the sense of the meaning of meaning has become a fascinating study in the language.

1.2 Nouns in Lexico-Semantic Study

In the linguistic theory, a word does not mean only the implied meaning. In the given grammatical structure an uttered word may have n-number of link ups and inferences. One word may fall into many categories. In other words, words are floating lexemes which move into different categories carrying them with distinct meanings contextually. For example, woman can be put under one or a combination of many categories like [+animate, +human, -masculine, +adult].

Langacker1987: 154) illustrates this using 'banana' as an example:

"Most concepts require specifications in more than one domain for their characterization. The concept 'banana', for example, includes in its matrix, a specification for shape in the spatial (and/or visual) domain; a color configuration involving the coordination of color space with this domain; a location in the domain of taste/smell sensations; as well as numerous specifications pertaining to abstract domains, e.g. the knowledge that bananas

are eaten, that they grow in bunches on trees that they come from tropical areas, and so on".

So, lexemes as words explicate different kinds of meanings and each time the meanings of these words are contextual and descriptive. A 'woman' is a living thing at one of the deeper layers of its meaning; at an another layer she is an 'animate' element unlike other living things like trees, being able to move from one place to another place; yet, she is 'human' since she can talk, think, sense like all these bodily features to designate her as human object. All these defined qualities keep her apart from other living things and attribute her as human with humanistic qualities, further her gender decided biologically. Finally her state of womanhood is decided by her age. So, all these features make a woman as a complete being. But each time she is described according to the demand of the context and explicated by the validated concepts. She is realized and represented by a large number of features and qualities but not momentum to single representation of a concept or idea (incidentally a number of these features are redundant enabling us to realize her with the minimum).

1.3 Telugu Nouns and Lexico-Semantic Study:

Nouns are considered to be the bricks or building blocks of the language edifice. Nouns constitute the major portion of a language. In this regard, there is much importance associated with the study of nouns. It's interesting to look at these how the grammarians as well as linguists defined them and their role in the language. Algeo (1995:203) stated that "The semantic content of sentences is borne mostly by the nouns". Even the ancient grammarian Dionysius Thrax, who belonged to 2 B.C. defined nouns as in the following: "The noun is a part of speech having case-inflexions, signifying a person or a thing" (Quoted from Subrahmanyam, P.S., 2004:

97-98). Even in Chinese where it does not have case inflexions, nouns have to be there and express case relations possibly by covertly marked phenomena like positional placement in a sentence or marked by another word distantly placed to it. There cannot be any argument (even in case of a noun) in a sentence without any case and thematic role.

Now moving on to Telugu nouns, they form different types and categories. Like in many languages, nouns are not single monolithic category. They come with different categories characterized by their inflexions in usage. They are called as nouns of proper kind, pronouns, nouns of space and time, number word nouns etc. (cf. Uma Maheshwar Rao, 2003). Nouns in Telugu, with a few exceptions are characterized by case, number and gender. There are two numbers: singular and plural. A great majority of the plurals in Telugu end in the plural suffix (lu).

Gender: There are a large number of different kinds of distinctions in the marking of gender and number in many languages across the Globe. In many languages, the gender and number of nouns are reflected on adjectives, finite verbs etc. in accordance with the agreement relations. There are some languages which do not have overtly marked gender as in Thoda and Brahui. Chinese and Vietnamese do not have overt marking of number on the nouns. The usage of plural in nominal and verbal inflexion even in Ancient and Modern Tamil is rare.

The distinctions of gender in Telugu can be stated as in the following case studies: According to Krishnamurti, Bh. (1985: 56) and Subrahmanyam, P.S. (2004: 109) gender in Telugu can be of two types i.e. Masculine and Non-masculine (in singular).The male human beings and "The Sun" and the "The Moon" are masculine and the rest (including human females) are Non-masculine. Hence, this is not equal to

Natural gender. Though it is not difficult to identify the difference of gender in animals, but such distinctions are not verbalized in Telugu in other words they are all treated as belonging to single category of non-human males. Unlike in Telugu, Hindi assigns gender distinction on the basis of the form of the words rather than the nature of the concept. Whereas, in Telugu, the nature (ontological) of the concept of the word irrespective of the shape of the word defines the gender.

Telugu Nouns

Gender

Singular   Plural

[+ Male human]   [-Male human]   [+Human]   [-Human]
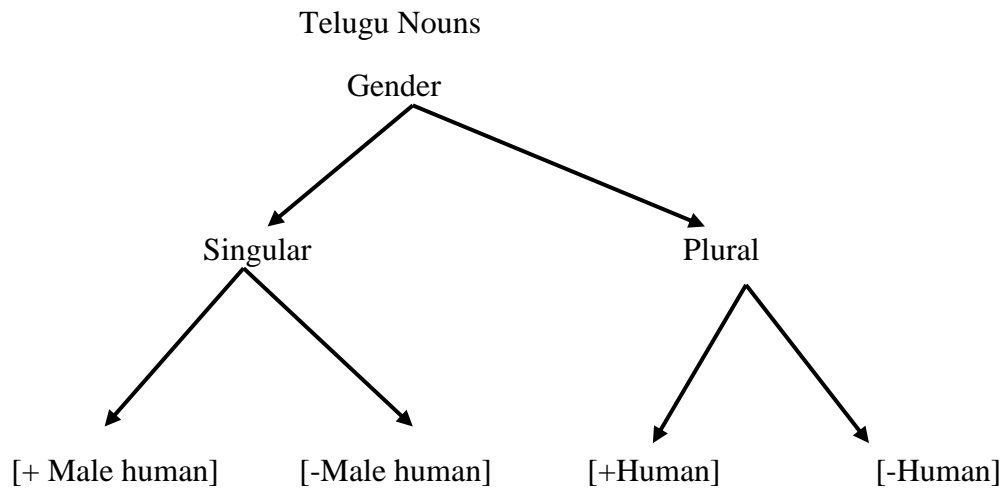
Fig: 1.1 Gender in Telugu

Ex:

| veVMkayya raMgadu Yesobu (name of human male) pAnakAlu (name of human male) muwyaM 'pearl' (name of human male) caMxrudu 'moon' sUryudu 'sun' | (Includes all other than human males) veVMkAyamma panixi (servant maid) paMxi (pig) purugu (insect) AkASam (Sky) eVxxu (bullock) | (Includes all Humans) manuRulu swrIlu 'women' AdavAru 'ladies' vIrulu 'heroes' tIcarlu 'teachers' | purugulu panulu koVMdalu 'hills' nIlYlu 'waters' pAlu 'milk' kukkalu 'dogs' |

When these nouns denote a human male they are nouns of masculine category.

Singular and Plural: Nouns in Telugu inflect for number and the difference between singular and plural is mostly overt. (Krishnamurti, Bh, 1985: 50) & (Subrahmanyam,

P.S, 2004: 109-110). Singular has no particular unique marker but plural is marked with the suffix 'lu' or its variants.

Telugu

Singular	Plural	Gloss
gudi	gulYlu	Temple/s
penu	pelu	louse/lice
kannu	kalYlu	eye/s
kAlu	kAlYlu	leg/s
vIrudu	vIrulu	champion/s
bAludu	bAluru	boy/s
maniRi	manuRulu	man/men

These words of Telugu nouns are usually understood by processing them phonologically, morphologically and sometimes syntactically.

It's not uncommon in any computational approach to the analysis and generation of the nouns the need for their ontological information to be accessed and deftly used. In other words, computational modelling of natural language analysis and generation essentially involves number modules of grammar (each dealing with a specific task) requiring ontological information. In the case of computational modules of lexical semantics, all such tasks or modules concern with lexico-semantics. They involve, word analysis, synthesis, word sense disambiguation, labelling, establishing case relations, identifying multiword expressions, ontological representations, automatic and semi-automatic learning of ontological properties of words, creating new words representing new concepts (automatic) based on ontological chunking or compounding.

1.4 Computational Approach to Lexico-Semantic Study

Computational linguistics is alternatively used as a synonym for the study of automatic processing of natural language. One of the major applications of computational linguistics is the creation of automatic processing mechanisms to analyze and generate words and their meanings of texts in natural language. The processing of natural language within the scope of computational linguistics or computational approach to linguistics is considered as comprehensive computational modelling of natural language. This is a complex task that involves modelling one of the cognitive faculties concerning human language using computer. The ultimate goal of computational linguistics is man-machine and machine-machine interaction using Natural language. Though computational modelling of natural languages begins in a modest way, now they have come of age and rival human processing in time and coverage. In other words, it has become a challenge to modern computing and multifarious to chronologies.

> "Computational linguists have been concerned with developing procedures for handling a useful range of natural language input. They are in general, willing to accept approximate solutions which cover most sentences of interest and put up with a system which fails on a few peculiar inputs. The requirement of constructing complete, working systems has led them to seek an understanding of the entire process of natural language comprehension and generation".
> (Grishman, 1986: 6)

One of the important tasks in computational linguistics is computational lexico-semantics. Lexical semantics is not only an important but also the most crucial in the successful development of natural language analysis and generation, ultimately

leading to Machine Translation and a number of other natural language engineering products. Since, lexical semantics is concerned with the identification and representation of the semantics of natural language vocabulary, while a computational approach to them, involves computational representation of lexical semantic structures. In the analysis, it involves the resolution of ambiguity, involving polysemy and homography, structural ambiguity in sentence decomposition and categorization of words.

Thus, not every program dealing with natural language texts is related to linguistics. Though, such word processors as 'Windows', 'Notebook' deal with the processing of texts in concerning language. However, they are not contemplated as linguistic software, since they are not sufficiently language-dependent.

Supposing in explanation of certain concepts, words and their meanings, there may be a need for processing hyphenated words according to the information about the vowels and consonants in a specific alphabet and about syllable formation in a specific language. Thus, they are language-dependent. However, they do not rely on large enough linguistic resources. Therefore, all hyphenated words do not make meanings and do not show explanation in software 'Windows'. In Microsoft Office or in any other word processor, word meanings or semantics are not checked for their validation and corrections. These, therefore are basic linguistic programs lacking knowledge of human language. Hence, there is a need for a computational approach to provide elaborate knowledge of words or concepts in the processing of natural languages by the computers.

1.5 Word Meanings in the Lexico-Semantic Study

There are essentially three different kinds of relations between word meanings. They are, (1) words that have same form but mean different things, usually involving

homonymy and polysemy. Homonymy involves two or more words having the same spelling or pronunciation but different meanings. For example, the word *'tear'* with same spelling but gives different meanings, *tear* gives one meaning as *tears in eyes,* another meaning is *'to separate or to be separated by force'*. Another example would be different spellings but same pronunciation with different meanings as in *weak,* means *dull or deficiency*, *week* consists of seven days. In these two examples the parts of speech 'noun' endowed with different meanings. Unlike this, polysemy involves different meanings for the same word or phrase. Example,

1. Sanjay built his house on the <u>bank</u> of a river.
2. Sanjay invested his money in an Indian bank.

In these two sentences, the word *'bank'* is a common lexeme but it produces two distinct meanings. In both the sentences the lexeme *'bank'* is a noun yet it takes different meanings with the context. Polysemy can be used as an instance of alternative meaning or variation in the sense. For example:

1. The window is closed.
2. The window is made of glass.

These two sentence formations are purely contextual, one sentence explains the position of window and second sentence explains its quality. Thus, polysemy is an ambiguous in its nature.

(2) Some lexemes evoke similar meanings but have different forms, such as synonyms and hyponyms. In a language, a lexeme or a phrase may indicate the same meaning as the other lexeme, for example *'element'* and *'component'*. Hypernyms and hyponym are semantic categories and they denote superordinate and subordinate

subcategories of more general class or it is subgroup of same featured group, for example *'chair'* and *'table'* are hyponyms of 'furniture'.

(3) Antonyms are words that have different forms and different meanings and are semantically related through opposition, for example *'ancient' vs 'modern'*.

But it is people or the community rather than the language that is it slow, that it cannot cope up with the amount and variety of information that we experience every day. However, information shall be made available to everyone. This demand pushes forward that language accessing tools that must be available to quench our thirst for new knowledge. Computational lexical semantics will be the answer for this. Research in computational lexical semantics integrated with computational processing of natural languages can greatly enhance the quality and the speed in the development of the tools.

1.6 Research Interest

It is a fact that a number of revolutionary studies are carried out in the area of computational linguistics and especially involving the subject of lexical-semantics. But it is also a fact to admit that a lesser amount of research is carried out on Indian languages particularly on Telugu language with respect to lexical semantics. There is a tremendous need for computational approach to the lexical semantics of Telugu language to broaden its wings almost on all aspects of natural processing. In this era of language technological world, much space is created for the research of computational approach of Telugu language with respect to language processing tools. Natural languages have generated aptitude among people in the globalized world where plenty of opportunities are created for jobs and career. People started showing interest in learning new languages apart from their mother-tongue. In this

process, people definitely seek for assistance from new technologies. Machine translation certainly becomes the assistance to learn new languages.

In natural language processing, the ambiguity is ubiquitous and it interferes with the processors of new languages. The phenomenon of ambiguousness in natural languages is primarily at the level of lexemes having different meanings. The spelling of the word and pronunciation of the word would be same but the meaning differs in expression. There is the possibility of giving wrong meaning when the word is not retrained rightly and contextually. For example, the word *'nails'* can be used in two different meanings. The hard part of fingers and toes are called *nails* and they grow every time though they are cut. Another meaning of nails is thin, sharp metal pieces used in construction. Supposing, when an English speaker speaks Telugu language, he cannot use the same word or same meaning pragmatically, semantically and contextually, because, in Telugu there are two different words representing the two meanings.

Nail [+sharp, +longish]

goru   meku

[-artif]   [+artif] [±sharp.]

[+sharp]   [+metal.]
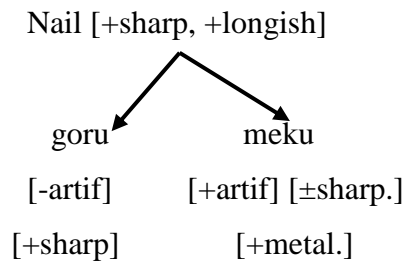
Fig: 1.2 Ambiguous word

The word is *'goru (sg.)'* used for expressing hardest part of fingers. Another word *'meku (sg.)'* is used for conveying meaning of sharpened and hardest metal piece used for construction. So, words in natural languages are ambiguous in meaning and cannot be replaced suitably in one to one correspondence with other words in the other languages. This thesis tries to study the Telugu nouns and their lexical semantics and see how this knowledge can be used in computational approach. When a native

speaker uses a natural language a certain amount of cognitive intelligence is used particularly concerning the words, concepts, and the referents.

It is very impressive and tremendously admirable task that the computer software aids human beings in accessing information from natural languages and in retrieving databases for future references. But, admitting the fact that such databases still lack real intelligence demand that human beings invent new ideas and new modes of learning. The ambition for crafting new lexical representation and new wave methods for profound language understanding and production would require radical changes in promoting complete and sufficiently automatic translation mechanisms that enable man-machine communication in unobstructed natural language. So, certainly there is a much-needed inquiry in computational approach in developing new facets in accessing information from natural languages.

Alexander Clark and Shalom Lappin(2013: 3)in their book *Computational Learning Theory and Language Acquisition* observe in the following way:

"Computational learning theory does not motivate strong linguistic nativism, nor is it irrelevant to the task of understanding language acquisition. It will not provide an explanation of this phenomenon. As Yang observes, it is not a substitute for a good psycholinguistic account of the facts. However, it can clarify the class of natural language representations that are efficiently learnable from the PLD (Primary Language Data)".

In the case of computational processing of natural languages, the machines need a tremendous amount of information with regard to lexicon in terms of lexemes, their semantic properties, morpho-syntactic, and pragmatic properties. However, this information cannot be given to machine as the descriptive information is not directly

used by them. This information with regard to the lexicon that occurs in the dictionaries is in the form of descriptive definitions. The existing system can process only in the form of the features and mnemonic representations. Therefore, we need to develop lexicon with minimum features and least redundancy.

1.7 Research Questions

A number of research questions can be raised and sought to provide some possible resolutions as stated here:

❖ Are lexemes semantic representations disguised in phonological forms with respect to their meanings in articulating meanings?

❖ Lexicon of a language is said to be archetypically ambiguous, and in this context how does the lexical semantics enhance the quality of processing natural languages?

❖ Provided that the Telugu nouns are given their lexical semantic representation in processing a text, does this qualitatively effect processing?

❖ What are the possibilities for a machine to learn to 'understand' Telugu nouns semantically in the context of machine translation?

❖ What is the role of computational approach in lexical semantics in providing an alternative representation of the lexicon?

❖ In the lexical-semantic database of an efficiently integrated computational approach, is there a possibility to misread or misrepresent the analysis and generation in language processing?

Some of these questions will be pursued to be answered as much as possible with some illustrations in this thesis.

1.8 Aims and Objectives of the study

The main aim of the study is to come up with a proposal and illustrate by practical implication of the classification of the Telugu nouns (through lexico-semantic study) to know that it is aptly relevant and it is very crucial in the disambiguation of different nouns involving a number of senses. Here are some of the objectives to be investigated through this research:

1. To classify the Telugu nouns for the use of computational purpose: This classification may prove to be extremely useful in the representation of lexical knowledge in the long run. Representing the meaning of a word which minimally implies (i) distinguishing it from other senses of the same word, (ii) representing its similarity with the meaning of other words (Busa et la 2001:31). For instance, given the word *mouse* an appropriate but minimal representation of its meaning requires distinguishing the sense of 'small rodent' from the one that of 'small pointing device for computers'. Moreover, the same representation should be able to capture the fact that being a rodent entails being a mammal, as well as the fact that the sense of *mouse* as 'small rodent' shares with the meaning of other words such as *dog*, or *cat*, the fact of being subtypes of mammal. Ontologies are therefore powerful formal tools to represent lexical knowledge, exactly because word meanings can actually be regarded as entities to be classified in terms of the ontology types. In this perspective, a given sense can be described by assigning it to a particular type. The ontological structure will then account for entailments between senses in terms of relations between their types. Finally, resemblances between word senses will correspond to the sharing of the same ontology type.

2. Towards a purposeful lexical semantics to solve the noun's ambiguity.

3. To achieve a comprehensive semantic representation.

4. In order to execute this study, a semi-automatic –computational approach needs to be adopted.

1.9 The methodology

This thesis intends to clear the ground for a later large-scale attempt to develop a system for word sense disambiguation especially for the nouns based on the lexico-semantic study through computational approach. For this purpose, we draw data from the Telugu language. Telugu is an agglutinating language. Telugu nouns are inflected for number (singular, plural), gender (masculine (sg.), non-masculine (sg.), and human (pl.), and non-human (pl.) optionally for person 1, 2, & 3 and case (nominative, accusative, genitive, dative, vocative, purposive, instrumental, and locative) (cf. Uma Maheshwar Rao, 2002).

1.9.1 Resources:

For the purpose of this study, we have extracted nearly 50,000 nouns from CALTS Language Laboratory Lexical Repository (LLLR) and cleaned them. Nearly another 10,000 nouns are collected from different electronic books which are available in the CALTS Laboratory. A total of 60,000 nouns are studied and classified into various Semantic categories. Each noun from these Semantic groups is annotated with the necessary features. The feature based lexicon now allows us to represent ambiguous nouns unambiguously in their natural class. Rules of distributional constraints or selectional constraints are easily implemented. For this study, feature-based approach was adopted which is discussed in detail in fifth chapter. The

empirical data of Telugu nouns are discussed with examples by using computational approach to lexico-semantic study.

1.9.2 Annotation of Telugu Names using distinctive semantic features:

The Telugu nouns that are obtained from CALTS language Technology Lab are selected for exhaustive annotation. The Annotation of nouns is undertaken both manually and automatically using ontolexic program developed by CLATS Language Technology Lab. The program uses about 18 distinct features and many more are added as and when required for the current features. There are two sets of ontological/semantic features are used, 1. Constituent features, such as ±liv., ±ani., ±hum., ±abs., ±gr_mob., ±wat_mob., ±air_mob., etc. When the annotation is done, the nouns are classified semi-automatically onto various subgroups, groups, super groups into a large number of lagers. The consistency in the use of semantic features and ability to form classes would validate the features used in the classification. A modest classification of Telugu nouns accordingly arrived at as discussed in chapter-5. Precedence relations and the predictability of the super class features enable us to specify one and only the minimum set of features which allows us under specification. The under specification drastically reduces the number of features that are required to be used in operations.

1.9.3 Validation and proof of the relevance of ontological lexicon:

As specified in 1.9.1 the annotation of Telugu nouns with ontological features results in Telugu ontolex (ontological lexicon) which can be used fruitfully in all other operations whenever they are required. Chapter-6 provides evidence of the validity of annotation and the concomitant ontolex in morphology of nominal inflexion, identifications and word sense disambiguation.

1.9.4 Evaluation of Translational texts:

The annotated lexicon is used in the building of machine translation system. The machine translation system that used ontological lexical information is now such with the texts to translate Telugu to Hindi and Hindi to Telugu and see if there is an improvement in the comprehension and accuracy of the text. The evaluation is carried only by three readers both in blind and often evaluation. The results are discussed accordingly.

1.10 Organization of the Thesis

The thesis is organized into seven chapters, followed by references and appendices.

Chapter 1 deals with Introduction which includes the basic introduction to Lexical semantic study. It discusses about words as lexemes and their semantics. When the integration oflexical semantics with computational processing, the ambiguity in natural language system is easily resolved. This introductory chapter also covers a study of Telugu nouns and how these nouns are studied in terms of bundles of semantic features. It also covers various approaches towards the study of Telugu nouns. The chapter raises a number of research questions for developing this thesis as a systematic study of the semantics of Telugu nouns. These questions exemplify lexico-semantic study of nouns to be analyzed in the computational approach.

Chapter 2 describes the types of Lexicons. All types of lexicon viz., Traditional, conventional, printed, Inter-lingual, synonym, domain based, and Machine readable dictionaries, besides WordNet etc are discussed in a modest way.

Chapter 3 is a discussion on some of the major techniques used in the study of lexical meaning, specifically the lexicographical method, the referential method, the

structuralist method, the behaviouristic method, the functional-pragmatic method, the logical method, the psychologist method, the computational method and the neuro- and biological methods is undertaken. In each context, an attempt has been undertaken to point out the valuable contribution(s) of each of these approaches.

Chapter 4 reviews some related works from the existing literature as a background of the study. It provides a review of salient works of this kind and mentions earlier works done in this area of study. It gives a brief conceptual background of various models of semantic Classifications of nouns for the purpose of this study.

Chapter 5 examines the "Hierarchical organizational structure of nouns in Telugu". In this chapter, the discussion focuses on how the nouns are grouped into Semantic divisions conceptualized in Telugu and the way they are derived from the annotated features.

Chapter 6 deals with the modest illustration of the 'Computational Implementation' of the integrated ontological lexicon with the system. This chapter describes the application of the research and its outcome.

Chapter 7 is a conclusion. In this chapter, findings, results and future work are discussed briefly.

CHAPTER - 2

Classification of Lexicon relating to Ontological Studies

2.0 Introduction

Lexicon is the mental dictionary of an individual in other words a conceptual catalogue of human language. Human-made lexicons always consist of words which can stand on their own e.g. like free words. Lexicon most of the times, does not include the bound category of the words like affixes but compound words, idiomatic expressions and collocations are sometimes considered to be part of the lexicon. Lexicographers try to represent the lexical items of a given language in an alphabetical order in a dictionary. While making the dictionaries of a given language, loan words, new words coined out of neologisms and compound words also will be listed by giving their semantic meanings. These dictionaries also will be of different types and belong to different domains. Dictionaries can be classified according to their, need, necessity and importance. Some of them are traditional, conventional, some are computational, some of them are pedagogical and some are ontological based. We shall see some of the dictionaries and their types discussed below based on requirements of functions and needs.

2.1 Dictionaries

Learning a language is essential for human beings for communicative purpose. In learning a language whether it is first (mother-tongue) language or any other second language, there is a primary necessity to learn vocabulary. Learning vocabulary is not only an important but primary pre-requisite to learn a language. Basically, vocabulary is about having the awareness of information of a word and its meanings while using them for communication. It is very much important for beginners of the language to

know about the phonological form of words and knowing the pre-determined meaning in order to understand the speech or a text. In absence of such knowledge of the word, it is difficult for the learner to use the word in the context. Vocabulary is nothing new but knowing their meanings and their interrelationship is very essential. When a learner comes up with new word while listening to someone or while reading a book, one cannot keep away the word from the context as he/she cannot understand. So, the learner tends to look up for the word and retrieve it from the dictionaries. Now the question is what is dictionary? Why is it used? What sort of information does a dictionary provide? A dictionary is a basic tool for language learning. The practice of compiling dictionaries is called lexicography according to Oxford English Dictionary. Now, the augmentative point is that in a language there is clear demarcation between formal language or academic language and colloquial language. All the words that are used are gathered and arranged by lexicographers in an effective manner into a dictionary. But, at the same time, such words that are used in colloquial contexts that are used more frequently get popularized by society find their way into dictionaries. Usually, these words are structured according to the order by their form or a letter arrangement and provide information about meaning, etymology, usage, and grammar. A. H. Marckwardt (1973: 369) in his article, *The Dictionary as an English Teaching Resource* declares that:

"Dictionaries often supply information about the language not found elsewhere. Dictionaries often supply information about grammar, usage, status, synonym discrimination application of derivative affixes and distinctions between spoken and written English not generally treated in textbooks, even in a rudimentary fashion".

So, a learner learns from a dictionary about new words in a language in order to master the productive skills like writing and speaking. Suppose a learner while learning the Telugu language, comes across many words in the process. The colloquial Telugu phrase *'vAdu adukku winnavAdu'* context describes the meaning that a person 'He is begging to eat'. But, if anyone uses the same phrase appropriately in a different context, the learner would be confounded to understand the meaning. So, he/she has to look up the word in the dictionary. Thus, it is very necessary that lexicographers add all the words in dictionary whether formal or colloquial. So, when a learner comes across these words in different contexts, he/she needs to understand the meaning of both the words by looking into synonyms. Then only a learner can use words efficiently in the context in his/her usage of words. Thus it is necessary that all these words are incorporated into dictionaries for the purpose of assembling the knowledge of words. There are varieties of dictionaries or lexical resources according to the subjects of study at academics, especially produced by individual/institutions. At sometimes, there could be more than one for each subject. So, one can easily find a wide variety of dictionaries in the market. To be frank, one needs a dictionary to look up meanings for a variety of subjects and they are distinguished according to the subject. *Britannica Encyclopedia* (2007: 19) on the History of Dictionary explains that:

> "Dictionaries range from abridged easy dictionaries to the unabridged difficult dictionaries. There are dictionaries of biography and history, real and fictitious, general and special, relating to men of all countries, characters and professions; the English Dictionary of National Biography is a great instance of one form of these; dictionaries of bibliography, relating to all books, or to those of some particular kind or country; dictionaries of geography

(sometimes called gazetteers) of the whole world, of particular countries, or of small districts, of towns and of villages, of castles, monasteries and other buildings. There are dictionaries of philosophy; of the Bible; of mathematics; of natural history, zoology, botany; of birds, trees, plants and flowers; of chemistry, geology and mineralogy; of architecture, painting and music; of medicine, surgery, anatomy, pathology and physiology; of diplomacy; of law, canon, civil, statutory and criminal; of political and social sciences; of agriculture, rural economy and gardening; of commerce, navigation, horsemanship and the military arts; of mechanics, machines and the manual arts. There are dictionaries of antiquities, of chronology, of dates, of genealogy, of heraldry, of diplomacy, of abbreviations, of useful receipts, of monograms, of anthropology and numerous dictionaries of very many other subjects."

Thus, dictionaries are information providers. They include as many words as possible. Apart from providing information, they also help the learners how to use the words in context. Dictionary is a very important language learning tool. A basic language learner learns not only through various grammar books, but, can also do it through dictionaries. Dictionaries provide the basic information about parts of speech and their usage with example sentences. They help to develop vocabulary without anybody's help and they are simulative for academic achievements.

2.2 Traditional Dictionaries

Dictionaries are well-documented structures which try to comprehend the reciprocality between the learner and vocabulary. Generally, dictionaries are classified into printed and electronic dictionaries. Before the influx of electronic

facility and the progress of electronic dictionaries, traditional printed dictionaries used to prevail in language pedagogy and even now they are being followed because of their durability. Though these dictionaries are used to vary in shape, size and quality but the application procedures are similar. Some of the advantages of printed dictionaries are as in the following:

- Easy to look through the words alphabetically.

- When compared to other academic books, easy to buy; the cost is lower.

- Easy to reproduce in different sizes and number of volumes according to the flexibility of users.

- In using them, one can learn words with the awareness of order of alphabet and basic information mentioned in the dictionaries.

- They are durable with conciseness. One can carry them flexibily wherever one wants to.

- One can mark important note on pages according to the requirement. It is palpable and useful.

These features coerce proponents to keep using paper dictionaries.

2.3 Inter-lingual Dictionaries

An interlingual system dictionary does not have informative interpretation of translation of a word but it has the required connotation of words with an appropriate grouping of inter-lingual concepts. In explanation to this idea, interlingual dictionaries are about transformation of one word's information about source language and how they can be translated to a second language or target language with necessary triggering explanations of words. It is basically done between two languages or multiple languages.

Organization of a lexicon or a dictionary raises some crucial questions, particularly in natural language processing applications. Here, we are concerned with the nature of lexical entries, the content, the type of information, and their representation etc.

In any natural language processing, applications of dictionaries are of crucial importance from two important points of view:

1. Nature of their content;
2. Nature of their organization;

The content and their organization may effect the dictionary or lexicon in question. The dictionaries used in the analysis of the source language, there are mostly monolingual and all and the entire information is source language-oriented and exhaustive.

Whereas in the case of transfer lexicon in machine translation particularly in inter-lingual systems, the dictionary is organized into a natural semantic knowledge base. The third kind of dictionaries is target language-oriented where they are oriented to carry information for appropriate target language Generation. Interlanguage representation is a language Independent representation of the lexicon.

The central aspect of lexical semantics – with respect to the aspects of word meaning particularly, properly semantic information and the other collateral information that is relevant to systematic grammatical effects (semantics effect syntax).

2.4 Lexicon

In knowing about lexicon, the primary step is to know about lexicons. A lexicon is a list of words in a language, synonymously called vocabulary of words and at the same time having knowledge of using each word in relation to grammar structure. It is a domain of words having at our sight. It also includes multi-word expressions such as permanent phrases like 'At the end of the day' meaning basic point, phrasal verbs like 'break into' meaning to enter forcibly and other common expressions like Happy Diwali.

In linguistics, the lexicon is an entire storage of words from all arenas providing adequate meaning. Lexicon is a provider of words and their meanings which facilitate to the functions of a language.

Linguistic theories in general view languages comprising of two parts: a lexicon, principally a register of words of a language and grammar, which is an arrangement of rules which agree to use the group of words in meaningful sentences. The lexicon consists of certain morphemes, which are accompanied with affixes either prefixes or suffixes. It also includes compound words and certain classes of idiomatic expressions and collocations. Gazdar Klein, Pullum and Sag (1985: 34) assume in their book *Generalized Phrase Structure Grammar* that:

> "A lexical entry contains at least four kinds of information: a phonological form, a syntactic category, an indication of any irregular morphology, and a meaning".

Conventionally, a lexicon is considered as the listing of words in alphabetical order according to the phonemic inventory of a given language. The entries in the

lexicon are called lexemes or word forms. Generally, lexemes comprise of phonological and morphological components. In describing lexicon, the size of a lexicon is analyzed through group of lemmas. In linguistic theory, a lemma is a group of lexemes produced by changing morphology. Lemmas are signified in dictionaries by headwords which list the reference forms and any irregular forms which help to use words correctly. It deals with deriving of foreign words, composing the combination of lexemes to make compounds. David F. Coward and Charles E. Grimes (2000: 7) in their book *Making Dictionaries: A guide to lexicography and the Multi-Dictionary Formatter* elucidates that:

Lexicon dictionary making is a multifaceted process. It includes at least the following aspects:

"1. It helps to understand the language(s) structurally, functionally, semantically, and socio-culturally. 2) Structuring the information, such as kinds of information in an entry, codes, ordering of information in an entry, etc. 3) Inputting the information (compiling the lexical database) normally over a period of years. This is best begun in the earliest stages of contact with a language and continued throughout—much is gained by doing it this way. 4) Checking and refining information in the lexical database. 5) Manipulating the data for analytic or other purposes, such as extracting semantic domains, doing reversals, etc. 6) Output: deciding the format and making changes".

2.5 Synonym Dictionaries

In language theory, synonymy can be explained as two or more words belonging to the same part of speech in grammar and having one or more equal or identical or closely alike referenced meanings which are interchangeable in some

contexts. And synonyms are differentiated by diverse nuances of meaning, connotations and stylistic features. Thus, synonyms are two or more words which are usually similar in meaning or nearest in meaning with connotative implication. They have definite common concept to fit into exchangeability, but at the same time there is the possibility for intruding separate word to the domain of synonym. Suppose, in the context of using the word 'shades' for denoting variety of meaning with shades can be intruded by another word like 'spectacles', in synonymous relation. So, it is very important to be attentive in using perfect synonyms in required context. Hence, synonym is that which has quality of impact to fit in context with effectiveness of expression. As it has the feature of interchangeability, synonyms can be used by writer or speaker with the advent of liberty to use them in a skilful manner. Synonym facilitates speaker or writer to choose the words in every example like perfect reflection of thought with its distinctive and unambiguous procedure. But, one should have exact idea to choose particular words to write or to speak for the best purpose. *The Synonymous Dictionary* (GLS, 1974: 12, DS, 1990: 7) explains that:

> "The image of lexis is mirrored in synonym dictionaries by grouping words of the same part of speech into semantically close or equivalent microstructures joined by a common concept. These may be of different varieties: Most synonym dictionaries just present 'bare lists' of words with similar meanings".

But, the language system has certain instructions in using synonyms with essentiality. Because speakers or writers are endowed with the analytical powers to perform with words effectively and have inclination of mind to embrace a series definitions in thought and to equate them with each other and regulate the idea that where and when they can be connected in groups and least provide with information.

2.6 Phrasal Verb Dictionaries

In natural language, the concept of 'Phrasal Verbs' has drawn much attention as they played a critical role since they stylize language while writing or speaking in representing meanings contextually in an efficient manner. Generally, phrasal verbs are a combination of verb and prepositions and other parts of speech. In phrasal verbs occur by a following 'particle'. This 'particle' could be either a preposition or an adverb. Mostly, a preposition is accompanied by the verbs, not particularly all the time, sometimes; it could be adverb too according to the context. Sometimes the meaning is expressed literally. Suppose in a sentence, 'the apple falls down' gives literal meaning as it expresses that the earth has gravity, therefore, apple falls down. The meaning is expressed by taking phrasal verb, conjoining the verb and the adverb 'down'. There are other sentences in which prepositions do follow verb and the meaning is imperceptible. For example, 'please lookup for the word in a dictionary'. This sentence gives the idea of finishing the task of an activity. In this way, phrasal verbs are used contextually. Clifford (1982: 3) in his book *Phrasal Verbs Definition and Dictionary* observes that:

> "There are four types of phrasal verbs and knowing the specific type is not necessary. However, knowing what type a verb is can be useful for two reasons. Firstly, it shows the grammatical construction, and secondly, some verbs can be more than one type and change meaning accordingly. Each particular type can include verbs with literal and non-literal meanings.
>
> TYPE 1: SUBJECT + VERB + ADVERB + NO OBJECT
>
> TYPE 2 (a): SUBJECT + VERB + ADVERB + OBJECT

TYPE 2 (b): SUBJECT + VERB + OBJECT + ADVERB

TYPE 2 (c): SUBJECT + VERB + OBJECT (PRONOUN) + ADVERB

TYPE 3: SUBJECT + VERB + PREPOSITION + OBJECT

TYPE 4: SUBJECT + VERB + ADVERB + PREPOSITION + OBJECT."

In explaining these with examples may somewhat clarify the causes in type 1, the verbs do not have an object in the sentence, 'The plane took off two hours late'. TYPE 2 (a): SUBJECT + VERB + ADVERB + OBJECT, the sentence, 'I must put off the meeting until tomorrow' may be opted for explanation. TYPE 2 (b): SUBJECT + VERB + OBJECT + ADVERB, the sentence, 'Kiran turned on the TV and went to bed' is suited for the second type and with alternative syntax. TYPE 2 (c): SUBJECT + VERB + OBJECT (PRONOUN) + ADVERB, in this the sentence, 'the committee decides to try out this new product along other products'. TYPE 3: SUBJECT + VERB + PREPOSITION + OBJECT, the example could be 'My father gets up at 5 'o' clock in the morning. TYPE 4: SUBJECT + VERB + ADVERB + PREPOSITION + OBJECT, for this the example could be 'Students looking forward to the holidays.

2.7 Idiom Dictionaries

In the English language, sometimes the phrases or sentences cannot be apprehended literally, as they cause a bit of confusion in knowing the inner meaning. Even, one knows well all the grammar rules, concerning phrases, one cannot conceive the real meaning of certain phrases. In English language for that matter in any language, there are many proverbs, informal phrases, and common sayings do have come with the characteristic feature of uncertainty or perplexity. So, these phrases in language are called idioms. These idioms have significant role as expressions of

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intense in language. As a point of fact, the extensive use of idioms refines the language of the speaker or writer. Idiomatic expressions bounce indispensable accomplishment in communication. It adds sophistication to the listening, speaking, reading and writing. Some idioms are used commonly and they appear as clichés in spoken language and so they are avoided in writing to be clear in originality of the speaker or writer. Suppose in an idiom expression, 'too many cooks spoil the broth' can be used or explained in context of many people having different ideas involve in managing an activity may ruin it. McGraw-Hill Company (Richard A. Spears, 2005: 7) in Essential American Idioms Dictionary in its introduction observes that:

> "Idioms are usually described as "fixed phrases," and most of them exhibit some type of variation. A larger number of idioms may present different kinds of variation. The majority of the idioms found may be categorized into four kinds of variation, as represented by optional elements, variable elements, movable elements, and grammatical variation. Optional elements are those that can be originated from the idiom, whereas variable elements are those that stand for the substitution in the given context. Movable elements are dynamic elements often moved according to the grammatical requirement. Grammatical variation deals with differences in tense, aspect, voice, irregular forms, number, case and gender. These can interfere with the semantic processing of the idiom. Knowledge of basic English grammar provides the ability to reduce nouns to their singular form, verbs to their infinitive or bare form, and passive voice to active".

Idioms are the eccentricities in a language, they time and again challenge the rules of logic. The dictionary helps to understand some of the idiomatic phrases and sentences. The idiomatic expressions in the dictionary are arranged according to

theme sometimes but mostly they are done with alphabetical order. Rosa Elena (2001: 2) in her article *Representing and Processing Idioms* tells that:

> "For many years, the standard way of looking at idioms has been to consider them as words (lexical items) which are listed and retrieved as chunks from the lexicon. According to this view, there is no need to worry about idioms, no need for a complex theory of how to communicate with them. The motivation for claiming this is based on the belief that the meaning of an idiom is in no way recoverable from the meanings of its individual constituents and that idioms behave as syntactic as well as semantic units. That is, there is nothing in the meanings of 'the', 'kick' and 'bucket' that tells us that 'kick the bucket means' DIE. Furthermore, there is no way, once we are familiar with the idiom, to break up its meaning into the individual constituents of the string".

The sequence of the three words 'kick', 'the', 'bucket' may have literal sense too distinct from the idiomatic sense. Thus, the words arranged in idioms and its expressions are listed as long words and they have independent meaning in the normal understood lexicon but they were given a different meaning when joined with other words in an idiom lexicon. Agreeing to this fact, the literal meaning is possible and most of the times, the meaning comes retrieves from idioms according to the context.

2.8 Professional Dictionaries

In learning a language, people come across many terms and professional vocabularies which sometimes ambiguous to the learner and sometimes these are totally new to the native speaker. At those times, professional dictionaries offer students and faculty, the definitions of professional terms. There may be times when the terms used in textbooks, journals and the classroom are not in accordance with

each other. This needs a constant expansion of knowledge in the profession. These dictionaries are helpful as resources and provide a conceptual framework related to that professional work.

Professional dictionary helps to assimilate and to incorporate new terms into an understanding of theoretical material as well as helps in the application of the practical experience. In this type of dictionary, quite a lot of words which are not acquainted and familiar to common language learner are amplified and ordered in a systematic way as to show the relationship between concepts and definitions. In this way, dictionaries are available on every subject and they help learners to understand abstract terms and how to use them professionally. Examples of professional dictionaries are medical sciences, social work, dictionary of phonetics and much more based on particular subject.

2.9 Domain Based Dictionaries

In the domain dictionaries, terms are collected as either 'abstractions' which are present in many applications in the domain but take a different form in each time and context or they can designate 'domain-invariant functionalities' that segment the same operation and execution in all applications in the domain. At architectural level, the domain dictionary abstractions are often mapped to abstract interfaces and the domain-invariant functionalities are often mapped to concrete components.

The domain dictionary entries are well-suited in describing an application in a non-formal manner. Formal description of an application is best done using the modelling techniques offered by the OBS (On-Board Software) Framework. In a typical scenario, the domain dictionary entries can be used to formulate the

requirements baseline whereas more formal modelling techniques are used to define the application software requirements.

For each entry, the domain dictionary provides the following information:

- The name of the dictionary entry

- The definition of the dictionary entry

- The design pattern where the dictionary entry is introduced (only for entries that are directly associated with a design pattern)

2.10 Machine Readable Dictionaries

Machine-readable dictionaries (MRDs) are instructive and explanatory, they have been observed as a possible basis of information for use in Natural Language Processing (NLP) for the reason that they comprise of massive volume of lexical and semantic knowledge collected together over years of effort by lexicographers. MRD is a machine readable dictionary which consists of lexical databases which bring words with all their lexical information. It maintains various semantic relations among synonym sets. It maintains rich vocabulary organizational structure. Using this, it is very easy to construct and expand a domain lexicon. It provides rich semantic relations of words including synonyms, and antonyms.

It is a dictionary in an electronic form that can be loaded in a database and can be queried through application software. It may be a single language explanatory dictionary or a multi-language dictionary to support translations between two or more languages or a combination of both. An MRD is a dictionary with a registered arrangement that is demanded by faithful software (for example online via internet) or

it can be a dictionary that has an open structure and is available for loading in computer databases and thus can be used through various software applications.

A machine-readable dictionary likely to have additional aptitudes and is therefore sometimes called a Smart Dictionary. An example of a smart dictionary is the Open Source English dictionary. Machine-readable versions of everyday dictionaries have been seen as a likely source of information for use in natural language processing because they contain an enormous amount of lexical and semantic knowledge.

2.11 Electronic Lexicons

Electronic lexicography consists of a wide range of tasks, including planning, compilation, usage and finally evaluation of the electronic lexical resources with the help of computational tools. Panagiotis Gakis, et al. (2014: 1) explain that:

> "Electronic linguistic resources can be: (i) electronic corpora, (ii) electronic-computational lexicons for natural language processing (NLP) systems. There are two categories of electronic lexicons: Machine readable dictionaries (MRDs), usually built by transcription of existing printed-form lexicons to computer-readable form, aiming to support larger NLP systems. Electronic lexicons for humans, which employ a user interface for the interaction and databases with extra information".

The basic benefits of electronic lexicons with respect to printed dictionaries are their ability to store discretionary and impulsive extents of information in any of their fields. Hanks. P (2001: 3) in his article, *'The Probable and the Possible: Lexicography in the Age of the Internet'* says that:

"The absence of space constraints calls for more, not less, intellectual discipline in the selection and arrangement of information".

These lexicons display immediate reply to recall, process, and exposition of data with a capability of searching in many sub-lexicons simultaneously and ability for frequent and timely updates than printed form of lexicons. An additional advantage of electronic lexicons is their augmented search functionality. Besides the traditional alphabetic search by lemma, i. it is possible to perform complex searches by using information in other fields as well, like grammatical and morphological information, for example, all nouns with no plural form; ii. style fields, example, colloquial words; iii. thematic domain, example, biomedical terms; iv. etymological information, example, words that are derived from other languages like Greek, Latin, Arabic and so on and v. syntactic information, example, transitive verbs, like read, eat, hit, which takes direct object after the usage of verb, example, *He reads a book or poem, an essay, etc.*

2.11.1 Semantic & Lexical Relations

Before going to the explanation of semantics and lexicons and their relations, it is significant to discuss briefly their meanings. Accordingly, lexemes deal with words, semantics with meanings, and lexical semantics with the study of word meanings. The foremost objects for knowing the meaning of word-level semantics is principally stimulating from a reasoning standpoint is that words are names for individual concepts. Thus lexical semantics is the study of those concepts that have names. Lexical semantics brings the questions like, 'What can words mean, then, what concepts can have names?' And it provides with answers like words are

meanings of synonyms, antonyms, polysemes, homonyms and hyponyms. Palmer while reviewing on semantics says that:

"Semantics is the technical term used to refer to the study of meaning. The meaning of word is determined by the word's arrangements in sentences or other words." (Palmer, 1976:1) and Bolinger says that:

"Lexical relations are relationship of the meaning of a word to other words." (Bolinger, 1968:11) "Lexical relations include hyponymy, homonymy, synonymy, and antonymy and through these meaningful properties words' meanings are considered to observe meaningfulness, ambiguity, redundancy, anomaly, and contradiction of words meanings in detail".

Hyponymy is a word, the meaning of which may be said to be included in that of another word, example, Word: colour, Hyponyms: blue, red, yellow, green, black and purple. Homonyms are different words which are pronounced the same, but have different meanings; example, the word 'fluke' has same pronunciation and same spelling but, fluke can be used in two meanings, it is a fish as well as a flatworm. Synonyms are words which sound different, but have the same or nearly the same meaning; example, the word 'refer' also means 'to denote', and antonyms are words or expressions which are opposite in meaning or two words that express opposing concepts, example, bad –good, light-dark.

2.11.2 WordNet

WordNet is a lexical database of words belonging to various lexical categories like Nouns, Verbs, Adjectives and Adverbs. These are grouped into different sets of synonyms (synsets) each expressing a distinct concept. Synsets are connected by

means of a series of relations, viz. conceptual-semantic and lexical properties. Wordnet thanes some common characterization with thesaurus – in that they group words based on their meaning.

Bags of words as lexicons in WordNet are possibly arranged separately as part of the syntactic component of language. It confirms the comprehension that syntactic categories vary in idiosyncratic organization developed first from studies of word relations and connotations. Fillenbaum and Jones in 1965 asked English speaking subjects to give the first word they thought of in response to highly familiar words drawn from different syntactic categories. The fundamental differences in the semantic organization of these syntactic categories can be clearly seen and systematically exploited. George A. Miller, Richard Beckwith and Christiane Fellbaum (1993: 3) confirm that:

> In WordNet "….nouns are organized in lexical memory as topical hierarchies, verbs are organized by a variety of entailment relations, and adjectives and adverbs are organized as N-dimensional hyperspaces. Each of these lexical structures reflects a different way of categorizing experience; attempts to impose a single organizing principle on all syntactic categories would badly misrepresent the psychological complexity of lexical knowledge".

The most striking feature of WordNet, however, is its effort to consolidate lexical information in terms of word meanings, rather than word forms. In this meaning, WordNet reminds of a thesaurus more than a dictionary. WordNet is systematized by semantic relations. Since a semantic relation is a relation between meanings, and since meanings can be represented by Synsets, it is natural to think of semantic relations as indicators between Synsets.

2.11.3 Euro WordNet

Euro WordNet is a database which consists of a multi-lingual database of European languages. It is a network of the common elements or words of all European languages put together in the form of Euro WordNet. The aim of the Euro WordNet is the development of a common lexical database of WordNet for English, Spanish, French, Portuguese, Dutch and Italian, which means the meanings of one language word Synsets are clubbed with other languages' word Synsets. It results in a multilingual database that can be directly used for multi-lingual information retrieval.

The structure of the monolingual WordNet is first of all based on Synset structure which in Euro WordNet contains:

1. The multi-lingual database.

2. Multi-dimensional utility in Information Retrieval.

3. Machine Readable Dictionaries (MRDs) in Euro WordNet for semi-automatic extraction.

4. Maximal compatibility across the different resources.

5. Maintains language-specific to multi-lingual relations in the WordNets

6. User-friendly database for specific application.

Euro WordNet aims to build a multilingual database consisting of WordNets in several European languages (English, Dutch, Italian, and Spanish) etc. Each language-specific WordNet is structured along the same lines as WordNet (George A. Miller, 1993: 2), i.e. synonyms are grouped in Synsets, which in their turn are related by means of basic semantic relations. In addition, each meaning will be linked with an equivalence relation to a WordNet Synsets, thus creating a multilingual database.

2.11.4 Indo-WordNet

Indo WordNet is an online crossing point to render multilingual Indo WordNet information in the dictionary format. It allows user to view the results in multiple arrangements as per the need. Also, user can view the result in multiple languages simultaneously. The look and feel of the dictionary is kept same as a traditional dictionary keeping in mind the user adaptability. The Indo WordNet makes the information available in a simple and easy way to access and manipulate the WordNet resource independent of the underlying storage technology. The function of Indo-Word Net is visible through a set of well-defined objects that developer can create and operate as per his/her processing requirement. Although the current implementation expects the data to be available in a relational database, a two-layered architecture separates functionality from the database.

The Indo WordNet permits simultaneous access and updates to single or multiple language WordNets. A new design using relational database has been implemented for this purpose. This database design (Indo WordNet database) supports storage of multiple language WordNets. An effort has been made to optimize the design to reduce redundancy. Certain data common across all languages like ontology information, semantic relationships are stored in a separate master database and data specific to a language like synsets; lexical relationships are stored separately for each language in the database of respective language.

"It is constructed using the expansion model where Hindi WordNet Synsets are taken as a source. The concepts provided along with the Hindi Synsets are first conceived in the form of appropriate concepts in target language and are manually provided by the language experts. So far, it renders WordNet information of 19 Indian languages.

These languages are: Assamese, Bodo, Bengali, Gujarati, Hindi, Kannada, Kashmiri, Konkani, Maithili, Malayalam, Manipuri, Marathi, Nepali, Odia, Punjabi, Sanskrit, Tamil, Telugu and Urdu. The WordNet information is also rendered in English. The English WordNet information is taken from Princeton University website. All these WordNets are imported into Indo WordNet database structure." (Prabhu, 2012: 7) using DB

2.11.5 ConceptNet

ConceptNet is a broader range reasonable and coherent knowledge which is obtainable without obstruction basis with a cohesive natural-language-processing apparatus that supports many practical textual reasoning tasks over real world documents. ConceptNet is improved for constructing applied context-based implications over practical world texts. That it explains basically the form that is perhaps allocated to the fact that its knowledge representation is itself semi-structured English.

ConceptNet is a knowledge representation project, providing an enormous semantic display that defines general human knowledge and how it is expressed in natural language. The scope of ConceptNet includes words and common phrases in any written human language. It provides a large set of background knowledge that a computer application working with natural language texts. These words and phrases are related through an open purview of establishes, relating not just how words are related by their lexical definitions, but also how they are related through common knowledge. ConceptNet originated as a representation for the knowledge collected by the Open Mind Common Sense project (Singh, 2002: 3)

ConceptNet provides a combination of features not available in other knowledge representation projects:

- Its concepts are connected to natural language words and phrases that can also be found in permitted text.

- It includes not just definitions and lexical relationships, but also the common-sense associations that ordinary people make among these concepts. Its sources range in formality from dictionaries to online games.

- The concepts are not limited to a single language; they can be from any written language.

- It integrates knowledge from sources with varying levels of coarseness and varying catalogues of formality and makes them available through a common representation.

ConceptNet intends comprising both specific facts and confused ideas which are unreliable in world of common sense knowledge. In order to understand concepts that appear in natural language text, it is important to recognize the informal relations between these concepts that are part of everyday knowledge, which are often under-represented in other lexical resources.

2.11.6 Telugu WordNet

Numerous methods are followed in the construction of WordNets across the languages of the world. For the Indian languages, WordNets are created using the develop model. For every Indian language, in the construction of WordNet, Hindi is considered as.

For the construction of Telugu WordNet, following the expand model, taking Hindi as source language WordNet synsets are developed. The concepts provided along with the Hindi synsets are first conceived and appropriate concepts in Telugu are manually provided by language experts. The Telugu synsets are then built based on the concepts created keeping in view the three principles through minimalism, coverage and replaceability. For the building of synsets, the use of the Offline Tool provided along with Hindi WordNet synsets. This standalone interface allows users to view the Hindi synsets, concepts, example sentence on the one side and simultaneously keying the target language synsets, concepts and example sentence. The tool also has the Princeton WordNet English synsets interlinked. This helps the language experts to cross check with English WordNet synsets.

CHAPTER - 3

Approaches to Lexico-Semantic Studies

3.0 Introduction

The present chapter discusses some of the modern approaches to lexical meaning in semantic theories. It has been noted that the implication of various linguistic elements and the mode in which their meaning signifies human knowledge, has been a concern from ancient to present times (Crystal 1987: 100-101). Furthermore, it has been noted and investigated by Schank and Kass (1988) on the question of what is the nature of – linguistic-semantic – knowledge? and how is this knowledge utilized? Within the rubric of cognitive science.

To investigate the historical progress of the issues related to linguistic meaning from the initiation of primitive analysis of languages to the advanced technologies across socio-cultures and traditions contemplating the challenges posed by various demands from modern requirements. Hence, in this chapter, emphasis is on the different methods related to the aspects of linguistic, and particularly, lexical meaning in the twentieth century and in particular the latter half of the present century.

3.1 Approaches to lexical meaning

It may be said that the study of semantics is an interdisciplinary endeavor, and has by no means been the only concern of linguists. As a matter of fact, more often than not, linguists have been dissuaded away from aspects of meaning and left it to be addressed by philosophers, psychologists, cognitive scientists and more in recent times computational linguists working on the language and mind or on artificial intelligence and language technology. The current study will be dealing with the

different effects of the various disciplines with respect to the study of meaning in this study. We will summarize lexical semantic study in the tradition so far in the following perspectives: lexicographical, referential, structuralist, behaviorist, functional-pragmatic, logical, psycholinguistic, neurobiological, and computational.

3.1.1 The Lexicographic Perspective

When the sociolinguistics was on the rise in the commencement of the twentieth century, the major issue with lexical meaning was the mode(s) in which the meaning (and structure) of individual lexical substances in the languages had been changing. A thorough etymological study of individual lexical matters (often in connection to their phonology) was taken up. This suited the broader objective of tracing the basis of modern European languages from a general, distinct source, such as Indo-European (Crystal 1987: 296, 330).

The methods at work in changing the meanings of words, such as metaphor, metonymy, bleaching, etc. were acknowledged and considered to have contributed a major function in the progression in modern lexicalist Semantics. From these etymological readings, the foremost modern dictionaries (which replicated this etymological objective) were fashioned (Crystal 1987: 109). Modern lexicography has, since its origin in 1755 with Samuel Johnson's *Dictionary of the English Language*, transformed significantly from this perspective.

For instance, many different categories of dictionaries (encompassing bilingual, professional and learner dictionaries, as well as thesauri) are now being compiled, of which only monolingual dictionaries are positively appropriate to this study in view of the fact that they are characteristically considered as representatives of the mental lexicon of mature monolingual speakers. The subsequent progress in

contemporary monolingual lexicography has had ramifications on the study of word meaning:

(1) The Dictionaries have changed from being normative and prescriptive to being representative records of languages.

(2) The objective of dictionary listings has chiefly switched from the etymology and pronunciation to their meaning – by giving definitions – and their contexts of use.

(3) Previously being modelled merely on a literary corpus and depending on the lexicographer's wisdom, modern dictionaries are at present supported by vast electronic text databases illustrating all variations, including dialects in a language.

(4) The contemporary technology is advancing rapidly and it is being employed both in the construction of novel resources distributed in dictionaries – for example, frequency counting and the grouping of words with the assistance of computational indexes – and in the illustration of this information in huge digital databases.

It may be noted that the impact of present, monolingual dictionaries to the study of word meaning is said to be twofold: (a) Comprehensive interpretations, meaningful instances of usage, characteristic collocations and selective elements are accessible for use and factor analysis. (b) The definite representation in which the information is characterized in printed dictionaries and in electronic form has had an effective outcome in the way that cognitive scientists consider information is represented in the mind. In this form the vocabulary of a language is characteristically perceived as a component of a lexicon or lexical element independent from the grammar of the language, with a record of entries in which each lexical slot is represented, and where

each lexical entry comprises all the semantic, phonological and grammatical information required to employ and comprehend that specific word.

The emphasis of the lexicographical stance in terms of the semiotic triangle is, in some respects, on the triangle as a complete: lexemes – (i) the orthographic (visual) and/or phonetic (sound) word structure, (ii) the ideas they signify (in the definition), and (iii) the referents in the actual world (e.g. with instances of a notion) is discussed. It is, nevertheless, essential to emphasize that the 'notion' in the lexicographical perspective has no position as a mental agency; it simply refers to the logic or meaning of a word. In view of the fact that the rationale of the lexicographical perspective as such is to record the 'traditionalized' lexical elements of a language as an independent object, the lexicographical approach makes no effort to linguistic creativity, apart from the representation of creative derivational word-formation regulations.

3.1.2 The Referential Perspective

It has been noted that the referential approach to meaning is, in a way branded as a folk theory of meaning (Zawada, 2005). A majority of populace consider that the meaning of words can be associated with the actuality that they name refer to objects in the actual world (Lyons 1968). The 'reference' of a term is the association amid the expression in terms of objects, actions, events, elements and characteristics in the world. The meaning of a word is hence regarded as corresponding to the reference of that term to the external world (Lyons 1968, De Stadler 1989), and the objective of this approach is thus totally on the relationship of WORD with the entities in the WORLD. Furthermore, Saeed (2003: 46) describes this as the "denotational approach which emphasizes the links between language and external reality". Various issues have conventionally been ascertained with the idea of reference as a mode of linking

word meaning (De Stadler 1989: 9, 17-18). It has been noted that the following are such as problems for the theory:

- There are several words for which the reference is not effectively set up. For instance, adjectives, and the words of fictional or mythical instances, viz., yeti dragon etc.

- Compositional semantics, as in the case of compound words such as white house (referring to the official abode of American President), are complicated, because the meaning of the compound cannot be generated from the reference of either in white nor the house, or from a basic arrangement of the references of the two terms (This is not a strong point against referential theory of semantics).

- Reference is a characteristic of expressions, such as complete noun phrases in a particular context, rather than an independent lexical object. For instance, the term *table* in isolation has a connotation which can be specified in a dictionary, however, the term *table* will simply have associative meaning is an expression, viz., *the table in my dining room sits 8 people* (cf. Zawada, 2005).

- The similar object in the actual world (for instance, *Venus)* can be described by various expressions which are both substantial, viz., *the morning star* and *the evening star*.

The aspect of reference (as contrasting to sense) has, nevertheless, persisted as a part of the discourse of word meaning, although it is only to employ it as a mode of rejecting the external world from the arena of semantic theory, as the subsequent quote from Crystal (1987: 102) illustrates:

> "Semantics is not directly concerned with the study of the external world, or its conceptualization. The world of non-linguistic experience

is the province of physicists, geographers, psychologists, and others. Nor, ... is semantics easily able to cope with the study of how language refers to this external world ... Rather, the primary focus of the modern subject is on the way people relate words to each other within the framework of their language - on their 'sense', rather than their reference".

This reference emphasizes an analysis in so-called independent linguistics that linguistic meaning (the speaker's familiarity of the meaning or substance of a word) is unique, and to be differentiated from encyclopedic information (the speaker's world knowledge, i.e. information which speakers have of the actual world in which they require to operate and perform, as well as such knowledge as is offered by the physical sciences) (Taylor 1991).

The main question now that can be asked is: What is the impact of the concept reference into the study of word meaning, and why can it not be discarded, although there are such unresolvable problems with it? It may be said that the impact and perseverance of the aspect of reference can be ascribed to the situation that human beings do not subsist in a Platonic ideal world, nevertheless in a physical actual world in which they speak, behave, respond and perform, and employ terms and linguistic expressions to ascribe to actual objects and circumstances. Further, it may be noted that part of the meaning of a word is at all times the third component of the meaning triangle (world), which illustrates the notion that component of the meaning of a word is that it illustrates human experience in the actual world.

3.1.3 The Structuralist approach

In the structuralist approach, the meaning of a term is associated with the *sense* of the word. Any *sense* of a word, may be said, signifies its position in a

classification of relationships which it accords with other words in the vocabulary (Lyons 1968). In accordance with structuralism "every language is a unique relational structure or motion and the units which we identify a postulated by theoretical constant in analyzing the sentence of a particular language derives both their existence and essence from the relationships with other units in the same language system" (Lyons, 1977). The substance of a word is, in accordance, the complete set of the discursive and paradigmatic sense relations that the word enters into in a particular language (De Stadler 1989). In view of the fact that, the sense of a word is definable entirely in terms of its relationship to other terms in the vocabulary of that language, the idea of sense makes no presumptions either about the subsistence of objects or properties exterior to the vocabulary of that language, or else about the mental representation of terms and conceptions in the minds of speakers.

It has been noted that the paradigmatic sense associations subsist amid the members of the sets of semantically-related words that can take place in the unchanged context. For instance, words of same category are paradigmatically associated, while *dog* and different categories are syntagmatically associated. The sense relations that usually feature in structural evaluations of the meaning of terms comprise antonymy, synonymy, homonymy, hyponymy, and polysemy (cf. Bloomfield 1933, Hockett 1958, Lyons, 1977).

In the structuralist approach to word meaning, in addition to language in common, the analytical method of examining the structure of the vocabulary of a language was of major significance. The systematic methods employed were componential analysis, in the sense the meanings of terms are found to have been analyzed into primordial elements (Lyons 1968, Nida 1976), and the examination of

semantic fields (Lyons 1968), and different semantic evaluations and diagnostic categories that were formulated for precise semantic patterns (Cruse 1986).

In accordance to Lyons (1968: 429), the significance of the structural technique to semantics constitutes in the meticulous challenges on methodology and evaluation that should be addressed by all succeeding approaches, and it has been established by examinations into *semantic fields* (or arenas), such as kinship terms, color terms, body organs, the words of moral and aesthetic appraisal, and different additional types of knowledge, ability and comprehension, which have established that specific arenas of human activity and knowledge are classified in a different way by various languages.

The objective of the structuralist approach may be said is based entirely on the tradition of language as an external entity, which means that it could not, in opinion, formulate a contribution to linguistic creativity, even though exhaustive study across a variety of fields of human progress, referring to the above, have introduced the path for an identification of the function of background knowledge in the construction of meaning.

3.1.4 The Behavioristic Approach

In the behavioristic perspective of meaning, the meaning of a term is associated to the motivation generated on the part of the speaker and the reaction that results from the listener (Crystal 1987, De Stadler 1989). A lot of socially-triggered, ready-made replies to traditional repetitive proceedings in the social progression (such as compliments and greetings) are in the structure of accustomed responses, and according to Lyons (1968: 416) "quite properly described in behaviorist terms", although behaviorism as a common justification for human effort is no longer visualized as applicable. The major problem that is frequently ascribed to the

behaviouristic approach in linguistics is that standard terms only figure as a minor subpart of our linguistic selection.

The contemporary corpus linguistics is, on the other hand, portraying those standard terms possibly will, actually, not be such a minor part of the linguistic range. The issue with behaviorism in terms of linguistic creativity exists in the actuality that the human cause as the focus of creativity is nullified. The involvement that this approach formulates to the study of word meaning is that phatic statement and the social attitudes that speakers produce to meaning and conversation are not left out of the representation. A motivating issue that this approach conveys to the semiotic triangle is that the world part of the triangle does at present not merely comprise of things and occurrences in the actual world which are referred by words, however, that the world at present, in addition, encompasses the real language users in real language use conditions.

3.1.5 The Functional-Pragmatic Approach

The functional-pragmatic approach visualizes language as a social mechanism with which an individual executes social communicative activities, viz., greeting each other, seeking information, giving instructions, providing information and linguistically functioning in the world. In this method, the meaning of an expression is akin to its *use*. This perspective of meaning may be said has accorded growth to the arena of pragmatics, in which theories such as speech act theory consider messages as speech acts with different kinds of elements. For instance, a message or an expression such as *It is cold today* can have the performative force of both an announcement and a request and can comprise the perlocutionary consequence of a substantiation (in response to the statement) or an act (in response to the request).

In various observations of meaning, the semantic module (in which the *sense* of an expression is illustrated) and the pragmatic module (in which the contextualized *use* of an expression is illustrated) are visualized as divergent components, each with their individual set of evocative units and regulations (Crystal 1987, De Stadler1989). As is the issue with the behaviorist method, the concentration in this method is on the language structure and its employability in the actual world which comprises other language users.

It may be noted that the importance of the functional-pragmatic method has been twofold: linguistic messages as social actions may be said to have continued as part of what has to be clarified within the broader outline of meaning, and the information that non-literal and indirect expressions form a major part of human's everyday linguistic and creative behavior (and persisted mostly unaccounted for in semantic theories) is emphasized.

3.1.6 The Logical Approach

It may be said that in the exploration for a formal model of meaning, some semanticists moved to the language of propositional and predicate logic to illustrate meaning. For instance, in the justifiable approach to meaning, the meaning of a sentence, or a suggestion, is associated with the factors under which this suggestion would be actual in every probable world. This kind of semantics is as a result often as well called 'possible world semantics' (Van Fraassen 1988, Saeed 2003). This method may be influenced to a great degree by the superiority of mathematical and computational modules and gave rise to theories such as truth-conditional semantics, logical form and mathematical linguistics. The logical method as a complete will not be illustrated at this juncture in any more detail as its chief concentration was not on

lexical semantics as such, with the clear exception of the logical developers, viz., conjunctions and quantifiers (Crystal 1989, De Stadler 1987).

For the explanation of the meaning of lexical components, the logical method mainly may be said relied on the idea of compositionality from the structuralists. The explanatory mechanisms of the structuralists, viz., binary definitional characteristics were turned into theoretical mental concepts (Katz and Fodor 1963, Kempson 1977, Saeed 2003). The logical method, in addition, initiated the notion of the computational modelling of semantic theories.

Santambrogio and Violi (1988: 7), for instance, mention that "logical semantics does not aim at giving a psychologically plausible representation of meaning ... [even though it is] committed to some degree of psychological realism". In the logical method, there is hence a concentration on the relationship amongst words and the concepts they signify, even though the concepts are not at all times proposed as modelling the lexical knowledge of a speaker. The mere sense in which this method establishes a contribution to linguistic creativity is that the definitional characteristics can be joined in various modes to create meanings for various words.

3.1.7 The Psycholinguistic Approach

It may be noted that the term 'psychologistic' (Santambrogio and Violi, 1988) or psycholinguistic pertains to the explicit notion that theories of meaning ought to be psychologically factual. That is psychological implies to the supposition that linguistic meaning is initially a phenomenon of the human mind or 'psyche'. Employing the term 'psycholinguistic' as an umbrella term for this method (as an alternative of the easier terms 'mental', 'cognitive' or still 'conceptual') is entailed by the perception that the terms 'mental', 'cognitive' and 'conceptual' have all been

employed to allocate definite theories (with exceptionally diverse suppositions, methodologies and hypotheses) in this method.

The mere commonality amid the different theories in this technique is that they all consider linguistic meaning as a phenomenon of the human psyche. Although the psycholinguistic method to the study of language is regularly perceived as emanating in the rejection in the sixties (by Chomsky) of Skinnerian behaviourism, hence, it must be noted in mind that in studies of word meaning, structuralism dates back to the beginning of the 20th century (Crystal 1987). By rationale of the nature of the method, the major concentration in all the individual theories in this approach is on the concept as a mentally signified entity. Proposals regarding the nature of the concept and the nature of the mental representation differ from theory to theory.

It may be noted that an added contemporary formulation of the psychologistic perspective can be noticed in Jackendoff (1988) with his Mentalist Postulate: "meaning in natural language is an information structure that is mentally encoded by human beings". Jackendoff (1988) asserts that it is the *construal* of the outside world by speakers that is of significance, rather than the objects of the actual world themselves as the agencies to which language denotes. *Construal* is interpreted as "the result of an external input and the means available to internally represent it" (Jackendoff 1988: 83). In view of the fact that mental construal is, in rationale, inaccessible to primary examination and depiction, a number of theories about the structure of semantic construal and mental illustration formulated in the psycholinguistic method. Jackendoff's *Conceptual Semantics* is merely one such theory and principally instigated in the logical method initiated by Katz and Fodor (1963).

An additional kind of psychological theory to word meaning was formulated within the broad area of psycholinguistics, as in Johnson-Laird's (1988) semantic networks and mental patterns, which is clearly grounded on data from language acquisition and behavioral psycholinguistics, and on investigational data on reasoning, memory and observation from the area of cognitive psychology (Lehnert 1988). Nevertheless, another kind of psychologistic theory is the one formulated under the name of *Cognitive Linguistics* (Lakoff 1987, Langacker 1987) which formulated principally from the so-called 'Roschian revolution' on model classification (a word coined by Posner 1986) in the seventies. However, at present, it expanded to comprise all notions of word meaning, sentence and discourse meaning in addition to linguistic structure. One of the major precepts of Cognitive Linguistics is that of *embodiment* or *experiential realism* where "meaning is understood via real experiences in a very real world with very real bodies" (Lakoff 1987: 206).

Santambrogio and Violi (1988: 10) note the following concerning the psychological stance to meaning. It is primarily of a theory of recognizing and of language utility, as contrasting with a theory of abstract agencies called "meanings". As such it is noticeably sensitive to empirical limitations of different types; it must represent what "actually goes on in the mind" (psychological realism), and it must explicate how language itself can be so competently learned by human beings - which is a stringent restraint than simply requiring ... ability to finite representation of meaning.

It may be said that such a viewpoint is generally shared in different areas of intellectual discourse such as theoretical linguistics, artificial intelligence and cognitive psychology, and is personified in a number of detailed theories of meaning ...Santambrogio and Violi (1988) then categorize four major developments or

"families of theories" in the psycholinguistic method to meaning: (i) the decompositional theory, the meaning postulates are grounded on semantic works, theory and the perspective grounded on semantic networks, which are historically and functionally stringently related; (ii) the methods grounded on the aspects of prototypes, stereotypes and structures; (iii) the perception from artificial intelligence that the notion of procedure is a key to the formulation of meaning, and (iv) techniques grounded on the aspect of mental patterns.

The differences among the diverse kinds of theories in the psychological or method to word meaning can be basically ascribed to differences in philosophical levels of departure, which guide to various background suppositions, which in order decide the questions that have to be accounted for, in addition to the appropriate data and probable explanations (cf. also Bosch 1988). The contribution of the psycholinguistic method to meaning is threefold: (i) An emphasis on meaning considered as an *information structure*. (ii) An emphasis on meaning considered as an *act of construal* by the speaker. (iii) Studies in word meaning were shifted from the domain of examination and description to a domain of theorizing, which has been corroborated by the computational representation of these theories.

Provided these contributions of the psychologistic techniques, these kinds of techniques ought to be capable of formulating the most significant type of contribution to the study of linguistic creativity interpreted as the 'making of new meaning', even though this has not been apparent. At the end of the twentieth century in a technological age which has, in addition, had meaning can be studied. Technology, by and large in the shape of computers, has had a result on the study of word meaning in terms of its methodology given the vast lexical databases at present, in addition to the sense that novel techniques for the study of word meaning have

materialized in that the nature of meaning could be computationally modeled. These novel techniques, the computational method (encompassing natural-language processing (NLP) and Artificial intelligence (AI)), and the neurolinguistic strategy, will be addressed within the following sections.

3.1.8 The Neuro- and Biological Approaches

The beginning of a neurological perception in the discussion on the illustration of linguistic meaning, unavoidably promotes the aspect of classical dualism, i.e. the question of whether the psyche and the body (or brain) ought to be considered as detached entities. In view of the fact that this is not an inquiry that has in any way been sorted and as present day neuroscience has been promoting a few interesting novel perceptions on the aspect, it is probably essential to comprise this method at this juncture. It may be noted that the two patterns have constantly influenced the neurological study of language. On the one hand, from the times of Broca and Wernicke in the earlier century (Crystal 1987), the area of neurolinguistics has dedicated itself to pathological linguistic disorders. Subsequently, particular disorders were typically associated with definite areas of the brain; hypotheses were fashioned as to the particular loci of linguistic skills in the brain. On the other hand, a constant, though variable, concern in the evolution of the human brain, particularly as it is connected to the progress of the linguistic skill in human beings, has lingered all through the century (what Crystal 1987: 412 calls biological linguistics). In the contemporary progress of the neurosciences in the last twenty years, and in particular with the beginning of novel scientific technology, these two developments have continued, however with an improved interest in the advancement of the brain in terms of phylogenetic as well as in ontogenetic processes (cf. Deacon 1997, Lamb 1998, Schwarz 1992). It has been observed that progressively research of the

execution of healthy, normal brains somewhat than simply of damaged or diseased brains are in addition being undertaken.

The major involvement of the neurological and biological techniques to the study of language in common, and meaning particularly, is that it poses the necessity and interest of computational models of semantic theories. Neuro- and biological techniques reaffirm that it is linguists that 'make new meaning' and not machines. The requirement to set in any semantic theory within a probable account of the progression of the linguistic skill of humans as a species, in addition to in a particular individual, in terms of biological formations and procedures, appears a limitation that can barely be ignored. The beginning of studies of the architecture and performance of the brain in semantic techniques has supplemented thus far another facet to the semiotic triangle which was not present earlier. The concept part of the semiotic triangle can no longer merely be considered as an entirely conceptual aspect, although neurological structures and progressions may, in future, require being taken into description.

3.1.9 The Computational Approach

It may be noted that apart from the utility of computers in the progress of research in computational techniques in the analysis of vast electronic lexical databases, the introduction of faster, additional powerful computers have fashioned the novel areas of NLP and AI. Natural language processing entails human-machine communication in which the machines are configured to recognize human speech (speech recognition) and respond in human speech (speech synthesis). NLP is characteristically employed in communications applications, and also in machine translation (Crystal 1987). Artificial intelligence, furthermore, encompasses a broader area (which comprises NLP) and engrosses the simulation of different kinds of human

knowledge and abilities by machines. As Schank and Kass (1988: 181) state: "The AI researcher tries to program the computer so that it can understand and interact with the outside world".

The objective at this point is hence on the *word* and *world* notions of the meaning triangle. No contribution is, in provision, meant to be made to conceptual creativity as simply existing knowledge is or can be modelled. It may be noted that efforts have been undertaken to model conceptual creativity involving AI techniques, however as they do not prioritize on lexical meaning and the illustration thereof in human psyches and brains, these studies will not be discussed here.

In these two strictly associated areas there are two chief philosophies (which in wide terms correspond with the dissimilarity amid applied and theoretical work): (i) the idea that software applications must be formulated as practical assistance in definite situations, for instance as communication devices, as opposed to; (ii) the idea that a fractional (or even total) simulation of the actions of the human psyche by a computer is an attainable target, which will add to the perception of how the human psyche works (Kourie 1989).

In both NLP and AI, the function of lexical knowledge has performed a great part, and achievements and failures in these areas have added the following to the discourse on the demonstration of meaning: The effective computational simulation of linguistic (and as a result semantic) theories appear to have turned out to be an advantageous both as an investigation for linguistic theories and as a vital facet in practical applications.

3.2 Summary

In this chapter thus far, a discussion on some of the major techniques to the study of lexical meaning, specifically the lexicographical method, the referential

method, the structuralist method, the behaviouristic method, the functional-pragmatic method, the logical method, the psychologistic method, the computational method and the neuro- and biological methods is undertaken. In each context, an attempt has been undertaken to point out the natural contribution(s) of each of these approaches. Many of the points mentioned come from the listing of Zawada (2005).

CHAPTER - 4

Review of Literature

4.0 Introduction

The present chapter discusses the earlier works carried out in the field of lexico-semantic study of nouns. The main emphasis of the chapter is to describe, how the analyses are carried out previously in the field of lexico-semantic studies which are relevant for the ontological studies starting from the Aristotelian origin to the present. The chapter also concentrates on how exactly ontological studies were carried out and implemented in the field of natural language processing.

4.1 The Aristotelian Origin

The history of scientific taxonomy was considered to have started with Aristotle and is popular as a 'first philosophy' of essentialism. Taxonomic principles were laid out both in Aristotle's work on natural history and in his logic. In the logic, taxonomy or the division of things into genera and species is a way of classifying predicates (categories); it is a refinement of the ten basic categories of predicates (categories). In the long tradition of Aristotelian logic, the basic idea was developed in detail. Classification of the various categories say, of substance, took the form of branching tree diagrams that specified the various genera and species of the category. In Aristotle's natural history, as opposed to his logic, the taxonomic notions of genus and species were developed to handle relations between things, primarily animals.

There are two sources for Aristotle's notions of classification: the first is in the logical works where he lays down the general theory of classification; the other is in the biological writings where he discusses the problems arising in the classification of animals. There is evidence which indicates that Aristotle's early biological studies were instrumental in his developing taxonomies as logical concepts. Aristotle has

provided the first division, the *summa genera*, in his ten categories, and within the

category of substance, his cosmology and biology were but further elaborations of

division. He did not extend this division to develop a hierarchical arrangement but his

commentator Porphyry did and the Porphyrian tree of hierarchically linked genera and

species became canonical in the tradition of Aristotelian logic. The tree provides a

logical classification of the category of substance as Figure 1 shows (*Slaugheter,*

1982:29)

Logical Classification of the Category of Substance

Supreme genus:	Substance
Differentiae:	Material	Immaterial
Subordinate genera:	Body	Spirit
Differentiae:	Animate	Inanimate
Superordinate genera:	Living	Mineral
Differentiae:	Sensitive	Insensitive
Proximate genera	Animal	Plant
Differentiae	Rational	Irrational
Species:	Human	Beast
	Socrates Plato Aristotle etc.
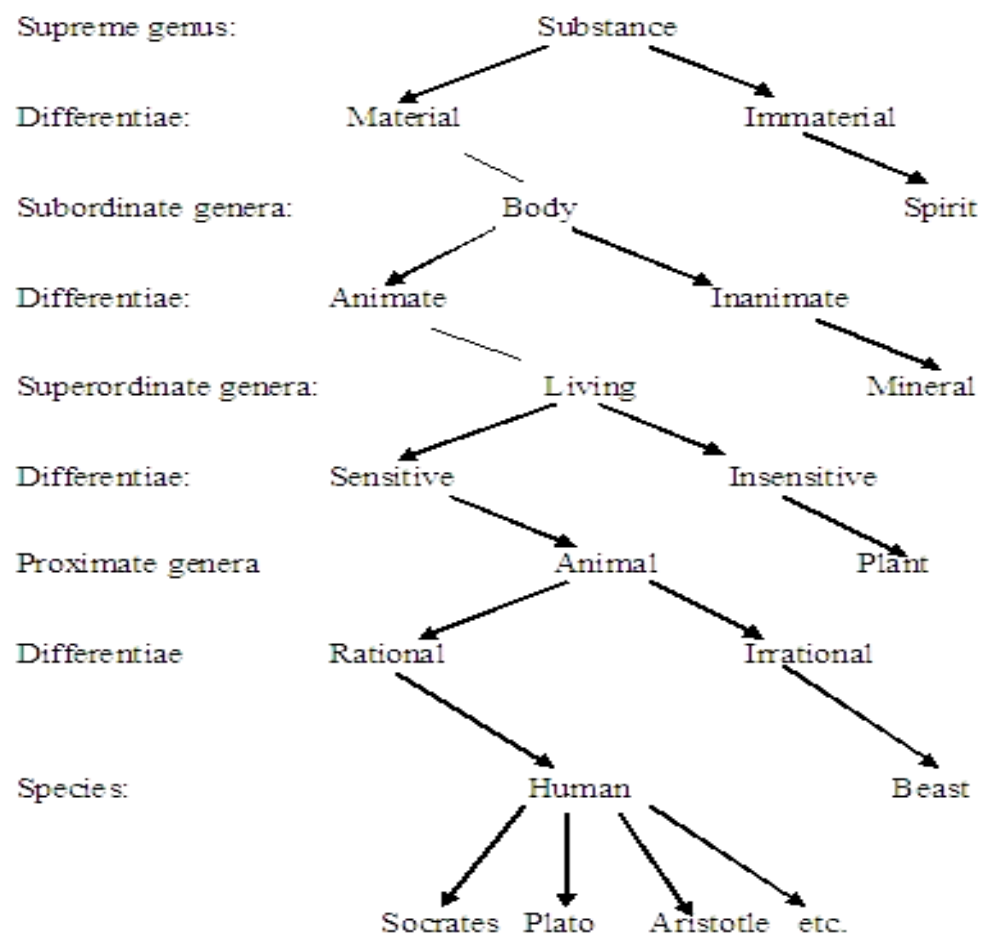
Fig: 4.1

According to the writing of Aristotle based on his remarks on categories, we could divide his secondary substance into the following Ten subcategories.

0. Substance

1. Immobile Substance – unmoved

2. Mobile Substance – Body

3. External mobile Substances – Heavens

4. Destructible mobile substance – Sublunar bodies

5. Un unsolved destructible mobile substance – Elements

6. Resolved destructible mobile substances – Living things

7. Incapable of perceptions - Plants

8. Capable of perceptions – Animals

9. Irrationals – Non- Humans

10. Rationals– Humans

By the sixteenth and seventeenth centuries what we find in Aristotelian logic books is further divisions in each category and in these divisions and tables include the philosophical and scientific lore of the age. The examples of Bunddeville (figure 2) (Slaughter, 1982:30). And Du Moulin (figure 3) are typical of the encyclopaedic nature of these logics (Slaughter, 1982:31).

Substance
```
                                    Substance
                          ┌────────────┴────────────┐
                     With body                  Without body
                          │                          │
                          │                  An Angel, A sprit or soul
                          │                  separate from the body
              ┌───────────┴──────────┐
           Simple            Compound of body & soul
              │                       │
      ┌───────┴───────┐       ┌───────┴───────┐
  Celestial as   Elemental  Living         Unliving
  the eleven     Fire,  Air,   │                │
  heavens &      Water,  Earth │                │
  all the stars            ┌───┴───┐      ┌──────┴──────┐
  & planets              Sensible Unsensible  Perfect   Unperfect
                          Animal  as a plant
                            │         │
                    ┌───────┴───┐     │
              Reasonable  Unreasonable  A tree
               as Man      A bird      A shrub, or
                           four foot   a herb
                            beast
                           A fish
                         A creeping beast
                          as a worm
                        A snake, a viper
```

Metal,
as a stone
Gold or silver, etc.
a precious stone or flint
Artificial, as a tile or brick

Liquor
as wine,
honey

Fiery impression
Thunder

Watery
Natural, as
Lightening

Fig: 4. 2

Substance

Created   Uncreated-God

Material   Immaterial

Complex   Simple   Separated soul   Angels

Elements: Heaven

Earth, Air,

Fire, Water

Imperfectly   Perfectly

Not-living   Living

Animals   Plants

Trees Herbs Shrubs

Beast   Man

Imperfect   Perfect

Zoophyta   Oyster   Air   Earth   Water

Birds, Insects,

Creeping things,

4 footed Amphibian

Fig: 4. 3

4.2 Taxonomy

Originally, the Aristotelian world view, retained and popularized in the concept of the Great Chain of Being, encompassed all phenomena of nature – everything embraced hierarchically from the heavenly planets to the lowliest worm and the mud in which it borrowed. Mechanistic philosophy made inroads on the higher reaches of the heavens but for the most part, it left untouched the world of living creatures.

Aristotle had posited that animate and inanimate natures are two fundamentally different things. Decontextualization and universalization of the words or concepts were attempted. This lead to the development of a scientific (botanical, zoological) taxonomy. The following levels of taxa are found:

1. Unique Beginner: e.g. plant, animal

2. Life form: e.g. tree, bush, flower, weed, fern.

3. Intermediate: this is an unstable category that manifests itself during a period of adjustment in the taxonomic system and then disappears when a settled, adjusted system is re-established

4. Genus: pine, oak, masterwork

5. Species: ponderosa pine, black oak

6. Variety: northern ponderosa pine, swamp white oak

A Comparison of Berlin's folk taxonomy with a fully developed hierarchy of specialized taxa reveal two ways of classification of things.

FOLK TAXONOMY   **SCIENTIFIC TAXONOMY**

Unique Beginner   Kingdom

Life Form   Phylum

	Class
	Order Specialized taxa
	Family
(Intermediate)	
Genus	Genus
Species	Species
	Sub-species
Variety	Variety

Rogets' thesaurus: Plan of Classification: In Roget's Plan of classification divides 1000 key items into the following six groups:

1. Words relating to **Abstract Relations**;

2. Words relating to **Space**;

3. Words relating to **Matter**;

4. Words relating to **Intellect**;

5. Words relating to **Volition;**

6. Words relating to **Affection**.

Class	Section	Sub section
1. ABSTRACT RELATIONS	I. Existence	
	II. Relation	
	III. Quantity	
	IV. Order	
	V. Number	
	VI. Time	

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		VII. Change	
		VIII. Causation	
2.	SPACE	I. In General	
		II. Dimension	
		III. Form	
		IV. Motion	
3.	MATTER	I. In General	
		II. Inorganic	1. Solids
			2. Fluids
		III. Organic	1. Vitality
			2. Sensation
4.	INTELLECT	I. Formation of Ideas	
		II. Communication of ideas	
5.	VOLITION	I. Individual	
		II. Intersocial	1. In General
			2. Possessive relations
6.	AFFECTIONS	I. In General	
		II. Personal	
		III. Sympathetic	
		IV. Moral	
		V. Religious	

4.3 Classification in (Dictionary) *niGaMtuvu* in Indian Tradition:

Lexicographic work began in India in the early Christian era culminating in the compilation of glossaries organized into ontological traits and into explanatory

theorised texts as Yaska's nirukta more emplaces laying on etymology. However, nighantu is the common term for dictionaries which are alternatively called as ko′sas 'depositions' of nouns nāmalingamu's a reads. Particularly mention may be made of Amarasimha's namalinganu sasra or Amarakosa. These are usually synonymic or homonymic-dictionaries (samānārthā or ekartha) grouped into subject-wise. Attempts to classify vocabulary of a language are found in the traditional Indian Lexicon, (*niGaMtu*) *dictionary*, which lay foundation for the compilation of thesauri or thesaurus dictionaries. The following classification is found in traditional Lexicon of Telugu

Rational creatures:	1. Divinities	*Devavarga*
	2. Human Beings	*mAnavavarga*
Irrational creatures:	1. Quadrupeds	*cawurpAxAlu*
	2. Birds	*aMdajAlu*
	3. Crawling beings	*krimulu*
	4. Aquatics	*jalacarAlu*
	5. Plants	*vanaspawulu*
Irrational non-living beings:	1. Natural things	*aprANiBOwikAlu*
	2. Artificial things	*kqwrimanirmiwAlu*
	3. Place	*xeSa*
	4. Time	*kAla*
	5. Part	*BAga*
Qualities:	1. Living creatures: mental qualities	
	2. Living creatures: communicative qualities	

3. Living creatures: qualities of

action

4. Qualities of non-living beings

The classification can be restructured as follows:

Things

guNa Object (of qualities)   *guNaM* Qualities

Qualities of   Qualities of
living beings   non-living beings

Mind   Speech   Action

Rational beings   irrational beings

Divinities Humans   Living beings   Non-living beings

Quadrupeds Birds Crawling Aquatics Plants

creatures

Natural Artificial Time Place Part
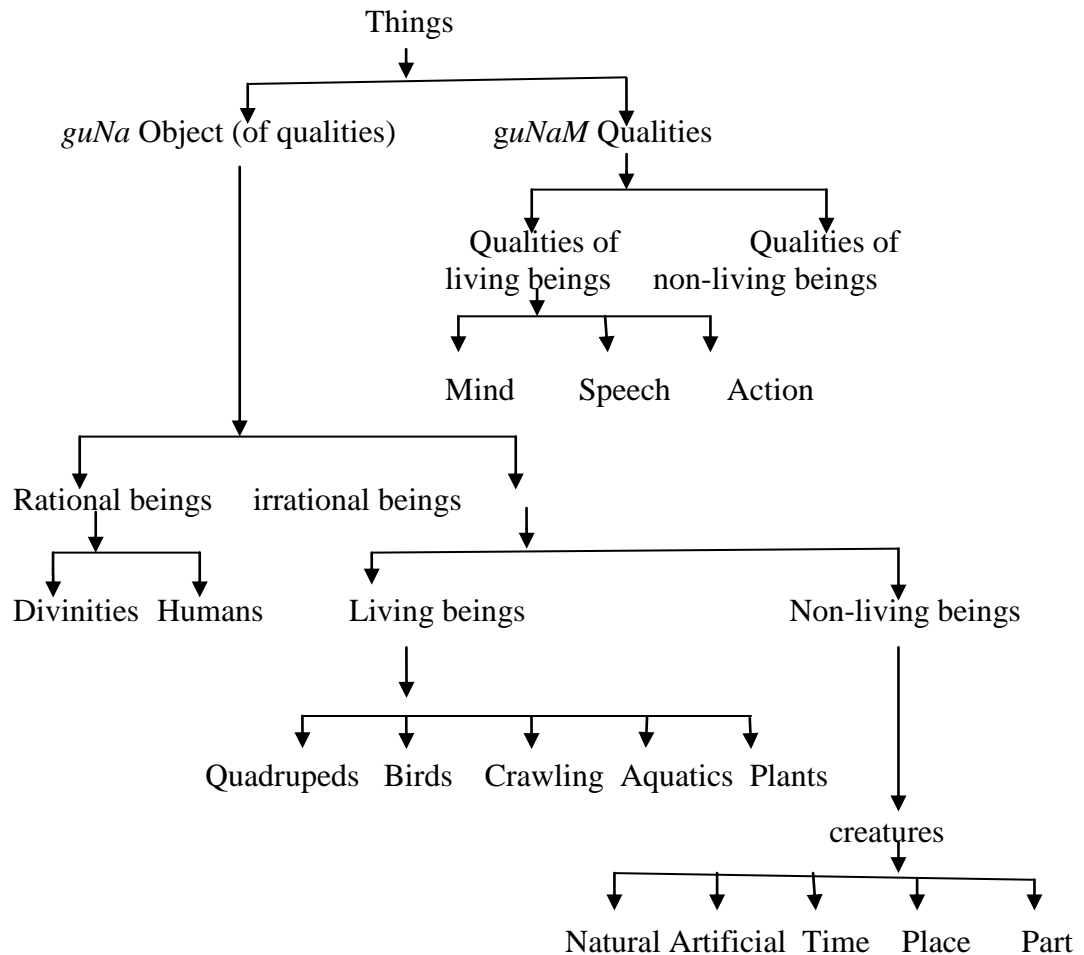
Fig: 4.4

4. 4 Nida's hierarchical classification

Nida (1976) who was concerned with the preparation of a thesaurus dictionary for Greek gives the following as the tentative hierarchical classification of the lexical items (178-186).

I. Entities

A. Inanimate

1. Natural

    a. Geographical

    b. Natural substances

    c. Flora and plant products

2. Manufactured or constructed entities

    a. Artifacts (non-constructions)

    b. Processed substances: foods, medicines, and perfumes

    c. Constructions

B. Animate entities

    1. Animals, birds, insects

    2. Human beings

    3. Supernatural power or beings

II. Events

    A. Physical, B. Physiological, C. Sensory, D. Emotive, E. Intellection,

    F. Communication, G. Association, H. Control, I. Movement, J. Impact,

    K. Transfer, L. Complex activities, involving a series of movements

    or actions

III. Abstracts

    A. Time, B. Distance, C. Volume, D. Velocity, E. Temperature, F. Color,

    G. Number, H. Status, I. Religious character, J. Attractiveness, K. Age,

    L. Truth-falsehood, M. Good-bad, N. Capacity, O. State of health, etc.

IV. Relational A. Spatial, B. Temporal, C. Deictic, D. Logical, etc.

This classification is based on referential meanings and it is not possible to obtain one to one correspondence between the semantic domain of classes and the grammatical classes.

4.5 Lexicography:

According to Trench (1858), a dictionary is an inventory of the words of a language along with details of meaning and other relevant information. Communities of the world's major and minor languages have recognized the need for the dictionary. Motivation for compiling a dictionary comes from various needs of the language, viz. language teaching, developing writers tools, language technology, natural language processing etc. Initially, collecting words, defining them, and arranging them in certain order would not seem to require any profound theoretical basis. However, when the activity demands for the building of a sophisticated and exhaustive work, involving theoretical and applied linguistic aspects then a number of issues begin to crowd in as in the following:

With regards to the relationship between words and phrases, the traditional dictionaries have tried to present distinction between words, idioms, and 'fixed phrases'. Recent advances, both in construction of grammar (e.g. Goldberg, 1995, 2006) and in corpus linguistics (e.g. Sinclair 1991, 1998; Hanks, 2004, 2013), suggest that meaning resides not only in lexical items but also in phraseology. Other question, often lexicographers juggled with is question of recording the millions of attested nominal phrases, such as *fire escape* and *forest fire*, each of which has at least one unique meaning, which is very often not derivable from the sum of its parts. Different languages dealt with such compounds in different ways. Further questions regarding the limitation of its inventory to recorded usage. Questions such as possible words and meanings in addition to recorded words and meanings.

It has been claimed that the earliest dictionaries in the world were compiled in China (Li Ming 2006, Yong and Peng 2008). Erya, dating from the 2nd or 3rd century BC, is usually classified as a work of encyclopaedic lexicography: it contains explanations of the meanings of words, phrases, and other passages in classic Chinese texts. According to Karen Chung (personal communication), the Erya falls somewhere between a thesaurus and a topically organized lexicon. During   (ca. 2 AD), Xu Shen compiled the Shouwenjiezi, etymology of Chinese words. This is the beginning of all subsequent Chinese lexicography it contains around 10,000 entries in Chinese characters, with information about their origins, meanings, and pronunciation. It is organized in 540 sections according to the 'radicals' of each word.

India and Persia Sanskrit dictionaries and thesauri were compiled over two thousand years ago, and these were the start of a long tradition of native lexicography in Indian languages. Three terms are particularly relevant to the Indian lexicographic tradition: nighantu(ko′sa), and nirukta. Nighantu simply means 'lexicon'. The earliest known nighantu gives explanations of obscure words found in Vedic texts (sacred literature). In the second or third century BC, a scholar called Yaska, about whom nothing else is known, wrote an etymological commentary (nirukta 'explanation') on words found in a lexicon (nighantu). A kosha is literally a storehouse or treasury. Unusually for lexicography, the earliest kosha was written in verse. It contains entries for nouns and indeclinable forms, but not verbs, and was intended for use by poets. The best-known such work is the Amarako′sa by Amarasimha, a Buddhist scholar and poet who probably lived in the sixth century AD.

Amarakośa is the ancient and the most popular lexicon compiled by Amarasiṁha, the renowned scholar, a well-known poet, and grammarian lived around 5th century AD. It discusses the usefulness and derivations of a word. Scholars ascribed the immortality of nāmaliṅgānuśāsana is due to its faultless work. Essentially, it is a dictionary of synonymous words but devotes a section called nānārthavarga dealing with homonymous words too. The latter words   are arranged according to the final syllable. It contains a total of 11,580 words.   These words are the words that are used in the synonymous sets of words which define the semantic content of the words. In the beginning of his work, he brings up some special rules, a sub set of metarules to interpret the gender information of a word. Amarakośa is divided into three kāṇḍas. Each kāṇḍa is further sub-divided into "vargas". The first kāṇḍa has words pertaining to gods, heaven and thefive basic elements (pañcamahābhūtas) and abstract concepts such as direction (dik), time (kāla), the speech (vāk), etc. This chapter has ten "vargas". The second kāṇḍa deals with the words denoting real physical objects such as earth, human beings, animals, plants etc. This chapter also has ten "vargas". The third kāṇḍa has five "vargas" where words dealing with the description of the grammatical miscellany, polysemous words and other miscellaneous words are dealt with as in the following:

Chapters (khaṇḍas):

      I.   First Chapter (prathamakāṇḍa),

      Vargas from each kāṇḍa are named thus:

1. Svargavargaḥ (heaven): Heaven, Gods, Demons, their arms, ornaments, symbols or vehicles, and other attributes, Fire, Air, Velocity, Eternity, etc.

2. Vyomavargaḥ (sky): The Sky and its related concepts.

3. Digvargaḥ (direction): Directions, Deities of the directions, elephants at the points, their female elephants, Cloud, thunder, lightning, rainbow, Rain, hail, rainy day, cloudy day, Moon, types of light, frost, Stars, Planets, sunset, dawn, sunlight, etc.

4. Kālavargaḥ (time): Time, day, night, variations of the moon, eclipse, second, hour, months, year, Weather, seasons, Happy, Sorrow, Soul, Mind, etc.

5. Dhīvargaḥ (cognition): Individuality, consciousness, knowledge, sense, organs, tastes, fragrance, colours, etc.

6. Śabdādivargaḥ (sound): Sarasvatī, voice, word, Vedas, Vedāṅgas, stories, legends, sound, types of sounds, speech, musical sounds, song, ornament's sound, etc.

7. Nāṭyavargaḥ (dance and drama): Seven musical tones, Musical Instruments, dance, theatrical characters, sentiments, desire, affection, kindness, Festival etc.

8. Pātālabhogivargaḥ (nether world): Infernal region, hole, darkness, Snakes, kinds of serpent, parts of snake, etc.

9. Narakavargaḥ (hell): Hell, various hells, departed souls, pain, etc.

10. Vārivargaḥ (water): Water, Ocean, wave, whirlpool, shore, channel, island, boat, voyage, pilot, deep, fish, fisherman, net, fish basket, hook, etc., types of fishes, Aquatic animals, crab, turtle, etc. Well, pond, types of ponds, River, Names of rivers, water plants, lotus, water lily, etc. Parts of these plants etc.

II. The Second Chapter (dvitīyakāṇḍa) :

1. Bhūmivargaḥ (earth):Earth, land, soil, clay, world, India, regions, types of lands, country, village, kingdom, hill, road;

2. Puravargaḥ (Towns or Cities): City, suburb, Market, fort, wall, house, kinds of houses, parts of house, house holdings, building land, etc.

3. Śailavargaḥ (hills and mountains): Mountains, kinds of mountains, parts of mountains, caves, etc.

4. Vanauṣadhivargaḥ (forests and medicines): Forest, garden, tree, parts of tree, flowers, fruits, leaf, shrub, creeper, names of trees, names of shrubs, names of creepers, names of grass, etc.

5. Siṃhādivargaḥ (lions and other animals): Animals, lion, tiger, wolf, deer, kinds of deers, etc. Insects, bee, cricket, birds, hawk, skylark, crow, parrot, etc. parts of birds, wing, beak, etc.

6. Manuṣyavargaḥ (mankind): Man, woman, descriptions of woman, blood-relations like son, daughter, husband, wife etc., manhood, different stages of manhood, parts of our body, diseases such as cough, scab, etc., dress, ornaments, cloths, types of cloths, cosmetics, fragrant plants, sandal etc., hair decoration styles, daily usable things etc.

7. Brahmavargaḥ (priest section): Tribes, religious states, sacerdotal, scholars, characters and descriptions of priests, their occupations and observances, types of fires, sacrifice, its requisites, alms, worship, austerity, study, hypocrisy, marriage, human, pursuits and objects etc.

8. Kṣatriyavargaḥ (military section): Military tribe, kings, ministers, officers, servants, enemies, allies, requisites of government, means of defense, and of success, revenue, foresight, insignia of royalty, army, elephants, parts and kind of elephants, horses, types of horses, vehicles, chariots, litters, warriors, arms and weapons, bow, arrow, javelin etc. war, slaughter, funeral, prison, life, etc.

9. Vaiśyavargaḥ (business section): Third tribe, professions, husbandman, field, implements of husbandry, corn, pulse, oilseeds, granary, kitchen, vessels, prepared food, dairy, cattle, traffic, weights and measures, commodities, etc.

10. Śūdravargaḥ (Others): The Fourth tribe, the mixed classes, artisans, jugglers, dancers, musician, hunters, servants, barbarians, dogs, hogs, theft, nets, fops, loom, plot for burden, wrought leather, tools, art, images, wages, spirituous gaming, etc.

III. Third Chapter (tṛtīyakāṇḍa):

1. Viśeṣyanighnavargaḥ (adjective): Epithets of persons, Qualities of things, etc.

2. Saṁkīrṇavargaḥ (miscellaneous): Miscellaneous words;

3. Nānārthavargaḥ (polysemous): Homonymous and polysemous words;

4. Avyayavargaḥ (indeclinables): Indeclinables

5. Liṅgādisaṅgrahavargaḥ (gender): The three genders, and variations of gender: They are Masculine, Feminine, Neuter, Masculine and Feminine, Masculine and Neuter, and Feminine and Neuter.

The lexicon, Amarakośa is of great importance and is seriously studied, used and one of the most extensively translated text into various

Indian and foreign languages. Scores of commentaries are written and published. It has influenced lexicographic traditions, both in the east and the west.

During the early middle age, there has been a lot of cultural exchanges between India and neighbouring Persia. There is some evidence that Persian dictionaries existed before the modern times, particularly mention must be made of Loghat-e-Fors (Lexicon of Persian), compiled by Abu Mansur Ali ibn Ahmad AsadiTusi (c. 1072). The main aim was not only to record and explain words found in Persian literature and that might be unfamiliar to his contemporaries. The entries are illustrated with citations from literature and are arranged according to the alphabetical order, unlike the Amarakośa. However, another Persian lexicon compiled by Faxr-e-QavasQaznavi in India in 1291, the Farhang-e-PanjBaxši 'culture in five sections'. The Persian lexicographical tradition flourished in India, where many Persian writers lived and practised. In the last millennium, there are about 130 Persian dictionaries were compiled.

The history of Greek lexicography account both the efforts of Greek lexicographers in classical times and of the lexicography of ancient Greek since the Renaissance. From the fifth century BC onwards, Greek scribes used glasses to read and understand manuscripts of earlier scholars to explain obsolete and unusual words. Later these glosses were compiled into separate glossaries. In the second century AD, a   dictionary was compiled to distinguish 'correct' words and terms from the colloquialisms. Eklogē (Ἐκλογὴ 'selection') by Phrynichos of Bithynia.   Ancient Latin lexicographers are comparatively less known; works of classical Latin

lexicography have been hardly available. An ambitious monolingual dictionary called De Verborum Significatu 'on the meaning of words' was compiled by the philologist and educationist Marcus Verrius Flaccus (c. 55 BC – 20 AD). It was a huge work and was concerned with etymology and cultural history as well as word meaning. Entries were supported by citations from literature. In the 2nd century AD, Sextus Pompeius Festus edited a revised version of this work, partly survived. In the eighth century, the historian Paulus Diaconus created an abridged version of Flaccus's dictionary, and this has survived. It is said to be a cultural work rather than a linguistic compendium.

Arabic and Hebrew dictionaries were compiled between the 7th and the 13th centuries AD, with a variety of functions, including the prescriptive use of language, the facilitation of the use of the words of the Qur'an. As noted in Roth (1994), both Arabic and Hebrew lexicography flourished in medieval Spain, before they were all swept away by the Christian 'suzerainty'. Latin and Greek enjoyed a universally accepted conventional alphabetical order, but the history of the conventional order of letters in the Arabic writing system is ridden with problems. The fact that in written Arabic, normally only consonants are represented while readers are left to supply the vowels for themselves. Arab lexicographers experimented with various ways of ordering of words. In the Lexicon, Al-Jawhariyy's As-sihah 'the Strong' (ca. 10 A.D.) and IbnManzur's monumental Lisan Al-'Arab 'Language of the Arabs' (ca. 13 A.D.) words are ordered according to the last consonant and arrange the consonants in an order that is determined to some extent by the mode of articulation (as in Indian languages). Modern Arabic

dictionaries invented a different alphabetical order. The most important work of medieval Arabic lexicography is the Kitab Al-'Ayn (literally, Book of the 'ayn), compiled by Al-Khalil ibn Ahmad in the 8th century. An 'ayn is a written symbol representing the Arabic voiced pharyngeal fricative consonant /ʕ/ to indicate a comprehensive dictionary of the Arabic language. The earliest known works of Hebrew lexicography were compiled in the Middle East in the 10th century AD (see Drory 2000; Cohen and Choueka 2006). Hebrew had already become rare or extinct during the Roman Empire, so these were, in effect, dictionaries of a dead language. For two millennia Hebrew survived mainly (or only) as a liturgical and literary language, being preserved and cherished as a symbol of the ethnic and religious identity of Jews during the Diaspora. From at least the 2nd century AD it was no longer a medium of everyday communication. For that purpose, it was supplanted first by Aramaic and subsequently by Arabic. Sefer ha-Egron (902) is a lexicon of approximately 1000 Hebrew words for poetic purposes, compiled in Egypt by Sa'adiah ben Josef. The words are presented in two arrangements: first, they are listed alphabetically, while the second list is of words according to their final consonant, in order to facilitate rhyming. Some years later Sa'adiah issued a version of his work with glosses in Arabic, to facilitate understanding of the meaning of Hebrew words. Kitab Jami al-Alfaz (c. 945) is a Hebrew-Arabic biblical dictionary compiled in Fez, Morocco by David ben-Abraham El-Fasi. According to Cohen and Choueka (2006), "probably the finest achievement of medieval Hebrew lexicography is 'the Book of Roots' by Yonahibn-Janah." Ibn-Janah, otherwise known as Abu al-Walīd Marwānibn-Janāh. His lexicon, Kitab al-'usul, is the second part of a

work known as Kitab al-Anqih 'the Book of Exact Investigation'. The order of the words of the lexicon is based on the three-letter root system that is now recognized as universal for Semitic languages. The description and details of glosses are in Arabic. In the thirteenth century, a revised grammar and lexicon based on the work of IbnJanah was compiled in Narbonne by the Biblical scholar and philosopher Rabbi David Qimhi (ca. 12 A.D.).

In the middle ages, Europe has developed its lexicography in the form of interlinear vernacular glossing of words of Latin manuscripts. These glosses then compiled in alphabetical order. The earliest known example is the 8th-century Glosses de Reichenau consisted of over 5,000 words of the Latin Vulgate with glosses in Gallo-Roman a precursor of Old French. Similarly, in England, a glossary, PromptoriumParvulorum ('Young People's Storeroom'), compiled in about 1440 by Galfridus Anglicuswith 10,000 entries. Then, in 1499, the Promptorium was set in type and printed. Thus, the invention of printing is of the great importance in the history of lexicography.

4.6 Semantic Fields

Ontology enables (entities) to be related to their semantic fields. Aspects of semantic fields presume that the vocabulary of a language is structured in accordance with the structures of grammar and semantics of a language. The words of a language can be classified into sets in terms of conceptual fields and divide up the semantic space or the semantic domain in certain ways. The works of German linguists of half a century ago and that of American anthropologists has led to the development of field theories. Trier was most influential among the German linguists. Trier distinguishes between lexical and conceptual fields. The lexical field divides the

conceptual field into parts, like a mosaic. A word acquires its meaning by its opposition to its adjacent words in the pattern. Field theories are suitable for analysis of certain sets of words and less suitable for others. Trier believed that linguistic fields are not isolated, but rather that they "join together to form in turn fields of higher order, until finally the entire vocabulary is included. Whether or not a progressive synthesis of small fields into larger ones is semantically congruent is an open question. There is evidence for the view that semantic structures can be looked at in a variety of ways as is this case.

Lyons (1977) defines the meaning of a term as a function of its relationship to the other term in the lexical field, and the relationships (synonymy, antonymy, class inclusion, incompatibility, etc.) are primitives of his theory. Synonyms can be defined as a bilateral implication that A and B are synonyms if $A \supset B$ and $B \subset A$. Class inclusion is unilateral implication. $A \supset B$, where B is higher in the taxonomy than A, but it is not the case that $B \subset A$. Word contrast in a taxonomy are incompatible. If A and B are incompatible, then $A \supset$ not B and $B \subset$ not A.

Animal			
Dog	Cat	Horse	Sheep

The field theory provides a good model for deciding what to look for and what to describe when dealing with sets of words that are obviously closely related. Sets are words that show different types of patterns. For example cooking words, kinship terms and colour terms show different types of patterns exhibiting different types of relations between the words.

4.7 Semantic Networks

One of the important applications of ontologies is semantic networks. A semantic network or net is a graphic notation of representing knowledge in patterns of interconnected nodes and arcs. Computer implementations of semantic networks were first developed for artificial intelligence and machine translation, but earlier versions have long been used in philosophy and linguistics. What is common to all semantic networks is a declarative graphic representation that can be used either to represent knowledge or to support systems for reasoning about knowledge. Some versions are informal, but other versions are formally defined systems of logic.

It is necessary to build a knowledge base that includes hierarchical information in order to process language effectively. It is not difficult to argue that the knowledge base should 'know' facts like a Tommy IS-A dog, a dog IS-A mammal, and a mammal IS-A animal. In the knowledge base, Tommy will have all the properties of a dogs, and a dog will have all the properties of a mammal, etc. Although, there are differing opinions about whether this knowledge is inferred at that time of processing or inferred earlier and stored in the knowledge base. This is nonetheless crucial information which must be available for language processing. In general, the network/hierarchy efforts are more narrowly devoted to detailing hypernymic and hyponymic relations (at other times referred to as IS-A relation or AKO [a-kind-of] relations) between words and word senses defined in the dictionary. These are various semantic relations explicitly intended to support inheritance. Dictionaries provide a rich source from which we can extract this kind of information automatically on a large scale.

4.8 Naïve Semantics: Knowledge base for Natural Language Understanding: **Dahlgren Kathlean**, in her book *'Naïve Semantics for Natural Language*

Understanding' published on 1998. Naive Semantics (NS) is a theory of the knowledge underlying natural language understanding. The basic assumption of NS is that knowing what a word means is not very different from knowing anything else, so that there is no difference in form of cognitive representation between lexical semantics and encyclopaedic knowledge. Naïve Semantics represents word meanings as commonsense knowledge and builds no special representation. Commonsense knowledge is a set of naive beliefs, at times vague and inaccurate, about the way the world is structured. Traditionally, word meanings have been viewed as critical to giving truth conditions for membership of word classes' name. The theory of NS, in identifying word meanings with commonsense knowledge, sees word meanings as typical descriptions of classes of objects, rather than as criterial descriptions. This book is divided into two parts. Part I elaborates the theory of Naive Semantics. Chapter 1 illustrates and justifies the theory. Chapter 2 details the representation of nouns in the theory, and Chapter 4 the verbs, originally published as "Commonsense Reasoning with Verbs" (McDowell and Dahlgren, 1987). Chapter 3 describes kind of semantic types, which are naive constraints on noun representations.

He classifies nouns, verbs, adjective and verbal adjectives. He classifies approximately 1500 nouns based on semantics as followed:

Entity → abstract Vs real & individual Vs collective

Abstract → ideal Vs propositional Vs quantity Vs ir-real

Quantity → Numerical Vs Measure

Real → Physical Vs Temporal Vs Sentient & Natural Vs social

Physical → Stationary Vs non-stationary & living Vs non-living

Non-stationary →   Self moving & non-self-moving

Collective →   mass Vs set Vs non-relational

Relations →   Event Vs state & mental Vs emotional Vs Non-mental

Event →   goal Vs non-goal & activity Vs accomplishment Vs

Achievement

4.9 WordNet: Lexical Database: George A. Miller's book, *'WordNet: A Lexical Database for English'* is compiled in 1993 for the first time by Princeton University. This book elucidates that "meaningful sentences are composed of meaningful words." In the process of analyzing natural languages as a system that anticipates to appropriate comprehensive Lexical relations based on semantic evidence and supplementary information. The information about words and their meanings are called as 'Lexical Semantics' in language theory. Initially, word level information is usually rendered by dictionaries and in recent times by machine-readable dictionaries. Nevertheless, the records of words in dictionaries developed for the suitability and accessibility of human readers, not for machines. With the help of WordNet, the operative arrangement of traditional lexicographic information is done more efficiently through modern computing. The book demonstrates that WordNet is an online lexical database designed for use under program control. English nouns, verbs, adjectives, and adverbs are organized into sets of synonyms, each representing a concept. The book also deals with information that WordNet would be more useful if it allows the program to evaluate the contexts in which words are used. Certainly, this unfulfilled requirement elucidating on lexical meanings becomes the goal for further development.

WordNet: an electronic lexical database is a book edited by Christiane Fellbaum in 1998. The book deals with 'WordNet', an electronic lexical database which is considered to be the most important resource available to researchers in computational linguistics, text analysis, and many related areas. Its design is inspired by late-1990s psycholinguistic and computational theories of human lexical memory. English nouns, verbs, adjectives, and adverbs are organized into synonym sets, each representing one underlying lexical concept. Different relations link the synonym sets. The purpose of this volume is twofold. First, it discusses the design of the current version of WordNet and the theoretical motivations behind it. Second, it provides a survey of representative applications, including word sense identification, information retrieval, selectional preferences of verbs and other lexical chains.

Introduction to WordNet: An On-line Lexical Database is a book revised by George A. Miller, Richard Beckwith Christiane Fellbaum. It is defined as an on-line lexical reference system whose design is inspired by current psycholinguistic theories of human lexical memory. English nouns, verbs, adjectives and adverbs are organized into synonym sets, each representing one underlying lexical concept. Different kinds of lexical relations link the synonym sets. In 1990 WordNet contained approximately 54,000 different lexical entries organized into some 48,000 sets of synonyms.

The book further focuses on Psycholexicology, initially by concentrating on historical (diachronic) evidence, on the neglected questions concerning the synchronic organization of lexical knowledge. A traditional dictionary lists lexical items alphabetically, giving definitions for each sense. WordNet, in contrast, is based on word meaning; all of the words that can express a given sense are grouped together in a synonym set.

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The book (*Introduction to WordNet: An On-line Lexical Database*) elaborates on Lexical Matrix: Lexical semantics begins with recognition that a word is a conventional association between a lexicalized concept (=meaning) and an utterance (=form) that plays a syntactic role. Word form will be used here to refer to the physical utterance or inscription and word meaning to refer to the lexicalized form that can be used to express the concept. Then the starting point for lexical semantics can be said to be the mapping between forms and meanings. The book further deals with semantic relations, description of verb, noun and adjective with explanations.

For this study, the authors have selected 5700 English nouns and the selected nouns are classified into 25 different categories. They are:

a. (act, action, activity)

b. (animal, fauna)

c. (artifact)

d. (attribute, property)

e. (body, corpus)

f. (cognition, knowledge)

g. (communication)

h. (event, happening)

i. (feeling, emotion)

j. (food)

k. (group, collection)

l. (location, place)

m. (motive)

n. (natural, object)

o. (natural phenomenon)

p. (person, human being)

q. (plant, flora)

r. (possession)

s. (process action, activity)

t. (quantity, amount)

u. (relation)

v. (shape)

w. (state, condition)

x. (substance)

y. (time)

The above list could be grouped into a hierarchy using "thing/entity" as the hypernym, followed by hyponyms such as (living thing, organism), (non-living thing, object) etc. Each group could be the purpose of information for disambiguating the entity. The above-mentioned study is nothing but feature representation of a particular concept.

4.10 Uma Maheswararao, G., Sinha, R. M. K. and Puspak Bhattacharya (2002) proposed a tentative classification of nouns based on English nouns for Indian languages. They not only classified nouns but also Verbs, Adjectives and Verbal adjectives. In their categorization of nouns, they categorized mainly as Proper Nouns, Common Nouns, Collective Nouns, and nouns into Animate, Inanimate, Object, Place, Event, Abstract, State categories and each one classified into small set of groups. They are:

1. → Proper Noun

2. → Common Noun

3. →Collective Noun

4. →Animate

    →Flora

        → Shrubs

        → Aquatic plants

        → Climbers

        → Trees

    →Fauna

        → Mammals

            o Person

            o Ape

            o Lesser Mammals

        → Reptiles

        → Amphibians

        → Aquatic Animals

        →Birds

        → Fish

        → Insects

        → Micro organism

        → Imaginary Animals

5. → Inanimate

    → Object

        o Artifact

        o Natural Object

        o Edible

- o Anatomical

- o Chemical

- o Physical

- o Imaginary

→ Place

- o Imaginary Place

- o Physical Place

→ Event

- o Natural Event

- o Historical Event

- o Planned Event

- o Social Event

- o Fateful Event

- o Fatal Event

6. →Abstract

→ Quality

→ Perception

→ Cognition

→ Colour

→ Title

→ Measurement

→ Time

→ Period

→ Season

→ Historical ages

→ Action

  → Social

  → Anti-social

  → Occupation

  → Communication

  → Physical Action

➔ Object

→ Logos

  → Religion

  → Philosophy

  →Social Sciences

  → Language

  →The Arts

  →History

  →Natural Sciences

  →Mathematics

  →Applied Sciences

  →Sports

  →Transport

  →Home Science

  →Mass media

  →Fashion Designing

  →Miscellaneous

→ Physical State

  → Solid

→ Liquid

→ Gas

→ Disease

→ Biological State

→ Mental State

➔ Social State

→ Process

→ Physical Process

➔ Mental Process

7. →Miscellaneous Noun Attributes:

→Abbreviation

→Acronym

→Heading

4.11 Richard A. Morneau(2006) worked on *"The Lexical Semantics of a Machine Translation Interlingua"*. In this thesis, the author discourses design of words for an artificial language precisely for use as an Interlingua in machine translation. In his work, he focuses on classifying the verb, noun and adjectives. The author emphasizes on classification of nouns which appropriately pinpoint on Semantics but not aiming on how a word is actually used in a sentence. He classified most of the English nouns as followed:

a. An entity represented by a basic noun that must consists of matter, energy or sometimes a combination of both, or time.

b. An entity of matter and /or energy represented by a basic noun must be either living or non-living.

c. A non-living entity represented by a basic noun that must be either natural or artificial.

So, using this approach, the author created the following basic noun classes:

Matter & Energy:

Living, Species → man, lizard, clam.

Living, Organs → arthritis, pneumonia.

Non-living, natural → storm, tide, geyser.

Non-living, artificial → computer, airplane.

Matter:

Natural → salt, rock, cliff, river.

Artificial → key, statue, ax, book.

Energy/ (non-matter):

Living → ghost, angel, genie, demon.

Non-living → heat, thunder, sunshine.

(Non-energy + non-matter + time)

Time → winter, midnight.

4.12 Rajini Reddy Kotla (2008), an unpublished doctoral thesis on *"The Treatment of Lexical Equivalence in Machine Readable Dictionaries for Machine Translation"* from University of Hyderabad focuses on developing a methodology for designing a

Machine Readable Dictionary for Machine Translation. She specifically deals with the usage of Lexical equivalence and discusses the issues and their solutions.

She has used feature based method to disambiguate the words especially Nouns. In this approach, the concepts and the sense of a word are defined by using sets of features. She has worked on the following hierarchical groups:

1. Proper Noun

2. Common Noun

3. Collective Noun

4. Animate:

      a. Flora   ➔ Shrubs

                  ➔ Aquatic plants

                  ➔ Climbers

                  ➔ Trees

      b. Fauna   ➔ Mammals

                  ➔ Reptiles

                  ➔ Amphibians

                  ➔ Aquatic animals

                  ➔ Birds

                        o   Birds which can fly

                        o   Birds which cannot fly

                  ➔ Fish

                  ➔ Insects

                  ➔ Microorganisms

                  ➔ Imaginary animals

5. Inanimate

    a. Object →Artifact

          ➔ Natural object

          ➔ Edible

          ➔ Chemical

          ➔ Imaginary

          ➔ Physical

    b. Place   ➔ Imaginary places

          ➔ Physical places

    c. Events ➔ Natural events

          ➔ Historical events

          ➔ Planned events

    d. Abstract ➔ Quality

          ➔ Measurement

          ➔ Perception

          ➔ Cognition

          ➔ Title

    e. Time

    f. Action ➔ Social

          ➔ Anti-social

          ➔ Occupation

          ➔ Communication

          ➔ Physical action

    g. Field   ➔ Religion

          ➔ Philosophy

➔ Social Sciences

➔ Language

➔ The Art

➔ Geography

➔ History

➔ Natural Sciences

➔ Mathematics

➔ Applied Sciences

➔ Sports

➔ Transport

➔ Home Science

➔ Mass media

➔ Fashion Designing

➔ Miscellaneous

h. State ➔ Physical State

o Solid

o Liquid

o Gas

➔ Disease

➔ Biological State

➔ Mental State

➔ Social State

In the above categorization, she has mainly classified nouns into five groups, namely, Proper noun, Common noun, Collective noun, Animate and Inanimate. Every

main group of noun divided into sub-groups like Flora, Fauna, and Object etc. Her classification of nouns is based on the English nouns.

4.13 Bharat Ravipati (2009), is an another important unpublished thesis entitled as *"An Ontological Classification of Telugu Nouns in the Context of English-Telugu Machine Translation"*. In this work, he has classified 30 thousand nouns disambiguously. Much of his classification is based on the following hierarchy:

Concrete→   living, non-living.

            living→animate, inanimate

                    animate→ human, non-human

                          human→ Male, female

                                Male→ stages, roles, etc.

                                Female→ stages, role, etc.

                      Non-human→ Animals birds, insects, micro-organism

                  Inanimate→ flora, anatomical.

                        Flora→ terrestrial, aquatic, amphibians

                        Anatomical→ parts, objects.

                                Parts→ fauna, flora

                                Objects→ fauna, flora.

                Non-living→ places, objects

                      Places→ (Location, myth) (Natural, Artifact)

                        Natural→ terrestrial, aquatic, spatial.

                      Artifact→ terrestrial, aquatic, spatial.

Abstract→ cognition, qualities, skills, ideals, light, colors, tastes, directions, states, temporal, quantifier, events, actions, process, onomatopoeic, terminology, human related.

His classification is based on the assumption that all physical or abstract entities can be exhaustively classified using a limited number of distinctive semantic features (cf. Uma Maheshwar Rao, 2003)

4.14 Sobha, L. (2011) has worked on *"Anaphora Resolution Using Named Entity and Ontology"*. In her work, she has presented a knowledge rich approach for resolving the anaphora. For disambiguating the nouns, she has classified and assigned subcategorized features to nouns. She believes that if a noun is assigned or annotated with subcategorized features, readers may get more semantic information. She has classified nouns with following features:

Living→ (+animal) (-animal)

(+animal) → (-vertebrate) (+vertebrate) (bacteria/virus)

(-vertebrate)→(-shell) (insects) (+shell)

(-shell)→ (+avion) (-avion)

(insects)→ (+avion) (-avion)

(+shell)→ (+avion) (-avion)

(+avion)→ (+edible) (-edible)

(-avion)→ (+edible) (-edible)

(-animal)→ (plants)

Non-living→ (-concrete) (+concrete)

(-concrete)→ (+virtual) (-virtual)

(+virtual) → (+feature) (-feature)

(+feature)→ (physical feature)

(psychological feature)

(physical feature) → (+feeling) (-feeling)

(psychological feature) → (characteristic)

(-characteristic)

(-feature) → (time) (phenomena) (act) (content)

(state) (sensible) (events)

(sensible) → (+feeling) (-feeling)

(-virtual) → (+comp) (-comp)

(+concrete) → (+movable) (-movable)

(-movable) → (+artifact) (-artifact)

(+artifacts)→ (buildings) (roads)

(-artifacts) → (body parts) (natural objects)

Based on the above sub-categorized features, she has got extremely interesting results. The system performance is increased 5% when she used the Semantic Disambiguator.

4.15 Philip Resnik's research paper entitled "Disambiguating Noun Grouping with Respect to WordNet Senses" was published on 1995 (arXiv:cmp/lg/9511006vl 29 November 1995). In this paper, the emphasis was on developing a method for automatic sense disambiguation of nouns especially which appears in the online

thesauri or as the output of distributional clustering algorithms. In this paper, he restricted himself to his attention to WordNet's IS –A taxonomy for nouns, and the approach where in the semantic similarity is evaluated on the basis of the information content shared by the items being compared.

Word senses are more important than words themselves. Synsets of nouns are used in word sense disambiguation.

CHAPTER - 5

Hierarchical Structure of Nouns

5.0 Introduction

In this chapter, a discussion would be undertaken on the hierarchical structure of nouns and their classification. On one hand, the selected nouns are grouped according to their nature of meaning (semantic), which are emphasized through the necessary graphic representations. On the other hand, every selected noun is annotated with semantic features, manually according to a particular methodology – Feature Based Method. This process can be considered as helpful for Computational Linguistics mainly for Machine Translation.

The current chapter deals with the demonstration of semantic identities or concepts hierarchically organized into a tree. Nodes at the end of the top branching are shallow and leaves at the end of the lower branches are deep. Nouns at each nodes or a leaf are characteristic of that language may be found or may not be found in a given language. The numbers of features required to annotated (represent) a noun are more towards the end of the leaves whereas few and less in number towards top of unique entity. The classifications of the nouns are according to the way they are used by the language users and not necessarily identical or match with that of scientific biological or physical classifications.

In this study, Telugu nouns are divided into two major groups. They are

Entity ⟶ 1. Concrete nouns (*mUrwa vAcakAlu*)

⟶ 2. Abstract nouns (*amUrwa vAcakAlu*)
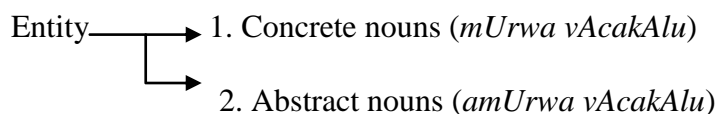
### 5.1 Concrete nouns (*mUrwa vAcakAlu*):

It has been observed that **t**he first words taught to many a learner are nouns of: places, people, objects, actions, qualities, and ideas. They are essential and are utilized to distinguish the arguments in a sentence. The absolute majority of nouns can be recognized through our five senses. If a noun is characterized as being concrete, it implies it can be tasted, seen, touched, smelled, or felt. The Longman Dictionary of Language Teaching and Applied Linguistics defines concrete noun as an entity as which refers to a physical thing, rather than a quality, state, or action". Similarly, the Oxford Dictionary of English defines concrete noun as anentity "denoting a material object rather than an abstract quality, state, or action, e.g. dog, building, tree". Concrete nouns refer to things that actually prevail in our nature. Cartilage points that concrete nouns are precisely "tough substance" and Track, R.L. (1997: 50) defines them as "entities which denote some kind of physical objects, such as dog, child, tree, house or iron". As concrete nouns have physical existence, they can be divided into two kinds, 1) Living (jIvaMunnavi) 2) Non-Living (jIvaMlenivi).

5.1.1 Living (*jIvaMunnavi*):

In this creation, everything can be considered in the form of objects. We identify some objects with life and they are known as living beings, viz. humans, and animals/animate things come under this group.

As Trees/Plants have life, they are considered under the category of living things. Hence, taking the above view into consideration the plant category is added in this group. The living can be classified into two kinds. Based upon the vital spirit/life and existence, the movements and functions, they are marked for animacy. They can be divided as animate nouns (humans and animals) and inanimate nouns (plants). These are divided into two kinds; they are:

Living ⟶ 1. Animate (*jaMgamAlu*)
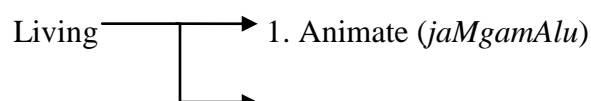
2. Inanimate (*sWAvaravAcakAlu*)

5.1.1.1 Animate Nouns (*jaMwuvAcakAlu or jaMgamAlu*):

Living things which have movable features are called Animates. The feature of moving from one place to another place in humans, animals, birds and similar other things come under this animate group. Living beings can be defined as an object or a thing which is filled with life (soul), and give birth to another being. These can be considered to be living beings as they have life. These are parasites. They depend upon others for their feeding. They have self-movement and these beings have sexual reproductive ability.

Basing on the characteristics of grasping power, thinking power and the power of speaking, fauna can be divided into two kinds. They are:

Animate ⟶ 1. Human (*manuRyavAcakAlu*)

2. Non-human (*manuRyewaravAcakAlu*)
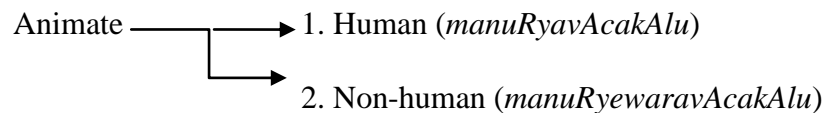
5.1.1.1.1 Human Nouns (*manuRyavAcakAlu*):

Any living or extinct member of the family, Hominidae is identified by superior intelligence, articulate speech, and erect carriage is known as Human. The living things (human beings) are distinct from the other living beings modelled on their features of grasping power, thinking power, speaking and the knowledge of dexterity. These factors can be said to make these living things (human beings) as Human.

Ex: Human (*manuRyvAcakaM*)

1. Gender (*liMganirNayaM*):

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The properties that distinguish organisms are on the basis of their reproductive roles. Humans are divided into two major kinds according to the differences in their gender.

1. Feminine (*swrIliMgaM or swrIvAcakaM*)

2. Masculine (*puruRaliMgaM or puruRavAcakaM*)

Due to differences, the usage of words is in different ways. Woman and Man.

2. Stages (*jIviwa xaSalu*):

We can observe stages of human life. In accordance to the stages, a set of terminology used as per the stages both in male and female is different. They are lexicalized in Telugu as in the following:

i. Birth (*janma, puttuka*)

ii. Infancy (*SESavaM/pasiwanaM*)

iii. Childhood (*bAlyaM/cinnawanaM*)

iv. Adolescence (*yavvanaM/kOmAraM*)

v. Adulthood (*vayojanaM/peVxxawanaM*)

vi. Old age (*vqxXApyaM/muswaliwanaM*)

vii. Death (*maraNaM/cAvu*)

Usually, we can find the order of the stages of growth in any other living beings as in humans and probably in higher order primates and other animals.

i. Infancy (*SESavaM/pasiwanaM*)**:**

This is the initial stage of human life. We consider the early life form as infant/baby/pup in the womb of a mother. In this stage (infancy), differentiation in gender is not pointed. Hence, the usage of lexicalized terminology in Telugu is not common in particular.

Ex: Infant (*SiSuvu*), Babe (*bidda*), Pup (*pilla*).

Gender is determined after the delivery of the infant/baby from the womb of mother. Subsequently, terms which are specific are used, viz., he or she -male infant, male babe, female infant, female baby. The rest of the stages like childhood, Adolescence, Adulthood and Old age have differences. The usage of terminology is different.

Ex: Female infant (*Ada SiSuvu, Ada bidda, Adapilla*)

Ex: Male infant (*maga SiSuvu, maga bidda, magapillavAdu*)

ii. Childhood (*bAlyaM*):

This stage is in between one year to 12 years. Hence, the Telugu terminology distinguishes sex by different usages.

Ex: Girl (*bAlika, pilla, ammAyi*), Boy (*bAludu, pillavAdu, abbAyi*)

iii. Adolescence (*yavvanaM/kOmAraM*):

This stage is in between 13 years to 19 years [Teen Age]. This is the initial/starting age of girls and boys. In this stage, girls and boys, undergo many changes due to physical growth. Hence, the terminology, in specific, goes in accordance with the physical growth which is different.

Ex: Young girl (*yuvawi, kurraxi, ammAyi*), Young Boy (*yuvakudu, kurravAdu, abbAyi*).

iv. Adulthood (*vayojana xaSa*):

This stage is in between 20 years to 50 years. In this stage, the young complete their adolescence and make themselves physically fit. This stage also sees the stoppage of growth. It is the age, in which factors like marriage and settlement in life are generally observed to be happening. After completion of this stage, the body is bound to lose its strength. Further, the diminishing of stamina/strength of the body is found to take place. Hence, in this situation the usage of terminology is different.

Ex: woman (*Adaxi, mahilYa, swrI*), man (*magavAdu, puruRudu*)

v. Old Age (*vqxXApyaM*):

The stage begins from the 50th year to death. During this age the body gradually loses its stability/stamina. In this stage the mode of terminology is different.

Ex: Old woman (*vqxXurAlu, musalixi*), Old man (*vqxXudu, mussalivAdu*)

vi. Death Stage (*maraNasaMbaMXavAcakAlu*):

Human life begins with birth and ends with death. After death, the living being (Human) loses life and movement. The body starts to decay becomes dry and perishes when buried. So, a dead body does not have life and movement. The dead body loses its physical condition. Hence, the terms relating to expired stage are different. In Telugu they are lexicalized as in the following:

Ex: Corpse (*SavaM, pInuga*), Dead body (*mqwaxehaM, mqwudu, mqwurAlu*), Mortals reside in Heaven (*svargaswulu, svargswurAlu, swargaswudu*, etc.).

3. **Roles/Organizational Responsibilities (*pAwralu/nirvahaNAbaXyawalu*):**

The usage of terminology for ladies and gents is different in consideration to their race, caste, religion, occupations, authority, designations, relationships, characteristics, etc. Based on all the above aspects, the usage of terms is different. Moreover, the men in mythology are noted in a different way. In literature, the characteristics and roles of the hero, heroine and other characters are identified by different terms.

i. **Race (*jAwi, weVga*):** There are many races and tribes in human beings in connection to geographical areas, countries, regions and color. The terms relating to Race are mentioned in this study.

Ex: Blacks (*nallavAlYlu*), the white people (*weVllavalYlu*), the pygmies (*pigmIlu*).

ii. **Caste (*kulaM*):** Humans are segregated as caste by occupations/works. There are so many castes in India. Such kind of division in terms of caste is not very common in other countries. Thus, there are a number of terms hundreds of them lexicalized these distinctions.

Ex: Brahmin (*brahmaNudu*), Kshatriya (*kRawriyudu*), VyshIya (*vEsyudu*), Shudrudu (*SUxrudu*).

More common localized terms include; *reVddi, kamma, veVlama, Komati, kApu, balija, sAleV, AcAri, vadla, oVddeVra, eVrukala, yAnAxi, mAla, mAxiga* and many more

iii. **Occupations (*vqwwulu*):** In course of time, human beings have taken up various occupations pertaining to their needs and contexts. They have engaged in various works for their livelihood. Hence, this study recognizes the terms related to works that have become occupations.

Ex: Goldsmith (*kaMsAli*), Teacher (*aXyapakudu, paMwulu, upAXyAyudu, ayyavAru*), Worker or Laborer (*panivAdu, rEwukUli*).

iv. **Designations/Profession (*aXikArika hoxAlu*):** Designations are accorded to people, according to the responsibilities they have taken.

Ex: Minister (*maMwri*), Officer (*aXikAri*), Servant (*sevakudu*), *baMtrowu*.

v. **Religion (*mawaM*):** Humans can be differentiated according to the devotion they demonstrate towards various Gods/Goddesses. This distinction classifies them under a religion. India is a secular country. It is a mixture of different religions, traditions and cultures. Every religion has designed specific terms to determine its existence. Hence, the people of various religions (identified through explicit terms) are mentioned in this study. A number of terms are in use in Telugu to denote various functions/ concepts

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lexicalized as in the following: *xeVudu, xevawa, xEvaM, Bakwudu, Bakwi, pApaM, puNyaM, ArAXana, prArWana, varaM, prasAxaM, vrawaM,* etc.

Ex: The Jain (*jEnudu*), Christian (*krEswavudu*), Nun (*sanyAsini*), Father (*PAxar*), Pope (*pop*).

vi. **Relations (*saMbaMXa vAcakAlu*):** Humans liveas families formed into social groups. Most of them have explicit relationships with one another. These terms are classified into two kinds. They are:

a. **Kinship Relations (*baMXuwva vAcakAlu*):** A number of associations, denoting the blood and marriage relations among the humans are noted in this study. CCALE (Collins Co-build Advanced Learner's English Dictionary - 2003) defines that kinship relation is as "the relationship among the members of the particular family unit." Even, Leach (1958: 143) precisely defines kinship as "kind of terms by means of which aparticular individual is taught to identify the significant alliances in the social structure into which he is born." Likewise, Shakir and Farghal (1994: 242) defined that "kinship relations are familiar with allocated kin relations among particular unit of people. These are known as kinship relations.

Ex: Mother (*walli*), Father (*waMdri*), Brother (*anna/wammudu/wami*), Sister (*akka/ceVlli*), Father-in-law (*mAmayyA, mAma*), Mother-in-law (*awwa*), wife (*BArya*), Husband (*Barwa*) etc.

b. **Social Relations (*sAMGika saMbaMXa vAcakAlu*):** As human beings live in a society, most of them have attachments with one another. These attachments relate to other members in the society which are mentioned as social relationships.

Ex: Friend (*miwrudu/snehiwudu*), Girlfriend (*snehiwurAlu*).

vii. **Qualities (*lakRaNalu*):** Human beings exhibit a number of qualities. These qualities are often used in different comparisons. By adding adjectives to roots and words, they become human nouns.

Ex: good man (*maMcivAdu*), good woman (*maMcixi*), handsome (*aMxagAdu*), and charming (*aMxagawweV*)

4. Mythological persons (*purANa puruRulu*):

Most of the cultures and traditions are found to have depended upon mythology and ethics. In connection to this, humans have treated some of the characters in mythology as divine beings, having divine power in comparison to the common beings. Hence, these terms are defined in a different way.

Ex: (Indian Gods/Goddesses) Brahma (*brahma*), Vishnu (*viRNu*),

According to the feature; divine and anti-divine, the characters are divided into two kinds.

i. Divine one who is gifted with spiritual insight.

Ex: Goddess (*xevawa*), God (*xevudu*)

ii. Evil related to wicked, evil spirit.

Ex: Devil (*xeVyyaM*), Ghost (*BUwam*), Demon (*rAkRasudu*)

5.1.1.1.2 Non-Humans (*amanuRya vAcakAlu*):

The nouns which do not relate to humans are identified as Non-Human terms. These living beings are not humans and thus they are ascertained as Non-Humans. These living beings do not have any characteristics like grasping power, thinking power, power of speaking and common sense. Hence, these living things are separated from humankind.

It is found that there are peculiarities in Non-Human beings like having spinal cord and of not having spinal cord, the ability of flying and the inability of flying, the

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feature of physical form either complex or similar (unicellular or multicellular) etc. Based on these reasons, Non-Human beings are divided into four kinds

1. Animals (*jaMwuvulu*)

2. Birds (*pakRulu*)

3. Insects (*krimikItakAlu*)

4. Micro-Organisms (*sUkRmajIvulu*)

5.1.1.1.2.1 Animals (*jaMwuvulu*):

Animals have some identical and uneque characteristics in comparison to human beings. As they do not have same particular characters, which human beings have like grasping power, thinking power, power of speaking and common sense, these are separated from Humans and are indentified as animals. Some animals have self-movements. These are parasites. Some are herbivores and some carnivores. Some animals are amphibians. Some belong to mammals. Some lay eggs. Some beings give milk even though they lay eggs.

Some animals are warm blooded beings and some are cold blooded. Some animals are vertebrates and some are invertebrates. This is one main cause that distinguishes them from human beings. Hence, the structure of the body system is not alike and is somewhat different.

As in referring to places where animals reside or wander, such can be classified as below:

    I.   Terrestrial (*BUcarAlu*)

    II. Aquatics (*jalacarAlu*)

    III. Amphibians (*uBayacarAlu*)

I. Terrestrials (*BUcarAlu*)**:**

These are animals that wander on the surface of the Earth. In this study, all kinds of terrestrials are mentioned. These terrestrials are seen according to their living characteristics shown as below. They are:

1. Domestic Animals (*peVMpudu JaMwuvulu*)

2. Wild Animals (*vanya/adavi jaMwuvulu*)

1. Domestic Animals (*peVMpudu JaMwuvulu*):

These are animals that are tamed. Humans tamed and developed an attachment with them to fulfil their needs. Hence, these animals co-operate with humans and live with them. By living along with them they support in agricultural and non-agricultural activities.

A. Herbivores (*SAkAhArulu*)

B. Carnivores (*mAMsAhArulu*)

C. Omnivores (*sarvaBakRulu*)

A. Herbivores (*SAkAhArulu*)**:** These animals depend on only vegetarian food like plants, grains.

Ex: Cow (*Avu*), Buffalo (*gexeV, barreV, xunna*), Ox (*eVxxu, Ambowu*), Goats (*meka*), Sheep (*gorreV*).

B. Carnivores (*mAMsAhArulu*): Human being has managed some animals to fulfill his/her needs by molding them according to his/her wish. By nature some of the tamed animals, viz. Dogs (puppies) Cats (kitten) are Carnivores. Though the humans have molded their nature to a certain extent, still they remain carnivores. These beings are non-vegetarians.

Ex: Dog (*kukka*), Cat (*pilli*)

C. Omnivores (*sarvaBakRulu***):** These animals feed upon both plant and animal origin.Humans pet these animals to utilize for their personal needs.

Ex: pig (*paMxi*).

2. Wild Animals (*vanya jaMwuvulu***):**

These animals live far away from human habitation. They reside/live at the end of the villages/towns, in forests where humans do not dwell. These are again divided into three types according to the nature of food habits. They are

A. Herbivores (*SAkAhArulu*)

B. Carnivores (*mAMsAhArulu*)

C. Omnivores (*sarvaBakRulu*)

A. Herbivores (*SAkAhArulu***):** These animals depend on only vegetarian food like plants, grains etc. These beings reside far away from the village/town, in the forests.

Ex: Squirrel (*uduwa*), rabbit/ hare (*kuMxelu*), dear (*xuppi*), spotted deer (*jiMka*).

B. Carnivores (*mAMsAhArulu***):** These beings are non-vegetarians but they dwell in the wild places.

Ex: lion (*siMhaM*), tiger (*puli*).

C. Omnivores (*sarvaBakRulu***):** These animals feed upon both plant and animal origin. These also live in the forest areas.

Ex: Monkeys (*kowulu*), Gorillas (*goVrillAlu*), Bears (*eVlugubaMti*).

II. Aquatics (*jalacarAlu***):**

These beings reside in water. Among these, some are related to descendants of mammals. Some improve upon their descendants by laying eggs. Though, both the categories survive in water, the structure/formation of the body is found to be dissimilar. Among these, some are vertebrates and some invertebrates. It is said that

there are various kinds in this group, viz. Insects/Bacteria, belonging to different genera living/residing in water. By considering all the aspects of the living beings and the region of their residing area, they are taken under one group.

A. Herbivores (*SAkAhArulu*)

B. Carnivores (*mAMsAhArulu*)

A. Herbivores (*SAkAhArulu*):

These animals depend mostly on vegetarian food like plant products.

Ex: Fish (*cepa*), Prawn (*roVyya*).

B. Carnivores (*mAMsAhArulu*): Some of these live upon consuming other aquatic animals.

Ex: Shark (soracepa)

III. Amphibians (*sarvaBakRulu*):

These categories of animals dwell upon earth and in water also. They live for a particular period of life on earth and the remaining in water for their needs, for instance, to give birth (reproduction). Amphibians give birth to their offspring by laying eggs. Most of them, in this category, lay eggs in water. They are born with a tail like that of fish to swim easily. They breathe in water through gills. Some amphibians walk and swim in water. The structure of their body system is different, which is convenient for the being to reside both on earth and in water accordingly.

Ex: Frog (*kappa*), Tortoise (*wAbelu*).

IV. Mythological Animals (*purANa jaMwuvulu*):

These animals are mentioned in mythology and ancient stories. As per legends, some animals have divine powers. Some animals, viz., cow, elephant and horse, in mythology are attributed with exceptional divine powers, they appear as divine animals.

In common, they cannot be seen; the animals which have divine qualities appear to be from imagination/guess. As a feature, humanism is added to some animals, when read through mythological and ancient legendaries/stories.

Ex: *kAmaXenuvu, ErAvawaM, garududu, kalpavrukRaM.*

I. Gender (*liMgaM*):

As per the difference in animals, they are divided into two kinds. a) Male and b) Female According to the variations found, the usage of nouns differ as well. It is observed that mostly differences between male and female are attributed to domestic animals. Human beings have given distinct names to the domestic animals which give edible products accordingly. Humans obtain edible products from cow, buffalo, sheep, and goat etc. Only these differences – related nouns are mentioned in the Telugu language.

	Female (*swrI/Ada*)	-	**Male (*pumas/maga*)**
Ex:	Cow (*Avu*)	-	Ox (*eVxxu/A(M)bowu*)
	Buffalo (*gexeV*)	-	He-Buffalo (*xunna*)

However, with the rest of the animals there are no distinct words to indicate male and female of them but adjectives of male (*maga*) and female (*Ada*) are appended before the words as in the following:

Ex:	**Female**	**Male**
	Bitch (*Ada kukka*)	Dog (*magakukka*)
	Queen (*Adapilli*)	Tom (*magapilli*)
	Female tiger (*Ada puli*)	Male tiger (*magapuli*)
	Female elephant (*Ada enugu*)	Male elephant (*magaenugu*)

Some languages, viz., English consider the other animals as male and female. They have different nouns/terms.

	Ex:	**Female**	**Male**

Ex: **Female**   **Male**

Doe/Hind (*Ada jiMka*)   Buck/Hart/Stag (*magajiMka*)

Mare (*Ada gurraM*)   Stallion (*magagurraM*)

Lioness (*Ada siMhaM, sivaMgi*)   Lion (*magasiMhaM*)

Though the distinction of gender in animals is sometimes recognized, the Telugu language considers all of them as non-masculine and assigns grammatical gender instead of biological gender with reference to nouns other than non-male humans. Thus, Telugu recognizes these terms and uses same noun/term.

Ex: Cow Came (*AvuvacciMxi* [n.m.sg.]), Ox Came (*eVxxuvacciMxi* [n.m.sg.])

2. Stages of Animals (*jaMwuvulalo xaSalu*):

In life of animals' two important stages are recognized. They are

a. Childhood (*bAlyaM pasiprAyaM*)

Ex: Animal baby (*peVyya, xUda*), Calf (*peVyya*), Heifer (*giwwa*), Young bull (*kodeV*).

b. Adulthood (*peVxxa*)

Ex: Mother Cow (*walli_Avu*), Bull (*AMbowu*)

However, animals, viz., elephants have some particular terms at the stage of Adolescence – as young elephant (*gunna*).

It is to be observed that there is no particular terminology for animals indicating their sizes like small and big as per these two stages. The childhood in these animals is short in period. Hence, the usage of terms for adult animals is undertaken with generic names of their species, instead of, particular nouns. So the names of the adult animals used are viz., dog, cat, tiger and lion.

Sometimes the progeny of the animals are called with their generic names followed by specific names like infant, calf. However, these are used for some particular animals only.

Ex: Kitten (*pillikUna*), Infant of pig (*paMxikUna*), Spaniel/Puppy (*kukka pilla*).

In English and some other languages, these are identified with different names. There is a particular terminology used in mentioning them.

Ex: Pup (*kukkapilla*), Colt (*gurrapupilla*), Cub (*siMhapupilla, koVxama simhaM*).

5.1.1.1.2.2 Birds (*pakRulu*):

It has been noted that the birth/origin of birds can be traced to some 150 million of years back. At present, most of the birds reside throughout the surface of the earth. There are nearly 8,000 kinds of birds living. Birds have three important characteristics; i.e., 1) Wings to fly (*eVgaratAnikireVkkalu*), 2) Feathers (*Ikalu*) and 3) Long beak instead of teeth (*palYlaku baxulu poVdavEna mukku*).

Birds are vertebrate beings. The structure of its vertebrate skeleton is arranged in order to fly easily. Their bones and skull are very light in weight which cause their body to carry less weight. Its skeleton is naturally designed with necessary changes. Having wings is one of the exact/necessary characteristic of its body. These wings are used to fly.

Though some birds have wings they are unable to fly. Birds like hen, peacock, sometimes fly in accordance with their necessity. Flying means they travel in air from one place to another.

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In these categories, birds are divided as per the characteristics into two kinds. They are Aviates and Non-Aviates. Aviates means that they fly and non-aviates do not fly.

a. Aviates (*eVgirevi*)

b. Non-Aviates (*eVgaranivi*)

a. Aviates (*eVgirevi*): In this group, the flying birds are mentioned.According to the relationship with human, the category of birds is divided into two kinds.

i.   **Domestic Birds (*peVMpudu pakRulu*):** These birds reside along with humans. Birds like hen becomes useful to human as an edible need. Parrots are fed for the sake of fun.

Based on the feed they take, birds can be categorized into three kinds. They are

1. Herbivores (*SAkAhArulu*): Parrot (*ciluka*), Pigeon (*pAvuraM*) etc.

2. Carnivores (*mAMsAhArulu*): Crow (*kAki*)

3. Omnivores (*sarva BakRulu*): Hen (*kodi*).

ii. **Wild Birds (*adavi pakRulu*):**

These birds reside far away from the living atmosphere of humankind and reside in other areas of cities and wander in forests. Again these are divided into three types according their characteristic nature of food habits. They are

1. Herbivores (*SAkAhArulu*): Peacock (*neVmali*).

2. Carnivores (*mAMsAhArulu*): Eagle (*dega*)

3. Omnivores (*sarva bakRulu*): Hawk (*gaxxa*).

b. Non-aviates (*eVgaranivi*): These birds dwell in the forests and they do not fly, though they have wings. Non-flying birds are mentioned in this group.

i.   Domestic Birds (*peVMpudupakRulu*)

ii. Wild Birds (*adavipakRulu*)

i. Domestic Birds (*peVMpudu pakRulu*): These birds live in along with Humans. But these birds do not fly like other birds which are able to fly**.**

Ex: Hen(*kodipeVtta*) Cock (*puMju*).

ii. **Wild Birds (*adavi pakRulu*):** These birds reside far away from the living atmosphere of humankind and reside in other than the areas of cities and wander in forests. These are unable fly like other birds which fly.

Ex: Ostrich (*nippu kodi*)

1. Gender in Birds (*pakRula liMganirXAraNa*):

It is difficult to come across distinct names based on the gender in birds. Except for domestic birds, the rest do not have any particular terminology to confirm their gender in the Telugu language. In Telugu, some adjectives like female, male are appended before the generic name.

Ex:	**Female**	**Male**
	She crow (*Ada kAki*)	He crow (*magakAki*)
	She parrot (*Ada ciluka*)	He parrot (*magaciluka*)

However, in Telugu and in some languages, viz., English, there are distinct names given to birds based on their gender.

Ex:	**Female**	**Male**
	Hen (*peVtta*)	Cock (*puMju*)
	Pen (haMsa)	Cob (magahaMsa)

2. **Stages (*xaSalu*):**

Birds undergo or experience their pregnancy by laying eggs. By hatching the eggs the pregnancy is said to come out. At this phase, it is difficult to identify the stages except the stage of infancy. There are no particular names given in Telugu to

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the birds in the various stages of life. However, the identity of the parent bird is generic and by the addition a suffix –identify the baby/child.

Ex: Chicken (*kodipilla*), Crow infant (*kAkipilla*), Cuckoo infant (*koyilapilla*)

Moreover, some languages like English have particular nouns for identification:

Ex: Chicken (*kodipilla*), Cygnet (*haMsapilla*).

5.1.1.1.2.3 Insects (*krimi kItakAlu*):

Insects are invertebrates and cold blooded beings. Zoologically speaking they are arranged into a group called arthropoda. 80% of animal race, which we are familiar with are related to this group. The division of Arthropods – insects – is the biggest among the kingdom of animals. If we compare the group as per the total number or as per the percentage in animal kingdom, the arthropod is the biggest among all.

Arthropod means a drone formed with bones. The arthropod animals are accustomed to dwell in different shelters, viz., on earth, in water and air. They exhibit wonderful and favorable decentralization – spiders, scorpions, crabs, prawns, grass worms. Such insects belong to this group.

In this study, Insects are divided into two kinds as per the way of utilization/fulfillment of the necessities by/of human beings. They are

1. Productive insects (*uwpAxakakItakAlu*): Silkworm (*pattupurugu*), Honey bee (*wenetIga*), Wax insect (*lakkakItakaM*).

2. Harmful insects (*hAnikarakItakAlu*): Mosquito (*xoma*), Bug (*nalli*), Louse (*penu*).

According to the characteristics of Insects, the category is divided into two kinds,.

I. Aviates (*eVgirevi*)

II. Non-aviates (*eVgaranivi*)

I. Aviates (*eVgirevi*)**:** The insects which can fly (*aviate*) are mentioned in this group. They are honey bee (*weneVtIga*), fly (*Iga*), mosquito(xoma) etc.

II. Non-Aviates (*eVgaranivi*)**:** Silkworm (*pattupurugu*), Bug (*nalli*), Lice (*penu*).

1. Gender (*liMga nirXAraNa*):

It is difficult to identify the gender in insects. There is no particular terminology in Telugu language for the identification of gender in insects. In Telugu, the identification of gender among insects is through the usage of some adjectives like female and male. This phenomenon is most common among the world languages.

	Male	**Female**
Ex:	Fly (*maga Iga*)	Female Fly (*Ada Iga*)
	Mosquito (*maga xoma*)	Female Mosquito (*Ada xoma*)

2. Stages (xaSalu): It is difficult to see this stage in insects. However, they lay eggs, and some identifiable stages do occur but no special names exist in Telugu.

5.1.1.1.2.4 Micro-Organisms (*sUkRma krimulu*):

These are several invisible micro-organisms which are not visible to the eye. We can see them only with the assistance of a microscope. They dwell and take shelter on earth, in water and air. Some of them are useful and some harmful.

Ex: Bacteria (*byAktIriyA*), Fungus (*SilIMXrAlu*), Virus (*vEras*), Protozoa (*protojovA*).

5.1.1.2 Inanimate (*sWAvara vAcakAlu*):

In this study, inanimate is considered as unmoving. Even though these organisms reside in immovable shelters like flora, anatomical parts and anatomical

objects, they lead their life in the bodies of animals sustaining through liquid are mentioned in this group.

I. Flora (*vqkRajAlaM*)

II. Anatomical parts (*xehaBAgAlu*)

III. Anatomical objects (*jIva paxArWAlu*)

I. Flora (*vqkRajAlaM*):

These have life but do not have locomotion. These are mostly do not move and live where they are throughout their life. These have movements and swing according to wind. The structure of the body is more flexible or in a systematic shape and they grow centripetally when compared with the bodies of animals that have a limited growth. By any reason, if the animal loses one of its limbs pertaining to its body, it will not have a regeneration of the lost part. For some beings, a regeneration of limb at the lost part of the body is a substitute. There are some exceptions, for instance, the lizard. But in flora, if we cut the branches they re-grow. For instance, leaves, flowers, fallen seed, will re-grow in the someplace. In the species of flora, most of the plants support to reproduce the parts, viz., leaves and branches.

In the species of Flora, the characteristics of blooming and flourishing are differently identified. There is a growth that increases – bushy, creepers, climbers. The species of flora can be observed in different ways according to the features like shape, structure, seasonality, nature, attitude, usefulness and places/region where they grow (weather conditions). When the above concepts are taken into consideration, the species of flora can be seen in a multi-faceted way. The common terms for flora in Telugu language are called as vqkRAlu, ceVtlu, cemalu, vanaspawalu roughly of equivalent in meaning to English plan and plant kingdom

The species of flora is classified into three groups according to the places they grow up and exist. They are:

1. Terrestrial Plants (*BUruhAlu/BU vqkRAlu*)

2. Aquatic Plants (*jalaruhAlu/jala vqkRAlu*)

3. Amphibian (*uBayaruhAlu/uBayacara vqkRalu*)

1. **Terrestrial Plants (*BUruhAlu/BU vqkRAlu*):**

These plants grow on Earth. Some features of the species of flora viz., have flowers and fruits. They can be identified by different names and can be divided into different types in accordance with their shape, appearance, attitude and uses. They are

a. Grass (*gaddi jAwulu*)

b. Herbs (*gulmAlu*)

c. Shrubs (*poVxalu*)

d. Climbers/creepers (*wIgalu/lawalu*)

e. Plants (moVkkalu)

f. Trees (*ceVtlu/vqkRalu*)

a. Grass (*gaddi jAwulu*):

These plants belong to the species of Grass. They do not have thick trunks but grow as non-woody green plants. Most of these plants are related to the family of Grass. The stem of these plants is round in shape. It is a hollow stem covered and adjoined in between the leaves. They have sharp pointed leaves and bushy roots.

There are many species of Grass related to blossom family. These are approximately 8000 to 10000 kinds of real grass plants and are related to Caporal species. They play an important role in the financial or commercial field. They have nutritious values and make the earth very fertile.

The plants belong to the specie of Grass are favorable dwelling places to insects like Locusts or crickets. Some wild beings also use them as their residing areas. Further, these plants, in turn, are useful to living beings – both human and animals – as edibles. Some are functional to house constructions, home appliances and other articles (decorative items).

Some kinds of species are fashioned as ornaments in royal gardens. This brings elegance to the garden. These are cultivated for Green layers, amusement areas and also to cover wet areas. Though flora is useful in many ways, the present study limits to an observation based on the concept of its usefulness to humans in the form of edible or non-edible ones. The study is as followed:

    i.   Edibles (*AhArayogyaM*)

    ii.   Non-edibles (*AhArayogyaM kAnivi*)

i. Edibles (AhArayogyaM): Some Flora are edible either by its products and at some juncture, it becomes as edible by self. If observed and limited, this concept can be divided into two kinds: a. self and b. Products.

a. Self: They are ready to eat as it is, without any change.

Ex: Sugar Cane (*ceVruku*), Amaranth (*koVyya wotakUra*),

Roselle (*eVrragogu kUra*), Hemp (*janumu*).

b. Products: The species of grass provides a variety of food grains. They produce all kind of food grains, and pulses.

Ex: Paddy (*XAnyaM*), Wheat (*goXuma*), Corn (*joVnna*),

Black gram (*minumulu*).

ii. Non-Edibles (*AhArayogyaM kAnivi*): Certain species of grass are useful to humans – besides being edible – in other ways. Some of them are mentioned below. Blossomed plants which give fragrance (Aromatics), a variety of medicines, narcotics,

poison etc. These are utilized as mentioned above and further in many kinds of other ways. Some general race of grass has been considered in this group and however, some are exempted.

1. **Flowers (*puRpa*):** Plants which give flowers belongs this group. Ex: Anemone (*rawna Bogi*),

2. **Aromatics (*sugaMXa*):** These are utilized in the preparation of scents and other fragrant items. Ex: Marjoram (*maruvamu*).

3. **Medicine/Herbals (*ORaXa*):** These are the plants which are sources of medicines. Ex: Argemone (*balrakkasi*).

4. **Narcotics (*mAxaka/mawwu*):** These products are utilized as narcotics and in the preparation of narcotic items

     Ex: Tobacco (*poVgAku*), Ganja/Bhang (*gaMjAyi*).

5. **Poisonous (*viRa*):** These are considered to be poisonous and utilized in the preparation of these items. Ex: Hyacinth (*gomeXaM*)

6. **General (*sAXaraNa*):** These are not useful as edibles but useful in many kinds to the needs of humans.

     Ex: Bamboo (*boVMgu vAsaM*), teak (*teku*) as wood etc.

b. Herbs (*gulmAlu*):

     Herbs are considered as the smallest species of flora. These are non-productive as wood and have thin trunk. The herbs are of different foliage and have high medicinal values. These are utilized in aromatics, medicines and for fragrance in food items. Hence, herbs can be seen as human edibles. However, they can be divided into two kinds. They are i. Edibles, ii. Non-edibles.

i. Edibles (*AhArayogyaM*): Some are edibles by its products and the others are edibles by themselves. When we observe this concept again these are divided into two kinds. They are

a. Self: They are directly as edible. Ex: Ginger (*allaM*), Turmeric (*pasupu*), and Onion (*ulli*).

b. Products: The products of these plants are used as edible. Ex: Rice (vadlu), Wheat (*goxuma*), Cereals (*XAnyaM*).

ii. Non-Edible (*AhAra ayogyaM*): Some species are useful to humans in aromatics, Medicines, instead of being used as fragrances in food items edible to human.

iii. Medicinal Herbs (*ORaXa gulmAlu*): These are plants from which medicines are produced. They are found to be primarily used in India from the last 5000 years. These include diet and herbal remedies, while emphasizing the body, mind and spirit in disease prevention and treatment (Morgan, 2002).

> Ex: Sacred Basil (*wulasi*).

iv. Narcotics (*mAxaka gulmAlu*): The term narcotic originally referred medically to any psychoactive compound with any sleep-inducing properties. The term usually refers to opiates or opioids, which are called narcotic analgesics. The term "narcotic" is believed to have been coined by the Greek physician Galen to refer to agents that numb or induce sleep, causing loss of feeling or paralysis. Herbs with narcotic agents can be used to soothe intractable pain or to induce anesthesia. Herbs with these agents should be used carefully.

> Ex:Tobacco (*poVgAku*), Ganja (*gaMjAyi*).

v. Poisonous Herbs (viRa gulmAlu): Common poisonous plants encountered in India include (1) irritant plants, e.g. castor (*AmuxAlu*), colocynth (*ceVdu pucca*), croton (*nepAlYamu*), glory lily, marking nut, may apple, red pepper, rosary pea; (2)

cardiotoxic plants, e.g. aconite, autumn crocus, common oleander, yellow oleander, suicide tree; (3) neurotoxic plants, e.g. caltrops, cassava, chickling pea, datura, strychnos; (4) hepatotoxic plants, e.g. neem; and (5) miscellaneous toxic plants and plant products, including arachnid.

vi. General (*sAXaraNa*): These are utilized not only to the needs of human but also in many kinds.

>Ex: Prickly Chaff (*uwwareNi*).

c. Shrubs (*poVxalu*):

>These plants have long branches which grow nearly up to a length of more than three meters.

>Ex: Rose (*rojA*), Jasmine (*malleV*).

>In accordance to their edible nature (for humans), these can be divided into two kinds. They are

i. Edibles ii. Non-edibles

i. Edible Shrubs (*AhArayogyamEna poVxalu*): Some are used as edibles through making, the rest are naturally self-generating and are considered to be self-edibles.

ii. Non-Edible Shrubs: Some shrubs are not useful to humans and are inedible; however they are useful in other ways. These are used in aromatics, medicines, and to generate fragrance in dishes.

1. Flowers (*puRpa*): These Shrubs produce flowers. Ex: Jasmine (malleV).

2. Aromatics (*suGaMXa*): These are used to generate fragrances and in preparing fragrant products. Ex: Rose (*rojA*).

3. Medicines (*ORaXa*): These are used in producing medicines. Ex: Sacred Basil (*wulasi*).

4. Narcotics (*mAxaka*): These products cause sedation and are used in the preparation of such. Ex: Ganja (*gaMjAyi*).

5. Poisonous (*viRa*): These are poisonous and used in the preparation of such. Ex: Aconite (*vasanABi*).

6. General (*sAXaraNa*): These are not useful to human as edibles but useful in other ways.

d. Climbers (*lawalu/wIgalu*):

Plants which grow crawling and other creeper like are called climbers. They grow evenly on the Earth and crawl with some support.

Ex: Grape (*xrAkRa*), Beans (*gorucikkudu*), Gherkins (*Uravesina xosakAyalu*).

In accordance to the edible nature of these plants to human, these are divided into two kinds. They are: i. Edibles ii. Non-Edibles

i. Edibles (*AhArayogyaM*): Some become edibles through man-made production and some are edibles by nature. After taking the differences into consideration, these are divided into two kinds. They are: a. Self and b. Products.

a. Self: They grow as edibles naturally. Ex: Basallelba/creeping Perslane (*baccalikUra*).

b. Products: These generate various kinds of edibles through production. In these, vegetables are one kind and the other kinds are nuts and fruits.

Ex: Vegetables: Snake gourds (*poVtlakAyalu*), Beans (*cikkudu*),

Gherkins (*xosakAyalu*).

Fruits: Grapes (*xrakRa*), Pumpkin (*gummadi*)

ii. Non-Edibles (*AhAra ayogyaM*): Some more creepers are not edibles to human, but they come in handy in a different way. They are used in producing aromatics and

medicines. Further, Flowers blossom. These can be seen segregated by taking the production process into consideration.

1. Flowers (*puRpa*): Some creepers generate flowers.

2. Aromatics (*sugaMXa*): These are utilized for producing fragrance and in preparing them.

3. Medicines (*ORaxa*): These plants are used in the making of medicines.

4. Narcotics: These are the products which sedate and further are used in the preparation of such products. Ex: Tobacco, Ganjah.

5. Poisonous (*viRapUriwa*): These are used in the preparation of poison.

6. General (*iwarAlu*): Instead of being edible, these climbers (plants) are used in many other ways.

e. Plants (*moVkkalu*):

The object having a trunk which does not have wood, in particular, is called a plant. However, the order of growth is marked and indentified as plant. At a particular stage, the trunk of the plant is thick. In general, most of the flora of them is categorized under the section called plant. It can be observed that a non-wooden tree like banana tree is considered to be herbs. However, they are identified as Banana trees colloquially. By taking the factors; edibility and non-edibility to human, these are divided into two kinds. They are: i. Edible (*AhArayogyaM*), and ii. Non-Edible (*AhAra ayogyaM*)

i. Edibles (*AhArayogyaM*): Some become edible for humans consumption, while others are edible through natural processing. This concept is further sub-divided into two kinds. They are a. self and b. Products.

a. Self: Objects which are liable as edibles through the natural process. All leafy vegetables are clubbed in this group. Ex: Amaranth (*ceVMgaluva*), Roselle (*wamarawaceVttu*).

b. Products: These plants generate a lot of objects, which are considered useful as edibles. They produce vegetables, nuts and fruits. The plants which deliver vegetables are kept in this group.

Ex: Vegetables (*kAyagUralu*): Brinjal (*vaMkAya*), Chilli (*mirapa*)

Fruits: Jujube (*regu*)

ii. Non-Edibles (*AhAra ayogyaM*): Some creepers are not edible by Human. However, they are useful in another way. They are used in manufacturing aromatics, Medicines, Further, flowers bloom. They can be categorized into various products.

1. Flowers (*puRpAlu*): These plants generate flowers. Ex: Marigold (*baMwi puvvu*), Chrysanthemum (*cemaMwi*).

2. Aromatics: These generate fragrance and are utilized in the preparation of the same. Ex: Marjoram (*maruvamu*).

3. Medicines/Herbals: These plants produce medicines. Ex: Aloe Vera (*kalabaMxa*).

4. Narcotics: These products are utilized which cause sedation and in the preparation of such. Ex: Ganja (*gaMjAyi*).

5. Poisonous: These objects are utilized for preparing poison and in the preparation of such.

6. General: These are utilized not only as edibles by humans, but also become useful in preparing many a kind of item – for basic human needs. Ex: Cotton (*pawwi*).

f. Trees (*ceVtlu*):

The object called tree is part of Flora. Trees are the category that grow more than 6 meters in length and have a long trunk, in general, with a straight stem and have crown at the top. However, it should be remembered that plants like Banana tree are also treated as trees, but they do not produce wood through their trunk.

Ex: Mango (*mAmidi*), Neem (*vepa*).

i. Edibles (*AhArayogyaM*): According to the aspect of edibility to human these can be divided into two kinds. They are a. self and b. products.

a. Self: They are directly edible as available nature.However, to a certain extent, they can produce material that can be producing edible and can happen only if done with human interference. As there is a contrast, these cannot be clubbed in this group.

b. Products: These objects produce various kinds as edible products that are consumed. They produce vegetables, nuts and fruits. Plants which give fruits are divided and categorized. Ex: Mango and Palm tree.

ii. Non-Edibles (*AhAra ayogyaM*): Some plants and their products are not edible for humans but they are useful in other ways. They are used to generate aromatics and medicines. A categorization can be done in accordance with the products manufactured.

1. Flowers: These are the plants which produce flowers

2. Aromatics: These are utilized in the preparation of fragrances and in producing such.

   Ex: Sandal (*caMxanamu*).

3. Medicines: These plants are used in the preparation of medicines. Ex: Neem trees (*vepa ceVtlu*).

4. Narcotics: The products produced are utilized for sedation and in manufacturing of such objects. Ex: Wild date trees (*Iwa ceVttu*) (This is a palm wine which sedates, and it made out of wild date trees).

5. Poisonous: These are utilized in the preparation of poison and in the preparation of such.

6. General: These are not only useful as edible but also useful in many other ways. Ex: Teak tree (*teku ceVttu*).

Humans utilize maximum space of the Earth for the purpose of agriculture and cultivation of the land to fulfil their needs. They seed the crop to get products. They cultivate these not only for the purpose of feeding but also for wood and the basic needs. For example, like teak for wood, rubber and for paper. Moreover, these crops are considered as profitable and sustainable.

Crops: Crop as a category – particularly in monsoon season and region – produces more products at a time. They produce by growing in fields which are eligible for cultivation and sowing of the seeds. The act of proper cultivation causes them to grow in the form of tender young sprouts. These can be considered as crops.

Crops generate agricultural products like paddy, vegetables and fruits through cultivation. Moreover, products like Cotton, Tobacco are also cultivated in the form of crops.

The category called crops, totally depend upon water. Hence, these are regarded as wetlands (adapted for cultivation). Some crops do not need plenty of water which may be sub-categorized as dry lands.

Ex: Crops like paddy (*XAnyAlu*), Corn (*joVnna*), Red gram (*kaMXulu*).

2. Aquatic Plants (*jala ruhAlu/nIti moVkkalu*):

These plants germinate and flourish in water. Generally, instead of rivers and brooks, they grow in ponds, lakes, tanks and reservoirs. Some grow totally in water and some flourish by depending on water. As per the way of nourishment, a division into different kinds is normally done. They are

i. Non-Climbers (*lawalu kAnivi*)

ii. Climbers (*lawalu*)

iii. Species of Moss (*nAcu*)

i. Non-Climbers: These grow excessively in water. Ex: Reed (*wAmara*).

ii. Creepers: Crawling plants. These plants do not grow directly in water, but flourish evenly on water. These are called creepers and Climbers. Ex: Lotus (*kamalaM*).

iii. Species of Moss: These plants are a kind of flora that grows in water or based on the dampness of land. Ex: Moss (*nAcu*).

3. Amphibian Plants (*uBayaruhAlu*):

The categories of plants which nourish on land and in water are called Amphibians. In this category, some grow on the availability of water. However, they sustain even though the source of water ends. In the same way, same plants germinate on earth and thrive even under the seepage of water. However, it should be remembered that most of the plants sustain and depend on water.

Even though, plants living on the land depend on water, and they die if there is a lack of water source. In the same manner, plants which flourish in water also die when water becomes insufficient. However, it is to be remembered that plants flourish on land and also in water.

Ex: Bulrush (*jammu*), Reed (*wAmara*).

I. **Gender (*liMgaM*):**

The case of Gender in specie of Flora is difficult to be identified – unlike the gender (male and female) – as we do in the case of human beings and animals.

In the specie of Flora, the process of blossoming (to bloom into a flower) and Ripening (turning into a fruit) is sometimes (in particular species) considered as a right stage to identify the category of plants as belonging to female or male. However, in general, the species that blossom and turn into ripened fruit are considered to be female species, and the species that blossom (bloom into flower) and do not turn into ripeness (turn into fruit) are considered to be male species. Hence, plants related to the same species that blossom and non-blossoming do not are considered as above. However, it should be remembered that, there are so many plants that blossoming and do not ripe in the kingdom of flora. It is difficult to categorize in particular, whether they are related to a specific gender, male or female). By nature, some plants are non-blossoming and non-ripening. And, these are not regarded as male in particular. In the entire kingdom of flora, it is difficult to identify the difference and confirm their Gender.

However, there is a consideration of gender (male or female) specificity in one or two kinds of species. Its products are useful to human and are edible. Some trees like, coconut and palm tree are as mentioned above.

Ex: Male Palm tree (*maga wAti ceVttu*) (does not produce edible products)

Female Palm tree (*Ada wAti ceVttu*) (produces edible products)

Male Coconut tree (*maga koVbbari ceVttu*) (does not produce edible products)

Female Coconut tree (*Ada koVbbari ceVttu*) (produces edible products)

II. Anatomical Parts (*nirmANa BAgAlu*):

These are parts of the living body. These objects are related to the body of a living being. These are found to have come out from the bodies of living beings. They are referred to as Anatomical and Biological. Some parts related to the aspect of excretion can be sub-categorized. They are unique in the feature called – body – of a living being. Hence, these Anatomical objects are derived into two groups according to the differences.

   1. Body parts (*SarIra BAgAlu*)

   2. Releases (*visarjanAlu*)

      A. Useful (*upayogAlu*)

      B. Non-useful/Excretions) (*upayogaM kAnivi*)

1 Body parts (*SarIra BAgAlu*):

These are the parts of a body in the living being. These parts retain life until they are separated from the bodies of living beings. These parts become lifeless or dead, if separated from the body. Every limb in the body serves its purpose in accordance the way it evolved to perform the function. These parts are of two kinds:

1. If a part (limb) is separated or severed from the body, it will not grow again in its place. For instance, if the hands are removed from the body, no new hands will come in their place.

2. The second kind is – parts that self-generate life, though they are removed from body. Moreover, a fresh part may also grow in its place. For instance, Hair, Nails, and Skin etc. are such parts that re-develop even when they are separated or severed from the body. Hence, it can be said that these parts have non-detachable relation with the body of the living being. The living being, may be said, is identified through the

complete assemblage of all the limbs. The cluster of limbs in all the living beings may not be the same. They are assembled in diverse ways in different living beings.

Human beings may be said are part of the animal family. Human beings and non-human beings, viz., animals and birds have resemblances in the formation of physical bodies. Hence, the organs appear and resemble in both the groups. To an extent, this issue asserts that there is minimal difference among the parts of the bodies of human beings, animals and birds. Moreover, all the living beings have some parts in their bodies that are common in nature.

Ex: Eye (*kannu*), Leg (*kAlu*), Head (*wala*).

The natural limbs are separately defined:

i. Human body parts (*mAnava SarIra BAgAlu*).

ii. Non-Human body parts (*mAnavewara SarIra BAgAlu*).

i. Human Body Parts(*mAnava SarIra BAgAlu*):

The arrangement of the human body parts (limbs) is entirely different in comparison to the other living beings. However, while taking the case of gender (male and female) – in the case of human beings – there are some exceptions and differences that are to be noted. The general differences are stated in this group.

Ex: Hands (*cewulu*), Fingers (*velYlYu*).

According to the segregation of human bodies there are some differences between the body parts of male and female. However, in general most of the organs are common in both male and female – except some, notably, the sexual organs. These are to be examined separately. Hence the body parts of male and female are segregated and described below:

a. Male body parts (*maga SarIra BAgAlu*)

b. Female body parts (*Ada sarIra BAgAlu*)

a. Male body parts (*maga SarIra BAgAlu*):

Some organs are noted only in males.

Ex: Beard (*gaddaM*), moustache (*mIsamu*), Penis (*puruRAMgaM*).

b. Female body parts (*AdavAri sarIra BAgAlu*):

Some particular organs are noted only in females.

Ex: Breast (*roVmmu* or *vakRamu*), teats (*cannulu*), Vagina (*yoni*).

ii. Non-Human body parts(*mAnavewara SarIra BAgAlu*):

Some particular organs in every living being are common in both human beings and non-human beings. So, an observation of the differences between these two groups is undertaken. In this group, a discussion on the common parts in non-human beings (animals and birds) is done.

Ex: Tail (*woka*)

In general, non-human beings have similar organs. But, there are some particular parts that can be mentioned. They are:

a. Animal body parts (*jaMwu SarIra BAgAlu*)

b. Bird body parts (*pakRula SarIra BAgAlu*)

a. Animal body parts (*jaMwu SarIra BAgAlu*):

Except for some organs like tail and trunk, most of the organs are common in human beings and animals.Hence, a difference can be observed. Further, in animals there are males and females. The general/common parts of the body in both male and female are noted here.

Ex: Trunk (*moVMdeVM, woVMdaM*), Hoof (*gittalu*)

The assemblage of animal body is as common as the assemblage of a human body. However, in and among the species, there are a few differences that can be noted in the body parts of male and female animals. So these are noted in the

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following manner. It is to be noted that these differences are recognized mostly in pet/domestic animals like cow, buffalo, bullock, and a male buffalo.

Hence, the body parts of the animals are also divided into two groups.

a. Body parts of Male animals.

b. Body parts of Female animals.

a. Body parts of male animals (*maga jaMwuvula SarIra BAgAlu*):

The body parts of male animals are only mentioned here.

Ex: (Bulls) Hump (eVxxula) *mUpuramu*, Dew Lap of cows (*Avula gaMgadolu*).

b. Body parts of female animals (*Ada jaMwuvula SarIra BAgAlu*):

A particular part of female animals are mentioned here.

Ex: The udder of a cow (*Avu poVxugu*).

B. Body parts of birds (*pakRula SarIra BAgAlu*):

In general, most of the parts are common in animals and birds. However, there are exceptions like wings and feathers. This observation shows a difference.

The observation of gender aspect among birds is not considered at this juncture. Hence, the body parts of the bird are not noted as separate group. However, there are some differences worth noting like, '*peVtta* (hen)' and '*punju* (male hen)'. It is difficult to identify some changes in the formations of bodies – in the parts of the bodies – of male and female birds. Hence, a mention of only the parts of the birds is undertaken.

Ex: Wings (*reVkkalu*), feathers (*Ika*).

C. Parts of the Plants (*vqkRa/moVkkala BAgAlu*):

The parts of the plants are related to anatomical objects. They have life. There is some difference between the body parts of humans, animals and plants.

The body parts of humans and non-humans will become lifeless when the parts (limbs) are separated or amputated from their bodies. No new organ will emerge in its place. It is not common to assemble/replace new part in its place as in the case surgical operations. However, some parts like hair and nails grow again and again even after clipping.

The parts of plants like stem (*kAMdaM*), branches (*koVmmalu*), and leaf (*Aku*) will regenerate/arise, though they are separated or removed from a particular spot of the plant. The same parts will re-grow without the plant losing its life and will replace again at the same spot of the plant.

Benefits:

In general, human bodies are not edible. But, it can be found that animals like Tiger, Lion eat human beings. When it comes to the case of human beings, they eat non-vegetarian edibles, where source of the food is the herbivores, viz., Sheep, Goat and some birds like Hen and others belonging to birds.

Some categories of plants become consumable and useful to humans, animals and birds. They serve as feed. The objects/things like grains, unripe fruits, flowers, fruits etc., are edible objects. These are not only edibles but are also used in preparing medicines.

Plants become useful in the preparation of various kinds of products. They are grown in fields. They are helpful in the making of furniture. Hence, it can be observed that there are several benefits from the plants.

There is very less discussion available about the aspect of gender in plants which humans and animals have. However, some plants are identified through differences in gender (male and female), which are not mentioned separately in this study. Hence, all parts of the plants are considered in a single group.

Ex: trunk (*moVMdeVM*), stem (*koVmma*), branch (*reVmma*), leaf (*Aku*).

In view of the aspect of edibility to humans, the examination of the parts of the plants can be divided into two groups.

A. Edibles (*Ahara yogyaM*)

B. Non-Edibles (*AhAra ayogyaM*)

A. Edibles (*AhArayogyaM*):

The edible parts of the plants are in maximum utilization with Humans. Most parts of the plants are regarded as consumable/edible.

Ex: Tender leaves: Tamarind sprouts (*ciMwa ciguru*)

Leaves: Curry leaf (*Aku kUra*), Amaranth Roselle (*koVyya wotakUra*).

Grains: Paddy (*XAnyAlu*), Wheat (*goXuma*), Red grains (*kaMXi*).

Flowers: Saffron, Cabbage plantation flower.

Vegetables: Lady's finger (*beVMda*), Brinjal (*vaMkAya*),

Cucumber (*xosakAya*).

Unripe fruits: Guava (*jamakAya*), Mango (*mAmidi*),

Coconut (*koVbbari kAya*).

Fruits: Banana (*Arati*), Mango (*mAmidi*), Grape (*XrAkRa*).

Though most parts of the plants are in utilization, only certain parts are considered to be edibles from point of view of human beings.

III. Anatomical objects (*jIva paxArWAlu*):

The objects in the bodies of living beings are regarded as anatomical objects. These support the growth and life of the living beings. Due to the presence of cellulose in these objects, the anatomical objects sustain life. These instigate not only growth, but also are a cause for the system of reproduction/re-creation of the objects.

The objects which are present in the system/body and instigate re-birth and reproduction are discussed in this group. These can be categorized as follows:

The objects responsible for the process of life are mentioned in this group. Hence, these are shown in two ways. They are

1. Causing the event to process of life (Motive/Cause to lead life)

2. Causing the event for Reproduction (Motive/Cause to Birth)

1. **Motive/Cause to lead life (*jIviMcadAniki kAraNaBUwaM*)**: Vital fluid (*jIva rasaM*)is important as it causes to lead life. As the Vital fluid contains the group of cells in it – it maintains life. It can be said in particular that the Vital fluid is in the form of liquid. It flows in the body which causes to lead life. It has life, it is in the body. When it comes out of the body, the cellulose perishes and further the cells die if they are not supported by the body. These are less than their actual measure and more or less they reside and sustain only with the support of the body or there would be a cause of death of the cells.

The causes that lead the death of the beings: This reaction is common in every being, and nothing is an exception, viz., humans, animals, birds, insects – besides no exemption is found even among the gender aspect, like female and male. It lives in every being providing life. Hence, it becomes vital to every living being for the sustainment of life. These are termed as Vital Organs. If they suffer a loss then the remaining life will cease.

Ex: Blood (*rakwaM*) – Resource/action of life.

2. **Causing an event for reproduction (Cause of Birth) (*prawyuwpawwiki xohaxaM cesevi/puttukaku kAraNaBUwaM*)**: It is possible for Vital fluid in the body of living beings to induce reproduction. This trigger, in turn, leads to the possibility of fertilization. Hence, it can be said that it generates life.

When human beings enter the stage of teenage (Young/Youth) – this is the phase in which production starts and this, in turn, will stop its production at the time of old age. Hence, this is not directly linked to the phases; Birth (puttuka) and Death (cAvu). As far as they are in the body of living beings, they sustain life. When they are released from the body, they mix with alternative Vital fluid to produce another being. However, it goes in vain if it is released outside.

Vital Fluid:

This Vital fluid is different in Humans and Non-Humans. These differences can be defined as:

    i.   Human Related (*mAnava saMbaMXi*)

    ii. Non-Human Related (*mAnavewara saMbaMXi*)

i. Human Related (*mAnava saMbaMXi*): This Vital fluid initiates the birth of fertility between the male and female. However, it can be said that the Vital fluid is different in the bodies of male and female. Thus, these differences point that they are dissimilar. They are

        a. Female Related (*swrI saMbaMXi*)

        b. Male Related (*puruRa saMbaMXi*)

a. Female Related (*swrI saMbaMXi*): This Vital fluid is released from the body of female leading to reproduction. When it is in the body of female, it has life. When it incorporates with the male sperm, it fertilizes and becomes a cause for the birth of another being. However, if there is no fertilization between the male sperm and the female ovary, the Vital fluid loses its life and becomes useless.

        Ex: Egg (*guddu*), Ovam (*aMdaM*).

b. Male Related (*puruRa saMbaMXi*): It is released from the body of a male and induces reproduction. The Vital fluid will survive until it resides in the body of a

male. However, when it mingles with the ovary of a female, it impregnates and gives birth to another being.

Ex: Sperm (*vIryaM*)

ii. Non-Human (*maniRewara saMbaMXi*): This Vital fluid can further be found in non-human, viz., animals and birds. However, the vital fluid can be considered to be in different ways. These function in various ways. Thus, these can be mentioned as below:

a. Animal Related (*jaMwu saMbaMXi*)

b. Birds Related (*pakRula saMbaMXi*)

a. Animal Related (*jaMwu saMbaMXi*): Animals also have vital fluidas in human beings. These are the nearest terms in relation to human. However, these are similar to humans, mammals and animals.

Ex: Sperm (*vIryaM*).

There are some particular variations in animals and the species of mammals. When it comes to the species of animals, viz., reptiles and amphibians – these obtain their pregnancy by laying eggs. However, it should be remembered that the eggs laid by animals and birds are edible to other species of birds and animals too.

The eggs are laid by the female animal species. In some cases, the terminology which is used may vary from the terminology used in the case of other animals. However, it is similar to the terms used for birds.

Ex: Ovam/Ovoid (*aMdaM*), Eggs (*gudlu*) as in *balliguddu*, *pAmuguddu*, *wAbeluguddu*, etc.

b. Birds Related (*pakRula saMbaMXi*): The vital fluid released by the birds for impregnation is in the form of Ovam. Hence, birds procure their pregnancy through

these eggs. The Egg comprises life (Vital fluid). Through hatching the eggs, the female bird, sustains its pregnancy in a particular period of time.

The Eggs laid by some birds and animals become edible to some species of birds and animals. The eggs laid by birds, viz., Hen, Duck become useful to Humans in the form of edibles.

Ex: Egg (*guddu*), Ovam/Ovoid (*aMdaM*), *kodiguddu, bAwuguddu*,etc .

5.1.2 Non-Living (*jIvaMlenivi*):

This category is divided into two types based on the nature of the nouns. They are

1. Places (*praxeSAlu/sWalAlu*)

2. Objects   (*vaswuvulu*)

5.1.2.1 Places (*praxeSAlu/sWalAlu*): Some nouns are divided by taking the situation into consideration as below:

1. Terrestrial (*BU BAgaM*)

2. Aquatic (*jala BAgaM*)

3. Spatial/Sky/Space (*AkASaBAgaM*)

1. Terrestrial/Earth (*BU BAgaM*):

The earth is the residential part to living beings. The earth, to large extent, is covered by forests, water bodies, hills and mountains. There are parts that are conditioned for dwelling to living beings. However, there are certain parts recognized as non-residential. The needs of human are enhanced with the development of culture. These needs make the human beings to take up many constructions through the utilization of the place on earth. Keeping this concept in view, the earth (place) is divided into two parts:

i. Natural places (*sahaja praxeSAlu/sahaja sWalAlu*)

ii. Artifacts places/Constructions (*kattadAlu*)

i. Natural places (*sahaja praxeSAlu/sahaja sWalAlu*):

These are places that are natural. These are not constructed by human beings. They are natural formations that have taken their existence naturally. More than to human beings, these places act as shelter/residence to other living beings. Hence, the cases: residence and non-residence are divided into two parts.

A. Residential Places (*nivAsa sWalAlu*).

B. Non-Residential Places (*nivAsa yogyaMkAnivi*)

A. Residential Places (*nivAsa sWalAlu*):

The terrestrial area is formed naturally with the treasures of water bodies, forests, rocks, hills and caves. It becomes difficult for the human beings to utilize the natural places as their residences. They have to alter and mould the conditions/situations in accordance to their living conditions. As a fact they have to change the shape of the place. These changed/reshaped places into social living areas are discussed in this group. Further, the places that are utilized, conditioned as suitable residential place/areas to animals and birds are also noted in this group.

a. Animal living Places (*jaMwu nivAsAlu*)

b. Bird Living Places (*pakRi nivAsAlu*)

a. Animal living places (*jaMwu nivAsAlu*):

Animals like lions and tigers live in natural abodes – such as caves – according to their living requirements. In the same way, rats in burrows, snakes in anthills and ants form holes.

Ex: Caves (*guhalu*), Holes (*boVkkalu, boVriyalu, kalugulu*), Hills of Ants and Snakes (*puttalu*).

b. Bird living places (*pakRi nivAsAlu*):

Birds design their living areas in trees by constructing nests. These are considered to be natural. Such living areas and constructions (nests) are discussed in this group.

Ex: Nest (*gUdu*), Net (*vala*).

B. Non-Residential Places (*nivAsa yogyaM kAnivi*):

The major part of the surface (land) of the earth is non-residential. This major part is filled with forests, mountains and hills. The non-living area is more than the living area. The places like forests are apt for animals and they are unsuitable for human beings. Moreover, areas like deserts are also unsuitable for residential purposes of humans.

In the same way the areas, where one can procure, natural resources from earth like, Iron ore, Coal, through mining are useful to humans as raw-material. However, these places are also not suitable for living. Hence, these non-residential areas are mentioned in this category.

Ex: Hills (*koVMdalu guttalu*), Mountains (*parvawAlu*).

Heritage/Historical Places (*cAriwraka sWalAlu*):

These are places that have naturally formed. These places are historically recorded and have gradually become tourist places.

Ex: Borra caves (*boVrra guhalu*).

ii. Artifact places (*nirmANAlu*):

A minimum part of the entire earth has been accessed for residential purposes by human beings. The development of culture has triggered the human beings to establish several constructions according to his/her need to lead a luxurious life.

The constructions made by the human beings are divided into two groups under residential and non-residential.

A. Residential places (***nivAsa yogya prAMwAlu***)**:**

B. Non-Residential places (***nivAsa ayogya prAMwAlu***)**:**

A. Residential places (***nivAsa yogya prAMwAlu***)**:**

Human beings have established residential places not only for themselves but also for animals and birds to make them live along. The areas surrounded by houses, villages, and living areas are discussed under this group. Thus, these living areas are divided into two groups:

a. Human Living Places (*mAnava nivAsAlu*)

b. Animal Living Places (*jaMwu nivAsAlu*)

a. Human Living Places(***mAnavula nivAsAlu***)**:**

Some places are constructed in accordance to the comforts of human beings. These are mentioned as residential places in this group

Ex: House (*illu, koVMpa, gUdu, vIdu*), Construction or Building (*baMgalYA, gUdiseV, pUrillu, pAka, parNasAla, peVMkutillu, manduvAlli, mixxeV, meda, prAsAxaM*)

b. Animal Living Places (***jaMwula nivAsAlu***)**:**

Some places have been recognized as residential places for animals. Thus, these places are discussed in this group.

Ex: Caves (*guhalu*), borrows (*boVriyalu*) etc.

B. Non-Residential Places (***nivAsa ayogya prAMwAlu***)**:**

According to their needs, humans use some areas for their comfortable living. They use these places for different purposes. Some public places are identified as non-residential. They are used for certain particular purposes and are identified as public places. They are called non-residential places. These places can be identified as below:

1. Educational (*vixyAparamEna*)

2. Charitable (*sevAparamEna*)

3. Religious places (*mawaparamEna*)

4. Recreational (*vinoxamEna*)

5. Business places (*vyApAramEna*)

6. Government places (*praBuwvaparamEna*)

7. Institutions (*kAryAlayAlayaparamEna*)

8. Historical places (*cAriwrakaparamEna*)

9. Burial grounds (*smaSAnaparamEna*)

10. Ways (*xArulu*)

11. General (*sAXaraNa*)

1. Educational places (*vixyApara sWalAlu*):

These are the places where education is bestowed. Some related terms are also added in this group.

Ex: School (*badi*), College (*kalYaSAla, kAlejI*), University (*viSva viXyAlayaM*).

2. Charitable places (*sevApara sWalAlu*):

These are the places where the destitute and refugees receive shelter under the services of humanity services.

Ex: Hostel (*vasawi gqhaM*), Charity (*Xarma SAla*) etc.

3. Religious places(*mawaparamEna sWalAlu*):

Human beings have constructed certain peculiar places subject to their religious activities. Such places have been noted in this group. The constructions are modeled within the features of their religion. The constructions subjected to their religion are mentioned as:

Ex: Temple (*gudi*), Mosque (*masIxu*), Church (*carci*).

4. Recreational places (*vinoxa sWlAlu*):

Some places have been allocated for entertainment and enjoyment by human beings. People use these places to relax from their daily stress – both physically and mentally. The places for the activities of relaxation and entertainment are mentioned in this group.

Ex: Playground (*Ata sWalaM*), Park (*uxyAna vanaM*),

Cinema theatre (*sinimA hAlu*).

5. Business Place (*vyApAra sWalAlu*):

These places are meant for selling and buying of essential commodities and daily goods by human beings. These places are particularly allotted for business purposes. Such places are mentioned in this group.

Ex: Shop (*aMgadi*), Petty shop (*cinna koVttu*), Market (*bajAru, saMwa*).

6. Government places(*praBuwva sWalAlu*):

The places which are allotted for activities of the public for their needs, administrative works of government, buildings, organizations and lands in relation to the purpose of the public are designated as government places. Such places are added in this group.

Ex: Secretariat (*sacivAlayaM*)

7. Institutions (*kAryAlayAlu*):

Some buildings are utilized for the needs, wishes and comforts of the human beings. Such special buildings are designed according to the comforts of humans and are called institutions/offices.

Ex: Office (*kAryAlayaM*).

8. Historical places/Heritage places(*cAriwraka sWalAlu*):

It has been observed that most of the historical and hostage places have become special mentioning. The constructions which are losing ground are being preserved. These places are considered to have had special place in history. By keeping this in view, at present they are being protected and given special importance. They are considered as famous places of tourism. Such types of historical monuments are added in this group.

Ex: Charminar (*cArminAru*), Taj Mahal (*wAjmahalu*).

9. Burial/Cremation Grounds (*smaSAnAlu*):

Human beings have allocated some particular places to bury their bodies after their death. In olden days these places (Burial grounds) used to be far away from the living areas. This used to be a special and particular area where the dead bodies were buried. However, at present, some particular places have been built for the purpose of cremating the dead bodies. Hence, this category is indicated in this group.

Ex: Burial/Cremation ground (*smaSAnaM*).

10. Ways/Roads (*xArulu*):

This category indicates facilities for moving from one place to another. These may either be considered as constructed or non-constructed. Through the usage (travelling frequently) of a particular place by living beings, animals and vehicles, the possibility of a pathway would start to exist. The place will become a pathway naturally. However, this may be said to emerge due to construction or non-construction. To make the aspect of travelling, some particular pathways are to be constructed. For instance, vehicles like trains need to have special constructions of rail lines on roads. Further, as trains cannot move on the surface of water, construction of

a bridge becomes essential. Hence, bridges are constructed as pathways. The related nouns are added in this group.

> Ex: Way (*xAri, weVnnu, weVruvu, weru*), Route (*xova, woVvva), Road (mArgaM, roddu)*, and Railway track (*rElu mArgaM*).

11. General (*sAXaraNamEnavi*):

According to cultural conditions and as per needs, human beings take up several constructions for their sustainment. In this group, only some aspects/objects have been clubbed and discussed. The nouns in the next groups are divided as in the following:

> Ex: Sawmill/ Timber depot (*aDiwi*).

5.1.1.2.1.2 Aquatics/Water (*jala prAMwAlu*):

As 71% of Earth is water, while 29% is land, human beings are unable to utilize the major area of aquatics for residential purpose [Living]. However, it should be remembered that water is essential for the sustainment of human beings. Water is one of the basic needs of every living thing. The water which flows and found in fresh water bodies is being used by human beings for their daily needs. Human beings have constructed storage tanks according to their needs and are utilizing the water in several ways. Hence, aquatics can be divided into two groups, they are:

A. Natural places (*sahaja jalASayAlu*)

B. Artifact places/constructions (*nirmiwa jalaSayAlu*)

A. Natural places (*sahaja jalASayAlu*):

As mentioned above a major part of the earth is covered with water. It can be said that one of the natural characters of water is to flow. It generally flows from up to down. Hence, some flows reach deep down areas and get stagnated. However, there are other flows of water, viz., rivers, brooks, and streams that merge with the seas and

oceans constantly. Hence, according to the category (aquatics) mentioned, the features can be divided into two groups. They are

   i. Flows (*pravAhAlu*)

   ii. Non-Flows (*apravAhAlu*)

i. Flows (*pravAhAlu*):

Flow is a general feature of water. It flows from upwards to downwards. The aspect of flowing makes all the rivers, brooks and streams merge with the seas and oceans, which in turn are formed. All these aspects are found to have formed naturally. However, some flows are diverted and are considered to be man-made. Further, the mention of waterfalls is to be mentioned here as a sub-category. Waterfalls are flows from high places, like, mountains and hillocks. Hence, these can be mentioned as waters that have self-flow ability.

     Ex: Canal (*kAluva*), River (*eru, naxi*), Sea (*samuxraM*) and Waterfalls

        (*jalapAwaM*).

ii. Non-Flows (*apravAhAlu*): People construct particular structures for storage. It can be considered under the category of − Non-Flows as reservoirs of water. This water will be utilized for the needs of the public, crops and to generate electricity. Thus, this sub-category can be mentioned under Dams and Reservoirs.

     Ex: Well (*bAvi, ceVlama*), Tank (*ceVruvu, kuMta*), Dams like Nagarujuna

        Sagar (*Anakatta, jalAsayaM, sAgaru*).

B. Artifacts/Constructions (*nirmiwAlu*):

People utilize water which has an ability to flow (floating) for constructions according to their needs in several ways. Humans are conserving water through various sources, for instance, rainwater from flowing into sea. This is done by

constructing Dams/Reservoirs for storage and in order to generate electricity and further for cultivation (agricultural purposes).

The characteristics of the water are divided into two parts, they are:

1. Water of flow (*pravAhAlu*).
2. Water of non-flow (*apravAhAlu*).

1. Flows (*pravAhAlu*): In order to fulfill the needs of human beings, they have constructed particular structures in a systematic mode to avoid the wastage of water. They allow the flow of water for the needs of public and for the cultivation of crops. Thus, the flow of water is directed to places for storage.

Ex: Canal (*kAluva*).

2. Non-flow (*apravAhAlu*):

The special constructions would be built to store water. This water can be utilized in terms of drinking purpose, producing power, and for agriculture. Under this category, water is stored by constructing dams to channelize for specific purposes.

Ex: Well (*bAvi*), pond (*ceVruvu*)

5.1.1.2.1.3 Spatial/Sky/Space (*AkASa BAgaM*)

Universe is infinite. This infinite consists of earth, sky, planets, galaxies, satellites, air and space. All these are in the Universe, which is infinite. Thus, it has been categorized as such.

Ex: Sky (*AkASaM, aMwarikRaM*), Orbit of Sun (*sUryamaMdalaM*),

Orbit of moon (*caMxramaMdalaM*).

I. Location (*sWAnaM*):

Location is a part of space that is utilized for the needs of human and non-human. These spaces are created as stipulated places. Thus, it is clubbed and mentioned as a sub-category.

Ex: Location (*sWAnaM*)

II. Mythological Places (*pOrANikamEnavi*): These places are imagined/creative spaces from ancient history/period. These are not confirmed by the facts. These places are imaginative. They are places created and situated through our ancient stories. They cannot be visited (physically). Most of the names of places mentioned in the ancient mythological books are constructed and situated in some or other physical place and some are not. Due to this reason these places are divided into two sections.

1. Construct/Constructed (*nirmiwaM*).

2. Non-Constructed (*nirmiwewaraM*).

1. Construct/ Constructed (*nirmiwaM*):

The names of places which are mentioned as constructed in ancient mythological books are discussed.

Ex: Maya Sabha (*mayasaBa*) [From the books of The *Mahabharata*, the *Ramayana*]

2. Non-constructed (*nirmiwewaraM*):

There are names of constructed, imagined spaces and non-constructed places. However, they are described from the ancient books, which become a source.

Ex: Heaven (*svargaM*), Hell (*narakaM, pAwAlaM*).

5.1.1.2.2 Objects (*paxArWAlu*):

Air, Water, Fire, Earth, and Space are considered to be natural elements. Every object is created from these elements of Nature. The entire universe is considered to be constructed from the above-mentioned elements. Every object is constructed and exists in one of the ways, solid, liquid or gas.

1. Solid (*Gana paxArWAlu*)

2. Liquid (*xrava paxArWAlu*)

3. Gas (*vAyu paxArWAlu*)

5.1.2.2.1 Solid objects (*Gana paxArWAlu*):

The solid objects do not have movement, life and individuality. But, they are moved by applying strength upon them. Such types of objects are divided into two types.

1. Natural Objects (*sahajamEnavi*):

These are products of pure nature. They do not have any physical implication of humans. They are divided into six parts

    i.   Biological (*jEvikamEnavi*)

    ii. Phenomena (*axBuwa*)

    iii. Minerals (*KanijalavaNAlu*)

    iv. Chemicals (*rasAyanAlu*)

    v. Consumables (*xravyAlu*)

    vi. Artifacts (*vaswuvulu*)

i. Biological (*jEvikamEnavi*):

The biological objects are related to aviate. The parts of body are divided into two parts.

    A. Edibles (*AhArayogyAlu*)

    B. Excretions (*visarjanAlu*)

A. Edibles (*AhArayogyAlu*):

There are edibles in our biological system. No solid objects are there in products put by human. These edibles can be in three ways.

    a. Animal Related (*jaMwusaMbaMXamEna*)

    b. Bird Related (*pakRisaMbaMXamEna*)

    c. Plant related (*vqkRasaMbaMXamEna*)

a. Animal Related (*jaMwu saMbaMXamEna*):

People generate meat from their pet animals, viz., Sheep, Goat and so for their meal. Hence, the objects are mentioned.

Ex: Meat of sheep/Goat (*meka/goVrreVmAMsaM*).

b. Bird Related (*pakRi saMbaMXamEna*):

The meat of Hen and Duck come under this category. The eggs of Hens and Ducks are also consumed by people, as it is a biological origin. Hence, this subject is mentioned in this category.

Ex: Eggs (*grudlu*), Chicken (*kodimAMsaM*)

c. Plant Related (*vqkRa saMbaMXamEna*):

Most of the objects that emanate from plants become suitable for consumption. Hence, every human being, animal, bird and other creatures depend on plants for their nutrition.

Ex: Raw fruits (*pacci kAyalu*)/ripe fruits (*paMdlu*).

B. Non-Useful / Excretions (*visarjanAlu*):

Excretions are objects discharged by human beings and living creatures. Some of the biological objects do not have the suitable characteristics, though they are produced by the self – one's own body. Hence they are indentified as excretions and are discussed under this sub-category.

The undigested waste and useless biological edibles taken by the living being are pushed out from the physical body in the form of excretion. These undigested biological edibles are in the form of; solid, liquid and gas. The above concept points the solid excretion as waste, however, the same may be suitable for consumption by another living being.

The names of excretion as objects of living beings are identified through the use of different words. They are divided as below:

   a. Human Related (*manuRyasaMbaMXi*)

   b. Animal Related (*jaMwusaMbaMXi*)

   c. Bird Related (*pakRisaMbaMXi*)

a. Human Related (*manuRya saMbaMXi*):

The excretion by the human being is mentioned in this study. This category does not highlight or show up any differentiations between the gender case (male and female).

   Ex: stool (*malaM, xoVddi, xoVddiki, bElu, pIyi, piyyi, peVMta*).

b. Animal Related(*jaMwusaMbaMXi*): The excretion in animals is mentioned as Dung.

   Ex: Dung (*peda, peVMda, pidaka*).

c. Bird Related (*pakRi saMbaMXi*): The excretion in birds is mentioned as Bird droppings.

   Ex: Stool/Droppings (*reVtta*).

ii. Phenomena (*axBuwa*): The occurrence a circumstances or facts that are perceptible by the senses.

   Ex: Rainbow (*iMxraXanassu, siMgiNi*), Thunder (*urumu, meVrupu*), Thunder
   Bolt (*pidugu*).

iii. Metals/Minerals (*lohAlu/KanijAlu*):

The main characteristics of natural product which is a deadly solid object (Metal/ Minerals) consist of an exact chemical action, color, purity and solidness just like gold, silver are considered to be the natural objects.

The above is nothing but a product of excavation process through the earth or water to discover the objects like Stones, Sand, Salt, Coal and Petroleum for the purpose of utility they come under same category.

For living beings like Humans, Animals and plants, the objects of deadly Dhathuvulu produces most valuable nutritious elements like calcium, Iron, Potassium, Sodium, Zinc etc. Such types of objects are discussed in this division.

Ex: Gold (*baMgAraM*), Silver (*veVMdi*), Diamond (*rawnaM, vajraM*),

Coal (*boVggu*), Sand (*isuka*) and Stones (*rAlYlu*).

iv. Chemicals (*rasAyanAlu*):

A number of naturally available chemicals are excavated from the Earth itself. These chemical objects are utilized in many ways in human necessities by experiments on which they obtain the raw materials from the Earth. In the above concept the objects of some solid chemicals are addressed.

Ex: Sodium Chloride (*uppu*), Uranium (*yUreniyaM*), Radium (*rediyaM*) and

Magnesium (*magnamu*).

v. Consumables (*xravyAlu*):

Consume means used up [waste] melting (like candle) making empty of its existence [Exhaust]. By usage of the objects they are considered to be consumables. So the utilization of these consumables caused to exhaust that physical existence. So these are the disposable objects if once they are used.

These are considered to be in the form of physical objects. They can be seen in two ways Eatables [Edible], Non-Eatables [Non-Edible].

Edible Objects (*wine paxArWAlu/AhArayogyAlu*):

Without taking edible objects no living being can survive. Every living being survives by consuming the edible objects. The living beings like plants are self-

patrons and self-managed whereas the rest are parasites. These parasites depend upon edible/food/eatables from the objects obtained from other living beings.

Some living beings are considered to be vegetarians as they live on plant oriented edibles for living some are considered to be non-vegetarians as they feed upon flesh of the other living beings. Some take both Vegetarian food (plant-based) and Non-Vegetarian food (animal based) [edibles]. They are considered to be omnivores. So the attitudes and manners change according to the living beings. Let us observe objects of edibles according to nature.

A. Edibles of human (*manava AhArAlu*)

B. Edibles of Animals (*jaMwu saMbaMXa AhArAlu*)

C. Edibles of Birds (*pakRi saMbaMXa AhArAlu*)

D. Rituals (*prasAxAlu*)

E. Myth (*purANa saMbaMXa AhArAlu*)

A. Edibles of Humans (*manava AhArAlu*):

Generally, Humans are semi-edibles. They depend upon the availability of the objects the plants related and animal based food to lead their lives.

People used to take their food product from nature and they cook the materials before they eat it. The names and attitudes are changed after the objects were cooked. Now we will examine the objects cooked/uncooked (prepared/unprepared).But in this concept only solid edible objects are explained.

Vegetarian:

Cooked/Prepared: Rice (*annaM*), Curry (*kUra, iguru, pulusu, cAru, rasaM*), and Buttermilk (*majjiga*).

Uncooked/Unprepared: Fruits (*kAyalu, paMdlu*)

Uncooked/Unprepared: Egg (*guddu*), Spawn (*poVxugadaM*), roe (*cepa gruddu*).

B. Edibles of Animals (*jaMwu saMbaMXa AhArAlu*):

Animals can be considered to be Vegetarians or Non-Vegetarians and semi-edibles by the way of their consumed edibles/food.

People used to pet the animals for their needs and live along together with them. They took keen care about the objects and health in an extraordinary way. Thus, nowadays special nutritious edibles are specially prepared and supplied to domestic animals. So the edibles of animals divided into two parts. They are prepared and unprepared.

Vegetarian (*SAkAhAri*):

Usually every animal used to take plants and grass as its edible food.

Non-Vegetarian (*mAMsAhAri*):

Usually animals want to hunt a vegetarian animal as its food. But the natural desire is they want to have smaller than themselves. But the animals like Lion, Tiger [the cruel of the wild animals] hunt not only small animals but also bigger animals like elephant, buffalos, bulls, deer or stags kill them and eat them. Menial animals like dogs do not hunt for pray but search for dead bodies of other animals flesh for their feed.

C. Edibles of Birds (*pakRi saMbaMXa AhArAlu*):

Birds are also categorized according to their food habits like Vegetarians, Non-Vegetarians and edibles.

In general, these are fed up with by eating small plants and small creatures to lead their lives. But the pet birds like hen will be prepared in a particular way. Thus nowadays, specially prepared edibles are available. Hence we can see these edibles are also divided as prepared and unprepared.

Ex: Grain (*XAnyaM*) or Grams and Bran.

D. Ritual (*prasAxAlu*):

It is a custom that people used to present things as an offering to idols of Gods and Goddesses in memory of their relatives or devotees. They believe that the spirits of their dead relatives will accept this offering. Thus this was attached in this concept.

Ex: Composure of Mind/Grace and Consecrations of food to God.

It is a strong belief of humans that the dead person goes to either Heaven or Hell and Reborn. So the people celebrate the death anniversary every year by presenting a measure of Rice and along with the related prayers. In the same away the above process was included in this rituals process.

Ex: Lump of food [Rice in memory of their Late Relatives] (piMdaM).

E. Mythological (*purANa*):

We can only imagine the objects which mentioned in mythological we cannot visit them physically. As per the mythology, they are very scary, valuable and adorable objects. But these objects cannot be used as natural edibles.

Ex: Nector (*wene*), Ambrosia (*aMqwaM*), deadly poison (*garalYaM*).

Non-Edibles (*AhAra ayogyaM*):

These are utilized not for consumption but used for another purpose. They can be used if necessary nominally. They are

   A. Aromatics (*sugaMXaxravyAlu*)

   B. Medicines (*ORaXAlu*)

   C. Narcotics (*mAxaka/mawwu paxArWAlu*)

   D. Poisons (*viRapUriwAlu*)

A. Aromatics (*sugaMXa*):

These objects are totally filled with fragrance. People used them in occasions in their daily lives.

Ex: Sandal (*caMxanamu*).

B. Medicines (*ORaXAlu*):

People utilize these objects to protect from diseases.

Ex: Homeopathy (*homiyopawi maMxulu*)/ Allopathy (*alopawi maMxulu*).

C. Narcotics (*mAxaka/mawwu*):

Consumption of narcotics by the people.

Ex: Ganja/ Bhang (*gaMjAyi*), Tobacco (*poVgAku*).

D. Poisons (*viRa*):

These objects are poisonous not edible. Maybe in microscopic quantities they consumed for medical purposes.

vi. Artifacts (*vaswuvulu*):

Some objects which are deprived of their quality/shape with time are known as durables. Human beings manufacture these objects for their daily needs. According to the usage of the products, they can be categorized as:

1. Books (*graMWAlu/puswakAlu*)

2. Cultural (*sAMskqwikamEnavi*)

3. Accessories/Garments (*upakaraNAlu*)

4. Household (*gqhasaMbaMXi*)

5. Stationary (*sAmagri*)

6. Implements (*panimutlu*)

7. Musical instruments (*vAxya viSeRAlu*)

8. Machines (*yaMwrAlu*)

9. Weapons (*AyuXAlu*)

10. Vehicles (*vAhanAlu*)

11. Fireworks (*bANa saMcA*)

12. Mythological (*purANa vaswuvulu*)

13. General (*sAXaraNa vaswuvulu*)

1. Books (*graMWAlu/puswakAlu*):

In this group topics related to Books are mentioned

Ex: Itihasa (*iwihAsAlu*), Ayurveda SAstra (*Ayurvexa SAswraM*).

2. Cultural Objects (*sAMskqwikamEnavi*):

By taking the part of heritage and tradition, this category tries to mention some general objects in accordance to the need of the human being. Based on particular aspects, these objects are used by humans. These are used to pay homage to Gods/Goddesses. The ornaments worn at the time of paying homage to the Gods, esp. at the time of festivals, have special characteristics. These objects are discussed in particular and mentioned/added in this group.

Ex: Camphor (*karpUraM, xIpaM, xUpaM, sAmbrANi*).

3. Accessories (*upakaraNAlu*):

The objects/ornaments that can be worn are added to this group. These objects/ornaments are not only worn by humans but are also used in decorating animals. At this juncture, these objects are divided into two groups.

A. Human Related (*mAnuRya XAraNa yogyAlu*)

B. Animal Related (*jaMwuvulaXAraNa yogyAlu*)

A. Human Related (*mAnuRya XAraNa yogyAlu*):

The costumes and ornaments that can be worn are added in this group. These are considered to be part of some cultures. The utilization and development of these objects are designed and structured along with the advancement of human culture. Besides giving protection, these objects add beauty to the human body

i. Clothes (*xuswulu/vaswrAlu*):

This category can be grouped into various sections: casual wear, ethnic wear, formal wear, sport wear for men/women. However, the purpose and the occasion of wearing the clothes come into the foreground. Hence, they can be categorized and sub-categorized for discussion.

Ex: Women's wear: Saree (*cIra, koka*), Blouse (*jAkettu/ravika*).

Men's wear: Dhoti (*paMca*), Shirt (*coVkkA, jubbA*).

ii. Ornaments (*nagalu/alaMkArAlu*):

Since from ages, men and women have tried to look beautiful and handsome by wearing ornaments made off different materials, viz., wood, glass, beads, pearls, corals, stones and different metals that are found in earth. In some cases, these ornaments worn by men and women are same and sometimes they are different.

Ex: diamond necklace (*rawnAla hAraM*), diamond ring(*vajraputuMgaraM*).

iii. Ornaments related to Animal (*jaMwuvulaXAraNa yogyAlu*)**:**

It is observed that since the dawn of civilizations, man has tried to rear animals. Among these animals, some of them have been hard to handle, rear and nurture. In order to control them, man has invented ornaments which make them look good and also control them.

Ex: *mukku wAdu, cikkaM, jInu, gudibanda and gaMta.*

4. Household (*gqhasaMbaMXi*)**:**

Things which are used in the house are discussed in this category.

Ex: *ginneV, kurcI, soPA, maMcaM.*

5. Stationary (*rAwasAmagri*):

Things that are used in offices and educational institutions are discussed under this category. Ex: Pen (*kalaM*), Paper (*kAgiwaM*), Pen (*peVnnu*).

6. Instruments used in the agriculture (*vyavasAya panimutlu*):

Agriculture is considered to be the backbone of Indian culture. To make agriculture, more handy and easy, various methods have been invented by man. In this process the invention of instruments and the method of handling them have changed a lot. The instruments that are used in agriculture are discussed under this category.

Ex: *nAgali, palugu, pAra, koVdavali.*

7. Musical Instruments (*vAxya viSeRAlu*):

Musical instruments that are used in different traditions (sampradayas) of dance and singing are discussed in this category. Among these instruments, some of them are made of wood, animals' skin, iron, bronze, copper, and animals' bones in different shapes.

Ex: *vINa, waMbura, dolu, sannAyi* and war trumpets.

8. Machines (*yaMwrAlu*):

Man is a unique person on earth, who is different from animals. In order to make his life and work easy he has been trying to invent new machines and new things continuously.

Among these inventions some of them run with oil, some of them with gas, and some of them with electricity.

Ex: *kaMpyUtar, kyAlikyuletar, janaretar, maralu, and yamwrAlu* etc.

9. Weapons (*AyuXAlu*):

In olden days, man is said to have invented weapons to save himself from the wild animals. As time passed, man has become an enemy to himself and his neighbors. In order to protect himself from the enemy, he has been inventing weapons since ages. In olden days these weapons were made of wood and stone. But in modern times, he has been inventing them with various metals. These weapons are sometimes

flammable and they have the capacity of blasting. Sometimes these weapons are used to destroy human beings and sometimes are used to explore space.

Ex: *kawwi, Ite, bANaM, piswol, bAMbu, rAkeVt and vimAnaM*.

Weapon used in mythology:

Through the study of Indian epics, The *Ramayana* and The *Mahabharata* one can understand that the characters in the epics have used various magical weapons and missiles.

Ex: *vajrAyuXaM, AgneyAswraM, and pASyupawAswraM*.

10. Vehicles (*vAhanAlu*):

Invention of the wheel has radically transformed human life. The invention has helped in building vehicles that move from one place to another place and to transport things from one place to another place. Among these vehicles some of them are self-driven some of them are dependent driven. Self-driven are cycle, bullock cart, etc. Dependent driven are bus, train aeroplane that run with oil, gas, and electricity. In order to control these things mans' control is absolutely necessary. In order to run these vehicles they need some special ways like Railway line and for airways, runways are essential. The travelling modes of these vehicles are terrestrial, aquatic, and in space. Again these vehicles can be divided into manually movable and automatically movable categories.

a. Terrestrial vehicles (*BUcara vAhanAlu*):

These vehicles run only on earth. Some need special tracks, and some need natural roads. Ex: manually movable: Cycle, rickshaw.

Automatically moved or self-propelled things: Scooter, Car, Bus.

b. Aquatic Vehicle (jala saMbaMXa vAhanAlu):

These vehicles run only in water with special navigation systems.

Ex: Manually movable Vehicles: Boat and Ferry.

Automatically or Self-propelled Vehicles: Ships and steamers.

c. Spatial Vehicles (*vAyu saMbaMXa vAhanAlu*):

These vehicles run only in the air either through radar system, or satellite signals. Ex: Airplane, Helicopter and Rocket.

11. Fire Works (*bANa saMcA*):

Any substance that explodes with a loud sound and emits colourful lighting in air by generating smoke can be defined as a firework. They explode and turn into ashes.

Ex: *mawAbulu, ciccubuddi*.

12. Mythological related nouns (*purANa vaswuvulu*):

In myths, we can observe innumerable things. Each and everything has an extraordinary value which humans cannot facilitate or construct.

Ex: *akRaya_pAwra*.

13. General nouns (*sAXaraNa vaswuvulu*):

This group contains numerous objects. Hence, a lot of things are not reviewed under this category. The things which are not covered under this category are listed as general category.

5.1.1.2.2.2 Liquids (*xravAlu*):

Liquids can be divided into two types. They are 1) Natural (Liquids) 2) Artifacts (Liquids)

I. Natural Liquids (*sahaja xravAlu*): The following can be categorized as natural liquids. They are:

1) Biological (*jIvasaMbaMXamEnavi*)

2) Chemical (*rasayanAlu*)

3) Oil (*nUneVlu*)

4) Non-oil (*nUneVlu kAnivi*)

1. Biological Liquids (*jIva saMbaMXa xravAlu*):

These are derived from the bodies of creatures. These categories of liquids are generated continuously. Among these, certain liquids stay put in the creatures' body and some come out for the sustainability and existence of the creatures. Hence, these can be divided into two types: a. Useful, b. Non-useful (excretions).

a. Useful (*upayogikAlu*): These types of liquids are produced from the body of creatures. These liquids are used as feed for their offspring. Most often, female creatures produce this type of liquids. These are used as fodder for their offspring. Further, these liquids act as nutrients for humans as well.

Ex: Milk (*pAlu*).

b. Un-useful (Excretion) (*visarjanAlu*): Some liquids produce and function to send out solid and liquid waste matter from the body of human and other non-human creatures. These are 1. Human-related, 2. Animal related, and 3. Plant related.

1. **Human Related (*manuRya saMbaMXi*):** As mentioned above, the waste material passes out from (creatures) humans. This is in connection to both male and female.

   Ex: Urine (*mUwraM*), sweat (*ceVmata*), and pus (*cImurasi*).

   a. **Male-related:** There are excretions that are considered to be waste material produced from the human body. These seem to be different between the male and female. The excretions that are produced in female are not produced in male.

b. **Female related:** The female body releases ovum to reproduce children. The ovum (egg) when it doesn't get fertilized by sperm released out every month from the female sex organs. It is called menstruation flow.

Ex: Menses (*muttu, neVlasari*), Rajassu (*rajassu*).

2. **Animal-Related:** Animals produce excretion. It is identified as urine.

Ex: Urine (*mUwraM*)

3. **Plant Related:** Most of the plant species is useful for humans. It is found that some excretions come out from trees continuously. Though these are considered to be excretions, they are useful for human beings.

Ex: (Plant) milk (*pAlu*), Gum (*jiguru*).

ii. **Chemicals (*rasAyana xravAlu*):** Some chemicals in the form of liquids are added in this category.

Ex: Chloroform (*kloroPAm*), Sulfuric acid (*salPyarik yAsid, gaMXaki AmlaM*).

iii. **Oils (*nUneV/wElamu, camuru*):** These are special liquids. Most of the oils are tacky and they produce heat. Most of them function as heat-transistors. In this subcategory, some are (used as) edibles and some are non-edibles.

a. **Edibles (*AharayogyAlu*):** Most of the edibles do not come directly from nature.

b. **Non-edibles (*AhAra ayogyAlu*):** Some are natural liquids and these are useful for human in many ways. viz., petrol.

iv. **Non-oils (*nUneVlu kAnivi*):** These are oils; however, they are natural liquids like water. These are useful for human in many ways. However, these are considered to be on par with food and treated as on par with food. These are divided into two types: 1. Edible and 2. Non-edibles.

1. **Edible:** used for drinking, processing and irrigation purpose. Ex: Water (*nIru*).

2. **Non-edible:** These are natural and these are not used as food sources.

   Ex: Drainage water (*murugu nIru*)

II. **Artifacts (*kqwrima*):** Humans prepare many artifacts with liquids for their multi purposes by using raw material which are drawn from nature. They are

1. Chemicals (*rasAyanAlu*)

2. Oils (*nUneVlu/wElAlu*)

3. Non-oils (*nUneVlu kAnivi*)

1. **Chemicals (*rasAyanAlu*):** By using some liquid chemicals, humans manufacture many liquid chemicals with chemical reactions for their purposes.

   Ex: Sulfuric acid (*salPArik yAsid*), Nitric acid (*nEtrik yAsid, nawrajanika AmlaM*)

2. **Oils (*nUneVlu/wElAlu*):** These are obtained from trees and seeds. To an extent, humans are using these liquid oils for multi purposes.

a. **Edibles (*AhArayogyAlu*):** Groundnut oil (SeVnaganUnev), Coconut oil (koVbbari nUnev), and Vanaspathi oil (vanaspawi nUnev).

b. **Non-Edibles (*AhAra ayogyaM*):** Neem oil (*vepa nUnev*).

3. **Non-oils (*nUneVlu kAnivi*):** Trees produce not only oils, but also produce natural liquids such as Juice. They are used as food.

a. **Edibles:** Mango Juice (*mAmidi rasaM*), Sugar Cane Juice (*cevruku rasaM*)

b. **Non-Edibles:** Gum (*jiguru*), Rubber (*rabbarupAlu*).

5.1.2.2.3 Gas (*vAyuvu*): A matter in a state that is intermediate between liquids and plasma and that can be contained only if it is fully surrounded by a solid. We come to know these through the sense of touch and the sense of smell. They are two types:

1. Natural Gas (*sAXaraNa vAyuvu*)

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2. Artificial Gas (*kqwrima vAyuvu*)

1. **Natural Gas (*sahaja vAyuvu*):** These are not artificial, these are formed naturally. They are

a. Biological Gas (*jIvasaMbaMXamEnavi*), b. Chemical Gas (*rasAyanAlu*), and c. Non-Chemical Gas (*rasAyanAlu kAnivi*).

a. **Biological Gas (*jIva saMbaMXa vAyuvu*):**It's a natural gas which is a byproduct of physiological processes in plant and animal bodies and remains in the earth.

b. **Chemical Gas (*rasAyana vAyuvu*):** Natural chemical gases come under this group.

Ex: Oxygen (*Aksijanu*).

c. **Non-Chemical Gas (*rasAyanalu kAni vAyuvu*):** Those which are non-chemicals, but in the form of natural gases come under this category.

Ex: Air (*gAli*), Gas (*vAyuvu*).

II. **Artificial Gas (*kqwrima vAyuvu*):** These are not natural. These are created by humans for their needs and for business.

Ex: 1. Chemicals (*rasAyanAlu*) and 2. Non-chemicals (*rasAyanAlu kAnivi*).

1. **Chemicals (*rasAyanAlu*):** These are prepared through chemical reactions and these chemicals and gases are used for various purposes by humans.

Ex: Nitrogen (*nEtrojanu*) Hydrogen (*hEdrojanu*).

2. **Non-chemicals (*rasAyanAlu kAnivi*):** These are not produced from chemicals. However, these are produced through animals for other purposes. These are used as fuel.

Ex: Marsh gas (*mArR gyAs*), Goober gas (*gobar gyAs*).

5.2 Abstract Nouns (*amUrwa vAcakAlu*):

Abstract nouns are words that describe things that are not concrete. The five physical senses of the human being cannot detect an abstract noun – you cannot see it, smell it, taste it, hear it, or touch it. In essence, an abstract noun describes a quality, a concept, an idea, or maybe even an event.

Ex: Beauty (*aMxaM*), Happiness (*AnaMxaM*), and History (*cariwra*).

Abstract nouns can be divided into the following categories:

1. Cognition
2. Quality
3. Skill
4. Ideals
5. Temporal

6. Quantifier
7. Events
8. Actions
9. Process
10. Onomatopoeic sounds

11. Human Related
12. Terminology

1. **Cognition (*BOxXikamEnavi*):**

In our universe, we can't see or touch everything, butfeel with our mind. Ex: Creativity (*sqjanAwmakawa*), Guess (*Uha*), Happiness (*AnaMxaM*), Strong or Weak etc.

2. **Qualities (*lakRaNAlu*):**

In this creation, every object has some special features, because of this, they show their specialty. Ex: Good (*maMci*) and bad (*ceVdu*).

3. **Skill (*nEpuNyAlu*):**

If we want to do any work, we should have concentration, capacity for skills. Skill related nouns come under this category. Ex: Expert (*nerpu*), Skill (*nEpuNyaM*).

4. Ideals (*AxarSAlu*):

A person or a thing that you think is perfect. These can be followed by others. These ideals and its related words come under this part. Ex: Justice, Law, Judgment and Principle.

5. Temporal (*kAlagawa vAcakAlu*):

In this section, seasons, periods, ages are discussed:

A. Period (*kAlaM*):

The rotation of the Sun causes day and night. Based on this concept, people calculate time, days, weeks, months and years. Such particular periods of times are identified as weeks, months, years and ages. Such types of past times are mentioned in these nouns. But, to identify them, a division of these timings in systematic way is to be done.

> Ex: Dawn (*poVxxuna*), Morning (*uxayaM*), Second (*seVkanu*), Month (*nimiRaM*).

B. Seasons (*ruwuvulu*):

The weather conditions are not the same in all times. It changes with the natural system. The temperature levels of the atmosphere may go up and or may go down or sometimes become equal amid time/season. The occurrence of changes in temperature levels due to the collections of weather changes in respect to the seasons. Due to these reasons and on the basis of the weather, the atmosphere may become hot, may become cool, and may even become semi-seasonal for particular periods. The nature changes according to the conditions. The seasons form due to this reason. There may be changes that can be identified in nature within the conditions of nature. These are divided into three terms and six seasons. These terms and seasons are noted in this concept.

Ex: Summer (*vesavi kAlaM*), spring (*vasaMwa ruwuvu*) and autumn (*SiSiraM*).

C. Historical Ages (*cAriwraka*):

The ages are formed with the combination of some thousands of years. Most of the ages have been concealed. But some historical facts reveal the concealed time – this is found to have been done through writings and important records of a particular age. These spaces have been identified as historical places. In this study, these places have been mentioned.

Ex: Stone Age (*SilA/rAwi yugaM*), Age of industrial revolution (*pAriSrAmika yugaM*).

6. Quantifier (*gaNana vAcakAlu*):

We can find the value of some objects through measurements. Such types of measurements are noted in this group.

A. Numerals (*saMKyA vAcakAlu*):

The number of some objects has to be answered through numbers. These are symbols that are used in the calculation of numbers. The identification of these numbers and their calculations are mentioned under numerology.

Ex: Three (*mUdu*), nine (*woVmmixi*).

B. Measurements (*koVlawalu*):

The sizes of some objects are measured and answered in the form of measurement. These sizes become symbols for calculating measurements. The finding of height, weight of the objects is done. So, the terms of measurement are added in this group

Ex: Meter (*mItaru*), centimeter (*seVMtImItaru*), feet (*adugu*), kilogram (*kilo*), *jAna, beVwweV, mUra, gajaM*.

C. Distance (*xUrAlu*):

In this group the length of the distance between two points in the space are discussed.

Ex: Mile (*mElu*), kilometer (*kilomItaru*).

7. Events (*saMGatanalu*):

An incident is known within the situation of its occurrence. It can be realized through the facts of materialization. An occurrence of any situation is known as an incident. We can identify the completions of actions when they are framed into another shape. Thus, we cannot explain this concept in different ways as it is included internally in materialization. We cannot exhibit or mention in a separate group.

These incidents happen by natural means and some incidents happen by planning, predeterminedand some unexpectedly. Some become familiar after the happening of the incident. Some incidents happen according to social factors as determining agents. Such events are noted as below:

A. Natural Events (*sahaja saMGatanalu*)

B. Planned Events (*yojanAnuguNa saMGatanalu*)

C. Historical Events (*cAriwraka saMGatanalu*)

D. Social Events (*sAMGika saMGatanalu*)

E. Accidental events (*Akasmika saMGatanalu*)

A. Natural Events (*sahaja saMGatanalu*):

These events happen naturally. These are not planned and created by human. Such types of incidents are added in this group.

Ex: Earthquake (*BUkaMpaM*), drought (*karuvu kAtakAlu*), floods (*varaxalu, uppeVnela*).

B. Planned Events (*yociMcina saMGatanalu*):

These incidents are pre-planned events. Such incidents are particularly planned. The results of the events will relive on the success or failure of the execution of the event. Thus, such types of events are added in this group.

Ex: Bamb blast (*bAMbu peludu*), Murder (*hawya*)

C. Historical Events (*cAriwraka saMGatanalu*):

The incidents occurred in the past, which have historical memories of the society and are noted even in the present. Such incidents are remembered. These are noted in this group.

Ex: The war of Kalinga (*kalYiMga yuxXaM*), The First World War

(*moVxati prapaMca yuxXaM*).

D. Social Events (*sAMgika saMGatanalu*):

These are incidents that occur in between living beings and are natural in society. They are discussed in this group. Even though these are natural concepts, all these happen as social acceptations.

Ex: Birth (*jananaM*), death (*maraNaM*), Marriage (*peVlYli*).

E. Accidental Events (*Akasmika saMGatanalu*):

Some incidents happen suddenly. An accident can be said as an unintended and an unexpected one. Some incidents happen; these may said to be categorized as expected. These cause sorrow and cause sadness and some happen beyond our expectations. Some of these incidents may cause either happiness or sadness. The symbols of good and bad situation are shown as above.

a. Positive events (*SuBa saMGatanalu*):

Some unexpected events are positive and cause happiness events. Such events are added in this group.

Ex: Getting a job (*uxyogaM rAvadaM*) and lucky lottery (*lAtarI wagaladaM*).

b. Fatal events (*aSuBa saMGatanalu*):

Some unexpected events which hurt us physically and mental causing serious injury are known as fatal events. Such events are noted in this group.

Ex: Sad incident *(xurGatana)*, accident *(pramAxaM)*,

slipped down (*jAripadataM*).

8. Actions (*caryalu*):

Execution of any work is called action. These actions appear physically. They are noted as below:

    A. Physical actions (*BOwikA caryalu*)

    B. Social actions (*sAMGika caryalu*)

    C. Anti-Social actions (*asAMGika caryalu*)

    D. Communication (*BARaNa*)

    E. Celebrations (*vedukalu*)

    F. Sports (*krIdalu*)

A. Physical Actions (*BOwikA caryalu*):

The actions which involve in physical state or movements, such types of actions are executed physically and they appear in this group. Actions may be expressed as nouns are added with other words or suffixes ending in a sense of possible affixes. Such physical actions are clubbed in this group.

Ex: Drown (*munagadaM, muMpu, munaka*), write (*rAyadaM, rAwa*), and read

(*caxavadaM, caxuvu*)

B. Social Actions (*sAMGika caryalu*):

Actions occurring socially – within the bounds of society are part of this group. These actions are acceptable by public.

Ex: Meeting (*saBa*), felicitation (*sanmAnaM*).

C. Anti-Social Actions (*asAMGika caryalu*):

Actions which are related to illegal are noted as anti-social actions and they are described in this group.

Ex: Robbery (*xoVMgawanaM*) and murder (*hawya*).

D. Communication (*BARaNa*):

Events related to communications are added in this group.

Ex: Visit (*parAmarSa*), speech (*BARa*), question (*praSna*), sign (*saMjFa*).

E. Celebrations (*vedukalu*):

Occasions generally celebrated by people, viz., festivals, functions are added in this group. As per the occasion, these celebrations are divided as below,

    i.   Cultural (*sAMskqwika paramEnavi*)

    ii.   Religious (*mawa paramEnavi*)

    iii.   Social (*sAMGika paramEnavi*)

    iv.   Historical (*cAriwrakamEnavi*)

i. Cultural Celebrations (*sAMskqwika paramEnavi*):

These celebrations are celebrated as per the traditions and cultural background of the people of a particular area. Some celebrations being personal and some being group celebrations. Hence, these are divided as:

    a.   Personal Celebrations (*vyakwigawamEnavi*).

    b.   Group Celebrations (*sAmUhikaMgA cesukonevi*).

a. Personal celebrations (*vyakwigawamEnavi*):

These celebrations are celebrated as per the importance of particular individuals. However, these are celebrated/organized due to not only happy but also unhappy events. These are divided as:

A. Happy celebrations (*saMwoRakaramEnavi*)

B. Un-Happy celebrations (*viRAxakaramEnavi*).

A.   Happy celebrations (*saMwoRakaramEnavi*): These are the events which are celebrated on happy occasions.

Ex: Birthday (*jayaMwi, puttinaroju*), wedding day (*peVlYli roju*).

B.   Un-Happy celebrations (*viRAxakaramEnavi*): These are the events organized on unhappy occasions.

Ex: Death day (*varWaMwi, cAvuroju, xinaM, sAvawsarikaM*).

b.   Group celebrations (*sAmUhikaMgA cesukonevi*):

These are the events that are part in tradition and are celebrated among groups.

Ex: Offering a sacrifice (*yajFaM*).

i. Religious celebrations (*mawa paramEnavi*):

These events are in connection to religious events. These depend upon the conditions of the confidence of the people as per their religious feelings. These will be celebrated either individually or in groups that go as per their wish. However, these events are celebrated among all, though these are arranged personally.

Ex: Offering sacrifice (*yajFaM*), prayer (*prArWana*).

A. Festivals (*paMdugalu*):

These are the events which are celebrated or particularly arranged. These are not only celebrated in person but also among all the people of the regional areas. These events are the symbols of happiness.

Ex: Ugadi (*ugAxi*), Sankranthi (*saMkrAMwi*).

ii. Social Celebrations (*sAMGikamEnavi*):

Some days – events – are particularly announced and are accommodated in society as social celebrations. Such events are recognized as symbols of the celebrations. People are found to celebrate the celebrations every year.

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Ex: Mother tongue day (*mAwqBARA xinowsavaM*),

Environmental day (*paryAvaraNa xinowsavaM*).

ii. Historical Celebrations (*cAriwrakamEna vedukalu*):

The events occurred in the history are mentioned in this group. These events are undertaken as a result of the sacrifices, hardships, happiness and demise of our forefathers who fought for the country. Such events are celebrated in remembrance of them and for paying tribute and homage. Hence, these events are added in this group.

Ex: Independence Day (*svAwaMwrya xinowsavaM*), Republic day

(*gaNawaMwra xinowsavaM*).

F. Sports (*krIdalu*):

Sports and games have become a part of human life. These act as recreation activities for physical and mental faculties. It may be said that through sports one can overcome over physical strain and some mental stress. Hence, sports are divided as physical sports and mind sports. Some sports are funny. Nowadays, computer games play a major role. Physical games improve strength whereas mind games strengthen intellectual capacity. These games do not require particular places. However, some particular places are allotted for physical games. These games provide physical exercise and good health to body. The places of play can be seen as below:

Ex: Carroms (*kyArams*), chess (*caxaraMgaM*).

The playgrounds for the sports are noted as:

i.   Terrestrial sports/Earth (*BUsaMbaMXa krIdalu*)

ii. Aquatic sports/Water (*jala saMbaMXa krIdalu*)

iii. Sky/Space (*AkASa saMbaMXa krIdalu*)

iv. Personality Development (*manovikAsakrIdalu*)

i. Terrestrial Sports (*BUsaMbaMXa krIdalu*):

These sports are merely played on the land. These are noted as indoor games and outdoor games. So the playgrounds are mentioned as:

    a. Indoor games (*lopala Ade Atalu*)

    b. Outdoor games (*bayata Ade Atalu*)

a. Indoor games (*lopala Ade Atalu*):

These games can be played in specially constructed rooms. They do not need any special playground. They recreate fun and can be played by both males and females.

Ex: Shuttle (*Ratil*), Badminton (*byAdmiMtan*).

Some games are differentiated on the basis of gender (male and female). They are mentioned as follows.

A. Female Related Games (*swrIla krIdalu*)

B. Male Related Games (*puruRula krIdalu*)

A. Female Related Games: These are meant only for females to additionally**.**

Ex: coin & board game (*acana gAyalu*)

B. Male Related Games: These are meant only for males traditionally.

Ex: Dice (*pAcikalu*)

b. Out Door Games (*bayata Ade Atalu*):

These games are played in some particular open playgrounds. Some particular playgrounds are constructed for these games. The construction of the playground is undertaken as per the rules and regulations of the game. Games like marbles do not require any particular playground. There are some games played in open large playgrounds. These are played by both the male and female.

Ex: Kho-Kho (*koko*), Kabaddi (*kabaddI*), Cricket (*krikeVt*).

Some games are played differently. These types are differentiated between male and female. Thus these can be seen separately. They are

A. Female Related Games (*swrIla krIdalu*)

B. Male Related Games (*puruRula kridalu*)

A. Female Related Games: These are only for females traditionally.

Ex: Tokkudubilla (*woVkkudu bilYa*)

B. Male Related Games: These are only for males traditionally.

Ex: Kotikommaci (*kowikoVmmacci*)

ii. Aquatic/Water Sports (*jala saMbaMXa krIdalu*):

These are played only in water and can be played both by males and females. Thus there is no difference in these games.

Ex: Swimming (*Iwa*), Boating (*botiMgu*).

iii. Sky/Space Related Sports (*AkASa saMbaMXa krIdalu*):

These games can be played only in the sky and these are also played by both malse and females. Thus these also do not have particular differences.

Ex: Sky exhibitions (*AkASa vinyAsAlu*).

iv. Personality Development (*manovikAsaM*):

It isa necessary for humans to retain their physical and mental efficiency. Some aspects like exercise and yoga play an important role in their lives. These are considered to increase self-confidence levels in humans. Thus, these are included in this group.

Ex: Yoga (*yoga*), wrestling (*mallabaMXaM*), karate (*karAte*).

9. Process (*viXAnaM*):

Process refers to actions involving resource material and producing the output through constructed action. It means an action will be concluded. These actions may

occur either physically or mentally. We can see the actions happen physically, but the actions which happen mentally, are considered as imagined. Such types of processes are mentioned in this study. Thus, these are divided into two types:

   i. Physical process (*BOwika*)

   ii. Mental process (*mAnasika*)

i. Physical process (*BOwika*):

These happen physically. We can see them.

Ex: Study (*caxuvu*), Investigation (*pariSoXana*), examination (*parIkRa*).

ii. Mental process (*mAnasika*):

It is related to mind. We cannot see them. They are merely feelings/imaginations.

Ex: Bloom (*vikAsaM*), Discussion (*nirNayaM*), Planning (*yojana*), System (*paxXawi*).

10. Onomatopoeic/ Sounds (*XvanyanukaraNAlu/Xvanulu*):

These are sounds of imitation or Onomatopoeia. These are understood and are said to process only through hearing/listening. Most of these are only audio aids. It is familiar that one can imitate the voices/speech of other, which is a process. These may be considered into two types

   A. Natural (*sahajamEnavi*)

   B. Artificial (*kqwrimamEnavi*)

A. Natural (sahajamEnavi): These are created by nature.

Ex: Thunders (*urumulu*), The roar of an ocean (*samuxra GoRa*).

B. Physical (*BOwikamEnavi*): These are created by living beings and other objects. They are:

   i. Human-related (*mAnava saMbaMXi*)

ii. Animal related (*jaMwu saMbaMXi*)

iii. Birds related (*pakRi saMbaMXi*)

iv. Objects related (*paXxarWa saMbaMXi*)

i. Human Related (*mAnava saMbaMXi*):

These are sounds created by humans. Humans make different sounds, which are known as shouting. Similarly, some sounds are made with the clapping of hands.

Ex: Whistle (*Ila*), Claps (*cappatlu*), sneeze (*wummulu*), cough (*xaggu*).

ii. Animal Related (*jaMwu saMbaMXi*):

These sounds are created by animals. Different types of sounds are made by the Animals. Roaring and barking are there in this group. We can identify the sound of an animal by the noise it makes. Every animal shouts/sounds in a different manner. It is not possible for the human to reproduce the same. However, we can identify the sounds of animals through the imitational process of a particular animal. Every animal howls its in a different way. Thus, we can identify the animals by their imitations.

Ex: Myave, Myave (*myAv myAv*), bhow-bhow (*BO BO*) and Mowning (*aMbA*).

iii. Bird Related(*pakRi saMbaMXi*):

These are different sounds created by different birds. The howling and chirping are specified in this group. We cannot make or pronounce the sound as done by the birds in the same way. So we can identify the voices by hearing the sounds made by a bird. Every bird makes sounds in a different way. It can be said that there is a possibility of imitating a sound of a particular bird.

Ex: Khuhoo-Khuhoo (*kuhukuhu*), Kila-kila (*kilakila*) and Kicha-kicha (*kicakica*).

iv. Objects Related (*paXxarWa saMbaMXi*):

We have known that animals and birds make/produce different sounds. In the same way some sounds are produced by touch. Such sounds which are produced by touch are added in this group.

   a. Instrumental (*vAyixyAla Xvanulu*)

   b. Vehicle (*vahanala Xvanulu*)

   c. General (*sAXAraNa Xvanulu*)

a. Instrumental (*vAyixyAla Xvanulu*):

Sound systems are the basic products of musical instruments. They produce sweet melodious musical sounds by touch. They (instruments) are used obtained by playing and generating sounds that give pleasure. Such imitations of sounds are added in this group.

b. Vehicle (*vahanala Xvanulu*):

The sounds made by the vehicles are added in this group. The sounds generated by special instruments like horn of vehicles while warning passengers to give way while travelling are mentioned here.

Ex: Horn (*bUra*)

c. General Sounds (*sAXAraNa Xvanulu*):

The nouns of onomatopoeia not related are added in this group.

Ex: Valavala (vala vala), Salasala (salasala)

11. Human Related (*manuRya saMbaMXi*):

Names of titles of arts & crafts which are related to humans are added in this group.

    i.   Arts(*kalYalu*)

   ii.   Titles(*biruxulu*)

i. Arts (*kalYalu*):

The Actions which are exhibited for the pleasure are known as Arts. They are received due to the precession and get pleasure from them. Such types of nouns/terms are noted in this group.

Ex: Music (*saMgIwaM*), Dance (*nAtyaM*), Drawing (*ciwraleKanaM*),

Singing (*gAnaM*)

ii. Titles (*biruxulu*):

These are presented for individuals by the government for achieving great things and offering meritorious services for the nation. The government felicitates them with the nouns (Titles). All these indicate arts. Such terms are mentioned in this group.

Ex: Padmasri (*paXmasrI*), Nightingale (*nEtiMgel*), Acharya (*AcArya*),

Doctorate (*paMdiwudu*)

12. Terminology (*pariBARa*):

Concepts related to literature particularly concepts related to text and discourse concepts related to grammar and concepts concerning with the advancements science, social sciences, technology and medicine may form part of this group:

A.   Metaphorical Expressions (*alaMkAra prayogAlu*)

B.   Grammar related (*vyAkaraNa paramEna*)

C.   Prosody related (*caMXassu paramEna*)

D.   Subjects (*SAswra viRayA saMbaMXAlu*)

A. Metaphorical Expressions (*alaMkAra prayogAlu*):

Generally, when we hear the speech/dialogues of humans, we find many expressions/emotions. These are defined in the forms: style, mode of speech and word

of expressions. These are attributed to human literal behaviour. These expressions give the best meaning, rather than a mere sentence meaning.

B. Grammar Related (*vyAkaraNa paramEna*):

The nouns related to grammar are noted in this group.

Ex: Letter (*akRaraM*), phoneme (*varNaM*), Word (*paxaM*) and Sentence (*vAkyaM*).

C. Prosody Related (*caMXassu paramEna*):

The nouns/words related to prosody are noted in this group.

Ex: Metrical (*caMxassu, mAwrA caMxas*)

D. Subjects (*SAswra viRayA saMbaMXAlu*):

These are related to Speech various ways of expressing knowledge resources, such as Literature and Text. These are mentioned in this group. They are noted as below:

I.   Humanities (*mAnavIya SAswrAlu*)

II.   Social Sciences (*sAMGika SAswrAlu*)

III.   Sciences (*vijFAna SAswrAlu*)

IV.   Technology (*sAMkewika SAswraM*)

V.   Etc. (*iwarAlu*)

I. Humanities (*mAnaviya SAswralu*):

The usage of literature is varied and this is changed and used in accordance to the languages of the human beings. Hence, due to various approaches in view, these are regarded as specific aspects of knowledge.

a.   Telugu (*weVlugu*)

b.   English (*AMglaM*)

c.   Hindi (*hiMxi*)

d.   Others (*iwara*)

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a. **Telugu (*weVlugu*):** The words/terms which are used in Telugu literature are discussed in this group.

b. **English (*AMglaM*):** The words/terms which are used in English literature are discussed in this group.

c. **Hindi (*hiMxi*):** The words/terms which are used in Hindi literature are included in this group.

II. Social Sciences (*sAMGika SAswraM*):

Some concepts relating to social studies are added in this group.

a. Economics (*ArWika SAswraM*)

b. Political science (*rAjanIwi SAswraM*)

a. Economics (*ArWika SAswraM*): Some concepts related to economics and financial aspects of individuals and societies are mentioned in this group.

Ex: (*xravyolBaNaM*) (*ArWika mAMxyaM*)

b. Political Science (*rAjanIwi SAswraM*): The concepts of political science – related to social and administrative concepts are included in this group.

Ex: (*rAjyAXikAraM*), (*paripAlana*)

III. Sciences (*vijFAna SAswrAlu*):

The subjects are related to knowledges of structural, constituent and functional aspects of this world are discussed in this group. These are many kinds. These are explained in different ways.

a. Maths (*gaNiwa SAswraM*)

b. Physics (*BOwika SAswraM*)

c. Chemistry (*rasAyana SAswraM*)

d. Technology (*sAMkewika SAswraM*)

a. Mathematics (*gaNiwa SAswraM*): The topics are related to the above subject and are mentioned in this group.

> Ex: Arithmetic (*aMkagaNiwaM*), Algebra (*mAwrikalu*), Trigonometry (*wrikoNamiwi*).

b. Physics (*BOwika SAswraM*): The subjects related to physical sciences and its activities are mentioned in this group.

> Ex: Magnet, Action of magnet (*ayaskAMwa kRewraM, ayaskAMwa wawwvaM*).

c. Chemistry (*rasAyana SAswraM*): The topics related to chemical sciences, its actions/reactions are noted in this group.

> Ex: (*mUlakAlu, ArBitAlu*)

d. Technology (*sAMkewika SAswraM*): The topics related to the subjects of technology are added in this group.

> Ex: web (*jAlika*), Internet (*aMwarjAlaM*), Hardware (*hArdaver*), Software (*sAPtver*).

IV. Etc (*iwarAlu*):

> Other than the aforementioned concepts viz. Maths, Physics, Chemistry, Biology, Technology and other studies are also mentioned in this group.

> Ex: space (*aMwarikRaM*)

5.3 Conceptualization:

The simple definition of the conceptualization involves understanding and naming a concept in a given language. But Langacker (2008) defines conceptualization as a broad term in linguistics especially in semantics and cognitive linguistics. Cognitive semantics studies language as a container and an organizer or as a gateway to knowledge of knowledge within the human mind. The field interprets the language

interms of concepts. This interpretation varies from language (family) to language (family). Also the interpretation varies based on the relation like within the family, within the same clan, within the same community and outside the family, clan and the community. This concept even extended to the field of ontological studies. A precise specification of a particular aspect of conceptualization is ontology and it may occur that a conceptualization can be realized by several distinct ontologies. For example we will see the differences between English language and Telugu. Both languages belong to two different families of languages. One belongs to Indo-European family of languages and the other belongs to Dravidian family of languages. These pose a problem of lexicalization, which means the absence of lexicalization of certain concepts lead to lexical gaps. Lexical gaps are recognized in the language during a language contact in the process of comparison of two languages or translation from one language to another (Cvilkaite Jurgita, 2006: 129), but Lehrer (1974) Lyons (1977) and Kjelmer (2003) were analyzed for the occurrence of only one language. Following are some examples of lexical gaps:
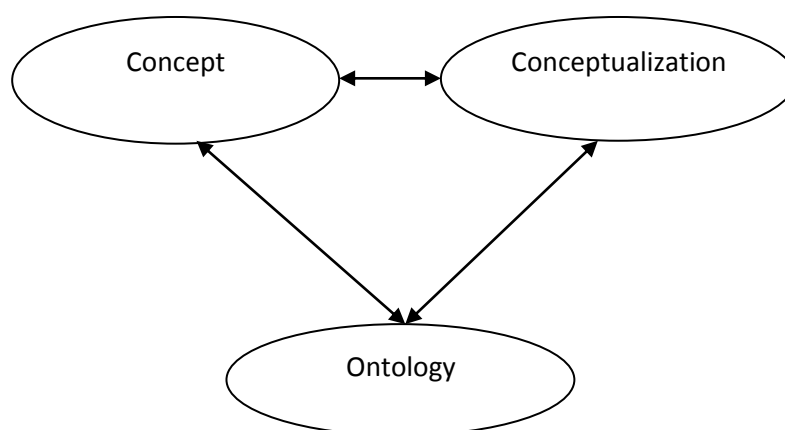
Fig: Graphic display of concept, conceptualization and ontology

Forms of Address in Telugu:

Terms of address and reference are used to address and refer people and things (sometimes). Usually these terms of address and reference represent the customs and practices of a linguistic community in terms of Sociocultural and Pragmatic conditions which determines interpersonal relationships. Usage of these terms of address and reference are depended on interpersonal relationships in terms of various factors like social, cultural and mental etc. Interlocutors address and refer each other considering the interpersonal relationships factors. Following are some examples of forms of address in Telugu:

English

The address term **uncle** in English is used to denote as in the following

- Fathers elder brother is referred and addressed as 'uncle'

- Fathers younger brother is referred and addressed as same as elder brother i.e. 'uncle'

- Fathers middle brother is referred as 'uncle'

- Fathers brothers younger and elder belong to same family referred to as 'uncle'

- Father's sister's husband and husband's fathers are referred to as 'uncle'

- Mother's brothers are referred to as 'uncle'

- Wife's father's referred to as 'uncle'

- Anybody outside the family but elder to ego again also referred to as 'uncle'.

- In this language every elderly male may be referred to as 'uncle'

Telugu

When it comes to the Telugu language it is entirely different. The word **uncle** has no single equivalent and is not as same as in English. We can see the following examples.

- Father's elder brother is referred as '*peVdda nAnna*'

- Father's younger brother is referred as '*cinanAnna*' or '*bAbayi*'

- Father's middle brother is referred as '*bAbayi*'

- Father's last youngest brother referred as '*kadagoVti bAbayi*'

- Father's brothers who is younger or elder and belongs to same family referred to as '*peVdda nAnna*' or '*bAbayi*' '*cinanAnna*' or '*bAbayi*'

- Father's sister's husband and husband's brothers are referred as '*menamAma*'.

- If it is elder 'peVdda mAmayya, if it is younger '*cinamAmayya*'.

- Mother's brothers elder and younger are referred to as uncle '*mena mAma*'.

- If heis elder 'peVdda mAmayya', if he is younger '*cina mAmayya*'.

- Wife's father is referred to as '*mAmayya*'

- Anybody outside the family who is older than ego may bereferred to as '*bAbayi*' or '*mAmayya*'.

- In the English language we can see the case of syncretism whereas in Telugu it is explicit

The address term **<u>uncle</u>** in English is used for many people viz.:

English	Telugu
Father's elder brother called as 'uncle'	Father's elder brother - '*peVxxa nAna*'
Father's younger brother called as 'uncle'	Father's younger brother - '*cinanAna* or *bAbayi*'
Father's middle brother called as 'uncle'	Father's middle brother - '*bAbayi*'
Father's sister husband and his brothers called as 'uncle'	Fathers last youngest brother - '*kadugoti bAbayi*'
Mother's brother elder and younger are called as 'uncle'	Father's brothers -'*peVxa/cina nAnna*' or '*bAbayi*'
Wife's father is referred to as 'uncle'	Father's sister's husband - '*mena mAma*'
Any male individual older than egoreferred to as 'uncle'.	Mother's brothers - '*menamAma*'
	Wife's father referred as - '*mAmayya*'
	Anybody outside the family in general conversation will be referred as - '*bAbayi*' and '*mAmayya*'

<u>Uncle</u>	**<u>bAbAyi</u>**
+human	+human
+masculine	+masculine
+adult	+adult
+older to ego	+older to ego
	+younger to parent

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The address term **aunty** in English is used for many people viz.:

English

The address term **aunty** in English is used to refer to many reactivates others viz.

- Father's elder sister is addressed as 'aunty'

- Father's younger sister is referred to and addressed as same as elder sister as 'aunty'

- Father's middle sister is referred to as 'aunty'

- Father's sisters- younger or elder and belongs to same family referred to as 'aunty'

- Mother's brothers' wife and her sisters referred to as 'aunty'

- Mother's brother's wife and her sisters are referred to as 'aunty'

- Husband's mother referred to as 'aunty'

- Any female older than ego is also referred to as 'aunty'.

- In this language, everybody little above the age of 30 are referred to as 'aunty'

Telugu

When it comes to the Telugu language it is entirely different. The word **aunty** is not as same as in English. We can see the following examples.

- Father's elder sister is referred to as '*menawwa*' and if it is an elder '*peVxa menawwa*'

- Father's younger sister is referred to as '*menawwa*' '*cina menawwa*' or '*awwa*'

- Father's middle sister referred to as '*awwa*'

- Father's last youngest sister referred to as '*kadugUti awwa*' '*kadugUti menawwa*'

- Mother's sister elder as '*peVxxamma*'

- Mother's sister younger as '*pinni*'

- Mother's sister younger or elder but belongs to the same family referred to as '*peVxxamma*' for elder and '*pinni*' for younger.
- Father's brothers wife and wife sister referred to as '*peVxxamma*'
- If she is elder as 'peVxxamma, if she is younger as '*cinnamma*' or '*pinni*'.
- Any elderly female outside the family in general conversation may be referred to as '*peVxxamma*' and '*pinni*'.

The address term **<u>aunty</u>** in English is used for many people viz.:

English	Telugu
Father's elder sister is addressed to as 'aunty'	Father's elder sister is referred as '*mena awwa*' and if it is elder '*peVxxa menawwa*'.
Father's younger sister is referred and addressed as same to as elder sister 'aunty'	Father's younger sister is referred to as '*menawwa*' '*cinna menawwa*' or '*awwa*'.
Father's middle sister: referred as 'aunty'	Father's middle sister is referred as '*awwa*'.
Father's sisters- younger and elder belong to same family referred as 'aunty'	Father's last youngest sister is referred to as '*kadugUti awwa*' '*kadugUti mena awwa*'.
Mother's brothers wife and her sisters referred as 'aunty'	Mother's sister elder '*peVxxamma*'.
Mother's brothers wife and her sisters are referred as 'aunty'	Mother's sister younger as '*pinni*'.
Husband's mother referred as 'aunty'	Mother's sisters younger and elder belong to same family referred as '*peVxxamma*' for elder and '*pinni*' for youngers.
Any elderly lady outside the family also referred as 'aunty'.	Father's brothers wife and wifes sisters referred to as '*peVxxamma*'.
	If it is elder 'peVxxamma, if she is younger '*cinamma*' or '*pinni*'.
	Any lady outside the family in general conversation may be referred to as '*peVxxamma*' and '*pinni*'.

	Aunty	**awwa**	**menawwa**
	+human	+human	+human
	-masculine	-masculine	-masculine
	+adult	+adult	+adult
	+olden to ago	+olden to ago	+olden to ego
	±older to parent	±older to parent	±older to parent
	±address	+address (term)	-address (term)

The address term **sister** in English is used as in the following:

English:

Elder sister is ego'sas'sister'

Younger sister is toas'sister'

Nurses are called ego'sas'sisters'

In general conversation with some familiarity and who belongs to the same age group 'sister'

Catholic nun's are calledas'sisters'

Telugu:

Elder sister is called ego'sas '*peVxxakka*' or '*akka*'

Younger sister is called ego'sas '*cinnakka*' or '*ceVlleVlu*'

Father's brother's daughter's elder sisterto as '*peVxxakka*' or '*akka*'

Father's brother's daughter's younger sisteras '*cinnakka*' or '*ceVlleV(lu)*'

Girls the same generation elder to the ego to as '*akka*' or '*ceVlleVlu*'

In general conversation with little familiarity, any lady of the same age or above is addressed as'*akka*'

The address term **sister** in English is used for many people viz.:

English	Telugu
Elder sister is to ego as 'sister' Younger sister to ego as 'sister' Nurse is to as 'sister' In general conversation with little familiarity as 'sister' Catholic nuns are as 'sisters'	Elder sister is to as '*peVxxakka*' or '*akka*'. Younger sister as '*cinnakka*' or '*ceVlleVlu*'. Father's brother's daughter's elder as '*peVxxakka*' or '*akka*'. Father's brother's daughter's younger as '*cinakka*' or '*ceVlleVlu*'. Girls of the same generation may be addresses A*kka*' or '*ceVlleVlu*' In general conversation a women may be addressed as '*akka*'.

Sister	**akka**	**ceVlleV**
+human	+human	+human
-masculine	-masculine	-masculine
+sibling	+sibling	+sibling
±older to ego	+older to ego	-older to ego

Betwwen English and Telugu the words sister and its equivalents differ by age.

Eng. **Sibling**   Tel. **wobuttuvu**

+human   +human

±masculine   ±masculine

+shared parent   +shared parent

±older to ego   ±older to ego

In English and Telugu the kinship terms sibling and 'wobuttuvu' share the same ontological feature complexes as shown above.

The address term **brother** in English is used for many people viz.:

English:

Elder brotheras'brother'

Younger brotheras'brother'

Male Nurseisas 'brother'

Catholic priest aspirantsas'brother'

In general conversation with some familiarity a male relative same generationas'brother'

In general conversation any male member of the society of same age group may be addressed 'brother/brawa'

Telugu:

Elder brother is '*anna*' or '*peVxxanna*'

Younger brother '*cinanna*' or '*wammudu*'

Father's brother's sons elder '*peVxxanna*' or '*anna*'

Father's brother's sons- younger '*cinnanna*' or '*wammudu*'

Mother's sister's elder sonas '*peVxxanna*' or '*anna*'

Mother's sister's younger sonas '*cinnanna*' or '*wammudu*'

Boys with the same sirnameand belong to one family as '*anna*' or '*wammudu*'

In general conversation with some familiarity as'*anna*'

English	Telugu
'Elder brotheras'brother'	Elder brother to as'*anna*' or '*peVxxanna*'
Younger brotheras'brother'	Younger brotheras '*cinnanna*' or '*wammudu*'.
A Male Nurseas'brother'	
A Catholic priest aspirantsas'brother'	Fathers' brothers' elder sonas '*peVxxanna*' or '*anna*'
In general any male relative of same ageas'brother'	Fathers' brothers' younger sonas '*cinnanna*' or '*wammudu*'.
In general conversation any male member of same age group of the societyas 'brother'	Mothers' sisters' elder sonsas '*pexxanna*' or '*anna*'.
	Mothers' sisters' younger sonsas '*cinnanna*' or '*wammudu*'.
	Boys with the same sirname belong to one familyas '*anna*' or '*wammudu*'.
	In general conversation any male older cousinto as'*anna*'
	In general conversation any male member of the same generationas'*anna*' or '*wammudu*'

Similarly the kinship terms for brother in English and its equivalents in Telugu can be represented by the following ontological complexes.

Brother	**anna**	**wammi (udu)**
+human	+human	+human
+masculine	+masculine	+masculine
±older to ego	+older to ego	-older to ego
+sibling	+sibling	+sibling

English term 'brother' is not distinguished for age i.e older than ego or not whereas in Telugu 'anna' is older than ego and 'wammi (udu)' is younger than ego.

Age in English:

Age in English language is not considered significant in terms of address addressing people around them. If they want to specify they try to use adjectives like elder, younger, big, small etc.

Age in Telugu:

Age in Telugu language is the matter of concern for addressing the people. The address terms will change according to the age of the person. Some examples are mentioned in the above tables. These differences can be called lexical gapes in the languages and language families across the world.

5.4 Summary of the Chapter:

The Chapter describes entities belonging to different categories in this world. Each of the identifiable entities is known by a name. Existing a name, in other words an existing word indicates the conceptualization of the concept known in the community or shared by the members of the community. These concepts, each with one or more name (synsets) are hierarchically distributed. These concepts often form relatable networks. Every existing word in a language represent a concept occupied a certain node in the network. A whole lot of series pf them are represented here as graphic tables or flow charts. When all the flow charts aligned represent a ground network of nominal concepts in Telugu, concepts are discrete entities. However, a concept occupy as a higher node may share one or more ontological features. Concepts occupying lower nodes or leaves may share one or more ontological features not shared with those of their upper nodes and such features are specific. This

specificity is the one that captures characterization of the word. This hierarchical nature of the concepts and the name give scope for cross-linguistic comparison. Between any pair of language it is hard to come by equivalence with reference to words but very commonly we can see conceptual equivalent characterized by ontological features. Words are only superficial phonetic forms that trigger nearest semantics across the language. Native speakers process language semantics by concepts with ontological complexes in the underlying representations that trigger surface representation with morpho-syntax.

CHAPTER – 6

Computational Implementation

6.0 Introduction

The computational implementation of the present proposal involves the following modules which are considered crucial in Machine Translation System. These modules include Morphology, Agreement, Case, Argument structure, Thematic Roles, and Word Sense Disambiguation. In this chapter, we would demonstrate how ontology plays a pivotal role in implementing the lexical semantics in the realization of the outcome of these modules.

Representing word meanings via inheritance i.e., hyponymic – hypernymic relationships across the lexicon displays extensive use of default inheritance between the lexical items. Lexicon of a language is structured in such a way that it reflects inheritance relations. For example (Pustejovsky, 1996), autobiography, novel, and dictionary inherits lexical semantic information, encoded in the qualia structure, from book. Each of these have individual telic roles instantiated as 'to read' while it is contested for dictionary wherein appropriate telic role is 'refer -to'.
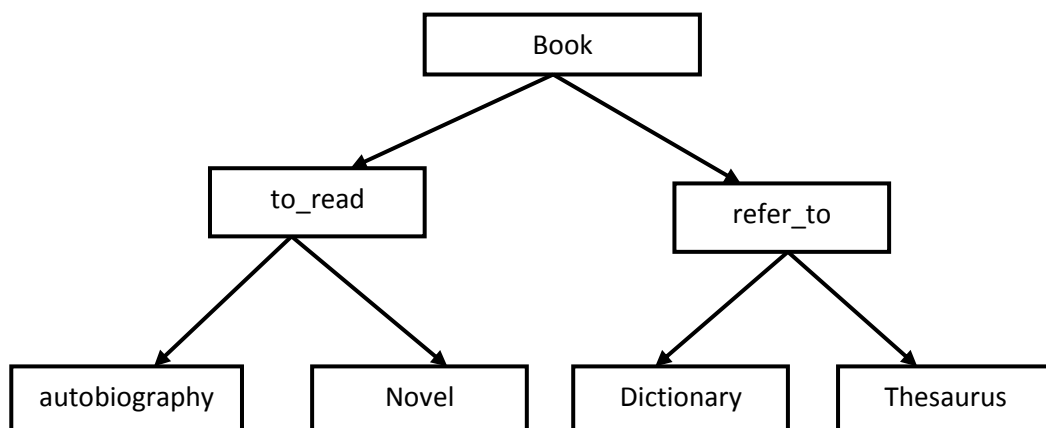
Fig: 6.1 word meaning via inheritance (after Pustejovsky)

Pustejovsky's (1996) approach to lexical semantics is based on the assumption that the lexicon should be seen as a highly structured, generative device.

Pustejovsky considers lexical decomposition should be generative rather than involving exhaustive decomposition into a fixed set of primitives. He considers lexical meaning can be analyzed into 4 levels of representatives:

AS   Argument Structure

ES   Event Structure

QS   Qualia Structure

IS   Inheritance Structure

AS, assumes that arguments of a verb map onto syntactic expression, and this is highly characteristic of lexicon.

ES, required that semantics of words be described in terms of sorted events,such as states (e^s), processes (e^p) or events of transition (e^t) etc.

QS, is the most significant discussion of structured generative lexicon of Pustejovsky. Particularly, he deals with nominals which interact with verbal representatives; Qualia - consists of 4 roles:

1. Constituent role: Constituency of object.
2. Formal role: physical organization of object.
3. Telic role: purpose of action and aim.
4. Agentive role:

IS, relates individual lexical semantic structures with other lexemes − as in the following:

Nom Arg. [±ani]

Agent   Theme/Patient

([+ani] [+hum])   ([+ani]) ([-ani])

                        Patient   Theme

vAdu rAyiwo <u>guddu</u> pagulagoVttAdu.

[+h]_Ag.   [Patient]

guddu   pagiliMxi.

[patient]

Fig: 6.2

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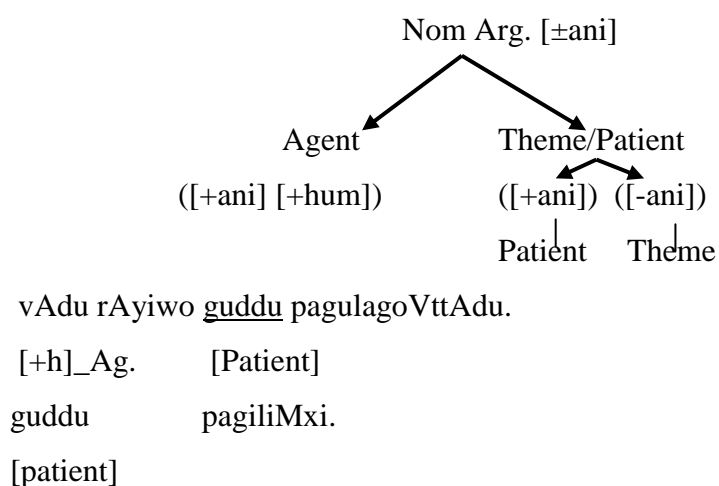
6.1 Relevance of Ontology in Morphology:

Morphological formations both in inflection and derivation are sensitive to ontological representation of words. It is often thought and written in the literature of linguistic description that morphological formations particularly of inflexion are not sensitive to semantics but to a great extent driven by the characteristics of morphological component. However, in a number of cases, inflection in Telugu often requires semantic information represented as defined by ontology. Particularly mention may be made of plural formation of singular nouns both in analysis and generation requiring the ontological information.

Plural formation in Telugu plural nouns usually take the suffix –lu, but the surface representations differ widely based on their ontological information. The same can be described as in the following:

The Telugu nouns ending in –du when get inflected for plural display different output.

1. gU**du** + lu → gUl**Ylu** 'shoulders'

   meVxa**du** + lu → meVxal**Ylu** 'brains'

   pelu**du** + lu → pelul**Ylu** 'explosions'

2. mUrKu**du** +lu → mUrKu**lu** 'idiots'

   snehiwu**du** +lu → snehiwu**lu** 'friends'

   vIru**du** +lu → vIru**lu** 'heroes'

3. vinayaSIlu**du** +lu → vinayaSIlu**ru** 'the obedient ones'

   viRayalolu**du** +lu → viRayalolu**ru** ' '

   anukUlu**du** +lu → anukUlu**ru** 'followers'

Though phonologically and morphologically the set of nouns illustrated above share the same input for the plural formation, but the output is different. The issue

here is, how those native speakers are overcome this problem both in the generation and analysis. The way native speakers differentiate these forms in the generation and recognition is in terms of their membership in different ontological classes such as the following:

Nouns in set 1 belong to [-ani] category.

1. gUdu   'nest' [-ani]

    meVxadu 'brain'

    peludu   'explosion'

Nouns of set 2 & 3 though belong to [+ani, +hum] distinguished into two sets based on their endings: in Singular and Plural again as in the following:

Set	Onto. Feat.	Sg. end in Phon. feat.	Pl. outcome
1	[-ani]	-du	-lYlu
2	[+ani, +hum]	-du	-lu
3	[+ani, +hum]	-ludu	-luru

Table: 6.1

The above discussion with the illustration of the examples demonstrates that in the inflexional morphology ontological feature representation of lexicon is extremely relevant for correct analysis and generation.

2. In the following, we demonstrate that the morphological inflection of case overtly or covertly is sensitive to ontological categorization of nouns. Here the discussion does not deal with the thematic roles or case functions (see 6.2) but only with the inflexional marking. As part of Nominal inflexion, selection of case markers is sensitive to ontological features of the lexicon which may be illustrated with the suffix-nu in some cases and zero in some. This differential marking in the selection of

the Direct object marking variable is again sensitive to ontological features of the nouns. Nouns of +animate category require obligatory marking by –nu whereas [-animate] nouns do not require it. Beyond this, marking of [-animate] nouns with –nu as direct object also indicates specificity.

1. rAmudu   AmeV**nu**   peVlYlAdAdu.   'Ram married her'

    Ram   her [+h] -D.O. marry-pt.3p.m.sg

2. rAmudu   kukka**nu**   koVttAdu   'Ram hit the boy'

    Ram   dog [+a] -D.O.hit-pt.3p.m.sg

3. rAmudu   annaM   winnAdu   'Ram ate the food'

    Ram   food [-a] -D.O. eat-pt.3p.m.sg

4. rAmudu   ceVttu   koVttAdu   'Ram hit the tree'

    Ram   tree [-a] -D.O. hit-pt.3p.m.sg

5. rAmudu   ceVttu**nu**   koVttAdu.   'Ram   hit   the   tree   (sp.not

    anything)'

    Ram   tree [-a] -D.O. hit-pt.3p.m.sg

Onto-feat.	mand.D.O.	Opt.D.O.	Spec.
1. N[+ani]	-nu	-	-nu
2. N[-ani]	-	Ø	-nu

Table: 6. 2

mand. = mandatory; opt. = optional; space. = specificity

As described above nouns inflected for direct object case, overtly or covertly need to be analyzed or generated in the context of the ontological feature + or − animacy.

3. Similar to the inflexional marking of direct object case marker –nu, the dative case marker –ku is also differentially treated for its overt and covert marking. All nouns of animate and inanimate categories obligatorily marked overtly. But when it comes to nouns of space and time, they are differentially treated. Place names like *hExarAbAx, amarAvawi, DillI,* and *ceVnnE* require dative marker only optionally whereas generic names of space/time likeakkada, appudu require the marking obligatory as in the following:

ceVnnE -(ki) veVlYlAdu

Chennai dat. go-pt.3p.m.sg.

Uri-ki poyAdu

Village dat. go-pt.3p.m.sg

patnaM/Akkadiki powuVnnAru

towns/there dat. go-dur./.3p.hm.pl

N	N	N
+place	+place	+place
+artif.	+artif	+gen-term]
+has_pop	+has_pop	+deice-cat.
-prop-n	+prop-n	-prop-n
Uru	ceVnnE	akkada
patnaM	DillI	ikkada
(-ku)	(-ku)	-ku
optional	optional	obligatory

6.2 Relevance of Ontology in Case, Thematic Roles and Argument Structure:

Unlike what is discussed in 6.1 where it was illustrated how relevant is ontological categorization of nouns in the display of inflexion, the current section tries

to demonstrate the relevance of ontological properties of nouns in the interpretation of their thematic roles or functions. Case refers to the function of nouns and pronouns in terms of their relationship with the predicate in a sentence. Thus, Case tells us about the thematic function of a noun phrase in a sentence. Case relations can be universal but how they are realized and the concomitant morpho-syntatic and semantic properties involved are language specific.

In Telugu, there are a number of cases, realized by case markers and post positions explicating morpho-syntactico semantic relations between the arguments and predicates. In Telugu, the nominative is the unmarked case. A noun in the nominative as the head of a noun phrase can function as the subject of the sentence. There are different case markers to represent accusative and dative case marking of the nouns of the direct objects and indirect objects. Case markers and post positions may depend upon the verb or the noun or both the verb and the concerned noun. Let us discuss a brief account of the choice of case relations realized by specific ontological features of nouns in Telugu.

6.2.1 Nominative Case:

A noun is understood to be in the Nominative case when it is the subject of a verb (ignore for some time non-nominative subjects (cf. Subba Rao, 2002)). A noun is used as a subject in a sentence and it can be a person or place or a thing. The subject usually carries out the action or undergoes the action or state denoted by the verb in the sentence. The nominative case is one of the grammatical cases of a noun, which generally functions as the subject of a verb or the predicate noun or predicate adjective, as opposed to its object or other arguments. So, it is also called subjective case. Nominative case may realize the following thematic roles according to their

ontological features. In other words, nouns or Arguments marked for nominative may function with different thematic roles mainly as Agents, Themes or Patients depending on their ontological properties in the context of specific verb types.

1. rAju   winnAdu.   'Rajuate'.
    Raju nom.[+h, +m<sg>]   eat-pt.3p.m.sg.
    (Agent) (subject)

2. rAXa   pAlu   wAgiMxi.
    Radhanom. [+h, -m<sg>]   milk [-a]   drink-pt.3p.nm.sg.
    (Agent) (subject)
    'Radha drunk the milk'.

3. kuMda   pagiliMxi.
    Pot nom. [-abs, +artif, -m<sg>]   brake-pt.3p.nm.sg.
    (Patient) (subject)
    'The pot broke'.

4. upAXyAyudu   vixyArWini   wittAdu.
    Teacher nom. [+h, +m<sg>]   student [+h]_acc.   Scold-pt.3p. m.sg.
    (Agent) (subject)
    'The teacher scolded a student'

S. No	Case	C. M.	Sem. Feat	Them. Role	Verb Type	Synt. Cat	Example Sentence
5	nom.	Ø	[+h,+a,+m,sg]	Ag.	Motion	(subject)	rAju vaccAdu (Raju came)
6	nom.	Ø	[-h,+a,-m,sg]	Ag.	State	(subject)	kodi guddu peVttiMxi. (hen laid the egg)
7	nom.	Ø	[-a,+artif,sg]	Pati.	Action	(subject)	axaM pagiliMxi. (The mirror broke)
8	nom.	Ø	[+artif, +mob.]	Them.	Action	(subject)	kAru ceVttunu guxxiMxi. (The car hit the tree)
9	nom.	Ø	(+h,+a,+m,sg)	Ag.	Motion	(subject)	rAmu kukkanu koVttAdu. (Ramu bet the dog)

Table: 6. 3

C.M. = Case marking

Whenever there is a nominative case where the nominal is marked for the ontological features like [+h,+a,+m], [-h,+a], [-a, +artif.] and [-artif., +mob.], its

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thematic role will be one of the three roles, viz. agentive, a patient, or a theme. They are always the syntactic subjects and the case marker is null.

In any given sentence where two or more arguments are involved, either one or more of them can be marked or at least one, often the subject remains unmarked as in the following cases.

If we take two arguments in a sentence, then they may belong to one of the following nine combinations on the basis of whether these arguments share [±hum] or [±ani] features. The two features of human and animacy, each with [-] or [+] values and involving two arguments result in 2^3 combinations i.e., $2 \times 2 \times 2 = 8$, a total of 8 different ontological combinations i.e. nouns of different ontological categories in pairs in a sentence that present a problem of thematic role interpretation as discussed here:

	N	N		
1.	$\begin{bmatrix} +hum \\ +ani \end{bmatrix}$	$\begin{bmatrix} +hum \\ +ani1 \end{bmatrix}$	rAmu BImuni koVttAdu.	Ram hit Bheem.
			Ram Ø Beem-acc. hit-pt.3p.m.sg.	
			Ag. Pat.	
2.	$\begin{bmatrix} +hum \\ +ani \end{bmatrix}$	$\begin{bmatrix} -hum \\ +ani2 \end{bmatrix}$	rAmu kukka<u>nu</u> kottAdu.	Ram hit the dog.
			Ram Ø dog-acc. hit-pt.3p.nh.sg.	
			Ag. Pat.	
3.	$\begin{bmatrix} +hum \\ +ani \end{bmatrix}$	$\begin{bmatrix} -hum \\ -ani3 \end{bmatrix}$	rAmu illu (ni) koVnnAdu.	Ram bought the house.
			Ram Ø house buy-pt.3p.nm.sg.	
			Ag. Theme	
4.	$\begin{bmatrix} -hum \\ +ani \end{bmatrix}$	$\begin{bmatrix} +hum \\ +ani4 \end{bmatrix}$	kukka BImuni kariciMxi.	The dog bit Beem.
			dog Ø Beem acc. bite-pt.3p.nm.sg.	
			Ag. Pat.	
5.	$\begin{bmatrix} -hum \\ +ani \end{bmatrix}$	$\begin{bmatrix} -hum \\ +ani5 \end{bmatrix}$	kukka pillini kariciMxi.	The dog bit the cat.
			dog Ø cat-acc.bite-pt.3p.nm.sg.	
			Ag. Pat.	

6. $\begin{bmatrix} \text{-hum} \\ \text{+ani} \end{bmatrix}$ $\begin{bmatrix} \text{-hum} \\ \text{-ani6} \end{bmatrix}$ kukka annaM (nu) winiMxi. The dog ate food.

dog Ø food (acc.) eat-pt.3p.nm.sg.

Ag.   Theme

7. $\begin{bmatrix} \text{-hum} \\ \text{-ani} \end{bmatrix}$ $\begin{bmatrix} \text{+hum} \\ \text{+ani7} \end{bmatrix}$ I ceVruvu eVMxarino baligoVMxi.

this tank Ø many acc. take-lives.pt.3p.nm.pl.

This tank has taken the lives of many.

Theme   Pat.

8. $\begin{bmatrix} \text{-hum} \\ \text{-ani} \end{bmatrix}$ $\begin{bmatrix} \text{-hum} \\ \text{-ani8} \end{bmatrix}$ I axxaManni (tinI)   cUpeVduwuMxi.

this mirror Ø all (acc.) show-ft.

Theme   Pat.

This mirror will show all.

[A combination of the features [+hum] and [-ani] does not occur, hence *[+hum, -ani] is ruled out as a feature complex of a noun.]

In such cases arguments may belong to one of the nine combinations involving N[±animate] and N[±human] features. We can establish ontologically sensitive thematic role assignment hierarchy.

Thematic role assignment hierarchy: 1 > 2 > 3 > 4 > 5 > 6 > 7 > 8.

Nouns or Arguments which show agreement with predicate will always remain unmarked. In other words, syntactic subjects are (overtly) unmarked for Agentive or thematic or patient roles. However, those nouns or arguments which do not show agreement with predicates i.e. those which are not subjects do require marking differentially. This differential marking is dependent on ontological properties of the argument. For example in accusative arguments, animate objects are always marked. Inanimate objects remain unmarked if not associated or specificity or definiteness.

In the case of the sentences 3, 6, and 8 where the accusative argument remains unmarked always belongs to [-hum, -ani] ontological feature.

However, where both the arguments remain unmarked then the argument of higher-order ontology will be the Agent as in the sentences 3 and 6 and one of the unmarked arguments show agreement with the predicate. In all such cases it is often the ontological properties that are the only clues to identify thematic roles and agreement.

6.2.2 Accusative Case:

Nouns and pronouns are said to be in objective case when they act as direct objects of verbs or if they are the objects of preposition. Direct object refers to an argument that is the most desired of the action as indicated by the verb and performed by the agent effecting it. So, it is also called objective case.

1. upAXyAyudu   vixyArXi-ni   wittAdu.

   Teacger Ø [+h, +a, +m, +sg][+h, +a, +m, +sg]-acc. scold-pt.3p.m/nm.sg.

   (Agent + Subject)

   'The teacher scolded a student'

2. immAniyelu   vAdi-ni   wittamannAdu.

   Emmanuel Ø [+h, +a, +m, +sg][+h, +a, +m] acc. scold-3p.m.sg.

   (causer + agent)

   'Emmanuel asked him to scold'

3. vAdu   kukkanu   koVttAdu.

   he[+h, +m] Ø dog-acc.   hit-pt.3p.m.sg.

   He hit the dog

4. vAdu   coVkkA (nu)   ciMcAdu.

   he[+h, +m] Ø shirt [-ani]_acc.   tear-pt.m.sg.

   He tore the shirt.

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S No.	Case	C. M. -ni	Sem. Feat.	Them. Role	Synt.Cat	Verb Type	Example Sentence
1	acc.	mand.	[+h,+a, +m,+sg]	causee + agent	D.O.	Motion	jayarAvu vAdi-ni koVttamannAdu. (Jayarao asked him to beat)
2	acc.	mand.	[+h, +a]	Pat.	D.O.	Motion	srIlawa jayasrI-ni kottiMxi. (Sri latha hit Jayasri)
3	acc.	mand.	[-h, +a]	Pat.	D.O	Action	vAdu kukkanu koVttAdu. (He hit the dog)
4	acc.	opt.	[-artif, +fabr.]	Pat.	D.O	Action	vAdu coVkkA ciMcAdu. (He tore the shirt)

Table: 6.4

Accusative case marking is mandatory with [+animate] nouns. However, with [-animate nouns it is optional.

6.2.3 Dative case:

A noun is understood to be in dative case when it occurs as the Indirect object of the verb. The indirect object of the verb is the noun for whom or for which the action of the verb is carried out. (There should not be any adposition/postposition marked on the indirect object, in that case it will be the object of that postposition.)

The Dative suffix in Telugu has two variants i.e. 'ku' and 'ki'. Usually 'ki' occurs when the preceding vowel is a front vowel; elsewhere it is 'ku'. However, 'ki' is the most frequent alternative. In Telugu, the dative 'ku' is used to denote a number of case relations as discussed below:

1. prawAp-ki rogaM vacciMxi.
   Pratap [+h, +a]_dat. disease[+abs. +stat.] come-pt.3p.m.sg.
   (Experiencer) (object)
   'Pratap (has) contracted a disease'

2. ravi   snAnAni-ki   veVllAdu.
   Ravi [+h, +ani] [-a] bath [+stat]_dat. go-pt.3p.m.sg.
   (Purpose) (object)
   'Ravi went to the well'

3. pramIla-ku   puswakaM   xoVrikiMxi.
   Pramila [+h, +a]_dat. book [-abs, +artif] find-pt.3p.nm. sg.
   (Recipient) (object)
   'Pramila (has got) found a book'

4. nijAm-ki   eVMxaro   BAryalu uMdevAru.
   Nizam[+h, +a]_dat. so many wives be-hab.3p.pl..
   (Possessor) (object)
   'Nizam has so many wives'

5. AmeV neVxarlAMdu-ki   veVlliMxi.
   she   Netherland[+plc, +artif]_dat. go-pt.3p.nm.sg.
   (goal) (obj)
   'She went to Nether land'

6. goda-ku   meku   uMxi.   'Wall has a nail'
   Wall [-ani]_dat. nail [-a,-abs] be-pt.3p.nm.sg.
   (location) (theme)

7. vAna-ki   illu   wadiciMxi.
   [-nat.force] dat.   house [-abs. +artif. +loc] wet-pt.3p.nm.sg.
   (instrumental) (pat.)
   'The house got wet of rain'

S No	Case	C. M.	Sem. Feat.	Them. Role	Verb Type	Synt. Cat	Example Sentence
1	dat.	ki	[+ani]	exper.	State	obj.	prakAR-ki jalubu pattiMxi. 'Prakash caught cold'
2	dat.	ki	[-ani] [+action]	purp.	Motion	obj.	ravi snAnAni-ki veVllAdu. 'Ravi went for a bath'
3	dat.	ki	[+ani]	reci.	transfor mation	obj.	vasaMwu-ku baMgAraM xoVrikiMxi. Vasanth found gold'
4	dat.	ki	[+ani]	poss.	Exist	obj.	wapan-ki pillalu unnAru 'Tapan has children'

S No	Case	C. M.	Sem. Feat.	Them. Role	Verb Type	Synt. Cat	Example Sentence
5	dat.	ki	[-ani] [space]	Goal	Motion	obj.	awanu aMwarikRAni-ki veVlYlAdu. 'He went to the Space'
6	dat.	ki	[-ani] [+surf]	loc.	Exist	obj.	goda-ki kannaM uMxi. 'wall has a hole'
7	dat.	ki	[-ani] [+nat.frc]	reas.	State	obj.	eVMda-ki coVkkA eVMdiMxi. 'The shirt dried in Sun light'

Table: 6.5

Whenever there is a dative case with the semantic features [+ani] and [-ani], [+space], [+action]the thematic roles of the dative-marked arguments will be realized differently into experiencer, purposive, recipient, possessor, goal, locative, reason and agentive thematic roles and they are all syntactically serve as objects.

6.2.4 Instrumental Case:

In Telugu, the instrumental case marker is 'wo' which is also used as the associative case marker. However, the definition is brought into grammar of the ontological features of the 'wo' marked nouns. Consider the following examples:

1. nenu   mA <u>amma-wo</u>   winnAnu 'I ate along with my mother'
   I [+hum] my mother [+h]_instr.eat-pt.3p.nm.sg.
    (Sociative) (object)

2. harinAX   <u>polisu-wo</u>   xoVMgani koVttiMcAdu.
   Harinadh[+h, +a] Ø police [+h, +a]_instr. to thief made to beat
   (Agent) (Causee)
   'Harinadh made police to beat the thief'

3. nenu gaxini <u>cIpuru-wo</u>   UdcAnu.
   I [+h] room broom [-ani]_instr. sweep-pt.3p.nm.sg.
   (Instrument) (object)
   'I swept the room with a broom'

4. nenu   <u>sIwa-wo</u>   ceVppAnu.   'I told Sita'
   I [+h] seethe [+h+a]_instr.   tell-pt.1p.m.sg.
   (Patient)

S No.	Case	C. M.	Sem.Feat.	Them. Role	Verb Type	Synt. Cat	Example Sentence
1	instr.	wo	[+hum]	soc.	Motion	obj.	Nenu ammAyi-wo veVlYlAnu. 'I went with a girl'
2	instr.	wo	[+ani]	Ag. Cause e	Action	obj.	vAli sugrIvudini rAmudi-wo caMpiMcAdu. 'Sugriva made Rama to kill Vali'
3	instr.	wo	[-ani]	inst.	Action	obj.	nenu ceVttunu goVddali-wo narikAnu. 'I cut the tree with an axe'
4	instr.	wo	[+ani]	pat.	Comm.	Obj.	nenu rAju-wo mAtladAnu. 'I spoke to Raju'

Table: 6.6

Whenever a noun (Argument) is marked for 'wo' it triggers a series of thematic roles depending on the kind of ontological features that it carries. A noun marked for the feature [-ani], the thematic role will be in instrumental. In case the feature is [+ani] it is associative. Further differentiation is brought into by the features of verbs, of action, motion, and communication in the context of the arguments marked for 'wo', the noun will be the patient. In this context the syntactic category is always object. Thus, cases and thematic roles are decided on the basis of the ontological features of the arguments taking help from verbs.

6.2.5 Ablative Case:

The ablative case is a grammatical case in the grammar of various languages all over the world. It is used to express the motion away from something. The realization and signaling differs from language to language. In Telugu, the ablative case marker is "nuMci/nuMdi and dialectally-keVlli".

The so called ablative marking realizes two distinct thematic roles, one commonly known as ablative role when an argument marked for –nuMdi is ontologically a spatio-temporal noun [+place/+temporal space] indicating point of departure. The other is source when an argument is a source of some product or result.

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1. AmeV Barwa-nuMci   vidAkulu wIsukoVMxi.
   her husband [+h,+a]_abl. divorce   take-pt.nm.sg..
   (Source) (obj)
   'She took divorce from her husband'

2. rAXa   poVlaM-nuMdi   vacciMxi.
   Radha [+h]   field [-a, +place]_abl.   come-pt.nm.sg.
   (abl.) (obj)
   'Radha came from the field'

S No.	Case	C. M.	Sem. Feat.	Them. Role	Verb Type	Synt. Cat	Example Sentence
1	abl.	nuMci	[+ani]	sour.	act.	obj.	awanu SaMkar-nuMci vidipoyAdu. 'He has got separated from Shanker'
2	abl.	nuMci	[-ani]	abl.	motion	obj.	awanu amerikA-nuMci vaccAdu. 'He came from America'
3.	abl.	nuMci	[+ani]	Caus..	stat.	subj.	nInuMci mAtalu padAlsi vacciMxi. I took the comments because of you.
4	abl.	nuMci	[+measr.]	measr.	Motion	Obj.	vAraM-nuMci AmeV rAlexu. 'She did not come since a week'.

Table: 6.7

Whenever an argument is marked for an ablative case with the ontological
features [+ani], [-ani, +place/+time], and the verb is of action, motion and stative
category then it realizes the thematic roles accordingly.

6.3 Word Sense Disambiguation and Ontology:

Word sense disambiguation involves, resolving or finding out the correct
sense of a word in the context. Word sense disambiguation (WSD) is considered as AI
& MT-complete problem. This is equivalent to very hard problem in AI as well as
MT. Ontology is a knowledge base with information about concepts existing in the
world. It concerns with their properties, and how they relate to each other. Three
principal reasons to use ontological knowledge in machine translation (MT) are to
enable exhaustively the functionality of source language analyzers and target

language generators to be able to operate on semantic constraints effectively, and to resolve semantic ambiguities by making inferences to the concept network of ontology (Mahesh, 1996; Nirenburg et al., 1992). Ontology is different from a thesaurus in that it contains only language-independent information and many more automatic semantic, as well as taxonomic relations. In this chapter, we propose to show how ontology can be used to disambiguate word senses. All approaches to word sense disambiguation (WSD) make use of words in a sentence to disambiguate each other. The distinctions between various approaches lie in the source and type of knowledge made available by the lexical units in a sentence.

Ontology is used as an external knowledge source along with the dictionary information as context information. First, we apply the previously-secured dictionary information to select the appropriate senses of some ambiguous words with high precision, and then use ontology to disambiguate the remaining ambiguous words. In order to acquire reasonably practical ontology in limited time and with less manpower, one can draw a full advantage of already existing knowledge resources and practical usages from corpora. First, we introduce the same number and grain size of concepts of Nida's thesaurus classification (Nida 1976) and its taxonomic hierarchy into the ontology. The second strategy is to extend the hierarchy of the Nida's thesaurus ontology by inserting additional semantic relations into its hierarchy. Consider the following to exemplify the mechanism.

The word 'Husband' has a number of equivalent words in Telugu which share the ontological features [+human, +masculine, +adult, +spouse]. However, some of these words are etymologically (origin) and connotatively different.

These connotative features, such as formal (frml.), colloquial (coll.), again differentiated by the gradiance of 1 to -n number of features (coll.1-n), literary (lit.1-

n) cultural (cul.1-n), domain specific (spec.1 -n), etc. may come handy to recognize their distinctions. As translational equivalents, one may find the nearest one matching most of these features. Some of these features have dialectal variants specified as X.dv..
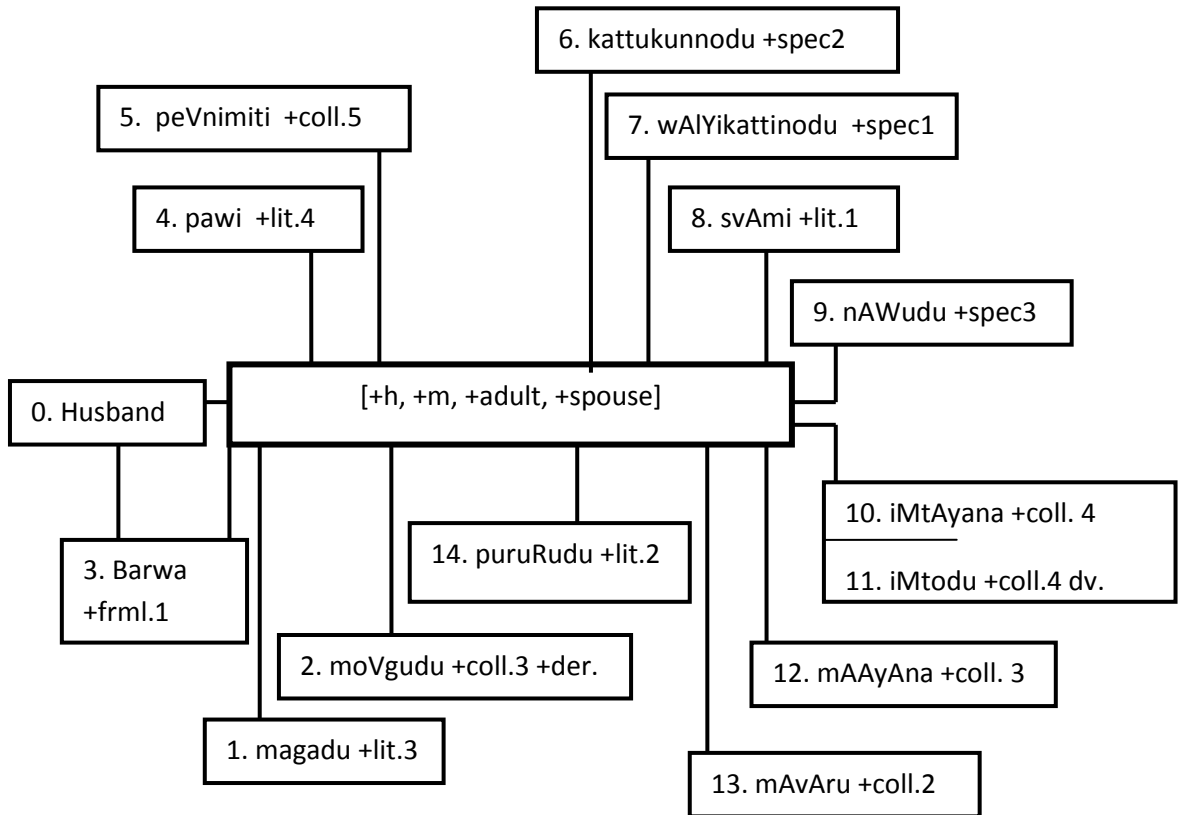
Fig: 6.3 Conceptual graphic representation of the synset of husband in Telugu.
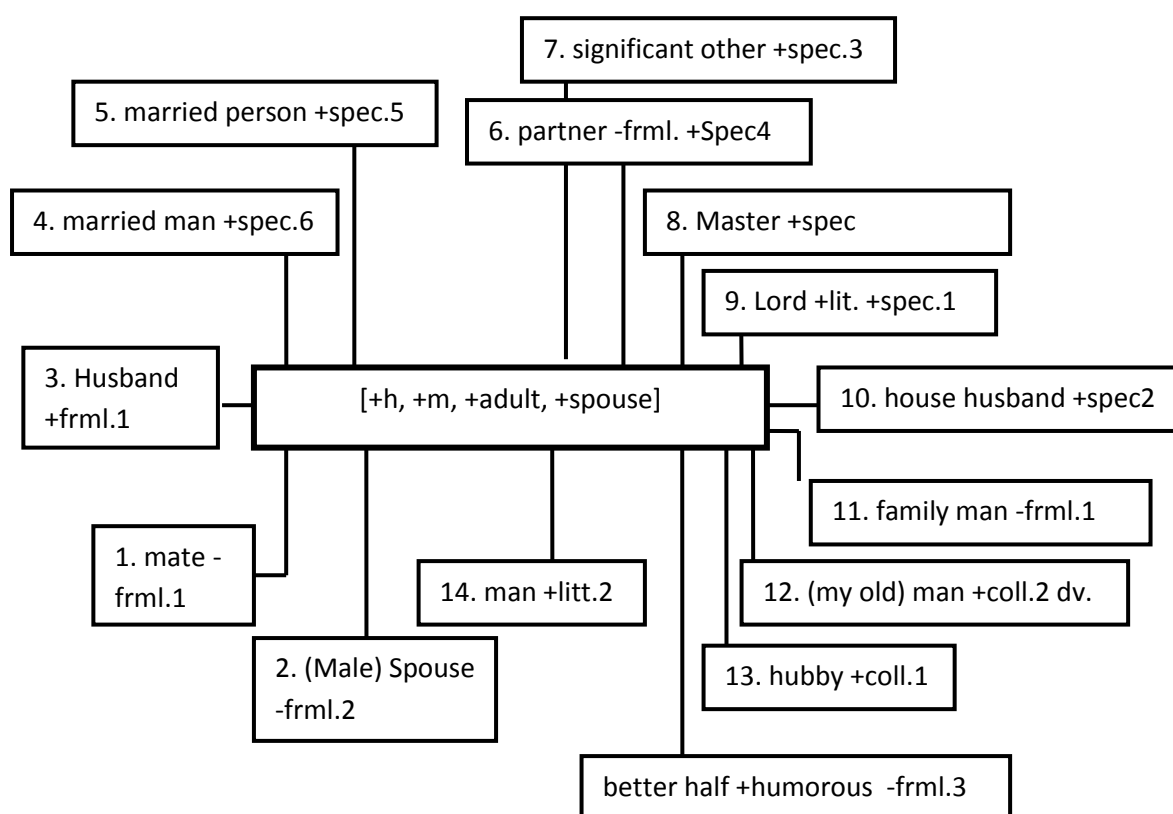
Fig: 6.4 Conceptual graphic representation of the synset of husband in English

**Wife:** Ontology of wife and its synset. It consists of sixteen distinct words. Some of these are etymologically related and some are conceptually related in the sense, by marriage, shared-living togetherness, woman of a man and the house, lady of the house, the female partner etc. Each of these words carry additional features beyond these minimal specifications. A word of English that does not have any additional specification would be replaced with the unmarked Telugu word as in the following: Husband = Barwa. The other words denotatively considered as equivalents may have extra features for connotative senses marked as, informal (-frml.), formal (+frml), literary (lit.), colloquial (coll.), specificity (spec.), dialectal (dv.), reference to masculinity, power relation, property, social hierarchy etc. The word that is free of all these or at least neutral would be the most unmarked one representing the synset.

Disambiguation between the members of the synsets of husband and wife between the Telugu and English equivalents would take place with reference to the maximal match of ontological feature matrix involving both denotative and connotative features associated with the word.
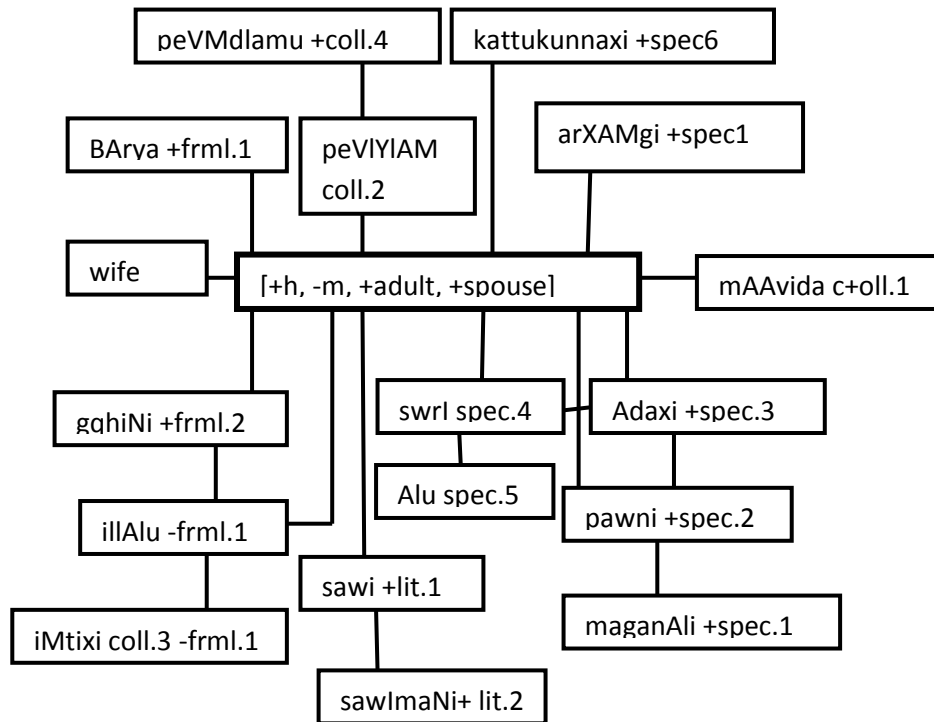
Fig: 6.5 Conceptual graphic representation of the synset of wife in Telugu

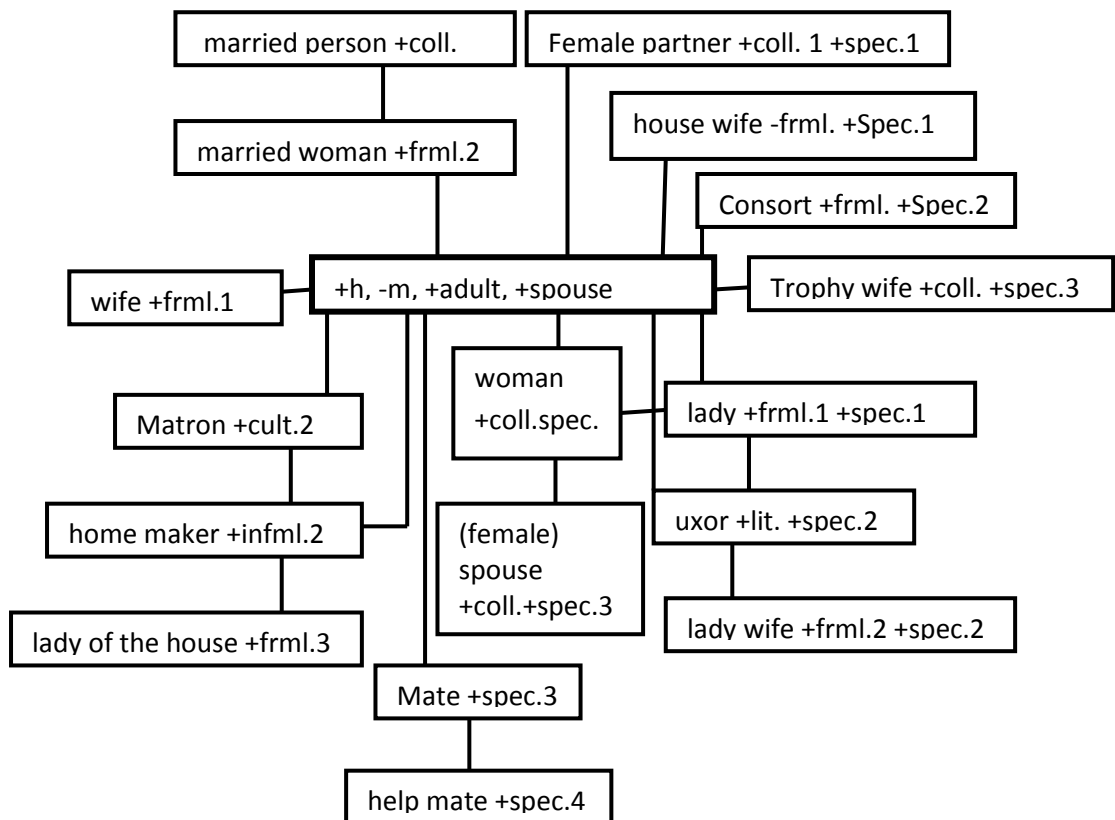**Figure: 6.6 Conceptual graphic representation of the synset of wife in English**

Though all these words share the ontological properties of [+human, -masculine, +adult, +spouse]. They are different by their connotative references as said in the case of husband.

The number of connotative features differentiating one member from the other in the given synset may occur in complex combinations. For example formal (fml 1-n), informal (infml 1-n), colloquial (coll. 1-n), literary (lit. 1-n), cultural (cult. 1-n) special features involving societal power relations, derogatory and honorific features etc. (spec.1-n) may combine to form complexes of connotative along with denotative features. When every member of the synset is redefined appropriately with the relevant denotative plus a number of connotative features may allow us to disambiguate the members from one another and map them from one language to another language with suitable equivalents.

6.4 Implementation:

To implement the ontological application in Machine Translation, Nouns have been classified into groups based on minimally required set of ontological features. Every individual word is a member of a synset. A synset may have at least one or more members, sharing the same set of denotative features but differ in connotative features.

A number of synsets sharing maximum features may form an immediate apex concept group. Every group was separated and made into folders with short names. There are 134 semantic groups sorted into 134 folders. This information is accessed by Machine Translation system at different modules. After installing the present work, it was tested with selected sentences. The chart below shows that how the present work with the application of ontology improves the performance of Machine Translation system in terms of its output and its accuracy.

Flow Chart of the Usage of Ontological Features in different Modules of Machine Translation:

Though ontological information of concepts represented by words is used almost everywhere in the process of machine translation, certain modules like morphological analysis, POS tagger, parser, word sense disambiguation, lexical substitution, Agreement and word synthesis, the dependence is much more.
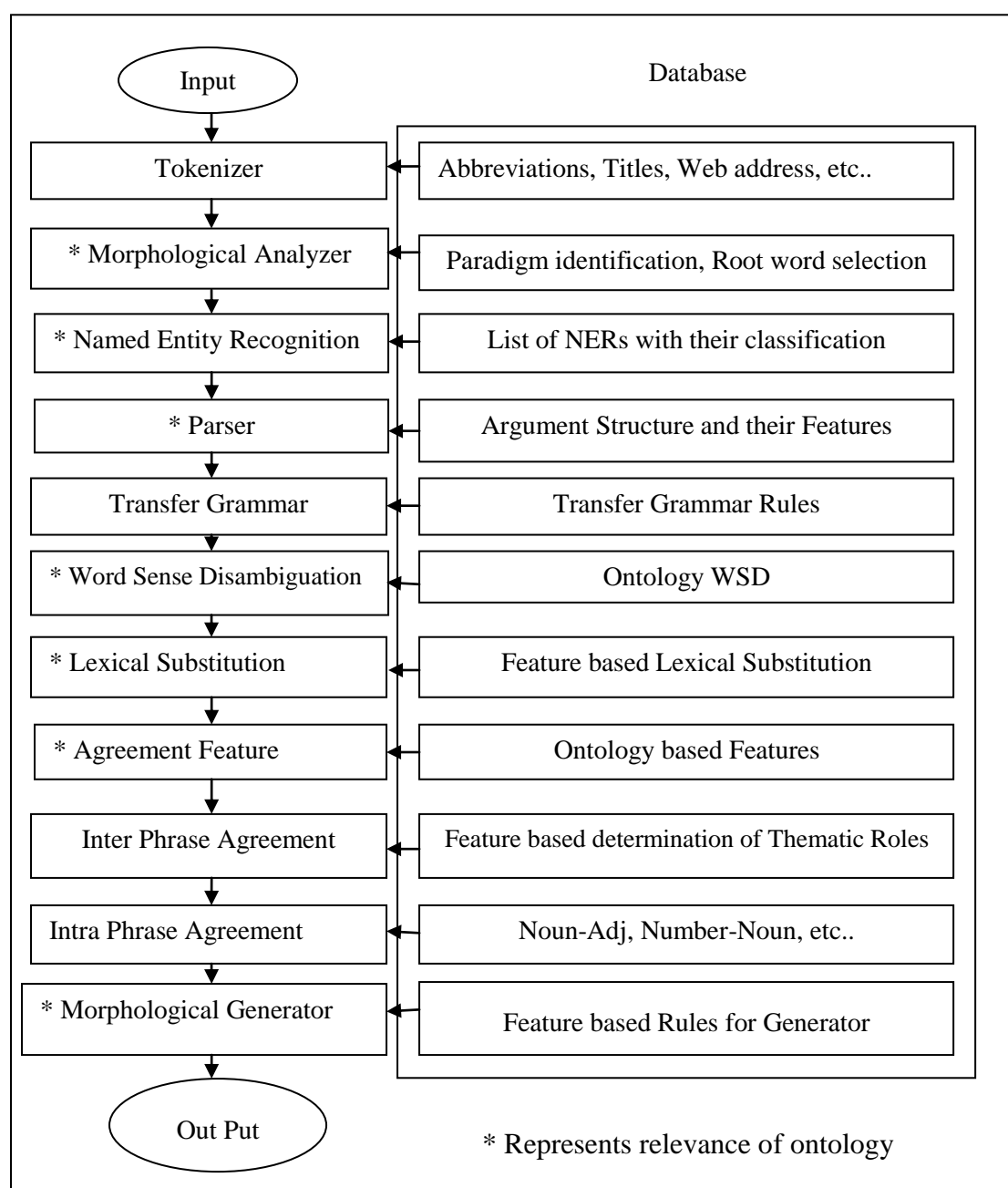
Fig: 6.7 Flow chart of the usage of ontological features in different modules of MT

With the introduction of feature based ontology in every module its relevant has drastically changed the quality of the output. The above flow chart displays the implementation of Ontological Feature-based operators in different Modules of Machine Translation.

6.5 Evaluation:

Consortium of Indian languages to Indian languages machine translation system was formed by a group of academicians from different institutions. It involved the development of nine pairs of Indian languages (total 18 systems) funded by the TDIL (Technology Development for Indian Languages), Department of Electronic and Information Technology (DEIT), Ministry of Information and Communication (MCIT), Govt. of India. Out of these nine pairs of the systems, four pairs, viz. Hindi-Telugu, Telugu-Hindi, Telugu-Tamil and Tamil-Telugu are developed at CALTS, University of Hyderabad, under the leadership of Prof. G. Uma Maheshwar Rao who is the Chief Investigator of the Project (2005 - 2014).

The testing work is entrusted to C-DAC-GIST. Testing was done on the two major points viz. comprehension and fluency. The percentage of comprehension and fluency is computed based on open testing and blind testing for Hindi-Telugu and Telugu Hindi. Without the implementation of ontology in the MT systems, the percentage for open testing of Hindi-Telugu is 53.25 and blind testing is 58.75. The percentage for open testing of Telugu-Hindi is 41.24 and blind testing is 47.94, evaluation was done on June, 2015.

6.5.1 Improving the system's output:

The aim of the present task is to test the impact of the introduction of ontological features in the computational implementation in the analysis and generation. This measurement will help the translators in the area to see the problems

and advantages in the machine translation. This measurement also tries to evaluate the accuracies and lacunae in the concerned language pair i.e. the target and the source languages for the future course of actions like feeding the data and testing their problems.

6.5.2 Identification of Evaluators:

The output of the Machine Translation of Hindi-Telugu and Telugu Hindi are given to three Evaluators. These evaluators are educated and have the background of Linguistics and Translation Studies. There are three evaluators, two of them have Telugu as native language and the other has Hindi as the native language.

6.5.3 Grading and Testing:

Output of a set of 70 sentences Hindi-Telugu and Telugu-Hindi systems is given to each evaluator.The texts are in the domain of Tourism. Two types of data sheets are given to evaluators for blind testing and open testing. The data sheets providethe grading ranges (0-4). Based on the grading chart, the evaluators have to give grades. This Grade system was taken from C-DAC GIST Pune (ILMT Ph-II EVALUATION REPORT Version 1.2, Page-9)

Grade Value	Meaning of the evaluated grade
Grade-0	Nonsense (If the sentence doesn't make any sense at all)
Grade-1	Some parts make sense but is not comprehensible at all (e.g., listening to a language which has lots of borrowed words from your language-you understand those words but nothing more)
Grade-2	Comprehensible but has quite a few errors (e.g., someone who can speak your language but would make lots of errors. However, you can make sense out of what is being said)
Grade-3	Comprehensible, occasional errors (e.g., someone speaking Hindi getting all its genders wrong)
Grade-4	Perfect (e.g., someone who knows the language)

Table: 6.8 Grading scale for MT Evaluators

6.5.4 Test Data:

A set of 100 sentences from the tourism domain were downloaded from online resource and it was run on ILMT system and the output was taken from it. These sentences were organized into datasheet to evaluate (Data sheet is available in Apendex-1) by the selected evaluators.

6.5.5 Results:

The data sheets were collected from the evaluators after evaluation, after collecting the data sheet the evaluation of every sentence was completed to set the final averages. In overall, in terms of comprehensibility and Fluency the following grades are given for Hindi-Telugu and Telugu-Hindi. The percentage of open testing of Hindi-Telugu is 54.35 and blind testing is 69.05. The percentage for open testing of Telugu-Hindi is 53.24 and blind testing is 59.04. Approximately 10-12 percentage of accuracy was improved after the implementation of ontology in the respective systems.

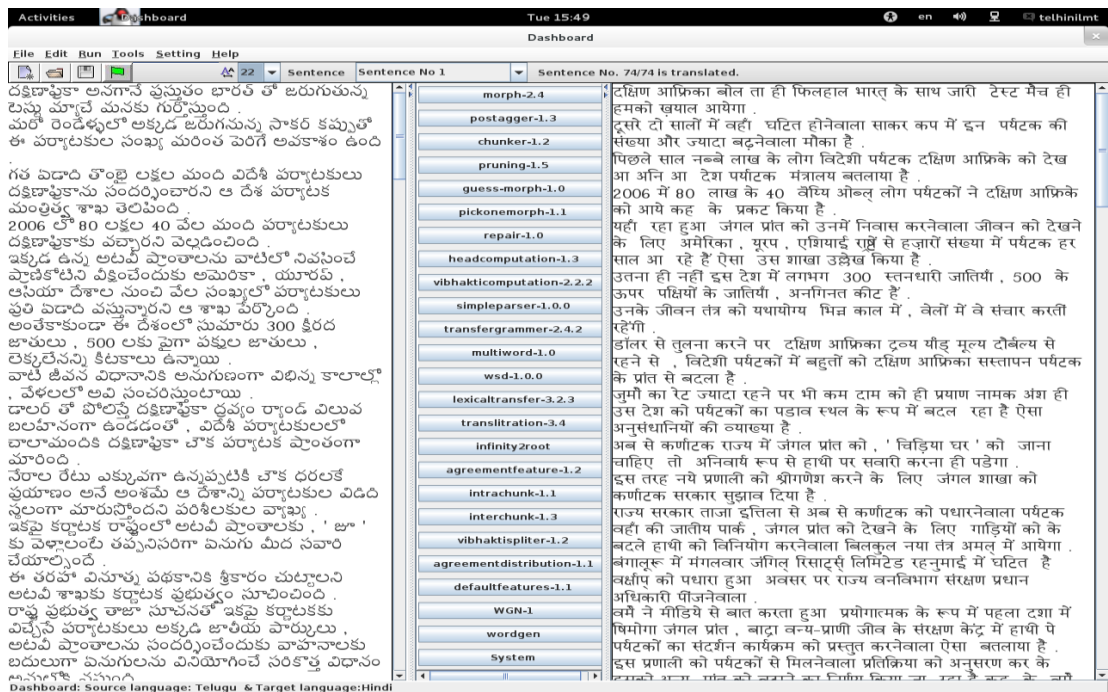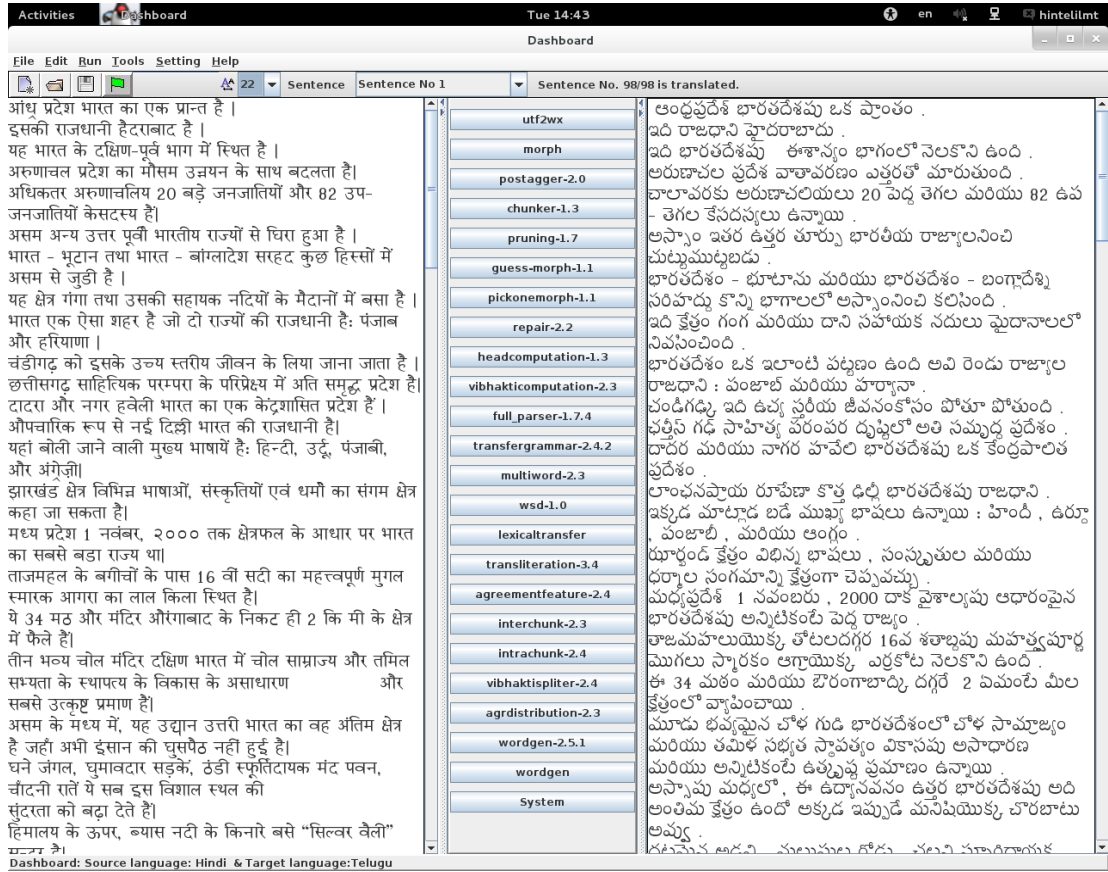**Following Screenshot is the example of Telugu-Hindi Machine Translation System:**

Fig: 6.8 Telugu - Hindi Machine Translation System

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Following Screenshot of the Hindi Telugu Machine Translation System:

Fig: 6.9 Hindi-Telugu Machine Translation System

CHAPTER - 7

Conclusions

In this chapter, a discussion would be taken up on conclusion which includes a summary of the findings and recommendations, for further study. To disambiguate the nouns of Telugu, the present work makes a modest effort in classifying nouns on the basis of their ontological annotation which is necessary to help to develop the accuracy of the MT system. If the data were annotated with necessary features of lexical semantic information, dealing with ambiguity would improve the rate of accuracy in terms of Comprehensibility and fluency. In the present work, the Telugu nouns are studied towards this end. This work demonstrates that if implemented in Indian languages in various MT systems this may greatly help to overcome various issues involving ontology.

Telugu has a rich tradition of building lexicons for centuries. However, most of the lexicons are arranged as lists of words with similar senses or lists of words indicating various shades of a specific word (polysemic). Usually, lexicographers try to represent the lexical items of given language in an alphabetical order in a lexicon. While making such lexicons is now fast becoming antedated and replaced by semantics based wordnets for easy searching and retrieval. Computational lexicography has taken over the traditional, conventional and printed passive models making them multitasking, dynamic and multifunctional using ontological information. Compiling the ontological dictionaries (lexico-semantic information) with necessary ingredients serves the needs of the computational purposes in language processing and helps in resolving ambiguity in translation.

The definition of ontology is not straight forward but of a delicate issue. The main point is to be able to define the essential but primitive or basic elements of identity capturing the concept of the word and the conceptual relational knowledge associated with the other words.

The backbone of ontology is often considered as taxonomy of concepts. Ontology is the most misunderstood or frequently interpreted and reinterpreted according to the needs and contexts of the source discipline. Linguists, philosophers, logicians, mathematicians, nature scientists lately, practitioners of artificial intelligence and computer science have their own way of defining and understanding of the notion of the ontology. For more than two thousand years, ontology has been a part of human search for understanding and conceptualizing the nature and the nature of this world in terms of natural language. It is an outcome of the attempt to describe the natural world and from the desire to arrive at a structure, organization and the taxonomy of the concepts or entities that make this world.

Ontology is understood here as a semantic modelling of a specific concept or concepts along with their relationships. The understanding of basic ontology essentially involves identifying classes and sub-classes. The properties of these are interpretive and automatic in terms of inheritance. It is often understood in terms of hierarchical relations. These assumptions are a derivation of discovering relationship between the nouns or across a whole lot of nouns or names of concepts other than processes, acts, activities, actions and states.

One of the major outcomes of the study is the ontological structure of Telugu nouns. In more nonconventional, native terms, ontology is understood as address of

an entity in the universe. Each identifiable entity is a concept which is provided with names in natural languages. (cf. Uma Maheshwar Rao, 2003).

Lexical semantics is the study of concepts, words and their representation in a language. Nevertheless, it is of no doubt that meaning and words in the sentences are profoundly and inseparably connected, and that lexical semantics is the context at which they emanate association with one another in developing word meanings.

The thesis focused on lexico-semantic study of the Telugu nouns and the description of their meanings in the context by adopting a computational approach.

Ontology is now understood as structural ontology which is essentially formed of classes and categories with the distinctions of super classes and sub-classes giving a hierarchical structure. Besides this, ontology is also understood in terms of ontology proper that refers to a set of properties that define every instance of a class. Members of every lower class or category inherit property of immediately dominating class.

The traditional and conventional semantic relations like synonymy, polysemy, and homonymy are used with relevance to form-meaning relation and has no relevance to real concepts. Ontologies are directly derived from concepts. No single instance of a concept is identical with another but every concept has an overlapping relationship with another. Therefore, ontologies are exclusive in constituency and inclusive in comprehension.

The study demonstrates that if we develop semi-automatic semantic feature analysis method, based on the ontological hierarchy for Telugu nouns, it is easy to handle language processing for the purpose of computer applications of natural languages. The test has been conducted to evaluate the accuracy of the output in MT (IL-ILMT Indian Language to Indian Language Machine Translation System i.e.,

Hindi-Telugu & Telugu-Hindi). Result of the evaluation indicates that the system was able to provide scope for improvement in terms of performance by comprehensibility and fluency. We have also found that with this approach it is easy to handle the ambiguity of the nouns and easy to disambiguate them.

This study considers words as physical formal representations of conceptual knowledge distributed and available for a given language speaker. These words are in a way represent nodes spun into a vast network of lexical knowledge. Though each of these words in collation require a great many identifying semantic features in any given context involving both denotative and connotative senses but only a few of them are sufficient to process the language. As every lower order feature predicts the higher order, there is no need to explicitly specify them. In other words, every lower order feature is a composite feature combining all the ascending features in a continuum of network as in the following:
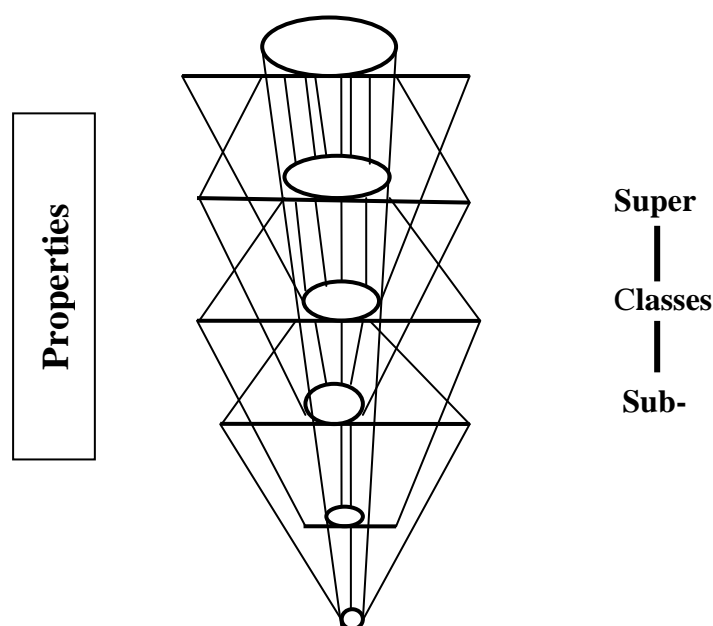
Fig: 7.1 A graphic representation of ontological structure of concepts

| Class —— properties ⬭ instance

```
                              entity
                            /       \
                      +natural    -natural
                        /     \
                  +concrete   -concrete
                    /    \
               +living    -living
                 /    \
           +animate   -animate
              /    \
         +human    -human
           /    \
      +adult    -adult
        /    \
  +masculine  –masculine
```
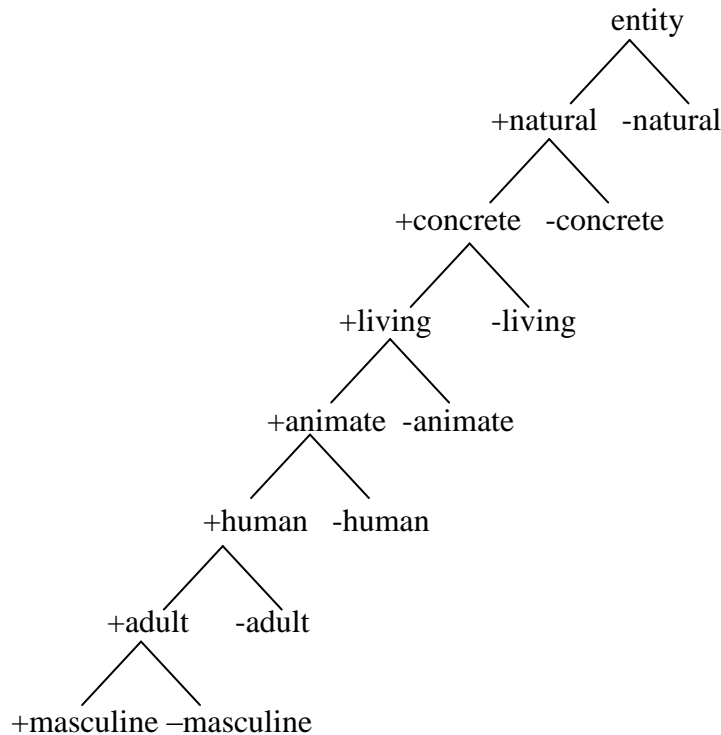
> **Fig: 7.2 A tree of instances and class hierarchies**

Man = [+hum, +adult, +masc.]

 [+hum] predicts all the other remaining features (such as [+ani], [+liv], [+nat], [+concre], [+ent]) representing above itself.

[+ani] predicts the other ascending features such as [+liv], [+nat], [-abs] similarly, [+liv] predicts [+nat] and [-abs]. These kinds of predictable relations between the ontological features enable us to use under specification. Under-specification is a natural phenomenon that leads to efficient operations in real time.

This study is only a beginning and a modest attempt in representing lexicon and semantics. Ontological representation (even partially) provides efficient

mechanism in the treatment of morphological and syntactic operations in natural languages. Transfer of information across one language to another can be efficiently carried out with this type of lexical ontology. The study foresees an exhaustive and a more refined mechanism for the development of ontological lexicon for each language to enable efficient natural language processing particularly in the area of machine translation information retrieval in internet searching.

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Appendix-I
Taxonomy of Ontolexicon of Telugu

The following is a modest sketch of a proposal for taxonomy of ontolexicon particularly of nouns in Telugu. It does not cover all but only a sketch of a modest possible proposal. Even this does not claim that the features given are final but only a suggestive of such work. It needs a collective but exhaustive work to be able to fruitful effective use. Bracketed features are predictable open features.

0. Entity: +ent.

1.0 Concrete nouns (mUrwa vAcakAlu): +conc.

1.1 Living things (jIvaM unnavi): +conc, +liv.

1.1.1 Animate Nouns (jaMwuvAcakAlu or jaMgamAlu): +conc, +liv, +ani.

1.1.1.1 Human Nouns (manuRyavAcakAlu): [+conc, +liv, +ani,] +hum.

1.1.1.1.A. Roles (pAwralu/nirvahaNAbAXyawalu): [+conc, +liv, +ani,] +hum, +rol.

 1.1.1.1.A.1 Race (jAwIyawa, weVga): [+conc, +liv, +ani,] +hum, +rol, +rac.

1.1.1.1.A.2 Caste (kulAlu): [+conc, +liv, +ani,] +hum, +rol, cst.

1.1.1.1.A.3 Occupant (vqwwikArulu): [+conc, +liv, +ani,] +hum, +rol, ocu.

1.1.1.1.A.4 Designated/Professional (aXikArika hoxAlu): [+conc, +liv, +ani,] +hum, +rol, +prof.

1.1.1.1.B Relations (saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, +reln.

1.1.1.1.B.1 Kinship Relations (baMXu saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, +reln, +kin.

1.1.1.1.B.2 Social Relations (sAMGika saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, +reln, -kin.

1.1.1.1.C Qualities (lakRaNalu): [+conc, +liv, +ani,] +hum, +qul.

1.1.1.1.D Mythological persons (purANa puruRulu): [+conc, +liv, +ani,] +hum, ++myth.

1.1.1.1.D.1 Divine (xEvikaM): [+conc, +liv, +ani,] +hum, ++myth, +dev.

1.1.1.1.D.2 Non-divine (axEvika): [+conc, +liv, +ani,] +hum, ++myth, -dev.

1.1.1.1.1 Feminine (swrIliMgaM/swrI vAcakaM): [+conc, +liv, +ani,] +hum, -masc.

1.1.1.1.1.i Infancy (SESavaM/pasiwanaM): [+conc, +liv, +ani,] +hum, -masc, +infan.

1.1.1.1.1.ii Childhood (bAlyaM/cinnawanaM): [+conc, +liv, +ani,] +hum, -masc, -adul.

1.1.1.1.1.iii Adolescence (yavvanaM/kOmAraM): [+conc, +liv, +ani,] +hum, -masc, +adol.

1.1.1.1.1.iv Adulthood (vayojanaM/peVxxawanaM): [+conc, +liv, +ani,] +hum, -masc, +adul.

1.1.1.1.1.v Old age (vqxXApyaM/musaliwanaM): [+conc, +liv, +ani,] +hum, -masc, +old.

1.1.1.1.1.vi Death (maraNaM/cAvu): [+conc, +liv, +ani,] +hum, -masc, +deth.

1.1.1.1.1.A. Roles (pAwralu/nirvahaNAbaXyawalu): [+conc, +liv, +ani,] +hum, -masc, +rol.

 1.1.1.1.1.A.1 Race (jAwi/weVga): [+conc, +liv, +ani,] +hum, -masc, +rol, +rac.

1.1.1.1.1.A.2 Caste (kulaM): [+conc, +liv, +ani,] +hum, -masc, +rol, +cst.

1.1.1.1.1.A.3 Occupations (vqwwulu): [+conc, +liv, +ani,] +hum, -masc, +rol, +ocu.

1.1.1.1.1.A.4 Designations/Profession (aXikArika hoxAlu): [+conc, +liv, +ani,] +hum, -masc, +rol, +prof.

1.1.1.1.1.B Relations (saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, -masc, +reln.

1.1.1.1.1.B.1 Kinship (baMXu saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, -masc, +reln, +kin.

1.1.1.1.1.B.2 Social (sAMGika saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, -masc, +reln, -kin.

1.1.1.1.1.C Qualities (lakRaNalu): [+conc, +liv, +ani,] +hum, -masc, +qul.

1.1.1.1.1.D Mythological persons (purANa puruRulu): [+conc, +liv, +ani,] +hum, +masc, ++myth.

1.1.1.1.1.D.1 Divine (xEvikaM): [+conc, +liv, +ani,] +hum, -masc, ++myth, +dev.

1.1.1.1.1.D.2 Non-divine (axEvika): [+conc, +liv, +ani,] +hum, -masc, ++myth, -dev.

1.1.1.1.2 Masculine (puruRa liMgaM/puruRa vAcakaM): [+conc, +liv, +ani,] +hum, +masc.

1.1.1.1.2.i Infancy (SESavaM/pasiwanaM): [+conc, +liv, +ani,] +hum, +masc, +infan.

1.1.1.1.2.ii Childhood (bAlyaM/cinnawanaM): [+conc, +liv, +ani,] +hum, +masc, -adul.

1.1.1.1.2.iii Adolescence (yavvanaM/kOmAraM): [+conc, +liv, +ani,] +hum, +masc, +adol.

1.1.1.1.2.iv Adulthood (vayojanaM/peVxxawanaM): [+conc, +liv, +ani,] +hum, +masc, +adul.

1.1.1.1.2.v Old age (vqxXApyaM/musaliwanaM): [+conc, +liv, +ani,] +hum, +masc, +old.

1.1.1.1.2.vi Death (maraNaM/cAvu): [+conc, +liv, +ani,] +hum, -masc, +deth.

1.1.1.1.2.A. Roles (pAwralu/nirvahaNAbaXyawalu): [+conc, +liv, +ani,] +hum, +masc, +rol.

 1.1.1.1.2.A.1 Race (jAwi/weVga): [+conc, +liv, +ani,] +hum, +masc, +rol, +rac.

1.1.1.1.2.A.2 Caste (kulaM): [+conc, +liv, +ani,] +hum, +masc, +rol, +cst.

1.1.1.1.2.A.3 Occupations (vqwwulu): [+conc, +liv, +ani,] +hum, +masc, +rol, +ocu.

1.1.1.1.2.A.4 Designations/Profession (aXikArika hoxAlu): [+conc, +liv, +ani,] +hum, +masc, +rol, +prof.

1.1.1.1.2.B Relations (saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, +masc, +reln.

1.1.1.1.2.B.1 Kinship (baMXu saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, +masc, +reln, +kin.

1.1.1.1.2.B.2 Social (sAMGika saMbaMXa vAcakAlu): [+conc, +liv, +ani,] +hum, +masc, +reln, -kin.

1.1.1.1.2.C Qualities (lakRaNalu): [+conc, +liv, +ani,] +hum, +masc, +qul.

1.1.1.12.D Mythological persons (purANa puruRulu): [+conc, +liv, +ani,] +hum, +masc, ++myth.

1.1.1.12.D.1 Divine (xEvikaM): [+conc, +liv, +ani,] +hum, +masc, ++myth, +dev.

1.1.1.12.D.2 Non-Divine (axEvika): [+conc, +liv, +ani,] +hum, +masc, ++myth, -dev.

1.1.1.2 Non-Humans (amanuRya vAcakAlu): [+conc, +liv, +ani,] -hum.

1.1.1.2.1 Animals (jaMwuvulu): [+conc, +liv, +ani,] –hum, +fau.

1.1.1.2.1.I Terrestrial (BUcarAlu): +fau, +terr.

1.1.1.2.1.I.1 Domestic Animals (peVMpudu JaMwuvulu): +terr, +fau, +dom.

1.1.1.2.1.I.1.A Herbivores (SAkAhArulu): +terr, +fau, +dom, +herb.

1.1.1.2.1.I.1.B Carnivores (mAMsAhArulu): +terr, +fau, +dom, -herb.

1.1.1.2.1.I.1.C Omnivores (sarvaBakRulu): +terr, +fau, +dom, ±herb.

1.1.1.2.1.I.2 Wild Animals (vanya/adavi jaMwuvulu): +terr, +fau, -dom.

1.1.1.2.1.I.2.A Herbivores (SAkAhArulu): +terr, +fau, -dom, +herb.

1.1.1.2.1.I.2.B Carnivores (mAMsAhArulu): +terr, +fau, -dom, -herb.

1.1.1.2.1.I.2.C Omnivores (sarvaBakRulu): +terr, +fau, -dom, ±herb.

1.1.1.2.1.II Aquatics (jalacarAlu): -terr, +fau.

1.1.1.2.1.II.A Herbivores (SAkAhArulu): -terr, +fau, +herb.

1.1.1.2.1.II.B Carnivores (mAMsAhArulu): -terr, +fau, -herb.

1.1.1.2.1.II.C Omnivores (sarvaBAkRulu): -terr, +fau, ±herb

1.1.1.2.1.III Amphibians (uBayacarAlu): ±terr, +fau.

1.1.1.2.1.IV Mythological Animals (purANa jaMwuvulu): +myth.

1.1.1.2.1.i Gender (liMgaM): ±masc.

1.1.1.2.1.ii Stages of Animals (jaMwuvulalo xaSalu): +stag.

1.1.1.2.1.ii.a. Childhood (bAlyaM pasiprAyaM): -adul.

1.1.1.2.1.ii.b Adulthood (peVxxa): +adul.

1.1.1.2.2 Birds (pakRulu): --hum,+bir.

1.1.1.2.2.a Aviates (eVgirevi): -hum, +bir, +avi.

1.1.1.2.2.a.i Domestic Birds (peVMpudu pakRulu): +bir, +avi, +dom.

1.1.1.2.2.a.i.1 Herbivores (SAkAhArulu): +bir, +avi, +dom, +herb.

1.1.1.2.2.a.i.2 Carnivores (mAMsAhArulu): Crow (kAki): : +bir, +avi, +dom, -herb.

1.1.1.2.2.a.i.3 Omnivores (sarva BakRulu): : +bir, +avi, +dom, ±herb.

1.1.1.2.2.a.ii Wild Birds (adavi pakRulu): : +bir, +avi, -dom.

1.1.1.2.2.a.ii.1 Herbivores (SAkAhArulu): : +bir, +avi, -dom, +herb.

1.1.1.2.2.a.ii.2 Carnivores (mAMsAhArulu): : +bir, +avi, -dom, -herb.

1.1.1.2.2.a.ii.3 Omnivores (sarva BakRulu): : +bir, +avi, -dom, ±herb.

1.1.1.2.2.b Non-Aviates (eVgaranivi): +bir, -avi.

1.1.1.2.2.b.i Domestic Birds (peVMpudu pakRulu): : +bir, -avi, +dom.

1.1.1.2.2.b.i.1 Herbivores (SAkAhArulu): +bir, -avi, +dom, +herb.

1.1.1.2.2.b.i.2 Carnivores (mAMsAhArulu): : +bir, -avi, +dom, -herb.

1.1.1.2.2.b.i.3 Omnivores (sarva BakRulu): : +bir, -avi, +dom, ±herb.

1.1.1.2.2.b.ii Wild Birds (adavi pakRulu): : +bir, -avi, -dom.

1.1.1.2.2.b.ii.1 Herbivores (SAkAhArulu): : +bir, -avi, -dom, +herb.

1.1.1.2.2.b.ii.2 Carnivores (mAMsAhArulu): : +bir, -avi, -dom, -herb.

1.1.1.2.2.b.ii.3 Omnivores (sarva BakRulu): : +bir, -avi, -dom, ±herb.

1.1.1.2.2.1 Gender in Birds (pakRula liMganirXAraNa): +bir, ±masc.

1.1.1.2.2.2 Stages (xaSalu): +bir, +stag.

1.1.1.2.3 Insects (krimi kITakAlu): -hum, +insc.

1.1.1.2.3.I Aviates (eVgirevi): +insc, +avi.

1.1.1.2.3.II. Non-aviates (eVgaranivi): +insc, -avi.

1.1.1.2.3.1 Gender (liMga nirXAraNa): +insc, ±masc.

1.1.1.2.3.2 Stages (xaSalu): +insc, +stag.

1.1.2.4 Micro Organisms (sUkRma krimulu): +insc, +mic_org.

1.1.2 Inanimate (sWAvara vAcakAlu): -ani.

1.1.2.I Flora (vqkRajAlaM): -ani, +flo.

1.1.2.I.1 Terrestrial Plants (BUruhAlu/BU vqkRAlu): +flo, +terr.

1.1.2.I.1.a Grass (gaddi jAwulu): +flo, +terr, +gras.

1.1.2.I.1.a.i Edibles (AhAra yogyaM): +flo, +terr, +gras, +edi.

1.1.2.I.1.a.i.1 Self: +flo, +terr, +gras, +edi, +slf.

1.1.2.I.1.a.i.2 Products: +flo, +terr, +gras, +edi, -slf.

1.1.2.I.1.a.ii Non-edibles (AhAra yogyaM kAnivi): +flo, +terr, +gras, -edi.

1.1.2.I.1.a.ii.1 Flowers (puRpa): +flo, +terr, +gras, -edi, +flwr.

1.1.2.I.1.a.ii.2 Aromatics (sugaMXa): +flo, +terr, +gras, -edi, +aro.

1.1.2.I.1.a.ii.3 Medicine/Herbals (ORaXa): +flo, +terr, +gras, -edi, +med.

1.1.2.I.1.a.ii.4 Narcotics (mAxaka/mawwu): +flo, +terr, +gras, -edi, +narc.

1.1.2.I.1.a.ii.5 Poisonous (viRa): +flo, +terr, +gras, -edi, +poi.

1.1.2.I.1.a.ii.6 General (sAXaraNa): +flo, +terr, +gras, -edi, +gen.

1.1.2.I.1.b. Herbs (gulmAlu): +flo, +terr, +herb.

1.1.2.I.1.b.i Edibles (AhArayogyaM): +flo, +terr, +herb, +edi.

1.1.2.I.1.b.i.1 Self: +flo, +terr, +herb, +edi, +slf.

1.1.2.I.1.b.i.2 Products: +flo, +terr, +herb, +edi, +pro.

1.1.2.I.1.b.ii Non-Edible (AhAra ayogyaM): +flo, +terr, +herb, -edi.

1.1.2.I.1.b.iii Medicinal Herbs (ORaXa gulmAlu): +flo, +terr, +herb, +med.

1.1.2.I.1.b.iv Narcotics (mAxaka gulmAlu): +flo, +terr, +herb, +narc.

1.1.2.I.1.b.v Poisonous Herbs (viRa gulmAlu): +flo, +terr, +herb, +poi.

1.1.2.I.1.b.vi General (sAXaraNa): +flo, +terr, +herb, +gen.

1.1.2.I.1.c. Shrubs (poVxalu): +flo, +terr, +shu.

1.1.2.I.1.c.i Edibles: +flo, +terr, +shu, +edi.

1.1.2.I.1.c.ii Non-Edible Shrubs: +flo, +terr, +shu, -edi

1.1.2.I.1.c.ii.1 Aromatics (suGaMXa): +flo, +terr, +shu, -edi, +aro.

1.1.2.I.1.c.ii.2 Medicines (ORaXa): +flo, +terr, +shu, -edi, +med.

1.1.2.I.1.c.ii.3 Narcotics (mAxaka): +flo, +terr, +shu, -edi, +narc.

1.1.2.I.1.c.ii.4 Poisonous (viRa): +flo, +terr, +shu, -edi, +poi.

1.1.2.I.1.c.ii.5 General (sAXaraNa): +flo, +terr, +shu, -edi, +gen.

1.1.2.I.1.d Climbers/creepers (wIgalu/lawalu): +flo, +terr, +cli.

1.1.2.I.1.d.i Edibles (AhArayogyaM): +flo, +terr, +cli, +edi.

1.1.2.I.1.d.i.a Self: +flo, +terr, +cli, +edi, +slf.

1.1.2.I.1.d.i.b Products: +flo, +terr, +cli, +edi, +pro.

1.1.2.I.1.d.ii Non-Edibles (AhAra ayogyaM): +flo, +terr, +cli, -edi.

1.1.2.I.1.d.ii.1 Flowers (puRpa): +flo, +terr, +cli, -edi, +flwr.

1.1.2.I.1.d.ii.2 Aromatics (sugaMXa): +flo, +terr, +cli, -edi, +aromtc.

1.1.2.I.1.d.ii.3 Medicines (ORaxa): +flo, +terr, +cli, -edi, +med.

1.1.2.I.1.d.ii.4 Narcotics: +flo, +terr, +cli, -edi, +narc.

1.1.2.I.1.d.ii.5 Poisonous (viRapUriwa): +flo, +terr, +cli, -edi, +poi.

1.1.2.I.1.d.ii.6 General (iwarAlu): +flo, +terr, +cli, -edi, +gen.

1.1.2.I.1.e. Plants (moVkkalu): +flo, +terr, +plan.

1.1.2.I.1.e.i Edibles (AhAra yogyaM): +flo, +terr, +plan, +edi.

1.1.2.I.1.e.i.a Self: +flo, +terr, +plan, +edi, +slf.

1.1.2.I.1.e.i.b Products: +flo, +terr, +plan, +edi, +pro.

1.1.2.I.1.e.ii Non-Edibles (AhAra ayogyaM): +flo, +terr, +plan, -edi.

1.1.2.I.1.e.ii.1 Flowers (puRpAlu): +flo, +terr, +plan, -edi, +flwr.

1.1.2.I.1.e.ii.2 Aromatics: +flo, +terr, +plan, -edi, +armcs.

1.1.2.I.1.e.ii.3 Medicines/Herbals: +flo, +terr, +plan, -edi, +med.

1.1.2.I.1.e.ii.4 Narcotics: +flo, +terr, +plan, -edi, +narc.

1.1.2.I.1.e.ii.5 Poisonous: +flo, +terr, +plan, -edi, +poi.

1.1.2.I.1.e.ii.6 General: +flo, +terr, +plan, -edi, +gen.

1.1.2.I.1.f. Trees (ceVtlu/vqkRalu): +flo, +terr, +tre.

1.1.2.I.1.f.i Edibles (AhArayogyaM): +flo, +terr, +tre, +edi.

1.1.2.I.1.f.i.a Self: +flo, +terr, +tre, +edi, +slf.

1.1.2.I.1.f.i.b Products: +flo, +terr, +tre, +edi, +pro.

1.1.2.I.1.f.ii Non-Edibles (AhAra ayogyaM): +flo, +terr, +tre, -edi.

1.1.2.I.1.f.ii.1 Flowers: +flo, +terr, +tre, -edi, +flwr.

1.1.2.I.1.f.ii.2 Aromatics: +flo, +terr, +tre, -edi, +aro.

1.1.2.I.1.f.ii.3 Medicines: +flo, +terr, +tre, -edi, +med.

1.1.2.I.1.f.ii.4 Narcotics: +flo, +terr, +tre, -edi, +narc.

1.1.2.I.1.f.ii.5 Poisonous: +flo, +terr, +tre, -edi, +poi.

1.1.2.I.1.f.ii.6 General: +flo, +terr, +tre, -edi, +gen.

1.1.2.I.2 Aquatic Plants (jalaruhAlu/jala vqkRAlu): +flo, -terr.

1.1.2.I.2.1 Non-Climbers (lawalu kAnivi): +flo, -terr, -clim.

1.1.2.I.2.2 Climbers (lawalu): +flo, -terr, +clim.

1.1.2.I.2.3 Species of Moss (nAcu): +flo, -terr, +specs.

1.1.2.I.3 Amphibian (uBayaruhAlu/uBaya-vqkRalu): +flo, ±terr.

1.1.2.I.3.I Gender (liMgaM): +flo, ±terr, ±masc.

1.1.2.II Anatomical parts (xehaBAgAlu): -ani, +ant.

1.1.2.II.1 Body parts (SarIra BAgAlu): -ani, +ant, +org.

1.1.2.II.1.i Human body parts (mAnava SarIra BAgAlu): -ani, +ant, +org, +fau.

1.1.2.II.1.i.a Male body parts (maga SarIra BAgAlu): -ani, +ant, +org, +fau, +masc.

1.1.2.II.1.i.b Female body parts (Ada sarIra BAgAlu): -ani, +ant, +org, +fau, +masc.

1.1.2.II.1.ii Non-Human body parts (mAnavewara SarIra BAgAlu): -ani, +ant, +org, -fau.

1.1.2.II.1.ii.A Animal body parts (jaMwu SarIra BAgAlu): -ani, +ant, +org, -fau, +fau.

1.1.2.II.1.ii.A.a Body parts of Male animals: -ani, +ant, +org, -fau, +fau, +masc.

1.1.2.II.1.ii.A.b Body parts of Female animals: -ani, +ant, +org, -fau, +fau, -masc.

1.1.2.II.1.ii.B Bird body parts (pakRula SarIra BAgAlu): -ani, +ant, +org, fau, +bir.

1.1.2.II.1.ii.C Parts of the Plants (vqkRa/moVkkala BAgAlu): -ani, +ant, +prt, +flo.

1.1.2.II.1.ii.A.i Edibles (winagaligevi): -ani, +ant, +prt, +flo, +edi.

1.1.2.II.1.ii.A.i.1 Leaves: -ani, +ant, +prt, +flo, +levs.

1.1.2.II.1.ii.A.i.2 Grains: -ani, +ant, +prt, +flo, +grn.

1.1.2.II.1.ii.A.i.3 Flowers: -ani, +ant, +prt, +flo, +flwr.

1.1.2.II.1.ii.A.i.4 Vegetables: -ani, +ant, +prt, +flo, +veg.

1.1.2.II.1.ii.A.i.5 Fruits: -ani, +ant, +prt, +flo, +frts.

1.1.2.II.1.ii.A.ii Non-Edibles (AhAra ayogyaM): -ani, +ant, +prt, +flo, -edi.

1.1.2.II.2 Releases (visarjanAlu): +relg.

1.1.2.II.2.A Useful (upayogAlu): +relg, +usf.

1.1.2.II.2.B Non-useful/Excretions): (upayogaM kAnivi): +relg, +excre.

1.1.2.III Anatomical objects (jIva paxArWAlu): -ani, +ant, +obj.

1.2 Non-Living (jIvaMlenivi): -liv.

1.2.1 Places (praxeSAlu/sWalAlu): -liv, +plc.

1.2.1.1 Terrestrial/Earth (BU BAgaM): +plc, +terr.

1.2.1.1.i Natural places (sahaja praxeSAlu/sahaja sWalAlu): +plc, +terr, +nat.

1.2.1.1.i.A Residential Places (nivAsa sWalAlu): +plc, +terr, +nat, +resi.

1.2.1.1.i.A.a Animal living Places (jaMwu nivAsAlu): +plc, +terr, +nat, +resi, +fau.

1.2.1.1.i.A.b Bird Living Places (pakRi nivAsAlu): +plc, +terr, +nat, +resi, +bir.

1.2.1.1.i.B Non-Residential Places (nivAsa yogyaMkAnivi): +plc, +terr, +nat, -resi.

1.2.1.1.i.B.1 Heritage/Histtorical Places (cAriwraka sWalAlu): +plc, +terr, +nat, -resi, +hist.

1.2.1.1.ii Artifact places (nirmANAlu): +plc, +terr, -nat.

1.2.1.1.ii.A Residential places (nivAsa yogya prAMwAlu): +plc, +terr, -nat, +resi.

1.2.1.1.ii.A.a Human Living Places (mAnava nivAsAlu): +plc, +terr, -nat, +resi, +fau.

1.2.1.1.ii.A.b Animal Living Places (jaMwu nivAsAlu): +plc, +terr, -nat, +resi, +fau.

1.2.1.1.ii.B Non-Residential places (nivAsa ayogya prAMwAlu): +plc, +terr, -nat, -resi.

1.2.1.1.ii.B.1 Educational (vixyAparamEna): +plc, +terr, -nat, -resi, +edu.

1.2.1.1.ii.B.2 Charitable (sevAparamEna): +plc, +terr, -nat, -resi, +chart.

1.2.1.1.ii.B.3 Religious places (mawaparamEna): +plc, +terr, -nat, -resi, +relg.

1.2.1.1.ii.B.4 Recreational (vinoxAwmaka): +plc, +terr, -nat, -resi, +recre.

1.2.1.1.ii.B.5 Business places (vyApAramEna): +plc, +terr, -nat, -resi, +bus.

1.2.1.1.ii.B.6 Government places (praBuwvaparamEna): +plc, +terr, -nat, -resi, +gov.

1.2.1.1.ii.B.7 Institutions (kAryAlayAlayaparamEna): +plc, +terr, -nat, -resi, +insti.

1.2.1.1.ii.B.8 Historical places (cAriwrakaparamEna): +plc, +terr, -nat, -resi, +hist.

1.2.1.1.ii.B.9 Burial grounds (smaSAnaparamEna): +plc, +terr, -nat, -resi, +bur_gro.

1.2.1.1.ii.B.10 Ways (xArulu): +plc, +terr, -nat, -resi, +wys.

1.2.1.1.ii.B.11 General (sAXaraNa): +plc, +terr, -nat, -resi, +gen.

1.1.2.1.2 Aquatics/Water (jala prAMwAlu): +plc, -terr.

1.1.2.1.2.A Natural places (sahaja jalASayAlu): +plc, -terr, +nat.

1.1.2.1.2.A.i Flows (pravAhAlu): +plc, -terr, +nat, +flw.

1.1.2.1.2.A.ii Non-Flows (apravAhAlu): +plc, -terr, +nat, -flw.

1.1.2.1.2.B Artifact places/constructions (nirmiwa jalaSayAlu): +plc, -terr, -nat.

1.1.2.1.2.B.1 Water of flow (pravAhAlu):.+plc, -terr, -nat, +flw.

1.1.2.1.2.B.2 Water of non-flow (apravAhAlu): +plc, -terr, -nat, -flw.

1.1.2.1.3 Spatial/Sky/Space (AkASa BAgaM): +plc, ±terr, -nat, +flw

1.2.1.I Location (sWAnaM): +plc, +loc.

1.2.1.II Mythological Places (pOrANikamEnavi): +plc, +myth.

1.2.1.1 Construct/Constructed (nirmiwaM): +plc, +con.

1.2.1.2 Non-constructed (nirmiwewaraM): +plc, -con.

1.2.2 Objects (paxArWAlu): +obj.

1.2.2.1 Solid objects (Gana paxArWAlu): +obj, +sol.

1.2.2.1.1 Natural Objects (sahajamEnavi): +obj, +sol, +nat.

1.2.2.1.1.i Biological (jEvikamEnavi): +obj, +sol, +nat, +bio.

1.2.2.1.1.ii Phenomena (axBuwa): +obj, +sol, +nat, +phe.

1.2.2.1.1.iii Minerals (KanijalavaNAlu): +obj, +sol, +nat, +min.

1.2.2.1.1.iv Chemicals (rasAyanAlu): +obj, +sol, +nat, +chem.

1.2.2.1.1.v Consumables (viniyogyAlu): +obj, +sol, +nat, +cons.

1.2.2.1.1.vi Artifacts (vaswuvulu): +obj, +sol, -nat.

1.2.2.1.1.vi.1 Books (graMWAlu/puswakAlu): +obj, +sol, -nat, +bok.

1.2.2.1.1.vi.2 Cultural Objects (sAMskqwikamEnavi): ++obj, +sol, -nat, +cul.

1.2.2.1.1.vi.3 Accessories (upakaraNAlu): +obj, +sol, -nat, +accs.

1.2.2.1.1.vi.3.i Clothes (xuswulu/vaswrAlu): +obj, +sol, -nat, +accs, +clo.

1.2.2.1.1.vi.3.ii Ornaments (nagalu/alaMkArAlu): +obj, +sol, -nat, +accs, +orn.

1.2.2.1.1.vi.3.iii Ornaments related to Animals(jaMwuvulaXAraNa yogyAlu):+obj, +sol, -nat, +accs, +fau.

1.2.2.1.1.vi.3.A Human Related (mAnuRya XAraNa yogyAlu):+obj, +sol, -nat, +accs, +fau.

1.2.2.1.1.vi.3.B Animal Related (jaMwuvulaXAraNa yogyAlu): +obj, +sol, -nat, +accs, +fau.

1.2.2.1.1.vi.4 Household (gqhasaMbaMXi): +obj, +sol, -nat, +hos_hol.

1.2.2.1.1.vi.5 Stationery (rAwasAmagri): +obj, +sol, -nat, +sta.

1.2.2.1.1.vi.6 Instruments used in the agriculture (vyavasAya panimutlu): +obj, +sol, -nat, +ins_agr.

1.2.2.1.1.vi.7 Musical Instruments (vAxya viSeRAlu): +obj, +sol, -nat, +mus_ins.

1.2.2.1.1.vi.8 Machines(yaMwrAlu): +obj, +sol, -nat, +mac.

1.2.2.1.1.vi.9 Weapons (AyuXAlu): +obj, +sol, -nat, +wep.

1.2.2.1.1.vi.9.1 Weapons used in +mythology: +obj, +sol, -nat, +wep, +myth.

1.2.2.1.1.vi.10 Vehicles (vAhanAlu): +obj, +sol, -nat, +veh.

1.2.2.1.1.vi.10.a Terrestrial vehicles (BUcara vAhanAlu): +obj, +sol, -nat, +veh, +terr.

1.2.2.1.1.vi.10.b Aquatic Vehicle (jala saMbaMXa vAhanAlu): +obj, +sol, -nat, +veh, -terr.

1.2.2.1.1.vi.10.c Spatial Vehicles (vAyu saMbaMXa vAhanAlu): +obj, +sol, -nat, +veh, ±terr

1.2.2.1.1.vi.11 Fire Works (bANa saMcA): +obj, +sol, -nat, +fir.

1.2.2.1.1.vi.12 Mythological related nouns (purANa vaswuvulu): +obj, +sol, -nat, +myth.

1.2.2.1.1.vi.13 General nouns (sAXAraNa vaswuvulu): +obj, +sol, -nat, +gen.

1.2.2.1.1.vi.A Edibles (AhAra yogyAlu): +obj, +sol, -nat, +edi.

1.2.2.1.1.vi.A.a Animal Related (jaMwusaMbaMXamEna): +obj, +sol, -nat, +edi, +fau.

1.2.2.1.1.vi.A.b Bird Related (pakRisaMbaMXamEna): +obj, +sol, -nat, +edi, +bir.

1.2.2.1.1.vi.A.c Plant related (vqkRasaMbaMXamEna): +obj, +sol, -nat, +edi, +plan.

1.2.2.1.1.vi.A.d Rituals (prasAxAlu): +obj, +sol, -nat, +edi, +rit.

1.2.2.1.1.vi.A.e Mythological (purANa saMbaMXa AhArAlu): +obj, +sol, -nat, +edi, +myth.

1.2.2.1.1.vi.B Non-Useful / Excretions (visarjanAlu): +obj, +sol, -nat, +excre.

1.2.2.1.1.vi.B.a Human Related (manuRyasaMbaMXi): +obj, +sol, -nat, +excre, +fau.

1.2.2.1.1.vi.B.b Animal Related (jaMwusaMbaMXi): +obj, +sol, -nat, +excre, +fau.

1.2.2.1.1.vi.B.c Bird Related (pakRisaMbaMXi): +obj, +sol, -nat, +excre, +bir.

1.1.2.2.2 Liquids (xravAlu): +obj, -sol.

1.1.2.2.2.I Natural Liquids (sahaja xravAlu): +obj, -sol, +nat.

1.1.2.2.2.I.1 Biological (jIvasaMbaMXamEnavi): +obj, -sol, +nat, +bio.

1.1.2.2.2.I.1.a Useful (upayogikAlu): +obj, -sol, +nat, +bio, +usf.

1.1.2.2.2.I.1.b Un-useful (Excretion): +obj, -sol, +nat, +bio, +excre.

1.1.2.2.2.I.1.1 Human Related (manuRya saMbaMXi): +obj, -sol, +nat, +bio, +fau.

1.1.2.2.2.I.1.1.a Male related: +obj, -sol, +nat, +bio, +fau, +masc.

1.1.2.2.2.I.1.1.b Female related: +obj, -sol, +nat, +bio, +fau, -masc.

1.1.2.2.2.I.1.2 Animal Related: +obj, -sol, +nat, +bio, +fau.

1.1.2.2.2.I.1.3 Plant Related: +obj, -sol, +nat, +bio, +flo.

1.1.2.2.2.I.2 Chemical (rasayanAlu): +obj, -sol, +nat, +chem.

1.1.2.2.2.I.3 Oil (nUneVlu): +obj, -sol, +nat, +oil.

1.1.2.2.2.I.4 Non-oil (nUneVlu kAnivi): +obj, -sol, +nat, -oil.

1.1.2.2.2.I.4.1 Edible: +obj, -sol, +nat, -oil, +edi.

1.1.2.2.2.I.4.2 Non-edible: +obj, -sol, +nat, -oil, -edi.

1.1.2.2.2.II Artifacts (kqwrima): +obj, -sol, -nat.

1.1.2.2.2.II.1 Chemicals (rasAyanAlu): +obj, -sol, -nat, +chem.

1.1.2.2.2.II.2 Oils (nUneVlu/wElAlu): +obj, -sol, -nat, +oil.

1.1.2.2.2.II.2.a Edibles (AhArayogyAlu): +obj, -sol, -nat, +oil, +edi.

1.1.2.2.2.II.2.b Non-Edibles (AhAra yogyaM kAnivi): +obj, -sol, -nat, +oil, -edi.

1.1.2.2.2.II.3 Non-oils (nUneVlu kAnivi): +obj, -sol, -nat, -oil

1.1.2.2.2.II.3.a Edibles: +obj, -sol, -nat, -oil, +edi.

1.1.2.2.2.II.3.b Non-Edibles: +obj, -sol, -nat, -oil, -edi.

1.2.2.3 Gas (vAyuvu): +obj, +gas.

1.2.2.3.I Natural Gas (sahaja vAyuvu): +obj, +gas, +nat.

1.2.2.3.I.a Biological Gas (jIvasaMbaMXamEnavi): +obj, +gas, +nat, +bio.

1.2.2.3.I.b Chemical Gas (rasAyanAlu): +obj, +gas, +nat, +chem.

1.2.2.3.I.c Non-Chemical Gas (rasAyanAlu kAnivi): +obj, +gas, +nat, -chem.

1.2.2.3.II Artificial Gas (kqwrima vAyuvu): +obj, +gas, -nat.

1.2.2.3.II.1 Chemicals (rasAyanAlu): +obj, +gas, -nat, +chem.

1.2.2.3.II.2 Non-chemicals (rasAyanAlu kAnivi): +obj, +gas, -nat, -chem.

2. Abstract Nouns (amUrwa vAcakAlu): +abs.

2.1 Cognition (BOxXikamEnavi): +abs, +cogn.

2.2 Qualities (lakRaNAlu): +abs, +qul.

2.3 Skill (nEpuNyAlu): +abs, +skil.

2.4 Ideals (AxarSAlu): +abs, +idl.

2.5 Temporal (kAlagawa vAcakAlu): +abs, +tem.

2.5.A Period (kAlaM): +abs, +tem, +per.

2.5.B Seasons (ruwuvulu): +abs, +tem, +seas.

2.5.C Historical Ages (cAriwraka): +abs, +tem, +hist.

2.6 Quantifier (gaNana vAcakAlu): +abs, +qun.

2.6.A Numerals (saMKyA vAcakAlu): +abs, +qun, +num.

2.6.B Measurements (koVlawalu): +abs, +qun, +mea.

2.6.C Distance (xUrAlu): +abs, +qun, +dis.

2.7 Events (saMGatanalu): +abs, +ev.

2.7.A Natural Events (sahaja saMGatanalu): +abs, +ev, +nat.

2.7.B Planned Events (yojanAnuguNa saMGatanalu): +abs, +ev, +nat, +pla.

2.7.C Historical Events (cAriwraka saMGatanalu): +abs, +ev, +nat, +hist.

2.7.D Social Events (sAMGika saMGatanalu): +abs, +ev, +nat, +soc.

2.7.E Accidental events (Akasmika saMGatanalu): +abs, +ev, +nat, +accd.

2.7.E.a Positive events (SuBa saMGatanalu): +abs, +ev, +nat, +pos.

2.7.E b Fatal events (aSuBa saMGatanalu): +abs, +ev, +nat, +fatal.

2.8 Actions (caryalu): +abs, +act.

2.8.A Physical actions (BOwika caryalu): +abs, +act, +phyc.

2.8.B Social actions (sAMGika caryalu): +abs, +act, +socl.

2.8.C Anti-Social actions (asAMGika caryalu): +abs, +act, +anti_socl.

2.8.D Communication (BARaNa): +abs, +act, +com.

2.8.E Celebrations (vedukalu): +abs, +act, +cel.

2.8.E.i Cultural Celebrations (sAMskqwika paramEnavi): +abs, +act, +cel, +cul.

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2.8.E.i.a Personal Celebrations (vyakwigawamEnavi): +abs, +act, +cel, +cul, +per.

2.8.E.i.a.1 Happy celebrations (saMwoRakaramEnavi): +abs, +act, +cel, +cul, +per, +hpy.

2.8.E.i.a.2 Un-Happy celebrations (viRAxakaramEnavi): +abs, +act, +cel, +cul, +per, -hpy.

2.8.E.i.b Group Celebrations (sAmUhikaMgA cesukonevi): +abs, +act, +cel, +cul, -per.

2.8.E.ii Religious celebrations (mawa paramEnavi): +abs, +act, +cel, +relg.

2.8.E.ii.A Festivals (paMdugalu): +abs, +act, +cel, +relg, +fes.

2.8.E.iii Social Celebrations (sAMGikamEnavi): +abs, +act, +cel, +soc.

2.8.E.iv Historical Celebrations (cAriwrakamEna vedukalu): +abs, +act, +cel, +hist.

2.8.F Sports (krIdalu): +abs, +act, +spo.

2.8.F.i Terrestrial Sports (BUsaMbaMXa krIdalu): +abs, +act, +spo, +terr.

2.8.F.i.a Indoor games (lopala Ade Atalu): +abs, +act, +spo, +terr, +indo.

2.8.F.i.a.A Female (swrIla krIdalu): +abs, +act, +spo, +terr, +indo, -masc.

2.8.F.i.a.B Male (puruRula krIdalu): +abs, +act, +spo, +terr, +indo, +masc.

2.8.F.i.b Outdoor games (bayata Ade Atalu): +abs, +act, +spo, +terr, -indo.

2.8.F.i.b.A Female (swrIla krIdalu): +abs, +act, +spo, +terr, -indo, -masc.

2.8.F.i.b.B Male (puruRula kridalu): +abs, +act, +spo, +terr, -indo,+masc.

2.8.F.ii Aquatic sports/Water (jala saMbaMXa krIdalu): +abs, +act, +spo, -terr.

2.8.F.iii Sky/Space (AkASa saMbaMXa krIdalu): +abs, +act, +spo, ±terr.

2.8.F.iv Personality Development (manovikAsaM): +abs, +act, +spo, +per_dev.

2.9 Process (viXAnaM): +abs, +proc.

2.9.i Physical process (BOwika): +abs, +proc, +phy.

2.9.ii Mental process (mAnasika): +abs, +proc, -phy.

2.10 Onomatopoeic/ Sounds (XvanyanukaraNAlu/Xvanulu): +abs, +onm.

2.10.A Natural (sahajamEnavi): +abs, +onm, +nat.

2.10.B Physical (BOwikamEnavi): +abs, +onm, +phy.

2.10.i Human Related (mAnava saMbaMXi): +abs, +onm, +fau.

2.10.ii Animal Related (jaMwu saMbaMXi): +abs, +onm, +fau,

2.10.iii Bird Related (pakRi saMbaMXi): +abs, +onm, +bir

2.10.iv Objects Related (paXxarWa saMbaMXi): +abs, +onm, +obj.

2.10.iv.a. Instrumental (vAyixyAla Xvanulu): +abs, +onm, +obj, +instr.

2.10.iv.b Vehicle (vahanala Xvanulu): +abs, +onm, +obj, +veh.

2.10.iv.c General Sounds (sAXAraNa Xvanulu): +abs, +onm, +obj, +gen.

2.11 Human Related (manuRya saMbaMXi): +abs, +fau.

2.11.i Arts (kalYalu): +abs, +fau, +arts.

2.11.ii Titles (biruxulu): +abs, +fau, +tit.

2.12 Terminology (pariBARa): +abs, +term.

2.12.A Metaphorical Expressions (alaMkAra prayogAlu): +abs, +term, +met_exp.

2.12.B Grammar Related (vyAkaraNa paramEna): +abs, +term, +gra.

2.12.C Prosody Related (caMXassu paramEna): +abs, +term, +pros.

2.12.D Subjects (SAswra viRayA saMbaMXAlu): +abs, +term, +sub.

2.12.D.I Humanities (mAnaviya SAswrAlu): +abs, +term, +sub, +humn.

2.12.D.I.a Telugu (weVlugu): +abs, +term, +sub, +humn, +tel.

2.12.D.I.b English (AMglaM): +abs, +term, +sub, +humn, +eng.

2.12.D.I.c Hindi (hiMxi): +abs, +term, +sub, +humn, +hin.

2.12.D.II Social Sciences (sAMGika SAswraM): +abs, +term, +sub, +soc_sci.

2.12.D.II.a Economics (ArWika SAswraM): +abs, +term, +sub, +soc_sci, +eco.

2.12.D.II.b Political Science (rAjanIwi SAswraM): +abs, +term, +sub, +soc_sci, +pol.

2.12.D.III Sciences (vijFAna SAswrAlu): +abs, +term, +sub, +sci.

2.12.D.III.a Mathematics (gaNiwa SAswraM): +abs, +term, +sub, +sci, +mat.

2.12.D.III.b Physics (BOwika SAswraM): +abs, +term, +sub, +sci, +phys.

2.12.D.III.c Chemistry (rasAyana SAswraM): +abs, +term, +sub, +sci, +chem.

2.12.D.III.d Technology (sAMkewika SAswraM): +abs, +term, +sub, +sci, +tech.

2.12.D.IV Etc (iwarAlu): +abs, +term, +sub, +etc.

Notes:

- ❖ Among humanities description can be split into language related i.e. linguistic or non-linguistic. Philosophy is non-language descriptive.

- ❖ Features given in square brackets are predicted by the features outside. Number pattern is indicative of hierarchical organization. Categories or classes with letter prefixes indicate secondary ontologies i.e. non-constituent out features.

APPENDIX-II
Evaluation of Telugu – Hindi Machine Translation

S. No	Input	Output	Open			Blind		
1.	దక్షిణాఫ్రికా అనగానే ప్రస్తుతం భారత్ తో జరుగుతున్న టెస్టు మ్యాచే మనకు గుర్తొస్తుంది.	दक्षिण आफ्रिका बोल ता ही फिलहाल भारत् के साथ जारी टेस्ट मैच ही हमको ख़याल आयेगा.	2	3	2	3	3	3
2.	మరో రెండేళ్ళలో అక్కడ జరుగనున్న సాకర్ కప్పుతో ఈ పర్యాటకుల సంఖ్య మరింత పెరిగే అవకాశం ఉంది.	दूसरे दो सालों में वहाँ घटित होनेवाला साकर कप में इन पर्यटक की संख्या और ज्यादा बढ़नेवाला मौका है.	3	2	2	3	4	3
3.	గత ఏడాది తొంబై లక్షల మంది విదేశీ పర్యాటకులు దక్షిణాఫ్రికాను సందర్శించారని ఆ దేశ పర్యాటక మంత్రిత్వ శాఖ తెలిపింది.	पिछले साल नब्बे लाख के लोग विदेशी पर्यटक दक्षिण आफ्रिके को देख आ अनि आ देश पर्यटक मंत्रालय बतलाया है.	3	2	3	3	4	3
4.	2006 లో 80 లక్షల 40 వేల మంది పర్యాటకులు దక్షిణాఫ్రికాకు వచ్చారని వెల్లడించింది.	2006 में 80 लाख के 40 वेय्यि ओब्ल् लोग पर्यटकों ने दक्षिण आफ्रिके को आये कह के प्रकट किया है.	2	2	2	3	3	3
5.	ఇక్కడ ఉన్న అటవీ ప్రాంతాలను వాటిలో నివసించే ప్రాణికోటిని వీక్షించేందుకు అమెరికా, యూరప్, ఆసియా దేశాల నుంచి వేల సంఖ్యలో పర్యాటకులు ప్రతి ఏడాది వస్తున్నారని ఆ శాఖ పేర్కొంది.	यहाँ रहा हुआ जंगल प्रांत को उनमें निवास करनेवाला जीवन को देखने के लिए अमेरिका, यूरप, एशियाई राष्ट्रों से हज़ारों संख्या में पर्यटक हर साल आ रहे हैं ऐसा उस शाखा उल्लेख किया है.	3	3	3	3	3	3
6.	అంతేకాకుండా ఈ దేశంలో సుమారు 300 క్షీరద జాతులు, 500 లక్షు పైగా పక్షుల జాతులు, లెక్కలేనన్ని కీటకాలు ఉన్నాయి.	उतना ही नहीं इस देश में लगभग 300 स्तनधारी जातियाँ, 500 के ऊपर पक्षियों के जातियाँ, अनगिनत कीट हैं.	2	3	3	3	4	4
7.	వాటి జీవన విధానానికి అనుగుణంగా విభిన్న కాలాల్లో, వేళలలో అవి సంచరిస్తుంటాయి.	उनके जीवन तंत्र को यथायोग्य भिन्न काल में, वेलों में वे संचार करतीं रहेंगी.	2	2	2	3	3	3
8.	డాలర్ తో పోలిస్తే దక్షిణాఫ్రికా ద్రవ్యం ర్యాండ్ విలువ బలహీనంగా	डॉलर से तुलना करने पर दक्षिण आफ्रिका द्रव्य र्यांड मूल्य दौर्बल्य से रहने से,	2	3	3	3	3	3

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	ఉండడంతో, విదేశీ పర్యాటకులలో చాలామందికి దక్షిణాఫ్రికా చౌక పర్యాటక ప్రాంతంగా మారింది.	विदेशी पर्यटकों में बहुतों को दक्षिण आफ्रिका सस्तापन पर्यटक के प्रांत से बदला है.							
9.	నేరాల రేటు ఎక్కువగా ఉన్నప్పటికీ చౌక ధరలకే ప్రయాణం అనే అంశమే ఆ దేశాన్ని పర్యాటకుల విడిది స్థలంగా మారుస్తోందని పరిశీలకుల వ్యాఖ్య.	जुर्मो का रेट ज्यादा रहने पर भी कम दाम को ही प्रयाण नामक अंश ही उस देश को पर्यटकों का पडाव स्थल के रूप में बदल रहा है ऐसा अनुसंधानियों की व्याख्या है.	3	2	3	3	3	4
10.	ఇకపై కర్ణాటక రాష్ట్రంలో అటవీ ప్రాంతాలకు, 'జూ 'కు పెళ్ళాలంటే తప్పనిసరిగా ఏనుగు మీద సవారి చేయాల్సిందే.	अब से कर्णाटक राज्य में जंगल प्रांत को, 'चिड़िया घर 'को जाना चाहिए तो अनिवार्य रूप से हाथी पर सवारी करना ही पडेगा.	3	3	2	3	4	3
11.	ఈ తరహా వినూత్న పథకానికి శ్రీకారం చుట్టాలని అటవీ శాఖకు కర్ణాటక ప్రభుత్వం సూచించింది.	इस तरह नये प्रणाली को श्रीगणेश करने के लिए जंगल शाखा को कर्णाटक सरकार सुझाव दिया है.	3	2	2	3	3	3
12.	రాష్ట్ర ప్రభుత్వ తాజా సూచనతో ఇకపై కర్ణాటకకు విచ్చేసే పర్యాటకులు అక్కడి జాతీయ పార్కులు, అటవీ ప్రాంతాలను సందర్శించేందుకు వాహనాలకు బదులుగా ఏనుగులను వినియోగించే సరికొత్త విధానం అమల్లోకి వస్తుంది.	राज्य सरकार ताजा इत्तिला से अब से कर्णाटक को पधारनेवाला पर्यटक वहाँ की जातीय पार्क, जंगल प्रांत को देखने के लिए गाड़ियों को के बदले हाथी को विनियोग करनेवाला बिलकुल नया तंत्र अमल् में आयेगा.	2	2	3	3	3	3
13.	బెంగుళూరులో మంగళవారం జంగిల్ రిసార్ట్స్ లిమిటెడ్ ఆధ్వర్యంలో జరిగిన వర్క్_షాప్ కు విచ్చేసిన సందర్భంగా రాష్ట్ర అటవీశాఖ సంరక్షణ ప్రధాన అధికారి ఏకే.	बंगालूरू में मंगलवार जंगिल् रिसार्ट्स् लिमिटेड रहनुमाई में घटित है वर्क्षाप् को पधारा हुआ अवसर पर राज्य वनविभाग संरक्षण प्रधान अधिकारी पींजनेवाला.	3	3	2	3	3	3
14.	వర్మ మీడియాతో మాట్లాడుతూ ప్రయోగాత్మకంగా తొలిదశలో షిమోగా అటవీ ప్రాంతాలు, బాద్రా వన్యప్రాణి జీవుల సంరక్షణా కేంద్రంలో ఏనుగులపై పర్యాటకుల సందర్శన కార్యక్రమాని	वर्मे ने मीडिये से बात करता हुआ प्रयोगात्मक के रूप में पहला दशा में षिमोगा जंगल प्रांत, बाद्रा वन्य-प्राणी जीव के संरक्षण केंद्र में हाथी पे पर्यटकों का संदर्शन कार्यक्रम को प्रस्तुत करनेवाला ऐसा बतलाया है.	2	3	2	2	3	3

	Telugu	Hindi						
	ప్రవేశపెట్టనున్నట్లు తెలిసింది.							
15.	ఈ పథకానికి పర్యాటకుల నుంచి లభించే స్పందనను అనుసరించి దీన్ని ఇతర ప్రాంతాలకు కొనసాగించేది నిర్ణయించబడుతుందని వర్మ పేర్కొన్నారు.	इस प्रणाली को पर्यटकों से मिलनेवाला प्रतिक्रिया को अनुसरण कर के इसको अन्य प्रांत को बढ़ाने का निर्णय किया जा रहा है कह के वर्मा ने उल्लेख किया है.	3	3	3	2	4	4
16.	పర్యాటకులను చేరవేసేందుకు ఉపయోగించే ఏనుగులు ఏ మేరకు భారాన్ని భరిస్తాయనే దాని అధ్యయనం చేయవలసి ఉందని వెల్లడించారు.	पर्यटकों को पहुँचाने के लिए प्रयोग करनेवाला हाथी ने किस हद को भार को झेलियेगा नामक उसको अध्ययन करने का है इस तरह से प्रकट किया है.	2	3	3	3	4	4
17.	పూర్తి అటవీ ప్రాంతాన్ని సందర్శించే క్రమంలో ఏనుగులు ఎక్కువ సమయాన్ని తీసుకుంటాయి కనుక పర్యాటకులు ఈ పథకానికి ఏ మేరకు మొగ్గుచూపుతారనేది కూడా పరిగణనలోకి తీసుకోవలసిన అంశంగా వర్మ తెలిపారు.	संपूर्ण जंगल प्रांत को देखने के क्रम में हाथी ने ज्यादा समय को लेंगे इसलिए पर्यटक इस प्रणाली को किस हद को तरफदारी करेंगे यह बात भी गिनती में लेने का अंश के रूप में वर्मा बतलाया है.	3	3	3	3	3	3
18.	అటవీశాఖ అధీనంలో గల సుమారు 200 ఏనుగులను వాహనాల స్థానంలో భర్తీ చేసినట్లయితే అటవీ ప్రాంతాలలో వాతావరణ కాలుష్య నియంత్రణ గావించవచ్చని.	वनविभाग अधीनता के लगभग 200 हाथी को गाड़ियों का स्थान में भर्ती किया है जैसा तो जंगल प्रांत में पर्यावरण प्रदूषण नियंत्रण कर सकेगा कि.	2	2	3	3	3	4
19.	అనేక మంది పర్యాటకులు కూడా ఈ ప్రతిపాదనను అంగీకరిస్తున్నారని వర్మ తెలిపారు.	अनेक लोग पर्यटक भी इस प्रस्ताव को स्वीकार रहे हैं ऐसा वर्मा बतलाये हैं.	3	3	2	3	3	3
20.	కీకారణ్యంలో ఉండే ఓ అరుదైన గుడ్లగూబ జనారణ్యంలోకి వచ్చింది.	घना जंगल में रहनेवाला एक दुर्लभ उल्लू जनारण्य में आया है.	2	2	3	3	3	4
21.	దట్టమైన అరణ్యాలల అరుదుగా కనిపించే తెల్ల గుడ్లగూబ విజయవాడ నగరంలోకి వచ్చింది.	घनापन अरण्यों में विरला ही दिखनेवाला सादा उल्लू विजयवाडा नगर में आया है.	3	4	3	3	3	3
22.	గాయంతో కనిపించిన ఆ గుడ్లగూబను సంపత్ అనే బాలుడు	जख्म के साथ दिखा हुआ उस उल्लू को संपत् नामक बालक ने बचाया है.	2	2	3	4	3	2

	కాపాడాడు.								
23.	చివరికి దానిని పెద్దల సహాకారంతో అటవీశాఖా అధికారులకు అప్పగించాడు.	आखिर उसको बुज़ुर्गो का सहयोग से वनविभाग अधिकारियों को सुपुर्द किया है.	3	3	3	3	3	2
24.	ఆఫ్రికా దేశంలో మాదిరి భారతదేశంలోని రాజస్థాన్ లో ఆ తరహా స్థాయిలో సింహల సఫారీని నిర్వహించాలని కొత్త ప్రణాళిక రూపొందించారు.	अफ्रीकी देश की तरह हिंदुस्तान के राजस्थान में उस तरह के स्तर पर सिंहों के सफारी को आयोजित करने के लिए नयी योजना रूपायित किये हैं.	2	3	2	3	4	3
25.	ఈ సింహల సఫారీని నహార్గహ్ బయోలాజికల్ పార్క్ లో ఏర్పాటు చేయనున్నట్లు అటవీశాఖ విభాగపు అధికారి ఒకరు చెప్పారు.	इन सिंह की सफारी को नहार्गाह् बयोलाजिकल पार्क में आयोजन करनेवाला ऐसा वनविभाग विभाग की अधिकारी एक बताये हैं.	3	4	3	3	3	3
26.	ఈ పథకానికి సంబంధించిన రూపురేఖలను సెంట్రల్ జూ అథారిటీ ఆమోదించిందన్నారు.	इस प्रणाली को संबंधित रूपरेखों को सेंट्रल चिड़िया घर अथारिटी अनुमोदित की बोले हैं.	3	2	2	3	3	3
27.	ఏప్రిల్ నుంచి పథకానికి సంబంధించిన పనులను ప్రారంభించగలమని ఆయన ధీమా వ్యక్తం చేశారు.	अप्रैल से प्रणाली को संबंधित कामों को शुरूवात कर सकते हैं इस तरह उनने दृढ विश्वास व्यक्त किया है.	3	2	3	3	3	3
28.	ముందుగా, ఈ సఫారీ కోసం 10 సింహాలను గిర్ నేషనల్ పార్కు, జైపూర్ జంతుశాలల నుంచి తెప్పించనున్నట్లు వివరించారు.	पहले, इस सफारी के लिए 10 सिंहों को गिर ने नेशनल पार्क, जयपुर चिड़िया ख़ानों से मँगवानेवाला ऐसा विवरण दिया है.	3	2	2	3	3	3
29.	అలాగే పర్యాటకుల కోసం అన్ని రకాల ముందస్తు జాగ్రత్త చర్యలు తీసుకుంటున్నట్లు పేర్కొన్నారు.	ऐसा ही पर्यटकों सब क़िस्म पूर्व सावधानी कार्यवाही कर रहा है जैसा उल्लेख किये हैं.	3	2	2	2	3	3
30.	ఈ సఫారీని ఏర్పాటు చేయడం ద్వారా సింహాలపై అధ్యయనం సులువే గాక, గుంపులు గుంపులుగా అవి కదలడం ద్వారా పర్యాటకులను మరింత ఆకర్షించవచ్చని తెలిపారు.	इस सफारी को आयोजन करने से सिंहों पे अध्ययन आसान ही नहीं, टोलियों में उनने हिलने से पर्यटकों को और ज्यादा आकर्षित कर सक ता है कि बतलाया है.	2	2	2	3	3	3
31.	నీజార్ ప్రాంతంలోని దట్టమైన అటవీ ప్రాంతం గల బొటానికల్ గార్డెన్	नीजार् प्रांत के घनापन जंगल प्रांत रह या हुआ बोटानिकल् गार्डेन में लगभग	2	3	3	3	3	4

	లో సుమారు 36 ఎకరాలను సింహాల సఫారీ కోసం సేకరించారు.	36 ए मिर्चों को सिंहों की सफारी के लिए जमा किये हैं.							
32.	సింహాలు ప్రకృతి సిద్ధంగా మనగలిగేందుకు ఐదు గుహలను సహజత్వం ఉట్టిపడేలా ఏర్పాటు చేయనున్నారు.	सिंह सहज के रूप में रह अ गल्लुग ए अंद्वल्ल पाँच गुफाओं को सहजता छलक एं जैसा आयोजन करने वाले हैं.	2	3	4	4	3	3	
33.	నిరంతరం నీటి సరఫరా కోసం నాలుగు రిజర్వాయర్లతో కూడిన భూగర్భ పైపులను కూడా కల్పించనున్నారు.	निरंतर पानी की आपूर्ति के लिए चार रिजर्वायरों से योग किया हुआ भूगर्भ निगालियों को भी गढ ॆ ने वाले हैं.	2	2	2	3	3	32	
34.	పక్షి ప్రేమికుల స్వర్గధామంగా పేరుగాంచిన చిలుకా సరస్సుకు సుమారు 9 లక్షల పక్షులు వలస వచ్చినట్లు చిలుకా సరస్సు అటవీ శాఖా విభాగపు అధికారి అభిమన్యు బహేరా వెల్లడించారు.	पक्षी ने प्रेमियों का स्वर्गधाम के रूप में विख्यात है चिलुका सरोवर को लगभग 9 लाख के पक्षी प्रवास आया है जैसा चिलुका सरोवर जंगल शाखा विभाग की अधिकारी अभिमन्यु बहेरा प्रकट की है.	2	3	3	3	3	3	
35.	భువనేశ్వర్ లో బుధవారం విలేకరుల సమావేశంలో అభిమన్యు మాట్లాడుతూ ఈ ఏడాది సరస్సుకు వచ్చిన 9 లక్షల వలస పక్షుల్లో 4, 50, 000 పక్షులు నలబానా దీవికి వెళ్లాయని వ్యాఖ్యానించారు.	भुवनेश्वर में बुधवार संवाददातों की बैठक में अभिमन्यु बात करता हुआ इस साल झील को आया हुआ 9 लाख के प्रवास व्याख्यान किये पक्षियों में 4, 50, 000 पक्षी नलबाना द्वीप को गये	2	2	3	3	3	3	
36.	గత ఏడాది 8, 40, 000 పక్షులు ఈ సరస్సుకు వచ్చాయని వాటిలో 1, 98, 000 పక్షులు నలబానాకు వెళ్లాయని చెప్పారు.	पिछले साल 8, 40, 000 पक्षी इस झील को आये कह के उनमें 1, 98, 000 पक्षी नलबाने को गये कह के बताये हैं.	3	2	3	3	2	3	
37.	ఈ సరస్సు వద్ద సుమారు వేయి చదరపు కిలోమీటర్ల స్థలంలో పక్షుల రక్షణ చర్యలు చేపట్టామన్నారు.	इस झील के पास लगभग डाल वर्ग किलोमीटर के स्थल में पक्षियों की सुरक्षा कार्य अपनाये बोले हैं.	2	2	3	3	3	3	
38.	వలస పక్షులు సేదతీరే ప్రాంతంలో కలుపు మొక్కలను ఏరిపారేయడంతో ఈ ఏడాది మరిన్ని పక్షులు ఇక్కడకు చేరాయని ఆయన వివరించారు.	प्रवास पक्षी थकावट दूर होने वाला प्रांत में घास पात पौधों को उखाड़ फेंकने से इस साल और इतना पक्षी पहुँच इक्कड कु आ अनि उनने विवरण दिया है.	3	3	3	3	3	3	

39.	ఈ పథకం కోసం సుమారు కోటీ 50 లక్షల రూపాయల మేర ఖర్చయ్యే అవకాశం ఉందని అంచనా వేశారు.	इस प्रणाली के लिए लगभग करोड़ 50 लाख रुपये तक खर्च होने की संभावना है इस तरह से अनुमान लगाये हैं.	2	2	3	3	3	3
40.	కేంద్ర, రాష్ట్రప్రభుత్వాలు ఈ పథకానికి కావలసిన నిధులను మంజూరు చేయనున్నట్లు అటవీ శాఖా వర్గాలు వెల్లడించాయి.	केंद्र , राष्ट्रप्रभुत्व इस प्रणाली को जितना चाहे उतने निधियों को मंजूरी करनेवाला ऐसा जंगल शाखा वर्ग प्रकट किये हैं.	3	3	3	4	4	3
41.	దేశంలోనే తొలి ఏనుగుల పునరావాస కేంద్రాన్ని ఛాచ్ రౌలీలోని బన్ సంతూర్ లో హర్యానా అటవీ మరియు పర్యావరణ శాఖల మంత్రి కిరణ్ చౌదరి ప్రారంభించారు.	देश में ही पहले हाथी के पुनर्वासन केंद्र को छाछ रौली के बन् संतूर में हरियाणा जंगल और पर्यावरण शाखाओं का मंत्री किरण् चौधरी शुरूवात किये हैं.	3	2	3	4	3	2
42.	ధాయ్_ల్యాండ్ లోని పునరావాస కేంద్రాన్ని స్ఫూర్తిగా తీసుకుని 50 ఎకరాల విస్తీర్ణంలో 90 లక్షల రూపాయల వ్యయంతో కేంద్రాన్ని నిర్మించారు.	थाय् ल्यांड के पुनर्वासन केंद्र को प्रेरणा से ले कर 50 एकरों का विस्तीर्ण में 90 लाख के रुपयों का व्यय के साथ केंद्र को निर्माण किये हैं.	3	3	2	2	3	3
43.	వచ్చే సంవత్సరం మార్చి మాసాంతానికి పునరావాస కేంద్రం పూర్తి స్థాయిలో తన కార్యకలాపాలను మొదలుపెడుతుంది.	आनेवाला साल मार्च मासांत को पुनर्वासन केंद्र संपूर्ण स्तर में उसके कार्य कलाप को शुरू करेगा.	2	3	2	3	3	3
44.	ఈ సందర్భంగా మంత్రి మీడియాతో మాట్లాడుతూ గాయపడిన, అనారోగ్యం పాలైన ఏనుగులకు పునరావాస కేంద్రంలో తగు వైద్య చికిత్సలు చేపడతామని అన్నారు.	इस संदर्भ के रूप में मंत्री मीडिये से बात करता हुआ घायल है, रोगी दूध हुएं हाथी को पुनर्वासन केंद्र में योग्य हो इलाज चिकित्साएँ ग्रहण करते हैं कह के बोले हैं.	3	2	3	3	3	4
45.	దట్టమైన వెదురుపొదలకు అలవాలమైన బన్ సంతూర్ ప్రాంతం ఏనుగులు సహజ సిద్ధంగా తిరుగాడే ప్రాంతం.	घनापन बँसवाड़ियों को अलवालमैन बन् संतूर प्रांत हाथी सहज सिद्ध के रूप में ख़ाक छाननेवाला प्रांत है.	3	3	2	4	3	3
46.	కేంద్రానికి తరలించబడే ఏనుగుల సంఖ్యను అనుసరించి కేంద్రం విస్తీర్ణని పెంచే అవకాశం ఉంది.	केंद्र को रवाना कर या जान एं हीवाला हाथी के संख्या को अनुसरण कर के केंद्र विस्तीर्ण को बढ़ानेवाला मौका है.	3	2	2	3	3	3

47.	పునరావాస చర్యలను చేపట్టడంలో అనుభవం గడించి డిల్లీ కేంద్రంగా కార్యకలాపాలు సాగిస్తున్న 'వైల్డ్ లైఫ్ ఎస్ఓఎస్' ప్రభుత్వేతర సంస్థకు ఏనుగుల పునరావాస కేంద్రం నిర్వహణ బాధ్యతలను అప్పగిస్తామని ఆమె వెల్లడించారు.	पुनर्वासन कार्य को अपना ने में अनुभव अभिग्रहण कर के दिल्ली केंद्र के रूप में कार्य कलाप चला रहा 'वैल्ड लैफ़ एसोएस' प्रभुत्वेतर संस्था को हाथी के पुनर्वासन केंद्र संचालन जिम्मेदारियों को सुपुर्द करते हैं कह के उसने प्रकट किया है.	2	2	3	2	3	3
48.	దాదాపు 1.	करीब 1 है.	3	3	3	3	3	3
49.	31 లక్షల పక్షులు ఒరిస్సాలోని భటార్ కానికా జాతీయ పార్కులో 2007 సంవత్సరం జరిపిన పక్షుల గణాంకాలలో చేరాయి.	31 लाख के पक्षियों ने उड़ीसे का भटार् कानिका जातीय पार्क या 2007 साल म हुआ पक्षियों के आँकड़ों में पहुँचा है.	3	2	2	3	3	4
50.	97 రకాల నీటి పక్షులు మరియు 38 రకాల ఇతర పక్షులతో కలుపుకుని మొత్తం 135 రకాల పక్షులకు భటార్ కానికా జాతీయ పార్కు ఈ సంవత్సరం విడిదిగా మారిందని జైనా తెలిపారు.	97 क़िस्म पानी के पक्षियों ने और 38 क़िस्म अन्य पक्षियों के साथ मिला कर कुल 135 क़िस्म पक्षियों को भटार् कानिका जातीय पार्क इस साल पडाव से बदला इस तरह से जैना बतलायी है.	3	3	2	4	4	3
51.	బరునియా ముహన, చటక, ప్రహరాజ్ పూర్, బాగాగహన్ మరియు రాయ్ టాపాటియా ప్రాంతాలలో గల మాంగ్రోవ్ వృక్షాలపై నీటి ఒడ్డున సేదతీరే పక్షులైన సౌండ్ పైపర్, ప్లోవర్, బాతులు, గూస్, హెరిన్, కోర్మొర్యాంట్స్, స్పూన్ బిల్ మరియు ఎగ్రెట్ పక్షులు కనిపించాయని వెల్లడించారు.	बरुनिया मुहन, चटक, प्रहराज् पूर, बागागहन् और राय् टापाटिया प्रांत के मांग्रोव् वृक्षों पे पानी के कगार पर थकावट दूर होने वाला पक्षी हुएं सांड़ पैपर, प्लोवर्, बतक, ग्नस्, हेरोन्, कोर्मोर्याट्स्, चमचा बिल और एग्रेट् पक्षी दिखे कह के प्रकट किये हैं.	2	3	3	3	3	3
52.	ఈ సంవత్సరపు వార్షిక గణాంకాల సేకరణ నిమిత్తం అధికారులు నియమించిన 10 బృందాలలో ప్రముఖ పక్షి శాస్త్రవేత్తలు డా.	इस साल सालियाने आँकड़ों का संग्रह निमित अधिकारी नियुक्त किया हुआ 10 वृंदों में प्रमुख पक्षी वैज्ञानिक डा है.	2	2	2	3	3	3
53.	గోహర్ అబిడిన్, రమేష్ ఝుంకార్, సువేందు భట్టాచార్య మరియు బిశ్వజిత్ మోహంతి పాల్గొన్నారు.	गोहर अबेडिन, रमेश झंकार, सुवेंद भट्टाचार्य और विश्वजित मोहंती भाग लिये हैं.	2	3	2	3	3	3

54.	ఇంటర్నేషనల్ యూనియన్ ఆఫ్ కన్సర్వేషన్ ఆఫ్ నేచర్ (ఐయూసీఎన్) కు చెందిన రెడ్_బుక్_ఆఫ్_డాటాలో అంతరించిపోతున్న పక్షులుగా నమోదు చేయబడిన యూరాసియన్ వైగ్విన్, ఫెరుగెని�‍య్స్, షోబెల్లర్ లు కనిపించడం ఈ సంవత్సరపు వార్షిక గణాంకాలలో ప్రధాన అంశంగా నిలుస్తోంది.	इंटरनेशनल यूनियन ऑफ कन्सर्वेषन ऑफ नेचर् (ऐयूसीएन्) का रेड् बुक् आफ् डाटे में विलुप्त है पक्षियों के रूप में दर्ज किया गया हुआ यूरेशियन् वैग्विन, फेरुगेनिस्स, षोबेल्लर् लु दिखना इस साल सालियाने आँकड़ों में प्रधान अंश के रूप में ठहर रहा है.	3	2	3	2	3	3
55.	తమిళనాడులోని నాగపట్టణం జిల్లాలో గల వేదారణ్యంలోని కొడైకారై బర్డ్ సాంక్చురిని సందర్శించే వలస పక్షుల సంఖ్య ఈ సంవత్సరం తగ్గిపోయింది.	तमिलनाडु के नागापट्टिनम जिले का वेदारण्य के कोडैकारै बर्ड सांच्चूरी को देखनेवाला प्रवास पक्षियों की संख्या इस साल घट गया है.	2	2	2	3	3	4
56.	బంగాళాఖాతం సముద్ర తీరానికి ఆనుకొని ఉండే ఈ సాంక్చురి ఆర్కిటికా మరియు అంటార్కిటికా, రష్యా మరియు ఐరోపా నుంచి వలస వచ్చే పక్షులకు ప్రీతిపాత్రమైన గమ్యస్థానంగా పేరుగాంచింది.	बंगाल की खाड़ी समुद्र तीर को सट कर रहने वाला इस सांच्चूरी आर्किटक और अंटार्किटिका, रूस और यूरोप से प्रवास आनेवाला पक्षियों को प्रीतिपात्र लक्ष्य स्थल के रूप में विख्यात है.	2	3	3	3	3	3
57.	ప్రపంచానికి మరోవైపున ఉష్ణోగ్రతలు తగ్గుముఖం పట్టడంతో అరుదైన పక్షులు ఇక్కడకు వలస వస్తుంటాయి.	दुनिया को दूसरी तरफ तापमान कम होने से दुर्लभ पक्षी यहाँ प्रवास आते रहियेगा.	3	2	3	3	3	4
58.	అయితే, తమిళనాడులో నైరుఋతి ఋుఋతుపవనాలు కొనసాగుతుండటంతో వలస పక్షుల సంఖ్య తగ్గిపోయిందని బర్డ్ సాంక్చురి రీసెర్చి ఆర్గనైజేషన్ తెలిపింది.	तो, तमिलनाडु में नैऋ्उति ऋउतुपवने चलने से प्रवास पक्षियों की संख्या घट गया इस तरह से बर्ड सांच्चूरी रीसर्च आर्गनैजेषन बतलाया है.	3	2	2	3	3	3
59.	కేంద్ర ప్రభుత్వ సహకారంతో సాంక్చురిలో పరిశోధన కేంద్రాన్ని నెలకొల్పే ప్రతిపాదనను కేంద్రానికి అందించినట్లు విశ్వసనీయ వర్గాల సమాచారం.	केंद्र सरकार सहयोग से सांच्चूरी में अनुसन्धान केंद्र को स्थापित करने वाला प्रस्ताव को केंद्र को पहुँचाया है जैसा विश्वसनीयते वर्गो का समाचार है.	2	3	3	2	3	3
60.	కేంద్ర ప్రభుత్వ ఏజెన్సీలు వెలువరించిన నివేదికలను అనుసరించి	केंद्र सरकार एजेन्सियाँ प्रकाशित किया हुआ विवरणिकों को अनुसरण कर के	2	3	2	3	3	3

	రాష్ట్రంలో పులుల సంఖ్య తగ్గుముఖం పట్టడం పట్ల మధ్యప్రదేశ్ అటవీశాఖ మంత్రి కున్వర్ విజయ్ షా ఆందోళన వ్యక్త చేశారు.	राज्य में बाघों की संख्या कम हो अडं पट्ल मध्यप्रदेश वनविभाग मंत्री कुन्वर विजय षा चिंता व्यक्त किये हैं.						
61.	పులుల పరిరక్షణకు అవసరమైన కార్యాచరణ ప్రణాళికను త్వరలో రూపొందిస్తామని మంత్రి మీడియాతో అన్నారు.	बाघों की महफूजता को जरूरत कार्य योजना को जल्दी रूपायित करते हैं कह के मंत्री मीडिये के साथ बोलीं हैं.	2	2	2	3	3	3
62.	అదే సమయంలో రాష్ట్రంలో జింకలు, నెమళ్ళు మరియు ఇతర వన్యప్రాణుల సంఖ్య గణనీయంగా పెరిగిందని తెలిపారు.	उसने ही समय को राज्य में सॉभर, मोर और अन्य वन्य-प्राणियों की संख्या महत्वपूर्ण से बढ़ी कि बतलाया है.	2	3	3	3	3	4
63.	రాష్ట్ర రాజధానిలో సోమవారం జరిగే సమీక్షా సమావేశంలో ప్రణాళిక విధివిధానాలకు రూపకల్పన చేస్తామని తెలిపారు.	राज्य राजधानी में सोमवार घटित होनेवाला समीक्षा बैठक में योजना विधिविधानों को कृति करते हैं कह के बतलाये हैं.	3	2	2	3	3	4
64.	వన్యప్రాణుల సంరక్షణ నిమిత్తం అటవీ రక్షకులకు తగు మార్గదర్శకాలను అందిస్తామని కున్వర్ విజయ్ షా వెల్లడించారు.	वन्य-प्राणियों का संरक्षण निमित जंगल रक्षकों को योग्य हो मार्गदर्शकों को पहुँचाते हैं कह के कुन्वर विजय षा प्रकट किये हैं.	2	2	2	3	3	3
65.	జాతీయ పక్షిగా వాసికెక్కిన నెమలి సంరక్షణార్థం అడవులలో అవసరమైన ఆహారధాన్యాలు మరియు నీటి లభ్యతపై తమ శాఖ తగు చర్యలు తీసుకుంటున్నదని తెలిపారు.	जातीय पक्षी के रूप में प्रसिद्ध है मोर ने संरक्षणार्थ जंगलों में जरूरतों आहारधान्य और पानी के लभ्यते पे आपकी शाखा योग्य हो कार्यवाही कर तुन्न अदि अनि बतलाया है.	3	3	3	3	3	3
66.	రాష్ట్రంలో అటవీప్రాంత విస్తీర్ణం పెరుగుదల యొక్క ప్రాధాన్యతను ప్రజలకు తెలియజేసే ప్రచార కార్యక్రమాన్ని త్వరలో ప్రారంభిస్తామని మంత్రి వెల్లడించారు.	राज्य में वन्यप्रांत विस्तीर्ण उत्कर्ष की महत्व को जनता को बतलानेवाला प्रचार कार्यक्रम को जल्दी शुरूवात करते हैं कह के मंत्री प्रकट किये हैं.	2	3	2	3	4	3
67.	తగ్గిపోతున్న అటవీ ప్రాంత విస్తీర్ణం, నానాటికి పెరిగిపోతున్న మానవ జనాభాతో పర్యావరణ సమతుల్యత దెబ్బతినడంతో పాటు గ్రామీణ ప్రాంతాలలో ఇంధన కొరత తలెత్తుతున్నదని ఆందోళన వ్యక్త చేశారు.	घट रहा जंगल प्रांत विस्तीर्ण, दिन ब दिन बढ़ रहा मानवीयता आबादी के साथ पर्यावरण संतुलन नष्ट होने के साथ साथ ग्रामीण प्रांत में ईंधन कमी उभर रहा है इस तरह से चिंता व्यक्त किये हैं.	3	2	3	3	4	3

68.	అంతరించిపోతున్న గద్దలను కాపాడుకునేందుకు త్రిపుర ప్రభుత్వం యుద్ధ ప్రాతిపదికన చర్యలు చేపడుతున్నది.	विलुप्त है चीलों को बचा लेने के कारण त्रिपुरा सरकार युद्ध स्तर से कार्य अपनानेवाला.	2	2	2	3	3	3
69.	ఆర్నిథాలజిస్టుల నివేదికను అనుసరించి త్రిపుర వన్యప్రాణి సంరక్షణ సమితి కొత్త ప్రాజెక్టుకు శ్రీకారం చుడుతున్నది.	आर्निथालजिस्टों के विवरणिक को अनुसरण कर के त्रिपुरा वन्य-प्राणी संरक्षण समिति नयी प्रोजेक्ट को श्रीगणेश करनेवाला.	3	2	2	3	3	3
70.	అంతేకాక గద్దలను కాపాడుకునేందుకు గాను ఇంగ్లాండ్ కేంద్రంగా గల రాయల్ సొసైటీ ఫర్ ప్రిజర్వేషన్ ఆఫ్ బర్డ్స్ (ఆర్ ఎస్ పీ బీ) సహాయాన్ని అటవీశాఖ కోరింది.	उतना ही नहीं चीलों को बचा लेने के लिए इंग्लांड केंद्र के रूप में रह या हुआ रायल सोसैटी फर प्रिजर्वेषन ऑफ बईस् (आरु अ वलयु ए पक्षलो श् पी बी) सहायता को वनविभाग माँगा है.	2	2	2	3	3	3

APPENDIX-III

Evaluation of Hindi – Telugu Machine Translation

S No	Input	Output	Open			Blind		
1.	आंध्र प्रदेश भारत का एक प्रान्त है ।	AMXrapraxeS BArawaxeSapu oVka prAMwaM.	4	4	4	4	4	4
2.	इसकी राजधानी हैदराबाद है ।	xIni rAjaXAni hExarAbAxu.	4	4	4	4	4	4
3.	यह भारत के दक्षिण-पूर्व भाग में स्थित है ।	ixi BArawaxeSapu ISAnya BAgaMlo neVlakoVni uMxi.	4	3	3	3	4	3
4.	अरुणाचल प्रदेश का मौसम उन्नयन के साथ बदलता है।	aruNAcala praxeSa vAwAvaraNaM eVwwarawo mAruwuMxi.	3	2	3	2	3	3
5.	अधिकतर अरुणाचलिय 20 बड़े जनजातियों और 82 उप-जनजातियों केसदस्य हैं।	cAlAvarku aruNAcaliyalu 20 peVxxa weVgala mariyu 82 upA – wevgala kesaxasyalu unnAyi.	3	3	2	3	2	3
6.	असम अन्य उत्तर पूर्वी भारतीय राज्यों से घिरा हुआ है ।	assAM iwara uwwara wUrpu BArawIya rAjyAlaniMci cuttumuttabaddAyi .	3	2	3	3	2	2
7.	भारत - भूटान तथा भारत - बांग्लादेश सरहद कुछ हिस्सों में असम से जुडी है ।	BArawaxeSaM – ButAnu mariyu BArawaxeSaM – baMglAxeSyapu sarihaxxu koVnni BAgAlalo assAMniMci kalisiMxi.	3	3	2	3	3	3
8.	यह क्षेत्र गंगा तथा उसकी सहायक नदियों के मैदानों में बसा है ।	xIni kRewraM gaMga mariyu xAni sahAyaka naxula mexAnAlalo uMxi.	3	3	3	3	3	3
9.	भारत एक ऐसा शहर है जो दो राज्यों की राजधानी है: पंजाब और हरियाणा ।	BArawaxeSapu ovka eVlaMti pattaNaM aMte avi reMdu rAjyAla rAjaXAni: paMjab mariyu haryAnA.	2	2	2	3	3	2
10.	चंडीगढ़ को इसके उच्य स्तरीय जीवन के लिया जाना जाता है ।	caMdIgaDki xIni ucya swariya jIvanaMkosaM weVlipiMxi.	2	2	2	3	2	2
11.	छत्तीसगढ़ साहित्यिक परम्परा के परिप्रेक्ष्य में अति समृद्ध	CawwIs gaD sAhiwya paraMpara xqRtilo awi samqxxa	3	3	2	2	4	4

	प्रदेश है।	praxeSaM.						
12.	दादरा और नगर हवेली भारत का एक केंद्रशासित प्रदेश हैं ।	xAxara mariyu nAgara haveli BArawaxeSapu oVka keMxrapAliwa praxeSaM.	3	3	3	3	4	4
13.	औपचारिक रूप से नई दिल्ली भारत की राजधानी है।	lAMCanaprAya rUpeNA koVwwa DillI BArawaxeSapu rAjaXAni.	3	2	2	4	3	3
14.	यहां बोली जाने वाली मुख्य भाषायें है: हिन्दी, उर्दू, पंजाबी, और अंग्रेज़ी।	Ikkada mAtlAda bade muKya BARalu: hiMxI, urxU, paMjAbI, mariyu AMglaM.	3	3	3	4	4	3
15.	झारखंड क्षेत्र विभिन्न भाषाओं, संस्कृतियों एवं धर्मों का संगम क्षेत्र कहा जा सकता है।	JArKaMd kRewraM viBinna BARalu, saMskqwula mariyu XarmAla saMgamAnni kRewraMgA ceVppavaccu.	4	4	4	4	4	4
16.	मध्य प्रदेश 1 नवंबर, २००० तक क्षेत्रफल के आधार पर भारत का सबसे बडा राज्य था।	maXyapraxeS 1 navaMbaru, 2000 xAka vESAlyapu AXAraMpEna BArawaxeSapu annitikaMte peVxxa rAjyaM.	2	2	3	3	2	3
17.	ताजमहल के बगीचों के पास 16 वीं सदी का महत्त्वपूर्ण मुगल स्मारक आगरा का लाल किला स्थित है।	wAjamahaluyoVkka wotalaxaggara 16va SawAbxapu mahawwvapUrNa moVgalu smArakaM AgrAyoVkka eVrrakota neVlakoVni uMxi.	3	2	3	4	3	3
18.	ये 34 मठ और मंदिर औरंगाबाद के निकट ही 2 कि मी के क्षेत्र में फैले हैं।	I 34 maTaM mariyu maMxiraM OraMgAbAxki xaggare 2 ki. mIla kRewraMlo vyApiMcAyi.	2	2	3	2	3	2
19.	तीन भव्य चोल मंदिर दक्षिण भारत में चोल साम्राज्य और तमिल सभ्यता के स्थापत्य के विकास के असाधारण और सबसे उत्कृष्ट प्रमाण हैं।	mUdu BavyamEna colYa gudulu BArawaxeSaMlo colYa sAmrAjyaM mariyu wamilYa saByawa sWApawyaM vikAsapu asAXAraNa mariyu annitikaMte uwkqRta pramANaM.	2	3	2	2	3	3
20.	असम के मध्य में, यह उद्यान उत्तरी भारत का वह अंतिम क्षेत्र है जहाँ अभी इंसान की घुसपैठ नहीं हुई है।	assAM maXyalo, I vanaM uwwara BArawaxeSapu aMwima kRewraM uMxo akkada iMkA maniRiyoVkka coVrabAtu kAlexu.	2	2	2	2	2	2
21.	घने जंगल, घुमावदार सड़कें, ठंडी स्फूर्तिदायक मंद पवन,	xattamEna adavi, malupu rodlu, callani sPUrwixAyaka	2	2	2	2	2	2

	चाँदनी रातें ये सब इस विशाल स्थल की सुंदरता को बढ़ा देते हैं।	maMxra pavanaM, veVnnevla rAwrilYlu I viSAlni sWlapu sOxaryAni peVMcuwAyi.						
22.	हिमालय के ऊपर, ब्यास नदी के किनारे बसे "सिल्वर वैली" सुन्दर है।	himAlayaMmIxa, byAsu naxi oVdduna unna silvar vyAlI suMxaramEnaxi.	2	2	2	2	3	2
23.	भारत-तिब्बत सीमा पर बसे लहौल एवं स्पिति घाटी ६५०० मीटर ऊँचाई पर स्थित है।	BArawaxeSaM – wibbawa sarihaxxupEna unna lahOla mariyu spiwi loya 6500 mItarla eVwwupEna neVlakoVni uMxi.	3	2	3	4	3	4
24.	विश्व के उत्तर में उत्तरी ध्रुव से लेकर भूमध्य रेखा तक फैला एशिया विश्व का सबसे बड़ा महाद्वीप है।	viSvapu uwwarAna uwwara XruvaMnuMci BUmaXya reKa xAka vyApiMcina AsiyA viSvapu annitikaMte peVxxa mahAxvIpaM.	3	3	3	4	3	4
25.	इसके निवासियों, रहन-सहन, भूगोल तथा पर्यावरण आदि सभी क्षेत्रों में बहुत विभिन्नताएँ पाई जाती है।	xIni nivAsulu, jIvana – viXAnaM, BUgolYaM mariyu paryAvaraNaM moVxalEna annI kRewrAlalo cAlA vEviXyAlu xoVrukuwAyi.	2	3	2	3	3	2
26.	तंजानिया विश्व का एक खुबसूरत पर्यटन स्थल बन कर उभर रहा है।	tAMjAniyA viSvapu oVka suMxaramEna paryatana sWalaM wayAravuwoMxi..	2	2	2	2	2	2
27.	भीलवाडा पर्यटन दर्शन में आपका स्वागत है।	BilvAdA paryatana xarSanaMlo mIku svAgawaM.	2	3	3	4	3	4
28.	नक्सली गतिविधियों के कारण सूबे के अधिकतर पर्यटन स्थल उपेक्षित हो कर रह गए हैं।	Naksalu kAryakalApAla kAraNaMgA sUbayoVkka cAlA varaku paryatanala sWlAlu upekRiMca badi uMdi poyAyi.	2	2	3	2	3	3
29.	यह शिमला के उत्तर में १० कि.मी. दूर पर ७,०४७ फुट ऊंचाई पर है।	Ixi simlAyoVkka uwwarAna 10ki.lu mI. xUraMpEna uMxi.	3	3	2	3	3	3
30.	यह शिमला से ८.६०२ फुट ऊँचाई पर, १७ कि.मी. दूर है।	Ixi simlAniMci 8.602 adugula eVwwupEna, 17 kI.lu mI. xUraMppEna uMxi.	3	3	3	3	4	3
31.	इसका निर्माण पटियाला के महाराजा ने किया।	xIni nirmANaM patiyAlA maharaja cesAdu.	2	2	2	2	2	2
32.	अन्य पहाड़ी प्रदेशों से भिन्न शिमला अत्यंत सुन्दर पहाड़ी	Iwara koVMda praxeSAlaniMci BinnamEna simlA cAlA	2	2	2	2	3	2

	प्रदेश हैं।	suMxaramEna koVMda praxeSaM.						
33.	यह कांग्रा घाटी के ऊपर धौलधर श्रृंखला के आगे है।	I kAMgrA loyamIxa XOlaXara SqMKalAniki muMxu uMxi.	2	3	2	3	2	3
34.	यहाँ ब्रिटिश शैली के भवन तथा कम ऊँचाईवाले छत हैं।	Ikkada britiR SEli BavanaM mariyu wakkuva eVwweV pEkappu uMXi.	2	2	2	2	2	2
35.	इसके चारों ओर हिम आच्छादित शिखर है।	xIni nAluguvEpulA himaMwo kappabadina SiKarAlu unnAyi.	4	4	4	4	4	4
36.	भारत-तिब्बत सीमा पर बसे लहौल एवं स्पिति घाटी ६५०० मीटर ऊँचाई पर स्थित है।	BArawaxeSaM – wibbawa sarihaxxupEna unna lahOla mariyu spiwi loya 6500 mItalru eVwwupEna neVlakoVni uMxi.	3	3	2	3	3	4
37.	यहाँ के शिवालिक श्रृंखला, धौलाधर, पिर पंजाल तथा जनस्कर अत्यंत सुन्दर दृश्य प्रदान करती है।	Ikkadi SivAlik SqMKalaM, XOlAXara, pira paMjAla mariyu janaskara cAlA suMxaramEna xqSyAnni praxAnaM ceswuMxi.	2	2	2	2	2	2
38.	चिकमंगलूर शहर की पश्चिम की ओर है।	cikamaMgulUru pattaNapu padamaravepu uMxi.	3	3	4	4	4	4
39.	पक्षियों का कलरव और भ्रमरों का गुंजन सुनते सुनते जग जाँए।	pakRula kilakilArAvAlu mariyu BramarAla GUMkArAnni viMtU viMtU melkoVMtAru	3	3	2	3	2	4
40.	स्वच्छ हवा और बहार का आनंद लीजिए।	svacCamEna gAli mariyu paruvapu AnaMxAni poVMxaMdi.	3	3	3	4	3	3
41.	वन्य पशु और वनवासियों के बीच में एक भ्रमण कर लीजिये।	Adavi jamwuvulu mariyu vanavAsula maxyalo oVka cuttu wiragaMdi.	2	3	2	3	2	3
42.	ऐसे कई स्थान है जहाँ अब तक पर्यटकों का जाना नहीं हुआ।	ilA eVnno sWnAlu akkada ippati varaku paryAtakulu povadAniki kuxaranivi unnAyi.	2	2	2	2	2	2
43.	चिकमंगलूर जिले का तरीकेरी तालुका एक चित्रमय छोटा सा गाँव है जिसे के आर पहाड़ी के नाम से भी जाना जाता है।	cikamaMgulUru jillAyoVkka warIkeri wAlUkAki oVka ciwramaya cinna palleV uMxe ixi Ar koVMdayoVkka	2	2	2	2	2	2

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		peruwo kUdA weVliyabaduwuMxi.						
44.	बंगलूर के 60 किलो मीटर पश्चिम की ओर स्थित नंदी पहाड़ी ग्रीष्म निवास-स्थल है।	beVMgalYUriyoVkka 60 kilo mItarla padamaravEpu neVlakoVni unna naMxi koVMda grIRma nivAsa – sWalaM.	2	2	2	3	3	2
45.	यह नंदी दुर्ग के नाम से भी जाना जाता है।	Ixi naMxi xirgaMyoVkka peruwo kUdA pilavabaduwuMxi.	3	3	3	3	3	3
46.	बंगलूर वासियों के लिए सप्तांल छुट्टी का बहुत ही आदर्श फाटक है।-------??	beVMgalYUru vAsulakosaM vArAMwapu seVlavu cAlA AxaraNIya praveSa sWAnaM.	2	2	2	2	3	3
47. 48.	इसे एक झरने को घेरकर निर्माण किया गया है तथा जंगली पहाड़ों से घेरे हुए है।	xInni oVka jalapAwAnni cuduwU nirmANaM ceyadamegAka adavi koVMdalawo cuttumuttabadiuMxi.	2	3	2	3	3	3
49.	ऑस्ट्रेलिया महाद्वीप समूह में एक आकर्षक एवं प्रसिद्ध पर्यटक स्थल है।	AstreliyA mahAxvIpaM samUhaMlo oVka AkarRaka mariyu prasixxamEna paryAtaka sWalaM.	3	4	3	4		3
50.	तीन दिशाओं से पहाड़ियों से घिरी डल झील जम्मू-कश्मीर की दूसरी सबसे बड़ी झील है।	mUdu xiSalaniMci koVMdalawo cuttumuttabadina dal sarassu jammU kAsmIruyoVkka reVMdava awi peVxxa sarassu.	4	3	4	4	4	4
51.	डल झील के मुख्य आकर्षण का केन्द्र है यहाँ के हाउसबोट।	Dal sarassu yokka muKya AkarRaNa keMxraM ikkadi hOsbot.	3	2	3	3	3	3
52.	कश्मीर के प्रसिद्ध विश्वविद्यालय झील के तट पर स्थित है।	kASmIruyoVkka prasixxamEna viSvavixyAlayaM sarassuyoVkka wIraMpEna neVlakoVni uMxi.	3	3	3	4	3	4
53.	इन पहाड़ी इलाकों पर यात्रा करने के लिए दस से बारह घंटे लगते हैं।	I koVMda ilAkAlamIxa yAwra ceVyyadaM kosaM paxinuMdi panneVMdu gaMtalu padawAyi.	4	3	3	4	4	4
54.	इस सफर के दौरान पर्यटक यहाँ के प्रसिद्ध जवाहर टनल को निहार सकते हैं।	I yAwra saMxarBaMlo paryAtakudu ikkadi pasixxamEna javAharni taneVlini wilakiMca galaru.	2	2	2	2	2	2
55.	शिकारे के माध्यम से श्रद्धालु इस तीर्थस्थल के दर्शन कर सकते हैं।	vetagAlYla xvArA SraxXAlYuvulu I wIrWasWalapu xarSanaM cesukogalaru.	2	2	2	2	3	2
56.	यहाँ श्रीअरबिंदो और श्रीमाँ की संगमरमर की समाधि बनी हुई	Ikkada SrIarabiMxo mariyu SrImAMpAlarAwiyoVkka	2	3	2	3	3	3

	है।	samAXi wayArEMxi.						
57.	एथेंस (ग्रीस) महाद्वीप, सैलानियों को रोमांचित कर देने वाला एक आकर्षक पर्यटक स्थल है।	eWnsu (grIsu) mahAxvIpaM, paryAtakulani romAMciwamxigA cesetatuvaMti oVka AkarRaka paryAtaka sWalaM.	2	3	3	3	4	3
58.	प्राकृतिक सौंदर्य का लुत्फ उठाने के लिए पर्यटक, डेन्यूब नदी के तट पर शिविरों में रात भर कैम्प में रहते हैं।	svABAvika sOMxaryapu AsvAxiMcadaM kosaM paryAtakudu, deVnyUbu naxiyoVkka wIraMpEna SibirAlalo rAwraMwA kyAMpulo uMtAru.	3	2	3	3	3	3
59.	डेन्यूब नदी मछलियों के लिए ही प्रसिद्ध हैं।	deVnyUbu naxi cepalakosame prasixxamEnaxi.	3	4	4	4	4	4
60.	भूटान विश्व के एक अद्भुत देश के नाम से जाना जाता है।	BUtAnu viSvapu oVka axBuwa xeSapu peruwo pilavabaduwuMxi.	2	2	3	3	3	3
61.	मध्यप्रदेश की राजधानी भोपाल से 330 किलोमीटर की दूरी पर स्थित है प्राचीन शहर जबलपुर।	maXyapraxeSyoVkka rAjaXAni BopAluniMci 330 kilomItarla xUrana neVlakoVni uMxi prAcIna pattaNaM jabalpUru.	3	3	4	4	2	
62.	यह शहर पवित्र नर्मदा नदी के तट पर स्थित है।	I pattaNaM paviwra narmaxA naxiyoVkka wIraMpEna neVlakoVni uMxi.	4	4	4	4	4	4
63.	जबलपुर का भौगोलिक क्षेत्र पथरीली, बंजर ज़मीन और पहाड़ों से आच्छादित है।	jabalpUruyoVkka BOgolYika kRewraM rAwi, baMjara BUmi mariyu koVMdalalo AcCAxiwamEnaxi.	2	3	2	3	2	3
64.	जबलपुर से 15 कि.मी. की दूरी पर स्थित रामनगर में गोंद राजाओं का किला स्थित है।	jabalpUruniMci 15 ki. mI.yoVkka xUrana neVlakoVni unna rAmanagarlo goMdu rAjula kota neVlakoVni uMxi.	4	4	3	4	4	4
65.	मध्यप्रदेश के छतरपुर जिले में स्थित खजुराहो के मंदिर जीवन, आनंद और सौंदर्य के प्रतीक हैं।	maXyapraxeSkokka Cawarapura jillAlo neVlakoVniunna gudi jIvanaM, AnaMxaM mariyu sOMxaryAniki prawIka.	3	2	3	4	3	3
66.	खजूर के वृक्षों के आधार पर ही इस जगह का नाम पड़ा खजुराहो।	KarjUrapu vqkRAla AXAraMpEne I sWAnAniki KajurAhogA peru padiMxi.	2	2	2	2	2	2
67.	भारतीय इतिहास की बौद्ध परंपरा के स्वर्ण युग का अमिट दस्तावेज है साँची।	BArawIya cariwra bOxxudi paraMpara yoVkka svarNa	2	3	3	3	3	3

		yugapu ceVragani xaswAveju sAMci.						
68.	साँची स्थित इन स्तूपों का निर्माण प्रायः धार्मिक उद्देश्यों को लेकर किया गया था।	sAMcI neVlakoVni unna I swUpAla nirmANaM prAyaHXArmika uxxeSyAlani wIsukoVni ceSAru.	2	2	2	2	2	2
69.	सर्वाधिक प्रसिद्ध स्तूप क्रमांक एक का निर्माण महान मौर्य शासक अशोक ने करवाया था।	sarvAXika prasixXamEna swUpAnni kramAMkaM moVxati nirmANaM goVppa mOrya SAsakudu aSokunice ceyiMcabadiMxi.	2	2	3	3	2	3
70.	उत्तर प्रदेश के प्रसिद्ध तीर्थस्थल इलाहाबाद के हनुमान मंदिर में भगवान सोई हुई अवस्था में हैं।	uwwarapraxeSuyoVkka prasixxamEna wIrWasWalaM alhAbAxuyoVkka hanumaMwudu gudilo BagavaMwudilA nixriMcu sWiwilo unnAyi.	2	3	3	3	3	3

APPENDIX-IV

Fig: 5.1 nAmavAcakAlu
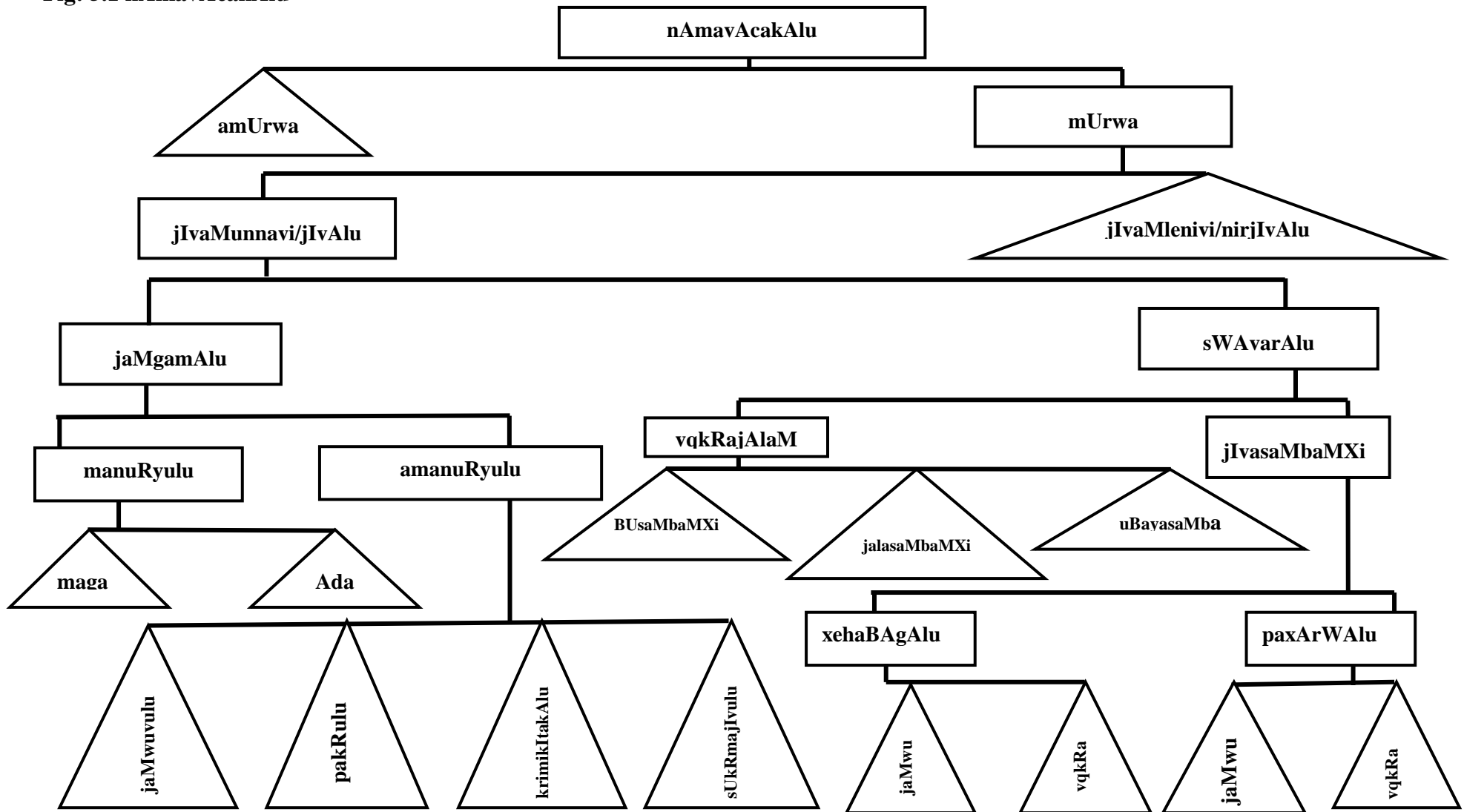
Fig: 5.2 manuRyulu
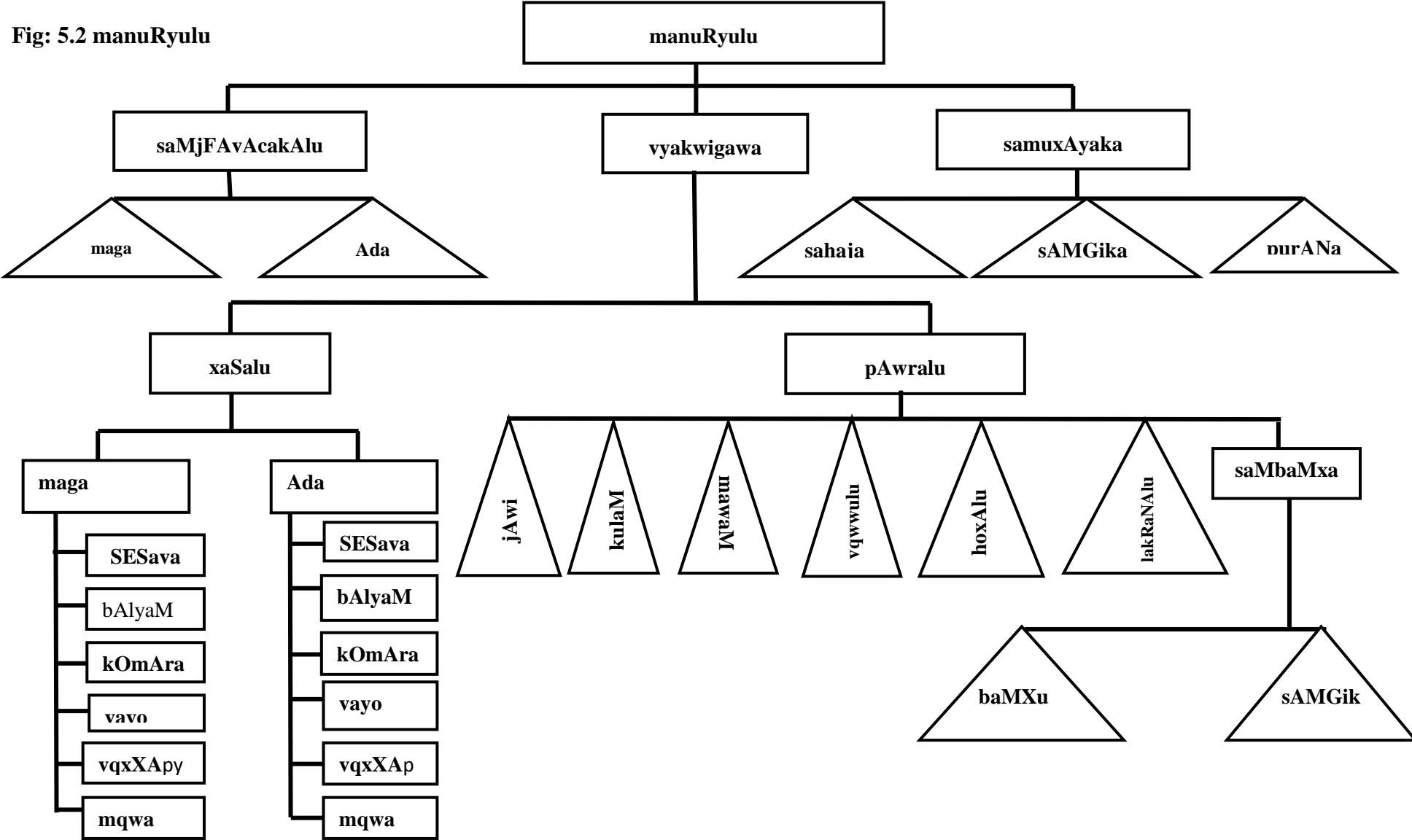
Fig: 5.3 jaMwuvAcakAlu/Animals

284
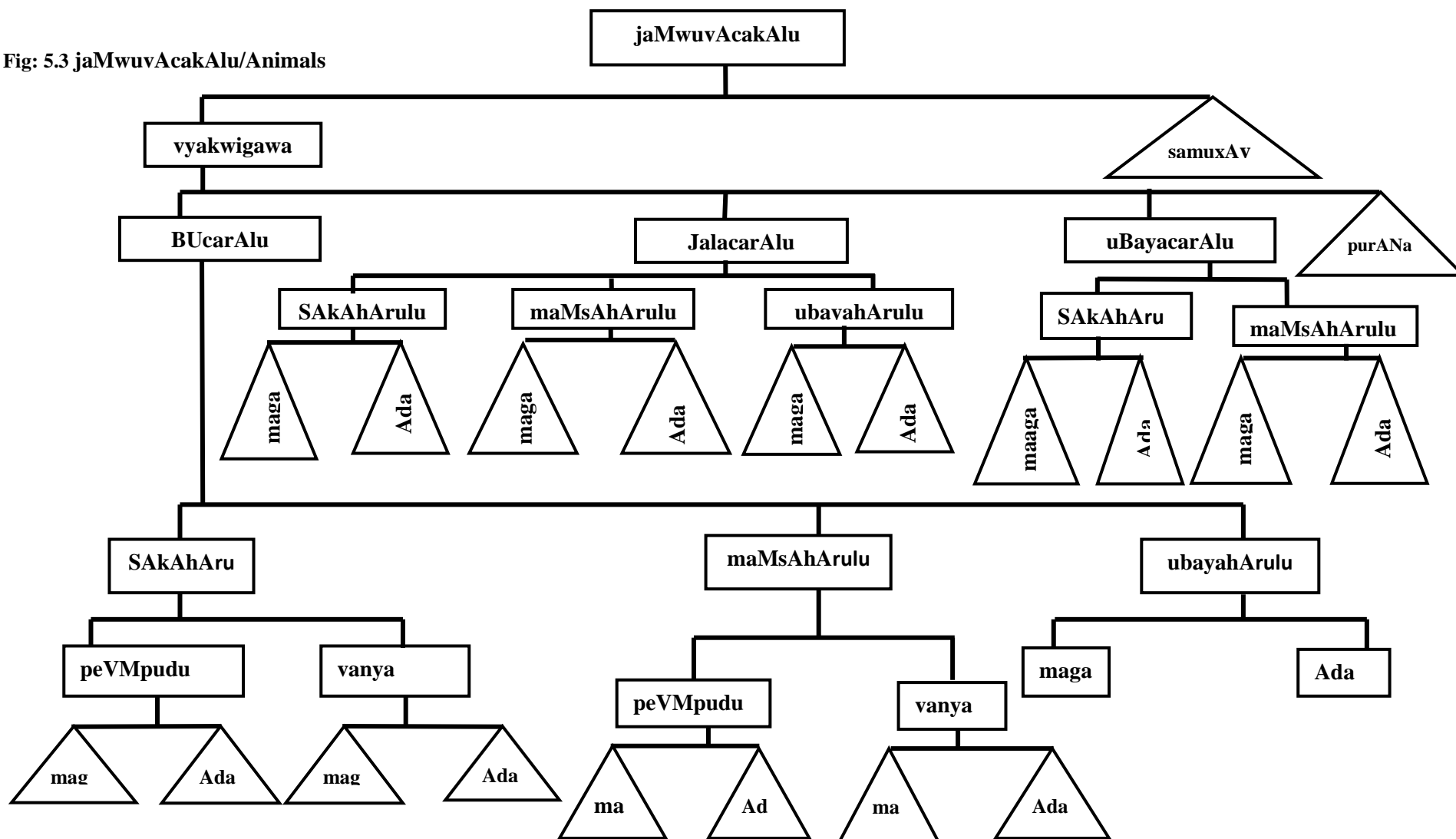
Fig: 5.4 pakRulu
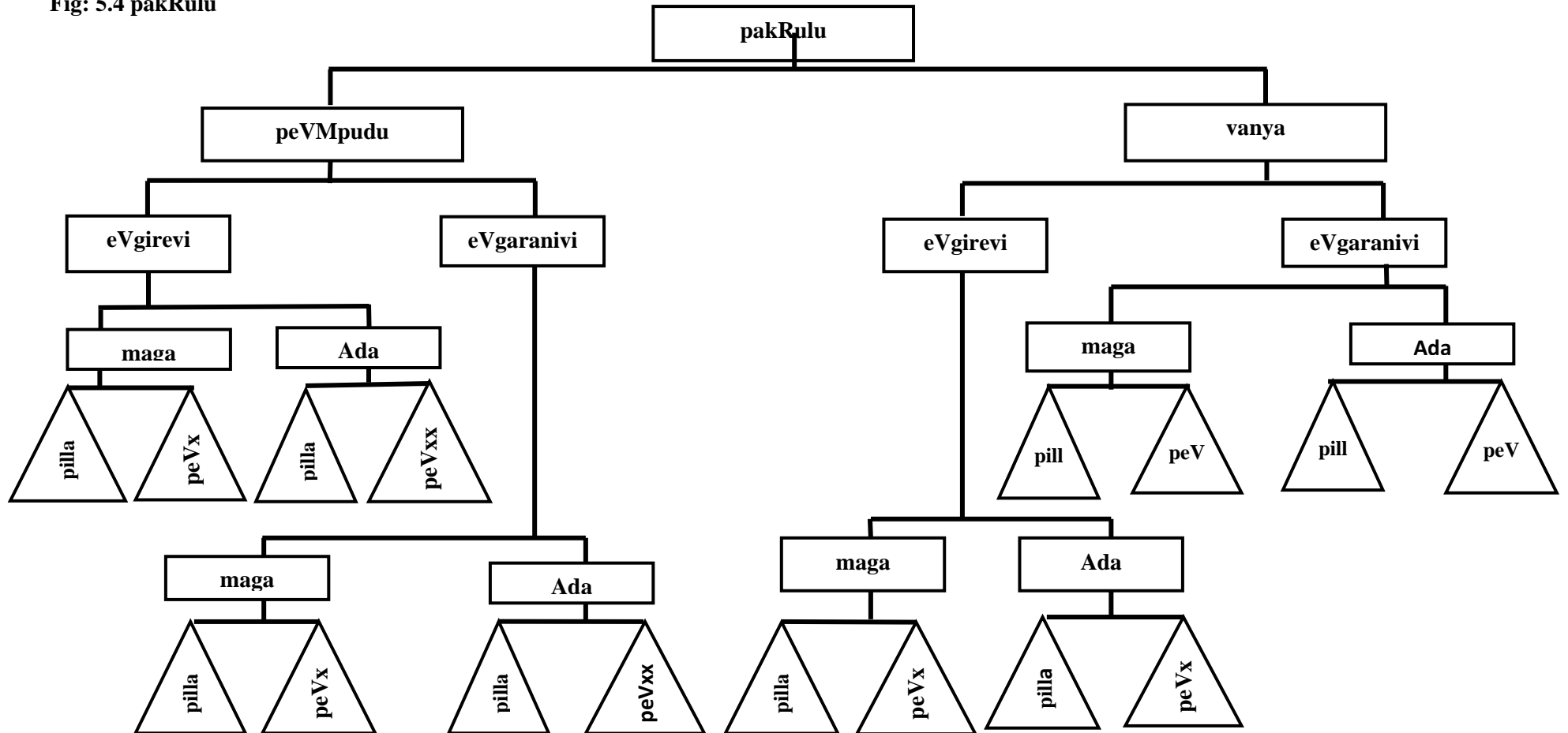
Fig: 5.5 jIvaMunnavi-krimikItakAlu&sUkRmajIvulu

Fig: 5.6 vqkRajAlaM

287
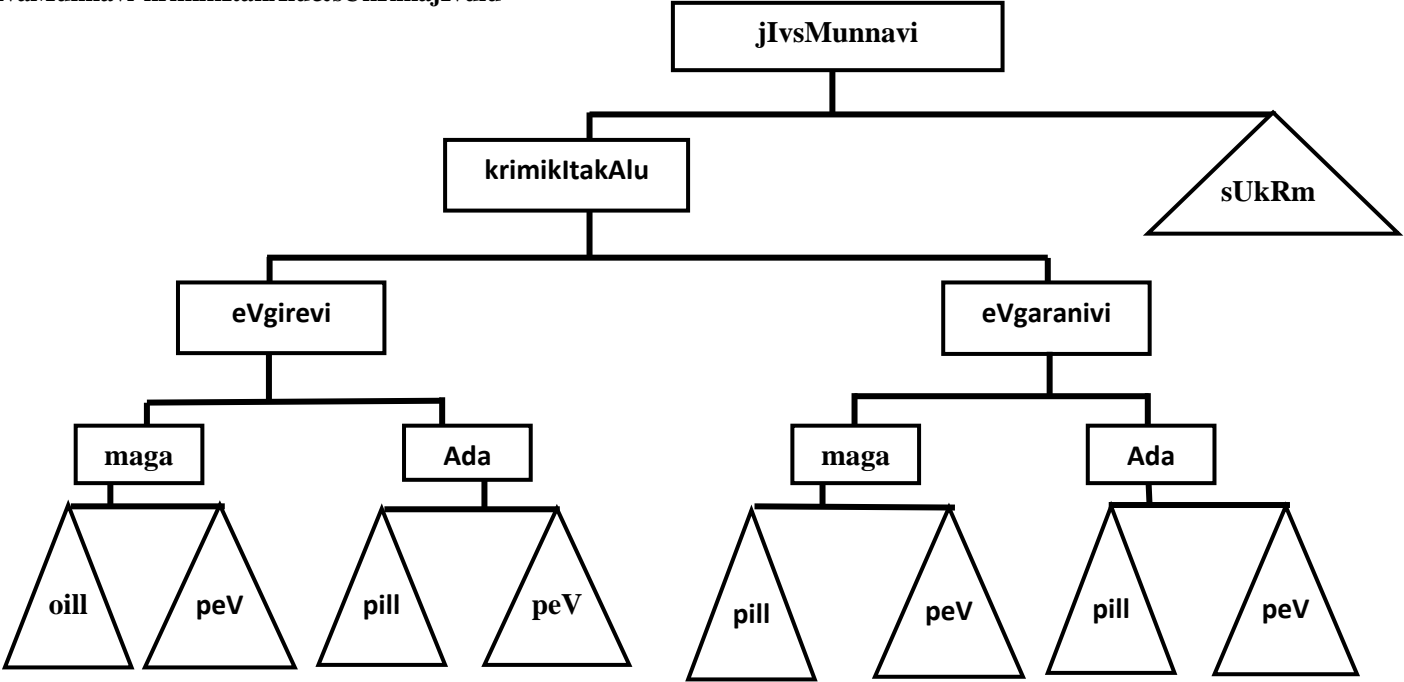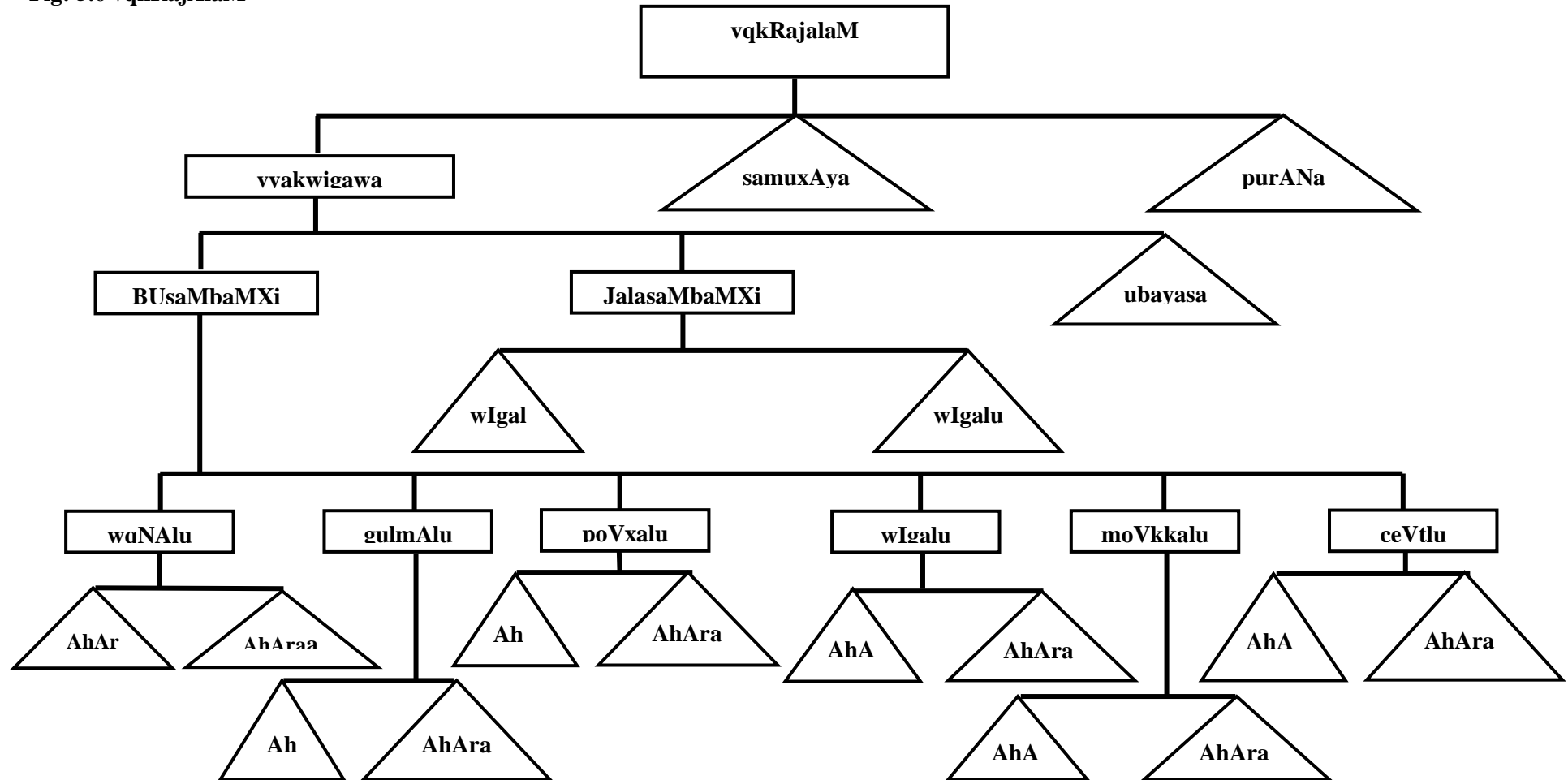
Fig: 5.7 jIvasaMbaMXaBAgAlu
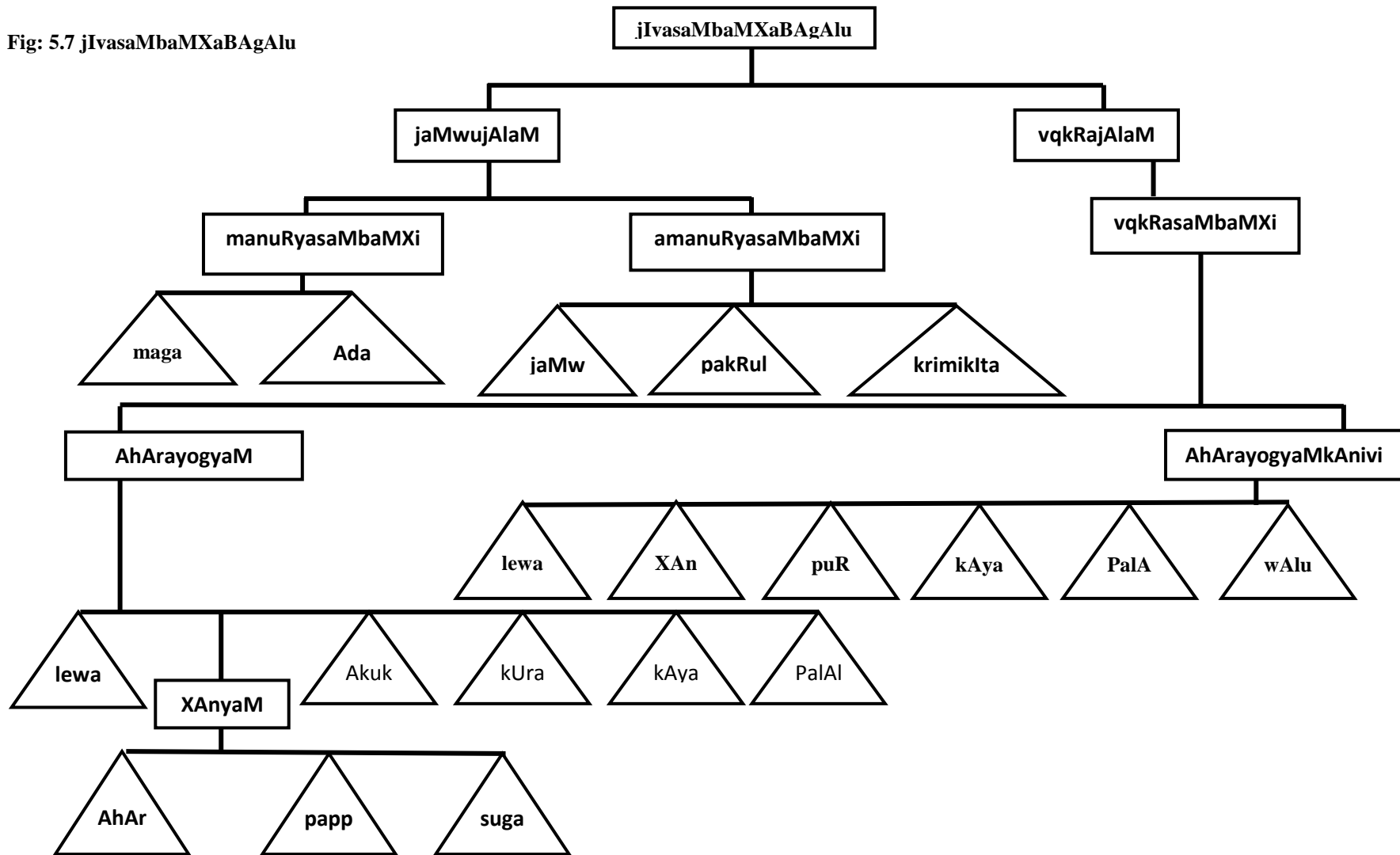
Fig: 5.8 jIvasaMbaMXapaxArWAlu

289
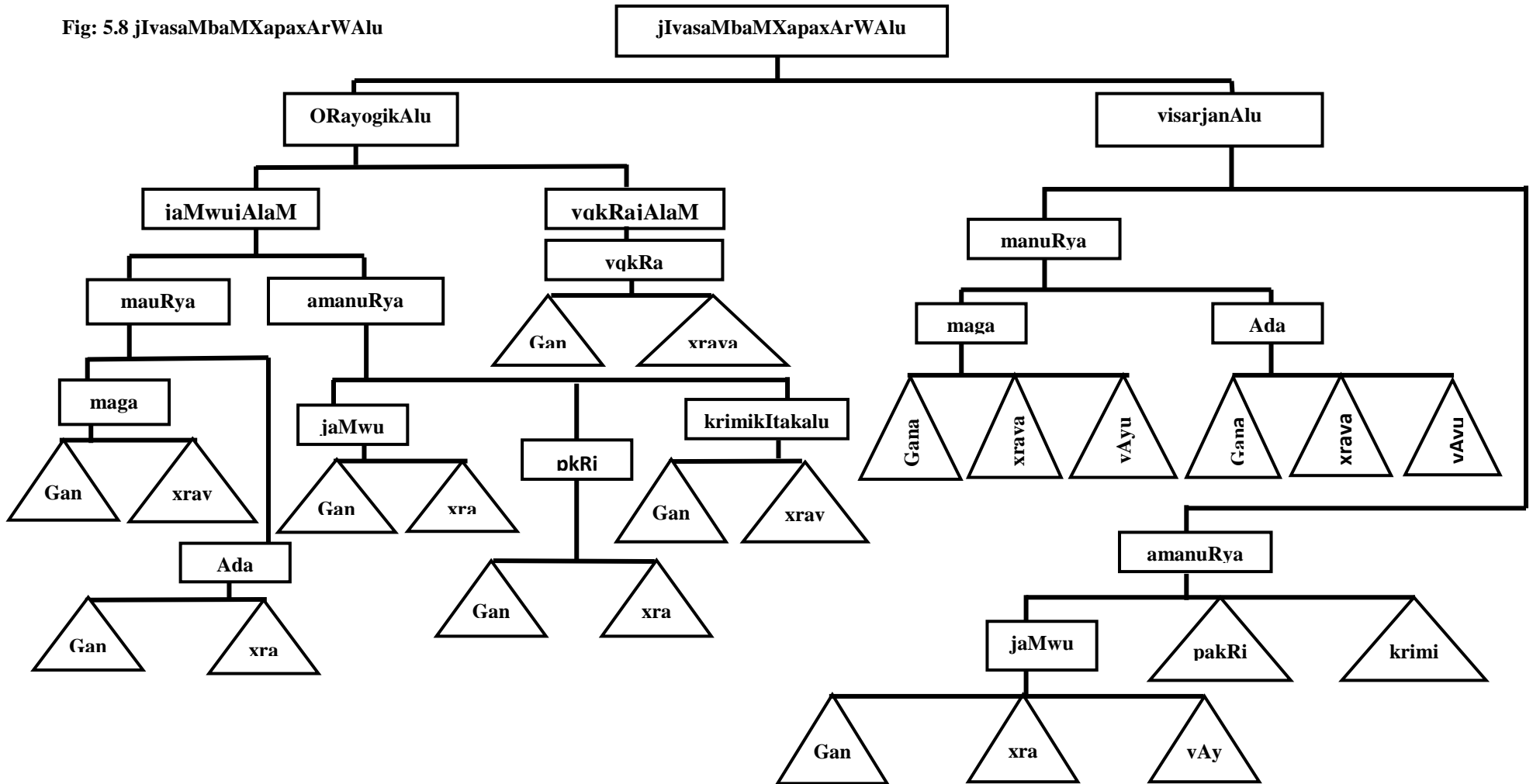
Fig: 5.9 jIvaMlenivi
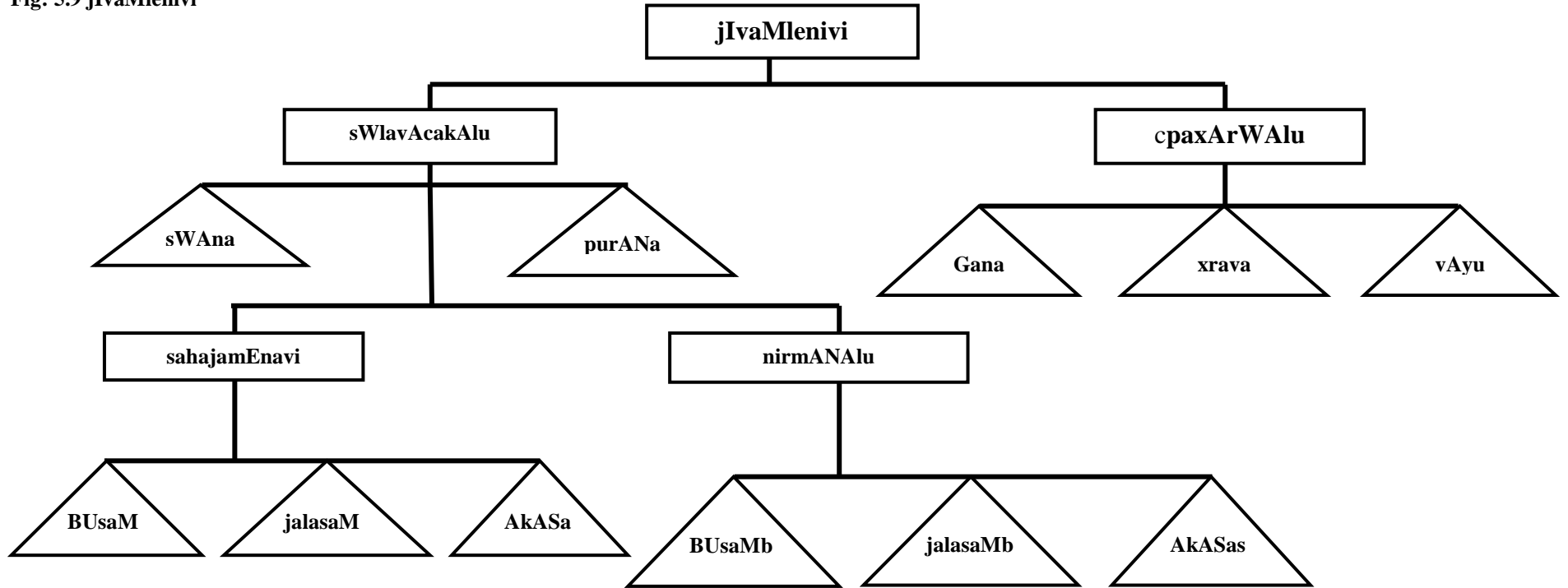
Fig: 5.10 sWalavAcakAlu
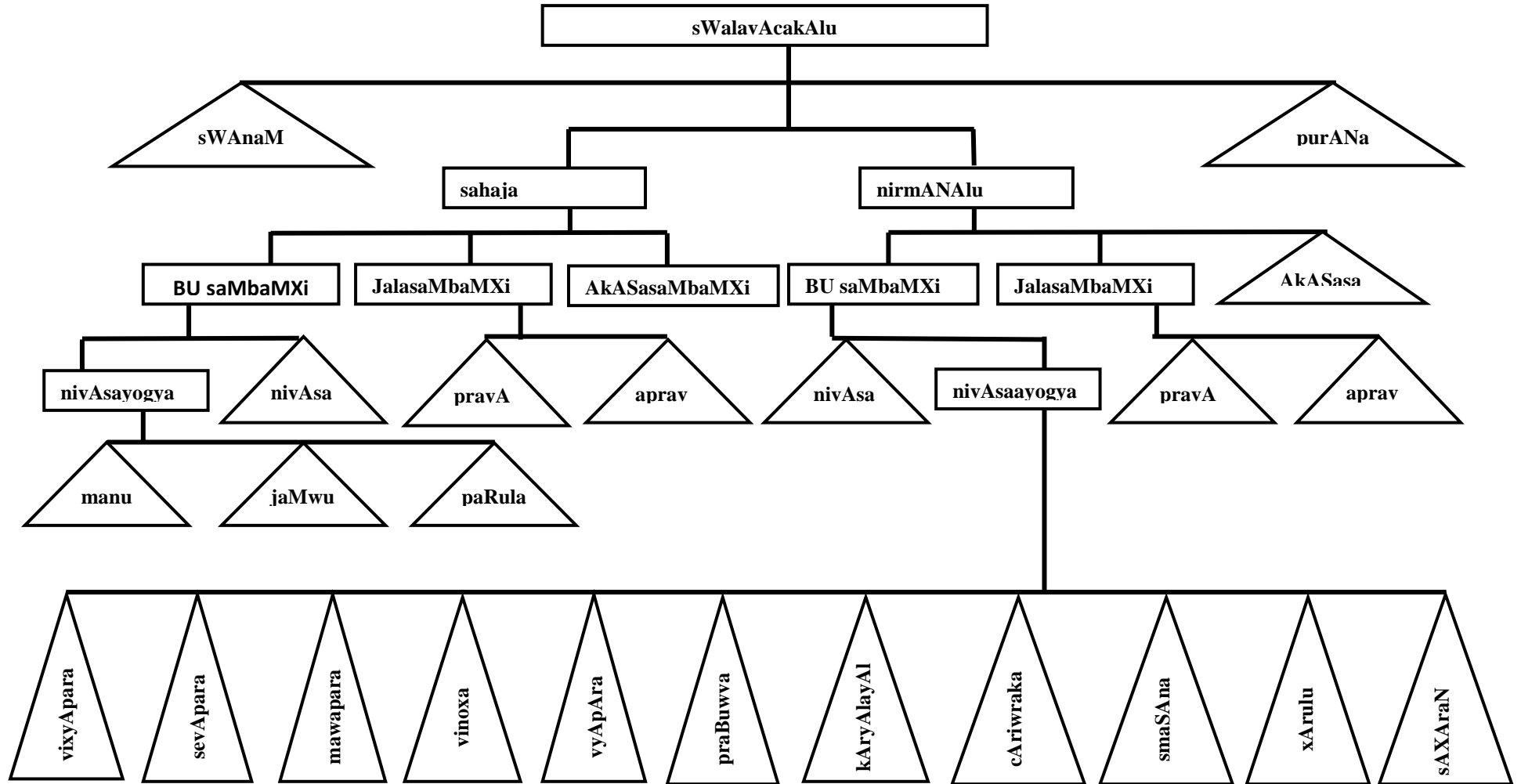
Fig: 5.11 paxArWAlu
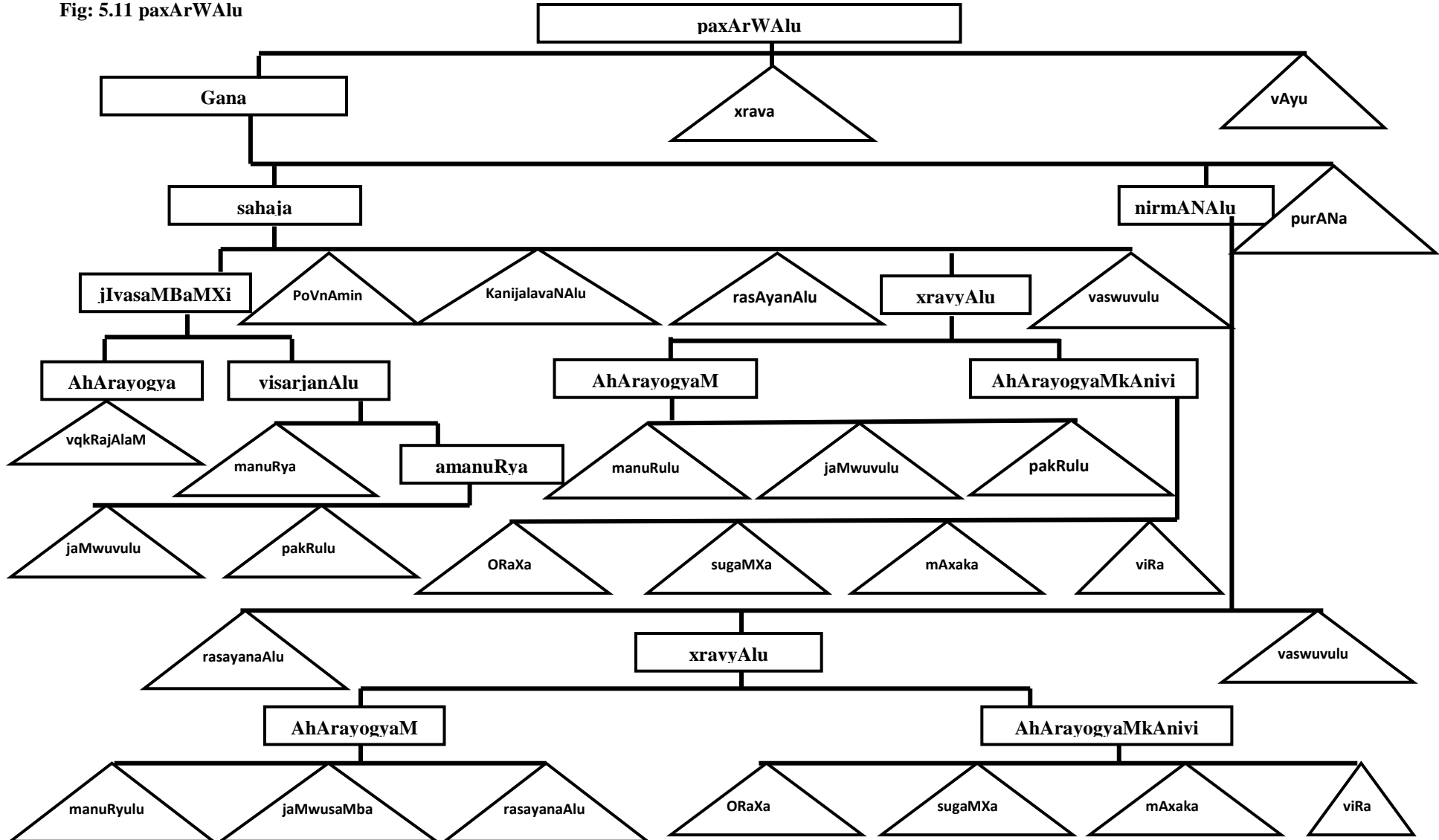
Fig: 5.12 AhArayogyaM
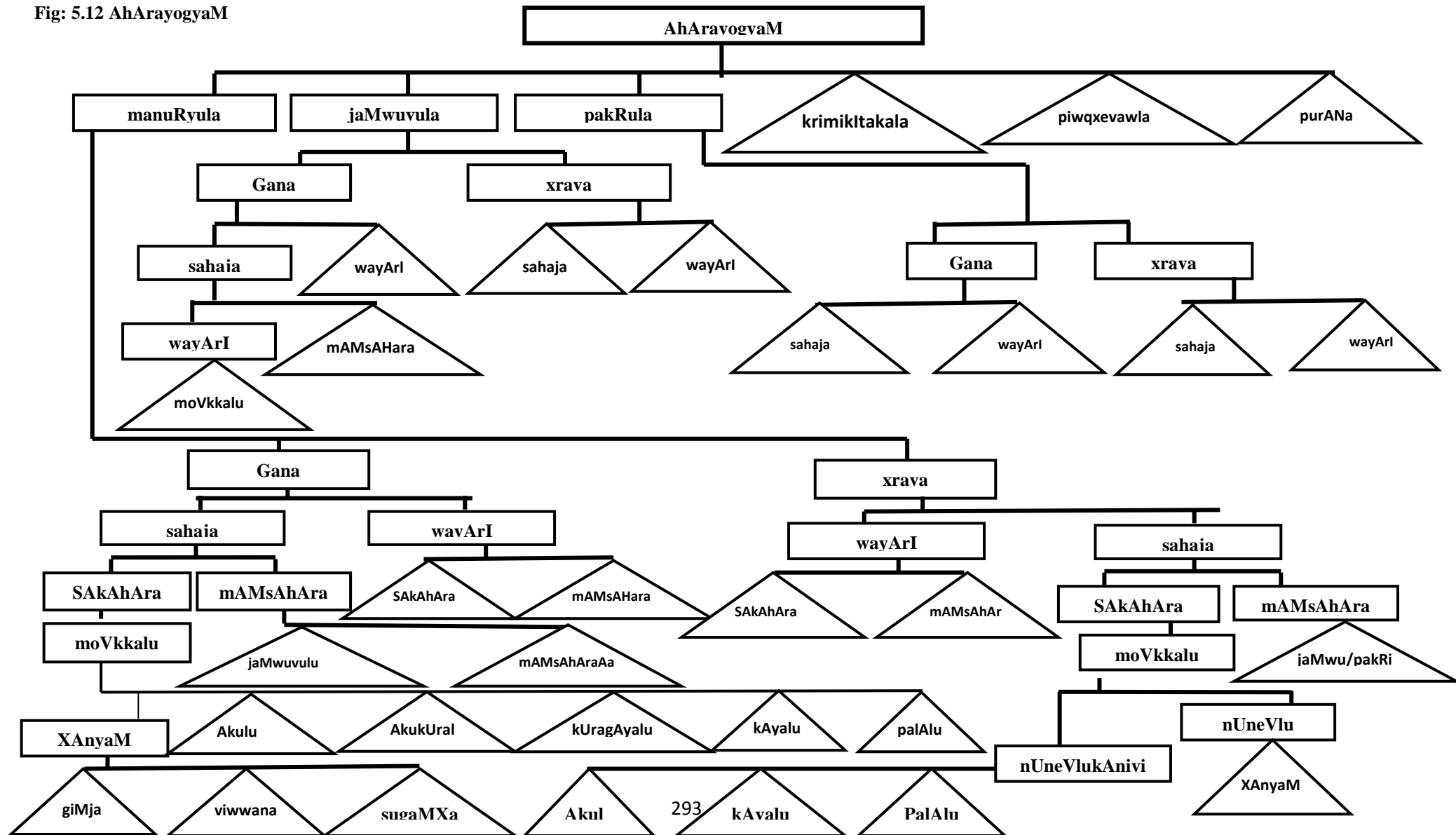
Fig: 5.13 AhArayogyaMkAnivi
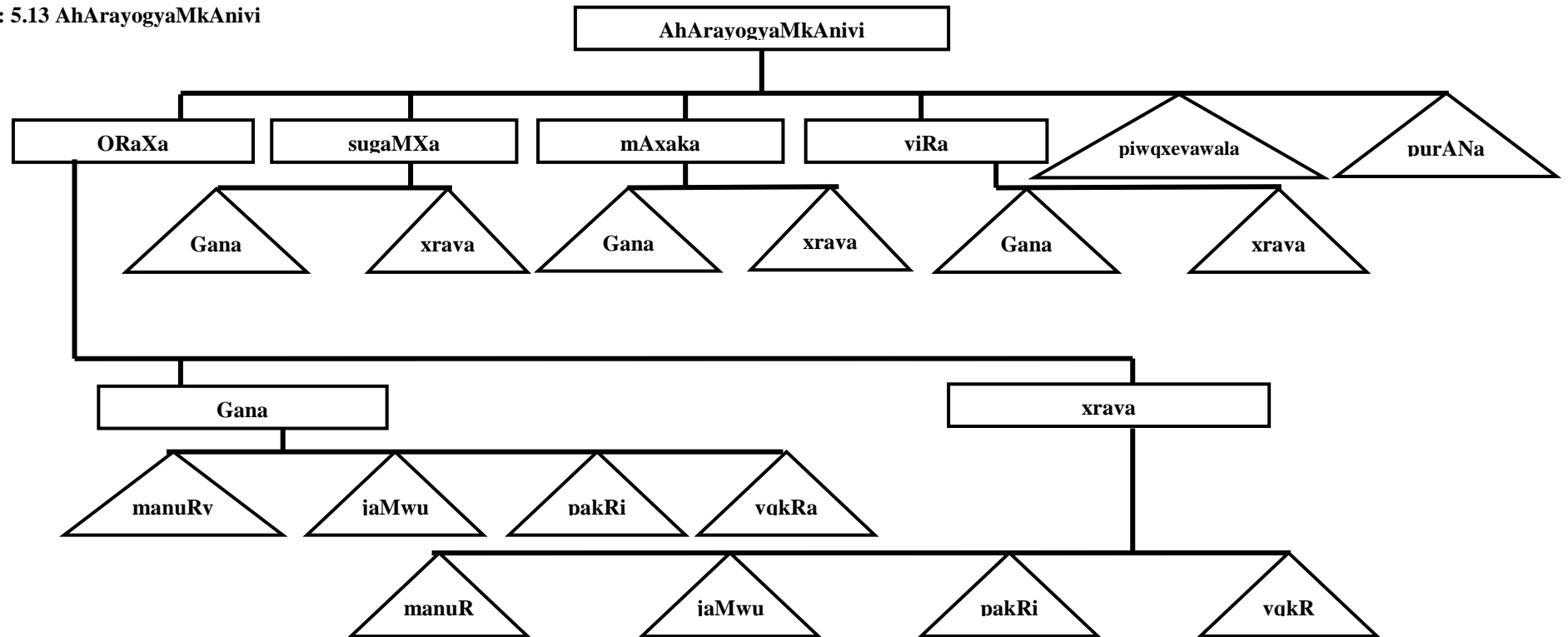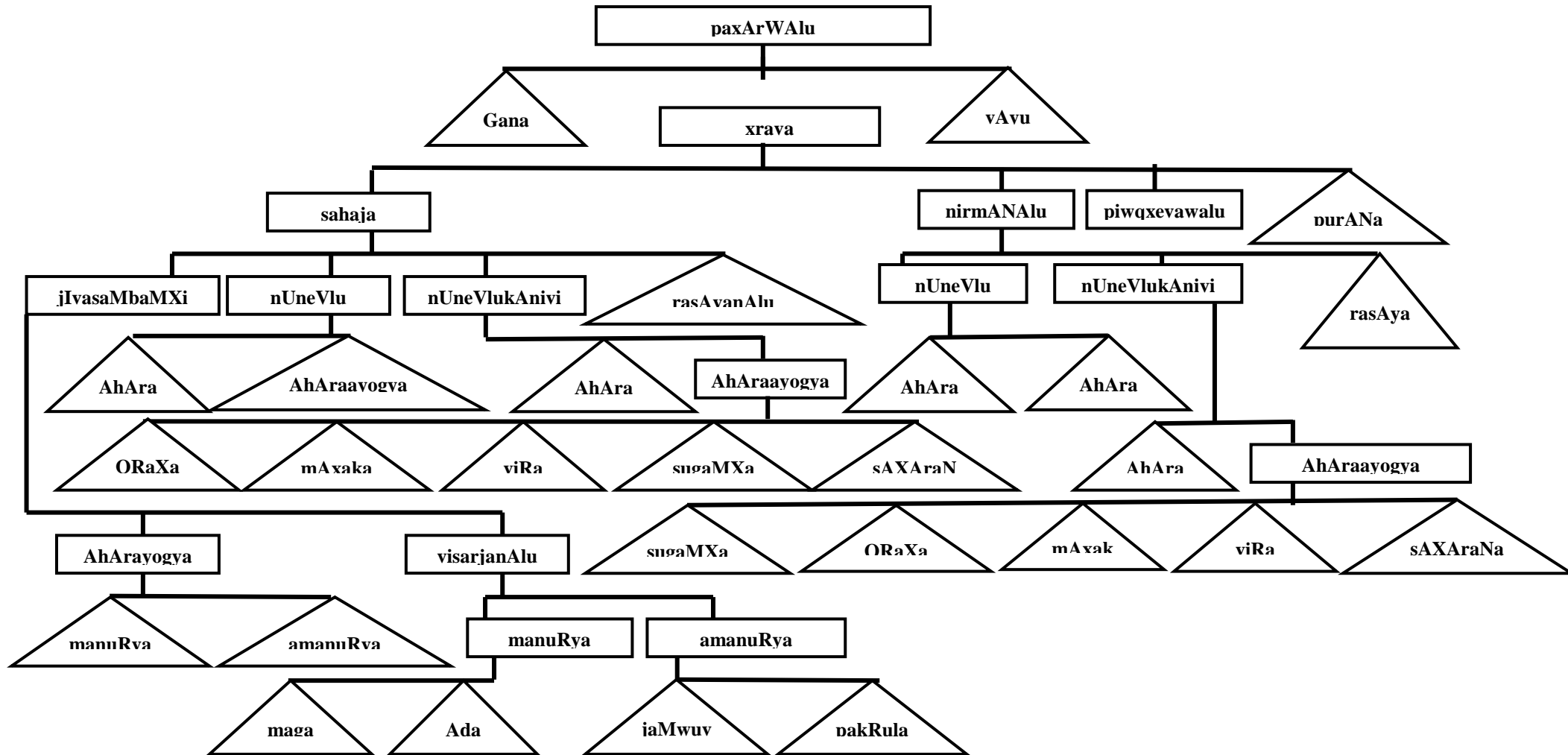
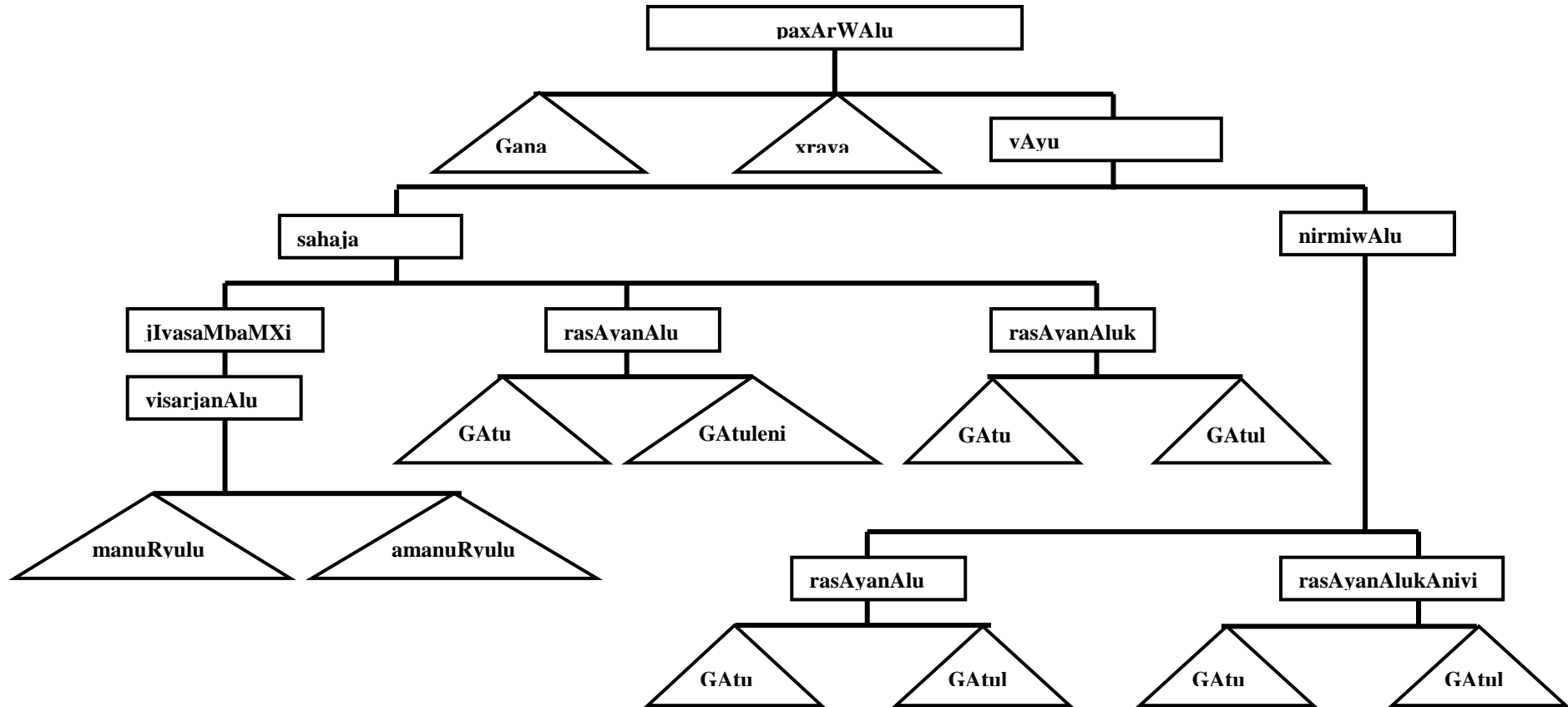Fig: 5.14 nirmiwAlu
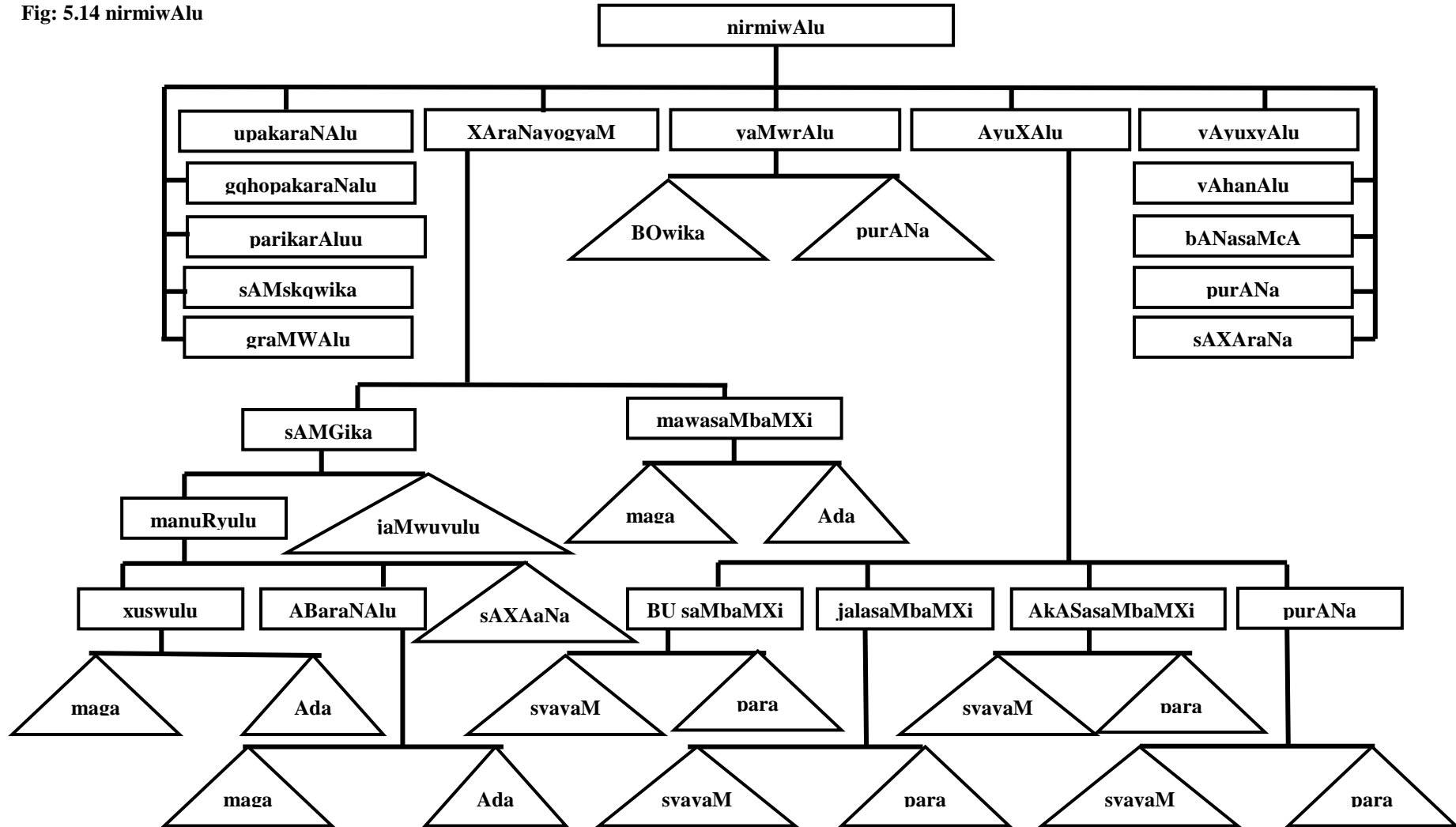
Fig: 5.15 (xrava) paxArWAlu

Fig: 5.16 (vAyu) paxArWAlu

Fig: 5.17 amUrwavAcakAlu
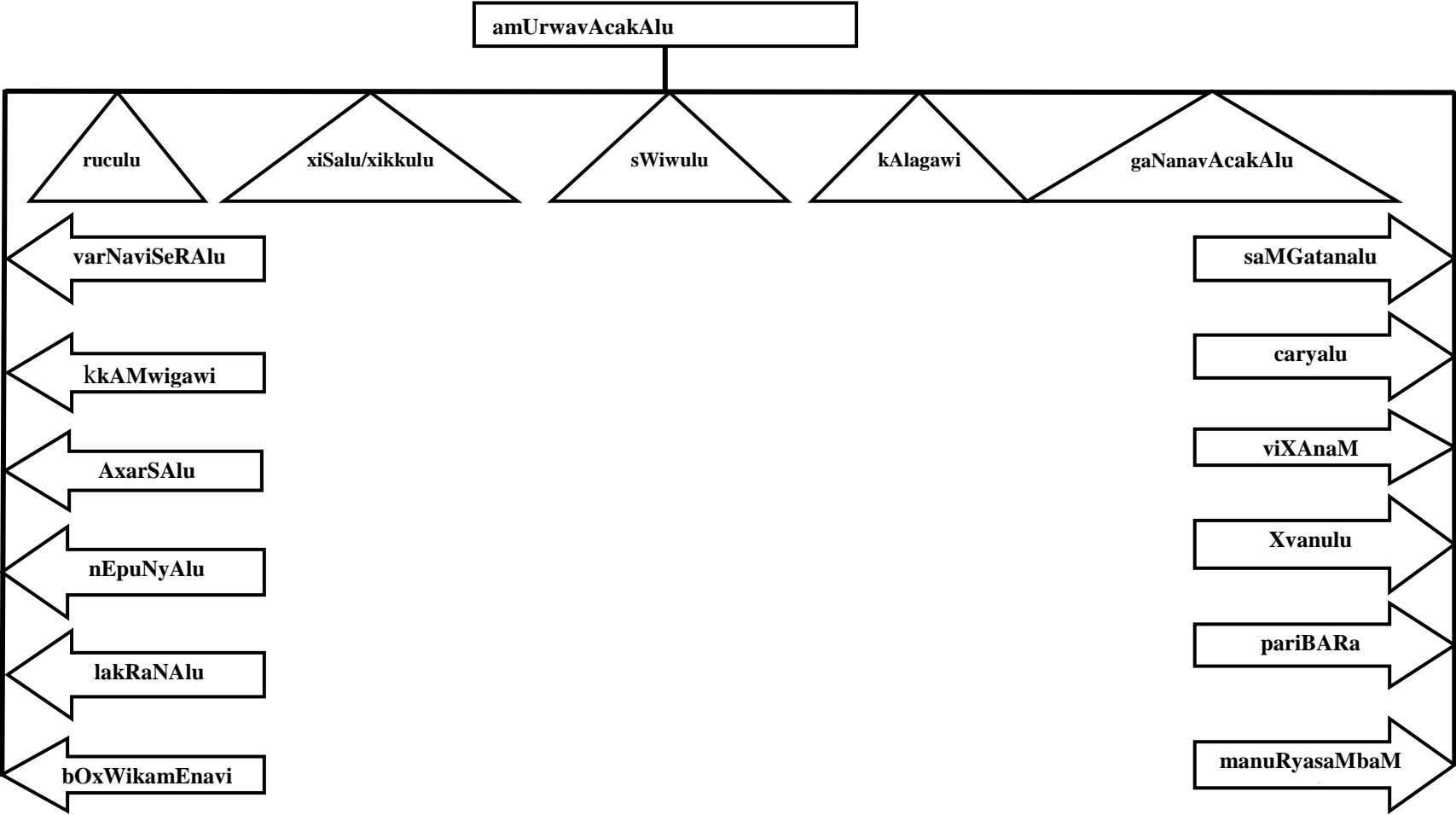
Fig: 5.18 sWiwulu
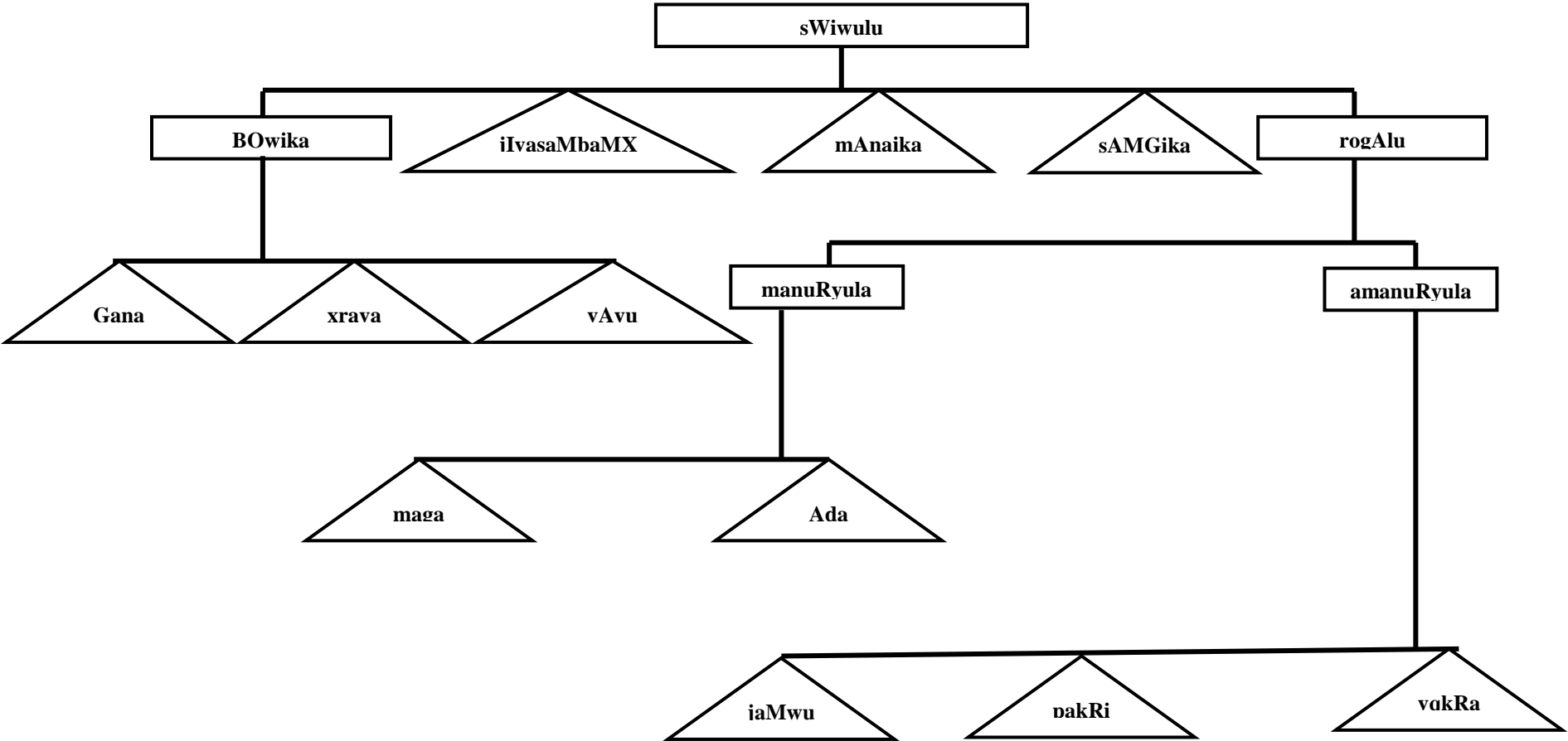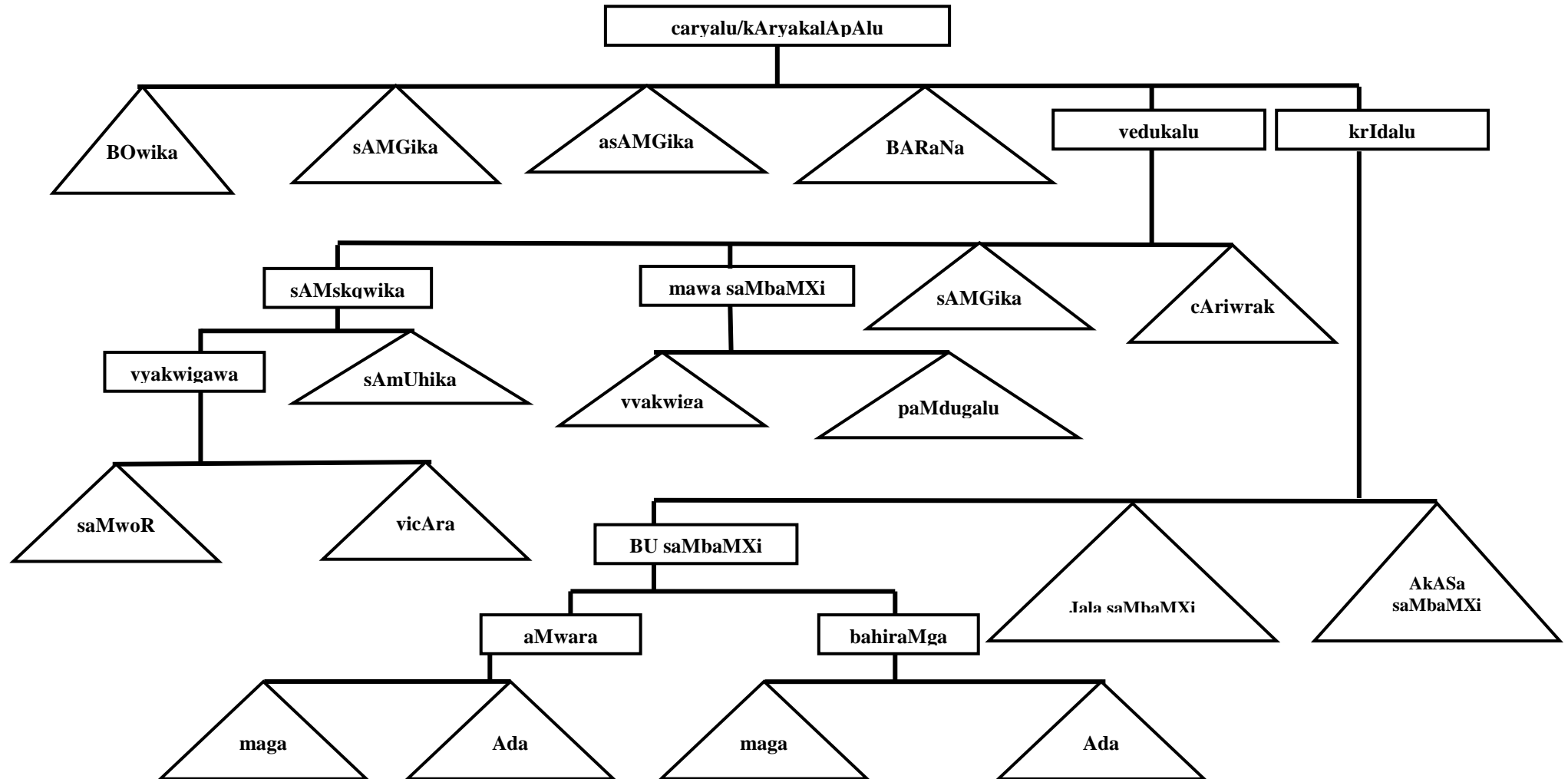
Fig: 5.19 saMGatanalu

300
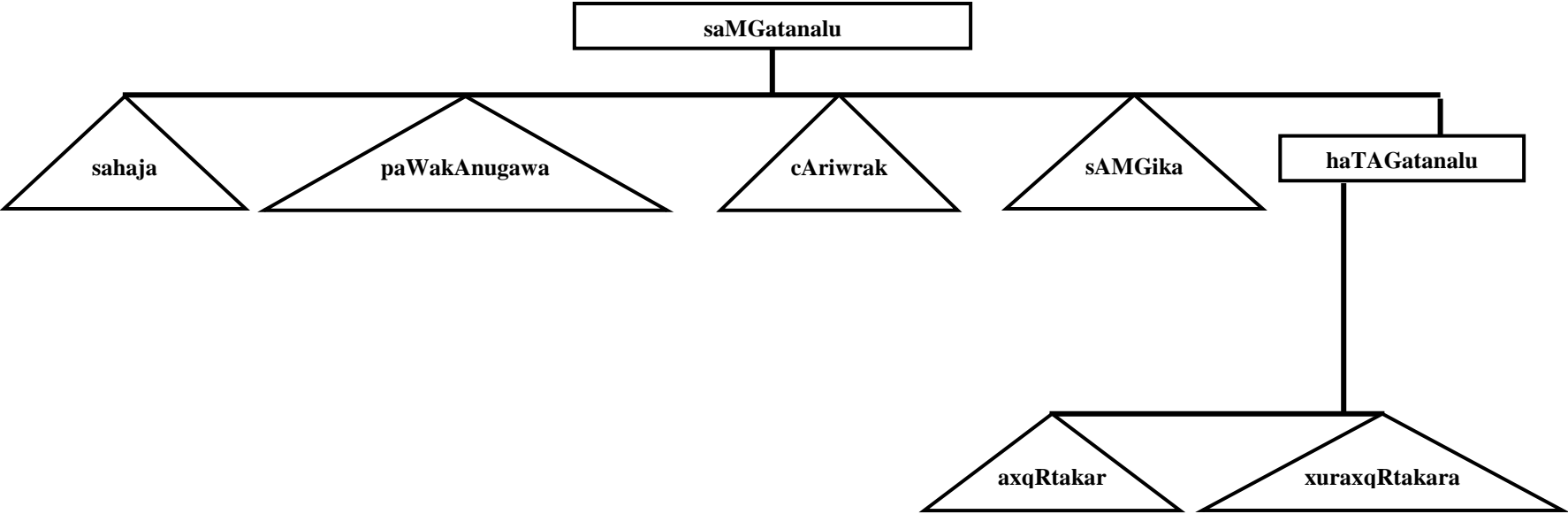
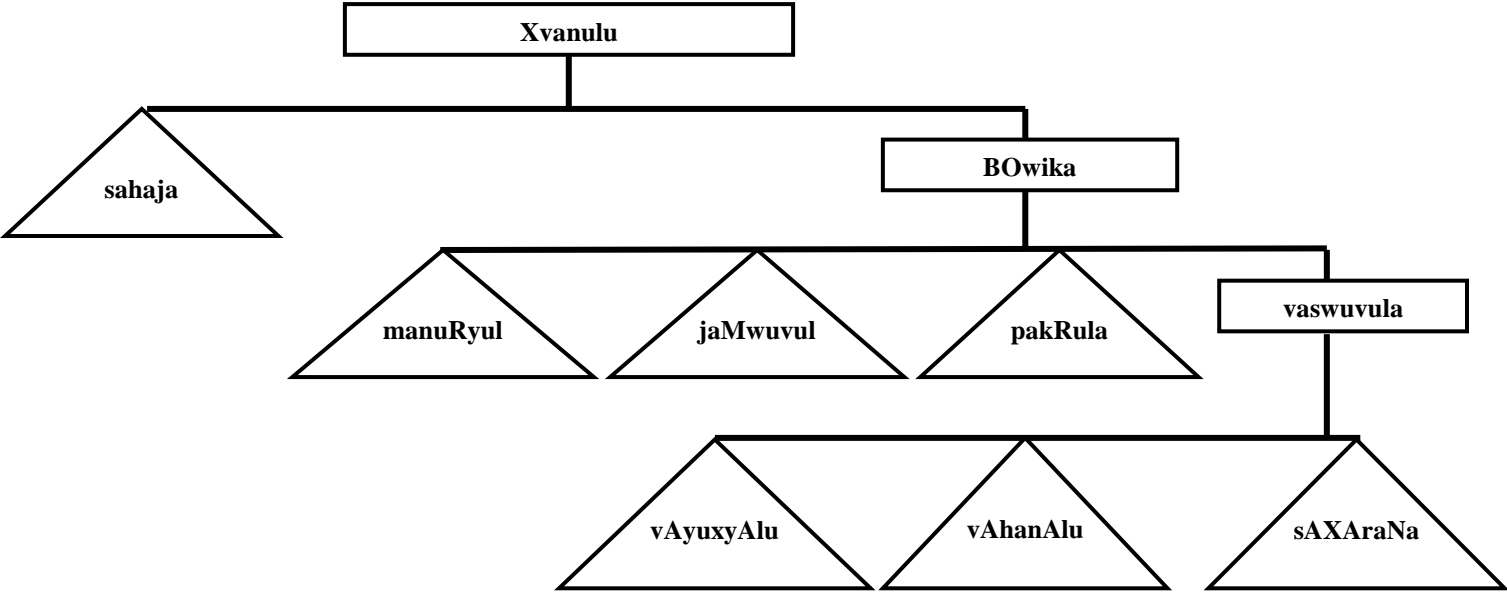Fig: 5.20 caryalu/kAryakalApAlu
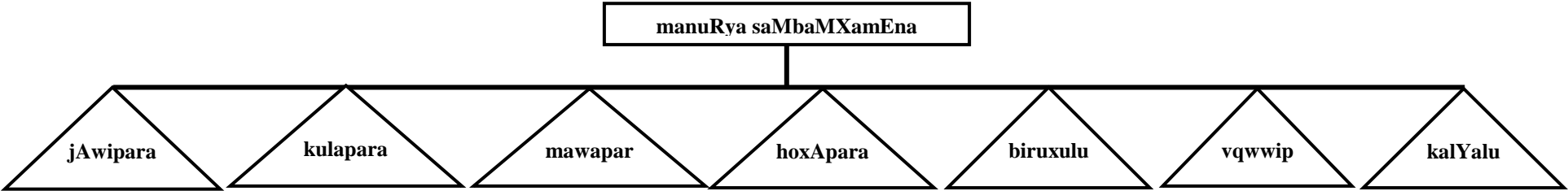
Fig: 5.21 Xvanulu

Fig: 5.22 manuRya saMbaMXamEna

manuRya saMbaMXamEna

jAwipara kulapara mawapar hoxApara biruxulu vqwwip kalYalu

Fig: 5.23 pariBAra