

**DEVELOPING POST - EDITING STRATEGIES FOR DIFFERENT
APPLICATIONS WITH REFERENCE TO TELUGU – HINDI**

ANUSAARAKA

DECLARATION

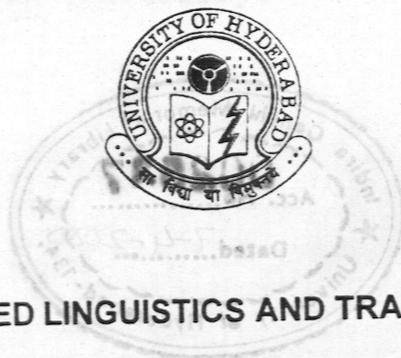
KOTLA RAJINI REDDY

**A Dissertation submitted to the University of Hyderabad
in partial fulfilment for the degree of**

MASTER OF PHILOSOPHY

In

TRANSLATION STUDIES



CENTRE FOR APPLIED LINGUISTICS AND TRANSLATION STUDIES

**UNIVERSITY OF HYDERABAD
HYDERABAD – 500 046**

1998

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CERTIFICATE

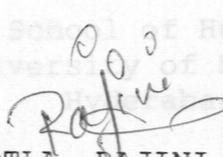
This is to certify that Ms. KOTLA RAJINI REDDY has worked under my supervision for her M.Phil. dissertation entitled DEVELOPING POST-EDITING STRATEGIES FOR DIFFERENT APPLICATIONS WITH REFERENCE TO TELUGU-HINDI ANUSAARAKA, at the Centre for Applied Linguistics and Translation Studies (CALTS), University of Hyderabad, Hyderabad- 046. This is her

DECLARATION

I hereby declare that the work presented in this dissertation entitled "DEVELOPING POST-EDITING STRATEGIES FOR DIFFERENT APPLICATIONS WITH REFERENCE TO TELUGU-HINDI ANUSAARAKA" has been carried out by me under the supervision of Dr. G.UMAMAHESHWAR RAO, Reader, Centre for Applied linguistics & Translation Studies, University of Hyderabad, and that this has not been submitted for a degree or diploma of any other University.

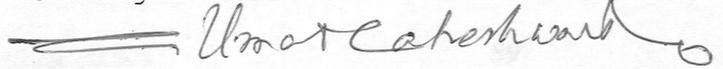
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CERTIFICATE

This is to certify that Ms. KOTLA RAJINI REDDY has worked under my supervision for her M.Phil. dissertation entitled **DEVELOPING POST-EDITING STRATEGIES FOR DIFFERENT APPLICATIONS WITH REFERENCE TO TELUGU-HINDI ANUSAARAKA**, at the Centre for Applied Linguistics and Translation Studies (CALTS), University of Hyderabad, Hyderabad- 046. This is her bonafide work and does not constitute part of any material submitted for a degree here or elsewhere.



G. UMAMAHESHWAR RAO

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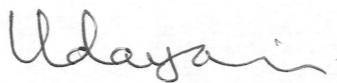
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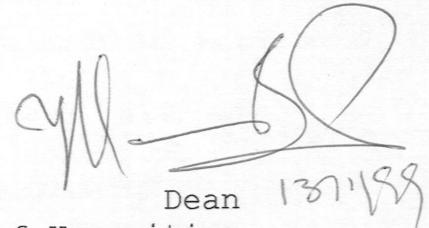
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LIST OF ABBREVIATIONS

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TRANSLITERATION OF Telugu AND Hindi
ORTHOGRAPHY

LIST OF ABBREVIATIONS

Hi.	:	Hindi
@H	:	Anusaaraka Hindi
AMT	:	Anusaaraka Machine Translation
Adj.	:	Adjective
Adv.	:	Adverb
FAGPHQMT	:	Fully Automatic General Purpose High Quality Machine Translation
GNP	:	Gender Number Person
MT	:	Machine Translation
N	:	Noun
PH	:	Post-edited Hindi
SL	:	Source Language
TL	:	Target Language
Te.	:	Telugu
V	:	Verb
acc.	:	Accusative
ani.	:	Animate
dat.	:	Dative
hum.	:	Human
inst.	:	Instrumental
msc.	:	Masculine
nom.	:	Nominative
obl.	:	Oblique
p	:	Person
pl.	:	Plural
sg.	:	Singular
1p.sg.	:	First person singular
2p.sg.	:	Second person singular
3p.msc.sg.	:	Third person masculine singular
3p.~hum.pl.	:	Third person nonhuman plural
Z	:	Long Vowel
~hum.	:	non human
~msc.	:	Non masculine

TRANSLITERATION OF Telugu AND Hindi ORTHOGRAPHY

అ	ఆ	ఇ	ఈ	ఉ	ఊ	ఋ	అ	आ	इ	ई	उ	ऊ	ऋ
a	Ā	i	ī	u	ū	ṛ	a	Ā	i	ī	u	ū	ṛ

eU	e	E	oU	o	O	eU	e	E	oU	o	O
ఐ	ఏ	ఋ	ఌ	఍	ఐ	ऐ	ए	ऌ	ऍ	ऎ	ए

ఱ	ఱ	ఱ
M	z	H

క	ఖ	గ	ఘ	ఙ
k	K	g	G	f

చ	ఛ	జ	ఝ	ఞ
c	C	j	J	F

ట	ఠ	డ	ఢ	ణ
t	T	d	D	N

త	థ	ద	ధ	న
w	W	x	X	n

ప	ఫ	బ	భ	మ
p	P	b	B	m

య	ర	ల	ళ	వ
y	r	l	lY	v

శ	స	ష	హ	క్ష
S	s	R	h	kR

क	ख	ग	घ	ङ
k	K	g	G	f

च	छ	ज	झ	ञ
c	C	j	J	F

ट	ठ	ड	ढ	ण
t	T	d	D	N

त	थ	द	ध	न
w	W	x	X	n

प	फ	ब	भ	म
p	P	b	B	m

य	र	ल	ळ	व
y	r	l	lY	v

श	स	ष	ह	क्ष
S	s	R	h	kR

become apparent that the "Fully Automatic General Purpose High Quality Translation" will remain as a long-term goal which could be attained by a large investment and effort in basic research within the disciplines of linguistics and artificial intelligence.

1.2 Alternative: So far as the technological aspects of mechanical translation are concerned it is almost trivial by comparison with the difficulty of programming a computer with all the information required for the successful identification and interpretation of natural language utterances. A native speaker draws upon the world knowledge in order to analyze and comprehend a sentence, otherwise it would be ambiguous in a number of ways. Therefore linguistic descriptions must include considerable amount of knowledge about the world. Formal analysis of language, which deals with a purely morphological and syntactic analysis without involving semantics, prove to be impracticable.

Chapter-1

General Introduction

1.0 In the present world computer plays an important role in every field of human activity. In the present scenario man wants to do most of his work effortlessly with the help of the machine. In this attempt he is quite successful to an extent. As in every field he is seeking the help from machine even in the field of translation. To build this dream-machine he has been trying very hard in the last five decades. His goal is to build a Fully Automatic General Purpose High Quality Machine Translation system (FAGHQMTS). Not long ago researchers in the field have realized that such systems are not feasible in the near future.

1.1 The Dream: In 1949, the year of the circulation of the famous memorandum by Warren Weaver wherein he proposed that automatic computers might be used as a solution for worldwide translation problem. Early work in this area was characterized by a very naive approach to the problems involved. It was assumed that the computer could be made to perform the same operations ^{which} presumably take place when the translation was carried out by a human translator. Soon it was realized, however, the preparation of a bilingual dictionary is not a very easy task. Now it has

become apparent that the "Fully Automatic General Purpose High Quality Translation" will remain as a long-term goal which could be attained by a large investment and effort in basic research within the disciplines of linguistics and artificial intelligence.

1.2 Alternative: So far as the technological aspects of mechanical translation are concerned it is almost trivial by comparison with the difficulty of providing the computer with all the information required for the successful identification and interpretation of natural language utterances. A native speaker draws upon the world knowledge in order to analyze and comprehend a sentence; otherwise it would be ambiguous in a number of ways. Therefore linguistic descriptions must include considerable amount of 'knowledge about the world'. Automatic analysis of language, which deals with a purely morphological and syntactic analysis without involving semantics prove to be impracticable.

However, alternatively, an engineer's view of the problem i.e., a problem solving approach, considers the entire process of building automatic translation system as involving a combination of two distinct steps one involving mechanical effort and another the human effort. Accordingly before or after mechanical processing, the raw output is necessarily processed by a human post-editor who has the knowledge of the target language. The requirement of a human post-editor becomes necessary and unavoidable, since language understanding to a considerable extent depends upon the 'encyclopedic knowledge of the real world'. Mechanical processing- alone often produces multiple options reflecting the ambiguities in a given sentence. However, a trained human post-editor by context and by his encyclopedic knowledge and experience of the real world resolves the ambiguities.

1.3 The post-editor: Since we do not know today 'how' encyclopedic knowledge could be held in a computer, proportionate division of labour between man and machine shall be recognized as the only way today (to achieve the goal partially) as an alternative to the Fully Automatic General Purpose High Quality Machine Translation System (FAGPHQMTS). Anusaaraka Machine Translation (AMT) system or language accessor is one of such alternatives to the FAGPHQMTS. The output produced by

Anusaaraka Machine Translation Systems usually not the target language but very close to it. It can be called as the anusarit Hindi (@ Hindi). It does not exhibit agreement and in some cases the relevant case markers besides uses special notation to represent the appropriate meaning corresponding to the SL Text. The output may be called as not a translation in the conventional sense but a faithful 'image' of source language. Since the target language reader does not have the sufficient knowledge regarding the culture and pragmatics of the SL, the reader may not be able to interpret this transferred image and comprehends it. To make this transferred image read-worthy the output may require post-editing.

People who are bilinguals in the Source and target languages and those who possess both linguistic and extra linguistic knowledge can easily interpret and comprehend the transferred image, but a monolingual reader of the TL may not be able to comprehend the output since he does not have the relevant pragmatic and encyclopedic knowledge. Hence, he requires some training in understanding this image of the SL Text and need to put some effort in understanding the output. This effort of understanding depends to the extent that the source language and the target language share a number of common features with each other (with respect to culture and linguistics). As an example both Telugu and Kannada share more or less same cultural and pragmatic features which enables the TL reader of Telugu-@Kannada or Kannada-@Telugu to understand the @output with little effort. However, when the two languages do not have much in common i.e., the cultural and pragmatical features are different the effort required by the TL reader in order to understand the Anusaaraka output of SL will be more. To make such output comprehensible to the target reader post-editing is a necessary phenomenon.

1.4 The post-editing strategy: A point to be noted here is that all 'Texts' need not be subjected to post-editing. It depends upon the type and purpose of the Text and availability of time. For example if the Text is a technical and scientific material, then it may require only a little amount of post-editing. The degree of post-editing required for this type of 'Text' may be conveniently called as the first level of post-editing. Similarly depending upon the type, purpose of the text and time, various strategies for post-editing (Look for details in next chapter) may be proposed.

1.5 The aim of this study is to investigate and develop post-editing strategies for different applications with reference to Telugu-Hindi Anusaaraka. After a Text is fed into the machine and run Anusaaraka, the machine will produce a raw output, which is subjected to post-editing. In order to make the raw output read-worthy and comprehensible with minimum effort and maximum speed various post-editing strategies are needed to be adopted. By applying these strategies a post-editor can make the output read-worthy and comprehensible with minimum effort and maximum speed depending on the cost and time available for that purpose. The outcome of this study is expected to be directly adopted by the post-editors. Every MT output should fulfill the following three criteria (a more detailed description of these is given in the next chapter). They are:

1. Accuracy

2. Acceptability

3. Comprehensibility

If the output is not accurate the reader may find difficulty in grasping the theme of the text. Similarly, since the language of the output does not conform to the native speaker's usage, even though the output is accurate the native speaker may not accept the output and comprehend the exact meaning that is present in the SL text. Therefore this study is essentially an attempt to provide guidelines for improving the quality of Anusaaraka output in terms of accuracy, acceptability and comprehensibility.

1.6 Human Translation (HT) and creativity: Human Translations are creative. A human translator while translating a 'text' often tends to take subjective decisions. For this reason human translations are always innovative or creative. As a result we often find human translations as over-translated or under-translated and in some cases even mis-translated. In human translations a translator may skip words, phrases and even sentences. In human translations a translator with his experience and encyclopedic knowledge replaces the source language cultural components with the corresponding equivalents in the target language. In human translations if a translator does not find an equivalent for a word then he would try to explain the word or try to provide newly

coined word. For this reason human translations appear to be clear, comprehensive and natural. Mostly, human translations aimed to do better than their originals.

1.7 Machine Translation (MT) and objectivity: In Machine Translations there is no scope for creativity and innovation. Machine produces only the material that is present in the Text as an output. As present day machines are not provided with world knowledge they are incapable of resolving problems that are related to pragmatics, logic and reasoning. But it is capable of processing all other remaining procedural data. Machine translations tend to be faithful translations, since machines are incapable of resolving ambiguities in the absence of real world knowledge; the output appears to be unclear and less comprehensive. In machine translated outputs (obtained under human supervision) over-translations, under-translations or mis-translations are minimized. With the advent of Machine Translations we can say that translation ceased to be an art and become measurable scientific activity.

The three most important components of MT systems are the source language text analyzer, the systems bilingual dictionary and the target language text generator. The peripheral and auxiliary modules may include interactive pre-editing of the SL Text and interactive post-editing of the TL Text output.

1.8 Types of MT: Machine translations can be of various types, depending on translations that are produced as outputs.

a. Fully automatic machine translation is that which does not involve pre-editing or post-editing. This type of translation can be used successfully, but only in restricted domains where vocabulary and linguistic and extra linguistic structures are controlled. Taum Meteo which translates weather bulletins from English to French may be referred to as an example of such a system.

b. Controlled language machine translation is that in which the SL Text is modified according to a pre-determined format to be used by the machine as input to produce an output which can be directly used by the end-user.

c. The strategy of human involvement in editing the Text before, during or after the computer deals with it.

1.9 Anusaaraka Machine Translation system: A Telugu-Hindi Anusaaraka Machine Translation System is being built by a collaborative project involving University of Hyderabad and IIT Kanpur. When a Telugu Text is fed to the system it produces an output in @Hindi. Anusaaraka Machine Translation system, is not in a real sense a Machine translation System but a language accessor. In its process the workload is divided between machine and human reader, in other words the machine takes the language load and leaves the world knowledge load on the reader. It will be more effective if the languages are close structurally and culturally, like Indian languages. For instance, there are not many differences between Telugu and Hindi and the target language output of one of these languages can be understood by simple additional notations and other devices. The output thus produced is not the target language but very close to it, and which can be called as Anusarit language (faithful image of the TL). For example Anusarit Hindi employs some extra notational devices to bring exact meaning of the SL word but does not show agreement and sometimes lack appropriate case markers or post-positions etc. Due to this, the untrained reader may be required to put some effort in understanding the language produced in the output. To be able to comprehend the output effortlessly by any reader, the output of Anusaaraka may be subjected to post-editing.

1.10 Working of Anusaaraka MT system, a brief review: A source language text which is fed into the computer system is first interactively pre-edited to standardize the language of the Text and then it is passed on to Anusaaraka Machine Translation System as input. The input is processed by morphological analyzer, sandhi package and the Local Word Grouper (Bharati: 1995.pg.117). Now the source language Text is ready for mapping. After this processing the input is passed on to a mapping block. In this mapping block the SL words are replaced by the appropriate equivalents of the TL and output is produced. This output can be read directly by a trained reader or can be post-edited by a human post-editor and made available for any reader.

1.11 Language of Anusaaraka output: As said in 1.3 to 1.10 the language of Telugu-Hindi Anusaaraka output is not Hindi but is very close to Hindi. This can be called as Anusarit Hindi. Besides natural Hindi words it contains some Hindi words representing SL words marked with additional notational devices. Due to them the output tends to be more complex, awkward and more detailed. Hence less comprehensible. Through the process of post-editing Anusarit Hindi may be made comprehensible and read-worthy (to any untrained reader).

1.12 Post-editing: As has already been said post-editing is a process where a human post-editor, after obtaining the raw output from a MT system eliminates all inaccuracies and aberrations from the point of target language in the output by resolving ambiguities which are not resolved by the machine itself. In this process man and machine work together in their respective domains and the work is distributed between man and machine in an appropriate way.

As a matter of fact the elusiveness of the objective that the Fully Automatic General Purpose High Quality Machine Translation (FAGPHQMT) is not only possible, but in spite of it, we can make a claim that with help of machine FAGPHQMT is possible, only if one separates and recognizes the language based analysis of Text from knowledge and inference-based analysis. Since the present day machines can do only language based analysis of Text and are not provided with world knowledge and reasoning, post-editing of the output may be required.

Post-editing is not a revision of translation but it is a part and parcel of Machine translation. In post-editing process a post-editor may involve in various procedures such as correcting agreement, proper selection of case markers, converting source language constructions into more agreeable TL equivalent constructions, resolving lexical or functional ambiguities, eliminating redundant information, coping with the idiosyncracies of the source language by replacing an equivalent TL word or a phrase.

1.13. Levels of post-editing: MT system's raw output is not usually regarded as a finished product. This reveals the fact that users practice post-editing to some

degree. The degree of post-editing that a user practices can be regarded as the level of post-editing. A post-editor may apply these levels of post-editing according to the Text type and purpose of the Text and the time. AMT output may require post-editing at three levels. The raw output that is directly obtained from the Anusaaraka system without any changes and untouched by a human editor can be placed at zero level of post-editing. This level may be regarded as grasping level of untrained reader too. In the first level of post-editing grammatical corrections are done. Here, the post-editor drops all the redundant information that is present in the output inserts the case-markers wherever necessary and sees that proper agreement rules are followed. At the second level of post-editing alongwith grammatical corrections, the style of TL is maintained. In order to do this the post-editor will make the changes at semantic level. And in the third and the final level of post-editing the post-editor will try to nativize the constructions in the output and to achieve success in this he may change whatever he feels appropriate in the text to convey the message to a reader. This stage often involves stylistic changes for literary purpose. This level of post-editing requires more human involvement and a post-editor may go up to this level of post-editing if required. These levels of post-editing may effect changes in the output at syntactic, semantic and pragmatic(refer next chapter for details) levels.

1.14. The present work is organized in three Chapters: Chapter-1 discusses the problem of MT system and the alternate method that is adopted to overcome this problem with a brief introduction to HT, MT system, AMT system, working of AMT system, the phenomenon called post-editing and its levels in brief. Chapter-2 discusses the activity of translation with a brief comparison between HT and MT, and the problems noticed in MT and their possible solutions. It also discusses the phenomenon of post-editing as a consequence of alternative Machine translation efforts. It also includes a detailed study of different strategies of post-editing, based on the types of Text, the amount of time available and its cost effectivity. Chapter-3 discusses various applicational aspects of these techniques. Each of the three strategies of post-editing is demonstrated with a number of illustrations from actual texts drawn from

corpus. These texts with their @Hindi and Post-edited Hindi outputs(PH) will be displayed in the Appendix.

Chapter-2

Post-editing: Strategies

2.0 Translation: Primarily translation is an activity which serves as a means of communication and a promoter of understanding across cultures. Invariably this activity involves innovation or creation in the Target language since subjective decisions are taken throughout the process. These subjective decisions include making choices, particularly when one has to translate words denoting quality, where he has to choose words that are related to mental world rather than objects or events. To activate this mechanism he should possess encyclopedic knowledge. This is the basic requirement for any translator. This requirement can be accomplished only in human translators but not in machines. This is the reason why Machine Translations often appear to be incomplete and unclear. To tackle this problem MTs invariably

Chapter-2

accommodate post-editing processes which are nothing but human interventions in Machine Translation activity.

2.1 Comparison between HT and MT: Prior to starting the actual task of a translation a human translator carefully reads the Text to understand various factors such as intension of the author, intention of the Text, Text type, the purpose of the Text, for whom the Text has been addressed to etc. As against this machine directly translates what ever Text it is fed. Since present MT systems are not provided with world knowledge and reasoning they are incapable of producing a complete and perfect translation all at once. Machine Translations can be produced with a very high speed and with a very low cost. Human translations are quite unlike the Machine Translations in the sense that the latter, can deal only with standard versions of vocabulary and grammar. They are incapable of correcting human errors in the form of non-standard syntax, usage and punctuation, or missed or repeated words. A human translator can cope with this problem and he can produce a translation which can be called as better than the source Text. Human translations are not always perfect.

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To minimize these differences between human translations and machine translations and to overcome the problems that are related to world knowledge and

resolving ambiguity in vocabulary. Post-editing has become a necessary event in machine translations.

2.2 Need for post-editing: When a text is run on present machines, the output will be in semi-artificial or semi-natural Target language. The information that is brought out in the output will be cent percent accurate(except in some idiosyncratic cases), but with a failing grammar and style. A untrained reader who is new to the usage of this language may find the output to be cumbersome. Hence, for the benefit of the untrained reader and to make him get rid off this difficulty the artificiality of the output language has to be substituted by the natural language. For this conversion i.e., from artificial raw output into natural language human intervention becomes obligatory in MT process which in other words is known as post-editing.

2.2.1 Objects and aims of post-editing: Any translation activity should guarantee three requirements as benchmarks on MT's output. They are:

2.2.1.1 Accuracy of information: The information that is transferred from SL to TL should be accurate irrespective of grammatical and literary styles.

2.2.1.2 Acceptability of TL: The information that is transferred from SL to TL should be acceptable to the TL readers or native speakers of TL. Usually, the information produced in the output may be accurate but it may not be acceptable to the TL readers, since the grammatical structures employed or the words employed are not regularly occurring words or they do not conform to the native expectations. For example:

KAyA_hE_jo*_vaha- Pala; suMxara_hE_jo*_vaha- ladiki

In the above examples there are such artificial constructions which of course can be considered as part of the grammatical features of a Hindi dialect i.e., machine Hindi. The style used in these sentences to convey the expressions "jisa_Pala_ko_kAyA_vaha_Pala" and "jo_ladiki_suMxara_hE_vaha_ladiki" may not be acceptable. "KAyA_huA_Pala" and "suMxara_ladiki" are more acceptable ones.

Thus to make the output acceptable to the TL readers the usual style of the output conform to that of TL. This is one of the main criteria which should be fulfilled by the MT.

2.2.1.3 Comprehensibility: The last and the most crucial of the three criteria is comprehensibility i.e., the information that is transferred from SL to TL should be comprehensible to the readers. The aim of translation is to transfer the information that is present in the SL into the TL with same effect. This aim can be fulfilled if and only if this criterion is accomplished. In absence of this criterion there will not be any use of translation.

To achieve these criteria MT should go for post-editing. It has been discussed above that MT should fulfill the criteria viz., accuracy, acceptability and comprehensibility. If the above mentioned criteria are fulfilled then the goal of MT can be achieved. This goal can be achieved by post-editing the following areas of the language of the text output.

a. Grammar: As said in the beginning of 2.2 that the raw output produced by the machine will be artificial and consists of ungrammatical constructions. Its structures usually lack agreement and sometimes the case-markers are inappropriate and sometimes wrong collocations of words and the presence of unnecessary redundant information. In order to achieve the criterion of acceptability the output should have correct grammar, which can be achieved by human post-editor.

b. Vocabulary: Words are of two types. They are:

1. Content words: These words are mainly from the major categories such as nouns, verbs, adjectives etc., If these words possess only one meaning there would not be any problem, but it is not always so. Many times these words tend to be ambiguous. A single word may have many senses. Under the circumstances it is difficult for the machine to select from various corresponding TL equivalents. Hence this work is done by the human post-editor.

2. Functional words: These are not free words but bound words. These words cannot come independently and are always dependent on the preceding or the following content words. These too are ambiguous which will have to be resolved by the human post-editor.

To achieve the criteria of accuracy as well as acceptability, resolving ambiguity is one which the post-editor must deal with.

3. Pragmatics and world knowledge: In any language we find grammatical structures and vocabulary with idiosyncrasies. These words are not easily comprehensible. They require pragmatics and world knowledge to be comprehensible. Since current machines are not provided with this knowledge it is incapable of resolving the problems related to it. Hence to resolve this ambiguity the human post-editor must deal with this problem. For detailed explanation and illustration with examples refer the next chapter.

2.3 Post-editing: Today machines are not provided with the (power of) encyclopedic knowledge. Apparently FAGPHQMT seems not to be realized in the near future. To see this dream come true several alternative MT systems are proposed. Post-editing is an exercise to achieve the goal in the alternative way. As mentioned in the earlier chapter this post-editing process comprises of human involvement in converting the raw output into a more acceptable, readable and comprehensible form of TL. This process is not to be considered as a revision of draft but a continuation of it. Depending on the type of the Text, time and purpose of the Text one can subject the raw output for post-editing upto a particular degree or level. This sort of semi-technical and semi-market features of the input text and the quality of the final output are considered as determinants of the strategy that one should adopt while post-editing.

2.4 Strategies of post-editing: There are at least four levels or strategies that can be identified in post-editing.

2.4.1 Zero level: This is the level where the Anusaaraka output that is produced remains untouched by human i.e., the post-editor. At this level the accuracy of the text will be at its maximum but the output may not be grammatically acceptable and certain ambiguities remain to be resolved. These ambiguous words convey different meanings in different contexts. Since, machine is not provided with encyclopedic and pragmatic knowledge it may bring the meaning of a particular word which is not appropriate in that particular context. A trained Anusaaraka reader can understand the output without any difficulty. But the target language reader who is not having any knowledge about SL(i.e., an untrained reader) faces problems in understanding the @Hindi output. Raw output provides options for the TL readers to select an appropriate word i.e., to make an appropriate choice from two or more TL equivalents against the ambiguous word. During post-editing one may replace the word with the exact equivalent of a given word. For example in Telugu the word 'wIrcu' means to fulfill a desire, i.e., the desire of any kind such as to fulfill thirst, hunger, needs to pay back loan, etc., Whereas in Hindi this is not the case. There is a separate word for fulfillment of a particular type of desire. In the cases of this kind, problem arises. To overcome this problem the TL reader must be provided with some neutral word which can cover wider range of meanings and can be used in different contexts. At this level the TL reader can grasp the meaning of the source language word interactively browsing through the information which are available for post-editor who may replace the word with an exact equivalent of the word. See the following example to understand this concept more clearly.

Telugu word	Hindi equivalents	Neutral word
-------------	-------------------	--------------

wIrcu	nibatA, nipatA, pyAsa_buJAnA,	nibatA`
-------	-------------------------------	---------

	pUrA_kara,SAMwa_kara, mitA	
--	----------------------------	--

In the above example for the Telugu word 'wIrcu' there are more than one meaning i.e., nibatA, nipatA, pUrA_kara, pyAsa_buJA, SAMwa_kara, mitA in Hindi. Each of the Hindi words is used in a particular context. Since the machine is not provided with the world knowledge and the pragmatic knowledge it is not capable of

selecting the exact word according to the context. Therefore to tackle this problem instead of these many words in Hindi, a single word is given as the equivalent of the ambiguous SL word. The choice of this word dependent on its longer range of usage and application and it carries a diacritic [']. This word with diacritic in strict sense is not a word in natural Hindi but represents presumably all the senses that the SL word has. The trained post-editor is expected to acquire the required knowledge of such presumable and idiosyncratic knowledge about the SL. The extent and the amount of such knowledge about the SL that should be learnt by the post-editor will be around 15%. The acquisition of this knowledge about words or their range of application is what we call 'Sakwighraha'. In one way this is akin to or comparable to what people often call in the second language learning as 'acquisition of the conceptual and applicational range of words'.

2.4.2 First level: From this level the task of post-editing begins. For two reasons a raw output may be post-edited at level one i.e., the domain of the text is journalistic, technical and scientific texts or when the time available for post-editing is very short. It is also the cost-effective level of post-editing. The final version is available in a faster way, but at the cost of quality and demands some sort of training or attention of the end-user. In this level the post-editor aims at producing an output which is grammatically error free by using minimum efforts and a very high speed. In this he may delete all the mnemonic information that is given in the brackets. He will not change the constructions which are SL oriented reflecting the SL structure. At this level we will retain the SL peculiarities both in morphology and lexicon unless they are wrong or lead the reader to a wrong path. This level may be used for scientific and technical type of Texts where words are expected to be less ambiguous, narrow meanings and more or less one to one correspondences exist between SL and TL. There is little scope for metaphorical and innovative interpretation of words in the textual discourse. After this level of post-editing the rate of understanding improves by on an average of 20% and the time taken for post-editing at this level is always kept at its minimum.

2.4.3 Second level: After the first level the Anusaaraka output is grammatically free from errors but it may not be yet acceptable to the native readers. To make it grammatically as well as stylistically acceptable, this second level of post-editing is necessary. At this level all the constructions which are according to the SL style may be changed according to the TL. In this, all the words that are semantically ambiguous lexical alternatives may be replaced. The post-editor may build on-line dictionary or word usage dictionary for better presentability and also for resolving problems related to ambiguous expressions or words. This level may be used for the Texts like legal documents and contracts in which a peculiar style is maintained. The rate of comprehensibility improved through this level of post-editing would be on an average of 10%.

2.4.4 Third level: At this level of post-editing the problems that are related to pragmatics and background knowledge(world knowledge) are resolved. In this level the post-editor may change any thing in the output in order to remove all ambiguities present in the output. Like a human translator he may take freedom with the Text also if necessary. For literary material(fiction and narrative Texts) this level of post-editing may be applied. At the end of this level of post-editing the rate of acceptability and comprehensibility will be optimum.

It is said above(see 2.3) that each post-editing strategy can be applied for a particular type of Text. To know which kind of strategy to be used for which type of Text a classification of Texts becomes necessary. The classification of Texts can be made in the following way:

2.5 Types of Texts: Any written material can be called as a Text. Each Text may possess different theme in it. That theme may be a story, prose, narration, poem, scientific or informative material etc., Depending on these themes present in a Text the types of Texts may be classified. The translation theorists while discussing the typology of Texts as inputs for translation classified the Texts mainly into four or five types. Taking into consideration the views of such experts on this topic like

Cook (1989:52) and Newmark (1989:13), an alternative view has been given below. A text belongs to one of the following five categories:

- a. Narrative sentences and article titles, where in no additional interpretation is required.
- b. Technical and scientific material.
- c. Journalistic and informative material.
- d. Legal documents and contracts.
- e. Fiction material (all literary works such as poetry, prose etc..)

Each type of Text above mentioned can be explained in the following way:

2.5.1 Narrative sentences and article titles, wherein no additional interpretation is required:

In this type of Texts there is no scope for creativity. They are only simple sentences or short utterances for which no further interpretation is required. Mostly, the sentences in this type of Texts are used in regular and ordinary usage. For these type of Texts just word to word and literal translation is sufficient. Hardly, there is any need of post-editing on the output of these Texts. Only the raw output which is untouched by the post-editor is sufficient. These type of Texts are generally used for information retrieval access purposes. As there is no need of post-editing of these type of Texts the time factor may be ignored.

2.5.2 Technical and scientific material: In these type of Texts most of the words belong to scientific and technical terminology and very few words are of ordinary usage. These type of Texts are usually found with 3rd person narrations. Due to less complexity or the nature of the vocabulary the machine output of these Texts are considered better translations. The post-editor has to drop only the redundant information which is in mnemonic form in the output and if necessary grammatical

corrections can be made. The level of post-editing required for these type of Texts may be considered as "a" level strategy in the first level of post-editing

These type of Texts are used for retrieving information either by specialists in a limited field or by general public. These type of Texts require a very less amount of time for post-editing.

2.5.3 Journalistic and informative Texts: These type of Texts are found with 3rd person narrations, reporting some incident happened in the past or giving some information about an unknown fact. These type of Texts comprise of both scientific and technical terms and also involve words which are often subjected to metaphorical usage in our day to day life. Usually the language used is formal one. Sometimes some new words which are normally not used are also found. The language used in these Texts is purely expressive. The strategy required for these type of Texts may be considered as "b" level in the first level or strategy of post-editing. At this strategic point grammatical and stylistic corrections such as placement of words according to TL, in some cases providing appropriate case-markers, dropping of redundant information etc., along with some minor changes are made. This type of Texts may be post-edited with high speed and using minimum efforts. These Texts are generally used for information retrieval purposes. Treatment of advertisements may come under this category.

2.5.4 Legal documents and contracts: In this type of Texts the interpretation of the sentences lies primarily in its unambiguous and logical nature and also of some peculiar style that is followed. In order to attain similar effect of SL in TL, it becomes necessary to maintain style as well as accuracy. Hence, second strategy of post-editing may be applied for these type of Texts. At this level along with grammatical and stylistic changes, some changes related to semantics are also made. Mostly, these changes are related to logic and reasoning which machine cannot do. Such as choosing correct equivalents, replacing the vocabulary according to the style of TL, resolving problems related to functional and lexical ambiguity etc. This type of Texts are generally used by the people of specialized registers of language.

They will use these Texts both for internal use as well as for a wider audience.

These type of Texts require some what more time than compared to that of the first level of post- editing.

2.5.5 Fiction: Fiction may cover all literary works. The value of these Texts primarily lies in the emotion that they convey to the reader. These Texts are largely innovative and creative. The language used in these type of Texts is of very loose usage. Mostly, in these type of Texts author tries to express his feelings and intentions in a very creative manner. In order to express his ideas he uses many idioms, proverbs and other collocations which require world knowledge and pragmatics to understand. Since at present machines are not provided with this sort of knowledge the output appears to be less clear.

Hence, for these type of Texts in which a considerable number of words are ambiguous and carry idiomatic sense, the final strategy i.e., the third level of post-editing may be applied. This level of post-editing takes more time and effort. For better presentability of any output the post-editor may use this strategy of post-editing. The output that is post-edited under this level may have wider circulation, more demand, more appealing and remain for long.

2.6 Features determining the strategies: The following are the features which determine the strategies for post-editing:

2.6.1 Time: Time is one of the constraints which determines the choice of right strategy. If a post-editor has very little time at his disposal he may have to be satisfied with the first level of post-editing. The post-editor will do post-editing keeping in view this time constraint.

2.6.2 Type of Text: As said earlier the output is post-edited according to the typological character of the Text. If the text is scientific and technical the first level of post-editing may be suggested or else for literary based Text third level of post-editing may be applied. Thus it can be said that the type of Text determines the strategy that one should adopt for post-editing.

2.6.3 Cost effectivity in post-editing: In a way MT outputs are usually expected to be cheaper, faster and accurate than those of human translations. Hence, it is not an unjustified demand to insist the cost-effective factor of the MT outputs. However, the increasing degree of post-editing ensuring the quality of the output become less cost-effective. More work may be required to reduce the number of post-editing features. The Thesis intends to reduce not only the un-necessary post-editing but also the proper locus of appropriate post-editing.

Post-editing: Application

3.0 Strategies of Post-editing: In the earlier chapters we have introduced the concept of post-editing, 'the need of it' and various levels or degrees of its application. It has been discussed that the number of levels or degrees of its application is dependent on the text type, time and purpose of the Text. For example, if the text is a literary piece then the output should be post-edited to its maximum level (refer Chapter-2). The post-editor who is engaged in the task of post-editing will always try to preserve much of the machine's output and allows changes in the text at strategic points instead of redoing it. For this purpose the post-editor needs a set of context-dependent techniques for post-editing the output that is produced by the machine. Application of these techniques at strategic points shall help a post-editor to post-edit the output effortlessly and with maximum speed.

As said earlier, each level of post-editing refers to a strategy that one should adopt appropriately for a given output. Under each strategy, a post-editor performs a series of changes in the raw-output gradually converting acceptable output text. This chapter discusses post-editing at different levels and the qualitative changes that are needed to be carried out at a particular level.

Chapter-3

3.1 Zero level post-editing: Under this level of post-editing no changes are made in the output. The output at this level remains unchanged. This level of post-editing can be used to produce unfinished output where in no further interpretation is demanded. These type of Texts may be used in information retrieval systems for fast browsing in other than one's own language and there is little time for post-editing. The 0-level post-edited text requires training on the part of the TL reader. 0 level post-edited texts can be used as excellently glossed SL Texts for research purposes and as quick reference material.

3.2 First level of post-editing: From this level the actual task of post-editing begins. Post-editing at this level can be called as 'rapid post-editing' too. At this level the post-editor's main emphasis is to produce an output which is grammatically correct. This level of post-editing may be applied to the text of technical and scientific material as well as in Journalistic and informative texts. At this level the post-editor's main emphasis is to produce an output which is grammatically correct.

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3.2.1 Grammar:

3.2.1.1 Agreement: Both Telugu and Hindi have got their own set of agreement rules. A post-editor with a knowledge of Hindi can post-edit the

output without leaving any wrong structures. The following is a short note on the agreement rules in Telugu and Hindi:

3.2.1.1.1 Agreement marking on finite verbs in Telugu:

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

Ex: puswakam padiMxi

1.	N	V
	{+msc.}	{+msc.}
	{+sg.}	{+sg.}

Ex: vAdu vaccAdu

2.	N	V
	{+msc.}	{+msc.}
	{+sg.}	{+sg.}

Note: There are no sentences or clauses in Telugu consisting of two or more nominative nouns sharing the same number and gender. In Hindi, the verb agrees with the noun having the feature [+msc.] but not [-msc.] irrespective of their order in a sentence or a clause i.e., a higher ranking order noun has a over riding power to percolate its features to a finite verb.

Hindi:

3.2.1.1.1.1 According to the unmarked order:

Ex: vAdu puswakamu caxivAdu

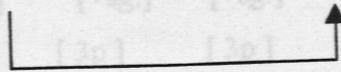
N1	N2	V
{+nom.}	{+nom.}	{+msc.}
{+msc.}	{-msc.}	{+msc.}



3.2.1.1.1.2 According to second order of a sentence:

Ex: puswakamu vAdu caxivAdu

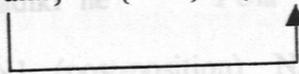
N1	N2	V
{+nom.}	{+nom.}	
{-msc.}	{+msc.}	{+msc.}



c. If a sentence has two nouns, in the nominative form but both are associated with the feature [-msc.] then the GNP (gender, number and person) of the verb agrees with the noun which is associated with the feature animate [+ani] and not with the feature [-ani].

Ex: AmeV annaM wiMxi

N1	N2	V
{+nom.}	{+nom.}	
{-msc.}	{-msc.}	{-msc.}
{+ani.}	{-ani.}	{+msc.}



Note: There are no sentences or clauses in Telugu consisting of two or more nominative nouns sharing the features [+msc.] or [-ani.] when the verb is non reciprocal.

3.2.1.1.2 A procedure for agreement marking on finite verbs in

Hindi:

a. In Hindi GNP of the verb agrees with the GNP of a noun in nominative i.e., when it does not carry any vibhakti. Let us consider the following example:

1. mohana Pula wodawA_hE {3p.msc.sg.}

N1	N2	takes	V
[+nom.]	[+nom.]		
[+hum.]	[-hum.]		
[+ani.]	[-ani.]	[+ani.]	
[+msc.]	[+msc.]	[+msc.]	
[+sg.]	[+sg.]	[+sg.]	
[3p]	[3p]	[3p]	

b. In Hindi too as in Telugu, finite verb shows agreement with a noun in the nominative form. However, in case the finite verb is a transitive and is in the past tense then the GNP of the verb agrees with the direct object (karma) in the sentence, since the noun which appears to be the logical subject of the sentence is marked by the post position 'ne'. See the following example:

1. ladikI ne PULa wodA

N1 (post-position)	N2	V
[-nom.]	[+nom.]	
[+ani.]	[-ani.]	
[+hum.]	[-hum.]	
[-msc.]	[+msc.]	[+msc.]
[+sg.]	[+sg.]	[+sg.]
[3p]	[3p]	[3p]

c. If two nouns are in the nominative form and both share similar features then the world knowledge of the reader regarding the objects behavior denoted by the nouns will judge the agreement with the verb. Since present machines lack this world knowledge post-editing becomes necessary. Usually in such cases the higher ranking or order noun takes precedence and its GNP features percolate to the

finite verb. The verb takes masculine singular third person form as illustrated below.

1. Sera KaragoSa KAwa hE

N1	N2	V
[+nom.]	[+nom.]	
[+ani.]	[+ani.]	
[+msc.]	[+msc.]	[+msc.]
[+sg.]	[+sg.]	[+sg.]

3.2.1.1.3 Procedure for agreement marking on adjectives: In

Telugu, adjectives will not show agreement with the nouns they modify. However, in Hindi unlike in Telugu adjectives show agreement with the nouns they modify in number and gender. For example:

Te: 1. maMci puswakaM

[Adj]	[N]
	[+sg.]

2. A maniRi

[Adj]	[N]
	[+sg.]

3. maMci manuRulu

[Adj]	[N]
	[+pl.]

4. A manuRulu

[Adj]	[N]
	[+pl.]

1. vaha m... MbA 5UDA AxamI (+mas.sg.)
 Hindi:
 Adj1 Adj2 Adj3 Adj4 N
2. vaha m... 1. acCA ladakA Orawa (-msc.sg.)
 Adj1 Adj2 [Adj] Adj3 [N] Adj4 N
3. ve mote l... (+msc.) (+msc.) (+msc.pl.)
 Adj1 Adj2 [+sg.] [+sg.] N
4. ve motI l... l... bl... OraweM (-msc.pl.)
 Adj1 Adj2 Adj3 Adj4 N

2. acCI ladakI

In the above examples according to the gender and number of the head noun adjectives show [-msc.] [-msc.] type of agreement is not found in Telugu. When the Telugu sentences are translated into Hindi by machine/ the @Hindi sentences show [+sg.] [+sg.] agreement. This situation will be changed into natural Hindi agreement by a post-editor looking at the gender, number and person of the nouns in @Hindi or a clause. Therefore the need for post-editing arises.

3. acCe ladake

[Adj] [N]
 [+pl.] [+pl.]

3.2.1.1.4 Agreement with Genitive nouns (RaRTI):

In Hindi whenever two nouns come in a sequence wherein the first noun is always in the genitive and it always shows agreement with the following head noun. This is not the case with Telugu. In Telugu, genitive case is not obligatory and there is no agreement of genitive with the following head noun. Hence, in the Anusaraka output i.e. in @Hindi this genitive agreement is never shown, and post-editing becomes necessary. In post-editing has to convert these structures into genitive nouns showing [+pl.] [+pl.] according to the GNP of the nouns that follow. Proper genitive case-marker should be inserted. If the genitive noun is followed by [[+masculine] and [+singular]] then genitive case-marker "kA" remains unchanged.

4. acCI ladakiyAz

[Adj] [N]
 [-msc.] [-msc.]
 [+pl.] [+pl.]

In Hindi all those adjectives (whose stem ends in -a) which modify a noun will show agreement with the noun. Consider some examples: "ki" and genitive case-marker "kA" is replaced with "ke" in case of [+plural] feature irrespective of the gender. Consider the following examples

1. vaha motA laMbA bUDA Axaml{+mas.sg.}
Adj1 Adj2 Adj3 Adj4 N
2. vaha motI laMbI bUDI Orawa{-msc.sg.}
Adj1 Adj2 Adj3 Adj4 N
3. ve mote laMbe bUDe loga{+msc.pl.}
Adj1 Adj2 Adj3 Adj4 N
4. ve motI laMbI bUDI OraweM {-msc.pl.}
Adj1 Adj2 Adj3 Adj4 N

In the above examples according to the gender and number of the head noun adjectives show agreement. This type of agreement is not found in Telugu. When the Telugu sentences are translated into Hindi by machine the @Hindi sentences show Telugu agreement. This situation will be changed into natural Hindi agreement by a post-editor looking at the gender, number and person of the nouns in @Hindi sentence or a clause. Therefore the need for post-editing arises.

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Tè: ammAyi puswakamu

N1 {obl.} N2

[+ani.] [-ani.]

[-msc.] [-msc.]

[+sg.] [+sg.]

Hì:ladakI_kI kiwAba

N1 {obl_gen.} N2

[+ani.] [-ani.] [-ani.]

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

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

Tè: ammAyi puswakAlu

N1 {obl.} N2

[+ani.] [-ani.]

[-msc.] [-msc.]

[+sg.] [+pl.]

Hì:ladakI_kI kiwAbeM

N1 {obl_gen.} N2

[+ani.] [-ani.] [-ani.]

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

[+sg.] [+pl.] [+pl.]

Tè:abbAyi puswakamu

N1 {obl.} N2

[+ani.] [-ani.]

[+msc.] [-msc.]

[+sg.] [+sg.]

7. Locative

Hi:ladake_kI kiwAba

N1{obl_gen.} N2
 [+ani.]_[-ani.] [-ani.]
 [+msc.]_[-msc.] [-msc.]
 [+sg.]_[+sg.] [+sg.]

Te: abbAyi puswakAlu

N1{obl.} N2
 [+ani.] [-ani.]
 [+msc.] [-msc.]
 [+sg.] [+pl.]

Hi:ladake_kI kiwAbeM

N1{obl_gen.} N2
 [+ani.]_[-ani.] [-ani.]
 [+msc.]_[-msc.] [-msc.]
 [+sg.]_[+pl.] [+pl.]

Hi: baccl ko gudiA xi

3.2.1.2 Procedure for appropriate case-markings: Case-

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

1. Nominative
2. Accusative
3. Instrumental
4. Dative
5. Ablative
6. Genitive

The following is a table of correspondences of case-markers in both the languages

Name	Case marker in Telugu	Corresponding case marker in @Hindi	Corresponding case marker in Hindi
1. Nominative			
2. Accusative			
3. Instrumental			
4. Dative			
5. Ablative			
6. Genitive	o	o	o,ne

7. Locative

8. Vocative

In both Telugu and Hindi a large number of case-markers are employed to mark any one of the eight cases. In majority of these there is one to one correspondence between Telugu and Hindi case-markers. However, there are a considerable number of cases where a Telugu case-marker when rendered into Hindi appear to be in appropriate. This is because of the lack of strict correspondence between Telugu and Hindi case markers owing to the different treatment they receive in each language. For example in Telugu there are different case markers to represent accusative and dative cases denoting direct object and indirect object nouns. However, in Hindi both are marked by single marker [ko]. Similarly in Hindi both instrumental and ablative are marked by the same case-marker [se], which however in Telugu is distinctly marked by separate markers viz., [wo] and [nuMdi]. Furthermore case-markers may depend upon the verb or the noun or both the verb and the concerned noun.

The following is an illustration how a single case-marker in Telugu has different correspondences in Hindi.

- Ex: a. Te: pApaku boVmma iccAnu
 Hi: baccl ko gudiyA xl
- b. Te: vAdu rEluku vaccAdu
 Hi: vaha rela se AyA
- c. Te: gAliki xIpaM AripoyiMxi
 Hi: havA ke kAraNa xIpa buJa gayl

The following is a table of correspondences of case-markers in both the languages.

Name of the case	Case marker in Telugu	Corresponding case marker in @Hindi	Corresponding case marker in Hindi
Nominative	o	o	o,ne

Accusative	ni/nu	ko	ko
Instrumental	wo/wo_pAtu	se'	se
Dative	ki/ku/koVraku/ kosam	ko'/ke_lie	ko/ke_lie
Ablative	nuMdi/nuMci	se	se
Genitive	(yoVokka)	kA	kA/kI/ke
Locative	lo/lopala/mIxa/pE	meM/aMxara/para/ ke_Upara	meM/para/ ke_Upara
Vocative	oy/orey/osey	are/rI/re	he!/are/rI/re

The following are some post positions function as case- markers in Telugu and their corresponding Hindi equivalents.

Telugu post-position	Corresponding post-position in @Hindi	Corresponding post-position in natural Hindi
guriMci	ke_bAre_meM	ke bAre meM
xvArA	ke_xvArA	ke xvArA
valana	ke_kAraNa	ke kAraNa
batti	ke_anusAra	ke anusAra
patla	ke_bAre_meM	ke bAre meM

As the above discussion explicitly indicates that there is the lack of one to one correspondence between case-markers of Telugu and Hindi and many times the choice of the case-marker is dependent on the context and sometimes exhibit idiosyncratic behavior. Hence, to overcome this idiosyncrasy human intervention is necessary i.e., post-editing is necessary. According to the requirement, an inappropriate case-marker will be substituted by an appropriate case-marker to convert the @Hindi output as an acceptable Hindi output closely approximating the natural Hindi. The following is an illustration of the application:

3.2.1.2.1 Nominative: The subject of a sentence is always in the nominative form in Telugu. There is no separate marker for the nominative case in Telugu. Whereas, in Hindi the subject of a sentence is marked by "ne" only when its predicate is a transitive verb and in the past perfect tense. For clarity see the format given below followed by an example.

Name of case-marker	Tense	Telugu	Hindi
Nominative	Past perfect	0	ne
Nominative	Elsewhere	0	0

Ex: vaha_ko (-msc.pl) iswemAa_kara_xeKa

Te: rAmudu mohanuni koVttAdu

@H: rAma mohana_ko mArA

PH: rAma ne mohana ko mArA

By looking at the above example it can be said that since the Telugu sentence does not convey subject marker information the output will not have

subject marker "ne". To resolve this problem post-editing must be adopted. This problem arises only when a predicate of a sentence is a transitive verb and in the past tense.

Note: However, the transitive verbs such as IA 'bring', bola 'talk' and BUla 'forget' are idiosyncratically treated as intransitive in Hindi and hence "ne" is not added to subjects of these verbs. See the following examples:

1. mohan puswaka lAyA

2. rAma EsA bolA

3. ladiki puswaka Bula gal

3.2.1.2 Accusative: The variants 'ni' or 'nu' are considered to be the accusative case-markers in Telugu, for which 'ko' is the corresponding accusative case-marker in Hindi. For example:

Te: awadini cUdu

Hi: usa ko xeKa

a. However, sometimes this case-marker variants i.e., 'ni' or 'nu' needs to be substituted by genitive case-markers 'kA' or 'ki' or 'ke' instead of 'ko'. Consider the following examples:

Te: bANAlanu prayogiMci cUpiMcAdu.

@H: bANa_ko{pl.} prayoga_kara xiKAyA{3p.msc.sg.}

PH: bANoM kA prayoga karake xiKAyA.

Te: vAtini upayogiMci cUdu.

@H: vaha_ko{~msc.pl.} iswemAla_kara xeKa.

PH: una kA iswemAla karake xeKa.

Te: akkada sAmrAjyAnni sWApiMcu.

@H: vahAz sAmrAjya_ko sWApAnA_kara.

PH: vahAz sAmrAjya ki sWApAnA kara.

In the above examples it is seen how the accusative case-marker is replaced by genitive case marker 'kA' or 'kI'. Without this replacement the output appears to be inappropriate. This happens due to Noun_Noun_aux. sentence structure. In Telugu the verb 'sWApiMcu' is a derived verb. Unlike its correspondence in Hindi which is a compound of N_aux. 'sWApAnA_kara'. In such cases the preceding object noun 'sAMrAjya' forms a phrase with the noun 'sWApAnA', hence forming genitive noun instead of accusative. As a solution to this problem the Noun_verb compound in TL were given alternatively Adjective_verb as equivalent to the Telugu verb sWApiMcu. This replacement in TL would allow the noun to retain the accusative [_ko] as in the following example:

Te: rAmudini avamAniMcAdu

@H: rAma_ko apamAna_kiyA{3p.msc.sg.}

PH: rAma kA apamAna kiyA N_kA_N aux.

Alternatively

Te: rAmudini avamAniMcAdu

@H: rAma_ko apamAniwa_kiyA (N_adj._aux. structure)

To recapitulate, the phenomenon of the use of Noun_aux. compounds in Hindi as equivalents to Telugu '_iMcu' verbs derived from the Sanskrit bases as in 'prayogiMcu', 'upayogiMcu', 'sWApiMcu', 'praxarSiMcu', 'nirUpiMcu' etc., Hindi shows a preference tendency, to form nominal phrase leaving the auxiliary verb stranded as in the following:

Te: sAMrAjyAnni sWApiMcAdu

@H: sAMrAjya_kA sWApAnA_kiyA{3p.msc.sg.}

As shown above this problem can be overcome by giving Adj_aux. as equivalents to Telugu '_iMcu' verbs instead of N_aux.

PH: sAMrAjya kI sWApAnA kiyA

or

PH: sAMrAjya ko sWApiwa kiyA

However, whenever the noun in N_aux. compounds in Hindi is not a Sanskrit noun as in 'iswemAla_kara' the problem cannot be solved as shown above, hence the post-editor has to change such cases by changing the object case-marker [_ko] to genitive [_kA] to get an acceptable form. We can describe this in the following way:

Te: N_acc. N_iMcu

@H: N_acc. N_kara

PH: N_gen. N_kara

elsewhere,

Te: N_acc. N_iMcu

@H: N_acc. Adj_kara

b. It is often observed that whenever verbs of speech and communication occur they require the object case-marker in Telugu i.e., accusative [_ni] as in 'vAdini adigAnu' for which the corresponding equivalent in Hindi is 'usa_se pUCA'. The use of non-object case marking is a case of idiosyncrasy of Hindi. Hence, such cases need to be post-edited.

Te: N_ni/nu V(speech and communication)

@H: N_ko V

PH: N_se V

Te: AmeVnu adugu

@H: vaha_ko pUCa

PH: usa se pUCa

Te: AmeVnu vedukunnAdu

@H: vaha_ko nivexana_kiyA {3p.msc.sg.}

PH: usa se nivexana kiyA

The following is a list of some verbs which require the change of object case [_ko] to [_se] as shown above. They are:

1. adugu `pUca'
2. praSniMcu `prasna-kara'
3. vedukoVnu `mAMga'
4. manavicesukoVnu `nivexana-kara'
5. prArWiMcu `prArWanA-kara'

Above mentioned phenomenon is also applicable to the SL verbs compounded with the auxiliary verb `_manu'. Let us see some examples:

Ex:

Te: sIwanu pAta pAdamanu
 @H: sIwA_ko gAnA gAne_ke_lie_kaha
 PH: sIwA se gAnA gAne ke lie kahA
 Te: rAXanu caxavamannAru
 @H: rAXA_ko paDane_ke_lie_kahA {2,3p.hum.pl.}
 PH: rAXA se paDane ke lie kaha

The above change i.e., from accusative [_ni/nu] to instrumental [_se] is also observed when the clause has the verb kaluvu, `mila', `to meet'. See the examples:

Te: praXAnamaMwrini kalisAnu
 @H: praXAnamaMwri_ko milA {1p.sg.}
 PH: praXAnamaMwri se milA

Te: praXAnamaMwrini kalavadaM aMwa welika kAxu
 @H: praXAnamaMwri_ko milanA uwanA AsAna nahIM {3p.~msc.sg.}
 PH: praXAnamaMwri se milanA uwanA AsAna nahIM hE

c. This is another instance where Telugu and Hindi do not correspond in the marking of the object case. In a Telugu sentence or a clause whenever the verb `ceru' or its derivatives occur its object noun is marked by the accusative marker

[_ni/nu] which however is not the case in Hindi. The corresponding marker in Hindi in this context is 'ke_nikata' as in the following examples:

Te: N_ni/nu V[ceru]
 @H: N_ko V[pahuMca]
 PH: N_ke_nikata V[pahuMca]

Ex:

Te: BagavaMwudini cerukunnAdu
 @H: BagavAna_ko pahuzcA{3p.msc.sg.}
 PH: BagavAna ke nikata pahuzcA

Te: lakRyAnni cerukunnAdu
 @H: lakRya_ko pahuzcA{3p.msc.sg.}
 PH: lakRya ke nikata pahuzcA

Te: sImanu cerukunnAdu
 @H: sImA_ko pahuzcA{3p.msc.sg.}
 PH: sIwA ke nikata pahuzcA

Note: In these contexts the corresponding @Hindi accusative marker [_ko] may be replaced by 'ke_pAsa' or 'waka' in later post-editing levels to make the output more appropriate.

3.2.1.2.3 Instrumental Case-marker: It has been found that at least in two situations the regular correspondence between the instrumental ['_wo'] of Telugu and ['_se'] of Hindi is inappropriate and requires a change to 'ke_sAWa' or 'ke_kAraNa' as the situation demands as shown below. First consider the regular correspondence between Telugu and Hindi:

a. _wo : _se

Ex:

Te: kawwiwo koVyyi

PH: Curl se kAto

Te: nIlYlawo Adaku

PH: pAnI se mawa Kelo

Te: cewulawo paniceVyyi

PH: hAWoM se kAma karo

In the following cases the above correspondence breaks down requiring the insertion of 'ke_sAWa' and 'ke_kAraNa':

b) _wo = ke_sAWa: Whenever in Telugu the case-marker '_wo' is used with the animate nouns in Hindi it always requires to be substituted by 'ke_sAWa'. This can be illustrated in the following:

Te: N{+ani}_wo V

@H: N{+ani}_se' V

PH: N_ke_sAWa V

Ex:

Te: awadu miwrulawo vaccAdu

@H: vaha miwra_se'{pl.} AyA{3p.msc.sg.}

PH: vaha miwroM ke sAWa AyA

Te: nuvvu AmeVwo veVIYlu

@H: wuma usa_se' jAo

PH: wuma usa_ke sAWa jAo

c) '_wo' = ke_kAraNa: When the instrumental case-marker '[-wo]' of Telugu is used with gerunds like 'doing', 'showing', 'telling', 'asking' etc., then the

case-marker should be replaced by 'ke_kAraNa' in Hindi. As in the following example:

Te: V_adaM_wo

@H: V_ne_se

PH: V ne ke kAraNa

Ex:

Te: vAdu nijaM ceVppadaMwo kaWa mugisiMxi

@H: vaha saca bolane_se kahAnI samApwa_huA{3p.~msc.sg.}

PH: vaha saca bolane ke kAraNa kahAnI samApwa huA.

Te: A pani ceVyadaMwo AmeV saMwoRiMciMxi

@H: vaha` kAma karane_se vaha-prasanna_huA{3p.~msc.sg.}

PH: vaha kAma karane ke kAraNa vaha prasanna hul.

3.2.1.2.4 Dative: The dative case-marker[_ki/ku] of Telugu does not have the regular correspondence in Hindi. It is either frequently rendered as: a) [_ko`] the object marker in Hindi as shown in the above table or it may be rendered as genitive, locative etc., as illustrated in the following examples:

Te: gIwaku A viRayamu weVlusu

@H: gIwA_ko` vaha- viRaya mA IUma _[hE/WA]

PH: gIwA ko vaha viRaya mA IUma hE

Te: rAmudu awaniki puswakAnni iccAdu

@H: rAma usa_ko` puswaka_ko xiyA{3p.msc.sg.}

PH: rAma ne usa ko puswaka xiyA

b. However, when gerunds are marked by the dative [_ki/ku] it always corresponds in Hindi 'ke_lie'.

Te: vAdu nannu cUdadAniki vaccAdu

@H: vaha muJe xeKane_ke_lie AyA{3p.msc.sg.}

PH: vaha muJe xeKane ke lie AyA

c. Adverbial nouns like prakka 'beside', civara 'end' and mUla 'corner' etc., when occur with dative [_ki/ku] marker the datives may be replaced by 'meM' in Hindi.

Te: N{place Adv.}_ki/ku V

@H: N{place Adv.}_ko V

PH: N meM V

Ex:

Te: vAdu prakkaku cUSAdu

@H: vaha bagala_ko` xeKA{3p.msc.sg.}

PH: vaha bagala meM xeKA

Te: civaraku emEMxi?

@H: aMwa_ko` kyA_huA{3p.~msc.sg.}?

PH: aMwa meM kyA huA?

Te: A mUlaki veVIYli kUrcunnAdu

@H: vaha_konA_ko` jAkara bETA{3p.msc.sg.}

PH: usa kone meM jAkara bETA

d. Whenever this case-marker occurs with temporal adverbs or nouns denoting time they correspond to [ke_bAxa] in Hindi. In post-editing [_ko] will be replaced by [ke_bAxa] as in the following:

Te: N{temporal Adv.}_ki/ku

@H: N_ko`

PH: N ke bAxa

Te: koVMwa sepatiki vaccAdu

@H: kuCa xera_ko` AyA{3p.msc.sg.}

PH: kuCa xera ke bAxa AyA

Te: cAlA roVjulaki vaccAdu

@H: bahuwa xinoM_ko` AyA_hE{3p.msc.sg.}

PH: bahuwa xinoM ke bAXa AyA hE

e. Elsewhere, when the dative case-marker is followed by the relative participle `saMbaMXiMcina' it corresponds to [_se] and not [_ko]. Consider the following examples:

Te: vixyaku saMbaMXiMcina viviXa aMSAlu

@H: vixyA_ko` saMbaMxiwa viviXa aMSa{pl.}

PH: vixyA se saMbaMxiwa viviXa aMSa

In an idiosyncratic case, this case-marker gives the sense of `meM'. Especially, when this case-marker occurs with the noun `ceVyyi'. As an example see the following:

Te: poVtlaM kowi cewiki iccAdu

@H: pudiye baMxara hAWa_ko` xiyA{3p.msc.sg.}

PH: pudiye ko banxara ke hAWa meM xiyA

Te: avi awani cewiki cikki caccAyi

@H: vaha usa_kA hAWa_ko` PaMsa_kara mara_gayA{3p.~msc.pl.}

PH: ve usake hAWa meM PaMsa kara mara gaye

f. Idiosyncratically with verbs other than iccu-`xe', wagulu-`laga', aMtiMcu-`CipakA', aMxiMcu-`pahuzcA', cUpiMcu-`xiKA' etc., or verbs which imply `passing on something' to `someone' the dative marking `_ku' on their indirect objects correspond to [_se], or alternatively `_ke_kAraNa' as in the following examples.

Te: puliki BayapaddAdu

@H: Sera_ko` dara_gayA{3p.msc.sg.}

PH: Sera se dara gayA

or

Sera ke kAraNa dara gayA

Te: golaki walano Vppi vacciMxi

@H: Sora_ko' sira_xarxa AyA

PH: Sora se sira xarxa AyA

or

Sora ke kAraNa sira xarxa AyA

Te: gAliku illu kUliMxi

@H: havA_ko' Gara Daha_gayA {3p.~msc.sg.}

PH: havA se Gara Daha-gayA

or

havA ke kAraNa Gara Daha-gayA

The whole problem of setting up correspondences between Telugu dative and Hindi case-markers is a complex one and more work needs to be done in this area.

3.2.1.2.5 Genitive: In Modern standard Telugu adnominal relations are not explicitly expressed by genitive marker. In fact, there is no such genitive marker in Modern Telugu. A genitive marker borrowed from classical Telugu is sometimes used in certain spoken and written varieties of Telugu less frequently. However, Hindi explicitly and obligatorily marks the adnominal relation by the use of genitive. @Hindi output almost and always lacks such explicit genitive marker. Hence, in post-editing the genitive marker will be added whenever necessary as shown below:

Te: N1 N2

{+mas}

{+sg.}

@H: N1 N2

{+mas.}

PH: pada {+sg.}

PH: N1 kA N2

TE: N1 N2

{-mas.}

{+sg.}

@H: N1 N2

{-mas}

{+sg}

PH: N1 kI N2

Te: N1 N2

{+pl.}

@H: N1 N2

{pl.}

PH: N1 ke N2

Ex:

Te: iMti AvaraNa

@H: Gara- AMgana

PH: Gara kA AMgana

Te: rAXa kumArudu

@H: rAXa[-] kumAra{+msc.sg.}

PH: rAXA kA kumAra

Te: axi slwa boVmma

@H: vaha slwA[-] gudiyA{~msc.sg.}

PH: vaha slwA kI gudiyA hE

Te: ceVttu paMdlu

@H: peda[-] Pala{pl.}

PH: peda ke Pala

3.2.1.2.6 Locative: While translating from Telugu to Hindi the locative markers in Telugu 'lo', 'kriMxa', 'pE', 'mIxa', etc., have regular correspondences in Hindi as 'meM', 'nIce', 'Upara', 'para' etc. However in some cases these do not work as in the following:

a. The locative case-marker when it occurs with the nouns like pani 'work', baMdi 'a cart', etc., it corresponds to Hindi [_para] or [_se] instead of [ke_Upara]. See the following examples:

Te: vAdu awi kaRtaM mIxa ikkadiki vaccAdu

@H: vaha bahuwa_muSkila-para yahAz_[ko] AyA{3p.msc.sg.}

PH: vaha bahuwa muSkila se yahAz AyA

b. Similarly, in Telugu when nouns marked with locatives and which are immediately followed by the negative particles 'wappa' or 'gAni', then these locative markers require to be replaced by '_ko'. The post-editor must note this point and should make this change as and when required. Consider the following examples:

Te: manaM padavala mIxa wappa prayANamu ceVyyalemu

@H: hama nAva{pl.}_para Codakara prayANa nahIM kara_sakwe hEM

PH: hama nAvoM ko Codakara prayANa nahIM kara sakwe hEM

Te: nAku panimIxa wappa iwara viRayAlalo Asakwi lexu

@H: muJe kAma-para Codakara anya viRayoM{pl.}_meM rucl nahIM hE{3p.~msc.sg.}

PH: muJe kAma ke sivA anya viRyoM meM rucl nahIM hE

3.2.1.2.7 Vocative: In Telugu Vocative is expressed by such expressions viz., 'oyi', 'oVrey' and 'oVsey' besides lengthening of the final vowel of the word standing for addressee. Whereas in Hindi the vocative clitics 'he', 'are', and 'rI' are used. Most often vocative words and vocative clitics on address terms both are used or only vocative clitics are employed. When both vocative words and vocative clitics are used the final clitics become redundant and they have to be dropped in Hindi. However, when only vocative clitics alone are used they often clash with other clitics such as conjunctive, disjunctive, emphatic and dubitative clitics. It is best resolved by human intervention. This is necessary since in our writing convention we do not follow strictly the placing of exclamatory marking after an address term which would otherwise offer a clue to the post-editor whether the clitic is a vocative or non-vocative. Post-editing will be done as shown below:

Te: oVrey rAmudU

@H: are rAma_BI[!]

PH: are rAma!

Te: o kavI!

@H: he kavi_BI[!]

PH: he kavI!

Te: o pApA!

@H: he ladikI_BI[!]/ladikI_kyA!

PH: he ladikI!

3.2.2 Post-editing in Vocabulary: In the case of words which are ambiguous and where the ambiguity cannot be resolved by morpho-syntactic context, the only resort that their ambiguity can be resolved is by post-editing. These words involve both lexical and functional words. Lexical words are also known as content words. Content words are those words which come under the major

grammatical categories such as noun, verb, adjective, adverb etc. Whereas functional words are those words which involve in the realization of grammatical function. Functional words are of two types: (a) Those words which occur only once in a clause or a sentence and (b) those words which occur more than once either within a clause or across clauses. The latter category mostly of syntactic in nature serve either the functions of disjunction and conjunction. The first category of words generally are of homonymous or polysemous in nature. A post-editor has to disambiguate these lexical words and functional words, since selecting an appropriate meaning from multiple meanings is a difficult task for machine. Consider the following examples:

3.2.2.1 Content words under various categories:

3.2.2.1.1 Noun:

a. viXi: nasIba/karwavya

Te: viXi nadakalu cAlA viciwramEnavi

@H: viXi[-] cAla_calana bahuwa viciwra_hE_jo_vaha' {3p.~msc.pl.}

PH: nasIba ke Kela bahuwa viciwra hE

Te: axi nI viXi

@H: vaha werA viXi_[hE/WA]

PH: vaha wumhArA karwavya hE

b. boVmma: gudiyA/ciwra

Te: I boVmma nAxi

@H: yaha gudiyA/ciwra merA_hE_jo_vaha'

PH: yaha gudiyA merI hE

Te: awanu boVmma gISAdu

@H: vaha gudiyA/ciwra [reKA_]banAyA {3p.msc.sg.}

PH: vaha ciwra uwArA

c. vaMwu: hissA/bArI

Te: ippudu nA vaMwu

@H: aba merA hissA/bArI

PH: aba merI bArI hE

Te: ixi awani vaMwu

@H: yaha vaha- {msc.}hissA/bArI

PH: yaha usa kA hissA hE

d. varasa: paMkwi/vyvahAra

Te: awadu mUdava varasalo kUrcunnAdu

@H: vaha` wIsarA paMkwi_meM bETA_hE{3p.msc.sg.}

PH: vaha wIsarA paMkwi meM bETA hE

Te: nI varasa emI bAgA lexu

@H: wumhArA paMkwi/vyavahAra kuCa_BI acCA

nahIM_hE{3p.~msc.sg.}

PH: wumhArA vyvahAra kuCa BI TIka nahIM hE

As a solution to this it can be suggested that whenever the word 'varasa' occurs with a suffix like 'lo' then the choice is 'paMkwi' in Hindi.

e. PalYlu: xAzwa/Pala

Te: axi kopaMwo palYlu koVrikiMxi

@H: vaha' gussA_se xAzwa/Pala {pl.} kAtA {swrI.}

PH: vaha gusse se xAzwa pIsI

Te: nakka xrAkRa palYlu winAliani anukuMxi

@H: lomadi azgUra[-] xAzwa/Pala{pl.} KANA_cAhie EsA socA

PH: lomadi azgUra ke Pala KANA cAhiye EsA socA

In the above examples the ambiguity will be resolved by the editor using his world knowledge in the context of the discourse.

3.2.2.1.2 Verb:

a. jarugu: saraka/huA

Te: koVMceVM muMxuku jarugu

@H: WodA sAmane [ko] saraka`

PH: WodA sAmane saraka`

Te: awani vivAhamu awyaMwa vEBavamugA jarigiMxi

@H: usa_kA vivAha awyaMwa vEBava_* sarakA`

PH: usa kA vivAha awyaMwa vEBava pUrvaka huA

In the above examples, the word 'jarugu' corresponds to either 'saraka' or 'ho' in Hindi. It can be suggested that if the word 'jarugu' occurs after the adverbs such as 'muMxuku', 'venukaku', 'prakkaki', 'kriMxiki', 'koVMceVM' etc., then it may correspond to 'saraka' in Hindi elsewhere it is 'ho'.

3.2.2.1.3 Adjective:

a. bAgA: bahuwa/acCI_waraha_se

Te: nAku A pAta bAgA vaccu

@H: muJe vaha' gAnA bahuwa/acCI_waraha_se AwA_hE

PH: muJe vaha gAnA acCI waraha se AwA hE

Te: vAdi xaggira bAgA dabbu uMxi

@H: usa_kA pAsa bahuwa/acCI_waraha_se pEsA hE

PH: usa ke pAsa bahuwa pEsA hE

In order to resolve the ambiguity in the above examples it can be said that when nouns of 'bAgA' follow then it may correspond to 'bahuwa' alternatively when it is followed by a verb it corresponds to 'acCI_waraha_se' in Hindi.

3.2.2.1.4 Adverb:

a. kAnI: lekina/hone_xo

Te: A pani kAnI

@H: vaha' kAma lekina/hone_xo

PH: vaha kAma hone xo

Te: kAnI axi nijaM kAxu

@H: lekina/hone_xo vaha' sawya nahIM hE

PH: lekina vaha sawya nahIM hE

3.2.2.1.5 Mixed category:

a. calla: mattA[N]/TaMdA[Adj]

Te: calla nIYlu

@H: mattA/TaMdA pAnI

PH: TaMdA pAnI

Te: calla ivvu

@H: mattA/TaMdA xo

PH: mattA xo

The word 'calla' may correspond to 'mattA' or 'TaMdA' in Hindi. This ambiguity can be resolved in the following way. Whenever this word is followed by verbs like 'ivvu', 'ceVyyi', 'wAgu', etc., then it corresponds to 'mattA' in Hindi. It should also be noted that if this word occurs with other suffixes like '_ni' and '_gA' it may always be translated as 'TaMdA' or 'SIwala', and in some idio-syncretic cases as 'KuSa'.

b. koVttu: xukAna[N]/mAra[V]

Te: axi oVka cinna koVttu

@H: vaha' eka CotA xukAna/mAra

PH: vaha eka CotI xukAna hE

Te: awanini bAgA koVttu

@H: usako bahuwa xukAna/mAra

PH: use acCI-waraha-se mAra

Whenever homophonous words involve Noun-Verb combination it is somewhat easier to disambiguate them than in other cases. One has to look for adjectives or adverbs and decide the category of the word in question as noun or verb respectively. A post-editor may get help from the menu to take the decision accordingly.

3.2.2.1.6 Interrogative particle:

a. emi: kyA/koI

Te: rAmUki emi kAvAli

@H: rAma_ko` kyA/koI cAhiye

PH: rAma ko kyA cAhiye

Te: ixi emi Xarmasawramu kAxu

@H: yaha kyA/koI xarmaSAIA nahIM

PH: yaha koI xarmaSAIA nahIM hE

3.2.2.2 Post-editing Functional words:

Category 1:

1. ayinA: [huA]_wo_[BI]

a. huA_wo_BI:

Te: e pani ayinA ceswAnu

@H: kOna_sA/kisa kAma huA_wo_BI karawA_hE{1p.sg.}

PH: kOna sA kAma huA wo BI karawA hUz

b. wo_BI:

Te: parvAlexu eVIAGA ayinA sare

@H: koI_bAwa_nahIM kisa_prakAra_kEsA [huA]_wo_[BI] TIka_hE

PH: koI bAwa nahIM kEsA wo BI TIka hE

c. wo:

Te: kanIsaM nIvu ayinA A pani ceVyyi

@H: kama_se_kama wuma [huA]_wo_[BI] vaha_kAma kara

PH: kama se kama wuma wo vaha kAma kara

d. 0:

Te: e puswakamu ayinA caxivAvA?

@H: kOna_sA kiwAba [huA]_wo_[BI] paDA_kyA?

PH: koI kiwAba paDA?

2. gAni: lekina/yaxi/0

a. lekina:

Te: pAta pAduxuvu gAni muMxu I pani ceVyyi

@H: gAnA gAwA_hE{2p.sg.} lekina pahale/sAmane yaha kAma
kara

PH: gAnA gA lenA lekina pahale yaha kAma kara

b. yaxi:

Te: nIvu gAni A pani ceswe nIku boVmmalu iswAnu

@H: wuma lekina/yaxi vaha` kAma kare_wo wuma_ko
gudiyA{pl.} xewA{1p.sg.}

PH: wuma yaxi vaha kAma kare wo wumhe gudiyA xUzGA

c. 0.

Te: awadu gAni vaccAdA

@H: vaha` lekina AyA_kyA

PH: vaha AyA kyA

Note: If this word is followed by any negative marker it gives the negative sense such as `ke_alAvA', `ke_sivA', `ko_Codakara' etc. (See more description about this functional word in the coming level of post-editing)

3. anna: badA_BAI/kahA_hE_so/nAmaka

a. badA_BAI:

Te: balarAmudu kqRNudi anna

@H: balarAma kqRNa- badA_BAI/kahA_hE_jo_vaha-

PH: balarAma kqRNa kA badA BAI hE

b. kahA_hE_jo_vaha:

Te: vAdu anna mAtalu cAlA viMwagA unnAyi

@H: vaha badA_BAI/kahA_hE_jo_vaha-/nAmaka bAwa{pl.}

bahuwa viciwra_* hE{3p.~msc.pl.}

PH: vaha kahA hE so bAweM bahuwa viciwra hEM

c. nAmaka:

Te: akkada rAmApuraM anna Uru uMxi

@H: vahAz rAmApura badA_BAI/kahA_hE_jo_vaha-/nAmaka gAzva

hE{3p.~msc.sg.}

PH: vahAz rAmApura nAmaka gAzva hE

As a solution to the above problem it can be said that whenever this word is followed by `mAtalu' then it corresponds to `kahA_hE_jo_vaha' in Hindi and

the sense of 'nAmaka' will occur in very rare cases i.e., when this word is followed by the words 'Uru', 'peru' etc.

4. ane: kahawA_hE_jo_vaha_/nAmaka

a. kahawA_hE_jo_vaha-:

Te: vAdu ane mAtalu vinu

@H: vaha kahawA_hE_jo_vaha-/nAmaka bAwa{pl.} suna ,

PH: vaha kahawA hE jo vaha bAweM suna

b. nAmaka:

Te: akkada rAmApuraM ane peVxxa Uru uMxi

@H: vahAz rAmApura kahawA_hE_jo_vaha-/nAmaka badA

gAzva hE{3p.~msc.sg.}

PH: vahAz rAmApura nAmaka badA gAzva hE

5. aMtU: kahawA_huA/EsA

a. kahawA_huA:

Te: vAdu rAma rAma aMtU japaM ceswunnAdu

@H: vaha rAma rAma kahawA_huA/EsA japa

kara rahA_hE{3p.msc.sg.}

PH: vaha rAma rAma kahawA_huA japa kara rahA hE

b. EsA:

Te: peVxxA, cinnA aMtU eml lexu

@H: badA, CotA kahawA_huA/EsA kuCa_BI nahIM_hE

PH: badA, CotA EsA kuCa BI nahIM hE

6. ani: EsA_[kaha_kara]

a. EsA:

Te: vAdu vaswAnu ani annAdu

@H: vaha AwA_hE EsA[kaha_kara] kahA{3p.msc.sg.}

PH: vaha AyegA EsA kahA

b. EsA_kaha_kara:

Te: mohana A pani pUrwi ceswAnu ani veVIYlipoyAdu

@H: mohana vaha- kAma pUrA karawA_hE

EsA/kaha_kara calA_gayA

PH: mohana vaha kAma pUrA karUzgA EsA kaha kara calA gayA

c. kaha_kara:

Te: nIku AmeV weVlusu ani akkadiki veVIYIAnu

@H: wuma_ko vaha{swrI} mAIUma_hE EsA[kaha_kara]

vahAz_ko gayA{1.p.sg.}

PH: wumheM vaha mAIUma hE kaha kara vahAz gayA

According to the context the post-editor may select the appropriate meaning for the above mentioned functional words.

Category 2:

a. Disjunction:

1. ayinA: [huA]_wo_[BI]

Te: rAmudu ayinA kqRNudu ayinA vaswAru

@H: rAma [huA]_wo_[BI] kqRNa [huA]_wo_[BI]

AwA_hE{2,3p.hum.pl.}

PH: rAma yA kqRNa AyeMge

2. annA: kahA_wo_BI/badA_BAI_BI[kyA]

Te: ISvara annA allA annA oVkkare

@H: ISvara badA_BAI_BI[kyA]/kahA_wo_BI allAha
badA_BAI_BI[kyA]/kahA_wo_BI eka_hi_hE

PH: ISvara yA allAha eka_hi hE

3. gAnI:

Te: gIwa gAnI sIwa gAnI vaccArA?

@H: gIwA lekina sIwA lekina AyeM_kyA?

PH: gIwA yA sIwA AyeM kyA

b. Conjunctive:

1. aMtU:

Te: koVMwa maMxi wAmu cAlA goVppavAlYlaM aMtU
welivEnavAlYlaM aMtU moVsagiswUuMtAru

@H: kuCa loga hama bahuwa mahAna_hE_jo*_ve`{1p.pl.}
kahawA_huA/EsA akalamaMxa_hE_jo_ve`{1p.pl.} kahawA_huA/EsA
XoKA_xewe_rahawe_hE {2.3.p.pl.}

PH: kuCa loga hama bahuwa mahAna hE akalamaMxa hE EsA
kahawe hue XoKA xewe rahawe hEM

3.2.3 Post-editing Redundant information: Since, Anusaaraka output tends to be faithful towards SL, it brings the exact meaning of the concerned SL Text. In this process it uses special notations in mnemonic form to make equivalent constructions. A post-editor may get help from these notations and accordingly does the post-editing. The following are the notations that appear in the output and they are post-edited in the following way:

a. "-" mark: This mark () indicates that the current form or a word which it is attached with a variant with a different function i.e. it is homophonous with

a word that is functionally different from it. For example the demonstrative adjective 'A' and the demonstrative pronoun 'axi' in Telugu corresponds to 'vaha' a homophonous form in Hindi. It indicates that in Hindi the same word (homophonous) is used indistinguishably, but serving different morphological functions as a pronoun and as an adjective. However, the corresponding Telugu forms are morphologically distinguished. In order to bring this distinction i.e., that Telugu makes a distinction between the pronominal and adjectival distinction is captured in @Hindi by using a hyphen '-' i.e. an adjectival diacritic indicating that it seeks a head. In this notation the corresponding Telugu and Hindi words look as follows:

Te: A puswakamu

@H: vaha- kiwAba

PH: vaha kiwAba

Te: A puswakAnni caxuvu

@H: vaha- kiwAba_ ko paDa

PH: usa kiwAba ko paDa

Te: axi puswakamu

@H: vaha` kiwAba

PH: vaha kiwAba hE

The reason for distinguishing functionally distinct words but having single phonological shape is according to one of the basic principles of Anusaaraka which tends to preserve the distinctions of any sort that exist in the source language. This is keeping with the claim that Anusaaraka output is an image of the SL text and not exactly the translation where one would tend to lose or gain some information. Unlike in translation Anusaaraka basically involves in the management of information located in the SL text even at the cost of readability.

b. *wA_[WA/hE]_jo*_vaha`_[WA]* construction: This is the functional and semantic equivalent of the Telugu morphological complexes of the pronominalized durative participle `*_e-vAdu*' and `*_e-xi*'. It is ambiguous between 'the one who does the action denoted by the verb habitually' and 'the one who is doing now'. The selection of one meaning over the other is not possible from structural context. It has to be done from a larger context and it shall be left for the human post-editor to resolve this ambiguity by selecting one from the context of discourse. Consider the example:

Te: vAdu vaMtacesevAdu

@H: vaha rasoI_karawA_[WA/hE]_jo*_vaha`_[WA]{3p.msc.sg.}

PH: vaha rasoI karawA hE jo* vaha

Te: vAdu cAlA woVMxaragA vaMtacesevAdu

@H: vaha bahuwa jalxI_* rasoI_karawA_[WA/hE]_jo*_vaha`_[WA]
{3p.msc.sg.}

PH: vaha bahuwa jalxI rasoI karawA WA

c. *'EsA_[*-kara]'*- construction: This construction is given as an equivalent for 'ani' of Telugu. In the construction "*" mark represents any verb such as 'suna', 'kaha', 'bawa', 'bola', 'soca', 'mAna' etc., If the context of the text demands the verbal form after 'EsA' then the post-editor may retain the form by replacing the "*" mark with the appropriate verb otherwise he may drop the '*-kara' form as a redundant information. Consider the following examples:

Te: awadi ekAgrawani BaMgaM ceVyyakUdaxu ani awadiwo
matlAdalexu

@H: vaha{msc.}- ekAgrawA_ko BaMga karanA_nahIM_cAhie
EsA_[*-kara] usa{msc.}_se bAwa_nahIM_kiyA

PH: usalI ekAgrawA ko BaMga nahIM karanA cAhie EsA soca kara
usase bAwa nahIM kI

Te: eVMwo maMxi vaswArani anukuMtunnAru

@H: bahuwa_hI loga Awa_hE_EsA [*-kara]{2,3p.pl.}

soca_rahA_hE{2,3p.pl.}

PH: bahuwa loga Awe hE EsA soca_rahe hEM

Te: cAlA maMxi vaswArani A erpAtu ceVyyamaMxi

@H: bahuwa loga Awa_hE_EsA [*-kara] vaha- prabaMXa

karane_ke_lie_bolA {3p.~msc.sg.}

PH: bahuwa loga Awe hEM EsA kaha kara vaha prabaMXa karane ke lie
boll

Te: ippude vaswAnani veVIYliMxi

@H: aba_hI Awa_hE EsA [*-kara] gayA{3.~msc.sg.}

PH: aBI Awa hUz EsA bawA kara gal

d. `_*' mark: This symbol occurs as an equivalent to Telugu adverbial marker '-ga' after a noun. This symbol `_*' may indicate various senses, such as 'se', 'meM', 'ke_kAraNa', 'ke_rUpa_meM', 'sA' etc., according to the context of the text. The post-editor may select the appropriate equivalent or else may drop it altogether. As an example see the following:

Te: AmeV aMxaMgA uMxi

@H: vaha{swrI.} suMxara_* hE{3p.~msc.sg.}

PH: vaha swrI suMxara hE {3p.msc.sg.}

PH: use Ao_EsA kaha

Te: akkadinuMdi jAgrawwagA rA

@H: vahAz_se sAvaXAnI_* Ani amAdu

PH: vahAz se sAvaXAnI se Ao_EsA kaha{3p.msc.sg.}

PH: glwA se Pula woda EsA kaha

Te: e vivAxaM weVccinA viciwraMgA pariRkariMcevAdu

@H: kOna_sA vivAxa lAyA_wo_BI viciwra_*

hala_karawA_[WA/hE]_jo-vaha`_[WA] {3p.msc.sg.}

PH: kOna_sA vivAxa lAye wo BI viciwra rUpa se hala karawA

WA

Te: akkada janaM guMpulu guMpulugA unnAru

@H: vahAz loga samUha samUha_* hE{2,3p.msc.pl.}

PH: vahAz loga samUha samUhoM meM heM

PH: Gara pahuzcA

Te: manaM prawyekaMgA oVka maMxu wayAru ceyiMcAli

@H: hama prawyeka_* eka xavA wEyAra karavAnA cAhiye

PH: hame prawyeka rUpa meM eka xavA wEyAra karavAnA hE

PH: gAzva pahuzcA

e. 'EsA' -construction: This construction is used as a corresponding Hindi equivalent for Telugu causative verbal participle 'mani' in Anusaaraka. This 'mani' form always occurs with the infinitive of a verb and this is not written separately. In this level with regard to post-editing since this construction is transparent to the readers, there is no need of post-editing it again. See the following examples:

Te: awanini rammani annAdu

@H: usa_ko Ao_EsA kahA{3p.msc.sg.}

PH: use Ao_EsA kahA

Te: vAdu paswulawo unnAdu

@H: Te: glwani puvvulu koVyyamani annAdu

@H: glwA_ko PUla{pl.} woda_EsA kahA{3p.msc.sg.}

PH: glwA se Pula woda EsA kahA

3.2.4 Dropping the redundant information: It was found that in the @Hindi output certain case-markers stand redundantly without adding any additional information. They often cause irritation to the reader hence they need to be dropped in post-editing. Here are some of them:

3.2.4.1 Accusative case-marker: Accusative case-marker inflected to adverbial nouns in the context of the verb "ceru" may be dropped. The following are the examples:

Te: iMtini cerukunnAdu

@H: Gara_ko pahuzcA{3p.msc.sg.}

PH: Gara pahuzcA

Te: Urunu cerukunnAdu

@H: gAzva_ko pahuzcA{3p.msc.sg.}

PH: gAzva pahuzcA

3.2.4.2 Instrumental: When certain nouns like jvaraM 'fever', rogaM 'disease', jabbu 'disease', paswulu 'fasting' etc. are marked for instrumental and the predicate of the sentence or clause is the verb uMdu 'to be' then the corresponding instrumental marker of @Hindi output may be dropped to obtain a more acceptable output as in the following examples:

Te: vAdu rogaMwo unnAdu

@H: vaha bImArI_se hE{3p.msc.sg.}

PH: vaha bImAra hE

Te: vAdu paswulawo unnAdu

@H: vaha BUKa_se hE{3p.msc.sg.}

PH: vaha BUKA hE

Te: vAdu jabbuwo unnAdu

@H: vaha bImArI_se hE{3p.msc.sg.}

PH: vaha bImAra hE

3.2.4.3 *Dative*: In Hindi, adverbial nouns of space and time (yahAz

'here', vahAz 'there', iXara 'here', uXara 'there', rAwa 'night', xina 'day', SAma 'evening', subaha 'morning', baje 'time', GaMtA 'hour', Gara 'house', gAva 'village' etc.) often do not require to be marked for goal by the marker [_ko] {accu.- dat.}. However, the Telugu output of @Hindi often carries this marking. Since this marker on adverbial nouns in the context of verbs of motions (A 'come', jA 'go', pahuzca 'reach' etc.) is redundant these markers will be dropped so that the output reads more natural.

Ex:

Te: iMtiki cerukunnAdu

@H: Gara_ko` pahuzcA{3p.msc.sg.}

PH: Gara pahuzcA

Te: Uriki po

@H: gAzva_ko` jA

PH: gAzva jAo

Te: iMtiki vaccAdu

@H: Gara_ko AyA{3p.msc.sg.}

PH: Gara AyA

Te: nIvu ikkadiki vaswAvA

@H: wuma yahAz_ko AwA_hE_kyA{2p.sg.}

PH: wuma yahAz Aoge_kyA

Te: lopalaki vaccAdu

@II: aMxara_ko AyA{3p.msc.sg.}

PH: aMxara Ao

Te: akkadiki velYli cUdu

@II: vahAz_ko jA_kara xeKa{2p.sg.}

PII: vahAz jA kara xeKo

Te: A Uri xaggiraki vacciMxi

@II: vaha- gAzva- pAsa_ko AyA{3p.~msc.sg.}

PII: vaha gAzva ke pAsa AyA

Te: vAdu paxi gaMtalaku vaccAdu

@II: vaha xasa GaMtA_ko' {ba.} AyA{3p.msc.sg.}

PH: vaha xasa baje AyA

Te: A iMlioki cUdu

a) Telugu quantifiers are combined with classifiers to function as quantifiers modifying nouns denoting human beings. But in Hindi such information becomes redundant and odd. Such cases needed to be deleted. For example, whenever a Telugu classifier noun 'maMxi' which is roughly translatable as 'loga' is followed by a noun denoting human beings the classifier maMxi is dropped and if the same classifier is followed by a verb it needs to be retained in the corresponding TL output.

Ex:

Te: akkadiki koVMwa maMxi pillalu vaccAru

@II: vahAz_ko kuCa loga baccA{ba.} AyA{3p.hum.pl.}

PII: vahAz kuCa baccAye

Te: akkadiki koVMwa maMxi vaccAru

@II: vahAz_ko kuCa loga AyA{3p.hum.pl.}

PII: vahAz kuCa loga Aye

3.2.5.1 A missing post-position:

3.2.4.4 Telugu locative and Hindi genitive: In the SL when nouns

are inflected for 'loni' then the output of TL should be in the following way:

Ex:

Te: kuMdaloni nllYlu

@H: matakA meM_kA pAnI

PH: matakE kA pAnI

Note: In the above structure the TL locative case-marker 'meM' is dropped in Hindi. Similarly, in the SL post-position 'loki' will have the corresponding Hindi equivalent 'ke_aMxara' instead of 'ke_aMxara_ko'. to Hindi '_ke_aMxara'.

Ex:

Te: A iMtiloki cUdu

@H: vaha- Gara_ke_aMxara_ko` xeKa

PH: usa Gara ke aMxara xeKo

Te: vAtini iMtiloki wIsukoVni rA

@H: una_ko Gara ke_aMxara_ko` lekara A

PH: unheM Gara ke aMxara lekara Ao

3.2.5 Miscellaneous: In Telugu, during the conversational discourse many words are omitted or elided, but the addressee is able to get the sense of the omitted words. However, the untrained @Hindi readers may not be able to get the senses of these elapses due to the differences in the pragmatics and world knowledge between these languages. As a result the output sometimes appear to be ambiguous. In these circumstances post-editing becomes essential for the correct comprehension of the output.

3.2.5.1 A missing post-position:

Ex:

Te: nIkU nAkU unna BexaM emiti?

@H: wumhe_BI muJe_BI rahA_hE_jo*_vaha- Bexa kyA_hE?

PH: wumhAre Ora mere blca meM rahA Bexa kyA_hE?

Te: viSvAsa wIrmAnAnikI, muRti yuxXAnikI wedA lekuMda
pravarwiMcAru.

@H: viSvAsa praswAva_ko_BI, mukka_yuxXz_ko_BI Paraka

nahIM_rahe_binA barwAva_kiyA{2,3p.hum.pl}

PH: viSvAsa praswAva Ora mukka yuxXa ke blca meM Paraka

nahIM hE jEsA barwAva kiyem

In the above Telugu sentences the word 'maXya' is missing. However, the Telugu speakers do understand this sentence. However in the target language it will be supplied by the post-editor. Whenever a sentence has one of the three words BexaM 'difference', wedA 'difference', xUraM 'distance' then one has to look for the missing word 'maXya'. In case such a word is missing one should either supply it while pre-editing of the text or supply its equivalent 'ke_bIca_meM' in post-editing.

Te: N_kU, N_kU (maXyA) unna BexaM/wedA/xUraM

Here are some more examples of certain cases involving elipses:

3.2.5.2 A missing post-position:

Ex:

Te: pillala manassu weVliyaxu AmeVku

@H: baccoM_kA mana mAUma_nahIM_howA_[hE] usa_ko` {swrl.}

PH: baccoM kA mana ke bAre meM mAUma nahIM hE usa swrl ko

In the above example the word 'guriMci' has been elided in the SL.

3.2.5.3 A missing correlating pronominal 'A':

Ex:

Te: mana wotalo unnaxe sarassu

@H: hamArA bAga_meM/bAga_vA{pl.} [rahA]_hE_jo*_vaha`_hI

Ex: {3p.~msc.sg.} sarovara

PH: hamAre bAga meM hE na vaha sarovara

In the above example the corresponding word 'A' is not used in SL.

3.2.6 Insertion of copula: Telugu employs verb less sentences in equative and comparative constructions in affirmative mood. In other words the use of copula is restricted to equative and comparative construction in negative mood. However, Hindi obligatorily uses the auxiliary ho- 'to be' and its morphological variants as copula. Hence the anusaaraka @Hindi output of Telugu equative and comparative constructions in affirmative would not have the necessary copula and the sentences look incomplete. In post-editing level-1 the necessary copula in its correct form shall be supplied to make the construction read natural.

Ex:

Te: rAmudu lakRmaNunikaMte peVxxavAdu

@H: rAma lakRmaNa_se` badA` {msc.sg.}

PH: rAma lakRmaNa_se badA hE

Te: rAmudu maMci bAludu

@H: rAma acCA bAlaka {msc.sg.}

PH: rAma acCA bAlaka hE

Te: AmeV peru himAni

@H: vaha- {swrI} nAma himAnI {3p.~msc.sg.}

PH: usa_kA nAma himAnI hE

3.2.7 Clitics: In Telugu cliticized words are used in certain constructions to denote conjunctions, disjunctions, interrogative and dubitative functions. However, in Hindi these functions are realized by a different mechanism which involves the use of conjunction and disjunction words such as 'Ora' and 'yA' as in the following:

Ex:

Te: rAmudU lakRmaNudU vaccAru.

@H: rAma_BI lakRmaNa_BI AyA{2,3.~hum.pl.}

PH: rAma Ora lakRmaNa Aye

Te: rAmudA lakRmaNudA vacciMxi?

@H: rAma_kyA lakRmaNa_kyA AyA_hE_jo*_vaha`{3p.~msc.sg.}?
 @H: rAma_kyA

PH: rAma AyA hE yA lakRmaNa

Te: ammAyo abbAyo vaccAru

@H: ladikI_vA ladakA_vA AyA{2,3.~hum.ba.}

PH: ladikI yA ladakA Aye

3.2.7.1 Clitic `U': This vowel at the end of an element signifies either vocation or conjunction. But if this vowel occurs with the negative finite verbs in SL such as "ceVppavU", "ceVyyarU", "ceVpparU", "ceVyyavU", "winavU" etc., then in the TL the clitic `_BI' may be replaced by the question word "kyA". This rule can be made automatic later.

Ex:

Te: nijaM emitto ceVppavU?

@H: sawya na_jAne_kyA_hE nahIM_kahawA_[hE]_BI
 {2p.sg.,3_~hum.pl.}

PH: sawya kyA hE nahIM kahawA hE kyA

Here are some examples involving nouns carrying the clitic `U':

Te: bAbU!

@H: bAbU!/bAbU_!BI

PH: bAbU!

Te: bAbU vaccAdu

@H: bAbU!/bAbu_BI AyA

PH: bAbu_BI AyA

3.2.7.2 Clitic `A': For a Telugu word which ends in `_A' the anusaaraka @Hindi output often is ambiguous depending on its source word structure as in the following.

1. Te: rikRA

@H: rikRA[-]

PH: rikRA

Note: In the above example `rikRA' may be nominative, singular, or vocative, singular.

2. Te: kAlA

@H: sapnA_kyA[BI/!]

PH: sapnA_kyA

Note: In the above example `kalA' can be analyzed as a morphological complex of +nominative, +singular, appended with an interrogative clitic {kala,+nom.sg.+A}; or +nominative, +singular appended with a conjunctive clitic {kala,nom.sg.+V}; or plus vocative and singular {kala,voc.sg}.

3. Te: pApA

@H: baccl_kyA[BI/!]

3.2 PH: baccl_kyA *'I'*: This vowel is a phonological variant of the vocative and conjunctive clitic expressed through the lengthening of the word final short *'i'*. Whenever it occurs on words they are always ambiguous between vocative. If the root ends in either *'_A'* or *'_a'* then the output is always ambiguous as in the above examples(1 and 2) which require to be resolved in post-editing since machine alone cannot resolve this ambiguity.

Te: rikRA vacciMxi
 @H: rikRA_[!] AyA_{3p.~msc.sg.}
 PH: rikRA AyA

Te: ey rikRA! itu rA
 @H: he rikRA_[!] iXara A
 PH: he rikRA! iXara A

Te: ixi kalA nijamA?
 @H: yaha sapanA_kyA[BI/!] saca_kyA?
 PH1: yaha sapanA_kyA saca_kyA?
 PH2: yaha sapanA hE yA saca?

Te: kalA nijamU oVkatelA unnAyi
 @H: sapanA_kyA[BI/!] saca_BI[!] eka_hI-jEsA hE{3p.~hum.pl.}
 PH1: sapanA_BI saca_BI eka_hI-jEsA hEM
 PH2: sapanA Ora saca eka hI jEsA hEM

Te: O pApA bAbU itu vaccAru
 @H: eka baccl_kyA[BI/!] baccA_BI[!] yahAz AyA{2,3p.pl.}
 PH: eka baccl Ora baccA ixara AyA

3.2.7.3 Clitic 'I': This vowel is a phonological variant of the vocative and conjunctive clitic expressed through the lengthening of the word final short 'i'. Whenever it occurs on words they are always ambiguous between vocative and conjunction. There is no fool proof mechanism to disambiguate this automatically. The post-editor will select the correct as shown below. Consider the examples:

Te: o kavI!

@H: he kavI_BI[!]

PH: he kavI!

Te: vAdu kavI mariyu racayiWA kUdA

@H: vaha kavI/kavI_BI[!] Ora leKaka BI

PH: vaha kavI BI hE Ora leKaka_BI

3.2.8 Special particles:

1. 'gAnI': gAnI is a syntactic element and comes in four alternate shapes as gani~gAnI~kAni~kAnI. It is a multi functional syntactic element not so easily lend itself for translation hence the necessity of post-editing. Of the four alternants, gAni is the most predominant and in frequency it is almost three times greater than any of its variants.

Distribution of gAnI: gAnI can occur after a noun (either inflected or uninflected), a verbal participle and after a finite verb. It can also occur as a conjunctive between clauses.

i. Noun: When nouns of time viz. seconds, minutes, hours, days, weeks, months, years, etc., are attached with 'gAnI' it means the action that is being referred to will not take place before but certainly it will happen afterwards. Hence the equivalent construction in Hindi would be 'N{tmp_n}_ke_pahale/huye_binA/_waka'. Since it is impossible to assign a single

appropriate equivalent to gAni it is decided to retain 'gAni' as 'gAni' in @Hindi output. A trained reader would read it appropriately according to the context getting online help. However, it will be post-edited for untrained anusaaraka readers in a thorough way. Again an online help through a menu will help a post-editor for selecting an appropriate equivalent in the context.

- a. N_ku_gAni - neg.fin_V. where N is temporal_adverb

Ex:

Te: vAdu nAlugu gaMtala waruvAwa gAni rAdu

@H: vaha cAra baje ke_bAxa gAnI nahIM AwA{3.msc.sg.}

PH: vaha cAra baje se_pahale nahIM AwA

Te: vAdu rAwriki gAni rAdu

@H: vaha rAwa_ko`_gAnI nahI_AwA{3p.msc.sg.}

PH: vaha rAwa hone_se_pahale nahIM AwA

Te: seVpteVMbaru 15 nAtikigAnI iMxuku saMbaMXiMcina

Ex: prapaMca samAveSaM jaragalexu.

@H: seVpteMbar_15 xina_ko`_gAnI isake_lie saMbaMXiwa

viSva_samAveSa huA_nahIM.

PH: siwaMbara 15 se pahale isa se saMbaMXiwa viSva bETaka nahIM huA.

- b. If a noun is inflected by 'lo_gAnI', 'wo_gAnI', 'ni_gAnI' and 'gAnI' the predicate is in the negative, they are translated in Hindi as 'ke_sivA_Ora_ka*/ ke_alAvA_Ora_ka*/ ke_awirikwa_Ora_ka*'. A point to be noted is that these constructions are the regular corresponding Hindi equivalents

which will again be followed by the question words such as *koI*, *kisI*, *kuCa* etc., as in the following:

N_lo_gAni neg_fin_V_neg

Ex:

Te: vAdu hiMxIlo_gAnI mAtIAdadu

@H: vaha hiMxI_meM_gAnI bAWa_nahIM_karawA {3p.msc.sg.}

PH: vaha hiMxI ke sivA Ora kisI BARA meM bAWa nahIM karawA

Te: cepalu nItilogAni bawakalevu

@H: maCall{ba.} pAnI_meM_gAnI nahIM_jI_sakawA_hE

{2p.sg.,3p.~hum.pl.}

PH: maCall pAnI ke sivA Ora kisI jagaha nahIM jI sakawe

Te: vAdu seVlavulalogAnI rAdu

@H: vaha- CuttiyoM_meM_gAnI nahIM_AwA_[hE]{3p.msc.sg.}

PH: vaha CuttiyoM ke sivA Ora kaBI nahIM AwA

N_wo_gAni neg_fin_V

Ex:

Te: vAdu nAwogAnI ceVppadu

@H: vaha{pu.} muJase`_gAnI nahIM_kahawA_[hE]{3p.msc.sg.}

PH: vaha mere sivA Ora kisI se nahIM kahawA

Te: rAmalakRmaNulawogAnI viSvAmiwruni samasyaku pariRkAraM
laBiMcalexu

@H: rAmalakRmaNa_se_gAnI viSvAmiwra-samasyA_ko` samAXAna

prApwa_huA_nahIM {3p.~msc.sg.}

PH: rAmalakRmaNa ke sivA Ora kisI se viSvAmiwra kA samasyA ke
lie samAXAna prApwa nahIM huA

N_ni_gAni fin_V_neg

Ex:

Te: vAdu vyAkaraNAnnigAnI caxavadu

@H: vaha vyAkaraNa_ko_gAni nahIM_paDawA_[hE]{3p.msc.sg.}

PH: vaha vyAkaraNa ke awirikwa Ora kuCa nahIM paDawA hE

Te: naksalEtlu pollsulnigAni caMparu

@H: naksalEt{ba.} pollsa_gAni nahIM_mAra_dAlawA_[hE]{23_ba.}

PH: naksalEt pollsa ke Codakara Ora kisI_ko nahIM mArawe hE

N_gAni fin_V_neg

Ex:

Te: rAvaNuni rAmudugAnI caMpaledu

@H: rAvaNa-ko rAma_gAni nahIM_mAra_sakawA_[hE]

PH: rAvaNa ko rAma ke sivA Ora koI nahIM mAra sakawA

c. Disjunctive gAnI: In the following cases 'gAnI' occurring more than once functions as a disjunctive

Ex:

Te: rAmudu gAnI lakRmanudu gAnI vaccArA?

@H: rAma yA lakRmaNa yA AyA_kyA?

PH: rAma yA lakRmaNa AyA kyA?

ii. Verbal participle-gAnI: When 'gAnI' is used after verbal participles, and when the predicate of the clause is in negative it has similar functions as discussed above.

Ex:



Te: vAdu winetappudu gAnI wAgadu

@H: vaha KAwe_samaya_gAnI pIwA_nahIM_[hE] {3p.msc.sg.}

PH: vaha KAwe_samaya_ko_Codakara Ora kaBI nahIM pIwA hE

Ex:

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Te: vAdiki A paniceswunnapudu gAnI weVliyalexu

@H: usa_kovaha-kAmakarawA_samayagAni

Uma_huA_nahIM{3p.~msc.sg.}

PH: usa ko vaha kAma karawe samaya waka mAUma nahIM huA

Ex:

Te: A paniceswegAni nIku nammakaM kuxaraxu

@H: vaha- kAma karane_para_gAnI wuma_ko viSvAsa
nahIM_jamawA{3p.~msc.sg.}

PH: vaha kAma karane waka wumhe viSvAsa nahIM hogA

Te: A pani ceswenegAnI nIku nijaM weVliyaxu

@H: vaha` kAma karane_para_hI_gAnI saca mAUma_nahIM
howA{3p.~msc.sg.}

PH: vaha kAma karane waka saca mAUma nahIM hogA

d. V_inA_gAnI: Unlike in other Verbal participles the occurrence of 'gAnI' does not condition or stipulate that the predicate of the clause or the sentence should be in negative. Hence, 'gAnI' here will be interpreted as an emphatic particle rather than a negative particle.

Ex:

Te: vAdu ceVppinAgAni caxavadu

@H: vaha kahane_para_BI_wo` gAni paDawA_nahIM{3p.msc.sg.}

PH: vaha kahane ke bAxa BI nahIM paDawA

Te: eVkkadiko gAnI veVIYIADu

@H: na_jAne_kahAz_ko_wo` gAnI gayA{3p.msc.sg }

PH: na jAne kahAz lekina gayA

Te: eVkkadiniMco gAnI vaccAdu

@H: na_jAne_kahAz_se gAnI AyA{3p.msc.sg }

PH: na jAne kahAz se lekina AyA

3.2.9 Idiosyncracies: In Telugu some words are metaphorically used as alternatives for some other words. Such usages are mostly idiosyncracies and they need to be post-edited properly. Consider the following examples:

3.2.9.1 wiyyi `nikAla': The Telugu verb `wiyyi' is listed in the Anusaaraka Telugu-Hindi bilingual dictionary with the meaning `nikAla' (to take) in the TL Hindi. In Telugu it is used somewhat loosely in the sense of `Kola' (to open) in the context of `a lock' `a door' and `a page in a book'. Since Anusaaraka is an image of the source language, the @Hindi output of the verb `wiyyi' will be ambiguous for the native Hindi reader. It requires to be post-edited at least in the last level of post-editing as illustrated below:

Te: wAIYaM wISAnu

@H: wAlA nikAlA{1p.sg } hE{3p msc sg }

PH: wAlA Kola

Te: walupu wiyyi

@H: xaravAjA nikAla

PH: xaravAjA Kola

Te: puswakamu wiyyi

@H: kiwAba nikAla

PH: kiwAba Kola

3.2.9.2 kAlcu `jalA`: In Telugu the word `kAlcu' has got various meanings such as jalA `to burn', seMka `to roast', goli_calA `to discharge gun', `to smoke'. Unlike Telugu, in Hindi there is a separate word for each of these. The Anusaaraka Telugu-Hindi bilingual dictionary lists jalA (with diacritic) `to burn' as equivalent to `kAlu' as it covers wider range of meanings. A post-editor has to select the appropriate word in the context. The examples may be illustrated in the following way:

Te: inumunu bAgA kAlcu

@H: lohA_ko acCI_waraha_se jalA`

PH: lohe ko acCI waraha se jalA

Te: roVtteVnu iMkA kAlcu

@H: rotI ko Ora_BI jalA`

PH: rotI ko Ora seMka

Te: vAdu wupAkiwo jiMkanu kAlcAdu

@H: vaha baMXUka_se hiraNa_ko jalAyA` {3p.msc.sg}

PH: vaha baMXuka se hiraNa ko goll mArA

Te: vAdu cutta kAluswunnAdu

@H: vaha sigAra jalA`_rahA_hE{3p.msc.sg}

PH: vaha sigAra pl rahA hE

In order to resolve such problems there is every need for post-editing. The ambiguity cannot be resolved automatically by machine, since world knowledge and pragmatic knowledge are essential to resolve these problems hence, post-editing becomes necessary. But before going for post-editing the convenience of an untrained reader the corresponding Hindi equivalent for `kAlcu' must be marked with a tag[] which means that it has many other senses too and an online help with more information about this word may also be provided

so that the post-editor can comprehend the correct meaning and according to the requirement of the context he may replace the word.

3.3 Post-editing level-2: It is mentioned earlier that the Anusaaraka output is an image of the SL both in the structure and the style. Even after the first level of post-editing the output will be similar to that of SL. Due to these stylistic differences between the @Hindi and the natural Hindi the native speaker of the TL Hindi may find it difficult to comprehend the language obtained in the output, though it is grammatically error free. To make the output acceptable both grammatically as well as stylistically the second level of post-editing is necessary. While post-editing at this level the post-editor makes the following changes on the output obtained from post-editing at level-1:

3.3.1 Dealing with the case-markers: It was mentioned that at the first level of post-editing certain case-markers are left unchanged though they do not convey exactly the same effect, since the readers are able to comprehend the sense due to their transparency. In other words in the first level of post-editing only minimum post-editing is done, therefore the post-editor will leave such case-markers which are of transparent in nature. However, in the second level of post-editing all those transparent case-markers but stylistically less appealing are now changed according to the native style of the TL.

3.3.2 Special Anusaaraka constructions: As said in the beginning that in order to bring the exact information that is present in the SL into the TL, anusaaraka uses certain artificial constructions. It has been also mentioned that while dealing with these construction in the first level of post-editing the post-editor has to drop only the redundant and unnecessary information present in the construction. But at the second level of post-editing the post-editor will convert these artificial constructions into their natural Hindi equivalents. This conversion may be done in the following way:

3.3.2.1 hE_jo*_vaha- construction: It is an artificial adjectival construction appended to any participle of a verb to derive the corresponding verbal adjectives as exact equivalents to a number of Telugu verbal adjectival constructions as shown below:

a. Te: caMpina puli

@H: marA_hE_jo*_vaha- Sera

Eg: 'the tiger that killed someone'

or

the tiger that was killed'

b. Te: winina Aku

@H: KAyA_hE_jo*_vaha- pawwA

Eg: 'the leaf (on which) somebody ate'

or

3.3.3 'the leaf that somebody ate' [IWA]: This is yet another artificial

construct which is provided as an exact equivalent to Telugu pronominalized

durative v. c. Te: winina ceVMcA

@H: KAyA_hE_jo*_vaha- cammaca' and the doers of durative actions' as

shown below. Eg: 'the spoon (with which) someone ate'

or

Ex: the spoon that somebody ate'

In the above sentences the anusaaraka @Hindi output to each of the Telugu phrases are exact equivalents both by structure and meaning. The Telugu phrases are ambiguous and they are disambiguated only in the context of world knowledge and pragmatics. Since the @Hindi inherits the Telugu structural as well as their semantic import they are too considered as ambiguous. However, the

readers who are native Hindi speakers and who do not have any knowledge of Telugu would not be able to get the same sense(s) that a Telugu reader is getting since their world knowledge and pragmatics are different. Therefore the need for training to read and understand the @Hindi output. Another way to read correctly the @Hindi output is to post-edit these constructs by a trained post-editor who would convert these into natural Hindi correlative constructions called Jo-vo- constructions.

Te: caMpina puli

@H: mArA_hE_jo*_vaha- Sera

PH: i. jisa Sera ne mArA hE vaha

ii. jisa Sera ko mArA hE vaha

Te: mekanu caMpina pulini pattukunnAru

@H: bakarI_ko mArA_hE_jo*_vaha- Sera_ko pakadA_{A.}_hE
{2,3p.hum.pl }

PH: bakarI ko jisa Sera ne mArA hE usa ko pakada lie hEM

3.3.2.2 [WA/hE]_jo_vaha_[WA]: This is yet another artificial construct which is provided as an exact equivalent to Telugu pronominalized durative verbal adjectival participle. This construct is ambiguous between the nouns indicating the 'doers of habitual actions' and the doers of durative actions' as shown below:

Ex:

Te: pUjAri rojU pUja cesevAdu

@H: pUjArIhara_xinapUjAkarawA_[WA/hE]_jo_vaha_[WA]{3p.msc.sg }

PH: pUjArI hara xina pUjA karawA_WA

Te: I gudilo pUja cesevAdu eVvadU ledu

@H: yaha_maMxira_meM pUjA karawA_[W/hEA]_[jo_vaha]_[WA]

PH: kol{3p.msc.sg.} nahI_hE{3p.msc.sg.}

PH: isa maMxira meM jo pUjA karawA_WA vaha kol nahI hE

Te: xii avani annaxi

@H: vAdu aByasiMcevAdu jo*_vaha_AshA_hE jo*_vaha

PH: vaha aBayAsa_karawA_[WA/hE]_[jo_vaha]_[WA]{3p.msc.sg.}

PH: vaha aBayAsa karawA hE so hE

3.3.2.5 *EsA [*/-kara]* construction: It is already mentioned in the

previous section. **3.3.2.3 0_hE_jo*_vaha`**: This construct is a pronominalized nominal of the artificial verbal adjective 0_hE_jo*_vaha- corresponding to Telugu pronominalized verbal participles. At the second level of post-editing they will be post-edited as shown below:

Te: rAmu cesinaxi aMxariki nacciMxi

@H: rAma kiyA_hE_jo*_vaha` saba_ko pasaMxa AyA{3p.~msc.sg.}

PH: rAma ne jo kiyA hE vaha saba ko pasaMxa AyA

Te: vAdu vasvAdani anukunAnu

@H: akkada kUrcunnavAdu BARawIyudu kAdu

@H: vahAz bETA_hE_jo*_vaha` BARawavAsI nahIM_hE{3p.msc.sg.}

PH: vahAz jo bETA hE vaha BARawavAsI nahIM hE

Te: vAdu I pani cesvAdani vaccAnu

3.3.2.4 kA_hE_jo*_vaha`: It is one of the artificial constructions given as equivalent to the source language Telugu constructions involving pronominalized oblique nouns i.e., oblique forms of nouns inflected for number gender and person. These artificial constructs have the import of both the SL structure and meaning. These structures need to be post-edited at post-editing level-2, since without the knowledge of Telugu and some training they are hardly comprehensible. Here are some examples:

Here are some examples:

Te: I puswakamu A ammAyixi

@H: yaha puswaka vaha-ladikI_kA_hE_jo*_vaha`

PH: yaha puswaka usa ladikI kA hE

Te: axi awani annaxi

@H: vaha usa_kA BAI_kA_hE_jo*_vaha-/kahA_hE_jo*_vaha`

PH: vaha usa kA BAI kA hE

3.3.2.5 EsA [*-kara] construction: It is already mentioned in the previous strategy that this construction serves as an artificial @Hindi word corresponding to SL word "ani". It is also said only if the context demands (the verb after 'EsA') the '*-kara' form representing various senses should be retained or else should be dropped. Whenever, the above mentioned construction is followed by the verbs such as anukoVnu `soca', annAnu `kaha', ceVppu `bawA', weVlupu `bawA' etc., then the element '*-kara' given in the square brackets must be omitted, elsewhere it must be retained.

Te: vAdu vaswAdani anukunnAnu

@H: vaha- AwA_hE_EsA [*-kara] socA {1p.sg }

PH: vaha AyegA EsA socA

Te: vAdu I pani ceswAdani vaccAnu

@H: vaha yaha- kAma karawA_hE_EsA [*-kara] AyA {1p.sg }

PH: vaha yaha kAma karegA EsA soca kara AyA

PH: vaBI vaha GatanA Gati

3.3.2.6 "-*" mark : This diacritic is used as an @Hindi equivalent to a noun appended with the adverbial particle "gA" in SL. As mentioned earlier this "-*" mark has several corresponding senses in TL. As per the demand of the context the concerned sense must be installed. In some cases this mark is dropped. Here are some examples:

Te: vAdu eVMwo uwsAhaMgA annAdu

@H: vaha bahuwa_hl uwsAha_* kahA{1p.msc.sg }

PH: vaha bahuwa uwsAha_se kahA

Te: A illu cAIA pariSuBraMgA uMxi

@H: vaha- Gara bahuwa sAPa_* hE{3p~msc.sg }

PH: vaha Gara bahuwa sAPa hE

Te: A iMtini cAIA aMxaMgA amarcAdu

@H: vaha- Gara_ko bahuwa suMxara_* sajAyA{3p.msc.sg }

PH: usa Gara_ko bahuwa suMxara rUpa meM sajAyA

3.3.3 Dealing with the content words: In the previous level under the sub-heading 'content words' it was mentioned that whenever, these words are ambiguous and cannot be listed in the bilingual dictionary with single equivalent Hindi word, Anusaaraka dictionary identifies one core meaning and it is represented by a single target language word i.e., Hindi word with a tag[] indicating that it is not the same as the TL Hindi word but it conveys less or more than its original meaning. An on line help is provided whenever such a word is found in the text along with the procedure for proper interpretation of the word in the context.

Te: appude A saMGatana jarigiMxi

@H: waba_hl vaha- Gatana sarakA'{3p~msc.sg }

PH: waBI vaha Gatana GatI

3.4.1 Word order: It is a known fact that in the anusaaraka bilingual dictionary with a diacritic selecting 'SoRiwa'_ho' a word which represents the case meaning of the Telugu word as in 'Aru' which means 'sUKa', 'TaMdA_ho', 'bujA' etc.

Te: wadi battalu Aripoyinay

@H: gIle kapade SoRiwa_ho_gayA{3p.~hum.pl.}

PH: gIle kapade sUkagaye

Te: kAcina nIlylu Aripoyinay

@H: garam_kiyA_he_jo*_vaha pAnI SoRiwa_ho_gayI{3p.~msc.pl.}

PH: garam pAnI TaMdA ho gayA

Te: xIpaM AripoyiMxi

@H: xIpa SoRiwa_ho_gayI_{3p.~msc.sg.}

PH: xIpa bujagayI

3.4 Third strategy of post-editing: This level is used for literary texts.

This is the final level of post-editing. In this level the post-editor generally deals with the problems not only that are related to pragmatics and world knowledge but which are concerned in making the output as more appealing and of course sacrificing originality, authenticity and accuracy. High level of acceptability is the object of this level of post-editing. Any number of stylistic changes such as word order, collocations, idiomatic changes and the use of native proverbs in the place of those of source language etc., can be made. This is the level where the post-editor uses his experience and freedom in reviving a draft of translation. Hence in this level the human involvement will be maximum. The following are some changes that are usually made in this level of post-editing.

3.4.1 Word order: It is a known fact that certain stylistic patterns of sentences of Telugu and Hindi are different. Due to these differences though they are accurate and comprehensible they may lack the exact style of the TL. Hence to make the SL sentences as that of TL, the post-editor may change the style of the SL sentences according to the TL style.

@H: anivArya_hE xUsarA mArga nahIM_{3p.~msc.sg.}

Te: sUryuNNi nadipexi eVvaru?

@H: sUrya_ko calAwA_hE_jo*_vaha` kOna_[hE] {2,3p.hum.pl.}?

PH: sUrya_ko kOna calAwA_hE?

PH: rAja Laroge kyA?

Te: sUryuNNi nadipexi xEvaM

@H: sUrya_ko calAwA_hE_jo*_vaha- xeVa

PH: sUrya_ko xeVa calAwA_hE

PH: parava

3.4.2 Word-grouping: In Telugu, wherever distinct words are available to indicate certain concepts but in the TL Hindi they are expressed by a single word in such cases the SL words are grouped as one and replaced with its equivalent in Hindi as shown below:

Te: nIku akkaLU, ceVIYleVIYIU unnArA?

@H: wuJe badI bahana_BI[!] {ba.}, CotI_bahana_BI[!] {ba }
hE{2,3p.ba.}kyA?

PH: wuJe bahane hEM kyA?

3.4.3 Idiomatic phrases: The raw output may consist of certain idiomatic phrases which require cultural knowledge and pragmatics of the SL in order to understand them. In some cases these idiomatic phrases may not have the exact equivalents in the TL. In such circumstances a post-editor may replace these phrases with the nearest possible equivalent selecting from the TL. Most of these expressions involve collocations with special and idiomatic sense and do not form any pattern and lack exact Hindi equivalents. So the native speakers find this expression as strange. In such cases the post-editor with his world knowledge has to cope with the problem by giving the nearest expression in Hindi.

a. Te: wappaxu maro mArgaM lexu

@H: anivArya_hE xUsarA mArga nahIM_[hE] {3p.~msc.sg }

CONCLUSION

PH: isake_sivA Ora kol rAswA nahIM hE

b. Te: UIYlu elawAvA?

@H: gAzva{ba } SAsana_karawA_hE_kyA{2p.sg }?

PH: rAja karoge kyA?

c. Te: Uru gAni Uru

@H: gAzva lekina gAzva

PH: paraxesa

In the case of the first two a) and b) the problem can be solved by the machine if a dictionary of idioms and phrases is provided for the machine, where as in the case of c) a rule which says that whenever 'gAnI' is flanked on either side by same word then the construction X-gAnI-X(where 'X' stands for a word) will be replaced by 'anuciwa X'. This construction will be later replaced by a more appropriate one by a post-editor.

Anusaaraka machine translation is a two part process. The first part involves anusaaraka accession of the SL text into the @TL. At this stage anusaaraka system is called as language accessor. Only a trained reader would be able to read it properly. In order to make this @language text accessible to a large number of untrained readers of the TL, it should be post-edited. Not only that it should be post-edited but for quick and faster access a post-editor must develop various strategies depending on different applications. These strategies are applied according to the type of the text, availability of time and the cost-effectivity. For example V level of post-editing may be applied to texts which belong to narratives and article titles, wherein no further interpretation is required. Similarly, dealing with the Texts of Science and Technology, Informative and Journalistic writings first strategy of post-editing may be applied, and for better presentability of these texts the third or the final strategy of post-editing may be applied.

CONCLUSION

Post-editing is hitherto considered as an important event in the process of Machine Translation. Post-editing is treated here as equivalent to the processing and interpreting of that part of language which requires world knowledge and pragmatics. When translation is mechanized, only the linguistic aspects i.e., the language structures are taken care of by the current machines and the remaining part that is the interpretative aspects of language involving world knowledge and pragmatics are left out - which requires human involvement called here as post-editing. Anusaaraka as an alternative to Fully Automatic General Purpose High Quality Machine Translation System lays special emphasis on post-editing. Anusaaraka enables a TL reader to see a picture of the 'message' coded in the SL by making its 'image' available in the machine version of the TL i.e. @language properly called a dialect of the TL. Here the post-editing reduces the differences between the @language and TL. The anusaaraka machine translation system considers post-editing not only as an important event but as an integrable part of the whole process by mechanically making a text in the SL available in a TL.

Anusaaraka machine translation is a two part process. The first part involves anusaaraka accession of the SL text into the @TL. At this stage anusaaraka system is called as language accessor. Only a trained reader would be able to read it properly. In order to make this @language text accessible to a large number of untrained readers of the TL, it should be post-edited. Not only that it should be post-edited but for quick and faster access a post-editor must develop various strategies depending on different applications. These strategies are applied according to the type of the text, availability of time and the cost-effectivity. For example '0' level of post-editing may be applied to texts which belong to narratives and article titles, wherein no further interpretation is required. Similarly, dealing with the Texts of Science and Technology, Informative and Journalistic writings first strategy of post-editing may be applied, and for better presentability of these texts the third or the final strategy of post-editing may be applied.

According to the purpose of the text too these strategies can be used. Like for example to attain the aim of an advertisement i.e., to attract a large number of audience the second strategy of post-editing can be applied which covers both accuracy as well as acceptability. Each strategy may consist of many techniques which will act as clues for a post-editor and help him to post-edit without any difficulty. Some of these techniques may be mechanised in latter period for which more detailed research is required. These techniques also help a post-editor to develop many more techniques in future. This is only a beginning, and still more work is required in this area.

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D. Cook, Norman. 1989. Machine Translation: How far can it go?

Newton, John. 1992. Computers In Translation: A Practical Appraisal.

2 The second text is a news item selected from the Telugu news daily 'vArwa' - post-edited at Level -1b

3 The third text is a literary piece, a story from caMxamAma kaWalu by M Kameswara Rao - it is post-edited at level - 3

1	వర్షానికి కుప్ప	వర్షము		
2	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
3	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
4	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
5	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
6	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
7	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
8	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
9	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం
10	అనాగతం ఏ పాట వ్రా/కావే దీ	అనాగతం	అనాగతం	అనాగతం

APPENDICES

TEXTS:

Appendices consist of three texts:

1. A Science text describing an experiment in chemistry , selected from an intermediate text book of chemistry, published by Telugu Academy. It is post-edited at level -1a
2. The second text is a news item selected from the Telugu news daily 'vArwa' - post-edited at Level -1b.
3. The third text is a literary piece, a story from caMxamAma kaWalu by M.Kameswara Rao - it is post-edited at level - 3.

TEXT - 1

गातिनुचि उत्कृष्ट		वायुवुलनु		
हवा_से	उत्कृष्ट-	^वायु_को(ब.)		
हवा_से	उत्कृष्ट	वायु_को	+	
वेरु+चेसे	अलग+करता_है_जो*_वह-/कर_के_ही	विधानातु		
	अलग+करने_के	^तरीका(ब.)		
		तरीके		
गातिलो	उन्न	उत्कृष्ट	वायुवुलनु	मिश्रम
हवा_मे [रहा]_है_जो*_वह-		उत्कृष्ट-	^वायु_को(ब.)	मिश्रण
हवा_मे	है_सो	उत्कृष्ट	वायु_को	मिश्रण
रूपलो	वेरु	चेयडानिक		
रूप_मे	अलग	करने_के_लिये		
रूप_मे	अलग	करने_के_लिये		
मूडु	पद्धतु	उत्त्रायि,		ई
तीन	पद्धति(ब.)	है/था/रहा_[है/था](3_न_ब.)		यह-
तीन	पद्धतियाँ	है,		इन
मूडु	विधानाललोनु	गातिलो		
तीन	^तरीके_मे_भी(@Z)(ब.)	हवा_मे		
तीन	^तरीके_मे_भी	हवा_मे		
उन्न		नैट्रोजन्,		
[रहा]_है_जो*_वह-		@nitrogen[-],		
है_सो		nitrogen,		
आक्सिजन्	वायुवुलनु	वेरु+चेयडलो	भेद	
@oxygen_[-]	^वायु_को(ब.)	अलग+करने_मे	भेद	
oxygen	वायु_को	अलग+करने_मे	भेद	
उंदि,				
है/था/रहा_[है/था](3_प_प.)				
है,				
राम्से-रेलेल	मोदटि	पद्धति:		
राम्से-रेले_का	पहला-	पद्धति_[-]:		
राम्से-रेले_का	पहला	पद्धति:		
ई	पद्धतिलो	गातिनि	ऐक्कुव	
यह-	पद्धति_मे	हवा_को[है]	अधिक-	
इस	पद्धति_मे	हवा_को	अधिक	
रूपमयतलो		उन्न		
तापमान_मे/तापमान_!(ब.)		[रहा]_है_जो*_वह-		
तापमान_मे		है_सो		
कापमीदिक	पंपि	आक्सिजन्-नु	@CuOgA	
@copper_का_ऊपर_को'	भेज_[कर]	@oxygen_[-]-और	@CuOgA	
copper_के_ऊपर	भेज_कर	oxygen_को'	CuO_के_रूप_मे	

वेरु+चेस्तारु, अलग+करता_है(23_ब.), अलग_करते_है,	तरवात [उसके]_बाद उसके_बाद	सोडालैम्(@NaOH+@CuO), सोडालैम्(@NaOH+@CuO), सोडालैम्(NaOH+CuO)_को'		15
गाढ गाढ- गाढा	सल्फ्यूरिकाम्तंलोनिकि सल्फ्यूरिकाम्त_मे_को' सल्फ्यूरिक_आम्ल_मे_को'	पंपुतारु, भेजता_है(23_ब.), भेजते_है,	ई यह- इस	16
प्रक्रियलो प्रक्रिया_!(ब,)/प्रक्रिये_मे प्रक्रिये_मे		कार्बन्-डिऑक्साइड, @carbon[-]-@dioxide, carbon-dioxide_और		17
नीरु पानी पानी	तौलगिपोताधि, हट_जाता_है(3_न._ब.) हट_जाते_है,	तरवात [उसके]_बाद उसके_बाद		18
अत्यधिक अत्यधिक- अत्यधिक	लष्णोग्रतलो+ तापमान_मे/तापमान_!(ब,)+ तापमान_मे	उन्न [रहा]_है_जो*_वह- रहा		19
मेग्नीषियं @magnesium @magnesium		पैकि [के]_ऊपर के_ऊपर		20
पंपिनदलु+अधिते भेजा_[हुआ]_जैसा+[हो]_तो भेजा_जाय+तो	गालिलो हवा_मे हवा_मे	गल [रहा]_है_जो*_वह- है_सो		21
नैट्रोजन्, @nitrogen[-]/@nitrogen_भी(@Z), @nitrogen		मेग्नीषियं @magnesium @magnesium		22
नैट्रैड्-गा @nitride[-]/@nitride_भी(@Z)-इस_प्रकार_से @nitride_के_रूप_मे		वेरु+अवतुंदि, अलग+होता_है(3_~पु._ए.), अलग+होता_है,		23
मिगिलेदि बच_ता_है_जो*_वह(~पु.)' बचता_है_सो	उत्कृष्ट उत्कृष्ट- उत्कृष्ट	मिश्रमं मिश्रण मिश्रण	मात्रमे, [सिर्फ/मात्र]_ही, मात्र_ही,	24
		$2@Cu+@O2 \rightarrow 2@CuO$ $2@Cu+@O2 \rightarrow 2@CuO$ $2@Cu+@O2 \rightarrow 2@CuO$		25
		$2@Mg+@N2 \rightarrow @Mg3@N2$ $2@Mg+@N2 \rightarrow @Mg3@N2$ $2@Mg+@N2 \rightarrow @Mg3@N2$		26
राम्-से-रेतेल राम्-से-रेते_का राम्-से-रेते_का	रेडव दूसरा_[-] दूसरा	पद्धति: पद्धति_[-]: पद्धति_[-]:		27
ई	पद्धतिलो	50	लीटर्ल	

यह- पहलति मे 50 @liter-(ब.)
 इस पहलति मे 50 @liters_का -----28

घन परिमाण गल
 घन- परिमाण [रहा] है जो* वह-
 घन परिमाण है सो -----29

ओक गाजु
 एक [-] छुडी/कौच_का
 एक कौच_का -----30

ग्लोबु तीसुकोनि दानिलोकि 9:11
 @globe_को' ते [कर] उसके_अन्दर_को 9:11
 @globe_को' ते_कर उसके_अन्दर_को 9:11 -----31

घन परिमाण निष्पत्तिलो
 घन- परिमाण- निष्पत्ति_मे
 घन परिमाण_के निष्पत्ति_मे -----32

गालि, आक्सिजन-ल
 हवा [-], @oxygen [-]_का
 हवा_और @oxygen_का -----33

मिश्रमात्रि पंपुतारु, आ ग्लोब-लो
 मिश्रण_को[हूँ] भेजता_है(23_ब.), वह- @globe_मे
 मिश्रण_को भेजते_है, उस @globe-मे -----34

रेडु प्लाटिनम् कड्डीलनु अमचि वटिनि
 दो [-] प्लाटिनम् छड_को(ब.) सजा [कर] उनको
 दो प्लाटिनम् छडो_को सजा_कर उनको -----35

ट्रान्स्फार्मर्-कु संधिचि
 @transformer_को' संधान_कर [कर]
 @transformer-को' जोड_कर -----36

6000 नुडि 8000 वोल्टुल विद्युत्-च्छरिनि
 6000 से 8000 वोल्टस्_का बिजली_को'
 6000 से 8000 वोल्टस्_का बिजली_को' -----37

पंपिस्तारु, आ ग्लोब-लोनिकि वेरोक
 भेजता_है(23_ब.), वह- @globe_का_भीतर_को' दूसरा_एक
 भेजते_है, उस @globe_के-भीतर और_एक -----38

गोट्टं द्वारा सोडियम
 नली/नली_द्वारा [के] द्वारा @sodium
 नली के_द्वारा @sodium -----39

हैड्राक्सैड् द्रावणात्रि
 @hydroxide[-] द्रावण_को[हूँ]
 @hydroxide द्रावण_को -----40

पंपुतारु, प्लाटिनम् कड्डील मध्य विद्युत्
 भेजता_है(23_ब.), प्लाटिनम् छड-(ब.) मध्य- विद्युत्

भेजते है, 5, प्लाटिनम् छोडो के 1998 बीच मे वियुत -----41

स्फुलिंग एर्यडुतुदि, 1998
 स्फुलिंग रूप लेता है(3 'g. प.).
 स्फुलिंग रूप लेता है. -----42

विनिम्न विनिम्न विनिम्न विनिम्न
 Spinning [-] मिल से ही (प.) इस्तेमाल [-]
 spinning मिल से ही इस्तेमाल

समन्वय समन्वय विनिम्न
 समन्वय की (प.) समन्वय
 समन्वय समन्वय का इत

विनिम्न विनिम्न विनिम्न (डीसेंट्रल
 Spinning [-] मिल (प.) (Decentralised [-]
 spinning मिल के (decentralised)

विनिम्न
 Spinning [-]
 spinning

मिल मिल मिल मिल मिल
 (mills [-]) समन्वय से ही समन्वय इस्तेमाल [-] समन्वय (प.)
 mills समन्वय से ही समन्वय की इस्तेमाल मिलों की

समन्वय समन्वय की (प.)
 समन्वय का

विनिम्न विनिम्न समन्वय
 समन्वय समन्वय से मिल (प-प) (3 'g. प.) समन्वय-
 समन्वय समन्वय से मिल समन्वय समन्वय

मिल मिल मिल
 मिल मिल मिल [-]
 मिल मिल मिल से

मिल मिल मिल
 मिल मिल मिल (प.) मिल (प.)
 मिल मिल मिल

मिल मिल मिल
 मिल मिल मिल (3 'g. प.) मिल [-] / मिल की (2)
 मिल मिल मिल मिल

मिल मिल मिल मिल मिल
 मिल मिल मिल मिल मिल (2) मिल मिल मिल मिल मिल
 मिल मिल मिल मिल मिल मिल मिल मिल मिल मिल

TEXT - 2

'वार्ता'	5,	नवंबर	1998	14
'वार्ता'	5,	@november_[-]/नवंबर	1998	
'वार्ता'	5,	november	1998	1

विकेद्रीकृत	स्पिन्निंग	मिल्लुलतोने	चेनेत	2
विकेद्रीकृत	@spinning_[-]	मित से ही(ब.)	इस्तकारी_[-]	16
विकेद्रीकृत	spinning	मितो से ही	इस्तकारी	3

कार्मिकुल		समस्थलकु	परिष्कारं	17
##^श्रमिक(^न, ब.)-		##समस्या_को'(ब.)	##समझौता	
श्रमिक		समस्याओ का	हल	4

विकेद्रीकृत	स्पिन्निंग	मिल्लुल	(डीसेंट्रलैड	5
विकेद्रीकृत	@spinning_[-]	मित-(ब.)	(@decentralised_[-]	19
विकेद्रीकृत	spinning	मितो के	(decentralised	6

स्पिन्निंग	@spinning_[-]	spinning		7

मिल्लुल	एपाटुतोने	राष्ट्र	चेनेत	कार्मिकुल
@mills_[-])	व्यवस्था से ही	##^राज्य-	इस्तकारी_[-]	##^श्रमिक(^न, ब.)-
mills)	व्यवस्था से ही	राज्य की	इस्तकारी	श्रमिको की

समस्थलकु	##समस्या_को'(ब.)	समस्याओ का		9

परिष्कारं	लभिरस्तुंदनि	प्राप्त होता है ऐसा	##संप्रदाय-	संप्रदाय
##समझौता		प्राप्त होता है ऐसा	##संप्रदाय-	संप्रदाय
हल				10

शास्त्र	विज्ञान	सदस्सु		11
##शास्त्र-	##विज्ञान-	सभा_[-]		
शास्त्र	विज्ञान	सभा के		

नूडल	रोजु	समके		12
##नूडल_[-]	##दिन/हौफ(2_ए.)	##एकत्रिन(न.)		
नूडल	दिन का	बेड		

पेकोदि		खादी		13
उल्लेख किया [है/या](3_ए.)		खादी_[-]/खादी_भी(2)		
उल्लेख किया		खादी		

टेक्नातजी	अने	अंशोपे		27
टेक्नातजी[-]/टेक्नातजी_भी(2)	##नामक[ऐसा]कहते_है_जो_बह_]	अंश_पर		
टेक्नातजी	नामक	अंश_पर		

-----14				
जरिगिन #सरका' है जो# वह- हुआ सो	ई यह- इस	समावेशलो #एकत्रित मे(न.) बैठक मे	देश #देश देश के	
-----15				
नतुमूलतनुंडी चारो तरफ से भी(ब.) चारो तरफ से	वचिचन #आया है जो# वह- आये		निपुणतु, #निपुण(^न. ब.), निपुण,	
-----16				
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