A Preliminary Work on Causative Verbs in Hindi

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Abstract
This paper introduces a preliminary work on Hindi causative verbs: their classification, a linguistic model for their classification and their verb frames. The main objective of this work is to come up with a classification of the Hindi causative verbs. In the classification we show how different types of Hindi verbs have different types of causative forms. It will be a linguistic resource for Hindi causative verbs which can be used in various NLP applications. This resource enriches the already available linguistic resource on Hindi verb frames (Begum et al., 2008b). This resource will be helpful in getting proper insight into Hindi verbs. In this paper, we present the morphology, semantics and syntax of the causative verbs. The morphology is captured by the word generation process; semantics is captured by the linguistic model followed for classifying the verbs and the syntax has been captured by the verb frames using relations given by Panini.

1 Introduction
Verbs play a major role in expressing the meaning of a sentence and its syntactic behavior. They decide the number of participants that will participate in the action. Semantically verbs are classified into action verbs, state verbs and process verbs. Syntactically they are classified into intransitives, transitives and ditransitives. The morphological, semantic and syntactic properties of verbs play an important role in deeper level analysis such as parsing.

Causative verbs are differently realized in different languages. These verbs have been an interesting area of study. The study of causative constructions is important as it involves the interaction of various components such as semantics, syntax and morphology (Comrie, 1981). This paper presents the preliminary work on Hindi causative verbs.

2 Causative Verbs
Causative verbs mean that some actor makes somebody else do something or causes him to be in a certain state (Agnihotri, 2007). The causal verb indicates the causing of another to do something, instead of doing it oneself (Greaves, 1983). Semantically causative verbs refer to a causative situation which has two components: (a) the causing situation or the antecedent; (b) the caused situation or the consequent. These two combine to make a causative situation (Nedyalkov and Silnitsky, 1973). There are different ways in which causation is indicated in different languages. There are three types of causatives: Morphological causatives, Periphrastic causatives and Lexical causatives (Comrie, 1981).

Morphological Causatives indicate causation with the help of verbal affixes. Sanskrit, Hindi/Urdu, Persian, Arabic, Hebrew, Japanese, Khmer and Finnish languages have morphological causatives. Periphrastic causatives indicate causation with the help of a verb which occurs along with the main verb. For example, in English in a sentence such as:

(1) John made the child drink milk.

In the above example the verb make is expressing causation which is occurring along with the verb drink which in turn is expressing...
the main action. English, German and French are some of the languages which have periphrastic causatives. **Lexical causatives** are those in which there is no morphological similarity between the base verb root and the causative verb form. A different lexical item is used to indicate causation. For example, the causative of English *eat* is *feed*. English and Japanese have lexical causatives. English has both **periphrastic** and lexical causatives.

3 Causative verbs in Hindi

Causatives in Hindi are realized through a morphological process. In Hindi, a base verb root changes to a causative verb when affixed by either an ‘-aa’ or a ‘-vaa’ suffix.

| Base verb | First causal | Second causal |
|-----------|--------------|---------------|
| so        | sul-aa       | sul-vaa       |
| ‘sleep’   | ‘put to sleep’ | ‘cause to put to sleep’ |

In each step of causative derivation there is an increase in the valency of the verb (Kachru, 2006; Comrie, 1981)

(2) *baccaa soyaa*  
child sleep.Pst  
‘The child slept.’

(3) *aayaa ne bacce ko sulvaayaa*  
maid Erg. child Acc. sleep.Caus.Pst  
‘The maid put the child to sleep.’

(4) *maa.N ne aayaa se bacce ko sulvaayaa*  
mother Erg. maid by child Acc. sleep.Caus.Pst  
‘Mother caused the maid to put the child to sleep.’

Hindi verbs are divided into two groups based on their behaviour in causative sentences: **affective verbs** and **effective verbs** (Kachru, 2006). The action of affective verbs benefits or affects the agent. **Affective verbs** will have both first and second causal forms. Verbs such as ronaa ‘to cry’ and dau.Dnaa ‘to run’ are affective intransitive verbs. Only verbs belonging to khaanaa ‘to eat’ class come under affective transitive verbs. The agent of the affective intransitive verb becomes the patient and the agent of the affective transitive verbs becomes the recipient in the first causal and they both will take a *ko* postposition (Hindi case marker). **Effective verbs** and ditransitive verbs have only one causal form. The agent of the effective verb and ditransitive verb becomes the causative agent in the first causal. So this causative agent in the first causal takes a *se* ‘with’ postposition (Hindi case marker). Verbs belonging to karnaa ‘to do’ class come under the effective verbs.

The major studies in Hindi causatives: Kachru (1966), Kachru (1980), Kachru (2006), McGregor (1995), Greaves (1983), Kellogg (1972), Agnihotri (2007), Sahaay (2004), Sahaay (2007), Singh (1997) and Tripathi (1986). Kachru (1966) has given the classification of Hindi verbs based on their causativization behavior. The others have mostly talked about the derivation process of the causative verbs.

However the classification of causative verbs in Hindi remains an issue of discussion. Since they are morphologically related, the decision of what is the base verb form of these verbs remains a point of discussion. There are two approaches which are followed in deciding the base verb: (1) causative formation based only on morphology, (2) causative formation based on morphology and semantics.

I. Based on Morphology

| Base verb | First causal | Second causal |
|-----------|--------------|---------------|
| (Intransitive) | (Transitive) | (Causative) |
| khul       | khol         | kholvaa       |
| ‘open’     | ‘open’       | ‘cause to open’ |

II. Based on Morphology and Semantics

| Intransitive | Base verb | Second causal |
|--------------|-----------|---------------|
| (Intransitive) | (Transitive) | (Causative) |
| khul         | khol       | kholvaa       |
| ‘open’       | ‘open’     | ‘cause to open’ |

In I, *khul ‘open’* is taken as the base verb and *khol ‘open’* and *kholvaa ‘cause to open’* are derived from it by adding suffix ‘-aa’ and ‘-vaa’ respectively to the base verb (Kachru, 1966; Kachru, 1980). The arrow denotes the direction of derivation from base verb. Here, the forward arrow denotes the increment of the argument from base to the causal forms. On the other
hand, in II, khol ‘open’ is taken as the base verb. Here, other than morphology, the semantics of the verbs is also taken into consideration. Here khol ‘open’ and khulva ‘cause to open’ are derived from the base verb khol ‘open’. khulva ‘cause to open’ is a causative verb which is derived from the base verb by adding suffix ‘-vaa’ to it. khol ‘open’ is a derived intransitive form. The agent of the base verb khol ‘open’ is not realized on the surface level of the derived intransitive verb khul ‘open’ though it is implied semantically. Here there is both forward and backward derivation. From base verb to the derived intransitive it is a backward derivation which means there is a reduction of one argument from base verb to the derived intransitive verb (Tripathi, 1986; Reinhart, 2005).

In this paper, we motivate our work by presenting our approach for classifying the causative verbs in Hindi.

4 Our Approach

4.1 Linguistic Model for Classifying Causative verbs

We have followed Paninian Grammatical framework in this model as the theoretical basis for our approach. The meaning of every verbal root (dhaatu) consists of: (a) activity (vyapaara) and; (b) result (phala). Activity denotes the actions carried out by the various participants (karakas) involved in the action. Result denotes the state that is reached, when the action is completed (Bharati et al., 1995). The participants of the action expressed by the verb root are called karakas. There are six basic karakas, namely; adhikarana ‘location’, apaadana ‘source’, sampradaan ‘recipient’, karana ‘instrument’, karma ‘theme’ and karta ‘agent’ (Begum et al., 2008a). Here the mapping between karakas and theta roles is a rough mapping.

The karta karaka is the locus of the activity. Similarly karma karaka is the locus of the result. The locus of the activity implied by the verbal root can be animate or inanimate. Sentence (2) given above, is the example where the locus of the activity is animate. Sentence (5) given below, is the example where the locus of the activity is inanimate.

(5) darvaazaa khulaa
door open.Pst
‘Door opened.’

(6) raam ne darvaazaa kholaa
ram Erg. door open.Pst
‘Ram opened the door.’

(7) maiM ne raam se darvaazaa
I Erg. ram by door
khulvaayaa
open.Caus.Pst
‘I made Ram open the door.’

When we come to the causatives, the notion of prayojak karta ‘causer’, prayojya karta ‘caussee’ and madhyastha karta ‘mediator causer’ are introduced. prayojak karta ‘causer’ is the initiator of the action. prayojya karta ‘caussee’ is the one who is made to do the action by the prayojak karta ‘causer’. madhyastha karta ‘mediator causer’ is the causative agent of the action. The karta of the base verb becomes the prayojya karta of the causative verb and the prayojak karta of the first causative becomes the madhyastha karta of the second causative.

This model takes both semantics and morphology into consideration.

4.1.1 Semantics

(8) caabii ne taalaa kholaa
key Erg lock open.Pst
‘The key opened the lock.’

(9)* raam ne caabii se taalaa khulvaayaa
ram Erg. key by lock open.Caus.Pst
‘Ram caused the key to open the lock.’

(10) raam ne mohan duvaraa caabii se taalaa
ram Erg. mohan by key with lock
khulvaayaa
open.Caus.Pst.
‘Ram made Mohan open the lock with the key.’

In (8), caabii ‘key’ is the karta of the transitive verb khol ‘open’, caabii ‘key’ is an inanimate karta so this sentence can’t be causativized. (8) has been tried to causativize in (9) which is unacceptable. (9) is actually interpreted as (10) where an inanimate noun with a se ‘with’ postposition acts as an instrument and not as a prayojya karta ‘caussee’. So in (10), caabii
‘key’ is an inanimate noun and takes se ‘with’ postposition so caabii se ‘with the key’ acts as instrument and mohan ‘Mohan’ acts as the prayojya karta ‘causee’ (Kachru, 1966). It seems that only those verbs can be causativized which take an animate karta.

Out of the above two given approaches, we are following approach II where both morphology and semantics are considered. In our approach we are saying that only those base verbs can be causativized which take an animate karta and it should also have volitionality (Tripathi, 1986; Reinhart, 2005). Those base verbs which take an inanimate karta can’t be causativized.

So in our approach the prayojya karta ‘causee’ in the causative sentence is always animate as the karta of the base verb becomes the prayojya karta ‘causee’ in the causative sentences. In our approach we have the notion of karmakartri which says an intransitive can be derived out of a basic transitive verb and the karma of the basic transitive verb becomes the karta of the derived intransitive verb. So the karta of the derived intransitive verb is called karmakartri. The derived intransitive verbs are like unaccusative verbs of English.

Whereas in approach I, the intransitive base verbs that take both animate and inanimate karta can be causativized. But in case of transitives, base verbs which take only animate karta can be causativized. Ditransitives can also be causativized. (Kachru 1966; Kachru 1980)

We follow the dependency tagging scheme proposed by Begum et al. (2008a) for the development of a dependency annotation for Indian Languages. In this scheme prayojak karta ‘causer’, prayojya karta ‘causee’ and madhyastha karta ‘mediator causer’ are represented as pk1, jk1 and mk1 respectively.

Some of the base verb forms and their causative sentences are given below with dependency relations marked in the brackets for the appropriate arguments:

(11) raam ne(k1) seb(k2) khaayaa
    ram    Erg.      apple eat.Pst
    ‘Ram ate an apple.’

(12) siitaa ne(pk1) raam ko(jk1) seb(k2)
    sita    Erg.      ram Acc. apple

Some of the base verb forms and their causative sentences are given below with dependency relations marked in the brackets for the appropriate arguments:

(13) maa.N ne(pk1) siitaa se(mk1) raam ko(jk1)
    mother Erg. sita by ram Acc.
    apple eat.Caus.Pst
    ‘Mother caused Sita to feed Ram an apple.’

(14) naukar ne(k1) kaam(k2) kiyaa
    servant Erg. work do.Pst
    ‘The servant did the work.’

(15) maalik ne(pk1) naukar se(mk1) kaam(k2)
    master Erg. servant by work
    karvaayaa do.Caus.Pst
    ‘The master caused Ram to do the job.’

(16) raam ne(k1) siitaa ko(k4) kitaab(k2) dii
    ram Erg. sita Dat. book give.Pst
    ‘Ram gave a book to Sita.’

(17) mohan ne(pk1) raam se(jk1) siitaa ko(k4)
    mohan Erg. ram by sita Dat.
    kitaab(k2) dilaaii book give.Caus.Pst
    ‘Mohan made Ram give a book to Sita.’

(18) mujhko(k4a) chaa.Nd(k1) dikhaa
    I.Dat. moon appear.Pst
    ‘The moon became visible to me.’

(19) maiM ne(k1) chaa.Nd(k2) dekhaa
    I Erg. moon see.Pst
    ‘I saw the moon.’

(20) maiM ne(pk1) raam ko(jk1) chaa.Nd(k2)
    mother Erg. ram Dat. moon
    dikhaayaa see.Caus.Pst
    ‘Mother showed moon to Ram.’

(21) maiM ne(pk1) mohan se(mk1)
    I Erg. mohan by
    raam ko(jk1) chaa.Nd(k2) dikhaayaa
    ram Dat. moon see.Caus.Pst
    ‘Mother made Mohan show moon to Ram.’
4.1.2 Morphology

In this section we have given the derivation process of the Hindi causative verbs. We have studied 160 Hindi verbs and have come up with certain number of rules for the derivation process of causative verbs.

When causative affixes are added to the base verb roots then some of the base verb roots change in form and some don’t. Various causal affixes are added to each verb type to form causatives. An example of affix addition for each verb type is discussed below. The affixes that are added are given in bold. The changes in the base verb root are underlined and made bold in both root form and the causal form.

4.1.2.1 Type-1 and its causative forms:

Suffix ‘-aa’ is added to the verb root to form the first causal and ‘-vaa’ to form the second causal.

No Change in the Root:

\[
\begin{align*}
\text{Chip} &\rightarrow \text{Chip-aa} \rightarrow \text{Chip-vaa} \\
\text{‘hide’} &\rightarrow \text{‘hide’} \rightarrow \text{‘cause to hide’}
\end{align*}
\]

Change in the Root:

\[
\begin{align*}
\text{nach} &\rightarrow \text{nach-aa} \rightarrow \text{nach-vaa} \\
\text{‘dance’} &\rightarrow \text{‘make someone dance’} \rightarrow \text{‘cause to make someone dance’}
\end{align*}
\]

4.1.2.2 Type-2 and its causative forms:

Suffix ‘-aa’ is added to the verb root to form the first causal.

No Change in the Root:

\[
\begin{align*}
\text{likh} &\rightarrow \text{likh-aa} \rightarrow \text{likh-vaa} \\
\text{‘write’} &\rightarrow \text{‘dictate’} \rightarrow \text{‘cause to dictate’}
\end{align*}
\]

Change in the root:

\[
\begin{align*}
\text{de} &\rightarrow \text{di-aa} \rightarrow \text{di-vaa} \\
\text{‘give’} &\rightarrow \text{‘cause to give’}
\end{align*}
\]

In case type-5 and type-6 verbs, we can derive intransitive verbs out of transitive verbs. Here we have two types of word formations:

- causative formation,
- Derived intransitive verb formation

Causative derivation is the forward derivation and intransitive derivation is backward derivation.

4.1.2.5 Type-5 and its causative forms:

Suffix ‘-aa’ is added to the verb root to form the first causal and ‘vaa’ to form the second causal.

No Change in the Root:

\[
\begin{align*}
\text{kharid} &\rightarrow \text{kharid-vaa} \\
\text{‘buy’} &\rightarrow \text{‘cause to buy’}
\end{align*}
\]

Change in the Root:

\[
\begin{align*}
\text{aa} &\rightarrow a \\
\text{vaa} &\rightarrow \text{vaa}
\end{align*}
\]

Suffix ‘-aa’ is added to the verb root to form the first causal.

No Change in the Root:

\[
\begin{align*}
\text{paros} &\rightarrow \text{paros-vaa} \\
\text{‘serve’} &\rightarrow \text{‘cause to serve’}
\end{align*}
\]

Change in the root:

\[
\begin{align*}
\text{e} &\rightarrow i; \text{In addition, ‘l’ is inserted here between the root and the causative suffix.} \rightarrow \text{‘cause to serve’}
\end{align*}
\]

In this verb type there is no example where the
verb root form doesn’t change.

**Causative Formation: Change in the root**

\[ e \rightarrow i \]

dekh   \[ \rightarrow \]  dihk-aa  \[ \rightarrow \]  dihk-vaa

‘see’ ‘show’ ‘cause to show’

**Derived intransitive formation:** Change in the above root:

\[ i \leftarrow e \]

dekh  \[ \leftarrow \]  dihk

‘appear’ ‘see’

**4.1.2.6 Type-6 and its causative forms:**

Suffix ‘-aa/-vaa’ is added to the transitive verb root to form the first causal.

**Causative formation:** No change in the root

bhar   \[ \rightarrow \]  bhar-vaa / bhar-aa

‘fill’ ‘cause someone to fill’

**Derived intransitive formation:** No change in the root

bhar  \[ \leftarrow \]  bhar

‘to fill’ ‘to fill’

**Causative formation:** Change in the root

\[ o \rightarrow u; \text{In addition, ‘}l\text{’ is inserted here between the root and the causative suffix} \]

dho   \[ \rightarrow \]  dhul-l-aa / dhul-l-vaa

‘wash’ ‘cause to wash’

**Derived intransitive formation:** Change in the above root:

\[ u \leftarrow o; \text{In addition, ‘}l\text{’ is inserted at the end of the root} \]

dhul-l  \[ \leftarrow \]  dhul

‘be washed’ ‘cause to wash’

In the implementation of the causative verbs, the causative feature of a verb is reflected in the morph analysis. There are two possible ways to implement causative information: (i) All the causative verb roots are included in the root dictionary of the morph analyzer with an additional feature marking it a causative verb type. (ii) For all causative verbs the following information is marked; causative root, base root, verb type and causative suffix. In (i), the information of base verb root from which the causative root is derived is missing which is captured in (ii). In the above mentioned two ways the latter gives more detailed information than the former.

**4.2 Methodology of the Work**

For this work, 160 base verbs were taken, their causative forms were given and were classified. Rules for deriving causative verb forms from their base forms were made. Verb frames for base verbs and their causative forms were developed. Based on the analysis of the base verbs certain problem cases were logged and generalizations regarding causativization were made. In this paper, we briefly discuss about all the points mentioned above.

**4.3 Classification of Hindi Causative Verbs**

Here Hindi verbs have been classified into 6 types based on their causativization behavior:

- **Type-1:** Basic Intransitive verb

  Basic intransitive verb has two causal forms i.e., first causal and second causal form. First causal of the basic intransitive verb functions as a transitive verb. The subject of the basic intransitive verb becomes the object of the transitive verb or the first causal form. The subject of the first causal form becomes the causative agent of the second causal form. Sentence (2) is the example of basic intransitive and sentences (3) and (4) are its causative forms.

- **Type-2:** Basic Transitive verb type-I (which is similar to khanaa ‘to eat’ verb type given by Kachru (1966))

- **Type-3:** Basic Transitive verb type-II (which is similar to karna ‘to eat’ verb type given by Kachru (1966))

  Type-2 and type-3 are transitive verbs which are divided into two types based on their causativization behavior. Basic transitive verbs of type-I, like khanaa ‘to eat’ have two causal forms. First causal of khanaa ‘to eat’ type verb
also functions as ditransitive. Whereas transitive verbs of type-II, like \textit{karna} ‘to do’ have one causal form. First causal of \textit{karna} ‘to eat’ type verb functions as causative. Sentences (11-13) are examples for type-2 verb. Sentences (14-15) are examples for type-3 verb.

- **Type-4**: Basic Ditransitive verb

  Ditransitive verbs also have one causal form. Sentences (16-17) are examples for type-4 verb.

- **Type-5**: Basic Transitive verb type-I, out of which intransitive verbs can be derived which takes a dative subject,

- **Type-6**: Basic Transitive verb type-II, out of which intransitive verbs can be derived.

Type-5 and type-6 are transitive verbs which have causal forms depending on whether it is type-I (\textit{kha} ‘to eat’) transitive or type-II (\textit{karna} ‘to do’) transitive and in addition both have a derived intransitive form. Type-5 takes a dative subject in the base form. Sentences (18-21) are examples for type-5 verb. Other than the 4 classes classified by Kachru (1966), we have two more extra classes, i.e., type-5 and type-6.

An example for each verb type that goes into the classification is given below:

- **Type-1**
  
  | Base verb | First causal | Second Causal |
  |------------|--------------|---------------|
  | \textit{so} | \textit{sulaa} | \textit{sulvaa} |
  |
  ‘sleep’ ‘put to sleep’ ‘cause to put to sleep’

- **Type-2**
  
  | Base verb | First causal | Second Causal |
  |------------|--------------|---------------|
  | \textit{kha} | \textit{khilaa} | \textit{khilvaa} |
  |
  ‘eat’ ‘feed’ ‘cause to feed’

- **Type-3**
  
  | Base verb | First causal |
  |------------|--------------|
  | \textit{kar} | \textit{karvaa} |
  |
  ‘do’ ‘cause to do’

- **Type-4**
  
  | Base verb | First causal |
  |------------|--------------|
  | \textit{de} | \textit{dilaa} |
  |
  ‘give’ ‘cause to give’

5 Verb Frames

In this section we list out the syntactic frames for all the causative types discussed in the previous sections. Verb frame (Begum et al., 2008b) is given for the base form and for its first and second causal form. For ease of exposition, below we show only the relevant information of a verb frame. Components not necessary for the present discussion have been left out. Here the structure of a verb frame is given in terms of dependency relation, postposition (Hindi case marker) and TAM. We have taken past tense (\textit{yaa} is the past tense marker) in the TAM. Refer the examples given above for each type of causatives for a better understanding of the frames.

**I. Frame of Type-1 and its Causative Forms:**

| Relation-Postposition | TAM |
|-----------------------|-----|
| (a)k1-0               | yaa |
| (b)pk1-ne jk1-ko      | yaa |
| (c)pk1-ne mk1-se jk1-ko | yaa |

**II. Frame of Type-2 and its Causative Forms:**

| Relation-Postposition | TAM |
|-----------------------|-----|
| (a)k1-ne              | k2-0 |
| (b)pk1-ne jk1-ko      | k2-0 |

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III. Frame of Type-3 and its Causative Forms:

| Relation-Postposition | TAM |
|------------------------|-----|
| (a) k1-ne              | k2-0| yaa |
| (b) pk1-ne             | jk1-se | k2-0 | yaa |

IV. Frame of Type-4 and its Causative Forms:

| Relation-Postposition | TAM |
|------------------------|-----|
| (a) k1-ne              | k4-ko | k2-0 | yaa |
| (b) pk1-ne             | jk1-se | k4-ko | k2-0 | yaa |

V. Frame of Type-5 and its Causative Forms:

| Relation-Postposition | TAM |
|------------------------|-----|
| (a) k4a-ko             | k1   | aa  |
| (b) k1-ne              | k2-0 | aa  |
| (c) pk1-ne             | jk1-ko | k2-0 | yaa |
| (d) pk1-ne             | mk1-se | jk1-ko | k2-0 | yaa |

VI. Frame of Type-6 and its Causative Forms:

| Relation-Postposition | TAM |
|------------------------|-----|
| (a) k1-0               | aa  |
| (b) k1-ne              | k2-0 | aa  |
| (c) pk1-ne             | jk1-se | k2-0 | yaa |

6 Issues and Observations

There are some verbs which can’t be causativized. Motion verbs like aa ‘come’ and jaan ‘go’ can’t be causativized. After analysing certain amount of corpus we have observed that not all motion verbs behave like the above verbs. aan ‘to come’ and jaan ‘to go’ verbs can’t be causativized because these verbs always occur as main verbs and take the following verbs as manner adverbs: chalan, bhaagnaa, daudnaa. For instance, chalkar aayaa ‘came running’ and daudkar gayaa ‘went running’. Those motion verbs which occur as manner adverbs and modify another motion verb can be causativized and those verbs which occur as main verbs and never occur as manner adverbs of another motion verb can’t be causativized. Natural process verbs like khil ‘blossom’, garajnaa ‘thunder’ and ug ‘rise’ also can’t be causativized.

There are three types of the verb nikal ‘leave’. All the three are used as intransitives.

- **derived intransitive**: sense → drain out

  (22) paanii kamre se nikal gayaa
  water room from leave go.Pst.
  ‘Water drained out of the room.’

- **Basic Intransitive**: sense → walked out

  (23) raam kamre se baahar nikal gayaa
  ram room from out leave go.Pst.
  ‘Ram walked out of the room.’

- **Basic Intransitive which involves natural process.**

  (24) gangaa gangotrii se nikaltii
  ganga gangotri from emerge.Impf.
  hai be.Pres.
  ‘Ganga emerges from Gangotri.’

The first type is a derived intransitive which is derived from the base transitive verb nikaal ‘remove’. This base transitive verb root can be causativized. The second type is basic intransitive which can also be causativized. The third type which is natural process can’t be causativized. This shows how important the property of animacy for making causatives is.

7 Conclusion and Future Work

In this work we flesh out the linguistic devices that work for causativization. In this paper we have introduced a preliminary work on Hindi causative verbs. We have given the classification of causative verbs and the linguistic model followed for their classification. We have also given the verb frames of the causative verbs. These insights have been incorporated in the Hindi dependency treebank (Bhatt et al., 2009). We also plan to use the verb frames in a Hindi dependency parser (Bharati et al., 2009) to improve its performance.
References

Agnihotri, Rama K. 2007. *Hindi, An Essential Grammar*. Routledge, London and New York, pp. 121-126.

Balachandran, Lakshmi B. 1973. *A Case Grammar of Hindi*. Central Institute of India, Agra.

Begum, Rafiya, Samar Husain, Arun Dhwaj, Dipi M. Sharma, Lakshmi Bai and Rajeev Sangal. 2008. Dependency Annotation Scheme for Indian Languages. *Proceedings of The Third International Joint Conference on Natural Language Processing (IJCNLP)*, Hyderabad, India.

Begum, Rafiya, Samar Husain, Dipi M. Sharma and Lakshmi Bai. 2008. Developing Verb Frames in Hindi. *In Proceedings of The Sixth International Conference on Language Resources and Evaluation (LREC)*, Marrakech, Morocco.

Bharati, Akshar, Vineet Chaitanya, and Rajeev Sangal. 1995. *Natural Language Processing: A Paninian Perspective*, Prentice-Hall of India, New Delhi, pp. 65-106.

Bharati, Akshar, Samar Husain, Dipi Misra Sharma and Rajeev Sangal. 2009. Two stage constraint based hybrid approach to free word order language dependency parsing. *In Proceedings of the 11th International Conference on Parsing Technologies (IWPT09)*, Paris.

Bhatt, Rajesh, Bhuvana Narasimhan, Martha Palmer, Owen Rambow, Dipi Misra Sharma, Fei Xia. 2009. A Multi-Representational and Multi-Layered Treebank for Hindi/Urdu. *In the Third Linguistic Annotation Workshop (The LAW III) in conjunction with ACL/IJCNLP 2009*. Singapore.

Comrie, Bernard. 1981. *Language Universals and Linguistic typology: Syntax and Morphology*. The University of Chicago Press.

Greaves, Edwin. 1983. *Hindi Grammar*. Asian Educational Services, New Delhi, pp. 301-313

Kachru, Yamuna. 1966. *Introduction To Hindi Syntax*. University of Illinois, Illionois, pp. 62-81

Kachru, Yamuna. 1980. *Aspects of Hindi Grammar*. Manohar Publications.

Kachru, Yamuna. 2006. *Hindi*. London Oriental and African Language Libary.

Kale, M.R. 1960. *A Higher Sanskrit Grammar*. Motilal Banarasidass, Delhi.

Kellogg, S. H. 1972. *A Grammar of the Hindi Language*. Munshiram Manoharal, New Delhi, pp. 253-257.

McGregor, R. S. 1995. *Outline of Hindi Grammar*. Oxford University Press, pp. 118-125.

Nedyalkov, Vladimir P., Georgij G. Silnitsky. 1973. The typology of Morphological and Lexical Causatives, in: F. Kiefer, (ed.), *Trends in Soviet Theoretical Linguistics*, Foundations of Language, Supplementary Series 18, Dordrecht, 1-32.

Reinhart, Tanya. 2005. *Causativization and Decausativization: Unpublished technical report*. LSA 2005.

Sahaay, Chaturbhuj. 2004. *Hindi ke Maal Vaakya Saanche*, Kumar Prakaashan, Agra, pp. 91-100.

Sahaay, Chaturbhuj. 2007. *Hindi Padvigyaan*, Kumar Prakaashan, Agra.

Shastri, Charu D. 1990. *Panini: Re-Interpreted*. Motilal Banarasidass, Delhi.

Singh, Rajendra and Rama K. Agnihotri. 1997. *Hindi Morphology: A Word-based Description*. Motilal Banarasidass, Delhi.

Tripathi, Acharya R. 1986. *Hindi Bhashaanushasan*. Bihar Granth Academy, Patna.