

# KĀRAKA-TEHORY FOR KNOWLEDGE REPRESENTATION

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## Introduction

The study on *kāraka-theory* has taken another new dimension recently in connection with the Knowledge Representation Scheme (KRS) (using Semantic Nets) in the fields of Artificial Intelligence (AI). The issue involved here is: Whether Sanskrit being a Natural Language (NL) is accessible to computer processing or not. Briggs (1985), an American computer scientist claims that the Shastric Sanskrit, being a NL is most suitable as an interlingua for Machine Translation (MT) in the field of AI<sup>1</sup>. In his opinion the early MT effort failed since there was no known method for extracting semantics from syntax. He says (1986) 'In order to construct a computational model for MT, research must be done to construct how human beings understand language'<sup>2</sup>.

Indian theoreticians in the schools of Navya-Nyāya (Neo-school of logic), Navya-Vyākaraṇa (Neo-school of grammar) and Mīmāṃsā have invented a very sophisticated device to explore the verbal knowledge from the syntax through semantics for its unambiguous representation known as *śābdabodha*. The theory of *śābdabodha* presents a scheme for knowledge acquisition from the hearer's point of view, when a competent hearer listens to a wellformed sentence. The verbal knowledge acquisition from a sentence depends upon its structure, which involves syntax and semantics. In this context the *kāraka-theory* plays the most significant role since a sentence is defined in terms of *kriyā* (action) and *kāraka* (factor) and their relations (*anvaya/samsarga*)<sup>3</sup>.

In this paper, I shall deal with a problem which is relevant to the KRS in AI, overlaps two distinct fields of Indian *śāstric* study viz. *śābdabodha* scheme and the *kāraka-theory*. As I have stated before, the *kāraka-theory* has a very significant role to play in the *śābdabodha* scheme. I shall first of all present here the structure of *śābdabodha* and then the *kāraka-theory* with special focus on the mutual dependency of the *kāra*kas in the accomplishment of the main action.

## ŚĀBDABODHA: THE BACKGROUND AND ITS STRUCTURE

Vātsyāyana, the author of the commentary on *Nyāya-sūtra* of Gautama proposes that the entire world of entities constitute the quadrangle viz. *pramātā* (the cogniser), *pramāṇa* (the means of valid knowledge), *prameya*

(the objects) and *pramiti* (the valid knowledge)<sup>4</sup>). The old school of Nyāya deals with all these entities of the quadrangle, whereas the neo-school of Nyāya mainly deals with only one of them viz. *pramāṇa* (the means of valid knowledge). Thus it is known as *pramāṇa-sāstra*. The Naiyāyikas accept only four *pramāṇas* viz. *pratyakṣa* (perception), *anumāna* (inference), *upamāna* (analogy) and *śabda* (sentence/ word) and they generate four types of valid knowledge viz. *pratyakṣa* (perceptual knowledge), *anumiti* (inferential knowledge), *upamiti* (analogical knowledge) and *śābdabodha* (verbal knowledge)<sup>5</sup>.

The *pramāṇa* is defined as: *pramākaraṇam pramāṇam*<sup>6</sup>, i. e. the most efficient causal factor for the generation of *pramā* (the valid cognition). The term *karaṇa* in the definition refers to one of the six *kāraṅkas* accepted by the Hindu Grammarians. Pāṇini, the pioneer of Sanskrit Grammatical system has defined the *kāraṅkas*. The most significant point which is quite relevant still today is that, all the theoreticians in almost all the schools of Indian Philosophy like Nyāya-Vaiśeṣika, Mīmāṃsā, Vedānta and Vyākaraṇa have accepted the authenticity of Pāṇini's definitions of *kāraṅkas*<sup>7</sup>. In this context also, they quote Pāṇini's definition of *karaṇa*, i. e. *sādhakatamam karaṇam* (P.1.4.45) (the most efficient means in the accomplishment of the action) to justify the definition of *pramāṇa*. According to this definition, since the valid knowledge (*pramā*) is generated by the most efficient causal factor viz. *pramāṇa* which is treated as the *karaṇa* in the accomplishment of the result namely *pramiti* (valid knowledge). Therefore, while investigating the nature of *pramāṇa*, most of the exponents of the *śāstras* have discussed the *kāraṅka*-theory in general and the nature of *karaṇa* in particular.

*Śābdabodha* as we know, is accepted as a separate *pramā* (valid knowledge). The term is explained as *śabdajanyam śābdam, śābdaś cāsau bodhaś ca śābdabodhaḥ*, i. e. the knowledge, which is generated by the causal factor *śabda* is called *śābdabodha* (verbal cognition). The word *śabda* does not mean a word, but it has a technical sense, i. e. here *śabda* means 'a proposition' or 'a sentence'. The tradition defines *śabda* as *āptavākyam śabdah*<sup>8</sup> (i. e. the sentence of an authentic speaker is called *śabda*).

The definition of a *vākya* is also quite controversial. We need not go into the details here. For the present purpose, I'll quote a definition of *vākya* presented by noted traditional lexicographer Amarasimha, the author of *Amarakoṣa*. He defines *vākya* as: *suptiṅnantacayo vākyam kriyā vā kāraṅkanvitā*<sup>9</sup>. Nāgeśa (1730-1810 AD), one of the most celebrated grammarians of the Pāṇinian school of Grammar from Maharashtra (India), after a thorough investigation of the definitions of *vākya*, has accepted that of the definition of Amarasimha. Nāgeśa explains the said definition of *vākya* in the following term: *kāraṅkāvītakriyābodhaka-suptiṅnantacayo vākyam*<sup>10</sup>, i. e. the conglomeration of the substantives with nominal suffixes and the verbs

which convey the action syntactically related with the factors. Thus, the sentences is defined in terms of the action (*kriyā*) and the factors (*kāraṅkas*) and their mutual relation<sup>11</sup>). Therefore, in the system of *śābdabodha* or *vākāyārthabodha*, the theory of *kāraṅka* plays the most significant role.

## ŚĀBDABODHA: THE STRUCTURE AND SCHEME.

Now let us see the structure and the scheme of *śābdabodha*. As we know, *śābdabodha* is a separate *pramā* (valid knowledge), represented by the causal operation of *śabda*. The structure of *śābdabodha* can be laid down in a formal mode as:

$$\begin{array}{ccc} S & = & (W \quad + \quad W) \\ \downarrow & & \downarrow \quad \downarrow \quad \downarrow \\ \acute{S}ā & = & (m \quad + \quad R \quad + \quad m) \end{array}$$

(Here S stands for sentence, W stands for word, *Śā* stands for *śābdabodha*, m stands for meaning/object (i. e. *padārtha*) and R stands for relation.)

We shall discuss on the scheme and methodology adopted for the structural presentation of *śābdabodha* later on. But here, for the present purpose, let us see the minimum scheme to yeild *śābdabodha*:

- (i) Knowledge of the *pada* (meaningful phonetic unit or grammatical elements like *prātipadika*, *dhātu*, *pratyaya* etc.) which is treated as the most efficient causal factor (*karāṅa*) to yeild *śābdabodha*.
- (ii) Knowledge of the word-meaning (*padārtha* = referent or import of the word) which is treated as the intermediatory function (*dvāra*) to generate *śābdabodha*.
- (iii) The knowledge of the relation between the *pada* and *padārtha* known as *śakti*, is considered to be the auxiliary cause of *śābdabodha*. (See fig. 1.)

According to most of the scholars in the Indian schools of epistemology, these three are considered to be most useful causal factors to generate the *śābdabodha*<sup>12</sup>). Jayanta Bhaṭṭa (900 AD), another celebrated scholar in the school of *prācīna-nyāya* (the old school of Logic) thinks, any particular factor can not be treated to be the most efficient causal factor, (*sādhakatama*) to yeild any result<sup>13</sup>). He opines each one of the factors must be treated as the most efficient causal factor for the generation of the result or effect (*phala*). Therefore, he considers *sāmagrī* (collocation or totality of the factors) as the most efficient causal factors (*karāṅa*) for the effect. We need not discuss the validity of his claim here. But our interest here is to focus on the *sāmagrī* (the collocation) of the *śābdabodha*, which is the most essential in presenting the same to the hearer's intellect.

## THE COLLOCATION (SĀMAGRĪ) FOR ŚĀBDABODHA

1. A speaker of a recognised linguistic community, who utters a grammatically wellformed sentence to convey some thought/idea to the hearer.
2. The hearer must be competent enough to participate in the same linguistic community.
3. The competence of the hearer refers to his familiarity with each word (*pada*) in the sentence and its import.
4. The familiarity again refers to the significant potency (*śakti*<sup>14</sup>) of the word with its meaning, by which its meaning is cognised/presented to the mind when ever the word is heard.
5. The word in the sentence must have mutual syntactic expectancy (*ākāṅkṣā*<sup>15</sup>).
6. The logical compatibility amongst the imports of the words, denoted by the significant potency (*śakti*) of the words. The hearer is expected to have sufficient awariness of such compatibility (*yogyatā*<sup>16</sup>).
7. The words in the sentence must be uttered by the speaker in contiguity or proximity (*āsatti or sannidhi*<sup>17</sup>) in the temporal sequence of their utterance.
8. The hearer must be able to guess about the speaker's intention in all the instances of *sābdabodha*.
9. The hearer should have auditory perception (*śrotrapratyakṣa*) of each word in the sentence and thereof he is reminded of the meaning/import of each word.
10. Each individual import of word, as a consequence of 5 & 6 get related syntactically with the order and the hearer acquires the knowledge of the whole meaning/idea intended to be communicated by the speaker.

When these components of the collocation (*sāmagrī*) are found intact the hearer comprehends the knowledge/idea that the speaker intends to convey through the verbal utterance. That is called *sābdabodha*. Now, it is clear from the above discussion that the *sābdabodha* mechanism is invented to investigate the hearer's knowledge that he comprehends from the speaker's linguistic utterance. That is to say, in the *sābdabodha* system the Indian epistemologist analyse the import of the sentence from the listener's point of view. Of course, as we have seen, the speaker's verbal exercise to convey the meaning/idea with exactness is taken care of in the system.

## NATURE OF KNOWLEDGE

First of all, let us see the nature of the knowledge/cognition. The cognition or knowledge is said — in Nyāya system of Indian Philosophy — to be

objective. That is to say every piece of knowledge must have reference to some object. Without an object one can not apprehend any knowledge (*viṣayanirūpyam hi jñānam. na hi nirviṣayakam kiñcij jñānam sambhavati*). And the *viṣaya* could be any *padārtha*/artha. In the knowledge, the *padārthas* appear in the qualifier-qualificand model (*prakāra-viśeṣya-vidhayā*). One of these *padārthas* is considered as the chief qualificand or nucleus (*mukhya-viśeṣya*) and all other *padārthas* remain qualifiers or subservient to it.

## MODEL OF ŚĀBDABODHA ACCORDING TO THE SCHOOL OF NAVYA-NYĀYA

Let us take an example to elucidate the model of *śābdabodha*.  
*caitraḥ grāmam gacchati.*

Caitra<sub>Nom.</sub> grāma<sub>Acc.</sub> gam-V+ (Pres.)  
Caitra goes to the village

According to the school of Navya-Nyāya, the *śābdabodha* of this sentence is:

*ekatvāvacchinna-grāmaniṣṭhasamyogānukūla-vyāpārānukulakṛtimān caitraḥ* i. e. 'Caitra who is qualified by effort that is conducive to the substratum of which is the village qualified by oneness'. (See fig. 2)

For the Naiyāyikas, the most efficient means of *vākyārthabodha*/*śābdabodha* is *pada* but not the *vākya* as a whole. Therefore, first of all the *vākya* is analysed into the constituent lexical/grammatical elements, technically known as *padas*<sup>19</sup> (six such *padas* are here.). They denote their respective meanings called *padārthas* by their denotative power/potency known as *śakti*. All the *padārthas* get syntactically related with each other by the principle called *samsargamaryādā*, i. e. the governing law of relation. As we know, the model of the representation of the *padārthas* with their relation is said to be qualifier-qualificand type or attributive-substantive type.. That means, in the knowledge comprehended from a sentence, the Indian theoreticians focus only on one *padārtha* which is treated as the chief qualificand or the nucleus of which all other *padārthas* are qualifiers or attributes. In the school of Navya-Nyāya the *padārthas* presented by the *prathamānta-pada*, i. e. the word ending with the nominative-case is always (unless otherwise impossible i. e. *asati vādhake*) considered to be the chief qualificand<sup>20</sup>. In contrast to this view of the Naiyāyikas, the Grammarians consider the main *padārtha* presented by the verbal base (i. e. *dhātvarthamukhyaviśeṣya-vyāpāra*) as the chief qualificand. The Mīmāṃsakas treat *bhāvanā*, the meaning/import of the verbal suffix as the chief qualificand in the *vākyārthabodha*. Coming back to the present discussion, the *prathamāntārtha*, i. e. the agent Caitra is the chief qualificand. Since he is the agent, he is the substratum of the agentness (*kartr̥tvam* = *kṛtimattvam* = *kṛit*), which is the meaning of the *ākhyātapratyaya* (the verbal

suffix) *tiñ*. The *padārtha* viz. *karṭṛtva* is related to the *prathamāntārtha* i. e. Caitra by the relation called *samavāya*. The meaning of the verbal base *gam-* 'to go' is the activity (*vyāpāra*) conducive to the contact (*samyoga*) of the agent with the destination. The result (*phala*) viz. the contact of the agent with the destination and the activity are considered to be the meanings of the verbal base (*dhātu*) *gam-* 'to go' *Vyāpāra* (the activity), one of the meanings of the *dhātu* is related to the *ākhyātārtha-karṭṛtva* (i. e. the agentness, the meaning of the verbal suffix) by the relation called *anukūlatā* (conduciveness). *Samyoga* i. e. the contact, (the other meaning of the verbal base *gam-*) is related to *vyāpāra* by the relation viz. *janyatā* or *anukūlatā*. The meaning of the substantive *grāma* is 'the village' and the meaning of the accusative case ending *-am* is *karmatva* and *ekatvasamkhyā*<sup>21)</sup> (number). The number (*samkhyā*) is related to the substantive *grāma* 'village' by the relation called *paryāpti*<sup>22)</sup> or *samavāya*. The import of the substantive 'village' is related to one of the meanings of the accusative case-ending (*-am*) i. e. *karmatva*<sup>23)</sup> by the relation called *ādheyatā* (substrateness). The *karmatva* is related to one of the meanings of the *dhātu* viz. *samyoga* (contact) by the relation *āśrayatā* (locusness). Thus finally we get the *śābdabodha* as: *ekatvāvachchinna-grāmaniṣṭha-samyogānukūlavvyāpārānukūlakṛtimān caitraḥ*; i. e. Caitra, who is qualified by the volitional effort that is conducive to the substratum of which is the village qualified by oneness.

## GRAMMARIAN'S THEORY OF ŚĀBDABODHA

According to the school of Grammer, *vākya* (sentence) as a whole is the cause of *vākyārthabodha*. For them, the sentence is indivisible i. e. a single unit without having any part as *padas* and further as *prakṛti*, *pratyaya* etc. and the *vākyārtha* is *sphoṭa*<sup>24)</sup>. That is how Bhaṭṭhari's *sphoṭa-theory* or the theory of *śābdabrahman* (the Supreme Verbam) brought a revolution in the world of meaning analysis of the sentence. This is not the context to deal with the *sphoṭa* theory. But the question is : how then the grammarians elucidate the *śābdabodha*? The basic problem is, it is said that: *padārthānām samsargāḥ vākyārthāḥ* (the syntactico-logical relation of the imports of the words is called *vākyārtha*). And when the grammarians do not accept *padavibhāga* i. e. when they propose the theory that sentence is only one and a single indivisible unit in the language without having any grammatical part as *pada* etc, in other words when they deny the existence of the division of a sentence into words: how can they explain the *śābdabodha* scheme? Moreover how can they claim: *śābdasādhitva-viṣayā saisā vyākaraṇasmṛtiḥ* and how to justify the term *śābdānuśāsana* used as synonymous to *Vyākaraṇa*? The question of justifying the derivational system in the grammatical tradition will stand highlighted above all.

But the grammarians do have some logical reply to all these questions. To quote Nāgeśa:

‘*tatra prativākyam samketagrahāsambhavāt tadanvākhyānasya laghunopāyenāsakyatvāc ca kalpanayā padāni pravibhajya pade prakṛtipratyaya-vibhāgakalpanena kalpitābhyām anvayavyatirekābhyām tattadarthavibhāgam śāstramātraviṣayam parikalpayanti sma ācāryaḥ*<sup>25</sup>).

‘Since it is difficult to establish the relation between each sentence with its sense and since there is no more simpler way to elucidate the sense from the sentence, the sentence is divided into words just by imagination and the words further fictitiously divided into stems and suffixes. Then with the help of these imaginary stems and suffixes, the individual import/meaning is assumed and due to their syntactico-logical relation, the *vākyārthabodha* arises. This is all done by the ācāryas (the exponents of the schools of thought), which just has a technical purpose to solve, but that does not have any validity in reality.’

Thus, the grammarians agree with the Naiyāyikas on the distinction of *prakṛti* and *pratyaya* etc. only to give a technical/formal justification to the theory of *śābdabodha*.

## MODEL OF ŚĀBDABODHA ACCORDING TO THE SCHOOL OF GRAMMER

Now let us see the structure of *śābdabodha* according to the school of grammar. Let us consider the sentence:

*Caitras taṇḍulam pacati.*

Caitra<sub>Nom.</sub> taṇḍula<sub>Acc.</sub> pac-V+(Pres.).

Caitra cooks rice.

The import (*śābdabodha*) of this sentence according to the grammarians is: *ekativāvacchinna-caitrābhinnakartṛko vartamānakaliks taṇḍulābhinnāśraya-kaviklittyanukūlo vyāpārah. i. e.* ‘The activity viz. cooking occurring in the present time conducive to the softening which is a change occurring in something not different from rice and which has an agent none other than Caitra delimited/specified by singularity. (See Fig. 3)

Here the significant distinction of this view from that of the school of Navya-Nyāya lies in the fact that the grammarians focus on the main meaning of the verbal base (*dhātu*) i. e. *vyāpāra* (action), which appears as the chief qualificand or nucleus. On this ground the AI scientists feel that grammarians theory is most suitable for the knowledge Representation Scheme (using Semantic Net) for NLP.

## A COMPARISON WITH K.R.S. IN AI

The knowledge representation is defined as ‘the process of encoding a

natural language utterance of Semantic Nets'. According to Briggs (1986) 'What is required is a minimum syntax which is formal and unambiguous'. For the knowledge representation scheme, the minimum syntax is designed between two nodes and a relation that connects them (forming a triplet). For instance, consider this sentence:

*kirātaḥ arjunāya pāsupatāstram prāyacchat.*

kirāta<sub>Nom.</sub> arjuna<sub>Dat.</sub> pāsupatāstra pra+dā<sub>v+(Past)</sub>.

'Kirata (Siva) gave the weapon called *pāsupatāstra* to Arjuna.

The triplets of the semantics nodes can be formed as follows: —

activity,	instance,	give	
give,	time,	past	
give,	agent,	Kirāta	
give,	object,	pāsupatāstra	
give,	recipient,	Arjuna.	(See Fig. 4)

Briggs (1986) thinks that the scheme presented by the school of Indian Grammarians is very much relevant for the AI scientist for NLP. He has all the praise for the grammarians' approach to *Śābadabodha* scheme. To quote him:

'This simple idea is fundamental in unambiguous language representation. What is surprising is that this idea was understood by Sanskrit Grammarians, forgotten for centuries and understood recently by AI researchers in Natural Language Processing. The motivation of the latter is clear : in order to build systems in which language is understood automatically, it is necessary to go back to the underlying meaning. This exemplifies the engineering approach. The motive of Sanskrit Grammarians is less obvious. They wanted to understand language for its own sake. Knowledge itself was the goal. The surprising situation which has developed is one of AI scientists who are either above looking at ancient approaches to the same problem or who are simply ignorant that such work has gone on<sup>26</sup>).

The after-math of criticism on Briggs claim is of course very strong. The issue: Sanskrit being a Natural Language, whether it can satisfy all the conditions for unambiguous knowledge representation scheme (using Semantic Nets) in the field of AI still doubtful. His critics have raised the questions on anaphoric constructions, pronouns, synonyms, homonyms, reflexive constructions poetry ect. They say if Sanskrit Language is rich enough (very rich indeed!) with all these, then it can not be used as an interlingua for Machine Translation in Computers<sup>27</sup>).

## THE NATURE OF KĀRAKA

That apart, Briggs presentation of the semantic nodes<sup>28</sup>) related each other with the connectors (i. e. esp. with the *kārakas*) gives an impression that each



*kāraka* is directly involved or related to the main action. On the contrary, the *kāraḥ* (mostly) participate in the accomplishment of the main action through their auxiliary actions. Vācaspati Mishra (C. 9th A.D.) the author of Nyāyavārtika-Tātparya-Tīkā says: *pradhānakriyāsādhane hetau avāntara-kriyāviśeṣayukte kāraḥśabdah pravartate*<sup>29</sup>, i. e. ‘the term *kāraka* is used (in the context) with an entity which possesses a specific auxiliary action by which the causal factors participate in accomplishing the main action. Consider this sentence:

*Devadattaḥ kuṭhāreṇa kāṣṭham cchinnati.*

Devadatta<sub>Nom</sub> kuṭhāra<sub>Inst</sub> kāṣṭha<sub>Acc</sub> chid-<sub>V+(Pres.)</sub>

‘Devadatta cuts the wood (into pieces) by means of an axe’.

To analyse the *vākyāthabodha* of this sentence, one has to be very keen to observe what really happens in the external worldly situation. Our observation reveals that, Devadatta, the agent has an instrument viz. an axe in his hand. A peice of wood lies before him. Devadatta takes the axe in his hand up and puts it down with all his force on the peice of the wood. He repeats it again and again. By this the axe becomes the most efficient cause in separating the parts of the wood. This, all together is called the cutting activity. Thus, from the *śābdabodha* point of view, the main action (denoted by the verbal base *chid-* ‘to cut’) is cutting activity (*avayavaviśeṣānukūlavvyāpāra*). The result is separation of the parts (*avayavaviśeṣa*) of the wood. It occurs when the auxiliary activity (viz. *unnamana* ‘taking up’ and *nipātana* ‘putting down’) is exercised by the agent and the auxiliary activity of the instrument (viz. *utpatana* ‘going up’ and *nipātana* ‘falling down’) is exercised. Thus, our observation reveals that, the agent participates in the accomplishment of the main action (in the present context of ‘cutting’) by exercising his auxiliary viz. *unnamana* and *nipātana*. Therefore, it is said that the *karṭṛ* is *caritārtha* (effective) with *kaṛaṇa kāraḥ*. In other words, the *karṭṛ kāraḥ* becomes effective (*caritārtha*) with reference to *kaṛaṇa kāraḥ* on its *kāraka* point of view. On this above observation it can be concluded that one *kāraka* depends upon another *kāraka* with the help of its auxiliary activity to participate in the accomplishment of the main action.

## MUTUAL DEPENDENCY OF THE KĀRAKAS

This phenomenon of the *kāraka* theory, viz. the mutual dependency of the *kāraḥ* is definitely very important to note on the role played by them in the knowledge representation scheme in the *śābdabodha* theory. Pāṇini has indicated to this phenomenon of the *kāraḥ* in his *Aṣṭādhyāyī*. In order to define the *sampradāna-kāraka*, Pāṇini says: *karmanā yam abhipraiti sa sampradānam* (P. 1. 4. 32); i. e. ‘the entity/person, whom one wishes to connect with the object (of the verb-*dā* ‘to give’) is called *sampradāna*

(recipient). This means according to Pāṇini, *sampradāna kāraka* participates in the accomplishment of the main action through its auxiliary action depending upon the *karma kāraka*. Some of the *ācāryas* (exponents) of the old school of Nyāya have also recognised this phenomenon of the *kāraka*. Bhartṛhari, the grammatico-philosopher defines *adhikaraṇa kāraka* from its dependency point of view. To quote him:

‘*karṭṛkarmavyavahitām asākṣād dhārayat kriyām  
upakurvāt kriyāsiddhau śāstre ’dhikaraṇam smṛtam’*

(V. P. iii. 7. 148)

i. e. ‘The substratum/ locus is said to be that which brings about the accomplishment of the main action indirectly by holding it through the intervention of the agent or the object’.

That means, *adhikaraṇakāraka* depends upon the agent or the object to participate in the accomplishment of the main action.

In this way the investigation on the issue viz. the mutual dependency of the *kāraṅkas* goes back to as early as Pāṇini. But it is only in a Vedānta text namely: *Khaṇḍanakhaṇḍakhādyā* by Śrīharṣa<sup>30</sup>), the complete picture of the mutual dependency of the *kāraṅkas* is given in a greater detail. Most surprisingly, to the best of my knowledge, no modern scholar has taken any note of this phenomenon of the *kāraka* theory.

## BHAVĀNANDA ON THE DEPENDENCY OF KĀRAKAS

In what follows, I shall give a brief account of the theory of dependency of the *kāraṅkas* as it is presented by Bhavānanda in his *Kāraṅkacakram*<sup>31</sup>) and my critical appreciation on it.

According to Bhavānanda, the *karāṇa kāraka* (the most efficient means for the accomplishment of the main action) is the only *kāraka* which is directly effective (*caritārtha*) in the main action. He agrees with Brartṛhari on the dependency of *adhikaraṇa kāraka* on *karṭṛ* as well as *karnam*.

Take into consideration of this sentence:

*Caitraḥ sthālyām gṛhe odanam pacati.*

Caitra<sub>Nom.</sub> sthāly<sub>Loc.</sub> gṛha<sub>Loc.</sub> odana<sub>Acc.</sub> pac-V+(present)

‘Caitra cooks rice in a pot in the house’.

Here according to Bhavānanda, *sthāly* is *caritārtha* (effective) through the *karmakāraka* (*odana* in present context) and the *gṛha* is *caritārtha* through *karṭṛ kāraka* (Caitra in present context) by prompting their respective auxiliary activities.

Bhavānanda, of course justifies the *cāritārthya* of *karṭṛ* and *karman* with reference to their auxiliary activities in the *karāṇa kāraka* as we have already explained above.

Bhavānanda thinks *apādāna* and *sampradāna* are effective (*caritārtha*) only

in *karṭṛ kāraka*. For instance:

*Brāhmaṇāya gām dadāti*

Brāhmaṇa<sub>Dat.</sub> go<sub>Acc.</sub> dā<sub>V+(present)</sub>  
'(He) gives a cow to the brahmin'.

Here, the brahmin is called *sampradāna kāraka* (recipient) since, he is responsible in the accomplishment of the main action viz. 'donation' by allowing the doner to offer the cow. It is said that unless and otherwise the consent of the recipient, the *dānakriyā* (donation) can not be performed. Thus *sampradāna kāraka* is responsible in the accomplishment of the main action by rousing the disire to donate in the mind of the agent. Therefore, the *sampradāna kāraka* is *caritārtha* with the agent only.

So also, to justify the *cāritārthya* of *apādāna kāraka* in *karṭṛ kāraka*, see the sentence:

*vṛkṣāt parṇam patati.*

vṛkṣa<sub>Abl.</sub> parṇa<sub>Acc.</sub> pat<sub>V+(Pre)</sub>  
'The leaf falls down from the tree.'

Here the tree is the *apādāna kāraka* (ablative factor) and the leaf is the agent with reference to the falling activity (*patana*).

The tree is responsible for the falling of the leaf (the agent) by its auxiliary activity viz. separation (*vibhāga*). Thus, *apādāna* is said to be effective with the agent (*karṭṛ*).

(see fig. 5 for the complete picture of dependency of *kārakas* as per Bhavānanda's presentation<sup>32</sup>.)

## A CRITIQUE

In my opinion, Bhavānanda's proposal on the dependency of the *kārakas* can not be justified in all instances. Therefore, the proposed theory of dependency of the *kārakas* needs some revision. Consider these instances:

(i) *dadhnaḥ navanītam ādattelāharati.*

dadhi<sub>Abl.</sub> navanīta<sub>Acc.</sub> ā + dā<sub>V+(present)</sub> / ā + hr̥<sub>V+(Pre.)</sub>.  
(He/She) takes out/collects the butter from the curd.

(ii) *vṛkṣāt puṣpam avacinoti.*

vṛkṣa<sub>Abl.</sub> puṣpa<sub>Acc.</sub> ava + cī<sub>V+(Pre.)</sub>.  
(He/She) plucks flower from the tree.

(iii) *cauraḥ koṣataḥ/grhāt dhanam corayati/muṣṇāti.*

caura<sub>Nom.</sub> koṣa<sub>Abl.</sub> / gr̥ha<sub>Abl.</sub> dhana<sub>Acc.</sub> cur<sub>V+</sub> / muṣ<sub>V+(Pre.)</sub>.  
The thief steals money from the pocket/the house.

In all these instances, the *apādāna kāraka* viz. *dadhi* in (i), *vṛkṣa* in (ii), and *koṣa/gr̥ha* in (iii) are effective through *karma kāraka* viz. *navanīta* in (i), *puṣpa* in (ii), and *dhana* in (iii) with reference to the main action expressed by the verbal bases viz. *ā + dā- / ā + hr̥-* in (i), *ava + cī-* in (ii) and *cur- / muṣ-* in (iii) respec-

tively. Therefore, I suggest a modification in the traditional theory as per the *cāritārthya* of *apādāna kāraka* is concerned that, *apādāna* must be treated as effective either through *karṭṛ* or through *karman*, depending on the nature of the verbal base (*dhātu*) its (*apādāna*'s) participation in the accomplishment of the main action.

We do not also agree with Bhavānanda's proposal on the *cāritārthyam* of *sampradāna kāraka* through *karṭṛ kāraka* only. Of course Bhavānanda faithfully follows the traditional concept that, for *dānakriyā* (the donation activity) one has to take the concept from the *dānīya* i. e. the recipient to designate himself as *sampradāna kāraka*. It is not always possible or not necessary also in some instances. Consider the following sentences:

- (i) *janiṣyamāṇapautrāya gām dadāti.*  
*janiṣyamāṇapautra*<sub>Dat.</sub> *gō*<sub>Acc.</sub> *dā*<sub>V+(pre.)</sub>.  
 '(He) gives a cow to (his) grandson (who is yet) to born'.
- (ii) *vṛkṣāya jalam dadāti.*  
*vṛkṣa*<sub>Dat.</sub> *jala*<sub>Acc.</sub> *dā*<sub>V+(pre.)</sub>.  
 '(He) waters the tree' (Lit. He pours water for the tree).
- (iii) *khaṇḍikopādhyāyaḥ śiṣyāya capeṭikām dadāti.*  
*khaṇḍikopādhyāya*<sub>Nom.</sub> *śiṣya*<sub>Dat.</sub> *capeṭikā*<sub>Acc.</sub> *dā*<sub>V+(pre.)</sub>.  
 'The wicked teacher slaps (lit. gives a slap to) the student'.
- (iv) *na sūdrāya matim dadyāt.*  
*na* (Negative particle) *sūdra*<sub>Dat.</sub> *mati*<sub>Acc.</sub> *dā*<sub>V+(Injunct.)</sub>.  
 'One should not impart knowledge (of any doctrine) to a *sūdra*'.

In all these cases it will be very difficult to justify the *cāritārthya* of *sampradāna kāraka* (recipient) with reference to their effectivity with *karṭṛ kāraka*. But the same can be explained on its being effective through *karman* following Pāṇini's definition of *sampradāna kāraka* (P. 1. 4. 32). Therefore, it will be wise to accept the *cāritārthya* of *sampradāna kāraka* through *karman* instead of *karṭṛ kāraka*.

Moreover, we do not feel that the effectivity of *karṭṛ kāraka* be accepted only with the *karāṇa kāraka* and that is the only *kāraka* which is *caritārtha* with the main action. Consider the following sentences:

- (i) *Caitraḥ śete*  
*Caitra*<sub>Nom.</sub> *śī*<sub>N</sub><sub>V+(Pre.)</sub>.  
 Caitra sleeps.
- (ii) *Devadattaḥ krīḍati*  
*Devadatta*<sub>Nom.</sub> *krīḍ*<sub>V-(Pre.)</sub>.  
 Devadatta plays.
- (iii) *patram patati*  
*Patra*<sub>(Nom.)</sub> *pat*<sub>V-/+(Pre.)</sub>.  
 The leaf falls.

In all these cases the *karṭṛ* is directly *caritārtha* (effective) with the main

action. Therefore, in my opinion the agent is directly effective in (the accomplishment of) the main action with reference to almost all the instances of *akarmaka-dhātus* (i. e. intransitive verbal bases). One important point must be noted here is that, the effectivity (*cāritārthya*) of the *kāraḥ* should be considered where more than one *kāraḥ* is stated explicitly in one and the same construction. But the *cāritārthya* of *kāraḥ* need not be or rather must not be treated, when they are implied (*adhyāhrta*) in one and the same construction. Therefore, the *karmakāraḥ* need not be taken to be *cāritārtha* through the implied *kāraḥ* when it is stated without its association with the latter explicitly. On the other hand, its *cāritārthya* can be justified either directly in accomplishment of the main action or through the agent.

For instance:

*Caitraḥ taṇḍulam pacati.*

Caitra<sub>Nom.</sub> taṇḍula<sub>Acc.</sub> pac<sub>-V+(Pre.)</sub>

Caitra cooks rice.

Here as per the *sābdabodha* viz. *taṇḍulaniṣṭha-viklityankūla-pākānukūla-kṛtimān caitraḥ*, it is explained that the *taṇḍula* (rice, the object in present context) is directly related with the *dhātvartha viklitti* and then with the *vyāpāra*. Thus, in such cases where the *kāraḥ* is not stated explicitly, the *cāritārthya* of the *karman* may be treated directly with the main action only. It should be noted further that in the ditransitive constructions (i. e., *dvikarmaka-dhātusthale*) the subordinate object (*guṇa karman*) gets its effectivity with the main object i. e. *mukhya-karman*. For instance:

*Māṇavakam dharmam brūte.*

Māṇavaka<sub>Acc.(3)</sub> dharmā<sub>Acc.(2)</sub> brū<sub>-V++(Pre.)</sub>

(He/ She) teaches (*lit. tells*) merits/ religious doctrins to the (young) student.

Here *māṇavaka* being the subordinate object depends upon the main object (i. e. *dharmā*) for its effectivity (*cāritārthya*) with reference to the accomplishment of the main action. Likewise, in an intransitive construction if we find a dative case only, its effectivity must be considered with the agent only. For instance:

*(strī) patye śete.*

(strī<sub>Nom.</sub>) pati<sub>Dat.</sub> ŚīN<sub>-V-(Pre.)</sub>

(The wife) lies down for (her) husband.

Here we find the dative case is effective with the agent only with reference to the accomplishment of the main action.

(See fig. No. 6 for the revised theory on the dependency of the *kāraḥ*<sup>33</sup>)

## RESUME

This study on the dependency of the *kāraḥ* serves an important purpose.

It gives a complete picture about the supermacy and the dependency of the *kāraḥas*, on which we can lay out a scheme to identify and confirm which are the prominent *kāraḥas* and which are dependent *kāraḥas*. In my opinion, the *karṭṛ*, *karman*, and *karaṇas* are the prominent *kāraḥas* and the *sampradāna*, *apādāna* and *adhikaraṇas* are dependent *kāraḥas*. Let us sum up, why the *karṭṛ*, *karman* and *karaṇas* are considered as prominent *kāraḥas* .:

#### 1 ) KARṬṚ:

- (i) Among all the *kāraḥas*, the *karṭṛ* has supermacy over all other *kāraḥas*, since it is the independent one (*svatantraḥ kartā*, P. 1. 4. 54). It is *svatantra* (independent) in the sence that it, not being prompted by any other *kāraḥa*, prompts all the *kāraḥas* to participate in the accomplishment of the main action (*kāraḥāntarāproyajyatve sati kāraḥacakraproyokṭṛtvam svātantryam*).
- (ii) *apādāna*, *adhikaraṇa* and *sampradāna* depend upon *karṭṛ* (agent) for their effectivity in the accomplishment of the main action.
- (iii) It also directly participates in the accomplishment of the main action.

#### 2 ) KARMAN:

- (i) The *karman* (object) is also a prominent *kāraḥa*, since it is the substratum of the result of the main action. Sometimes, it is identified with the result of the main action itself.
- (ii) With reference to the *karman* only, the auxiliary activities of the *karaṇa kāraḥa* (instrument) becomes effective, which is traditionally considered to be the most prominent *kāraḥa*.
- (iii) *Apādāna*, *adhikaraṇa* and *sampradāna* also depend upon the *karman* through their auxiliary activities in the accomplishment of the main action.
- (iv) It also directly participates in the accomplishment of the main action.

#### 3 ) KARAṆA:

- (i) *Karaṇa* — by its definition (P. 1. 4. 45) — is the most efficient factor in the accomplishment of the main aciton.
- (ii) It is the only *kāraḥa* according to the tradition, which participates directly in the accomplishment of the main action.
- (iii) *Karṭṛ* and *karman* also depend upon the *karaṇa* in most cases to participate in the accomplishment of the main action.
- (iv) It is only when the *karaṇa* exercises its auxiliary activites, the main action (or the result of the action) is produced (*yadvyāpārad anantaram kriyotpattiḥ tat kāraḥam karaṇakāraḥam ity ucyate*). Therefore, the *karaṇa* is said to be most efficient means and its supermacy is unchallenged.

Jayanta Bhaṭṭa, although argues in order to establish the *sāmagrī* (the collocation or the totality of the causal factors) to be the most efficient means (*karaṇa*) in the accomplishment of the main action, still, he was forced by his

critics to accept the separate identity of the agent and the object from his *sāmagrī* (what he considers as the *pramāṇa* or *karāṇa*). His critics argue that, if the collocation consists of all the causal factors, which includes even the subject and object of the knowledge: then the subject, being included in the collocation will cease to be subject. And if there is no subject, then who is to apprehend the object to be known by the causal operation? Moreover, as we know, the Nyāya system of epistemology maintains that the process knowing comprises the subject (*pramātā*), the object (*prameya*), the means (*pramāṇa*) and the result (*pramiti*). If Jayanta Bhaṭṭa's *sāmagrī* is to be accepted as the most efficient means (*karāṇa*), then the position of Nyāya system of epistemology will be jeopardised. Moreover, it is a common experience that a person perceives the entity/object through his organs (eye etc.) and nobody is known to approve the instrumentality of the collocation<sup>34</sup>.

Taking into account of all these arguments, Jayanta finally says '(athavā) kartṛkarmavilakṣaṇā. . . . bodhabodhasvabhāvā sāmagrī pramāṇam iti' i. e. 'the *pramāṇa* is the collocation of both conscious and unconscious conditions, distinct from a subject and an object'<sup>35</sup>.

By quoting this, I just wanted to point out that, even Jayant Bhaṭṭa—the exponent of the theory of collocation being the most efficient means—finally accepts that the agent, the object and the instruments are distinguished causal factors. This approves our claim that these three *kāraṅkas* are prominent *kāraṅkas*, whereas, the other three *kāraṅkas* viz. *apādāna*, *sampradāna* and *adhikarāṇa kāraṅkas* are dependent *kāraṅkas*. Needless to state that in our opinion the sixfold classification of the *kāraṅkas* maintained by the Hindu Grammarians stands intact and they are all distinct causal factors for the accomplishment of the main action.

## A NOTE ON FIGURES

I was quite impressed by the use of *figures* to present and explain the complexity of the theories in the School of Navya Nyāya in an easy and convincing manner by Yuko Miyasaka in his Ph. D. dissertation : The Concept of *Avacchedakatva* in Navya Nyāya, University of Poona (1980) and subsequently by Toshihiro Wada in his book : Invariable Concomitance in Navya Nyāya, Indian Book Centre, Delhi (1990). Here my presentation of the figures resemble to that of Miyasaka Y. and Wada T. but they are different in system. Because, here the figures are used to explain the complexity of the theories on *sābdabodha* in general and *Kāraṅka*-dependency in particular, where I had to deal with the *padas* (Grammatical/Linguistic entities) as well as *padārthas* (denoted meaning of the words) and their Relations. Whereas the figures in Miyasaka (1980) and Wada (1990) are presented to explain the complexity of the theories on *Anumāna* (Inference), where they had to deal with only *padārthas*

(worldly entities) and their relations. I owe both of them for developing a system which inspired me to develop a similar system for *śābdabodha*.

## NOTES AND REFERENCES

- 1) Briggs, Rick. 1985, Knowledge Representation in Sanskrit and Artificial Intelligence, THE A I MAGAZINE. Spring.
- 2) —1986, Shanstric Sanskrit an Inter Lingua for Machine Translation, Paper presented in the First National Seminar on Knowledge Representation and Sanskritam, Bangalore, December 1986.
- 3) cf. *suptināntacayo vākyam kriyā vā kārakānvitā*, *Amarakoṣa*, by Amarasimha. 1. 14.
- 4) Nyāyasūtrabhāṣya (NSBh.) by Vātsyāyana (on 1. 1. 1.), NYAYADARŚANAM (ND.) ed by Taranath Tarkatirtha, Munsiram Manoharlal Publishers Pvt. Ltd. New Delhi, (second edition) 1985, p. 24.
- 5) Tarkasamgraha (TS.), by Annam Baḥṭṭa, ed. by Y. V. Athalye, Pub. Bombay Sanskrit Series, No. LV, (Second Ed. - Second Impression), B.O.R.I., Poona, 1963, p. 24.
- 6) cf. *pramāsādhanam hi pramānam*, NSBhVT on ND. 1.1.1., see also *karaṇāsādhano 'yam pramāṇaśabdah*, NM. p. 31.
- 7) cf. i) NSBhVa. in ND. pp. 17-20.  
ii) NSBhVaT. in ND. pp. 16-20.  
iii) *Khaṇḍanakhaṇḍakhādyā* (Khaṇḍ) ed. Navikanta Jha, The Chaukhamba Sanskrit Series Office, Varanasi, 1970, p.
- 8) TS., *ibid*, p. 50
- 9) See Note No. 3.
- 10) *Vaiyākaraṇa Siddhānta Laghu Mañjuṣā* (VSLM.) by Nāgeśa Bhaṭṭa, with Comm. Ratnaprabhā, The Chaukhamba Sanskrit Series Office (CSSO.) Varanasi, 1963, pp. 810-811.
- 11) The relation between *kriyā* and *kāraka* is treated as *samavāya*, since they are *ayutasiddha* 'inherently integrated unit'. As we know that the relation between *kriyā* and *kriyāvat* is *samavāya* (See Tarkabhāṣā of Keshava Mishra, Kashi Samskrita Granthamala - 155, Varanasi, 1982, p. 31). Here *kriyāvat* is nothing but *kāraka*. But, as per the nature and the definition of *kāraka* is concerned, the relation between them could be asumed as it is said that: *kriyā ca kārakam karoti, na ca kriyāveśam antareṇa kārakam kārakam bhavati*, etc. see NM. p.
- 12) *padajñānam tu karaṇam dvāram tatra padārthadhīḥ! śābdabodhaḥ phalam tatra śaktidhīḥ sahakāriṇī!*/see *Kārikāvalī-Muktāvalī* (KM.) by Viśvanātha Pañcānana, (*kārikā* - 81) with Comm. Dinakarī and Rāmarūdrī, ed by Atmaram Narayan Jere, CSSO. Varanasi, 1982, p. 356.
- 13) *Nyāyamañjarī* (NM.) by Jayanta Bhaṭṭa, ed. K.S. Varadacarya, Oriental Institute, Mysore, 1969. p. 12-14.
- 14) The scholars belonging to the school of Navya Nyāya define *śakti* (the word potency) as *Īsvarasamketah* (the desire of God). *idam padam anum artham bodhayatu iti, asmāt padāt ayam arthaḥ bodhavya iti vā icchā samketarūpā vṛttih*, i. e. 'this word may convey this meaning or this meaning should be understood from this word, such a desire (of God) is called the denotative function (*vṛtti*) of the word with its meaning'. See *Śaktivāda* by Gadādhara Bhaṭṭācārya, ed by Harinath Tarkasiddhanta Bhaṭṭācārya with his own Comm. *Vivṛtti*, CSSO. Varanasi. 1986, p. 5.
- 15) *Ākāṅkṣā* is defined as: *yena padena vinā yatpadasyānvayā-nanubhāvakatvam tena padena saha tasyākāṅkṣā*, 'A word has expectancy with regard to that word without which it can not convey any idea of syntactico-semantic relation'. See KM. p. 423.
- 16) *Yogyatā* (compatibility) is defined as: *ekapadārthe aparapadarthasambandho yogyatā*, i. e. 'the syntactic relation of the meaning of a word with that of another word is called compatibility'. cf. K.M. p. 420.
- 17) Annam Bhaṭṭa defines *sannidhi* as: *padānām avilambenoccāraṇam*, i. e. 'See Tarkasamgraha, *opcit.* p. 52.



- 18) *Tātparya* is defined as: *vaktur icchā tu tātparyam* (KM.), i. e. 'the desire of the speaker is called intention'. For instance *saindhavam ānaya* might convey two distinct meanings according to the context: that is, in the context of eating, if this sentence is uttered by somebody and if the eater desires so than it will mean 'bring salt', whereas in the context of journey the same sentence may convey the message 'bring the horse' if the goer desires so. This has also an important role to play in *śābdabodha*.
- 19) A *pada* is defined as: *śaktam padam*, i. e. '(phonetic unit) which possess the potency to express a meaning is called *pada*'. But Pāṇini's definition of *pada* is quite different one, i. e. '*suptihantam padam*' (P. 1. 4. 14) - a (finished) word which ends with the case markers viz. either a nominal case marker or a verbal case marker is called *pada*. However, the neo-grammarians also have accepted this definition of *pada* to give the formal justification to the *Śābdabodha* scheme.
- 20) The Naiyāyikas also accept the *dhātvarthamukhyaviśeṣyaka - śābdabodha* in the intransitive passive constructions. For instance see the following usages:
- i) *Caitreṇa supyate*.  
 Caitra<sub>Inst.</sub> sup<sub>V-(Pass.)</sub>  
 'it is slept by Caitra.'
- ii) *Mayā sthīyate*.  
 asmad<sub>Inst.</sub> sthā<sub>V-(Pass.)</sub>  
 'it is waited (*lit.* remained) by me'.

Here, since a word ending with nominative case ending is not found in these constructions, the Naiyāyikas accept the *dhātvartha vyāpara* as the chief qualificand or nucleus. Therefore, they say *asati vādhake* i. e., 'unless otherwise impossible' the *prathamāntārtha* should be accepted as the chief qualificand.

- 21) See detailed discussion on the meaning of accusative case endings, Dash Achyutananda, DECCAN COLLEGE BULETTIN, Prof. Sankalia Memorial Volume, Vo.49, 1989. Deccan College Postgraduate Reserch Institute, Poona.
- 22) *paryāptiś ca 'yam eko ghaṭaḥ, imau dvau iti pratītiśākṣikaḥ svarūpasambandhaviśeṣaḥ*, see Vyutpattivāda, by Gadādhara Bhaṭṭācārya, Nirnayasaragar Press, 23 Kolbhal Lane, Bombay, 1968, p. 105.
- 23) The neo-logicians accept *ādheyatā* as the denoted meaning of the accusative case ending. According to them, the substantive (*grāma*) expresses *karman* itself. Therefore, according to the principle: *ananyalabhyaḥ śabdārthaḥ* — 'the meaning of a word is considered to be that which is not obtained by any other grammatical element in the sentence' — the accusative case ending is accepted as the denotator of the meaning *ādheyatā*.
- 24) The *sphoṭa* theory is the most significant doctrine presented by the grammarians in the context of knowledge representation in the traditional school of Grammer. We do not intend to enter into the detailed discussion on the *sphoṭa* theory here, because it is beyond the scope of this paper. But ofcourse it is worth mentioning here by name only and the details on the issue may be seen in the following monographs:
- (i) Joshi, S. D. 1967, The Sphoṭa Nirṇaya of Kauṇḍa Bhaṭṭa, ed. with translation and Notes, Publications of Centre of Advanced Studies in Sankrit, University of Poona, Poona.
- (ii) Coward, Harold G., Sphoṭa Theory of Language, Motilal Banarasidass, Delhi, 1980.
- 25) See VSLM. *opcit.* p. 5-6.  
 Bhartṛhari has proposed this view in detail in his VĀKYAPADĪYA. Let us look at this famous *kārikā*: *pade na varṇā vidyante varṇeṣv avayavā na ca vākyāt padānām atyantam praviveko na kaścana*!!

V.P. I. 73: also cf. 2.10.

'There are no phonemes in the word nor are there parts in the phoneme. There is no absolute difference of the words from the sentence'. See Tr. and Notes by K.A.S. Iyer, Vākyapadīya, Deccan Collage Postgraduate Research Institute, Poona, 1965.

- 26) See Note No.2.
- 27) See A.I., List Digest, 5 Oct. 1984, Vol.2, Issue 131. Briggs's critics are Dr. Kiparsky, Michael, G. Dyer *et al.*

- 28) cf. fig. 4.  
 29) See NVTaT. p. 17.  
 30) Khaṇḍ. pp. 239ff.  
 31) Kāraḥakacakraṃ (KC.) by Bhavānanda Siddhāntavāgīṣa, with Comm. Mādhavī, ed. by Brahmasankar Shastri, CSSO. Varanasi, 1942, pp. 40-41.  
 32) This is according to the traditional approach presented by Bhavānanda in his KC.  
 33) This is as per our revised theory on the dependency of *kāraḥakas*.  
 34) NM. pp. 31-32.  
 35) NM. p. 38.

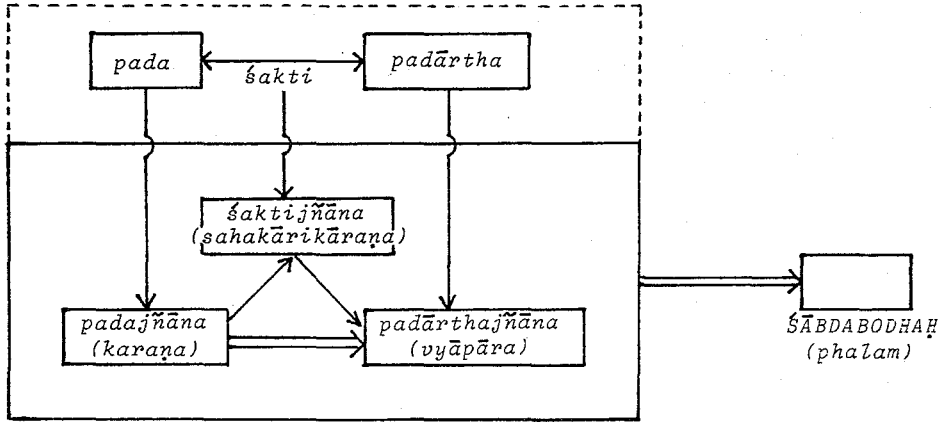
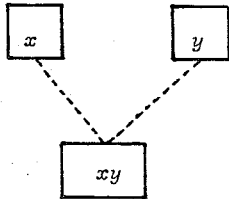


Figure 1.

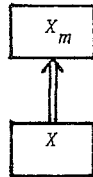
NOTES ON FIGURES 2 & 3

1.



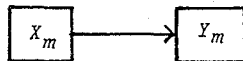
*x* is the nominal stem or verbal stem.  
*y* is the nominal suffix (-*sup*) or verbal suffix (-*tiñ*). *xy* is a word (*pada*) ending either in -*sup* or in -*tiñ* suffix.

2.



Here, upward pointed double-arrow-mark refers to the *śakti* (denotative potency) of the word viz. *X*. *X<sub>m</sub>* means the denoted sense of the stem (*X*). So also *Y<sub>m</sub>* should be treated as the denoted sense of a nominal or verbal suffix.

3.



This refers to the relation of *X<sub>m</sub>* with *Y<sub>m</sub>*. The particular relation is indicated below the figure and is explained in the particular context in the discussion.

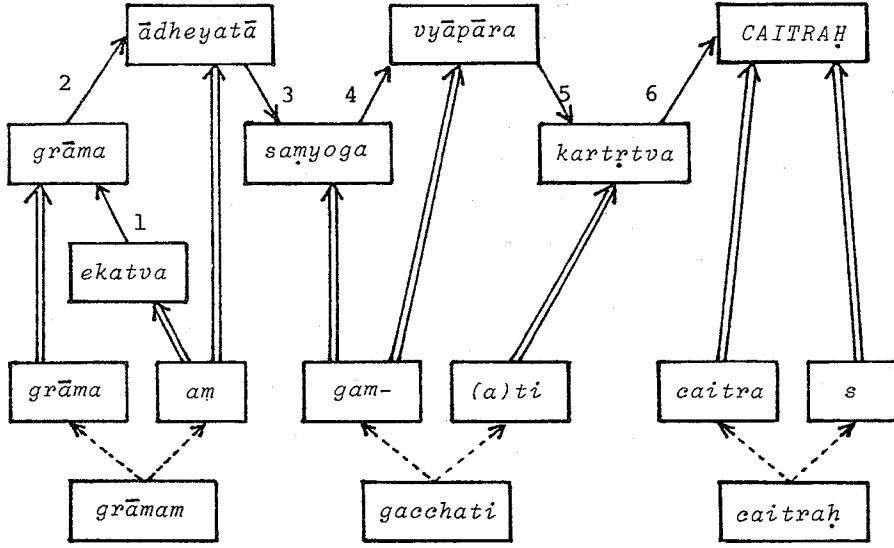


Figure 2.

1. *saṁavāya* or *pariyāpti* or *avacchedakatā* 2. *nirūpitatva* 3. *āśrayatā*  
 4. *janyatā* or *anukūlatā* 5. *anukūlatā* 6. *saṁavāya* or *āśrayatā*

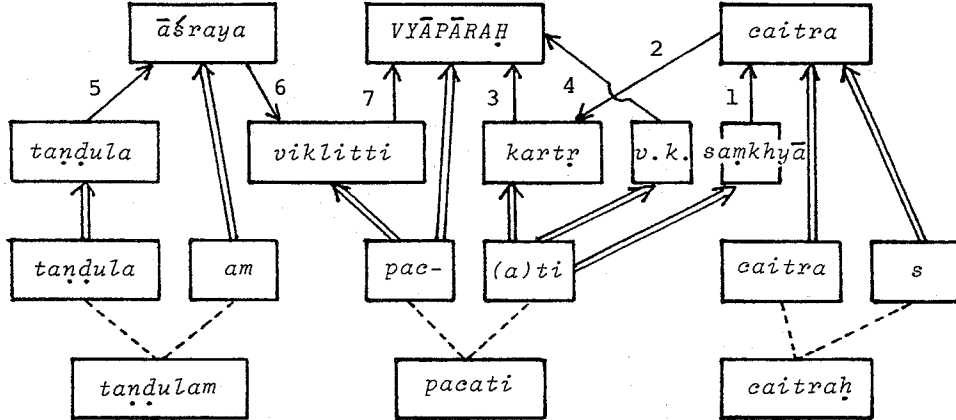


Figure 3.

1. *saṁavāya* or *pariyāpti* or *avacchedakatā* 2. *abheda* 3. *janyatā* or *anukūlatā*  
 4. *janyatā* 5. *abheda* 6. *āśrayatā* 7. *anukūlatā* or *janyatā*

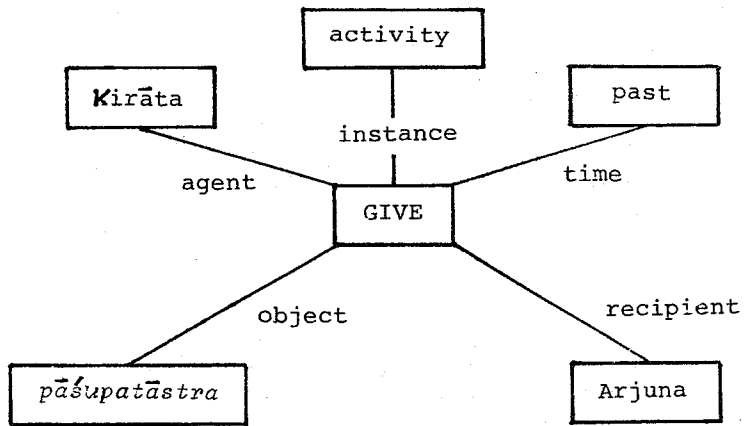
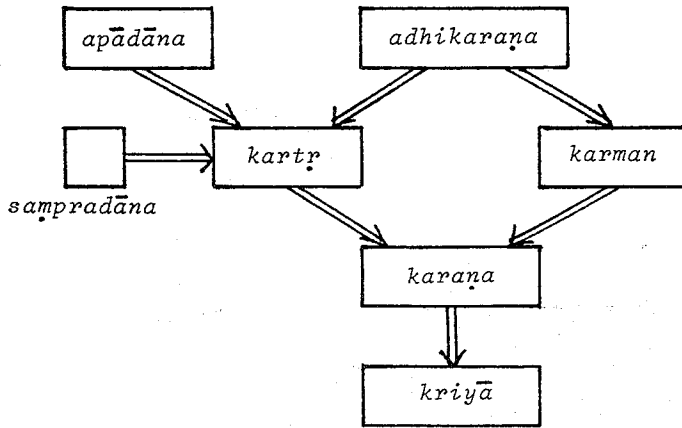
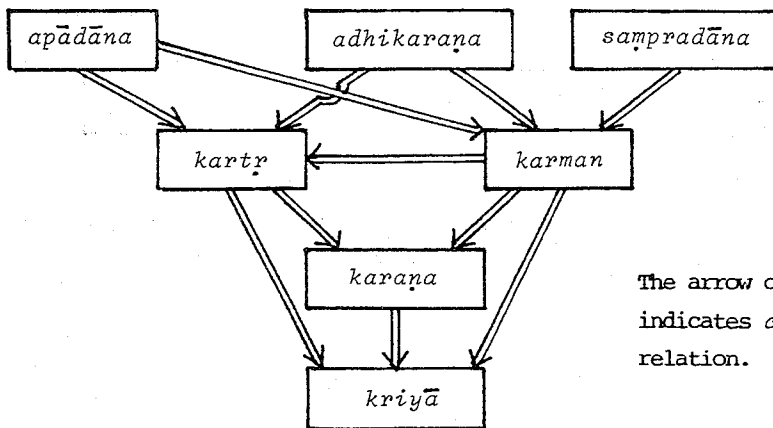


Figure 4.



The arrow of double line indicates *cāritārthya* relation.

Figure 5.



The arrow of double line indicates *cāritārthya* relation.

Figure 6.

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