CHAPTER THREE

3 GRAMMATICAL THEORY CONSTRUCTION-2

ASPECTS OF PĀNINI’S GRAMMATICAL METHODOLOGY

3.1 SAMJĀ RULES FROM STRUCTURAL AND HISTORICAL VIEWPOINTS

Pāṇini’s Aṣṭādhyāyī needs to be investigated from both structural point of view and historical point of view to understand the grammatical theory construction employed in it. We find these two points of views contrasting in Pāṇini’s saṃjā rules. Though Pāṇini adopted some traditional terms in his grammatical system, he integrated them into his coherent system of terminology and derivational rules. Certain grammatical notions are denoted by him by real words of sanskrit, such as pada and ārdhādhātuka while others are denoted by artificially created terms, such as ghu and bha. Again, Pāṇini defines some terms in his grammar and others are not defined.

One may try to find a rationale for these from structural view point or argue that the distinction is due to Pāṇini’s retaining pre-Pāṇinian terms or terms introduced by himself. One may argue that Pāṇini’s use of different words for optionality, namely, vā, vibhāṣā and anyatarasyām reflect the diversity which he found in his sources. However,
there is a strong evidence\textsuperscript{1} for the rationale from structural viewpoint rather than for the explaining away as due to arbitrary retention of pre-Paninian terms.

However, where the grammatical system of P\textlsima{n}ini imposes no formal requirements of its own, historical factors also might have influenced the system. Thus, the formation of technical terms in real words of sanskrit is completely arbitrary as far as P\textlsima{n}ini's grammatical system is concerned. For instance, it makes no difference if all occurrences of s\textlsima{r}vad\textlsima{d}h\textlsima{h}\textlsima{t}uka were replaced by an\textlsima{g}a and vice versa simultaneously. P\textlsima{n}ini's system has never formally exploited the etymological value of s\textlsima{r}vad\textlsima{d}h\textlsima{h}\textlsima{t}uka and its parallelism with \textlsima{r}dhd\textlsima{d}h\textlsima{h}\textlsima{t}uka. Though this is the case, many such words do have a meaning of their own outside of grammar, in the technical terminology of some other field such as phonetics or metrics, as for instance, an\textlsima{u}\textlsima{n}\textlsima{\=a}s\textlsima{i}ka 'nasal', savar\textlsima{\=a} 'homogeneous', laghu 'prosodically light', guru 'prosodically heavy', sam\textlsima{\=a}s\textlsima{\=a} 'combination' in ordinary language but 'compound' in technical language, \textlsima{\=a}m\textlsima{\=a}n\textlsima{\=a}n\textlsima{\=a}r\textlsima{\=a}t\textlsima{\=a}t\textlsima{\=a}a 'called' in ordinary language, but 'vocative endings' in technical language. The extra-grammatical meaning of such terms may even be closely related with the technical meaning as in the above cases, though this may not always be so as for instance, in gati 'going' in ordinary language but 'pre-verb' in technical language or as in tat\textlsima{\=a}puru\textlsima{\=a}s\textlsima{\=a} 'his servant' in ordinary language but 'compound formed
by rules P.2.1.22-2.2.22' in technical parlance, though it coincidently happens to be an example of the type of formation it denotes. Such extra-grammatical meanings have only a mnemonic value and are in the strict sense irrelevant in Pāṇini's grammatical theory, since for the purposes of applying the rules of the grammar, only the technical meaning assigned by the grammar counts. In contrast, constructional considerations have played some role in the constitution of artificial technical terms. For instance, the similarity in the names of the null elements luk, lup, slu enables them to be referred to collectively in P.1.1.63 na lumantangasya. Again, the choice of y, r and l as diacritics on suffixes in certain functions has enabled them to be combined as ugit.

In a general way, the avoidance of aspirates as diacritics (expectancy for gh, kh in krt suffixes) made them free for use in abstract underlying forms such as pha, dha, kha, cha, gha, tha, jha and also as cover terms like ghi, ghu, gha, bha. The pratvāhāras have made provision for an extended, productive system in the meta language which permits the creation of terms according to the needs the grammar by means of certain fixed rules.
3.2 TERMS WHICH CAN BE EXPLICATED OUTSIDE GRAMMAR ARE NOT DEFINED BY PÂNINI

Pânini does not define terms which can be explicated outside of grammar. For instance he has not defined any purely logical terms such as nityam 'always' or na 'not'. Also he uses both anya 'other' and sama 'same' without defining one as the negation of the other, though such a thing was possible. Pânini defines all terms proper to grammar and only those terms in so far as it is possible to do so. For instance he introduces laghu 'light' and guru 'heavy' by means of terms dīrgha 'long' and samyoga 'cluster'. Next he reduces each of these in turn to more primitive terms until ultimate primitive notions are reached which can no longer be explicated within grammar, as, for instance, in this case kāla 'time', anantara 'adjacent' and the phenomenological givens u, u and u3. On the other hand, when it comes to words like nitya, anya, sama etc., they are not terms proper to grammar and for that reason they have to be left undefined.

3.3 PÂNINI’S ORGANISATION OF GRAMMATICAL SYSTEM AS DIRECTED BY THE STRUCTURE OF BHĀṢĀ WITH VEDIC AS EXTENSION

From the way, Pânini has built his grammatical rules it appears that he did not think of the vedic language (chandas) as representing an earlier stage of the language current in his times (bhāṣā) though he was well aware of the special features of the
vedic language. Pāṇini has dealt with vedic, specially in over two hundred rules scattered through Astādhyāyī. However, both chandas and bhāsā are presented together in terms of a single system of rules.

In his system, unless expressly restricted, any rule is supposed to be equally applicable for both chandas and bhāsā in principle, though it does not mean that these two were given equal weightage in the process of construction of the grammar. In fact, almost every decision on how to organize grammatical system was dictated by the structure of bhāsā. In general, the vedic peculiarities are derived in the Astādhyāyī by patch up rules added to the rules established and motivated on the basis of bhāsā. Even if all the rules specifically applicable to chandas are deleted, the structure of Astādhyāyī virtually remains the same and one could scarcely tell the difference it makes to its structure. However, it is clear that though Pāṇini was aware of the two streams of sanskrit belonging to two historically different times, yet he considered both streams as a single language and built his grammatical system synchronically. He had no obligation, therefore, to trace the historical development of the language from chandas stage to bhāsā stage and this stand gave him the freedom to derive the words in a manner convenient to him.
Pāṇini's approach of deriving Vedic as an extension of bhāṣā works well only where both vedic and bhāṣā really have the same underlying representations and similar rules. It is only in such cases that Pāṇini can reasonably well capture the differences between the two by modifying the conditions under which a rule applies or changing the modality of a rule. But even then, we find looseness in the vedic analyses and the Vedic rules are mostly generalizations rather than restrictions on the rules applicable to bhāṣā. Typically, Pāṇini's approach involves listing additional environments where a rule applies in vedic, and also they are often rules making some process optional in vedic, as for example, vibhāsā chandasi, rather than making an optional process obligatory or inapplicable in vedic, as for example, in nityam chandasi, na chandasi. But, those aspects of the vedic language which have undergone more radical restructuring in bhāṣā cannot be treated that way. For instance, the lakāras 'tense mood categories' which are an appropriate device for presenting the verb system of bhāṣā, are incapable of representing the cross-classification of tense and mood in the vedic. However, there are some lessons to be learnt by modern grammarians in their attempt to build a grammar for a language, in that it would be more convenient to build a grammar synchronically without going into the details of historical development of changes in the language. However, as living languages continuously grow,
periodically some old rules may have to be deleted and some new rules added whenever there is a considerable change in the usage of the language. However, as a literary language is learned not only from the living, but also from the dead of the preceding generations that have made contributions to the literature which may still be current, there will be patterns of variations and there arises the need for optional rules and also preference among optional rules. Pāṇini uses the terms vā, vibhāṣā and anyatarasyām to indicate that a rule is to be applied optionally. Kiparsky⁷ has argued that contrary to traditional views, the three words are not synonymous, but are used to denote different preferences among optional variants and he has claimed that vā is to be translated as 'or rather', 'usually', 'preferably', vibhāṣā as 'or rather not', 'rarely', 'preferably not', 'marginally' and anyatarasyām as 'either way', 'sometimes', 'optionally', 'alternatively'. He has argued that this three-way distinction enables Pāṇini's rules to register the stylistic preferences among variants which are characteristic of any living language in its natural state. However, if this claim is accepted, there must be a strong influence of Pāṇini himself on usage subsequent to his times to carry away natural usage in preference to options preferred by Pāṇini. Kiparsky⁸ argues that if an exception is given marginal status by Pāṇini relative to an alternative regularised form, later authors who simply know Pāṇini's option may
also for convenience sake prefer to use the regularised form without knowing either that traditional usage prefers it or that Pāṇini recommends it.

3.4 **DISTINCTION BETWEEN OBJECT LANGUAGE AND META-LANGUAGE IN ASTĀDHYĀYI**

There is a great stress laid on the distinction between object language and meta-language in modern linguistics and this distinction was well known to Pāṇini. Pāṇini was very clear that a word as used in ordinary language to convey some idea could not be regarded as the same when employed to convey its own form. The use of a word was one thing but its mention was another altogether for him. In the beginning part of Mahābhāṣya, this idea is made very clear by Kaiyaṭa when a dispute arises whether obsolete words can be uttered at all, thus; \textit{yathā loko’rthavagamaya śabdam pravunkte naiyam mayaite’rthe prayukta api tu svarupapadarthaka ity arthaḥ}, ‘I have not used these words for conveying an idea the way the world uses words for conveying an idea but I have used them as denoting their own form; that is what is meant.’

The function of grammar is to explain formation of words. It is obvious that in this process grammar as a rule will have to mention words and not use them. This is because it is the form of a word that undergoes a grammatical operation and not its content. This axiom is expressed by Pāṇini in
p.1.1.68: *svaṁ rūpaṁ saddasyasabdasamīna* ‘excepting a grammatical technical term, a word signifies its own form’. As a matter of fact, this is a redundant statement since it is well known even without this statement. However, it serves one useful purpose in that it excludes a synonym from being subject to the operation concerned.

The natural use of a word is to convey a meaning and as such when a word is used to convey its own form, this use is something different from the normal. Many a time, a necessity was felt to draw attention to this unusual form-denoting function of a word and at such times the word *'iti'* was appended. *'iti'* was a sort of quotation mark which indicated that the word was denoting its form, for instance as in P.3.1.41: *vidamkurvanty ity anyatarasyām*. p.7.1.48 *istvinam iti ca*. But in a context like grammar, *iti* could be dispensed with without causing any confusion. In fact, this is what Panini normally does, as in P.1.4.94: *suhḥ pujayam*. *'su* is designated *karmaprayacaniya* when conveying honour”; or as in P.1.4.95: *atir atikramane ca*. *'ati* is designated *karmaprayacaniya* when conveying transgression also’. Panini has indicated the optional dispensation of *iti* in P.1.4.62: *anukaranam canitiparam* ‘also an imitative word, if not followed by *iti*, gets designation *gati* when in construction with a verb’. 
Sanskrit is a highly inflected language in which no word can appear without proper inflection, excepting the class of indeclinables. These inflections are divided into two categories, nominal and verbal. The nominal inflections show kāraka relationships, number etc., which the verbal inflections show tense, mood, person, number and voice. But all these hold good only in the object language. It is totally different when it comes to meta-language. The distinctions of noun and verb are caused by meaning. That means, they come in only when words are used, as in the ordinary language to convey meaning. All these distinctions are effaced when these words are mentioned for the sake of just their forms in grammatical discussions. Irrespective of their distinctions in the object language, they all form just one category in meta-language. But even to become category there must be some content. Though the form-denoting words have no meaning to convey in the ordinary sense, still they are not absolutely without any content. Their form itself is their denotation or content or svarūpa-padarthaka. Thus technically, they are still arthavat 'meaningful'. This fact, coupled with the circumstance that they are not subject to designations like verb etc., qualifies them to the designation prātipadika 'a nominal base', as defined in P.1.2.45: arthavad adhātur apratvayah prātipadikam, 'meaningful sound sequence which is not a verbal root, not a suffix is technically called a prātipadika'. 
Thus all the form-denoting words, whatever their category in the ordinary language are just praṇipadikas.

The difference between the object language and the meta-language in the Pāṇini’s system is felt in the inflection. In the meta-language, even the indeclinables become declinables like ordinary nominal bases. Verbs are declined like nouns and pronouns lose their special declension and are subjected to the general declension. Aṣṭādhvyāvī is full of such cases. Indeclinables thus used are: P.3.2.14 sami, P.3.4.18: alām-khalvyō, P.3.4.26: svādumi, P.3.4.60: tirvacī etc. Pre-verbs, a sub-class of indeclinables thus used are: P.1.3.42: propābhvām, P.1.3.51: avat, P.1.3.52: samah, P.1.4.93: adhi-pari etc. Verbal roots are mentioned in their pure form or along with their code-letters as: P.1.2.2: vijah, P.1.3.18: krivyah, P.1.3.22: sthān etc. P.1.3.32: kṛnah, P.1.2.22 pūnah, P.3.2.159 -dhet etc. Usually, however, they are mentioned with an appended -a as in P.3.1.24 lupā-sada-cara-japa-jabha-daha-dasa-grbhyo bhavagazhāvām or -i as in P.1.2.25 trśi-mṛśi-kṛēh kāyapasyā or in the 3rd person, singular present form as in P.3.1.52: asvati-vakti-khyātibhvyo’n cases of pronouns are: P.1.4.105 yuge, P.1.4.107 asmadi, P.2.4.32: idamah, P.2.4.33: atadah etc.
An interesting feature of such declensions is what may be called double declension, where if an inflected form is mentioned in the *sutra* and if it requires further inflection, then that inflected form is treated as a nominal base itself and subjected to further inflection. Thus, the compound *urasi-manasi* in p.1.4.75 means words *urasi* and *manasi* and not 'on the chest' and 'in the mind'. It is for this reason that *urasi-manasi* is treated as a nominal base in *i* and accordingly it becomes nominative dual *urasimana*.

3.5 **Pāṇini’s Grammar as Modelling Correct Sanskrit Usage**

Pāṇini’s approach to grammar is not prescriptive. His approach is to model the sanskrit as found in usage in his times to describe it. Thus it may be called a descriptive grammar in the sense that the rules in the grammar serve to derive forms which agree with the correct usage. Pāṇini’s stand is that the grammar must follow usage and not the other way round. Grammar is an explanation *anuvākhya*na of correct usage. The grammatical rules serve as a means to model or explain by derivation the correct forms of usage. The rules or the models are referred to as *lakṣaṇa* while the forms modelled *lakṣya*. Pāṇini’s derivational system is based on the distinction between *prakṛti* base and *pratyaya* affix, a distinction which had not been known in the west till recently, where the word was considered naively to be an indivisible
whole. The grammar lays down the derivation of items terminating in verbal or nominal endings called padas by introducing affixes after the bases under given conditions.

3.6 **BINARY DIVISION OF BASES INTO NOMINAL AND VERBAL**

The bases are of two kinds, dhātu, verbal roots and prātipadika, nominal bases. Further bases are either primitive or derived. The primitive verb roots are given in the dhātu-pātha while the primitive nominal bases are given in the gana-pātha, which is a partial lexicon of items which undergo specific operations. Rules of grammar generate the derived bases. Formation of derived verbal roots results from both primitive roots and nominal forms. For instance, causatives like kari, 'make do', 'have do' and desideratives like cikīra, 'wish to do' are derived from primitive root kr 'do', while denominatives like putrīya, 'desire a son for oneself' are derived from nominal bases. Derived nominal bases also are obtained from both verbal roots and nominal forms. For instance, the derived nominal base such as pāka 'cooking' and pācaka 'cook' are derived from the verbal root pac by the introduction of the primary affixes, kṛt, namely, ghan 'a' and ṣgvul 'aka' respectively. Likewise, derived compounds such as rāja-puruṣa 'king's man' as also items such as svapagava 'descendental of upagu' containing secondary affixes taddhita are derived from nominal forms.
3.7 **CONDITIONS WHEREBY AFFIXES ARE INTRODUCED AFTER BASES**

Affixes are introduced after bases under various types of conditions as follows. Meanings serve as conditions in some rules of the type: when meaning $M$ is denoted, affix $A$ is introduced after item $I$. For instance, P.3.4.69 'lap karmanī ca bhāve cakarmakebhyaḥ' and P.3.4.67 'kartari' provide that L-suffixes which are to be replaced by verb endings and participle affixes are introduced after roots if kartṛ 'an agent' or karman 'an object' is to be denoted and, after roots which, in given derivations, denote objectless actions 'akarmaka' if an action 'bhāva' is to be denoted. Specific meanings are assigned to bases and affixes, as for example, a root such as pac 'cook' denotes a set of actions which lead to a result viklitti 'softening of food and further it denotes the result also. A termination such as ti in pac-a-ti 'cooks, is cooking' denotes both an agent and a number. Such meaning assignments are arrived at by anvaya 'concurrent presence' and vyatireka 'concurrent absence'. In addition to such meanings or vācaka, dyotaka or cosignifiers are also assigned, dyotaka being items which, without denoting meanings attributed to them, have to be used with other items so that the meanings of the latter are expressed. For instance, the base deva denotes either a god or a goddess. The affix i is introduced after deva as a cosignifier or feminity, devi.
Concurrence conditions are stated by some rules as affix A is introduced after item I if item J occurs, for instance P.2.3.31 enapa dvitiya introduces a second triplet nominal ending, that is, an accusative ending, after a nominal base which is construed with an item containing the affix enap (= ena) as in daksinena graman 'south of the village'. There are also some rules which state a combination the above conditions such as A is introduced after I if M is to be denoted and J occurs. For instance P.3.2.118 lat sama provides that the L-suffix lat is introduced after a root if the action denoted by it is referred to the past and the particle sama is used. Further, there are also some rules which introduce affixes without giving any condition and such suffixes are said to be introduced redundantly. That is, the meaning denoted by the derivative is the same as that denoted by the item to which the affix is added. For instance, tatra 'there' is derived by affixing tra to a form tad-i which contains a locative ending denoting a locus and tatra too denotes a locus. This is referred to as svarthā 'meaning of the item itself is the meaning of the item to which is added an affix. There are two kinds of meanings which serve as conditions for affixation, like bhūta 'past', bhavīṣya 'future', vartamāna 'present', vidhi 'command' which are not introduced in the grammar by definition and involving purely semantic notions and others like kāraṇas which are not purely semantic and require definition in grammar.
3.8 **Transformation of Affixed Bases into String of Words in Actual Usage by Morphophonemic Rules**

After affixation of the bases, the resulting padas 'words' are subject to morphophonemic rules whereby the items are obtained as they occur in actual usage. For instance, the string *rājñāḥ puruṣo grāmaṁ gacchati* 'The king's man is going to the village' derives from *rājan-as puruṣa-s grāma-am* gam-a-ti which contain the padas genitive, singular of *rājan*, nominative, singular of *puruṣa*, accusative singular of *grāma*, third person, singular, present tense of *grama*. The related padas such as *rājan-as* and *puruṣa-s* are subject to other rules from which compounds are formed, such as *raja-puruṣa*. However, these rules are optional, so that *rāja puruṣa* and the sequence *rājñāḥ puruṣaḥ* become alternatives.

Similarly the string *upagar apatyam grāmam gacchati* derives from *upagu-as apatya-s grāma-am* gam-a-ti, *upagu-as* denoting genitive, singular of the name *upagu*, *apatya-s* denoting nominative, singular of *apatya* 'descendent', *gam-ati* denoting third person, singular present tense of *gam* 'go', consisting of bases and affixes introduced to denote a relation by *as*, an object by *am* and an agent by *ti*. Taddhita affix 'a' can be introduced after *upagu-as* to form *upagu-as-a* from which *apagava* could be derived. However, as this derivation is optional, the sequence *upagar apatyam* can be used as alternative to *apagava*. 
3.9 **Both Active and Passive Constructions of Sentences as Independent Derivations and Not Derivable from Each Other in Pāñinian System**

Unlike in many theories of modern linguistics, where passive sentences are derived from the active, it being the base and the passive as derived from the base, in Pāñinian grammatical system, active and passive sentences are entirely independent of each other and alternative to each other. One is not derivable from the other. For instance, the active sentence *devadatta odanam pacati* 'Devadatta is cooking rice' and the passive *odanah pacvata devadattena* 'Rice is being cooked by Devadatta' are derived not one from the other, but as alternatives. For denoting the active sentence above, the L-suffix *laṭ* is introduced by P.3.4.69 to denote an agent, the accusative ending *am* is introduced after *odana* to denote an object. But in deriving the passive sentence, the L-suffix *laṭ* is introduced to denote an object and the instrumental ending is introduced after *devadatta* to denote an agent. Such a thing is not done in the active sentence since an agent is denoted by the verbal affix *laṭ*. Thus primacy is given to the verbal affixes in introducing affixes to denote *kārakas*. By P.2.3.1 *anabhihite*, affixes are introduced by subsequent rules if what is to be denoted is not otherwise denoted 'anabhihita'. Thus we do not find any relation between
the active and passive construction of sentences, in the sense that both are independent derivations in their own right and one is not derivable from the other.

3.10 **PÂÑINIAN APPROACH TO WORDS AS PROCESSED ELEMENTS FIT FOR USE IN A SENTENCE**

From the above example, it is clear that Pâñini does not start the linguistic analysis from the sentence, but from the word. Not only that, but his grammar takes the word to be the output of a derivational process. The derivational process begins from given initial formal elements, namely, stems and suffixes, which are obtained from a previous descriptive analysis. These elements are then concatenated to get *alankikaprapakriyavigrahavakya*. They are then combined by applying grammatical rules. In other words, by teaching how to combine the initial elements, Pâñini actually teaches constituent analysis according to meaning, function and form. Pâñini's grammar, therefore, not only directs how to derive a word like *mahârâjâh* but it also tells us how this word has undergone linguistic construction previously. Pâñini's grammar has been compared to finite state machine mentioned by Chomsky, which has a finite number of internal states. However, in Chomsky's view, grammar assigns structural descriptions to sentences, not to words as in Pâñini's approach. In its initial state Pâñini's finite state machine just produces word
elements, namely, stems and suffixes and technical elements belonging to the system. From this initial state, it moves through several new states undergoing transformation step by step and finally producing a terminal word. Thus the finite state machine has not only generated a word but assigned a definite structural description to the word. For a long time the Western linguists naively thought that the word is an integral whole and not analyzable. It is only after their study of Pāṇini that they realised that word themselves have structural descriptions. However, even now modern linguistic methods have not gone into providing definite descriptions to words as systematically as was done by Pāṇini. It appears that, as was done by Chomsky, the thrust is still given to assigning structural description to the sentence in modern linguistics. It also appears that the Pāṇinian approach of treating words as processed elements fit for use in a sentence is not fully realised in modern linguistics since they start from a sentence and assign structural relations to words in a sentence rather than the inverse approach of starting from meaning of a sentence and deriving words fit for connection with other words in a sentence.
Pāṇini has fully made use of the work done by his predecessors when it comes to obtaining the initial elements in his derivation process. His predecessors had already subjected the words into linguistic analysis by developing the technique of contrast and agreement to identify phonemes, stems and suffixes. Even now, one is unable to think of any other way of arriving at the initial morphemic elements. Pāṇini does not follow the method of anvaya and vyatireka or agreement and contrast in his grammar but he rather presupposes that such an analysis has taken place behind the scene. What appear on the scene are the initial elements which are already the products of prior linguistic analysis, listed in the Dhātupātha, Ganapātha and the Aṣṭādhyāyī itself. It is only from this point onwards that the derivation process begins in Pāṇini's grammatical system. The elements are then combined according to the rules laid down for their combination for producing finished words fit for connection with other words in a sentence.
3.12 **Pāṇini’s intention as not to freeze Sanskrit as it existed in his times but only to demonstrate a method of characterising a language synchronically**

Pāṇini had to devise his derivation process since the other alternative of listening correct words of a language is an interminable job, besides it not being a grammarians task, but that of a lexicographer’s. The heart of a grammatical theory is construction of rules which govern correct usage or identifying and making use of the regularities to form rules. It appears that Pāṇini’s intention was to preserve Sanskrit language in a particular state which was considered pure and correct by him, for all time to come. But this involves the presuppositions by Pāṇini that Sanskrit language would stop growing further like any other natural living language. Therefore, it appears reasonable to assume that as a theoretician or a model builder, Pāṇini was interested in grammatical theory construction for the language of Sanskrit as it existed in his time. Also his method could be a guide to any future grammarian to build his theory further as the language changes over time. In fact, it appears, only Kātyāyana, appreciated this aspect and he tried to further build and modify the grammatical theory of Pāṇini. Patañjali seems to miss this aspect altogether, since otherwise, one has to assume that Pāṇini’s intention was to freeze the language of Sanskrit for ever at the state in which he found it,
which assumption is impractically wrong, since Pāṇini would definitely wish Sanskrit to grow like any other language. Thus we can conclude, that Pāṇini only demonstrated how a language can be characterised synchronically. We may find parallels to a similar situation in artificial languages like programming languages where continuous updating is done to make the language more suitable and efficient with changing needs. Thus, though some scholars feel that Pāṇini could not have known modern mathematical notions of modelling a language for the purpose of just generating words, we cannot help but accept that his ideas were in fact enacts that.

3.13 SYNTAX AS ENTERING INTO WORD-DERIVATION ITSELF IN PĀNINIAN SYSTEM

That is the reason for his adopting a non-descriptive method in presenting his grammar. His grammar is not suitable for learning the language as its aim has been to give a mathematical model for generating the word forms which are known to the language user already. For modelling Sanskrit, Pāṇini devised a grammatical system consisting of lexicon, some categorical notions like tiṅanta, subanta with further subdivisions, a set of syntactic and functional notions, a set of technical elements and a set of operating rules. His technical apparatus includes technical elements such as augments, pratyāhāras, anubandhas and techniques like lopa, atidéna, sthānin-
adeśa and asiddham, with the help of which he establishes a uniform procedure of derivation. The output of this grammatical system are correct Sanskrit words ready for use in syntactic combinations such as word groups and sentences. Unlike the notion of syntax in modern linguistics, syntax enters into word-derivation itself in Sanskrit due to its being an inflectional language. Pāṇini’s grammatical system may be described as algorithmic in the sense that the guarantee for the correctness of word-forms derived simply depends on the correct application of grammatical rules.

3.14 PĀṆINI AS NOT INTERESTED IN HISTORICALLY TRACING EARLIER AND LATER STAGES OF FORMS OF THE SAME WORD IN HIS THEORY BUILDING

Though Pāṇini’s grammatical system is claimed to cover both chandas, ‘the metrical language of the Vedas’ and the bhāṣā ‘the language of daily use in Pāṇini’s times’, Pāṇini was not interested in historically tracing the stages of development between earlier and later forms of the same word. As an instance of this, though avocat is a reduplicated aorist, historically, Pāṇini explains it as a normal aorist by saying that vac becomes voc, because the augment um is added here. Again, Pāṇini prescribes the derivation of words to suit accounting for the word-meaning, within his system. As an instance of this, though paṛca kapālah ‘prepared in five cups’ is a
bahuvrīḥ, historically, because it conveys anyapadārtha, Pāṇini assumes a taddhita suffix, namely, ‘aN’, because in Pāṇini’s system an anyapadārtha can only be vibhaktyārtha (yasya, yena etc.) or matvartha ‘the sense of possession and since the suffix does not appear in the terminal form pāṇca kapālāḥ, he prescribes deletion.

3.15 **Aṣṭādhyāyī AS DEALING WITH VARNAVIDHIS, ANGAVIDHIS AND PADAVIDHIS**

The Aṣṭādhyāyī deals with the three main divisions of grammar, namely, phonology, morphology and syntax, implicitly or explicitly. Operations conditioned by a mere concatenation or immediate sequence of phonemes are prescribed by the varṇavidhīs. Morphological operations conditioned by a stem-suffix relation are prescribed by angavidhis. For instance, in bhavati, the verbal base bhu- takes guṇa conditioned by the gārvadhātuka suffix tip and the rajñāḥ -a- has been deleted because of the addition of the genitive ending. Operations with regard to a terminal word or operations which turn a form into a terminal word are prescribed by padavidhis. In padavidhis, operations are conditioned by a syntactic relation. Compound formation between ṛajñāḥ and puruṣaḥ is not allowed in bhārvā ṛajñāḥ puruṣo devadattasya ‘wife of the king, servant of Devadatta’ because these two words are not syntactically connected.
3.16 USE OF THE DEVICE OF SĀHACARYA IN INTERPRETING PĀṇINI

As a true methodist, Pāṇini put much system in his presentation of the grammatical theory, mostly at the beginning of the Astādhyāyī and explained some of the techniques employed by him such as Saṃjñā, Paribhāṣā etc. However, some other techniques used by him but which were not explained by him in the Astādhyāyī, he probably explained orally to his students or took it for granted that they were familiar to students of his time. However, these techniques were also received by later grammarians like Katyāyana and Patañjali through tradition 'Vyākhyāna' which was not necessarily fully in tune with Pāṇini's intentions, for want of an unfailing oral transmission similar to that of Vedic texts. In such cases, Katyāyana and Patañjali applied all their ingenuity in discovering there non-explicit techniques in an attempt to give a true interpretation of Pāṇini's rules. Sāhacarya is one such technique which was discovered by later grammarians. Sāhacarya is the resemblance or similitude present in an item in a position of contiguity or close proximity with an item under discussion. The device of sāhacarya or contiguity narrows down the field of association to the internal structure of a rule and brings out the significance that was supposedly intended by Pāṇini to the close association of certain items within a rule or
constituents of the same rule of Pāṇini. Thus when an item suffers from the inconstancy or weakness of denoting more than one condition thereby causing confusion, it is its close company with another item possessing constancy or strength of always denoting a single condition that assumes significance and becomes of a decisive and conditioning nature. In other words, the other item is supposed to influence and determine or particularize the denotation of the item in hand, of ambiguous reference. It is the dictum that 'an item is known by the company it keeps' being extended from common sense approach into linguistic methodology, giving it the status of a linguistic principle.

While interpreting Pāṇini, Bhaṭṭoji Dīkṣita has made use of the device of sāhacarva; for example:

1 SK 2687 on P.1.3.21 krido’ nu-sam-paribhyas ca, the rule is valid for anu as upasarga and not as karmapravacanīya, since it is in company with sam which is an upasarga.

2 SK 705 on P.2.2.11 purāṇa-guṇa-suhiṭārtha-sad-avvaya-tavya-samānādhikaranena where the rule is valid for avvaya of the kāḍanta type being preceded and followed by kṛḍanta forms.

3 SK 285 on P.6.1.93 anto’m-sasoh where am is nominal it being in the company with nominal gām.
4 Mahābhāṣya on P.2.3.10 pañcamy ap-an-paribhiḥ where pari carries the sense of 'exclusion' being in company with apa, both of which carry that sense by P.1.4.88 apa-pari variane.

5 Mahābhāṣya on P.2.3.4 antara-ntareṇa yuktē where antareṇa is adverb it being in such a company.

3.17 PĀVINIAN STRATEGY OF RULES ACCOUNTING FOR ONLY WORDS TO OVERCOME THE IMPOSSIBLE PROBLEM OF RULES CHARACTERISING INFINITELY LARGE NUMBER OF SENTENCES

Pāṇini has not made any direct statements concerning the characterization of the notion of grammar and grammatical rule. According to Patañjali grammar is a discipline which instructs about words of classical and Vedic Sanskrit. As instruction about each and every word would be never ending, Patañjali proposes that a set of rules or laksanā would be formulated based on the principle of general or sāmānya and particular or vīseṣa. The idea is to formulate a general rule with reference to related exceptions in order to make generalizations about words, the basis of such generalizations being loka 'usage'. Thus, the grammar should treat usage as the standard from which generalizations are abstracted. Patañjali identifies usage as that of āśīta 'wise, learned people'. Thus based on Patañjali’s discussion in the Mahābhāṣya, one can say that the Astādhyāyī is a set of rules
formulated from generalizations which accept usage as norm. In other words, the Astādhyāyī formulates rules to account for correct Sanskrit usage. Naturally, usage is necessarily a set of sentences. Then one is faced with the problem of reconciling Patañjali's stand of accounting for words rather than sentences in grammar. It is only for strategic reasons that grammar may be called a set of rules which account for words, for otherwise it is impossible to explain the extent of individual relata and meanings reflected in separate sentences. Unlike the words, sentences of a language can be infinitely large in number and no purpose will be served by grammar by attempting to characterize infinitely large number of sentences. On the other hand, words which are finite in number lend themselves neatly for analysis in terms of their components as prakṛti 'bases' and pratyaya 'affixes'. Even for characterising these finite number of words, still fewer rules are sufficient because of the generalization made on words by the principle of the general and the particular. The words themselves are abstracted from the sentences by anvaya 'concurrent presence' and vyatireka 'concurrent absence'. However, the network of bases and affixes and the subsequent operations which derive the sentences are the product of the grammarian's kalpanā 'theoretical assumptions'.
Also unlike a rule in modern linguistics, pāṇinian sūtra is not self-contained, but interdependent and is based on the technique of context-sharing or ekavākyatā. Patanjali claims that two rules do not become different simply because they happen to be placed in different places in the grammar and that they may share a single context.

3.18 PĀNINI’S AVOIDANCE OF DEFINITION OF PARTS OF SPEECH BY MEANING AND FUNCTION

In many traditional grammatical systems, parts of speech are often defined by their meaning and function, for example, a noun is defined as the name of something, which is based on meaning. Similarly a verb is defined as an action word, which is again based on meaning. An adjective is defined as a word qualifying a noun and an adverb as a word which modifies a verb, an adjective or another adverb, both of which are based on function. In modern linguistics, words are grouped into classes on the basis of their form and function, that is to say, on the basis of their phonological, morphological and syntactic properties. However, for Panini there is only one part of speech, namely, the word which is defined purely on the basis of form by P.1.4.14 suptināntam padam. Though, the correlation between meaning and grammatical classes is important, the correlation between semantic and grammatical classes is seldom perfect. Thus, Pāṇini has chosen to classify words as sup- words and tiṅ- words on the
basis of form primarily and then allow one to look for any correlation between form and meaning secondarily. In Pāṇini's system, the prakṛti 'base' would provide the content or lexical meaning while the pratvaya 'affix' would indicated the grammatical relationship.

3.19 MOVING FROM SENTENTIAL-MEANING TO FORMATION OF WORDS FIT FOR USE IN SENTENCE

In modern linguistics each utterance is analysed into maximally independent sequences of constituents, the ultimate constituents being the smallest meaningful units. These constituents consist of a morpheme at the morphological level and a word at the syntactic level. However, Pāṇinian approach does not start from the sentence and come down to word in the syntactic level. In Pāṇinian approach, the speaker starts from a proposition or sentential meaning and forms words with meaning content or prakṛti 'base' and grammatical relational links to other words of the sentence or pratvaya 'affix' to form the sentence. On the part of the hearer, the process is reverse, that is, he constructs the sentential meaning from the prakṛti and pratvaya of different words constituting the utterance.
In modern linguistics, what the transformational rules do is to use phrase structure rules as their base and then state what type of constituent is moved, where it is moved from, and where it is moved to. Instead of classifying categories into various types such as Declarative, Interrogative, Affirmative, Negative, Interrogative-negative etc., transformations show the various relationships among linguistic categories and by adding and moving constituents by means of some simple rules, a large number of sentences can be formed without any need for classification.

Philosophers like Quine believe that anything that can be done by means of sentence-meanings can be done by sentences alone. There are no objective criterion for individuating sentence-meanings. In other words, there is no effective way of telling when two sentences have the same sentence-meaning. That is to say, that there is no adequate criterion of synonymy by which one could say that the sentence-meaning A expressed by sentence a equals sentence meaning B expressed by sentence b. Quine dismisses the very notion of identity of sentence-meanings as a mistaken ideal rather than an unsolved problem. In
view of the arguments of Quine given above, the claim of the transformational grammar as capable of revealing the relationships between sentence types is shaken. For example, the treatment of an active sentence as basic and passive as derived from the active sentence by a transformational rule is questioned. But in Pāṇini’s grammatical theory, active sentences are in no sense more basic than passive sentences and they are only alternative realizations of the same underlying structure.

3.21 Astādhvāyī as a Network of Entities Related by Propositions

Panini’s Astādhvāyī is not just a word grammar as it may look superficially, but it is a theory of language structure. At the most general level, it consists of the generalization that a theory of language is a network of entities related by propositions. Though, Panini chose to fit a grammatical system to Sanskrit, get his approach to Grammar as a theory of language structure is quite general to be applicable to any other language. For instance, bases and affixes are entities which are listed. P.1.4.14 sup tiṇantām padām is the proposition which relates bases and affixes to form a network of the entity, the word as shown below:

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<table>
<thead>
<tr>
<th>Word₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>base₁</td>
</tr>
</tbody>
</table>
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Such little networks for each entity will finally lead to the monster network that would be needed for the theory of language. Thus any grammar must define a structure in which every entity is related to every other entity directly or indirectly, so that it constitutes a network. A theory of language appears to have been viewed by Pāṇini as consisting entirely of declarative knowledge, expressed as propositions.

3.22 PĀṆINI’S APPROACH AS OVERCOMING THE PROBLEM OF DEMARCATING THE BOUNDARIES OF LEXICAL ENTRY

There has been no satisfactory criterion for deciding where the boundaries of a lexical entry lie. Thus, there is no general principle for deciding whether a word involves just one lexical entry or two. For example saindhava has two meanings, salt and horse and so we do not know where the boundary ends. However, in this kind of problem, one is trying to make a distinction which corresponds to no kind of reality and therefore, the search for principles on which to base it is bound to be futile. Pāṇini’s approach of network permits sidestepping this issue altogether, since in the network approach, there are two sets, a set of word-forms and a set of word-meanings which are related to the word-forms in a complex way, as a part of the network. Once these network connections are established, one is not motivated to chop up the network into discrete items as lexical.
The second distinction which is generally presupposed is the distinction between rules and lexical entries. There is generally a no man's land or indeterminate transition zone between typical rules and typical lexical entries where their respective properties are mixed up in a confusing way. For instance, a construction which is tied to particular words, such as alam kr̥dītvā which defy decision as to whether it should be treated by means of a rule, on the ground that such sentences contain pattern which are not permitted by other rules or whether it should be included in the lexicon, as a lexical entry, on the ground that it is an idiosyncratic pattern. Thus one is motivated to draw conclusion that we are in such cases trying to draw a distinction, rule versus lexical entry, which has no reality. The network approach to language structure is compatible with diffuseness of the language. Even though Pāṇini's Astādhyāyī consists of a set of rules and a set of lexical entries, still, unlike much of modern linguistic theories, it approaches the language with the notion of śabda or word or word elements of bases and affixes as the central linguistic entity. Thus, the word being central in Pāṇini's theory, any word actually found in the practice of a language can be represented as derived from the operations of grammatical rules on the
bases which are abstracted from the utterances by the grammarian. One important feature of Pāṇini's approach is that there is no mention of phrases, clauses or sentences as important, since the upper boundary in his grammar is taken as the word. In relation between the entities of words is determined by the proposition of the speaker. The rules of Astādhyāyī translate the proposition in the mind of the speaker into relations between words of the utterance by determining the affixes. We may simply say that in a grammatical system when the focus is on the forms of words, the language network includes words and their elements, the kāraka structures and nothing else. The network approach of Pāṇini excludes word-meanings and the elements of the utterance-event. Had Pāṇini focused on propositions, then he would have been forced to accept that a proposition is linguistic if it refers to a word or word-part or word-string in which case word-meanings would be included in the language network, on the ground that they are referred to by some propositions that also refer to words.

One can discern five types of propositions in Astādhyāyī. Composition proposition relates the words to its elements of base and affixes. The model proposition relates the word to the more general entity of which it is an instance, for example as prātipadika or dhātu. Kāraka proposition relates one word to the other as for example nominal to the verb referent proposition.
A person who has learned a language has in fact acquired a system of rules that relates the phonetic shapes of sentences to their meaning which enables both understanding and producing of utterances. The job of a grammarian is to try to propose a theory about the nature of such a grammatical system that explicates the rules that speakers use to relate sound and meaning. The grammatical system does not reflect the physical structure of utterances, since these rules are more abstract and complex and involve deeper principles of linguistic organisation expressing latent structure far richer than any facsimile of the physical structure of utterances. A grammatical system is a theory about the optimal model which lays down what form the rules of a grammar have to take, what constructs are to be used in the formulation of specific rules and how the rules should be systematically related in a grammar. Thus a theory of grammar is a theory of universals of language because it restricts the kind of rules that can appear in a grammar, the constructs used in their formulation and the organisation of a grammar. A theory of grammar is also a theory of language since the rules written under one set of restrictions express different kinds of linguistic generalizations from those that are expressed by rules under another set of restrictions.
Two competing theories of grammar can be judged on the basis as to in which one of the theories, it is more economical to make generalizations about the language. Pāṇini has thus differed from his predecessors in choosing a theory which helped him make more economical generalizations about Sanskrit. To determine empirical evidence in favour of a grammar and decide whether the particular grammar is the best choice on the available evidence, we must attest or compare what it predicts about the phonological, syntactic and semantic properties and relations of the sentences in the corpus of the language, with what fluent speakers of the language say about the phonological, syntactic and semantic properties and relations. The intuitive judgements of fluent speakers or sistas constitute the empirical phenomena to be predicted by linguistic descriptions.
3.25 **SUCCESSIVE APPLICATION OF GRAMMATICAL RULES AS TRANSFORMING SIMPLER STRUCTURES OF COMPLEX**

Pāṇini’s method of deriving words is referred to my Patañjali as *vyātīti ‘integration’. In his method units of a more complex structure are built out of units of a simpler structure by the application of grammatical rules. The derivation of the word *mahārāja*, for instance, begins from a combination of the constituents *mahat* and *rājan*, which again, in their turn, are derived from the initial lexical elements listed in the grammar, *mahā* and *rājR*. Once the nominal elements *mahat* and *rājan* have been derived, they can be technically combined as (*mahat* + *su*) + (*rājan* + *su*) + *su*, the last external case ending *su* indicating that the combination as a whole is intended to be one single word. This type of combination is referred to as *samāsa*\(^2\) by P.2.1.3. Once it is called *samāsa*, it receives the designation *prātipadika*\(^3\) by P.1.2.46 and as a consequence the internal case endings are deleted\(^4\) by P.2.4.71. After this, the *samāsānta* suffix *tac* is added to the compound stem by P.5.4.91. Eventually, after the application of some more rules concerned with phonetic representation of the word, the form *mahārājāḥ* results.
Logically distinct word-classes dealing with grammatical facts are considered as separate parts of speech. The classification of words into parts of speech is different from the classification of grammatical categories. Grammatical categories are based on morphological structure. In fact the term grammaticality refers to the morphemic form which expresses the notions of gender, number, person, tense, mood etc. The idea of parts of speech, on the other hand, is a logical categorization presenting the general procedure for the classification which, though based on logic, is not in any way contrary to the grammatical facts. In general, when there is a separate form to convey a particular concept in a language, there arises a different grammatical category. In a grammatical theory, there is nothing to bar placement of different logical facts under a single grammatical category if these logical facts have the same function. Though they have nothing in common from a logical view point. In the same way, different grammatical facts may be placed under a single logical category, even if they have nothing in common from a grammatical view point. If different grammatical facts are placed in a single logical category, then from the view point of meaning, or understanding, it will be significant.
This problem of choosing either the grammatical or logical category was first handled by Yāska, who represents early grammatical tradition. While Yāska leans toward choosing logical category, Pāṇini chooses grammatical category.

3.26 ĀSTĀDHVAYĪ AS AN ATTEMPT TO DETERMINE FUNDAMENTAL PRIMITIVES IN GRAMMATICAL THEORY ASSIMILATING THE PRE-PĀÑINIAN SYSTEMS

Some scholars have raised the question as to why the pratyāhāra sūtra provisions to generate artificial symbols are not fully used in Āstādhvayī. Perhaps it was only a provision for future development of grammar in tune with the development of language in a natural way. After all grammar is only descriptive and not prescriptive since no one dare prescribe how a living language should evolve. Thus it may be the forethought or vision of Pāṇini that, an elegant grammar must have some limit on the number of symbols used in the grammar and the remaining symbols are only the number of estimated additional symbols required for the description of Sanskrit in the posterity relative to Pāṇini. However, due to some reasons, Sanskrit must have become crystallized and fixed and thereby stopping further growth, which was not anticipated by Panini. In case all the provisions of pratyāhāra sūtra are exhausted, then perhaps it is time to rewrite a grammar fitting only the usage current at the time of rewriting and shaping the outdated symbols and rules of begone
times. Perhaps Panini expected continuation of grammatical modelling for Sanskrit after his times on the same lines he had followed in his time.

It is very difficult to construct a complete unified theory of everything in language all at one go. So, any grammarian is tempted to make some progress by finding partial theories that describe a limited range of empirical linguistic facts. Thus, the grammar will eventually become a package of different theories each having a limited compartmentalized approach. As a parallel in science, for example, chemistry allows one to calculate the interactions of atoms, without knowing the internal structure of an atom’s nucleus. However, this approach of the grammarian or for that matter, the scientist’s must be only tentative. Ultimately, however, one would hope to construct a complete, consistent, unified grammatical theory that would include all the tentative partial theories in such a manner that it did not need to be adjusted by exceptions to fit the empirical facts of the language. The quest for such a general grammatical theory may be referred to as unification of grammar. Perhaps, the time was ripe during the period of Panini for such a unification of grammar modelled by different schools of grammar. Pāṇinī was a theoretician who could see through the merits and demerits of the different systems of pre-Pāṇinian grammar and make the readjustments necessary at the fundamental level so that he could construct a consistent unified theory
different from each of the existing systems of his times but which served his purpose as useful input in grammatical theory construction. As a parallel in physics, the theories of gravitation, electromagnetic forces, weak and strong nuclear forces all developed separately without much common basis. However, at present, much effort is being put to arrive at a grand unified theory to describe all the four types of forces. Pāṇini's अष्टाध्यायः may be likened to this and may be said to be the grand unified grammar. However, unlike in science, language evolves and continuous updating of theory is required, weeding out obsolete rules and adding new rules, but still not arbitrarily, but within some definite albeit broad frame work. Thus, language may be considered as something bigger than the phenomena of the universe where the empirical data are by and large permanent leading to high degree of repeatability. The phenomena of nature are causal whereas language is the outcome of intelligent processing in the human brain and stands out unique in contrast with the physical universe. It is only when one goes into the fundamental primitives which cannot be further broken down or supported empirically that one can have an elegant theory without many islands of inconsistent partial theories. Pāṇini's अष्टाध्यायः shows this approach by his classification of words as सुबंता and तिनंता unlike the four-fold classification of his predecessors. Same is the case in his approach to अनेना when he does not follow the classification of
his predecessors which depends upon the importance of pūrvapada, uttarapada, ubhayapada and anyapada. Even though, Pāṇini is mostly a linguist rather than philosopher, unlike Kātyāyana who was more of a philosopher than a linguist, he fully makes use of philosophical ideas to advantage in linguistics. His grammatical theory is centered round the philosophical ideas of kāraka, which makes verb as the central focus and all the kārakas are related to the verb. In the absence of this kāraka model which is like a wheel, with the verb at the hub and other kārakas at the periphery linked to the hub by spokes. Of course, kārakas may be related to each other by possessor-possessed relation or qualifier-qualificand relation. In the absence of the kāraka approach, all types of problems would have arisen with different levels and transformations as seen in the transformational generative grammars of modern western grammarians with the exception of Fillmore. Moreover, Pāṇini’s approach does not make it compulsory that some constructions such as active voice is basic and the passive and stative voices are the transformations or derivatives from the basic. In Pāṇini’s grammatical theory, all constructs are independent, one not the derivative of the other. Pāṇini’s stand fits more appropriately the stand taken by philosophers like Quine that all sentences are unique as the meaning of one sentence cannot be distinguished by a public criterion from another claimed to be synonymous. Thus we find
Pāṇini’s linguistic approaches are as broad as possible assimilating the different partial theories of grammar within it by careful choice of fundamental primitives and policies of the theoretical approach.

3.27 PĀṆINI AS STICKING OUT THE REQUIREMENTS OF HIS ON GRAMMATICAL SYSTEM AND NOT FOLLOWING TRADITION

To indicate that a rule is to be applied optionally, Pāṇini uses three distinct words, namely, vā, vibhāsā and anyatarasyām. According to Kiparsky, the three words are not synonymous, but are used to denote different preferences among optional variants, vā meaning ‘preferably’, vibhāsā meaning ‘preferably not’ and anyatarasyām meaning ‘alternatively’. It is claimed by him that this way distinction enables Panini’s rules to register the stylistic preferences among the variants which are characteristic of any living language in its natural state. However, while examining Pāṇini’s usage in the light of his own three optional rules, one will have to exclude from consideration the technical terminology of grammar because the technical terminology composed of real Sanskrit words are completely arbitrary in form so far as Pāṇini’s grammatical system is concerned. Though Pāṇini has retained the traditional terms unchanged, in fact, they are used in the arbitrary sense. That is, the traditional meaning of such words are not at all a requirement for his grammatical system.
As far as the artificial invented syllables used by Pāṇini are concerned, they do not matter at all in studying the applicability of optional rules. Regarding the real Sanskrit words as technical terminology, Pāṇini might have coined them according to older patterns of word-formation. The stand that Pāṇini used even traditional, real Sanskrit words, in their capacity as pure technical symbol or term is supported by the fact that these technical terms in some cases violate even Pāṇini’s obligatory rules. Pāṇini does not follow the preferences among the optional variants indicated by him for this older stratum of the grammatical vocabulary composed of real Sanskrit words. For example, he uses the word kṛtya instead of kārya which is preferable by P.3.1.120 vibhāṣā kṛyneḥ and he uses visarjanīya instead of visṛjya which is preferable by P.3.1.110 rdupadhaṅ caḍāpīrteḥ with P.3.1.94 va’srupo’strivam. Pāṇini’s technical terminology does not conform as closely to the preferences expressed in his optional rules as the rest of his language because much of the technical terminology is traditional in form but Pāṇinian in its application in grammar. Thus in the hands of Pāṇini, tradition gives way completely to the requirements of his grammatical system.
3.28 **PRIMITIVE TERMS AS AXIOMATIC VOCABULARY TO WHICH ALL THEORETICAL TERMS ARE REDUCIBLE**

One has to make distinction between two kinds of technical terms whether it is in Sanskrit grammatical tradition or other formal systems, namely, theoretical terms and primitive terms. Theoretical terms are expressions whose meaning in the grammar is defined explicitly by the grammar itself. For example, terms like *lata* 'present tense', *sup* 'case suffix', *bha* 'a nominal stem before certain suffixes which have no independent meaning outside grammar', the only meaning given to them being that by the rules of the Āstādhyāyī. Or it may be terms like *ḥrīva*, *savarna*, *gati*, *tatpurusa* which do have a meaning outside grammar. Sometimes the meaning of the theoretical terms is defined by a single *samjña* rule as for example in 1.4.110 *viramo'vasānam* 'a pause is *vasāna*’ or as in P.3.2.127 *tansat* 'they (the suffixes *satR* and *sanaC*) are *sat*’. Barring the simplest cases, however, a complex of *samjña* rules are required as for example, for *pada* P.1.4.14-17 and *bha* P.1.4.18-20 where the rules of *bha* are in addition restrictions on the rules for *pada*, the whole set up forming an indissoluble unitary group. Also, many theoretical terms are defined by enumeration as, for example, in P.2.1.3 *prak kadarat samāsan* ‘the output of each rule upto kadara (P.2.2.38) is *samāsa* ‘compound’. Quite often, the rules defining the theoretical terms themselves involve
other theoretical terms as, for example, in P.1.1.2 adeśa gunaḥ 'short a and e, o are guna' where the expressions at 'short a' and en 'e and o' are theoretical terms drawing their meanings which are assigned by other rules in the grammatical system. About two hundred such defined theoretical terms, known in tradition as śāstrīya terms are introduced in the Āstādhyāyī. In contrast, primitive terms are those terms whose meaning is not explicitly defined by the rules of the grammar, though they are taken as the basic elements out of which the system of grammar is constructed. In other words, the primitive terms constitute the axiomatic vocabulary of the grammatical theory, to which all theoretically analyzed śāstrīya terms are reducible through the network of rules directly or indirectly.

3.29 ORIGINAL AND BORROWED PRIMITIVE TERMS IN THE ĀSTĀDHYĀYĪ

Many of the primitive terms of Pāṇini's grammar are theoretical terms of another field which are adopted by grammar retaining the meaning which they had in another field. It employs a number of theoretical terms of phonetics which are found in the Ākāra-Pṛātīkākhya and Nirukta which are pre-Pāṇinian in content and approach though it is not certain whether they antedate Pāṇini in chronology, for example, Pāṇini makes use of terms such as anusvāra 'nasal off glide', dravatna 'manner of articulation' and varṇa 'segment
Of course, there are many primitive terms of grammar which cannot be shown to have a basis in any other śāstra of Pāṇini's time.

### 3.30 CRITERION FOR SEPARATING THEORETICAL TERMS FROM PRIMITIVE TERMS IN THE ĀSTĀDHYĀYĪ

A popular proposal for a criterion generally prevalent since Goldstucker (1861) regarding the separation of theoretical terms from primitive terms in the Āstādhyaśī has been that Pāṇini analysed the terms which were of his own devising and left the terms of his predecessors unanalyzed, though there are many counter examples for both supporting and opposing this proposal. Bhate has listed 49 terms which Pāṇini analyses and which are yet found in pre-Paninian works, and 64 terms which Pāṇini does not analyse and which are yet not found in pre-Pāṇinian works, which weakens the Goldstucker hypothesis. Goldstucker's hypothesis might make sense if we suppose that Āstādhyaśī was purely a practical grammar designed for pedagogical convenience and as a consequence omitting what was likely to be already known to a student of Sanskrit in Pāṇini's time. The intended learner for whom Pāṇini's grammar is composed could not have been a beginner since in that case, he is supposed to come equipped with a knowledge of all the technical terms used by Pāṇini's predecessors. On the contrary, if he were a more advanced student who had already mastered the works of his predecessor, then there was no need of
instruction for him from the Astādhyāyī on the meaning of terms such as hrṣva, dīrgha, udatta, anudāta. Also there was no need for Pāṇini to teach the most elementary facts of Sanskrit such as that one says āgacchatī and not * gacchaty ā9 or that the plural denotes plurality ā0.

3.31 Astādhyāyī as Self-Contained Grammatical Treatise

It is clear that the form of the Astādhyāyī is not designed to meet the practical needs of a learner of Sanskrit grammar. Astādhyāyī is rather a theoretical inquiry into the grammar of Sanskrit and into language in general. Thus, one cannot argue that the saṃjñā rules could be omitted for those terms which are familiar from pre-Pāṇinian words since such a stand amounts to claiming that the Astādhyāyī is not a self-contained grammar but a kind of supplement to pre-Pāṇinian grammar. It is obvious that the Astādhyāyī is not composed in such a way as to need the reader to consult his predecessors. Further, we do not find that any of the vidhi rules are missing in the Astādhyāyī even though many of them are sure to have been given by his predecessor linguists. This being so, there is no reason for the situation to be different for saṃjñā rules.
Samjña rules are not something peripheral which could be added or removed from the grammar for practical and historical reasons. In a formal theory of empirical subject matter like grammar, the purpose of defining or analyzing a term is not just to gloss it for practical purposes by another synonymous expression assumed, familiar to the reader, in a manner similar to that in a dictionary followed in explaining the meaning of words.

The purpose of samjña system is rather to provide a theoretical understanding of the concept to which the term refers. According to Cardona, the purpose of the samjña system is the unification of grammatical procedure and terminology in a framework of generalization. Thus, the samjña rules are part of the system of grammar whose aim is to provide a theoretical understanding of linguistic structure. In fact, each technical term acquires its full explication only through the total network of rules in the grammatical system of which samjña rules are only a part. Samjña rules are not some kind of clarification of the terminology used in the Astādhyāyī, but an essential part of the theory of the grammatical structure of Sanskrit given by the Astādhyāyī itself.
3.33 **DELIMITING OF WHAT BELONGS IN GRAMMAR FROM WHAT DOES NOT TO MARK OFF PROVINCE OF GRAMMAR**

The treatment presented in the *Aṣṭādhyāyī* is based on definite domains of grammatical theory. Certain phenomena are understood as having to be explicated or as being *sisya* by means of grammatical theory or *śāstra* and certain others fall outside such a theory as conceived by Pāṇini. The rules P.1.2.53-57 which give some insight into the early controversy by other linguists on the way Pāṇini delimited the field, are unique and anomalous in that they play no role in the system of derivations. These five rules constitute the basis regarding the delimiting of what belongs in grammar from what does not belong in grammar. If we take P.1.2.53 *tad aśisyaṃ samiṇā pramāṇatvāt* to mean 'this, namely, gender and number, need not be taught, in so far as it depends on arbitrary convention', we would have Pāṇini's own position as reflected in his actual treatment of gender and number in the *Aṣṭādhyāyī*. Pāṇini accounts for gender and number in so far as they are predictable, as in rules such as P.1.2.51 *lupi yuktavad vyaktyvacane*, P.1.4.21 *bahusu bahuvacanam*, P.2.4.17 *sa napumsakam* etc. Wherever, they are arbitrary properties of particular stems or suffixes they are left out of grammar. Thus, the gender of nouns is not specified, except in derived words where it follows from general rules.
The same holds good for derivational suffixes. Thus, the suffix \textit{ta} which is always feminine is given by Panini in its underlying, short-vowel form \textit{tā}. The predictability is greater in the case of number, but the same principle is adhered to in that the semantically unmotivated fixed plurals such as \textit{dārāh} 'wife', \textit{āpah} 'water', \textit{prānāh} 'life' is not accounted anywhere. While all this is consistent with Panini's general treatment of words used in conventional, idiomatic meanings, in rules referring to technical words, the actual conventional meanings are not given. The condition \textit{sāmīnāyām} itself depends on knowing what these meanings are from outside of grammar.

From the rules P.1.2.53-57, one finds that some definite range of phenomena was deliberately marked off as the province of grammar. Borrowing the term of P.1.2.53, this is what is \textit{sīsya} 'the subject matter of the grammatical theory' or 'what is to be taught in grammar'. In general, facts of phonetics and semantics and arbitrary lexical facts are treated as \textit{sīsya} and excluded from the grammar. However, there may be \textit{sīsya} in other sciences such as phonetics, philosophy and etymology respectively. Various auxiliary systems such as the \textit{Lingānuśāsana}, the \textit{unādi sūtras}, which are considered as post-Pāṇinian appear to have been added to enlarge the scope of grammar by those who thought the original boundaries given by Pāṇini had been drawn too narrowly.
The criterion which demarcates theoretical terms and primitive terms of the grammatical system is that terms for grammatical notions are theoretical while terms for extra-grammatical notions are primitive terms. In other words, only śisya concepts are denoted by śāstrīya terms.

In the case of semantic terms the situation is quite simple. Pāṇini has not analysed any semantic terms in the Aṣṭādhyāyī. Thus semantics in its entirety has been taken as a primitive in Pāṇini’s theory of grammar. It appears that Pāṇini did not consider the task of explicating meaning as the business of grammar. Probably, he must have thought that explicating meaning belongs to the realm of philosophy. As a number of semantic terms occur in the etymological theorizing of Yāska’s Nirukta, it may be inferred that Pāṇini did not merely invent terms arbitrarily, but used conventional terms wherever they were available.

Again, Pāṇini does not define any of the terms pertaining to ritual and vedic studies, such as chandas, yajus, ra brāhmaṇa, nīcama, mantra, saman, sūtra and even bhāsa ‘ordinary speech’ as distinct from
3.34 ŚISYA CONCEPTS AS BEING DENOTED BY SĀSTRĪYA TERMS

The criterion which demarcates theoretical terms and primitive terms of the grammatical system is that terms for grammatical notions are theoretical while terms for extra-grammatical notions are primitive terms. In other words, only śisya concepts are denoted by sāstrīya terms.

3.35 SEMANTICS IN ENTIRELY TREATED AS PRIMITIVE IN PĀṇINI'S GRAMMATICAL THEORY CONSTRUCTION

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3.36 TERMS PERTAINING TO VEDIC TREATED AS PRIMITIVE

Again, Pāṇini does not define any of the terms pertaining to ritual and vedic studies, such as chandas, yajus, re brāhmaṇa, nīgama, mantra, saman, āutra and even bhasa 'ordinary speech as distinct from
vedic. Though the concepts of technical terms in this category, such as pada ‘verse’, avagraha ‘division of the padapātha text’, upasthitā ‘iti as a marker in the padapātha text’, are quite elaborate and by no means self-explanatory, yet Pāṇini has not found the necessity to provide any analysis of them since according to him such an analysis falls outside the province of grammar. Thus, such terms are primitives in Astādhyāyī.

3.37 TERMS OF META LANGUAGE TREATED AS PRIMITIVE

Further, Pāṇini does not regard terms used in his metalanguage to characterize the relations between elements in the structural analysis of a rule which must hold if the rule is to apply, such as ādi ‘beginning’, anta ‘end’, pūrya ‘preceding’, uttara, para, udaya ‘following’, upottama ‘penultimate’, vyavahita ‘separated by’, anantara ‘contiguous’, prathama ‘first’, dvitiyā ‘second’, madhya ‘middle’, etc., as falling within the province of grammar.

3.38 TERMS REFERRING TO FORM AND APPLICATION OF GRAMMATICAL RULES TREATED AS PRIMITIVE

Also, Pāṇini does not analyse terms referring to the form and application of grammatical rules. Such terms include those terms which are used to formulate paribhāṣas ‘metarules’ governing the interaction of rules in derivations such as laksanā, vidhi ‘rule’, sthāna ‘domain of applicability’, sthānin
'substituendum', *ṇaṇḍīti* 'basic form', *upadīśa* 'system of underlying forms', *ādeśa* 'substitute', 'output', *prāpti* 'applicability', *siddha* 'having applied', *(a-)* *siddha* '(not) having applied', *(in-)* valid, *vipratiśedha* 'conflict when applicability of two rules each of which has an independent domain of applicability', *nirdiśa* 'specified in a rule', *anuṇāsa* 'correspondence', *adhikāra* 'heading, governing rule', *sesa* 'the rest', *anabhihitā* 'not expressed', *akathita* 'not covered' etc. These terms are not analysed in the grammar because they are meta grammatical terms, in the sense that they refer to the basic tools which are used in the very task of grammatical analysis itself rather than to the concept about which grammatical analysis theorizes. Many of these terms are not exclusive terms of grammatical theory but are common property of the sutra technique which is also used outside grammar in ritual etc.

3.39 **Pāṇini as Distinguishing Phonetics and Phonology Similar to Modern Linguists**

In modern linguistics, these are two sides, a physical phonetic side concerned with the concrete sounds and their articulations and an abstract linguistic side having to do with the distinctive function of phonological differences in the system of language and with the classification of segments on the basis of their patterning in the system. Pāṇini also is found to hold a similar view, since he divides the
theoretical terms from the primitive terms in phonology in accordance with similar dual conception. Though Pāṇini defines categories which are established through grammatical analysis and categories which have a distinctive function in underlying representations, yet he does not define purely phonetic categories which have no function in underlying representations 'upadeśa'. Thus, terms for sounds and features which are exclusively derived by rules 'ādēsa' are not defined, for example, anusvāra 'nasal off glide', visarjanīva 'ṭh', laghuprayatnātara 'more weakly articulated'.

3.40 PĀŅINI AS DEFINING TERMS FOR DENOTING SOUNDS AND FEATURES FIGURING IN UNDERLYING REPRESENTATIONS AND CLASSES OF SOUNDS USED IN GRAMMATICAL RULES

Pāṇini does not define phonetically definable items such as asya 'mouth', pravatna 'articulatory effort'. Neither does he define such terms as svāra 'accentuation', kāla 'degree of length', and varṇa 'segment type' which are different classes of phonetic categories. But Pāṇini introduces detailed terminology which is defined in the grammar for denoting sounds and features which figure in underlying representations and also classes of sounds which must be formed for purposes of the grammatical rules, as may be seen from the following sūtras:
P.1.1.68 svam rūpam ṭaabdasyaṭaabdasamītā 'an expression denotes its own form, except for a linguistic term', P.1.1.69 anudit savarṇasya caprtyayah with P.1.1.68 svam rūpam. 'a vowel, h, glide and liquid, and a consonant with diacritic U, denotes also sounds homogeneous with it as well as its own form, except for a suffix', P.1.1.70 taparas tatkalasya with P.1.1.69 savarṇasya caprtyayah and P.1.1.68 svam rūpam 'that which is followed by t denotes also the sounds of its own degree of length which are homogeneous with it, as well as its own form, except for a suffix'.

3.41 **Segment Type as Denoted by a Token of Itself**

P.1.1.71 adir anṭyena saheta with P.1.1.68 svam rūpam 'the first expression of a list with a diacritic denotes its own form and that of the expressions intervening in the list, between it and the diacritic.

What P.1.1.68 indicates is that an expression denotes its own form or a segment type of designated by a token of itself. The śīva-sūtras abstract away the supra-segmental properties of accent, length and nasality in vowels and list all and only those segment types which figure in the underlying representations upadeśa of the Pāṇinian grammatical system. Most of these segment types appear in the upadeśa with as purely phonological elements and as diacritical elements.
3.42 THE GOVERNING PRINCIPLE OF PÂNINI'S GRAMMAR FOR ORDERING OF RULES

The ordering of rules in Pânini's grammar is governed by the principle that all rules are siddha with respect to all rules, unless a specific statement to the contrary is contained in the grammar. Also the antaranga principle as assumed in the tradition, was not assumed by Pânini in the formulation of his grammatical rules, since it plays no role in the grammatical system. The wordings of a number of rules of the Astādhyāyī support this view and therefore, can be considered as jñāpakas supporting this view.

According to Kātyāyana, making a rule asiddha has two functions as given in Varttika-1 on P.6.1.86 asiddhayacanam ādeśalakṣaṇapratita sedhartham utsargalakṣaṇā bhāvārtham ca. utsarga here meaning sthānin, the element which undergoes substitution in a rule. Symbolically, suppose we have the process 'A --> B' and also that process 'P is applicable in the environment A' and process 'Q is applicable in the environment B'. Then to say that "A --> B" is asiddha with respect to rule 'P' is applicable in the environment A' amounts to saying that 'P is applicable in the environment A even if A should become B' by rule 'A --> B' by utsarga-lakṣaṇa bhāvārtham. Again to say that rule 'A --> B' is asiddha with respect to rule 'Q is applicable in the environment B' amounts to saying that 'Q is not applicable in the environment A even if
it should become B' by rule 'A--->B' by ādesa lakṣanā pratīṣedhārtham. In modern linguistic terminology, asiddhatya blocks bleeding and feeding between rule. Thus that the rule 'A--->B' is asiddha with respect to the rule 'P is applicable in the environment A' means that it does not bleed the rule 'P is applicable in the environment A'. In other words, the rule 'A--->B' does not deprive the rule 'P is applicable in the environment A', of A's to which the rule 'P is applicable in the environment A' can apply and that the rule 'A--->B' is asiddha with respect to the rule 'Q is applicable in the environment B' means that the rule 'A--->B' does not feed the rule 'Q is applicable in the environment B'. In other words, the rule 'A--->B' does not provide the rule 'Q is applicable in the environment B' with B's to which the rule 'Q is applicable in the environment B' is allowed to apply.

For example, P.8.2.7 nalopaḥ prātipadikāntasya is asiddha with respect to P.6.4.8 sarvanāmasthāne ca sambuddhau by virtue of P.8.2.1 pūrvatrāśiddham. This blocks the deletion on n by P.8.2.1 pūrvatrāśiddham from bleeding the lengthening of the vowel before stem-final n in the strong cases by P.6.4.8 sarvanāmasthāne ca sambuddhau so that correct derivation becomes possible for nominative, singular (rājan + su )---rājan ----> (P.6.4.8) rājan ----> (P.8.2.7) rāja by utsargalakṣanābhāvārtham. The rule P.8.2.1 pūrvatra śiddham also makes P.8.2.7 nalopaḥ prātipadikāntasya, asiddha with respect to P.7.1.9 ato
bhisa aig, as a result of which the deletion of n by p.8.2.7 in rₐja + bhis ---> rₐja + bhis is not allowed to feed the replacement of bhis by aig after short a by p.7.1.9, so that we do not wrongly derive rₐja + bhis ---> * rₐja + aig as in the correct derivation vrksa + bhis ---> vrksa + aig ---> vrkṣa + aig with an original a-stem. This illustrates the āḍesalakṣaṇā pratīṣedhārtha function of asiddhatva in Pāṇini's system.

3.43 THE DEVICE OF ZERO AS A TOOL FOR LAYING DOWN SYMMETRIC GENERAL RULE TO COVER UP SPECIAL CASES

Pāṇini's Aṣṭādhyāyī has become paradigm example for Indian śāstras because of the fundamental nature of techniques used in it for description. So advanced are some of the techniques, that modern scholars could grasp the importance of Aṣṭādhyāyī only when the development in modern linguistics had sufficiently advanced creating the requisite skills to understand it. The technique of lopa or zero in Pāṇini's system is one of the highly developed techniques and one is tempted to compare this with techniques adopted in modern sciences like mathematics, computer science or modern symbolic logic. In Pāṇini's system, one can discern three types of zero techniques, namely, the linguistic-zero, the It-zero and the anuvṛtti-zero.
In a grammatical theory construction, sometime or the other one always encounters a situation where nothing is actually found say neither a phoneme nor a morpheme, but still something needs to be accounted for. In such situations, there is no other option but to use the technique of *lopa*. *Lopa* or zero is not simply the absence of anything, but is something positive and has attained the status of a concept which has become very helpful while laying down a symmetric general rule to cover up special cases. In the absence of such a zero technique, one would require special enumeration and treatment. The concept of zero being a logical device, it is a mental structure rather than a physical or empirical correlate.

3.44 **LINGUISTIC ZERO AS ANTEEDATING MATHEMATICAL ZERO**

The linguistic zero is employed for the sake of symmetry in description and presupposes an underlying structure. The linguistic zero is comparable to positional value of zero in arithmetic as an indicator of existence of an entity for the position. Thus, though phonetically, the zero of sap in the case of the roots in the second conjugations denotes total absence of any phoneme, its value as an indicator of the place in between the root and the termination is fully brought on par with any other non-zero suffix or *vikarana* occupying a place in between
the root and the termination. No pre-Pāṇinian work, which uses this type of positional analysis is found and therefore, it may be said that linguistic zero was invented earlier to mathematical zero.

3.45 PRESENCE OR ABSENCE OF IT-ZERO SYMBOLIZES GRAMMATICAL FUNCTIONS

The technique involved in the it-zero is one of symbolism. The presence and absence of the it-sounds symbolizes various grammatical functions in Pāṇini’s system. The technique of it-samājñā or a technique similar to it can be employed not only in linguistics but in any scientific field. Unlike the linguistic-zero, the technique of it-zero can be traced to pre-Pāṇinian literature of the Vedas, Brāhmaṇās and Upanisads, in which stage, the different deities, sounds, mantras stand for some action, such as agniḥ prajānanam or some concept such as om iti brahma. Next in the pre-Pāṇinian it-zero techniques, comes the Śiva Śūtras which employ the symbolism of the sounds to indicate the final limit of the pratyāhāra and thus to frame a pratyāhāra from the given sounds. This technique seems to have been used in later mathematics in which the extent of a straight line is indicated by the initial and final points. In the hands of Panini, the it-sounds attained still more complex status of symbolizing functions of different and varied grammatical operations ofṛddhi, guṇa, their absence, accent etc. Unlike the numbers in mathematics which
are different from the operational symbols like plus, minus, division and multiplication, etc., the difference between technique of \textit{it}-sounds and the grammatical function they perform disappears in Pāṇini's system so much so that \textit{it}-sounds create an impression of being natural part of the grammatical phenomena.

3.46

The third type of zero, namely anuvṛtti-zero appears to have its origin in the padapāthas from where Pāṇini appears to have borrowed it. Padapāthakāras used the techniques of galitas or galantas in cases where the paddas, verses, distichs of the Vedic mantras are repeated in toto and the repeated parts were indicated by the zeroes in the padapātha. It appears that mathematics borrowed the anuvṛtti-zero in the procedure of factorization from padapāthakāras and Pāṇini.

3.47 \textbf{PROBLEMS OF SŪTRA STYLE TEXT MEANT FOR ORAL TRANSMISSION}

The composition of the \textit{Aṣṭādhyāyī} in sūtra style meant for committing to memory and oral transmission in continuous recitation brings with it its own peculiar problems. But it also has merits in that unlike external memory on paper, the whole \textit{Aṣṭādhyāyī} would be available in the mind for processing on line, to borrow a computer terminology. However, the important problem areas of the sūtra style
are how to achieve the necessary economy, how to achieve and indicate connection between sūtras and how to identify the boundary of a sūtra to mark it off as a distinct sūtra.

Economy is achieved by anuvṛtti-procedure by which items or parts of rules or complete rules are carried over, so that the rules become intimately connected as a single rule. The formal framework provided by the adhikāras within which the sūtras are ordered by means of utsarga-apavada relation.

3.48 SENTENTIAL-FEATURES IMPLICIT IN PĀṇINĪ'S SYSTEM

Pāṇini has not defined the term vākya 'sentence' explicitly, but he has given the features of a sentence indirectly through the devices of (1) marking sentence boundary by avasāna 'final pause' in P.1.4.110; (2) describing sandhi between words in P.8.1.16-74 implying that sandhi operates in order to give ultimate sentence accent patterns; (3) making tiṇ 'finite verb form' as a marker for a clause; (4) describing the boundary of specific sentence-types in P.8.2.82 - 108 in terms of pitch of the sentence-final vowel; (5) describing the sandhi operation of pradānta 'word-final' and sentence-final in P.8.4 in terms of phonemic alternation; and (6) describing the entire grammar in terms of substitution at lower level of the various syntactic concepts which are supra-morphemic and are close to sememes.
3.49 Pāṇini as not demarcating morphology and syntax since for him sentence is both the initial and ultimate point in description

For Pāṇini, the sentence is both the starting and ultimate point in description, the entire framework depending on substitution for one syntactic concept either by way of compounding, primary or secondary derivation or inflection. For Pāṇini, there is no line demarcating morphology from syntax tallying with Bhartṛhari's assertion that there is no absolute dichotomy between a sentence and a wordist. The same idea has been recognised by modern linguists. While some of whom have advocated doing away with the morphology-syntax distinction altogether, according to Sydney Lamb, the only division which is useful is between the recurrent and non-recurrent constructions; that is, between a lexeme and a non-lexeme, between inflectional and derivational constructions. Thus, the notion that Pāṇini's description is limited to morphology alone and to the paradigmatic method of description in morphology is not based on facts.

3.50 ALGEBRAIC DEFINITION OF SENTENCE IN PĀNINIAN SYNTAX-DRIVEN MORPHOLOGICAL APPROACH

Pāṇini has defined the complex sentence implicitly as a combination of clauses marked by a finite verb tin, which may be samāna 'coordinate' or asamāna 'non-coordinate', and which may be connected by connectives such as ca, yavat etc., as illustrated in
and a simple sentence as a combination of *padas* 'words' which may be marked either by a declensional or a conjugational ending. Miśra has demonstrated that in the Pāṇinian framework, the sentence is algebraically defined as:

(1) $S \rightarrow Pn$ (a sum of related $n$ *padas* where $n$ is any positive number makes up a sentence $S$)

(2) $P \rightarrow P1$ or $P2$

(3) $P1 \rightarrow (Bn) + SBI$ ($B = \text{Non-verbal stem}$, $S = \text{Suffix}$, $I = \text{Inflection}$ $SB = \text{Suffix addable to } B$)

$P2 \rightarrow (BV) + SBVI$ ($BV = \text{verbal stem};$ $SBV = \text{suffix addable to } BV$)

(4) $B \rightarrow (B1)$ or $B2$

$BV \rightarrow (BV1)$ or $BV2$

(5) $B2 \rightarrow (B1 + SBD)SBDn$

$BV1 + SB \div BVD \rightarrow BV2$

(6) $B1 \rightarrow (BV) + SBVD$

$BV1 \rightarrow \text{Preverb}_n + BV$

(7) $SBI \rightarrow sU + P$ or zero

$SBVI \rightarrow ti-\tilde{N}$

(8) $SBD \rightarrow \text{Feminine} + \text{Taddhita}$

$SBVD \rightarrow Krt$

The $P <\rightarrow$ relationship called *sāmarthya* is
an essential requirement for a syntactic combination and is of two types:

(1) *kāraka* which is a verbal relationship, when one of the Ps must be a verb and the other a non-verb (P.1.4.23 - 55) and

(2) *non-kāraka* which is a relationship (sesa) when no such restriction exists (P.2.3.50).

Thus we may conclude that Pāṇini's grammar is not based on morphology but on syntax-driven morphology, with the ultimate aim of expressing a proposition or meaning.

3.51 **DISTRIBUTIONAL DEFINITION OF MORPHEME AND FORM-BUILDING PARADIGM IN PĀṆINIAN SYSTEM**

Though Pāṇini did not define any term like morpheme, his classification is based on the criteria that the minimal form has a meaning of its own and it can be described in terms of its total environment, that is, distribution. The following diagram shows how a form is built-up in Pāṇini:
There is a mental reality behind the actual linguistic behaviour. Any linguistic theory should be concerned with discovering the mental reality underlying actual behaviour as opposed to the classification of behavioural patterns. In this
regard, Pāñini has been very successful in abstracting in his grammatical theory building from the mental reality.

3.53 PĀÑINI’S ĀSTĀDHYĀYĪ AS A GENERATIVE DEVICE
FUNCTIONING FROM LINGUISTIC PERFORMANCE VIEWPOINT
AND NOT COMPETENCE VIEWPOINT

The distinction between competence and performance is quite crucial for linguistic descriptions. Linguistic competence is the language user’s knowledge of his language. However, the actual use of a language by the user of a language is linguistic performance. Which competence represents the ability of the listener to comprehend language, performance represents the actual generation of the language by the speaker. Pāñini’s approach in the theory building is from the performance viewpoint, since in his system one starts from meaning or proposition and through syntax pass on to morphology, all along the aim being generation of words fit for use as parts of sentences. The entire Āstādhyaṭyī acts as a device to generate sentences by the operation of various sūtras. Perhaps, the confusion in the West that Āstādhyaṭyī was merely morphology without any syntax was the viewpoint of these Western grammarians was from that of competence. From the viewpoint of competence, Āstādhyaṭyī ceases to be the generative device, as there is no driving force for its operation.
The major problem faced by Chomsky was that mere classification of surface phenomena would not give a real insight into the principles and processes of sentence construction, besides complete classification being impossible. The language user, because of his linguistic competence is capable of generating an infinite number of sentences using a finite set of principles just as a person who has learnt the principles of addition, subtraction, multiplication and division is capable of carrying out these operations on any number of figures. The finite set of principles which contributes the linguistic competence of a person can be captured consciously only by studying the relationship between sentences and the units of a sentence and not by classifying the data. Panini had realised that a grammatical theory of Sanskrit is not a list of sentences of Sanskrit but it is a system of rules. Learning of Sanskrit is something more than memorizing a list of sentences of a language but it involves the process of capturing principles. A native speaker may have limitations on his performance but not on his competence, that is, there is a limitation on the number and type of sentences one actually produces, but not on the ability to produce sentences. Pāṇini,
though, unaware of such concepts explicitly, nevertheless has demonstrated this knowledge by designing his grammatical theory exactly on these lines since the Astādhyāyī actually works like a machine which produces forms usable in sentences to express the proposition in the mind of the speaker. Pāṇini’s Astādhyāyī is a finite system of rules or significant generalizations which generates or describes an infinite number of all and only possible sentences in Sanskrit. Pāṇini’s approach automatically overcomes the Chomskyan grammar’s inability to prevent absurd or meaningless sentences as also the problems of relating deep structure and surface structure of a language since in Pāṇini’s grammatical theory one has start from meaning on proposition and therefore, the question of meaningless sentence formation does not arise at all and also as Pāṇini’s Kāraka system. Very smoothly interfaces the semantics with syntax without any need for transformational rules to link deep and surface structures.

3.55 PĀŅINIAN SYSTEM AS CIRCUITING CUMBERSONE TRANSFORMATIONAL RULES

The deep structure reflects the basic regularities in any language universally. In a way, the deep structure reflects the innate linguistic capacity of the mind. In the Kāraka theory, Pāṇini has elegantly captured all possible ways in which an agent can participate in an action theory linking the verb
with nouns like a six-place predicate, each slot or place being reserved for a possible noun. The deep linguistic structure which Panini identified has been neatly stated in a finite number, in fact, in six. Generalizations, namely the six kārakas. And with the kāraka system, Pāṇini has elegantly avoided the need for writing a number of transformational rules for deletion, movement and addition unlike Chomskyan grammar.

3.56 PANINIAN APPROACH TO GRAMMATICAL THEORY
CONSTRUCTION AS MEETING BOTH OBSERVATIONAL AND
DESCRIPTING ADEQUACY

Ideally, only the native speaker of a given language, who has an inbuilt grammar of his language, can make his intuition explicit and describe his language. The grammar that is made explicit must be a model of the inbuilt grammar. As the concept native speaker itself is an abstraction, what is actually described is the ideal native speaker-hearer relationship at the level of competence in a homogeneous speech community.

A linguistic description⁵⁶ that gives an account of only the observed sentences or the primary data, is said to be observationally adequate. A description that makes explicit the ideal native speaker’s competence and gives characterization of the data in psychologically valid terms is said to be
descriptively adequate. A theory that describes language universally common to all languages and postulates evaluation measures for selecting one grammar over others, at the same time predicting kinds of data that do not and cannot exist, is said to have explanatory adequacy. A theory should be general but not too general; it must have a device to compare alternative grammars for the same language and decide which, on universal grounds, is to be preferred. Pāṇini’s grammatical theory construction which gives an account of the observed facts of the sentences of Sanskrit language in psychologically valid terms meets the criteria of both observational and descriptive adequacy. In his kāraka theory, Pāṇini has ___ upon the language universals and provides explanatory adequacy to his grammar. Just like the modern generative grammars, Pāṇini’s grammar works from sentences downward, while in the structural linguistics, description starts from sound and moves on to sentence.

3.57 PĀṆINI’S DISTINCTION BETWEEN CASE-FORM AND CASE-MEANING REALISED IN MODERN LINGUISTICS ONLY RECENTLY

Charles Fillmore, one of the modern linguists, accepts the notion of transformation and attempts to account for differences in surface structures in terms of case relations in deep structures. Fillmore argued that case relation in
terms of meaning which are universals, are to be kept apart from case forms like inflections, prepositions, word-order etc., which are language specific. This sort of distinction was maintained by Panini, case meaning being kāraka and case form being vibhakti. Fill more suggested a frame for the description of case meaning relations. According to him, at its deepest level a sentence consists of:

Sentence = Modality + Proposition

Proposition = Verb + Case₁ + Case₂ + ….Caseₙ

Of course, even though Pāṇini’s Astādhyāyī was available to the Western linguists, they could not grasp the kāraka as syntax in Pāṇini’s grammar until they themselves re-discovered the hard way the same idea.

3.57 PĀṆINI’S BINARY DISTINCTION OF PARTS OF SPEECH CIRCUMVENTS CIRCULARITY ARISING FROM PARTLY ONTOLOGICAL AND PARTLY FORMAL CATEGORISATION

According to Jespersen, notional grammar starts from the assumption that there exist extra-lingual categories which are independent of the more or less accidental facts of existing languages, and are universal in so far as they are applicable to all languages. By contrast formal grammar makes no assumptions in advance about the universality of the grammatical categories and claims to describe the structure of every language on its own terms. Further,
the formal approach to grammatical analysis is generally taken to imply the rejection of semantic considerations both in the determination of the units of grammatical analysis and the establishment of rules for their permissible combinations. In this respect, formal grammar can be compared with formal logic.

The crucial question from a methodological point of view, is simply that of avoiding circularity in the completed description of the language, in which morphology, syntax and semantics are all integrated. Panini avoided the circularity since he had adopted the principle that grammatical categories are only partly determined ontologically or by the language-independent structure of the world, the categorical definitions of these categories are applicable only to their nuclear, or prototypical, members. That is why, Panini has opted for binary distinction of parts of speech, as prātipadika and dhātu. Such a distinction is also found in standard logical languages such as the predicate calculus.
Panini's treatment of negative compounds demonstrates that his work does not belong merely to linguistics but to logic too. The fact that Panini offers an interpretation of the negative compounds prior to Indian texts on logic has somehow passed unnoticed in the works dealing with Indian philosophy generally and even in works dealing with specific problem of negation. One might be tempted to think that the mental universe of a grammarian is more limited than that of a logician, by being restricted to a finite meta language, but Panini's demonstrates that opposite is the case as far as he is concerned. For instance, the technical term atini, which is a negated form of tin, 'verb personal endings' should not be taken as denoting the rest of the technical vocabulary; but it denotes only the primary suffixes, krt which like tin are added to the verbal root, dhatu. Therefore, it is clear that in Panini’s thought, the extension of a negative compound is restricted to the field of similar terms. This major principle is stated in paribhaga 74: nanivayuktam anya sadruddhikarane tatha varthagati ‘the word joined with nan and iva denotes a locus which is distinct but similar to that of the negated word for thus is the meaning according to the ordinary use’. The negative compound abrahamana
'non-brahman' does not denote any person but some one only belonging to the caste system. Thus Pāṇini's theory and use of the negative commands is in accordance with the object language. The negative particles are thus not taken unilaterally in their opposition or contrariety function, but more comprehensively in a dialectic where otherness and likeness share equal part.

3.59 **PĀṆINI'S USE OF SEMANTIC NOTIONS TO ACHIEVE RIGOUR IN GRAMMATICALLY SIGNIFICANT GENERALIZATIONS**

Pāṇini utilized in many ways semantic aspects to achieve rigour and grammatically significant generalizations in the description of the Sanskrit language in the Astādhyāyī, though Pāṇini's avowed goal was to provide an adequate descriptive grammar of Sanskrit and not to make a semantic analysis of the language. Thus, Pāṇini was not led away by semantic considerations, but he used them in his grammar so far as they do not go against formal considerations. Pāṇini concerned himself with deriving grammatically correct phrases and sentences and did not attempt to devise methods to eliminate the derivation of semantically absurd or deviant sentences like agninaśiścartipuspāṇidevadattataḥ 'Devadatta is sprinkling the flowers with fire'. However, here one must note that even a semantically absurd sentence is understood by the hearer; for otherwise, how did he come to know that
it is deviant? The only thing is such sentences are not in accordance with the reality of the world. But in the case of Pāṇini, as one starts from a proposition or sentence meaning and then form words fit for use in a sentence, the problem automatically vanishes. The burden does not lie on the grammar, but on the speaker to prevent absurd sentences.

3.60 PĀṇINI'S USE OF SEMANTICS AS PRIMITIVES TO DERIVE PHONOLOGICAL FORMS IN GROUPING WORDS AND STEMS INTO FORM-CLASSES AND AS A CONDITION FOR ASSIGNING PARTICULAR AFFIXES AND COMPOUND PROCESSES

Pāṇini made use of semantic aspects in his grammar in three main ways:

(1) By using semantic concepts, for example vartamāna 'present time', bahutva 'plurality' as the starting point in his grammar to derive ultimately phonological forms by a series of replacement rules.

(2) By using, as far as it was possible, semantic concepts for grouping words and stems into form-classes. For example, varṇa (P.2.1.69 - P.4.1.39) 'colour words', icchārtha (P.3.3.157, 160) 'verb meaning 'wish'', asattvavacana (P.2.3.33) 'that which denotes a non-substance', nadi (P.2.1.20, P.2.4.7) 'river', gunavacana (P.2.1.30, P.4.1.44) 'attributive word', kāla (P.3.3.137, P.4.2.5) 'time word' etc.
(3) By taking into consideration the shades of meaning conveyed by the whole derived word consisting of the root and the affixes or compound are taken into consideration by him as one of the conditions to assign a particular affix or compound process.

3.61 **Pāṇini as deriving semantically similar but syntactically dissimilar sentence types from one and the same underlying semantic structure**

As already discussed, Pāṇini’s grammar starts with semantic structure and proceeds to derive the corresponding phonetic structure by a series of replacement operations. Between these two levels, one or two intermediary levels are also set up according to necessity. Of these intermediary levels, the kāraka level and the morphophonemic ‘sāndhi’ level are valid throughout the grammar whereas those like L-suffix level hold good only for particular section of the grammar, the latter appearing only in the derivation of the verb. These levels are, however, are not self-contained and the processes that operate on one level sometimes depend upon items belonging to other levels. For example, items of semantic level are replaced by items of kāraka level. In the Indian grammatical tradition, the meaning is primary and the sound produced depends on the meaning to be expressed as is clear from Patañjali’s statement in Mahābhāṣya under sūtra 7.1.33, (sama akam) : na hi sabdanimittakena
nāmārthena bhavitavyam kim tarhi? arthanimittakena
nāma śabdena bhavitavyam. 'meaning is not there
because of the sound. What is it then? Sound is there
because of meaning'. As noted by Cardona\(^6\) and
Bronkhorst\(^6\), Pāṇini derives semantically similar but
syntactically dissimilar sentence types from one and
the same underlying semantic structure without giving
priority to any one of the types and in doing so he
specifies the syntactic relationships of the
constituents of a sentence. The semantic roles that
nouns within a sentence play in the fulfillment of the
action are first given kāraka labels and the kārakas
are then converted into cases. No one-to-one
relationship either between the semantic roles and the
kārakas or between the kārakas and the cases. In case,
the agent proper is not mentioned in the sentence, one
of the other kārakas like the instrument or the locus
can assume the role of the agent depending on the will
of the speaker. The verb expressed on understood,
occupies an important position in the grammatical
derivation of a sentence, so that if it refers to a
particular kāraka, the noun that represents that kāraka
must be in the nominative and the kārakas that are not
referred to by the verb will take the cases that are
assigned to them by the rules.
Likewise, in the case of the derivation of a finite verb, the grammar starts with the semantic concepts, such as, root meaning, voice, tense, mood, person and number. By means of voice, the kāraka, the kāraka kartṛ 'agent' or karman 'object' is indicated in the case of transitive verbs but in the case of intransitive verbs kartṛ or bhāva 'state' is indicated by P.3.4.69 laḥ karmanī ca bhāve ca karma ke bhyaḥ. In the process of derivation, the root is first followed by one of the ten lakāras 'L-suffixes', which stands for all the above semantic concepts other than the root. The L-suffix is then replaced by one of the terminations tiṅ, P.3.4.78. Depending on whether the termination is sārva dhātuka or ārdhadhātuka, a characteristic 'vikaraṇa' will either occur or not occur respectively. tiṅ and a suffix will indicator suffixes P.3.4.113 tiṅ sit, sārvadhātuka and ārdhadhātukam and līt and āśārliṅ are ārdhadhātukas P.3.1.114 ārdhadhātukam āśeṣāḥ, P.3.1.115 līt ca and P.3.1.116 liṅ āśāi. Ultimately, morphophonemic rules that depend on the root or the L-suffix or both operate to produce the actual form.
3.63 **Pāṇini's Use of Meaning to Group Words or Stems into Form-classes Accounting for Grammatical Separations**

Pāṇini also utilized meaning to group words or stems into form-classes, the primary motive in making such classification being to account for grammatical separations. His aim was to make generalizations to the extent possible by finding common characteristics among the members of a common class. The common characteristics may be phonological or semantic; listing being resorted to only when no generalization was possible. Even when semantics is made use of for the purposes of generalization, the ultimate is only to account for grammatical processes involved and it is only to avoid the cumbersome process of listing. For example, in P.2.3.54, \( \text{rniarthanam bhavavacananam ajvareh} \) 'in the case of verbs meaning \( \text{rui} \) 'to afflict' but not \( \text{ivari} \), which have an abstract noun as agent, \( \text{karm} \) is represented by the sixth case as in \( \text{caurasya rujati rogah} \) 'a disease afflicts the thief' but \( \text{chauram ivarayati ivarah} \) 'fever afflicts the thief'. \( \text{ivari} \) is excepted from verbs that mean 'to afflict' although it too means the same thing.
1.64 Pāṇini's Use of Meaning in Deriving Words or Compounds

The meaning of the whole derived word is also used by Pāṇini in deriving words or compounds. samāsāntas are dependent upon the meaning of the compound. For example, in the sutra P.5.4.147 trika-kut parvati, trikakut is the name of a particular mountain while any other thing that has three protuberances is called trika-kuda (cf P.5.4.84, 143).

In the case of feminine formation, the feminine suffix is used when the word denotes a particular person or object will be different from that when no such particular meaning is conveyed by the word. For example, according to P.4.1.58 nakhamukhat samijñāvam the feminine suffix is tap if the word denotes a particular woman like śūrpanākhā but it is nīś otherwise, as in tāmranakhi 'a woman with red finger nails'.

3.65 Implied Meaning and Mode of Sentence as Grammatical Operation

In a similar way, the implied meaning associated with a sentence as a whole and the nature of the sentence such as interrogative or reply to a question determine the usage of a particular L-suffix. For example, according to P.3.3.6 kimvṛtte līpasyaṃ, lāt which normally denotes the present, is used in the future sense if the sentence contains a word derived
from kīm and if it implies a wish on the part of the speaker to get something as in kātaro bhikṣam dāsyati | dadāti | data 'who will give | gives alms?' The speaker here implying that he wants alms.

If the sentence is an answer to a question and if it contains the word nanu 'certainly', lat is used to denote the part in accordance with P.3.2.120 nanu praṭa-prativacane as in akāśīn kātam devadatta 'Devadatta, did you make the mat?' - nanu karomi bhoh 'O yes, I did make it'.

3.66 PĀṇINI'S USE OF CONCEPT OF SEMANTIC COMPONENTS

It is interesting to note that Pāṇini utilized also the concept of 'semantic components or features', the convention being used in modern linguistics is '+' to denote the existence and '-' to denote the absence of the feature. The concept of semantic components is found in the assignment of L-suffixes to denote time. Past as well as future time in Sanskrit is divided into past, (anadvante lan P.3.2.111) or future, (anadvante lut, P.3.3.15) of the days other than present versus past (lun P.3.2.110) or future (lṛt seṣe ca P.3.3.13) of the present day. Further, past time not of the present day is further divided into one that is perceived by the speaker and the other not with respect to the action (parokṣe lit, P.3.2.115). The use of the L-suffixes is governed by these classifications as indicated by the following table, apart from other aspects.
Table 1: Classification of some of the -suffixes on the basis of semantic components (adyatana = present day; parokṣa = not perceived by the speaker)

<table>
<thead>
<tr>
<th>-adyatana</th>
<th>+ parokṣa</th>
<th>- parokṣa</th>
<th>+adyatana</th>
</tr>
</thead>
<tbody>
<tr>
<td>liṭ</td>
<td>liṭ</td>
<td>laṅ</td>
<td>luṅ</td>
</tr>
</tbody>
</table>

3.67 WOJASZYK’S FALSIFIABILITY CRITERIA FOR DETERMINING WHETHER PARIBHĀSAS REDUCE VALUE OF PĀṇININ’S THEORY

Many scholars have raised the question whether Pāṇini really did have the paribhāṣas at the back of his mind when he composed his grammar or they were merely the imaginations of later grammarians. As there appears to be no means to answer this question with definiteness, one may ask the question whether paribhāṣas have led to the growth of our knowledge of Sanskrit. Pāṇini accounts for the correct utterances of Sanskrit equipped with his 4000 rules together with a list of roots and nominal stems. If one considers Pāṇini’s grammar as a modelling of Sanskrit, just as Newton’s Mechanics is a modelling of the behaviour of physical objects, one might think of testing the model
to see how good it is. Though there are multitudes of words and sentences which corroborate Pāṇini’s modelling of Sanskrit, in a few cases the predictions of the modelling are found to be incorrect with actual facts. In mechanics, any such incorrect prediction would have rejected mechanics as a model. However, grammar being not an exact science like mechanics, though it adapts scientific techniques, it is not given up as incorrect model and efforts are made to improve the model. The extra rules introduced by the tradition to correct the situation are the paribhāṣas ‘meta rules’ or ‘auxilliary hypothesis’. Some paribhāṣas reduce the value of Pāṇini’s theory which others increase it. The crucial difference is that the first kind are unfalsifiable, while the second are not. This argument is based on the notation that a theory or a statement is informative in direct proportion to its falsifiability, proposed by Karl Popper and known as criterion of demarcation between science and non-science. The more information a theory contains, the greater the number of ways in which it may turn out to be false. In this background, one can say that Pāṇini’s theory of Sanskrit language has a very high degree of testability, since it predicts several million forms, each of which is testable and potentially falsifiable by any Sanskrit speaker, but still under severe testing, Panini’s theory has rarely been falsified. However, one can go on constructing auxilliary hypothesis or paribhāsas whenever the
theory is falsified. So, everything hinges on whether \textit{paribhāṣa} themselves are testable and falsifiable. Traditional grammarians evolved a criterion of their own for judging \textit{paribhāṣa} which is equivalent to Popper's falsifiability criterion. These criteria are referred by Wujastyk as tetralemma which are as follows:

1. (ādau) \textit{vaivartham} 'redundancy'
2. (paścāt) \textit{iṣṭārthajñāpanam} 'suggesting a desired sense'
3. (tataḥ) \textit{svamsea caritarthyam} 'efficacy on its own behalf'
4. \textit{anyatra phalam} 'additional effect'

\textit{Vaivartham} means that there must be something in one of Pāṇini's rules which is redundant or inconsistent, be it a word or even a syllable. \textit{iṣṭārthajñāpanam} means that the redundancy must intimate some desired meaning, this meaning being the \textit{paribhāṣa} itself, which is formulated at this stage. \textit{Svamsea caritarthyam} means that the suggestion which arose at the stage two must resolve the redundancy of stage one, rendering Pāṇini's statement efficient and operationally meaningful. \textit{Anyatra phalam} means that the suggestion must not only satisfy the requirements of its genesis, but it must also be of use in solving
problems elsewhere. Thus the set of generally accepted paribhāṣas which have passed this traditional test must, therefore, be considered as a genuine contribution to Pāṇini's theory.

3.68 SYSTEMATICS EVOLVED IN TRADITION FROM ASTĀDHYĀYĪ

The systematics of Astādhvāyī gives an impression of being somewhat mysterious due to the extreme brevity of expression, interdependence of the various sūtras, the order of the sūtras and their exceptions, the presence of anuvṛtti in an unpredictable manner and the numerous mnemonic devices used in a complex way. This gives rise to a question as to whether Pāṇini can understood by himself as a system independently of the traditional interpretations or whether traditional interpretations are an essential part of the system of Pāṇinian grammar, and as such these interpretations originated by Pāṇini himself. The puzzling systematics of Pāṇini, is in past atleast, are attributed to rewriting of his text in order to improve formulation of a rule, wordings or arrangement which are considered as more satisfactory and more elegant by his successors. Once such rewritings become the accepted text, the implications on which they are based become part of the system without which it cannot be understood. The only way available to the modern student of Pāṇini is to try to find out traces of the original state of affairs left over by oversight or neglect. It may be said that the systematics of
Pāṇini’s grammar is not only due to consolidation of the works of earlier grammarians by Pāṇini, but also due to the effect of reworking of his text by later scholars who formulated additional principles and reworked the text carefully so as not to leave any trace of the original position. Any research into extracting purely Pāṇini’s own text can only lead to more or less probable results and any rigorous proof appears improbable.
3.69 TRADITION AS NOT CANONICAL UP TO KĀTYĀYANA'S TIMES

Upto Kātyāyana, tradition had not become canonical\(^1\) and thus one could raise questions regarding formulation of specific rules and the organisation of the Asṭādhyāyī. Kātyāyana questions the correctness of Pāṇini's formulations if the rules contain superfluous words or lack necessary terms, and proposes additions, deletions and even complete changes. Kātyāyana thus attempts to understand Pāṇini by bare reasoning. On the other hand, Patañjali did not have the benefit of continuous tradition and the existing tradition had become inflexible. Though Patañjali sometimes accepts Kātyāyana's addition and deletions as separate vārttikas, he does not generally accept his new formulation of the sūtra itself. His attitude is captured in his statement apaniniyam tu bhavati yathanyagam eva tu 'this however, becomes un-Pāṇinian, but the rule should be kept in its original formulation'.

3.70 CANONICAL AUTHORITY AS REQUIRED FOR LEGITIMACY

PATAÑJALI'S TIMES ONWARD

This attitude of Patañjali in many cases leads to problems regarding the interpretation of Pāṇini's sūtras. He is inclined to read into a sūtra more than what Pāṇini possibly could have meant, though his general aim is to secure the right interpretation of Pāṇini's rule. Patañjali was not an exception in
this, as the practice of re-interpretation was followed in nearly every branch of Sanskrit learning as what mattered was the ultimate authority and to get legitimacy the later developed theories were read back into the authentic text of the authority by commentators.

3.71 **Aṣṭādhyāyī AS NOT ORGANISED ACCORDING TO STRUCTURE OF VEDIC SANSKRIT CONTRARY TO THE CLAIM OF PATAÑJALI**

Tradition holds that both classical Sanskrit words and vedic words are given equal importance from the viewpoint of the organisation of the grammar of Pāṇini. However, it is found that the rules of the Aṣṭādhyāyī are organised mainly to the structure of the classical Sanskrit. As an example, the tense and mood categories (lakāras) are an appropriate device for analyzing the classical Sanskrit, but they are incapable of representing a classification of the variety of voices, tenses and moods of the vedic language. The vedic rules appear to have been borrowed from several sources and inserted in the appropriate context and pasted together with non-vedic rules. Even if the entire vedic rules are removed from the Aṣṭādhyāyī, one would hardly find the remaining structure lacking anything which would justify the presence of those rules. Instead of treating the grammatical peculiarities of the important Samhitā texts, Pāṇini actually prefers to make generalizations in terms of vyatvaya 'divergence' and bahulan.
'diversity' (P.3.1.85, P.7.1.10 etc.). Though Vedic literature shows a large variety of forms compared to three of classical Sanskrit, Pāṇini has devoted only 270 rules out of the total number of 3983 rules in the Astādhyāyī. The complex Vedic inflexions is briefly discussed in twenty rules, while the Vedic infinitives which have not survived in the later Sanskrit have been covered in nine rules (P.3.4.9 to P.3.4.17). This shows, contrary to Patañjali's claim, that Pāṇini did not organize his grammar according to the structure of the Vedic Sanskrit. As we are used to looking at Pāṇini and Kātyāyana through the eyes of Patañjali, deliberate imposition of his own views without mentioning another interpretation often escapes our attention. This is not to undermine the usefulness of Mahābhāṣya. We can still make use of the traditional views it provides, but we must reserve our own right to weigh its arguments which we may refute using our own judgements and its technique of handling the procedure of grammar, which we may improve if it is possible. This stand is supported by Paul Thieme who also suggests that we must adopt a philological and historical approach to interpretation.
3.72 **BASIC PRINCIPLES OF GRAMMAR ACCORDING TO KĀTYĀYANA AND PATAṆJALI**

Patañjali himself admits that we know words on account of the usage of people. The point is clear that proper use words freely in daily life to express themselves without having to go to an authority for ordering the making of words as they would go to a potter to order a pot. Thus, grammar has no authority. The dogma behind grammar is that vedic language is eternal and unchangeable. The basic principles regarding grammar according to Katyayana and Patañjali are as follows:

(i) The relation between the meaning and the words used to refer to it falls outside the domain of grammar.

(ii) Grammar is secondary in relation to usage.

(iii) Grammar merely imposes a restriction on the use of words by telling us which are correct words, namely, those words which are derivable by rules of grammar.

3.73 **ATTENTION OF SPECIAL RULES IN USAGE AS A MUST**

The Āṣṭādhyāyī derives words by means of general and special rules. It is understandable that usage may show gaps in the case of words derived by general rules with regard to their attestation, but the words derived by special rules must have been attested.
somewhere since the purpose of the special rules itself was to accommodate the usage which defies the general rule. At any rate, the Aṣṭādhyāyī does not derive totally new words.

3.74 **MAHĀBHĀŚYA AS PRIMARY SOURCE FOR INTERPRETATION OF PĀṇINI ACCORDING TO TRADITION**

After Pāṇini had formulated the rules of grammar, the contribution of Kātyāyana and Patañjali was to bring it to perfection. In order to keep the original formula of Panini and yet interpret in a different meaning, Patañjali makes use of interpretative devices like paribhāsa 'interpretative maxim', jñāpaka 'clue', yogavibhāga 'splitting of rules' etc. The traditional view is that the interpretation of Pāṇini must be based on the **Mahābhāṣya** which is considered as the primary source.

3.75 **NEED FOR REPLACING AD HOC INTERPRETATIONS IN TRADITION WITH INTERPRETATIONS BASED ON LOGICAL AND HISTORICAL ANALYSIS OF TRADITIONALLY DOCUMENTED**

The recent development of generative grammar has led to the renewal of interest in the study of Pāṇini in the last twenty years. Modern research based on critical and historical approach has sufficiently demonstrated that we can no longer depend entirely on traditional commentaries which are unable to bridge the discontinuous tradition from Pāṇini to Patañjali. In
other words, both Kātyāyana and Patañjali did not possess a first hand knowledge of Pāṇini’s Astādhyāyī through a direct living tradition. Thus we are left with no option but to discard the ad hoc and tricky interpretations given by the later commentaries including the Mahābhāṣya and the Kāśikārvṛtti.

Recently Paul Kiparsky has established a thesis on the existence of hitherto unknown dimensions in Pāṇini’s treatment of linguistic variations. He has surveyed all the optional rules in the Astādhyāyī and claims that Pāṇini made a systematic distinction among the degrees of optionality as follows:

va means ‘or rather’, ‘usually’, ‘preferably’

vibhāṣā ‘or rather not’, ‘rarely’, ‘preferably not’


It is claimed that the above stated three-way distinction enables Pāṇini’s rules to register systematic preferences among variants which are characteristics of any living language in its natural state. Kiparsky’s contribution is important not only for establishing this distinction of three degrees of optionality but also for establishing that we cannot specially claim that tradition handed down up to Patañjali necessarily carries authentic information about the meaning of the rules in the Astādhyāyī. In
the changed circumstances, our attitude must be to accept or reject the commentator's interpretation basing on our own analysis of the documented evidence in the traditional literature, philological understanding and the internal structure of the Astādhyāvī.
Though Bohtlingk’s 1887 edition of Pāṇini’s sūtrapātha is considered to be the best so far, the time has arrived now to establish a finally settled critical edition of the Āstādhyāyī, to identify rules in it which do not fit properly in Pāṇini’s basic grammatical framework and brand them as interpolations. S.D. Joshi has suggested three steps in arriving at such a critical edition as follows:

(i) to support Pāṇini’s statements in accordance with the documented usage in pre-Pāṇinian literature,

(ii) to find out the later layers in the text on the basis of conventions of anuvṛtti, and

(iii) to investigate the basic grammatical theory intended by Pāṇini which could trace the layers showing incompatibility with the basic theory.

As regards the first point above, it is observed that the Mahābhāṣya and the Kasakavṛtti resort to artificially inventing examples when these do not find real examples for the sūtras of Pāṇini, hardly taking into account the factual coverage of these rules. The real intention of Pāṇini’s sūtras can be examined by investigating whether there is actually a close agreement between the rules and usage. A recent
study \(^6\) by S.N. Joshi has arrived at the conclusion that the percentage of attested forms in the fourth adhyāya of the Astādhyāyī amounts to only 40% whereas the non-attested forms amount to 60%. This is just a beginning and such studies must be extended to the remaining adhyāyas of the Astādhyāyī also. This should convince scholars of the need of a new edition of the Astādhyāyī which would be supplying attested examples from whatever literature of Pāṇini’s times that has survived. Similarly a recent study\(^2\) by S.D. Joshi and S. Bhate discovers the rules of anuvṛttī underlying the organisation of the Astādhyāyī. They hold that a clear cut idea of the individual rules and the connection between them is not obtained because the text of the Astādhyāyī makes it difficult to demarcate the individual sutras due to its oral transmission in continuous recitation. We are accustomed to accepting the division given in the Mahabhasya and the Kāśikāvyārtti without developing criteria for the demarcation of the sutras and their interrelationships. The text of the Astādhyāyī as we have it today does not show consistency in the use of anuvṛttī because of the additions of new rules or words to bring it up to date by his successors. Such additions are often found to interrupt the continuity of the topic concerned. Joshi and Bhate have identified 105 conventions of anuvṛttī and have found that these conventions do not work when
a rule is inserted in the pre-existing body of rules. It is found that often additions are made at the end of a pre-existing group or between two previously existing rules.

3.78 PROBLEMS FACED IN COMPOSITION MEANT FOR ORAL TRANSMISSION

The problems faced in the composition of a text like the Astādhyāyī which was to be committed to memory and to be orally transmitted in continuous recitation are those of how to achieve the required of economy, how to achieve and indicate connection between the sūtras and how to mark off individual sūtras.

To achieve economy, anuvṛtti procedure is to be adopted, to indicate connection between the sūtras, the formal framework is provided by adhikāras within which the sutras are ordered by means of utsarga-apavāda relation. Also, the connection between individual sūtras is naturally indicated by the use of the particle ca. However, we have to first develop notational devices before we can point to something definite with regard to marking off individual rules.

3.79 USE OF PARTICLE CA AS MULTIPURPOSE TOOL IN RESOLVING AMBIGUITIES IN SŪTRA TEXT

Joshi and Bhate who have made a thorough study of the role of the particle ca in the interpretation of the Astādhyāyī, have discovered that
in the particle *ca* 'and', Pāṇini has found a multipurpose tool to resolve ambiguities arising from the nature of a *śūtra*-text. They have also found that the text of the *Aṣṭāḍhyāyī* as we have it today is not consistent in the use of *ca*.

3.80 **DECISION OF WHETHER RULES ARE CONJUNCTIVELY OR DISJUNCTIVELY LINKED**

The decision whether the rules linked by *ca* are to be interpreted in terms of conjunction 'all together' or disjunction 'each separately' depends upon the application of the rule. Two rules must be interpreted in conjunction, if these rules can be applied together. In the remaining cases, rules coordinated by *ca* are to be interpreted in terms of disjunction.

3.81 **PARTICLE *CA* AS MARKING BOUNDARY BETWEEN RULES WHEN **anuvṛtti** FAILS TO SUPPLY OMITTED WORDS**

The device *ca* acts like a multipurpose tool reinforcing when the *anuvṛtti* device fails, resolving ambiguity when the intended grouping is not clear and indicating the boundary between two rules. In all these functions, however, the logical value of *ca* of indicating conjunction or disjunction remains unchanged. When the *anuvṛtti* device fails to supply omitted words or show the precise grouping between
elements, it is the particle ca that marks the boundary between the rules. A word followed by ca always indicates that the preceding statement is an independent rule.

3.82 PREDICTABILITY OF ORDER OF APPLICATION OF RULES IN THE ĀSTĀDHYĀYI

Āstādhyaśīryā differs from the modern generative grammar as regards the way in which relationship between rules in the grammar is determined. In the generative grammar, the order in which the rules must apply has to be indicated explicitly. In contrast, the order of the application of the rules is normally predictable in the Āstādhyaśīryā where the rules are applied in a specific order because the application of one rule feeds the application of the other rule. Thus, in the Āstādhyaśīryā, the rules often become automatically ordered. The fundamental principle for the ordering of rules is siddha 'effected'. This principle is not directly stated but implied from the special statement of asiddha 'not effected', which restricts the general principle of siddha. The principle of siddha can be expressed as follows:

A rule A which potentially affects or changes the environment of another rule B prevails over B which does not change or affect the environment of the rule A.
Another convention which is assumed by Pāṇini is that the special rule (apavyāda) prevails over the general rule (utsarga). A rule A is regarded as an apavyāda provided that it is included in the domain of the general rule B and the rules A and B cannot be applied together. The precise formulation and working of the utsargapavyāda relation in an area of research which must be taken up.

In order to phrase the principle of utsargapavyāda relation clearly, one has to study the situations where two rules involve mutual conflict. It is to be noted that a conflict does not arise between any two rules in the Aṣṭādhvyāyi. Rather, the conflict occurs between two or more rules which show some shared environments. To obtain the utsargapavyāda relation between two or more rules, first we have to find out the commonly shared features in the conditioning environments and further we have to show among these rules that one rule requires at least one specific feature which is not shared by another rule. In this way we can establish the utsargapavyāda relation between two or more rules which conflict with each other. The utsargapavyāda principle is restricted to the cases of mutual conflict.

If two rules A and B do not involve a mutual conflict in the form that A cannot be applied after B and B cannot be applied after A, and that A has no chance to apply where B is not applicable but B has a
chance to apply where A is not applicable, then the rule A is called niravakāśa. The niravakāśa and savakāśa rules are conjunctively applied. In other words, the niravakāśa can take effect before or after the taking effect of a general rule.

3.83 PARA-PRINCIPLE AS DISPENSABLE IN VIEW OF THE MORE GENERAL UTSAKGĀPĀVĀDA PRINCIPLE

According to the traditional view, in the case of mutual conflict, the rule mentioned later in the text of the Āṣṭādhyāyī prevails over the earlier rule (P.1.4.2). But one can find many counter-examples to this principle. Pataskar claims that the para-principle which is restricted to the case of mutual conflict can be dispensed with by the more general utsargāpāvāda principle. Pataskar solution is similar to Cardona's solution of limited blocking principle in the case of a conflict.

The ad hoc traditional interpretative principles regarding the ordering of rules which have come down to us are too generalized and complex to have ever been accepted by Pāṇini himself. The reconstruction of Pāṇinian theory of metarules is one of the major tasks of Pāṇinian research.
3.84 RECENT TRENDS OF RESEARCH IN PÂÑINIAN SYNTAX

New enthusiasm has been aroused in the syntactic studies in the last fifteen years by the development of generative grammar. Pâñini's grammar is now appreciated for its detailed and interesting treatment of syntax which had not been much noticed hitherto.

Recently Paul Kiparsky has dealt with the questions of (i) assignment of case in sentences and nominal phrases, (ii) how to construe the missing implicit agent and goals of non-finite verb forms or the problem of control and (iii) ellipses or the relation that holds between entities such as tvam pacasi and pacasi. Madhav Deshpande deals with the importance of complex sentences with their intricate problems of case assignment and control. The same problems which are topics of current research in the West have not yet been definitively resolved. Both Kiparsky's and Deshpande's works point to some of the overlooked aspects of the Pâñinian Systems.

3.85 ATTESTATION AS CRITERION FOR ACCEPTING OR REJECTING INTERPRETATIONS

Thus, to understand Pâñini through Pâñini, our strategy must be such that a particular interpretation of Pâñini's rule out of many possible interpretations is to be either accepted or rejected on the basis of the fact whether it enables us to derive
the attested forms or not. In order to establish correlation between the rules and the attested forms of the language, Pāṇini’s Āstādhyāyī has to be interpreted in a critical way. The problem is that all the interpretative principles which are required for understanding the rules are not stated in the Āstādhyāyī. For instance, the interpretative principles like anuvrtti or the ordering principles like siddha, antaranga and apavāda are not mentioned in the body of the Āstādhyāyī. These principles which are implicit in Pāṇini’s grammatical theory are deduced from the clues provided in the Āstādhyāyī. These implied principles which could be the backbone of grammatical theory construction are to be fully exploited, explicating a satisfactory and straightforward interpretation of the Āstādhyāyī. It is almost certain that a modern interpretation of the Āstādhyāyī which is based on the meta rules will give new results as far as Pāṇini’s grammatical theory construction is concerned.

3.86 PĀṇINI’S USE OF SEMANTIC CONCEPTS IN BINDING TOGETHER LEXICAL ITEMS SHARING COMMON GRAMMATICAL OPERATIONS

Just because Pāṇini does not make any explicit statement regarding problems of semantics does not mean that Pāṇini’s generative grammar is not concerned about the theory and problems of meaning. Pāṇini presupposes¹ that the semantic structure of
lexical items sharing the same grammatical operations can be described in terms of common semantic features found in them. Pāṇini's lexical items are not unanalyzable and undefinable wholes. Pāṇini's frequent reference to componential features like pumā, stṛī, prāṇini, manuṣya, cittavat implies that the vocabulary of language is analyzable into very general elements of meaning. The Astādhyāyī exploits various kinds of semantic relations like synonymy, hyponymy, and part whole relations. Pāṇini makes use of these semantic concepts to bind together the lexical items which share the same grammatical operations. Instead of listing words which denote a synonymous meaning. Panini uses conditions like unartha (P.2.1.31), dūrārtha (P.2.1.39), sukhartha (P.2.3.52) to bring together all synonymous words under the purview of a concerned rule. His technique is to mention one of the synonymous terms and adds either -artha or -vacana to it, so that all other terms having a similar connotation can fall under the purview of the rule.

3.87 **SEMANTIC USE OF COVER WORDS TO REPRESENT COMPLEXES MADE OF COMPONENTS OF MEANING**

The treatment of derivational morphology in the taddhita section of the Astādhyāyī offers some important insights about the organisation of vocabulary. The offspring-section (apatyātadhihikara) indicates that there is a systematic relation between the patronymic and matronymic words. Apatya
'descendant' is the internal lexical connection between these words. The word \textit{apatya} is a cover term for male and female descendants and also for members of senior and junior generations. Each lexical item derived by the rules of the taddhita section can be explained in terms of feature \textit{apatya} 'descendant'. In order to establish a different kind of semantic contrast between different kinds of descendants, the \textit{Aṣṭādhyāyī} introduces four features, namely, \textit{sthaviratara sapinda} 'the oldest ancestor', \textit{gotva} 'two or more generations junior to the oldest ancestor', \textit{yuvan}, \textit{anantarapatya} 'immediate descendant'. For example, \textit{garga} 'the oldest ancestor', \textit{gārgya} 'two or more generations junior to garga', \textit{gārgyāvana} 'one or more generations junior to gārgya', \textit{gargih} 'immediate descendant of gārgya'.

It is clear form the above that the meaning of \textit{apatya} words often do not stand for a unitary concept but represents complexes made of components of meanings.

3.88 \textsc{use of semantic parts of speech by pāṇini on ontological basis}

The semantic components are mentioned in the basic \textit{arthādhihikāras} 'meaning-sections' which collect words which are associated with the same semantic feature. On the other hand, when the sub-classification of words into various features is intended, semantic distinguishers are mentioned in the
locative case. In many cases the additional semantic features furnish important semantic information. Pāṇini puts together barter-words and coin-words in the section tena kritam (P.5.1.37). He assembles words dealing with measure in P.4.2.37-62. In another section, Pāṇini collects words dealing with 'state' and 'process' (P.5.1.119-136). Thus, we find the vocabulary in the taddhita section organised in terms of common basic semantic feature. Semantic considerations also play a significant role in fixing of parts of speech. Parts of speech presuppose the possibility of identifying entities, qualities, action, state, or process on the ontological basis. On semantic considerations, Panini recognises the following parts of speech: jāti 'generic character', dravya 'individual object', guṇa 'quality', bhāva 'state', karmaṇ 'process', asattva 'the third order entities'. It is to be remarked that the division of words into subanta 'case-inflected words' and tiṇanta 'finite verbs' does not represent the semantic classification of the parts of speech, but represents only formal parts of speech.

The semantic criteria made use of by Panini in establishing certain classes of parts of speech are mentioned independently of morpho-syntactic features. The grammatical structure of the Sanskrit as described by Pāṇini does not require adjectives and adverbs as separate parts of speech. The parts of speech required by Pāṇini are jātivācana, guṇavacana, bhāvavacana.
karmavacana, sattva-vacana / asattva vacana classes, which are determined by ontological distinction and which may or may not be independent of the structure of Sanskrit. These classes which are determined by the ontological consideration, frequently reveal correlation between semantic features and grammatical facts based on the conceptual framework within which Pāṇini organizes and describes the physical world.

3.89 FORMAL AND SEMANTIC ASPECTS OF PĀΝINIAN GRAMMATICAL CATEGORIES

The grammatical categories in the Astādhyāyī present a mixed picture. The categories like gender and number are purely formal ones. Other categories like aspect, mood, voice and person show correlation between grammatical elements and semantic properties.

Pāṇini does not have any special terms for the categories of tenses and moods which are represented by means of ten underlying different symbols. The terms vartamāna 'present', bhūta 'past', bhavīgya 'future' show aspect-definition of the action under description. Moods like the subjunctive, optative, imperative etc., deal with the attitudes of the speaker. vidhi 'must', nimantrapa 'please' are regarded as model meanings. The aspects and moods are often found intersecting one another since certain notions can be subsumed equally well under modal or aspectual distinction. These aspects and modalities
are basically semantic categories which are correlated with either verbal endings or with the use of particles like nanu, vad, iatu etc.

In Pāṇinian research, semantics is overshadowed by a scientific investigation of Pāṇini's technique of morphology, phonology, and syntax. The descriptive aspect has won the upper hand and semantics is relegated to peripheral portion. However, semantic analysis provided by the Astādhyāyī could be impressive on its own right from the viewpoint of the theory of syntax.

3.90 USE OF SET-THEORETIC APPROACH TO REDUCE PĀṆINIAN USE OF COMPLEX PATTERNS OF SYMBOLS TO SIMPLE ELEMENTAL SYMBOLS

Thus, we must approach Pāṇini through both tradition and bare reasoning. The modern interpretation of Pāṇini must follow both philological and historical approaches. Instead of trying to read into Pāṇini modern linguistic theories, we must investigate how the problems faced by the modern linguist have been resolved in the Astādhyāyī. We must develop axiomatic methods to the extent possible on the lines of Euclid's geometry or modern set theory in the investigation and understanding of Pāṇini. In fact, the set-theoretic approach is similar to Pāṇini's in that while the former uses pure symbols, Pāṇini uses complex symbols making use of the richness of Sanskrit language. The future needs of research in the areas of
artificial intelligence, natural language processing, knowledge representation and development efficient computer languages must stimulate deeper investigations of the techniques of the Astādvāyī and represent the Paninian rules in pure symbolic language as is done in modern set theory for wider applications even beyond linguistics.
3.91 DISTINCTION BETWEEN DERIVATION OF WORDS STARTING
FROM WORD-ELEMENTS AND DERIVATION OF COMPLEX
FORMS STARTING FROM WORDS IN THE ĀSTĀDHYĀYĪ

The grammatical procedure adopted in the Āstādhyaṇī may be conveniently divided into two
different processes from the view point of word
analysis and derivation:

1) the derivation of padas 'finished words'
starting from word-elements which also includes
elements to which syntactic meaning is assigned and

2) the derivation of more complex forms starting
from padas already derived.

Excluding the formation of the secondary
verbal bases, the second process is called taddhita
vṛtti and samāsa vṛtti. The first process requires the
ekaraṇa system as an essential part of the derivation of
the forms subanta and tiṇanta. In the karaṇa system, a
grammatical function namely, kartr, karman, etc., is
attributed to the word derived on the basis of
particular formal elements, namely, kṛt- suffixes, case
endings, finite verb endings. The second process also
uses this karaṇa system wherever necessary. However,
its speciality lies in the fact that it requires
finished word or words from which the derivation
starts to be samartṭha 'capable of entering into
meaningful combination with another word.'
3.92 **KAARA KAA SYSTEK AND DOMAINE COVERE BY SAMARTHA**

**OF DERIVESION PROCEDURE**

The term *samartha* lays down the basic semantic condition for the word derivation procedure. Thus, it is clear that the *kaara* system and the domain governed by the condition *samartha* deal with different aspects of derivational procedure. The *kaara* system makes clear the syntactic properties belonging to the *krt*-suffixes, case endings and finite verb suffixes and thus enters into the derivation of primary words. *kaara* system never assigns such properties to *taddhita*-suffixes or compound-bases. On the other hand, the *samartha* condition is confined to semantic relationships between units of a higher order which requires to be integrated.

3.93 **ABSENCE OF EVIDENCE TO INFER THAT KRT SECTION ON ONE HAND AND TADDHITA AND SAMASA SECTIONS ON THE OTHER STEM FROM THE WORKS OF THE SAME AUTHOR**

The *krt* suffixes are introduced in the general syntactic sense *kaart* (P.3.4.67). If special syntactic meanings are to be indicated, special *kaara* designation are used, such as, *kara* and *adhikara* (P.3..17), *karman* (P.3.4.70), *sampradana* (P.34.73), *apadana* (P.3.4.74). These designations are not used in the *taddhita* section. In the *taddhita* section, the meanings in which the suffix is prescribed is generally
stated by means of a phrase, which, in addition to indicating the grammatical meaning, specifies a categorical lexical meaning. For example, *tad adhite tad veda* (P.4.2.59) *tasmai hitam* (P.5.1.5), *tena kṛtam* (P.5.1.37).

In the *samsāsa*-section, to indicate the meaning in which a compound is to be derived, two types of meanings are used, namely, a general lexical meaning for the compound as a whole, and a specified *samartha*-relation which holds between the compound constituents. Panini also uses classes of meaning to select compound constituents. In this way, he can dispense with the enumeration of single eligible constituents. For example, *nadibhiḥ* (P.2.1.20) *kālaḥ* (P.2.1.28), *catuspadah* (P.2.1.71) etc. Examples of the general lexical meaning for the compound as a whole are *dvitiyā* (P.2.1.24), *tritiyā* (P.2.1.30) etc. In the *samsāsa* section the use of *kāraka*-designations is very rare; the only examples being P.2.2.14-16. Here these designations are used to specify the grammatical function of a compound constituent which is about to enter into a compound with a krd-derivative, and with which a compound formation is not permitted. Thus, it may be said that in the taddhita section, to indicate the specified *samātha* relation, *kāraka* names are avoided, whereas *vibhakti* names are used. For example, Pāṇini does not say *spādānam bhavena* (see P.2.1.37), but uses the term *pañcamī*. On the other hand, in the
section dealing with kṛt-formation, the use of kāraka-designations is common whereas that of vibhakti-designations is avoided. From the phrasing of the rules in the kṛt section on the one hand and taddhita- and saṃśāsa-sections on the other, one can conclude that there is no evidence to infer that these necessarily stem from the same author.

3.94 INCONSISTENCIES ARISING OUT OF LATER ADDITIONS OF AŚṬĀDHYĀYĪ OF TADDHITA AND SAMĀSA SECTIONS

Joshi and Roodbergen have discussed in detail the (i) inconsistencies which arise from the disturbance of anuvṛtti procedure, (ii) break of logical order due to the introduction of unrelated topics (iii) inconsistency in the use of anubandha, (iv) internal contradiction, (v) discrepancy regarding phrasings (vi) discrepancy regarding the way in which words are analysed into stems and suffixes (vii) discrepancies regarding the way meaning is indicated, (viii) discrepancy regarding the use of nipatana rules, (ix) discrepancy regarding the distribution of chandas-rules, and discrepancy regarding the use of gaṇas in the Aśṭādhvāyī. Joshi and Roodbergen conclude that Pāṇini being a system builder, could not allow major inconsistencies at any rate to arise in his grammar. Though it is generally assumed that Panini has borrowed individual rules from his predecessors, he would not go to the extent that he borrowed rules clashed with the system he had in mind. There is some evidence to say
that in such cases, Panini reworded the rule in question so as to make it fit in. Keeping other's rules which show major inconsistencies with the rest of his grammar would be out of character with Pāṇini’s accuracy and consistency shown elsewhere, besides these make him a bad theoretician and destroyer of his own system. Thus it is claimed that the taddhita-system. Thus it is claimed that the taddhita- and samāsa-sections have been added to the Aṣṭādhyāyī at some later date by others. They suggest a major surgery to the present text of Aṣṭādhyāyī.

3.95 **PĀṆINI AS DIFFERING FROM HIS PREDECESSOR’S SYSTEMS IN RESPECT OF TERMINOLOGY CLASSIFICATION OF GRAMMATICAL UNITS AND VIEWPOINT ON CERTAIN GRAMMATICAL OPERATIONS**

We find there are terms generally adopted by several grammarians later to Pāṇini in preference to the more artificial terms used by Pāṇini. It is possible that such terms used by the later grammarians belong to pre-Paninian schools. Kātyāyana’s preference to such terms appears to indicate his training in a school which retained some of the pre-Pāṇinian traditions. The difference between Pāṇini and the pre-Pāṇinians are found in respect of terminology employed, classification of grammatical units, and the way certain grammatical operations are viewed. For example, Pāṇini employs upasārāṇa (P.4.1.14), vy全家 (P.1.2.65), antarangā for apradāhāna, gotra and
pratvanga of earlier grammarians. Kātyāyana who is later to Pāṇini employs the term svara for Panini's ac, vyanjanā for hal, samānākṣaṇa for ak, sandhyākṣaṇa for ec, sparta and aghosa. He also uses prathamā, dvitīyā tṛtīyā and caturthā for the first, second, third and the fourth consonants of the fivevargag. He also uses ayogavāha, jihvamutiva and upadhmaniya. For lat, lūtt, lūv and lūn, he employs bhavati svastani, bhavisvanti and ādvanti.

Before words were clarified in four groups, nāma, ākhvāta, upasarga and nipāta as evident from fourfold distinction of Yāska. Pāṇini prefers only two fold distinction, nama which he terms 'subanta' and ākhvāta which he terms stubanta, even though all the four groups are present in his grammar, avyaya being considered as a sub type under subanta an avyaya subsuming upasarga and nipāta.

Again, compounds were earlier classified into four classes and given meanings according to which member of the compound, is the principal one. Though Pāṇini employs the same four classes for the description of compounds, these classes are not semantically defined by him. They are formal classes to which a derived compound is mechanically assigned on formal grounds without reference to the meaning of the principal member of that compound. Again, before Pāṇini's time, metrical composition was favoured for grammatical works. Some of Pāṇini's sūtras are
resonants of his style. For example, P.8.4.67: nodattasvaritodayam, P.1.4.100 tananavatmanepdam, P.1.1.45 igvanah tambrasaranam and P.1.2.46 kyttaddhitasamasaśca. These sūtras are reminders of the anustubh style and is likely to have been incorporated by Pāṇini into his grammar from earlier grammars in verse form. It appears to have been a concept known in the grammatical tradition prior to Panini, by the name of anubandha, for which Pāṇini seems to have coined the short symbol. Pāṇini has also made use of some of the technical terms of his predecessors.

3.96 APAVĀDA AS COUNTERING AN UTSARGA BY PROVIDING ANOTHER POSITIVE OPERATION AND NIŚEDHA AS COUNTERING A VIDHI BY CANCELLING ITS OPERATION

Pāṇini’s description is based on the principle of generalization. Thus, grammatical operations are distinguished as gāmānya ‘general’ and viśeṣa ‘particular’ or those which apply in a general domain and those which apply in a particular domain. Thus a distinction is made between utsargā ‘general rule’ and its apavāda ‘countering rule’. A given apavāda rule is said to cancel or block in its domain the utsargā with which it is related.

Related to utsargāpavāda principle, is the notion of vidhi ‘provision’ and niśedha ‘cancellation’, vidhi operating in a general domain and niśedha in a particular domain. The relation obtaining between vidhi and niśedha is parallel to the relation between
utsarga and apavāda. Apavāda counters an utsarga by providing another positive operation whereas a niśedha counters a vidhi by cancelling its operation.

3.97 VIDHI RULES AS FOR ACHIEVING TARGET STRUCTURE WHICH ARE DEFINED AND SPECIFIED BY ADHIKĀRA RULES DELIMITING THEIR DOMAIN OF OPERATION

Adhikāra sūtras define and specify the target structure for the vidhi sutras and thereby delimit the domain of their operation, while ivdhi sūtras are those whose application under specified conditions results in the target structures.

3.98 PRECEDENCE OF AFFIXATION AND AUGMENTATION RULES OVER SOUND REPLACEMENT RULES

There is another distinction involving the property of nityatva in Pāṇinian parlance of the two rules A and B which can both apply concurrently, A is called nitya with respect to B which is anitya if A can still apply after B has applied, while B cannot apply once A has taken effect. From nityatva principle follows the principle that affixation takes precedence over sound replacement (P.3.1.77 and P.7.3.86) and augment precedes the application of sound replacement (P.3.4.92 and P.6.4.107).
3.99 DISTINCTION BETWEEN OPERATIONS WHOSE CONDITIONS ARE

A distinction is made by Panini between operations which are antaranga whose conditions are internal or proximate and those which are bahiranga whose conditions are external and remote. The relation between these can be expressed as: Given a rule A such that its appropriate domain of operation is prior to or contained within the appropriate domain of operation for another rule B, then the rule A is antaranga in relation to rule B, and the rule B is bahiranga in relation to the rule A. By the paribhāsa 50: asiddham bahirangam antarange, it is stated that in the event of a conflict between the two, then an antaranga rule supersedes the bahiranga rule and the operations enjoined by an antarange rule takes precedence over the operations enjoined by a bahiranga rule. However, there is an exception given in paribhāsa 52: antarangenāpi vidhin bahirango bugbhādhate which states that a bahiranga rule whose operation results in the luk deletion of an item takes precedence over the operation of a rule that is antaranga in relation to it.
3.100 **FOUR-FOLD RESOLUTION OF CONFLICT IN APPLICATION OF RULES**

Thus in Pāṇini’s grammatical theory construction, four principles are pressed into action to resolve the conflict in the application of rules, namely, the (1) the principle of paratva by which a succeeding rule sets aside the operation of a prior one, (2) the principle of nitvatva by which the operation of a nitva rule, (3) the principle of antarangatva by which an antaranga rule is declared to supersede a bahiranga rule and (4) the principle of utsargāpavāda which provides for the operation of apavāda debarring the operation of utsarga.

3.101 **OPERATION OF ASIDDHATVA PRINCIPLE**

In addition to these four principles, Pāṇini’s grammar invokes the principle of asiddhatva ‘non-effectiveness’. For the purpose of this principle, the Astādhyāyī is considered in two parts, the first part comprising seven and one-fourth quarters from the beginning, and the second part comprising the remaining three quarters. By the sutra P.8.2.1 pūrvatrasiddham, Pāṇini declares that with regard to whatever has been said in the first part of his grammar, the operations provided in the rules of the second part are considered as having no effect. It is further interpreted to mean that within the second part too, operations given in a later rule will be treated as having no effect on the
operations stated in an earlier rule. However, the rules of interpretation counted in the previous part will apply to this part also because such rules cannot be considered prior. Though the vipraṭiṣedha rule does not apply in these portions, an apavāda rule even here does override an utsarga rule since otherwise the enunciation of an apavāda rule would be useless and thus an apavāda rule is not considered asiddha. Thus, the utsarga rule P.8.2.31 is set aside by the apavāda rule P.8.2.32.

3.102 RULE ABBREVIATION PRINCIPLE

Another important principle, used by Pāṇini in the grammatical theory construction is the rule-abbreviation principle to achieve economy in his description P.6.1.77 iko vaṇ aci is a good example of rule abbreviation, which includes four individual rules with the help of pratyāhāras. The economy achieved can be fully grasped when Pāṇini’s description is compared with other systems. For example, the Kātantra grammar uses four sūtras 35. e ay, 36. ai ay, 37. o. av, 38. au av for Pāṇini’s one sūtra P.6.1.77.
In modern linguistic analysis, five kinds of morphological processes are distinguished, namely, (1) affixation (2) internal change (3) reduplication (4) suppletion and (5) zero modification in order to distinguish the constituent words of a paradigm from one another. It appears that Pāṇini recognises only affixation as a derivational process in his analysis of Sanskrit although we may notice all these five processes in Pāṇini's grammar. The other four are treated as consequences of the affixing processes.

3.104 SENTENCE AS THE MINIMUM FREE-FORM IN PANINI’S SYSTEM

Ananthanarayana claims that the minimum free form according to Panini’s analysis of Sanskrit is pada which is defined in formal terms as subanta if it ends in one set of terminations and tihanta if it ends in another set. As a pada cannot be formed unless one starts from a sentence-meaning in one’s mind in Pāṇini’s approach, it is only the sentence which can be considered as the minimum free form in Pāṇini’s system.
3.105 **Pāṇini as Classifying Verb-Roots Formally, Syntactically and Semantically**

Pāṇini classifies verb roots formally, syntactically and semantically. The formal aspect is seen in the classification of roots into those with the adding of ātmanepada affixes and those with the adding of parśmaipada affixes. The semantic criterion is also employed in the choice of affixes. When it has to denote an action or an object (P.3.1.13) the ātmanepada affixes are added to roots. In denoting the agent when reciprocity of action is to be expressed, the affixes of ātmanepada are employed (P.1.3.14). Syntactic consideration has been used in the choice of affixes with verbs which take the words itaretara 'each other' and anyonya 'one another' as upapada 'complement' do not take ātmanepada affixes verb roots are classified on the basis of nominals with which they collocate in a syntactic expression.

3.106 **Pāṇini's Use of Nominal Sentences in Gramatical Theory Construction**

Pāṇini's syntax has its influence the way he forms his sūtras. One type of sentence which is commonly employed in defining the technical terms by Pāṇini is equational. In this equational pattern, we have two nominals, one which may be termed the topic and the other as making a comment on the topic. The topic or the definition is placed first followed by the
topic or the defined. For example, the gṛutra P.1.1.9 introduces the term savarnam 'homogeneous sound' and its definition is provided by the word tulyasyaprayatnam 'sharing in common the same place and manner of articulation' where there is an equation between the two nominals in the construction. In other words Panini has preferred nominal sentences for his grammatical theory construction, similar to those which are used in Nyāya. It may be inferred that Panini reduces his rules to single-role equational form because he did not want the complexities of the usual sentence with multi role karaka relations to appear in his rules which hinders the equational form. It may be observed that knowledge is best stored in equational form as evidenced by its wide spread use in mathematics and science.

3.107 LIMITATIONS OF STATIC FORMAL AXIOMATIC SYSTEMS

Paṇini's Āṣṭādhyāyī may be considered as axiomatic in its approach to linguistics in the sense that from a set of axioms which are accepted as valid, other valid non-axiomatic inferences are deduced as a theorem in conformity with the accepted rules of reasoning. Thus, instead of stating each and every fact of language as separate rules, general rules are formed, as in mathematical formulae, from which any number of particular cases can be attested.
At one time, Bertrand Russell's 'Principia Mathematica' almost claimed that every language can be derived as a particular case of mathematical set theory. However, the astonishing discovery by Kurt Godel of a theorem shook the foundation of mathematics and the claim that any language is a particular case of set theory.

Godel's theorem is universally applicable to systems and Panini's Astādhyāyī is no exception since Panini's grammatical theory is based on a few axiomatic rules and rules of inference such that these axiomatic rules and rules of inferences are sufficient to decide all propositions or theorems of the Astādhyāyī. Godel's theorem contradicts the above by stating that in any formal system there are relatively simple problems which cannot be decided from the axioms. From the above, it may be concluded, that not only Astādhyāyī but any system of grammar any one can come up with in the future, will be able to account for complete modelling of Sanskrit. Using finite number of rules in the Astādhyāyī, it will not be possible to account for each and every one of the infinite number of forms that can be generated by Astādhyāyī's rules. Thus, we have to adopt an organic model which can continually grow like a living organism and not a static set of rules. We will have to go on adding new rules without causing inconsistency to the system but accounting for items not attested by the Astādhyāyī.
There are many arguments on the levels assumed to have been recognised by Pāṇini in his grammatical system. Cardona holds¹ that Pāṇini’s kāraka classifications serve as intermediaries between grammatical expressions and their semantics. Kiparsky and Staal² operate with four levels, namely, semantic representation, deep structure, surface structure and phonologic representation. As opposed to Cardona, Kiparsky and Staal, A.C.Sinha³ claims that kāraka categorizations do not constitute a separate level and that kāraka categories are purely semantic. This aspect of Panini’s system cannot be clearly stated by clear distinctions of levels. On the other hand, kāraka context reminds the parallel in Gottlob Frege’s functional relation between concepts of sense and reference. Two entities may have different senses but same reference. For example, in the expression ‘morning star is the evening star’, both ‘morning star’ and ‘evening star’ refer to the same reference, namely, the planet Venus. But the expression reveals the new empirical truth which is nothing but that Venus has two senses or modes of expression as ‘morning star’ and ‘evening star’. Kārakas express different ‘senses’ in Frege’s terminology as equated to the appropriate references, namely, the concerned direct participant of action. Thus, the problem of levels is best resolved by claiming that kāraka’s are Fregean functions.
A technical term denoting the concept of voice is absent in Panini’s grammar. The terms ātmaneśpada and parasmaipada represent in Panini’s grammar two sets of verbal endings added to a root in the sense of either kārtṛ ‘agent’ or karman ‘grammatical object’ or bhāva ‘impersonal action or state’. From the common function assigned to them, it is evident that ātmaneśpada and parasmaipada are not syntactically distinguished from each other. The primary opposition between active and passive voice is based on syntactic difference. While the active endings denote the agent, the passive endings denote the grammatical object. In Sanskrit the active meaning is expressed by both the ātmaneśpada and the parasmaipada whereas the passive meaning is expressed only by the ātmaneśpada. Thus, the distinction between the passive and active cannot be stated to correspond to ātmaneśpada and parasmaipada. All the same, the division of finite verb endings and the participle endings into these two sets, which is formal must have some functional distinction at its basis. Panini, however, offers only enumerative definition of both these terms implying thereby that the semantic distinction is not grammatically relevant. Yet, as these terms themselves are semantically significant and pre-Pāṇinian as evidenced by P..3.7 vaikaranakhya.
"terms of grammarians" implying the earlier existence of these terms, they must have originally implied some semantic distinction.

3.109  **MENTIONING OF VERBAL ROOTS BY SUFFIXES IK AND STIP, IN PURE FORM, WITH A THEMATIC, WITH CODE-LETTERS AND WITH SPECIAL FORMS**

Throughout the *Aṣṭādhyāyī*, we see Panini mentioning verbal roots in connection with various grammatical operations. There is no single criterion followed in the naming of verbal roots by Pāṇini. Sometimes, Pāṇini mentions in their pure form, sometimes with a thematic a, still other times with a particular anubandha letter affixed. Panini is silent as regards his principles of naming the roots. However, Katyayana has observed two such ways in the *Vārttika* : **ikstipau dhātunirdeśe** under the rule P.3.3.108 **rogaḥkhyayām nyul bahulam** which means that the suffixes *ik* and *stip* taught under P.3.3.108 are used to mention a root. In addition to these two devices which involve use of a suffix and which are very frequent in the *Aṣṭādhyāyī*, some other devices are also used. These devices are : (1) mentioning of roots in their pure form (2) mentioning the roots with a thematic a (3) mentioning roots with the code-letters used in the dhatupatha (4) mentioning with atva, that is, using a vowel a for the final diphthongs of a root (5) mentioning with some special form.
It seems that historically thenaming with *ik* originated in those roots which had nominal derivatives in *i*, while naming with *stip* is common in the *Nighantu*. In addition to the above ways, roots have been mentioned in their pure form in the *pratisākhyas*. It may be that due to the composite structure of the *Aṣṭādhyāyī*, Panini has not adhered to *ik* and *stip* only.

3.110 **USE OF GRAMMATICAL NUMBER IN GRAMMATICAL FUNCTIONS**

Language consists of words which are mostly names of certain objects, qualities or acts. Often, we are required to use a name for a single thing or for many things. Some provision is required in the language for this differentiation of 'one' and 'many', by means of a suffix or a special form. This much is clear about the object language. But with meta-language, we have to do not with things proper, but with nominal forms or word-forms used to denote these things. This is told by *Paṇini* in P.1.1.68 *svam rupam sabdsvāsabdasamjñā* 'in grammar a word expresses its own form with exception of a word which is a grammatical technical term'. This word-form or nominal form is a single notion and therefore, that a singular should be used to denote the notion of a word-form. Thus in the *Aṣṭādhyāyī*, we find *sūtras* of this type: agner dhak (P.4.2.33) etc.
All the same, we face rules where single word-forms are mentioned in plural: kālāḥ (P.2.1.28) etc. Commentators explain this use of plural saying bahuvacana nirdeśaḥ svarupavidhiniragartah ‘mention in plural is for ruling our the application of the rule only to its word-form, that is, the rule is applicable to other word-forms, for instance, those possessing that meaning etc.’ But this explanation of commentators contradicts the principle given in P.1.1.68. Gokhale has studied78 as to how far this principle of number is applied in the Astādhyāyī and has come to the conclusion that we cannot divide sūtras into two such clear-cut groups. Se claims that there is sort of hierarchy of the applicability of sūtras; the principle ofP.1.1.68 occupying the top most position. Then come the sūtras where the principle is violated. Here the words stand for their meaning and obviously include other words in addition to the one stated in the sūtra. This portion of the hierarchy can be divided into two parts: the upper part and the lower part. Because the number of sūtras with single words in plural is considerably larger than the number of sūtras with single words in singular, so in the upper part we can place the single words in plural.

The lower part will constitute those mentioned in singular. Next to them in the hierarchy can be located the words with some definite scope depending upon the actual usage and at the bottom are the words
mentioned in plural after an imitation from the object language. Here they stand for their form. As far as the cardinal numbers are concerned, although they are declined in plural and in dual in the object language, in the meta-language, we observe a dichotomy of declension depending upon the nature of denotation, namely, of form and meaning.

Thus in the Astādhyāyī, the plural number has been used to do various functions. It either regulates the meanings of the word or it extends it or shows some hidden sense of the word, in which sense alone the rule should take effect. In order to derive the correct meaning from sūtras in the Astādhyāyī, one has to adopt both types of approaches, sometimes formal, sometimes lexical depending upon the actual usage of forms.