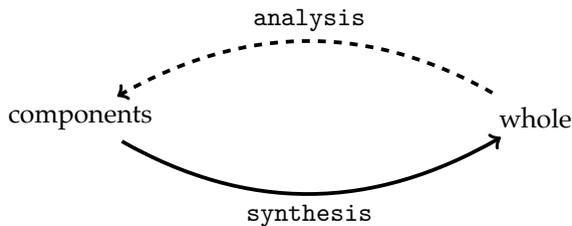


Chapter 2

System

One of the prime goals pursued by the ancillary disciplines associated with the Vedas is retention of a given phenomenon.¹ By a given phenomenon, I mean any existing linguistic or cultural practice established over a number of generations. It is something which one has received as the standard and would like to protect it and pass it on to the next generation—for example, the recitation of the Vedic *mantras*, performance of rituals or linguistic usage.

In order to achieve the goal of retention, these disciplines also follow a common systematic approach which consists of two interdependent and complementary processes. The first one is *analysis* of a given whole into constituent components. The other one is *synthesis* through (rule based) combination of components to regain the given whole.



For example, the continuous recitation (*saṃhitā-pāṭha*) is analyzed into a word-for-word recitation (*pada-pāṭha*) and the Prātiśākhya texts provide a rule based synthesis from word-for-word recitation to the continuous recitation. Similarly, the Śulbasūtras provide the rules for preparing the ritual

¹ The six ancillary disciplines associated with the Vedas are said to be phonetics (*Śikṣā*), prosody (*Chandas*), etymology (*Nirukta*), grammar (*Vyākaraṇa*), instructions on ritual practices (*Kalpa*) and astronomy (*Jyotiṣa*) (Gonda 1975 p. 34). For a summary of the literature on phonetics and grammar, see (Scharfe 1977), on ritual practices (Gonda 1977) and for astronomy (Pingree 1981).

altar. The building blocks of the geometrical figures (squares, rectangles, triangles etc.) are gained through the process of analysis. Similarly, once the individual steps of a particular ritual are identified, these are arranged in the Śrautasūtras and one can re-constitute the ritual by following the rules mentioned there.

This apparently cyclical exercise comprehends a given phenomenon in a systematic manner and gives rise to an interconnected *structure* of components. Such structures have the tendency to last longer and are explained on the basis of the underlying *system*. Moreover, structures facilitate variations and change.

In section A.1 of the appendix, I have worked out a few examples to show the details of these processes of analysis and synthesis. In this chapter, we will focus on the special case of linguistic expressions and the grammatical cycle.

2.1 The grammatical cycle: analysis and synthesis

There is a consensus among Sanskrit grammarians, both ancient and modern, that grammar involves primarily an analysis of a given linguistic expression into its constituent components. Analysis follows the process of concurrent presence (*anvaya*) and concurrent absence (*vyatireka*).² The process of analysis is called *anvākhyāna* and it has two stages:

1. *Vākyavibhajyānvākhyāna* is analysis of sentences (*vākya*) and identifying its component words (*padas*). For example, analysis of the continuous recitation of a Vedic *mantra* or a Sanskrit sentence into constituent words.
2. *Padavibhajyānvākhyāna* is further analysis of individual *padas* in its constituents. This stage of analysis yields more granular components.³

For example, the following sentence having two *padas* :

² The term *vyākaraṇa* for grammar, whose etymological meaning is analysis, reflects these processes. It is used in the sense of separation of things in (ŚB. 1.7.1.4) and (KŚS. 4.2.7-9), in the sense of discrimination between something, for example, between *satya* and *anṛta* as in (VS. 19.77), as something which was previously one single entity, that was not previously differentiated, becoming or being made differentiated in (BU. 1.4.7), or it can also signify the act of dividing, e.g. in (ŚB. 3.3.1.13) and finally in the sense of making something clear in (YSB. 3.17) or Vyāsabhāṣya on (YS. 3.17). George Cardona (1999 p. 564-576) provides a detailed exposition on the etymology and uses of *vyākaraṇa* as well as other expressions for grammar.

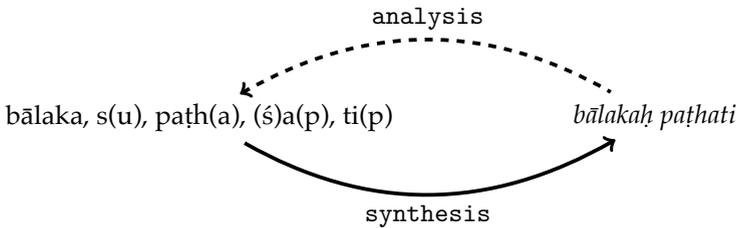
³ R. S. Bhattacharya (1966 p. 212-237) discusses these processes in detail. See also (S. D. Joshi 1968 p. xi).

bālakahaḥ paṭhāti (a boy recites)

is analyzed into constituent components such as:

bālaka, s(u), paṭh(a), (ś)a(p), ti(p).

The rules of grammar, however, establish a correlation between the analyzed components with the given linguistic expression. This is achieved by combining the components in a controlled manner to obtain the linguistic expressions. The grammatical system therefore not only undertakes an analysis of a given whole into components, but also consists of the complementary process of synthesis of the analyzed components to regain the original expression. This, in a way, is a cyclical exercise.



A given linguistic expression is first analyzed into constituent components and then re-gained by combining the components.

The process of synthesis is rule based. Rules lay down the constraints regarding the choices and manner in which the components should be combined. They prevent haphazard and unrestrained combinations and endorse the claim of the grammarians that the components *are* constituents of the original expression. The choice of components is vindicated by successful connection between them and the original expression.

In contrast to the rule-based nature of synthesis, there are no rules that bring about analysis of a given expression into constituent components.⁴ The components, however, are chosen in a manner so that they lead to the original expression once combined according to the rules of synthesis. The constituent components are stipulated by the grammarians for the purpose of grammar and exist within the grammatical system. They are not found in common usage and are, so to say, imaginary (*kālpānika*) i.e. improvised by the grammarians for their employment within the grammatical system.⁵

⁴ There are a few exceptions in the Prātiśākhya texts where such an attempt is made. See section A.1.3.

⁵ The grammatical components exist in the grammatical system (*śāstra*) only and not in the common usage (*loka*). Further, they are not established on the basis of usage (*lokataḥ siddha*) (R. S. Bhattacarya 1966 p. 213-214). Nāgeśa Bhaṭṭa in his *Vaiyākaraṇa-siddhānta-parama-laghu-mañjūṣā* remarks the imaginary nature of the components that are improvised by the teachers and employed only within the grammatical system (K.D. Shastri 1975 p. 7).

Moreover, the grammatical components are dependent on their parent expressions. This would be evident through an example Vyāsa provides in his commentary on *Yogasūtra* (3.17). The point he is noting there is that it is important to analyze the individual words further in order to determine, whether a word like *bhavati*, *aśvaḥ* or *ajāpayah* denotes an act or a *kāraka*.⁶ Here, *bhavati* can be either vocative singular feminine of the respectful pronoun *bhavatu*, and in this case consisting of the components *bhavatī-s(u)*,⁷ or third person singular of the present form with components *bhū-(ś)a(p)-ti(p)*. Similarly, *aśvaḥ* can have *aśva-s(u)* meaning “a horse”, or second person singular aorist form with *śvi-a(ñ)-si(p)* meaning “reached” and *ajāpayah* referring to an object (goat’s milk) has *ajāpayas-am* or the second person singular imperfect causative verb form of *ji* having *ajāp-i-a-s*. These examples show that the components are dependent on the parent expression or the given whole. If the given whole signifies an act, then the components are different from when it denotes a *kāraka*.

Not only are these components imaginary and dependent on their parent whole, they are also not unique. In other words, there may be more than one analysis of the same original expression depending upon the grammatical tradition. As an example, consider the expression *avati* (leads, brings to) which is derived using the root *av* according to the grammar of Whitney (1885 p. 4), but the root *u(ñ)* according to the Pāṇinian system. This implies that there can be more than one grammar of the same language.

The process of synthesis is provided through the rules of the *Aṣṭādhyāyī*. Without entering into the details of derivations, it suffices here to mention that the components are combined to create the given whole.⁸ Apart from that, the rules of grammar may also change depending upon the standard usage which they are supposed to account for.

Although the stipulated components are *non-real*—in that they come into existence through the grammarians and exist within the realm of grammar—this is not the case with the given linguistic expressions themselves. They are established (*siddha*) on the basis of their abiding usage among people.⁹

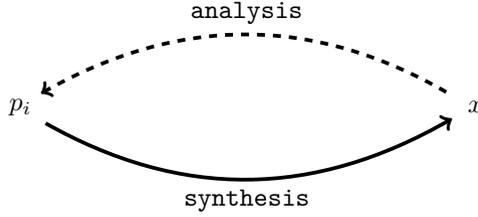
⁶ The word *kāraka* literally means “doer of an action” and in grammar used in a technical sense as “instrument of action” (Abhyankar 1986 p. 118). There are six *kāraḥ*. For details see (Cardona 1974 p. 231-306).

⁷ An example भवति भिक्षान्देहि comes in the commentaries to *Pāraskaragr̥hyasūtra* (2.5.2-4) and *Manusmṛti* (2.49).

⁸ S. D. Joshi (1968 p. ix-xi) notes this complementary character of the analysis (*vibhajya anvākyāna*) and synthesis, combination or integration (*vṛtti*).

⁹ R. S. Bhattacarya (1966 p. 228-237) summarizes by noting that the constituent components of a Sanskrit expression are non-real (*kālpānīka*), the rules of grammar (*upāya*) are not uniquely fixed (*anīyata*), but the linguistic expressions (*upeya*) are established (*siddha*).

Thus, the grammatical system as a whole consists of the complementary processes of analysis and synthesis. Any given standard linguistic expression (henceforth represented by the symbol x) is analyzed in constituent components (henceforth p_i). Aṣṭādhyāyī is a collection of the constituent components p_i together with the rules of synthesis. One can represent this cyclical process schematically as follows:



2.1.1 Why grammar?

A pertinent question arises here: Why should this cyclical procedure be undertaken at all? If grammatical processes involve regaining the original expression after one has analyzed it into components, then what is the use of such an exercise? In other words, what purposes are served by developing such a system?

The passages in the Paspasāhnika—both the Vārttika of Kātyāyana and the Bhāṣya by Patañjali—are explicit as to the purposes of grammar. Kātyāyana enumerates five:

- (i) *rakṣā* or safeguarding the Vedic texts as well as standard usage of the language (ii) *ūha* or suitable adaptation and modification of a *mantra* according to the requirements of a particular ritual (iii) *āgama* or complying with Vedic injunctions (iv) *laghu* or economy of effort and (v) *asaṁdeha* or absence of doubt as to the standard expressions are the purpose.¹⁰

The above enumeration of Kātyāyana and further explanations of Patañjali point out that the main purpose of developing the grammatical system is to safeguard the standard usage and effectuate acceptable modifications.

Both the non-Vedic common usage (*laukika*), as well as Vedic corpus, are sought to be preserved by the grammar. The Vedic corpus is a clearly delineated collection, and as to common usage, Pāṇinīyas recognize certain model speakers (the *śiṣṭas*) who set the standards. Patañjali in his Mahābhāṣya on 6.3.109 provides several characteristics of the model speakers on

¹⁰ रक्षोहागमलघ्वसन्देहाः प्रयोजनम्। (PV. 2).

the basis of their knowledge of the grammar as well as their dwelling place and behavior.

These model speakers are *brāhmaṇas* who dwell in the country of the *āryas* where alone their exemplary behavior is found. The *brāhmaṇas* who dwell in this abode of the *āryas* and have only as much grain as they can carry in a small pot, are not greedy for honor, following established rules of correct behavior without having to be given any immediate cause for this, and who have attained total expertise in some traditional area of learning without explicit instruction, these honorable ones are the *śiṣṭas*.¹¹

What is meant by correct speech or standard linguistic expressions, is the way these model speakers would speak.

The next question is how to safeguard standard usage. Patañjali's search for an answer to this question sheds important light on the nature of the grammatical method. The discussion on this point is in (PB. 46-55) and can be summarized as follows.¹²

One obvious way to retain the standard speech forms would be either to exhaustively specify them by uttering them one after another, or to stipulate the complementary set of non-standard forms. Both these options are to be discarded. It may be possible to retain a limited collection of utterances (as in case of the Vedic Saṃhitās) but impossible for the set of expressions of common speech as it is too large.¹³ Patañjali finally suggests providing a description of this big collection of standard expressions by pointing out their general and special characteristics and recording them in a systematic manner. His advice for attaining this is by putting constraints (*niyama*) that can distinguish between standard and non-standard speech.

In order to understand the concept of constraint or *niyama*, it is necessary to look into an important aspect regarding the nature of a linguistic expression, namely the distinction between its form and content. In Paśāhnikā (PB. 4-12) Patañjali looks into several suggestions regarding the exact nature of an expression like *gauḥ* (a cow). He mentions and rejects *gauḥ* to be substance (*dravya*), action (*kriyā*), quality (*guṇa*) and generic property (*ākṛti*).¹⁴ Finally, he characterizes expressions like *gauḥ* to be "that, which when uttered brings forth an understanding of an object with dewlap, tail,

¹¹ एवं तर्हि निवासत आचारतश्च। स चाचार आर्यावर्त्त एव ... एतस्मिन्नार्यनिवासे ये ब्राह्मणाः कुम्भीधान्या अलोलुपा अगृह्य-
माणकारणाः किञ्चिदन्तरेण कस्याश्चिद्विद्यायाः पारगास्तत्रभवन्तः शिष्टाः। (Transl. Cardona 1997 p. 552). For a detailed discussion about the *śiṣṭas*, see also (Aklujkar 2004 p. 713-717).

¹² For details see (Joshi and Roodbergen 1986 p. 70-78).

¹³ Patañjali tells here the story of Bṛhaspati and Indra who started in this manner and gave up owing to the large numbers. If it was impossible for the divine beings, then even more so for the mortal human beings, see (P. 50-51) (Joshi and Roodbergen 1986 p. 74-75).

¹⁴ See (Joshi and Roodbergen 1986 p. 12-17) and (Ganeri 1995 p. 4-10).

hump, hoofs and horns".¹⁵ This definition by Patañjali points towards an important distinction between the form and content of any linguistic expression.

The form of an expression is its phonetic part, which is uttered and which, when heard, produces an understanding of its content or meaning.

Pāṇini and the Pāṇinīyas distinguish between the form of an expression and its content. The term commonly used for the form is *rūpa* and for the content or meaning, *artha* is employed.¹⁶ The distinction between the phonetic form of a grammatical component and its content is explicitly stated in the rule: *svaṃ rūpaṃ śabdasyāśābdasamjñā*¹⁷. Here, Pāṇini specifies that "[A] word (in a grammatical rule) which is not a technical term denotes its own form".¹⁸ For example, if a component like *agni* is mentioned in the grammar, the grammatical operations are applied only to the own form (*svaṃ rūpaṃ*) of *agni*, namely the phoneme strings / *agni* / and neither to the actual thing meant by it, nor to any other linguistic form, like *pāvaka*, that can be used for the thing meant. This is not the case for technical terms occurring in grammar. The operations are applied not on the phonetic form of the terms themselves, but on the actual constituent components for which they stand. For example, a mention of *niṣṭhā* implies the components (k)ta and (k)tavat(u).¹⁹ In a rule like *sphāyāḥ sphī niṣṭhāyām*²⁰ where the substitution is to be applied on the condition that *niṣṭhā* follows, what is meant is that if the suffixes (k)ta or (k)tavat(u) follow and not the phoneme string / *niṣṭhā* /.

Similarly, in the rule: *sarūpāṇamekaśeṣa ekavibhaktau*²¹ Pāṇini provides for the remainder of only one among those which have the same form. As explained in *Kāśīkāvṛtti*, it is important here to differentiate between the form and its content. The rule applies only when the form is identical, and not when the content is same and form may be different.²²

¹⁵ कस्त्विह शब्दः । येन उच्चारितेन सास्त्रालाङ्गलककुदखुरविषाणिनां सम्प्रत्ययो भवति स शब्दः । (P. 13-14).

¹⁶ The expression *rūpa* in the sense of form is used more than once in *Aṣṭādhyāyī* including 1.1.68, 1.2.64, 2.2.27, 3.1.94, 6.1.94. The expression *artha* for meaning or content is employed more frequently (around 80 times). Some examples are: 2.3.46, 1.1.19, 1.4.19, 1.4.85 etc.

¹⁷ स्वं रूपं शब्दस्याशब्दसंज्ञा ॥ १.१.६८ ॥ ► an expression which is not a technical term denotes its own form.

¹⁸ Transl. John Brough (1951) reprinted in (Staal 1972 p. 403). For a discussion on this rule see (Brough 1951) reprinted in (Staal 1972 p. 402-414), (Scharfe 1971 p. 40) and (Staal 1975 p. 331ff.) and more recently (Scharfe 2009 p. 182-196).

¹⁹ क्तवत् निष्ठा ॥ १.१.२६ ॥ ► (k)ta and (k)tavat(u) are *niṣṭhā*.

²⁰ स्फायः स्फी निष्ठायाम् ॥ ६.१.२२ ॥ ► *sphāy(ī)* is replaced by *sphī* before *niṣṭhā*.

²¹ सरूपाणमेकशेष एकविविभक्तौ ॥ १.२.६४ ॥ ► of those with same form, only one remains, in case of single *vibhakti*.

²² सरूपाणाम् इति किम्? वृक्ष-न्यग्रोधाः । KV on 1.2.64. Why it is stated that "having the same form"? To exclude cases like *Plakṣa* and *Nyagrodha*, which have the same meaning but different form.

In other words, the form of a technical term does not contribute to the formation of intended expression, but only its content, namely the components to which it refers. In the case of a grammatical component, however, both—its form as well as content—become important and any mention of it in the grammatical corpus refers to both. When, however, only content or meaning needs to be stated, then the expression *iti* is used after it to indicate that in this case, not the form but only its content is to be taken into consideration.²³ For example in the rule: *tasminnitinirdiṣṭe pūrvasya*²⁴ the expression *iti* after *tasmin* indicates the locative case meant by it and not the phonetic form / *tasmin* /.

The expression *artha* is used frequently by Pāṇini to denote content or meaning of grammatical elements. One of the conditions for a component to be *prātipadika* or nominal stem is that it should be *arthavat* or “having some meaning”.²⁵ He also employs the expression *artha* when the content of some component is important for grammatical operations. As an example: *matvarthe*²⁶ or *ṛtīyārthe*²⁷ when one wants to express the meaning conveyed by the suffix *mat(u)(p)* or the content of *ṛtīyā*.

How is the form of any expression related to its content? According to Kātyāyana : “there is an established (*siddha*) relation between a linguistic expression (*śabda*) and its meaning (*artha*)”.²⁸ From this, it follows that the relation between the form of any linguistic expression and its content is “established”. Further, the fixed nature of this relation is “on the basis of

Incidentally, the two trees mentioned here *Plakṣa* (*Ficus infectoria*) and *Nyagrodha* (banyan, *Ficus benghalensis* L.) belong to the same family of fig trees, but are not same.

²³ Kāśikāvṛtti on न वेति विभाषा ॥ १.१.४४ ॥ : इतिकरणोऽर्थनिर्देशार्थः । The employment of *iti* is to denote the meaning.

²⁴ तस्मिन्नितिनिर्दिष्टे पूर्वस्य ॥ १.१.६६ ॥ ► locative case indicates that the grammatical operation is to be applied to the immediately preceding component.

²⁵ अर्थवद्धातुरप्रत्ययः प्रातिपदिकम् ॥ १.२.४५ ॥ ► a meaningful component which is not a dhātu and not a pratyaya is *prātipadika*.

²⁶ तसौ मत्वर्थे ॥ १.४.१९ ॥ ► components ending in t or s before a pratyaya and having the meaning of *mat(u)(p)* are called *bha*.

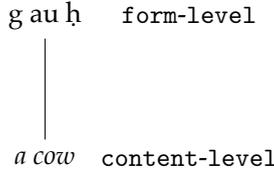
²⁷ तृतीयार्थे ॥ १.४.८५ ॥ ► *anu* is assigned *karmapravacanīya* when it denotes the meaning conveyed by *ṛtīyā*.

²⁸ सिद्धे शब्दार्थसम्बन्धे । (PV. 3). My translation of *siddha* as ‘established’ is to point to the established nature of usage of words in connection with specific meanings. Patañjali discusses the use of the expression *siddha* and suggests that what is meant is *nitya* (permanent or eternal) and clarifies that *nitya* here is not necessarily in the sense of something which is unchangeable (*kūṣṭha*) or immovable (*avicalin*), but rather something that becomes established through continuous repetition (*ābhikṣṇya*) (P. 63-71). He further tries to justify the *nitya* (permanent) character of this relation and sums up by pointing towards the irrelevance of this discussion in the present context of mentioning the purpose and need of grammatical instructions (P. 72-79). For Grammarians’ discussion with the Vaiśeṣikas on the relation between *śabda* and *artha*, see (Houben 1992).

its usage among the people”.²⁹ The point is explained by Patañjali in the following words:

People, in their common usage, after having brought to mind respective meanings, accordingly use linguistic expressions. They do not make any extra effort to make or generate these expressions (from their meanings). On the other hand, they do put in extra effort to make things which are to be produced. For instance, one who needs a pot for some purpose, goes to the house of a potter and says: “You make a pot. I need a pot for some purpose”. One who wants to use linguistic expressions does not go to the house of a grammarian and says: “You make linguistic expressions. I want to use them”. He uses it according to the meaning he wants to express.³⁰

Acknowledging the distinction between the form and content of any expression, I propose it as the basis for differentiating two levels in the grammatical system: the form-level and the content-level. Any linguistic expression like *gauḥ* has some phonetic form / g au ḥ / and content *gauḥ* or *a cow*. This can be depicted as in the following figure.



Here the form-level is depicted above the content-level. The connection between the phonetic form / g au ḥ / and its content *a cow* is established through usage and is represented by the connecting line.

The above observations can be formulated in general terms as follows. Let x be any given linguistic expression. If x^f denotes its form, x^m its content and the continuous straight line the fact that their connection is established through usage, then it can be pictorially represented as in the following figure.



If the relation between a linguistic expression and its meaning is established through usage, i.e. if people are the authority with regard to these, then the

²⁹ लोकतः। (PV. 3) (Joshi and Roodbergen 1986 p. 115-116).

³⁰ यत्लोकेश्चार्थमुपादाय शब्दान्प्रयुञ्जते। न एषां निर्वृत्तौ यत्नं कुर्वन्ति। ये पुनः कार्याः भावाः निर्वृत्तौ तावत्तेषां यत्नः क्रियते। तत्प्रथा। घटेन कार्यं करिष्यन्कुम्भकारकुलं गत्वा आह कुरु घटम्। कार्यमनेन करिष्यामीति। न तद्वत्शब्दान् प्रयोक्ष्यमाणः वैयाकरणकुलं गत्वा आह। कुरु शब्दान्। प्रयोक्ष्ये इति। तावत्येवार्थमुपादाय शब्दान्प्रयुञ्जते। (P. 81). Translation (with minor adaptations) from (Joshi and Roodbergen 1986 p. 115-116) which includes a detailed discussion. See also (Scharf 1995 p. 74) for a slightly variant interpretation.

obvious question arises as to what then is the function of grammar. This is exactly the next question raised by Patañjali :

If the people are the authority with regard to these (i.e. the relation between meaning and the corresponding linguistic expressions), then what is the use of grammar?³¹

Kātyāyana provides an answer by introducing the concept of constraint or *niyama*.

Given that linguistic expressions are employed in accordance with their meaning fixed on the basis of its usage among the people, constraint (*niyama*) is specified through grammatical instructions for the sake of *dharma*. And this is similar to the specifications of the constraints in case of instructions about non-ritual as well as Vedic ritual actions.³²

The general idea can be stated as follows: given a number of possible options, *niyama* is constraint or restriction which can be applied to distinguish and select certain specific options out of the various possibilities.³³ In this context the following examples by Patañjali from both the Vedic as well as non-Vedic realm are illustrative and worth reproducing in full detail.

With regard to common matters (*loka*) it is said that one should not eat tame cock or tame pig. But what is food (*bhakṣya*) is taken to satisfy hunger and following this it could also be possible to satisfy hunger by eating the meat of dog etc. With regard to this, a restriction (*niyama*) is made, namely, this is eatable and this is not eatable.³⁴

Similarly, desire for a woman is because of sexual urge. Satisfaction of sexual urge is possible equally with a woman suitable for intercourse or not. With regard to this, a restriction (*niyama*) is made, namely, this is suitable and this is not suitable.³⁵

In Vedic instructions as well, it is said that a brahmin observes the vow (*vrata*) of living on milk, a *kṣatriya* on gruel and a *vaiśya* on indian cottage cheese (*āmiḥṣā*). A vow however is for the sake of taking food. It is possible to observe the vow by using rice and meat as well. With regard to this, a restriction (*niyama*) is made.³⁶

Similarly, it is said that the post for tying the sacrificial animals should be either of the *bilva* wood or of the *khadira* wood. Such a post is for the sake of tying the sacrificial animals. It is possible to tie the animal with any wooden post, standing or lying. With regard to this, a restriction (*niyama*) is made.³⁷

³¹ यदि तर्हि लोकः एषु प्रमाणं किं शास्त्रेण क्रियते। (P. 82). See also (Joshi and Roodbergen 1986 p. 117).

³² लोकतोऽर्थप्रयुक्ते शब्दप्रयोगे शास्त्रेण धर्मनियमः। यथा लौकिकवैदिकेषु। (PV. 4-5). For a detailed discussion on this topic, see (Aklujkar 2004 p. 687-732).

³³ Paul Thieme (1931 p. 23-32) discusses this point on the basis of the beginning *sūtras* of Vājasaneyi-prātiśākhya.

³⁴ लोके तावत् अभक्ष्यः ग्राम्यकुक्कुटः अभक्ष्यः ग्राम्यशूकरः इति उच्यते। भक्ष्यं च नाम क्षुत्प्रतीघातार्थम् उपादीयते। शक्यं च अनेन श्रमांसादिभिः अपि क्षुत्प्रतिहन्तुम्। तत्र नियमः क्रियते। इदं भक्ष्यम्। इदमभक्ष्यम् इति। (P. 84).

³⁵ तथा खेदात् स्त्रीषु प्रवृत्तिः भवति। समानः च खेदविगमः गम्यायां च अगम्यायां च। तत्र नियमः क्रियते। इयं गम्या इयमगम्या इति। (P. 84).

³⁶ वेदे खलु अपि पयोव्रतः ब्राह्मणः यवाग्नव्रतः राजन्यः आमिक्षाव्रतः वैश्यः इति उच्यते। व्रतं च नाम अभ्यवहारार्थम् उपादीयते। शक्यं च अनेन शालिमांसादीनि अपि व्रतयितुम्। तत्र नियमः क्रियते। (P. 85).

³⁷ तथा बैल्वः खादिरः वा यूपः स्यात् इति उच्यते। यूपः च नाम पश्वनुबन्धार्थम् उपादीयते। शक्यं च अनेन किञ्चिदेव काष्ठम् उच्छ्रित्य अनुच्छ्रित्य वा पशुः अनुबन्धुम्। तत्र नियमः क्रियते। (P. 85).

Similarly, when the potsherds have been put near the fire, the Vedic mantra : *bhrgūnām aṅgirasāṃ gharṁsya tapasā tapyādhvamiti* [be you heated with the heat of the sweat of the Bhṛgu's and the Aṅgirasas] is recited. Even without the formula, the fire, whose nature is to burn, heats the potsherds. And with regard to that, a restriction (*niyama*) is made, namely, when it is being done in this way, it leads to bliss in the form of heaven (*abhyudaya*).³⁸

In the same way here also, when meaning can be understood equally from the standard expressions (*śabda*) and non standard expressions (*apaśabda*), a restriction (*niyama*) is made for *dharma*, namely, that meaning is to be conveyed by standard expressions only and not by non-standard expressions, as usage in this manner leads to bliss in the form of heaven (*abhyudaya*).³⁹

The above quote validates the assertion that the main aim of the ancillary disciplines, including grammar, is to preserve the given standard phenomena. The given phenomena may be the admissible objects for eating, or relationships with others, the way some ritual action is performed, or some linguistic expression is uttered. The systematic approach of these disciplines is not aimed towards generating rule based *constructs*, but to place constraints in order to select some preferable possibilities, from among the several existing options.

For example, in order to express *a cow* several expressions like *gauḥ*, *gāvī*, *gonī*, *gotā*, *gopotalikā* etc. are possible. From among them, only *gauḥ* is according to the usage of model speakers, although as Kaiyaṭa mentions that "in common usage, non-standard expressions (*apaśabda*) are also used and convey the same meaning as the standard expressions (*sādhu-śabda*)".⁴⁰

To summarize: The main task of a grammatical system is to ensure the retention of the standard usage of language. In other words, retention of the collection of the standard linguistic expressions. it is attempted to ensure this by placing constraints so that the inadmissible expressions are excluded and only the admissible ones are included.

³⁸ तथा अग्नौ कपालानि अधिश्रित्य अभिमन्त्रयते। भृगूणाम् अङ्गिरसां घर्मस्य तपसा तप्यध्वम् इति। अन्तरेण अपि मन्त्रम् अग्निः दहनकर्मा कपालानि सन्तापयति। तत्र नियमः क्रियते। एवं क्रियमाणम् अभ्युदयकारि भवति इति। (P. 85).

³⁹ एवमिहापि समानायामर्थगतौ शब्देन च अपशब्देन च धर्मनियमः क्रियते। शब्देन एव अर्थः अभिधेयः न अपशब्देन इति। एवं क्रियमाणम् अभ्युदयकारि भवति इति। (P. 86).

⁴⁰ गौरित्यस्य शब्दस्य गावी-गोणी-गोता-गोपोतलिकादयोऽपभ्रंशाः। (PB. 49). अपशब्दो हि लोके प्रयुज्यते, साधुशब्दसमानार्थश्च। (MBP. 3.1.8).

2.2 Grammatical synthesis

It is time now to focus on the rule-based process of synthesis which we depicted by the following diagram.

$$p_i \xrightarrow{\text{synthesis}} x$$

Here p_i represent the components gained by analyzing the linguistic expression x . Examples of the components include:

$$\text{bā}laka, s(u), \text{paṭh}(a), (\acute{s})a(p), \text{ti}(p).$$

The sub-script i in p_i is the general variable which stands for natural numbers. Thus, one can refer to the above five components as:

$$p_1 : \text{bā}laka, p_2 : s(u) \text{ etc.}$$

The task of grammar would be first to stipulate them and then to provide for their appropriate combinations. The combination must result in the given expression. A simple process of combination is the conjoining of two components one after another. More complex processes involve replacement, elision, augmentation and reduplication.

If Σp_i represents the combination of the constituent components, then the process of synthesis can be depicted as follows:

$$\Sigma p_i \longrightarrow x$$

The above figure says that, apart from the constituents p_i of any expression x , the grammar also provides rules of their combinations i.e. Σ which when applied to the components, leads to the standard expression x .

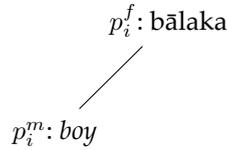
Thus, the task of grammar is two-fold: firstly to enunciate the components p_i and secondly to provide for their combinations Σ so that the combined components result in the standard expression x .

2.2.1 Form and content of a component

Like linguistic expressions, the constituent components p_i also have a form and some content. The form of any component consists of a sequence of one or more sounds. The next requirement is the specification of their content. This, I propose, can be comprehended through three basic categories: (i) the lexical meaning of a component (ii) the meaning-expressions that

are associated with a component in the grammatical corpus, and (iii) the characterizing attributes attached to the components.

The lexical meaning is the semantic content inherently associated with a component. By inherent association, I mean that it is not explicitly mentioned in the grammatical corpus. For example, the component *bālaka* means *boy* and it is assumed that the user of grammar is familiar with the meaning *boy* that is connected with the phonetic form *bālaka*. If we represent the phonetic form of any component p_i by the symbol p_i^f and the lexical content inherently associated with it by p_i^m , then this established association can be depicted as follows:



Here, the nature of association is similar to that between the form of any linguistic expression x^f and its content x^m , namely established by usage. It is therefore depicted by an unbroken line.

Pāṇinian definition of nominal stems reflects this inherent association. Nominal stems are defined as those components that have an inherent lexical meaning—and not belonging to the collection of verbal roots and suffixes.⁴¹ Pāṇini does not provide an exhaustive enumeration of the nominal stems. Instead he relies on the complement of finite sets of verbal roots and suffixes—which are enunciated in the grammatical corpus—and the condition that it must have lexical meaning.

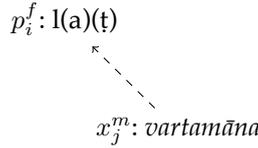
Not all components have inherent lexical meaning and in many cases grammar explicitly associates meaning-expressions to components. In the grammatical corpus, this association is usually in terms of the condition for introducing a component in the derivational process. For example, if the intention (*vivakṣā*) of the speaker is to express present time, then the component l(a)(t) should be introduced.⁴² In other words, the meaning-expression *vartamāna* (present time) is associated with the component l(a)(t).

⁴¹ अर्थवदधातुरप्रत्ययः प्रातिपदिकम् ॥ १.२.४५ ॥ ► a meaningful component which is not a dhātu and not a pratyaya is prātipadika.

⁴² वर्तमाने लट् ॥ ३.२.१२३ ॥ ► to express present time, introduce l(a)(t). In Vākyapadīya 1.24 Bhartṛhari speaks of meanings associated to the components (*apoddhāra-padārtha*). These are not fixed but there are differences of opinion (*vikalpa*) as to which meaning-expression be associated with which component. In this sense, they are different from established and fixed meanings (*sthita-lakṣaṇa*) of words. See (Rau 2002 p. 7) and (Cardona 1975 p. 280).

The user of Pāṇinian grammar must be able to correlate her or his intention with the corresponding meaning-expression in the grammatical corpus and then decide whether she or he agrees with it or not. If, for example, the speaker wants to express present time, then *vartamāna* is the corresponding meaning-expression. If the user agrees with it, then the component $l(a)(t)$ can be introduced. This is how components are associated with meaning-expressions. The component $l(a)(t)$ now carries the information that it is introduced when the user intends to express present time. Another example of this type of association is during the introduction of verbal roots. These are listed in the Dhātupāṭha with meaning-expressions that specify when a root is introduced.⁴³ A root like *bhū* would be introduced if the user understands *sattā* (existence, being) and is certain that this is what she or he intends to express. As we will see in the following pages, Pāṇini makes extensive use of meaning-expressions in his grammar.⁴⁴

The meaning-expressions are represented by the symbol x_j^m . The letter x indicates that it is a Sanskrit linguistic expression, the sub-script j refers to any of the several such expressions in the grammatical corpus. Further, the super-script m indicates that it is the meaning or content of this expression which is relevant for grammar and not its form. The association of meaning-expressions x_j^m with the form of components p_i^f can now be depicted as follows:



The dashed arrow from x_j^m to p_i^f represents the introduction of the component having the form p_i^f if the meaning-expression x_j^m is intended to be expressed.

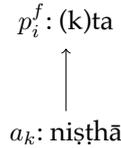
The third category is that of characterizing attributes which encapsulate grammatical or semantical information. These are designated through

⁴³ There is a divergence of opinion among the scholars on the issue whether the meaning entries formed a part of the original corpus of the Aṣṭādhyāyī as suggested by Johannes Bronkhorst (1981b p. 335-357) or were added later as maintained by Bruno Liebich (1919 p. 47-53) and G. B. Palsule (1961 p. 91ff.).

⁴⁴ Paul Kiparsky and Frits Staal (1969 p. 84) use the term “semantic representations”, Johannes Bronkhorst (1979 p. 150) uses the expression “semantic elements” and J.E.M. Houben (1999 p. 23-54) employs the phrase “meaning statements”. My choice of the term is to emphasize their semantic character as well as the fact that these are not parts or components of the whole (hence “expression” instead of “element”).

several technical terms or *sañjñās*.⁴⁵ An attribute can embody some grammatical aspect such as belongingness to a specific group of components. For example, Pāṇini groups the suffixes (k)ta and (k)tavat(u) together and calls it *niṣṭhā*.⁴⁶ In other words, he attaches the attribute *niṣṭhā* to these components.

An attribute is represented by the symbol a_k . The sub-script k indicates any of the several attributes that are specified in the grammatical corpus. The process of attachment of any attribute a_k to the form of any component p_i^f can be represented as follows:



The unbroken arrow in the figure above indicates the process of attachment of an attribute to some component.

Attributes not only comprehend some structural or systematic characteristics, but in several cases they can also represent semantic aspects. In such cases, meaning-expressions are used to specify them. For example, the attribute *karṭṛ* (agent) is defined in terms of the meaning-expression *svatantraḥ* or “that which is independent in performing an action”.⁴⁷ There is, thus, an association of a meaning-expression x_j^m with the attribute a_k . This association, however, is deliberately made in the grammatical corpus.⁴⁸ It is therefore represented through a dashed line. The following figure depicts this association.



The process of association of some meaning-expression to an attribute is different from that of attaching an attribute to some component. In the above example, the first process would be association of meaning-expression *svatantra* with the attribute *karṭṛ* and secondly, the attachment of the attribute *karṭṛ* to

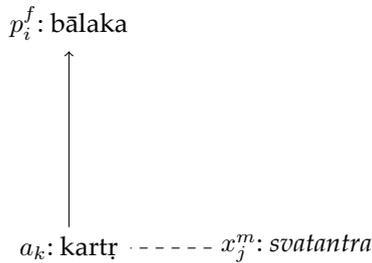
⁴⁵ There are numerous studies that deal with the Pāṇinian technical terms particularly (Renou 1942), (Chatterji 1964), (Cardona 1970 p. 195-212), (Wezler 1976 p. 361-379), (Dvivedi 1978) and (Singh 1979 p. 7-16).

⁴⁶ कर्तृवत् निष्ठा ॥ १.१.२६ ॥ ► (k)ta and (k)tavat(u) are *niṣṭhā*.

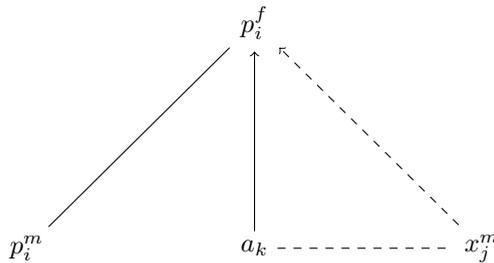
⁴⁷ स्वतन्त्रः कर्त्ता ॥ १.४.५४ ॥ ► that *kāraka* which is *svatantra* or independent of others is *karṭṛ*. See (Joshi and Roodbergen 1975 p. xviii-ix) for association of meanings or external information to the *kāraka* terms.

⁴⁸ In the words of S. D. Joshi (2001 p. 156-157): “Pāṇini establishes links between grammatical notions and non-linguistic reality ...” Joshi sees the meaning-expressions as “semantic metalinguistic statements” which “are considered to be a device to assign interpretation to the linguistic structure”.

the appropriate component, for example, the nominal stem *bālaka*. The two processes combined together can be represented as follows:



The three possible categories at the content level of any constituent component can be represented collectively as follows:



The above figure depicts the general structure of any constituent component.

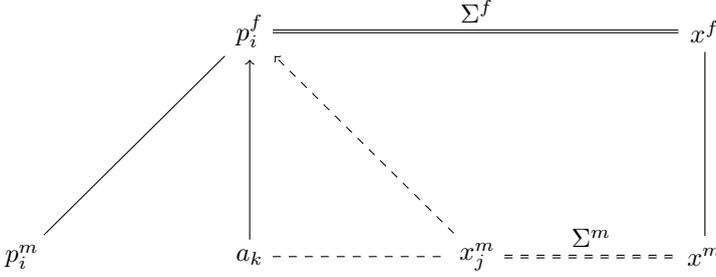
1. The two levels are distinguished as the upper form level and the lower content level. A component p_i has accordingly some form, which consists of a sequence of sounds and is depicted through the super-script f .
2. Further, it may have a lexical meaning which is not deliberately specified in the grammatical corpus. The phonetic form of lexical meaning is clearly the form of the component. This relation is similar to the one between the form and content of any given expression. These relations are established through usage. Grammar makes use of this connection, but it does not establish them. This lexical content is represented at the content level by the symbol p_i^m with the super-script m denoting the lexical meaning or content of the component. The inherent or established nature of the relationship between p_i^f and p_i^m is depicted through the unbroken line.
3. Sometimes a component is introduced by specifying certain semantic conditions. These meaning-expressions that form a condition for introduction of a component are represented by the symbol x_j^m . The dashed arrow stands for the fact that these meaning-expressions are deliberately mentioned in the grammatical corpus and form the condition for introduction of some component. The form of meaning-expression is of no direct

relevance to the process of derivation. What is of relevance is the content that it represents. In many cases it needs to be completed with other terms. Meaning-expressions in the grammatical corpus are, so to say, indices that refer to some content a user is supposed to understand and make use of. Their understanding depends upon the user's knowledge of the language, grammar and the external world.

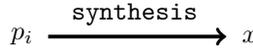
4. The next category is that of attributes a_k or names that are attached to any component. The attachment process is represented by an unbroken arrow and is specified in a deliberate manner with the grammatical corpus. The fact that attributes are placed only at the content level indicates that their phonetic form is irrelevant for the process of derivation. Formally speaking, what is important is to have a unique index through which they can be referred to. What phonetic form this index has, is of no relevance for the grammatical process.
5. Sometimes, the attributes are defined through meaning-expressions. This process is equivalent to associating a meaning-expression x_j^m with an attribute a_k which is depicted by dashed lines.

The constituent components within the grammatical system of Pāṇini can be represented in the above manner. It should be noted that the above representation makes use of the basic concept of two levels. At the form level the physical, audible sounds are represented and their content is represented through three basic categories. Further, four types of processes, depicted through four different kinds of connecting lines or arrows, are identified. Among them, only three i.e. (i) introduction of p_i^f based on x_j^m (ii) attachment of a_k to p_i^f and (iii) association of x_j^m to a_k are specified in the grammatical corpus. The lexical meaning i.e. connection of p_i^m with the p_i^f is not mentioned in it, but is taken to be established.

As mentioned before, the prime aim of grammatical synthesis is to combine the constituent components in a rule-based manner, so that the form of the combination results in the form of the desired standard expression and the sum total of the content of the components corresponds to the content of the desired standard expression. If we represent the combination of components by the symbol Σ and distinguish the combination at the form level Σ^f and content level Σ^m then the grammatical process of synthesis can be depicted as follows:

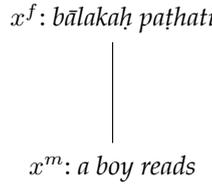


The above figure is a more detailed version of the following figure which represents that the synthesis is rule-based combination Σ of components p_i that results in x .



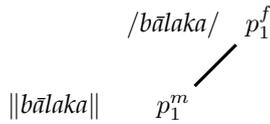
The next task is to explain how Σ , or the process of combination, functions. In order to show this, I use an example to work out the grammatical synthesis and present it in terms of the categories and processes introduced above.

1. Consider the Sanskrit expression *bālakaḥ paṭhati* (*a boy reads*) which is intended to be derived. We have:



Here, the connection between the phonetic form x^f and the meaning x^m is established by usage. In other words, even without following the grammatical process of derivation, someone conversant in Sanskrit would understand what is meant by this expression.

2. In order to derive this expression one must start by selecting the appropriate constituent components that may be associated with the intended expression.
 - a. The first selection would be the component p_1 : *bālaka* whose lexical meaning is *a boy*. This amounts to saying that since the speaker intends to express p_1^m : $\|bālaka\|$ or $\|boy\|$ the component with phonetic form p_1^f : $/bālaka/$ is introduced. This is represented as follows:



It should be noted that the phonetic form of the component chosen is conducive to the phonetic form of the intended expression. Thus, components like *mānavaka* or *bāla* are not chosen, although they also convey the same meaning.

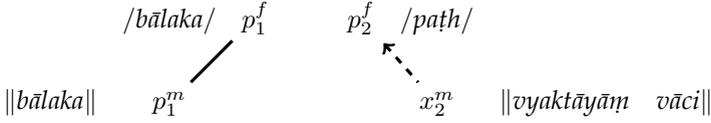
- b. The second component selected is p_2 : *paṭh(a)*. In the Dhātupāṭha, the verbal roots are listed along with the meaning-expressions that condition their introduction. Thus, the verbal root *paṭh(a)* along with the meaning-expression *vyaktāyāṃ vāci* implies that *paṭh(a)* is introduced when “expressed speech” is intended to be communicated. Thus, in this case, the component with the phonetic form p_2^f : /p a ṭh/ is specified together with the meaning-expression x_2^m : $\|\text{vyaktāyāṃ vāci}\|$ or *in case expressed speech is intended to be said*. This introduction is therefore based on some meaning-expression and can be represented as follows:



Again it should be mentioned that other components like *lap(a)* that are also listed with the same meaning-expression are not selected to avoid formation of *lapati* instead of *paṭhati*.

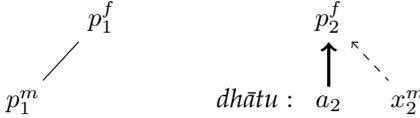
Thus, the selection of the components requires prior knowledge about them, what they denote, their lexical meaning as well as the meaning associated in the grammatical corpus. Both their form as well as their content are to be taken into consideration. Further, the two components p_1 and p_2 need to be placed in this sequence, otherwise the expression *paṭhati bālakaḥ* may result instead of *bālakaḥ paṭhati*, which has the same meaning but a different form owing to different sequencing.

The process of derivation can be considered as taking place through a series of changing derivational-states. At each derivational state a number of components, together with their contents are placed in a specific order. The derivational state after the introduction of p_1 and p_2 looks as follows:

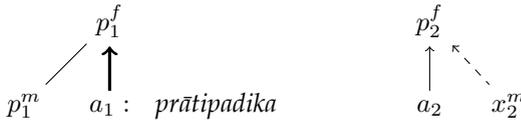


3. At this stage, the process of characterization follows. It involves attachment of a number of attributes to the components, depending upon fulfilment of appropriate conditions.

- a. The grammatical corpus consists of a table of verbal roots or the Dhātupāṭha. By the rule *bhūvādayo dhātavaḥ*⁴⁹ Pāṇini refers to it as “components beginning with bhū” and terms the components it contains as dhātu. Since the component paṭh(a) is listed in the Dhātupāṭha, therefore, an attribute a_2 : dhātu is attached to p_2^f : paṭh(a). This process can be represented as follows:



- b. Next, the first component bālaka is characterized as a nominal stem. The Pāṇinian term for nominal stems is prātipadika. As mentioned previously, unlike the verbal roots, there is no extra list of nominal stems in the grammatical corpus. Instead, they are specified by complementing the set of verbal roots and suffixes, provided they have some lexical meaning (*arthavat*). This is specified by the rule *arthavadadhāturapratyayaḥ prātipadikam*⁵⁰. Thus, the attachment of the attribute a_1 : prātipadika to the component p_1^f can be depicted as follows:

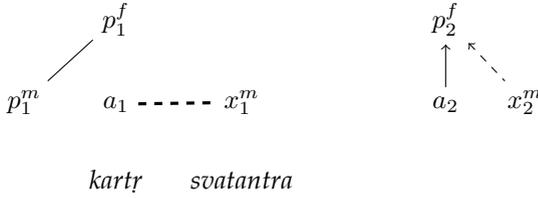


The attachment of the above attribute would include checking whether the concerned component has a lexical meaning and that it is not a verbal root or suffix.

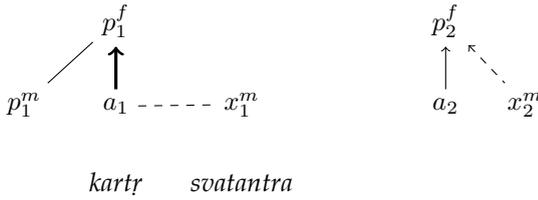
⁴⁹ भूवादयो धातवः ॥ १.३.१ ॥ ► components in the list beginning with bhū are dhātu.

⁵⁰ अर्थवद्धातुरप्रत्ययः प्रातिपदिकम् ॥ १.३.५५ ॥ ► a meaningful component which is not a dhātu and not a pratyaya is prātipadika.

- c. The component *bālaka* is also characterized as an agent. The Pāṇinian term for agent is *karṭṛ*. It is defined by the rule *svatantraḥ karṭṛā*⁵¹. The effect of this rule can be represented as the dashed line associating the meaning-expression x_1^m with the attribute a_1 . Here, to avoid further complex notations, I am using the same variable a_1 where the suffix only denotes that it is related to the first component p_1 and not the number of different attributes.



Further, the attribute *karṭṛ* or agent would be attached to the components *bālaka* if this is the intention of the speaker.



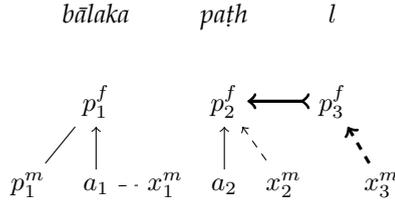
In this manner, further attributes would be attached to the components at a particular derivational state until it arrives at a point of saturation, in the sense that no more attributes can be assigned to it. These processes of attaching attributes are therefore meant to saturate the current derivational stage.

4. Once a given derivational state reaches saturation, new components can be introduced to it, depending upon the fulfilment of grammatical conditions and the intention of the speaker. The next component which is added is the suffix *l(a)(t)*. It is introduced when it is intended to express the present time.⁵² A further decision which is to be taken is whether active voice is intended, and if this is the case, then whether the suffix *l(a)(t)* which is being introduced expresses agency.⁵³ Moreover, as a suffix it must be placed after the verbal stem. This can be depicted as follows:

⁵¹ स्वतन्त्रः कर्त्ता ॥ १.४.५४ ॥ ► that *kāraka* which is *svatantra* or independent of others is *karṭṛ*.

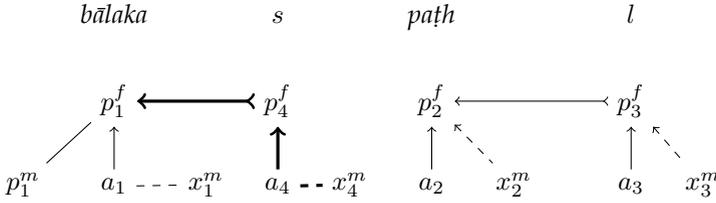
⁵² वर्तमाने लट् ॥ ३.२.१२३ ॥ ► to express present time, introduce *l(a)(t)*.

⁵³ लः कर्मणि च भावे चाकर्मकेभ्यः ॥ ३.४.६९ ॥ ► *lakāra* are used to denote the object or *karman* and the agent or *karṭṛ* in the case of transitive verbs and after intransitive verbs they denote the action or *bhāva* as well as the agent or *karṭṛ*.



There are two steps involved here. First, introduction of the component p_3^f on the basis of the meaning-expression x_3^m . This is depicted by the dashed arrow. The second step is placement of this component after the verbal root or the component p_2^f , which is specified by the arrow with a tail.

5. The next suffix $s(u)$ is introduced after the nominal stem *bālaka* and denotes nominative singular case ending. For this, it must first be decided whether the suffix $l(a)(t)$ associated with the verb expresses the agency. This implies that the attribute *kartṛ* or agent associated with the nominal stem is already expressed and therefore the first case ending can be introduced to it.⁵⁴ In case, singularity is intended, the singular case ending $s(u)$ is selected and introduced.



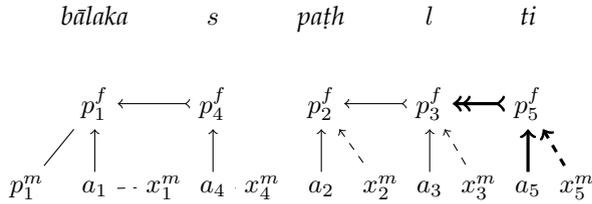
6. The following step involves introduction of the finite verb ending which replaces the suffix $l(a)(t)$ after the verb. The desired component is the third person singular suffix $ti(p)$. A number of decisions need to be taken and other grammatical constraints considered before its introduction. Since it is not in co-reference with a non-nominative,⁵⁵ the suffix $l(a)(t)$ can be replaced by one of the suffixes out of the *tiñ*-group.⁵⁶ Moreover, the fact that it is in co-reference with $[p_1 p_4]$ implies that the replacement must be

⁵⁴ अनभिहिते ॥२.३.१॥ ► when not otherwise expressed. प्रातिपदिकार्थलिङ्गपरिमाणवचनमात्रे प्रथमा ॥२.३.४६॥ ► to denote only the meaning of *prātipadika*, its gender, measure, and its number, *prathamā* is introduced.

⁵⁵ लटः शतृशानचावप्रथमासमानाधिकरणे ॥३.२.१२४॥ ► (\acute{s})at(\acute{r}) or (\acute{s})āna(c) are introduced after a verbal root in place of $l(a)(t)$ when the action is denoted at the current time and if $l(a)(t)$ is not coreferential with a *pada* which ends in *prathamā* or nominative case.

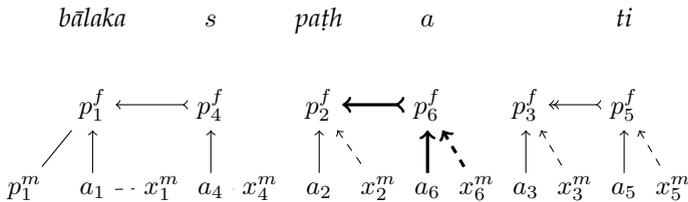
⁵⁶ लस्य ॥३.४.७७॥ ► in place of suffixes with cover term *l* namely $l(a)(t)$, $l(i)(t)$, $l(u)(t)$, $l(\acute{r})(t)$, $l(e)(t)$, $l(o)(t)$, $l(a)(\acute{n})$, $l(i)(\acute{n})$, $l(u)(\acute{n})$ and $l(\acute{r})(\acute{n})$ the suffixes coming in the next rule are substituted. तित्तसिद्धसिप्थस्थमिचस्मस्तातांझथासाथोध्वमिद्धहिमहिङ् ॥३.४.७८॥ ► $ti(p)$ *tas jhi si(p) thas tha mi(p) vas mas ta ātām jha thās āthām dhvam i(t) vahi mahi(\acute{n})* are the substitutes of the cover term *l* or a *lakāra*.

singular. Further, *paṭh(a)* is a *parasmaipada* verbal root and neither first nor second person is being expressed, therefore, *ti(p)* is selected which replaces *l(a)(t)*.



In the above figure, the double arrow depicts the process of replacement.

7. In the next step, an infix (*ś*)*a(p)* is introduced after the verbal root and before the finite case ending. If the case ending suffix denotes agency—which is inherited from the suffix *l(a)(t)* which it replaced—and if it is a *sārvadhātuka* suffix⁵⁷ then the infix (*ś*)*a(p)* is introduced.



8. The next change follows the rule *sasajūṣo ruḥ*⁵⁸, with the substitution of *r(u)* in place of *s*.

b ā l a k a r p a ṭ h a t i

9. Finally, following the rule *kharavasānayorvisarjanīyah*⁵⁹ the phoneme *r* is replaced by *visarjanīya* because of the following *khar* (i.e. *p*) sound.

b ā l a k a ḥ p a ṭ h a t i

From an operational point of view, both the above replacements are similar to the previous replacement of *l(a)(t)* by *ti(p)* in step 6.

The process of derivation presented in the above example is slightly different from that suggested by Joshi and Roodbergen (1980 p. ix-xi). The main difference is that they start by associating the meaning-expressions with the

⁵⁷ This is because it belongs to the group called *tiñ*. तिङ् शित्त सार्वधातुकम् ॥३.४.११३॥ ► *tiñ* and those having *ś* as its marker are called *sārvadhātuka*.

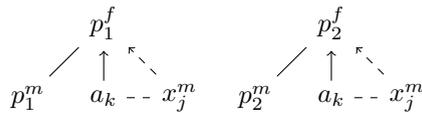
⁵⁸ ससजुषो रुः ॥८.२.६६॥ ► final *s* as well as *ś* of *sajūṣ* is replaced by *r(u)* at the end of a *pada*.

⁵⁹ खरवसानयोर्विसर्जनीयः ॥८.३.१५॥ ► before *khar* or pause (*avasāna*), *r* is replaced by the *visarjanīya* (= *ḥ*) provided this *r* is final in a *pada*.

(kāraka) attributes and introduce the constituent components like bālaka or paṭh(a) at a later stage.⁶⁰ In my representation, the attributes occur together with the constituent components in a composite manner. There is no pure or deeper semantic or syntactic level, but the components are a complex of phonetic form together with lexical, semantic and grammatical content.

2.3 The derivational process

The application of the grammatical system to synthesize a particular expression is carried out in a number of steps. Each step can be said to correspond to some derivational state. Such a derivational state would consist of a sequence of components. Its detailed specification at the form and content level would then consist of respective categories. A general derivational state with two components is shown in the following figure.



There are two components here, p_1 and p_2 , with their respective forms p_1^f and p_2^f and lexical contents p_1^m and p_2^m . Further, a number of grammatical attributes a_k or semantic content x_j^m can be attached to them.

2.3.1 Guiding principles of synthesis

The process of synthesis involves changes in the derivational state. A change could be at the content level, for example, when new attributes are attached or at the form level when new components are introduced. Any change in a given derivational state is guided by

1. the intention (*vivakṣā*) of the speaker, and
2. the constraints of the grammatical system, which involves
 - a. consistency of the derivational state
 - b. its saturation, and
 - c. its completion.

⁶⁰ See, for example, the stages A(1) to B(4) in (Joshi and Roodbergen 1980 p. ix-x). Brendan Gillon (2007 p. 451-461) follows a similar approach.

2.3.2 Intention of the speaker

The intention of the speaker relates either to the meaning-expressions x_j^m or to the lexical meaning p_i^m of the constituent components. The grammatical system interacts with the speaker and gathers information about her or his intention through meaning-expressions. Intention is also related through the meaning of a lexical component.

The meaning-expressions are explicitly stated in the grammar. A user must be able to understand them and react to them. For example, the meaning-expression *varṭamāna* requires that the user understands what is meant by it—namely, present time—and decides whether she or he wants to express it or not. The lexical meanings, on the other hand, are not explicitly stated in the grammar. A user must be able to choose the right lexeme or component that corresponds to the lexical content she or he wants to express and input it into the grammatical system. This requires familiarity with the lexemes of the language. This is necessary because the form and content of such components are fixed or established through usage.

It does not suffice to know only the meaning. Form is equally important. For example, if one wants to express *bālakaḥ paṭhati*, then one must select *bālaka* and not *bāla* or *māṇavaka* which also mean the same. Similarly, one must choose *paṭh(a)* and not *lap(a)* although both are listed in the Dhātupāṭha in the sense of *expressed speech* (*vyaktāyām vāci*). Otherwise, *lapati* instead of *paṭhati* may result.

2.3.3 Consistency of the derivational state

The rules of grammar provide for the consistency of a derivational state. The constraint of consistency regulates the distribution of the components and the categories expressing their content. At a given state, the sequence of components, their phonetic combinations and the presence or absence of grammatical attributes are specified in the grammar.

As an example, consider the placement of suffixes (*pratyaya*). This is regulated by the rule which specifies that components with the attribute *pratyaya* must be placed after the component for which they are introduced.⁶¹ Another example of the constraint of consistency is the presence of a particular attribute in a component, which sometimes excludes the possibility

⁶¹ प्रत्ययः ॥३.१.१॥ ► *pratyaya* are components introduced subsequently. परश्च ॥३.१.२॥ ► and are placed after the components to which they are introduced.

of attaching certain other attributes to that component. Such attributes can be grouped within a set of mutually exclusive attributes. For example, one such set is {hrasva, dīrgha, pluta}. If a phoneme unit is hrasva then it can not simultaneously be dīrgha or pluta. Similarly, a component with attribute kartṛ can not simultaneously have the attributes karman, sampradāna etc.⁶²

Only a consistent derivational state is admissible.

2.3.4 Saturation of the derivational state

Given a derivational state, a number of attributes can be attached to the components. Saturation of the derivational state is reached once no further attributes can be attached at that particular state. As long as some attribute can be attached to any component of a particular derivational state, it is not saturated.

Attachment of attributes in general leads to grammatical characterization of components, as well as of the derivational state. They can be attached to the phonetic form of any component. This can be either a single sound i.e. a phoneme, or a sequence of them which may represent one or more constituent components. The first case has phoneme attributes and such attributes can be distinguished from other attributes, i.e. those that characterize phoneme sequences. Consider, for example, the component (k)ta appearing at some stage in the derivational process. The phoneme t is termed *tu*, *khay*, *khar* and a is *ac*, *at*, *guṇa* etc. On the other hand, the component (k)ta is called *niṣṭhā*, *pratyaya*, *kit* etc.

There are many attributes, which once attached to a component, do not leave it. For example, the attribute *ac* for the phoneme / a /. This means, once attached, this attribute remains associated with that component in all the subsequent states as the derivational process advances. Such characteristics can be termed as *static-attributes*. On the other hand, certain attributes are assigned temporarily to some component. They depend upon the current derivational state and once its distribution changes, they no longer remain attached to that component. One such example is the attribute *aṅga*.⁶³ This is assigned with respect to some suffix and depending upon the distribution of suffixes in a particular state, it is attached to corresponding components, but

⁶² In Aṣṭādhyāyī this is specified under *eka-sañjñā* i.e. “assignment of only one term” constraint prescribed by the rule: आ कडारात् एका संज्ञा ॥ १.४.१ ॥ ► upto a.2.2.38 only one sañjñā or attribute is attached (from among the set of mutually exclusive attributes).

⁶³ यस्मात्प्रत्ययविधिस्तदादि प्रत्ययेऽङ्गम् ॥ १.४.१३ ॥ ► that part which enjoins a pratyaya based operation, before that the sequence is aṅga.

in the subsequent state things may change as may the assigned position of this attribute.⁶⁴ Other examples include *ṭi*⁶⁵ or *upadhā*⁶⁶ that are assigned on the basis of current positions of the phonemes.

Another criterion on the basis of which attributes are distinguished is whether some meaning-expressions are required for their assignment. If this is the case, then some kind of user intervention is required to interpret them and accordingly attach the attributes to the appropriate component. Consider the assignment of the attribute *karṭṛ*, which is specified in terms of a meaning-expression *svatantra*.⁶⁷ Here, the component which denotes the independent agency of action is assigned the attribute *karṭṛ*. This involves assistance from the user. On the other hand, several attributes can be assigned only on the basis of distribution of system internal parameters and without the help of the user. The grammatical system can decide on its own. For example, the attribute *niṣṭhā* can be assigned without consulting the user, solely on the basis of the presence of (k)ta or (k)tavat(u).⁶⁸

Given a distribution of components, the derivational state must attain a state of saturation before new components can be introduced or changes can be effected at the form level.

2.3.5 Completion of the derivational state

A saturated derivational state is complete if no more components can be added to it. Neither the user, who interacts through the meaning-expressions, nor the grammatical system calls for addition of any component. Such a complete state must fulfill two conditions, namely (1) the phonetic form reached must be identical with the phonetic form of the intended linguistic expression and (2) the collective content of the completed state must correspond to the content of the intended expression.

A derivational state, if incomplete, advances towards completion. This takes place when a new component is added to it. When it is placed adjacent to some existing component then it is a case of simple addition or augmentation (*āgama*), and when it replaces some component then it is substitution

⁶⁴ James Benson (1990) discusses Patañjali's remarks on *aṅga*. H. V. Nagarajarao (1978 p. 145-176) discusses the scope and necessity of the *adhikāra* of *aṅga* although Pāṇini does not explicitly states its domain.

⁶⁵ अचोऽन्त्यादि टि ॥ १.१.६४ ॥ ► that part which begins with last ac is *ṭi*.

⁶⁶ अलोऽन्त्यात्पूर्वं उपधा ॥ १.१.६५ ॥ ► an *al* which is penultimate is *upadhā*.

⁶⁷ स्वतन्त्रः कर्त्ता ॥ १.४.५४ ॥ ► that *kāra* which is *svatantra* or independent of others is *karṭṛ*.

⁶⁸ क्तवत् निष्ठा ॥ १.१.२६ ॥ ► (k)ta and (k)tavat(u) are *niṣṭhā*.

(*ādeśa*).⁶⁹ Augmentation or substitution of phonemes leads to change in the form of a component. Replacement of the entire components, however, not only leads to change in form but facilitates deeper layers of abstraction and generalization in formulation of grammar. The best example is the introduction of *abstract* components like l(a)(ṭ) and their complete replacement by case endings.⁷⁰ Pāṇini specifies *where* the new components should be placed. For example, the suffixes are added after the component to which they are introduced.⁷¹ Components marked with ṭ or k are added at the beginning or at the end of the constituents to which they are introduced.⁷² A component with m as marker is added after the last vowel of the component to which it is introduced.⁷³ Substitution involves a combination of two processes, namely the component which is replaced is made invisible by assigning an attribute replaced⁷⁴, and the substitute is introduced at the appropriate position.

2.3.6 Conditions

The forces that induce some change in the derivational state are specified through conditions. The process of saturation of a derivational state, or its transition towards completion from one state to the next, depends upon these conditions. They are formulated in terms of the distribution of components and their contents in the current state, in the previous state and sometimes in the subsequent future state as well. The nature of conditions and their complexities will be discussed in the following chapters 3 and 4.

⁶⁹ On the concept of substitution (*ādeśa*) and its possible origins in the Brāhmaṇa and Upaniṣad texts, see (Thieme 1968 p. 715-723). See also (Wezler 1972 p. 7-20) on *sthānin* (substituendum).

⁷⁰ For replacement techniques in Pāṇini, see (van Nooten 1967 p. 883-902). See also (Joshi and Roodbergen 1975 p. xvii-xix).

⁷¹ प्रत्ययः ॥ ३.१.१ ॥ ► pratyaya are components introduced subsequently. परश्च ॥ ३.१.२ ॥ ► and are placed after the components to which they are introduced.

⁷² आद्यन्तौ टकितौ ॥ १.१.४६ ॥ ► a ṭit element is placed at the beginning and a kit at the end of the component to which it is assigned.

⁷³ मिदचोऽन्त्यात्परः ॥ १.१.४७ ॥ ► a mit element is attached after the last ac of the component to which it is assigned.

⁷⁴ This is a new attribute which I use, instead of lopa. It represents those units which are now replaced because of substitution. In normal application of grammar, sometimes it is retained *in memory* (e.g. replacement of lakāras) and sometimes it is safely forgotten (e.g. in phoneme replacements).