Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

3

РАЗДЕЛ I. ТЕОРИЯ ЯЗЫКА
SECTION I. THEORY OF LANGUAGE

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A Comparative Reading of Pāṇinian Grammatical Tradition and Modern Science of Speech

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Abstract: The modern history of Western linguistics began with comparative philology and coincided with the colonisation of the East for a long time. The colonisation as a process not only involved an interplay of power, dominance and state, it was also a conquest of knowledge. Colonies such as India had a vast rubric of ancient knowledge and especially excelled in linguistics and philology. This paper is an attempt to showcase how the roots of various phonetic and phonological theories that defined and dominated modern linguistics were linked to the ancient Indian grammatical tradition. Scholars from Pāṇinian School of Grammar, such as Pāṇini, Kātyāyana, Patañjali, and Bhartṛhari, have explained a range of speech phenomena to which modern phonetics and phonology correspond significantly. This paper analyses the common grounds between prominent schools of Western phonology and their Indian counterparts and thus highlights a significant theoretical overlap between the knowledge offered by the Western linguistic schools and what was explained several centuries back by prominent Indian grammarians. From the linking of sounds to the psychological reality of a phoneme, the vast canvas of the Indian linguistic tradition could be verifiably seen as a precursor to the most of the structural turn in the twentieth century. Finally, the paper attempts to show the precedence of various recent concepts and theories, such as 'distinctive feature theory' or 'generative grammar' in the texts like *Aṣṭādhyāyī* and *Vākyapdīya*.

Keywords: Phonetics; Pāṇinian grammar; modern linguistics; speech; Aṣṭādhyāyī; Śikṣā

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition…
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини…

4

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| | Сравнительный анализ грамматической традиции Панини и современной науки о речи |

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Аннотация: Современная западная лингвистика берёт своё начало в сравнительной филологии, развивавшейся параллельно с колонизацией Востока. Колонизация была не только формой политического и культурного доминирования, но и процессом освоения и присвоения знаний. Индия, обладая богатейшим наследием древней науки, особенно выделялась в области лингвистики и филологии. Данная статья демонстрирует связь между основами современных фонетических и фонологических теорий и древнеиндийской грамматической традицией. Учёные Панинийской школы — Панини, Катьяяна, Патанджали и Бхартрихари — описали многие речевые явления, соответствующие современным представлениям о звуке, артикуляции и фонеме. Сопоставление индийских грамматических учений с западными школами фонологии выявляет значительное теоретическое пересечение. Таким образом, индийская лингвистическая традиция может рассматриваться как предтеча структурной лингвистики XX века. В частности, концепции «отличительных признаков» и «порождающей грамматики» находят ранние параллели в таких трудах, как «Аштадхьяи» и «Вакьяпадия».
Ключевые слова: Фонетика; грамматика Панини; современная лингвистика; речь; Аштадхьяйи; Шикша

Introduction

The root of science and philosophy of sound in the Indian tradition of knowledge is as deep as the grammatical theories and philosophy of language. The categorization of an incorrect utterance of Sanskrit hymns as a sin in Hindu tradition shows the emphasis on precision in the sound production. There have been various schools and theories in Indian tradition that deal with the production and transmission of speech sounds. While the comparative study of the grammatical theories

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

5

and philosophy of meaning has always preoccupied the attention of scholars, the analytical discussion on the evolution of phonetics in modern linguistics has always evaded such discussions. This paper intends to discuss this largely unattended subject by highlighting the evolutionary patterns of Indian and Western phonetics by juxtaposing the two, making their mutual interaction and impact on the other self-evident.

Though the term 'phonetics' seems to have been first used by Georg Zoega in 1797 (as Konrad Koerner (1993: 1) mentions citing Zwirner, (1966: 18), *Śikṣā* (articulatory phonetics) in Sanskrit language study has been studied since the Vedic era as one of the *Vedāngas*[1]. There are foundational problems in phonetics that have become enigmatic for the modern science of language. Yet, these problems and concepts have been theorized and resolved by ancient Indian grammarians thousands of years ago. So, as we discuss the subjects of phonetics and phonology, we would comparatively asses the theorisation of these in both Western linguistics and ancient Indian grammatical tradition to see how closely the two resemble.

A few of the biggest names in linguistics, Ferdinand de Saussure, Bloomfield, Sapir, Jakobson, and even Chomsky, have found significant inspirations in the Indian classical studies on human language and speech (Gillon 2007). But even much before that, a thorough impact of Indian grammatical tradition can be seen on the study of language by the West. During the nineteenth century, linguists, grammarians, and phoneticians paved the path for comparing Western understanding of the science of language with India's rich grammatical tradition. The road to the modern linguistics in the west started from Comparative Philology. William Jones, who was a key figure in the field of comparative philology, spent much of his life in India trying to find the link between the ancient European and Indian languages, and found ancient Indian texts on languages of exceptional value and linked many linguistic formulations to these Indian texts that were very advanced in their scope and vision (Stewart, 2023; Patterson, 2023). Jones's admiration for Sanskrit and Sanskrit texts was phenomenal. A famous account is a passage from his third 'anniversary discourse' delivered before Asiatick Society, where he says, "The Sanskrit language, whatever be its antiquity, is of a wonderful structure; more perfect than the *Greek*, more copious than the *Latin*, and more exquisitely refined than either…" (Jones, 1788: 442).

W. S. Allen in his book, *Phonetics in India*, discusses the Jones's contribution to the evolution of phonetics citing J. R. Firth, where he states, "Without the Indian grammarians and phoneticians whom he introduced and recommended to us, it is difficult to imagine our nineteenth century school of phonetics" (Allen, 1953: 3). Here, Firth's statement serves as a testimony to the influence of ancient Indian grammarians on the origin of phonetics. In this context, we see Pāṇini's *Aṣṭādhyāyī*, where he introduced us to fourteen *Śivasūtra*[2] with a novel technique

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[1] (Veda + angas.) 'Members of the Veda.' The Shadangas or six subjects necessary to be studied for the reading, understanding, and proper sacrificial employment of the Vedas:
i. Sikshā. Phonetics or pronunciation, embracing accents, quantity, and euphony in general.
ii. Chhandas. Metre.
iii. Vyakarana. Grammar. Said to be represented by Pāṇini, but rather by older grammars culminating in his great work.
iv. Nirukta. Etymology or glossary, represented by the glossary of Yāska.
v. Jyotisha. Astronomy. Such knowledge of the heavenly bodies as was necessary for compiling a calendar fixing the days and hours suitable for the performance of Vedic sacrifices and ceremonies.
vi. Kalpa. Ceremonial. Rules for applying the Vedas to the performance of sacrifices. These rules are generally written in the form of Sūtras or short aphorisms, and so they are known as the Kalpa-sutras or Srauta-sutras. (Dowson 1888: 352)

[2] "Pāṇini's corpus of rules (the Aṣṭādhyāyī) is preceded by a list of sounds divided into fourteen parts commonly called the *śivasūtras* or *māheśvarasūtras* after the tradition according to which these *sūtras* were revealed to Pāṇini by the lord Śiva. Each of the

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition…
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини…

6

of condensed notations called *pratyāhāras*[3].This aphoristic technique serves to form the structural base of the *Aṣṭādhyāyī*. One can always see modern theories as indebted to Pāṇini's grammar for the economical expression due upon his aphorisms. For instance, Pāṇini uses '*a***c**' for denoting the whole set of vowels or we can say all the phonemes that fall between '*a*' and *anubandha*[4] '**c**' of *Śivasūtra*. The *Śivasūtra* are in the core of the Pāṇinian scheme of grammar granting it one of the most features – namely, conciseness that adds further to the formulation of *sūtras* in the *Aṣṭādhyāyī*. J. F. Staal, talking about the close relationship of *Śivasūtra* with the *Aṣṭādhyāyī* states that it is "best illustrated by Pāṇini's special use of the indicatory sounds ... called *anubandha*... Each *anubandha* enables Pāṇini to refer in his grammar to groups of sounds by means of a special technique referred to as *pratyāhāra* 'condensation'" (Staal, 1962: 2). Further,

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fourteen sections ends with a consonantal *it* (halantyam). These *sūtras* are:

(1) *a i u* **ṇ** (2) *ṛ ḷ* **k** (3) *e o* **ṅ** (4) *ai au* **c** (5) *h y v r* **ṭ** (6) *l* **ṇ** (7) *ñ m ṅ ṇ n* **m** (8) *jh bh* **ñ** (9) *gh ḍh dh* **ṣ** (10) *j b g ḍ d* **ś** (11) *kh ph ch ṭh th c ṭ t* **v** (12) *k p* **y** (13) *ś ṣ s* **r** (14) *h* **l**" (Cardona, 1969: 6)

[3] "The Kāśikā, immediately before citing and commenting on the first *śivasūtras,* says: *atha kimartho varṇānāmupadeśaḥ/ pratyāhārārthaḥ/ pratyāhāro lāghavena śāstrapravṛttyarthaḥ* "Now what is the purpose of teaching the sounds? They are taught in order to form *pratyāhārs*. A *pratyāhāra* is intended for manipulating rules of the grammar with brevity." (Cardona, 1969: 12)

[4] The term *it* is formed from the root √in - which means 'to go or to disappear'. It is etymologically significant term. This term is an important device. Use of it is confined to the formation of samāhāra or pratyāhāra, i.e., collection of letters to make abbreviatory designation. It is also attached to roots for indicating some purpose. This term itself states its temporary status. This term is also called as anubandha in traditional grammar, literary meaning 'tagged afterwards'. The word anubandha or it indicates the same meaning, however neither Pāṇini nor Vopadeva used the word anubandha. Both of them preferred to use the monosyllabic term *it*. *It*- letters are not treated as active element in the grammatical operations. When *it*-letter serves as the last one for any initial element, they form samāhāra, i.e. abbreviatory term. (Deshpande, 2010-2011: 411).

throwing light on this technique, he says that it "consists in referring to a sequence of sounds, the last of which is followed by an *anubandha*, by means of an abbreviation consisting of the first sound of the group and the *anubandha* following the last sound. <Pāṇini 1.1.71: *ādir antyena sahetā* 'an initial sound joined to a final (indicatory) sound (denotes the intervening sounds as well)'. This applies not only to the grouping of simple sounds, but also to verbal and nominal terminations, etc.>" (Staal, 1962: 2). Delineating it further, he cites an example "the first three sounds *a i u* are followed by the *anubandha* **ṇ**. Therefore, *a***ṇ** denotes the sounds *a i u*; *i***ṇ** denotes the sounds *i* and *u*" (1962: 3). This conciseness of grammar has been a central attraction for modern Western scholars and an essential guideline for most modern theories. In line with this argument, John Earl Joseph says, "The most important figures in the development of linguistics in the last century, including Leonard Bloomfield and Noam Chomsky, have readily acknowledged their methodological and intellectual debt to Pāṇini. That his work had an impact on how Saussure too conceived of linguistic analysis is indisputable, though exactly how much will never be known with certainty" (Joseph, 2012: 84). Pāṇini's influence transcends even the disciplinary boundary as scholars have argued about the impact of Pāṇini's works in other domains, such as in the development of Modern Periodic Table by Mendeleev (Ghosh and Kiparsky, 2019: 350-352). The study on Pāṇini involves the other grammarians of India, who were purely the commentator of his treatise, viz. Kātyāyana, Patañjali, and Bhartṛhari. Looking at the grammar of Pāṇini and his associates, in further sections, this paper analyses the evolution of the science of speech sound in India beginning from the Vedas and then evaluate its impact on contemporary phonetics.

Modern Western speech science in the Pāṇinian grammatical system

What Stawarska states with regard to the science of speech in structuralism, shows

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

7

the significance of this branch of study in modern linguistics and structuralist understanding of the science of language. He begins with talking about Merleau-Ponty's claim about Saussure's association with phenomenology and sees it as unusual on the ground of his established connection with structuralism. Stawarska says that Saussure's linguistic science mainly dealt with the language system (*la langue*) and not so much with the performance of speech (*la parole*). Speech on its part was mostly considered a psychophysiological process sharing its object with phonology and phonetics in Saussureian linguistics (Stawarska, 2020: 188). Stawarska's observation shows the crucial place acquired by phonetic or phonological studies in the structuralist enquiry in its foundational years. However, it is also a fact that later, the Structuralists' study of linguistics is diverted to morphophonemics or morphology. It developed in the first half of the twentieth century, in both the movements of structuralism – American and European, from identifying the phoneme as the fundamental unit of the organization of a sound system. The contribution of Sapir is also noticeable in this regard. He represents phoneme as a psychological entity or speaker's mental representation of native language; he did not believe in any analytical construction of language. The later development of structuralism with a morphophonemic approach also finds its roots in Pāṇini's work as *Aṣṭādhyāyī* clearly expresses a clear understanding of a related artefact lying between phonemic and corresponding morphological structures. Stephen Anderson emphasizes this dependence and borrowing, as he writes,

"While Bloomfield was certainly one of the most noteworthy early practitioners of the morphophonemic method of description (which he had learned from Pāṇini's grammar), we should not therefore make the anachronistic assumption that he understood such description in the same way later linguists do. In particular, he seems clear to have considered them in the same light as he

did Pāṇini's description: an elegant artifact, providing a uniform and concise account of a complex set of facts, but not to be confused with the actual language capacity of speakers. Only the phonemic forms, and the morphological fact of relations between them, could be considered to have that status. For Bloomfield, the beginning and the end of a theory of phonological structure in natural language was a theory of phonemic representation" (Anderson, 2021: 360). Bloomfield, in his celebrated book *Language,* sees phonetics as a branch of study that focuses on the speech event in alienation from its meaning, it studies the movements made by the speaker for the production of speech sounds, sound waves, and how the hearer's ear-drum responds (Bloomfield, 1957: 74), and he considers phonology as the study of significant speech-sounds, he sees it as practical phonetics too (1957: 78). Contemporary phonetics is studied under three heads – namely, articulatory, acoustic and auditory phonetics. Articulatory phonetics, which stands out as the primary enquiry in the production of sound, deals with the study of sound production and the usability of speech mechanism of vocal organs, such as throat, lungs, mouth, nose, teeth etc. Knowledge of phonetics paved the way to study the science of language, which is the foundational study of any language and prepares to solve the basic concepts and methods of related language. The description and transcription of the articulation of English speech sounds was predominantly done during nineteenth and twentieth century by Henry Sweet followed by by Daniel Jones who largely extended Sweet's work and evolved a much simpler understanding of phonetics. According to modern western phoneticians, sounds are divided into two classes – segmental and suprasegmental[5]

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[5] Spoken language consists of successions of sounds emitted by the organs of speech, together with certain 'attributes. (Where Footnotes for: 1. Sounds- also called 'phones' or 'linear' or 'segmental' features of speech., 2. Attributes- also called 'prosodies or

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition…
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини…

8

(Folgado et al., 2020). Again, segmental maintains two types of components; the first one is the vowel, and the second is the consonant. Similarly, suprasegmental combines sound aspects other than consonants and vowels such as pitch, accent and junctures, stress, and length of a language. Modern Western studies of articulatory phonetics were firstly done by a German physiologist C.F. Hellwag in the eighteenth century, while in India it started way back by the Ancient Indian seers or śiṣṭās, two and half millennia ago for systematic pronunciation or recitation of Vedic hymns. According to Siddheshwar Varma, the Vedic literature on phonetics is divided into two types- *Prātiśākhya* [6] and *Śikṣā*; *Pratiśākhya* deals with "Applied Phonetics" and *Śikṣā* signifies "General Phonetics" (Varma, 1961: 5). Some *Śikṣā* treatises belong to Vedic recitation, but most of them consist of pure

phonetic studies – viz., sound division, place of articulation, quantity (*mātrā*), accent, juncture (*saṇdhi*) etc. Thus, the suprasegmental in modern linguistics seems to have grown from the understanding of these linguistic features described in Indian texts as both subscribe to very similar features in human language, and the key exponents of modern phonetics were well aware of the Sanskrit grammatical tradition. Mark Atherton in his D. Phil. dissertation notes that Sweet may have studied Sanskrit under Adolf Holtzmann (1994: 9), who was a professor of Sanskrit at the University of Heidelberg. While Sweet's comparative analysis of Sanskrit words with other European languages in his book *The History of Language* affirms his thorough understanding of Sanskrit. He talks about Sanskrit and Sanskrit words in varied contexts in his book for comparative analysis not once or twice but 70 times. While analyzing and understanding the history of English vowels, Sweet states that short English vowels are as old as Sanskrit vowels while long vowels and diphthongs are the products of later developments of just a few centuries ago. (Sweet, 1900: 33). C. L. Wrenn emphasises the similar point while giving a life sketch of Sweet in Seibok's edited volume the *Portrait of Linguists*. What Wrenn stated substantiates the claim that Sweet had thorough knowledge of Sanskrit Phonetics, and therefore, he could assert in a passing statement in one of his presidential addresses delivered in 1878. His statement that "the Germanic accent is 'substantially identical with that of Vedic Sanskrit' suggests for the first time an especially valuable direction in the search for the phonetic explanation of 'Verner's Law'" (Wrenn, 2002: 531).

It was with the influence of Darwin's 'living organism', the German linguists got involved in studying the evolution of language (Barbieri et al., 2022; Blancke and Denis 2018) and proposed the theory of family tree of languages in Indo-European languages. This was the time when the focus of linguists was largely on the physiological

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'suprasegmental' features of speech.) (Jones, D., 1969: 1).

[6] Madhava M. Deshpande states that *Pratiśākhyas* are conceded to be more authoritative than the *Śikṣās* (2001: 10). Manmohan Ghosh, talking about *Prātiśākhya*, cites Max Muller's view (1859), ' *Prātiśākhya* …does not mean, as has been supposed, a treatise on phonetic peculiarities of each Veda, but a collection of phonetic rules peculiar to one of the different branches of the four Vedas, i.e., to one of those different texts in which each of the Vedas had been handed down for ages in different families and different parts of India.' <Op. cit, p. 119) . . . Since then, almost all the scholars have followed this view. <See Siddheshwar Varma, Critical Studies, p. 12; Winternitz, Hist. of Ind. Lit., Vol. I, Calcutta, 1924, p. 284.>. But such an opinion seems to have been expressed on very inadequate grounds. For, Madhava, quoted by Jñānendra Sarasvatī in his gloss on the Siddh. Kau. (P. IV. 3. 59), explains *Prātiśākhya* as *pratiśākhaṃ bhavam*. <Siddhānta-Kaumudī, ed. Gadgil, Bombay, 1904, p.249.> . . . For in his commentary to the Nirukta I. 17) he says . . . "Those Pārṣada books by which in a Pariṣad of one's own Caraṇa, the peculiarities of accent, saṃhitā, krama-reading, pragṛhya vowels and separation of words are laid as enjoined for, and restricted to each śākhā are called Prātiśākhyas.'<Max muller, Op, cit., p. 131; Varma translates Mādhava's words as belonging to each individual (prati) śākhā (op.cit., p. 12). (Ghosh, xxxiii-xxxiv).

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

9

study of speech sounds. Both phonology and phonetics were concerned with the production and physical study of speech sounds. In the beginning of the twentieth century, Saussure approached this branch of language study and proposed a modified orientation. He did not agree only with physiological study of speech sounds, but paved the way for the psychological study of speech sounds. It is worth citing E. John Joseph here in this context,

"Saussure's fundamental dissatisfaction with phonology dated back more than a quarter century, and came up in one form or another in every course he gave. The section on 'Principles of phonology' in the first course on general linguistics raises deep philosophical issues about the nature of the phoneme as a unit and its connection with time. No sooner does he open the section than he starts detailing why 'The method followed in general in phonology manuals is not good'. They focus exclusively on articulation, neglecting the acoustic side – how a hearer perceives and understands the sounds. Yet, Saussure insists, what comes first is not the muscular movements but 'the <acoustic>, mental impression" (Joseph, 2012: 495).

Saussure's extension of understanding sound from articulatory position to combining the perceptive side of sound finds its precedence in Pāṇinian thoughts to which he was well exposed due to his learning and teaching of Sanskrit for several years.

There are fundamental similarities between the modern linguistics and Pāṇinian tradition of grammar as exemplified by the equivalence between what Saussure calls as arbitrary relation of signs and Bhartṛhari's idea of mutual relation between linguistic units (example, *vācaka-vācya* (expresser-expressed), *prakāśaka-prakāśya* (illuminator – illuminated), etc.). Bhartṛhari believed that general philosophy and metaphysical methods of language both are important in the philosophy of grammar. In line with this, Houben says,

"It is clear that the *Vākyapadīya* is designed and worked out as an organic whole . . . Bhartṛhari himself makes a distinction between philosophical, metaphysical, psycho-linguistic reality on the one hand and notions that are useful or necessary in the grammatical description on the other hand. Thus, it is very well possible to discuss details of the linguistic ideas as such, without tearing them completely out of context. The basis on which dialogue with modern linguistics can take place is the fact that the subject discussed is to a considerable extent similar, and that several premises are similar. Both these facts are reflected in similar terminology" (Houben, 1989: 120).

All these concepts where Saussure and his predecessors believe that a phoneme is a unit of speech can be linked to Bhartṛhari's theory of sphoṭa. *Vākyapadīya* emphaises that there is no difference between varṇa (phoneme) and speech sounds, as it is just an entity of the speech. Also, Bhartṛhari does not see much difference between *śabda* and *varṇa*[7]. He differentiates a *śabda* from other sounds on the basis of whether they represent physical or psychological entities, as he considers sphoṭa more psychological than physical, and all other sounds that include phoneme or speech sounds, as having more of a physical structure. A *śabda* is used variously by Bhartṛhari in varied contexts denoting phoneme (*varṇa*), morpheme (*prakṛti/pratyaya*), word (*pada*), *sphoṭa*, *vaikhary*, ordinary sound, *śabdapramāṇa* and sometimes even sentence (*vākya*)[8], and

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[7] *Deśādibhiśca saṁbandho dṛṣṭaḥ kāyavatāmiha/ deśabhedevikalpe'pi na bhedo dhvanisabdayoḥ||* (VP.1.96.)
"In life (only) concrete objects are found to have relation to place and the like (for instance, time) And even accepting the alternative (that difference in place, etc applies also to those that are not concrete objects), there is no (such) difference between the speech-sound and the Word (it reveals)" (Pillai, 1971: 21).

[8] *Akhyātaśabda sanghato jāti sanghātvartinī/ Eko'navayava śabda kramo buddhyanusahṛti ||* (VP.2.1)
Padamādya pṛthaksarvapadaṁ sākānkṣamityapi/vākyaṁ prati matirbhinnā bahudhā nyāyavādinām || (VP.2.2)
"Theorists hold different views as to what a sentence is thus a sentence is defined as (1) the verb (2) a close

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition…
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини…

10

discourse (*mahāvākya*)[9]. However, Bhartṛhari being *akhaṇḍavādi* believes that dividing the language units/sentences into various constitutive categories contradicts the fundamental nature of speech[10]. So, it is clear that modern linguists and Bhartṛhari share the notion that sign/*śabda* are constitutive units of a system and can be used to describe this linguistic structure without dividing them any further. Saussure emhasises that the reality of language was not of the muscular movements employed in the production of sound or their vibratory acoustics; it was rather the mental patterns and the socially shared cerebral traces that allowed the production and recognition of human speech as expressive language (Joseph, 2012: 237). Saussure's claim of the speech system as a mental pattern (Saussure, 1959: 11) also prefigures in Bhartṛhari's postulations in his first book of the *Vākyapadīya* where he mentions it clearly that before a word is uttered it is distinguished mentally and gets invested with certain meaning due upon the context of its usage. Bhartṛhari aptly cites an analogy of match-stick where light is inherently present similarly a *śabda* is present in mind like a mental entity but gets revealed when it is heard[11]. Bhartṛhari's *Vākyapadīya* covers

various dimensions of language study and each dimension is so richly explored that it succeeds in influencing the key exponents of modern science of language. For instance, Saussure's dictum on the production of sound which states that breath touches the appropriate speech-organs, it produces sounds or phonemes which, then form the other linguistic entities such as word, sentence, phrases etc. (Saussure, 1959: 41-43) seems to have its precedence in the concept cited by Bhartṛhari on speech production[12]. Bhartṛhari's idea on language change where he talks the change taking place in language over a long period of time in several generations[13] that works in consonance with Patañjali's comment in the *Mahābhāṣya* where he says that words are truly characterised when they are shared in society[14], reappears in the Saussurean formulations where he sees language as socially shared and generationally transformed.

(A) Speech sounds: phoneme and syllable vis-à-vis *Varṇa* and *Akṣar*

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combination of words (3) the universal which resides in a close combination of words (4) an utterance which is one and devoid of parts (5) a sequence (of words) (6) the transformation of consciousness (7) the first word (8) all the component words severally and possessing expectancy for one another" (Pillai, 1971: 36).

[9] In his preface to the translation of the Brahma Kanda, Korada Subrahmanyam also states about it (1992: ix).

[10] *Pratyekam vyañjakā bhinnā varṇavākyapadeṣu ye/ Teṣāmatyantabhede'pi saṃkirṇa iva saktaya* || (VP.1.88)

"When in reality revealing units in the syllable, word and sentence function independently of each other, they appear to function in combination, although they are entirely different" (Pillai, 1971: 19).

[11] *Vitarkitaḥ purā buddhyā kvacidarthe niveśitaḥ/ Karaṇebhyo vivṛttena dhvaninā so 'nugṛhyate* || (VP.1. 47)

"The Word is examined in the mind, is then fixed to a specific meaning and then through the instrumentality of

the speech-sounds produced through (their) causes" (Pillai, 1971: 10)

araṇistham yathā jyotiḥ prakāśāntarakāraṇam/ tadvacchabdo 'pi buddhisthaḥ śrutīnām kāraṇam pṛthaka || (VP.1. 46)

"Just as the light which is in the fire-stick acts as the cause for further lights, similarly the Word which is in the mind is the cause of speech-sounds" (Pillai, 1971: 10)

[12] *Ajastravṛttiḥ yaḥ śabdaḥ sūkṣmatvānnopalabhyate/ Vyañjanādvāyuriva sa svanimittātpratīyate* || (VP. 1. 116)

"(Yet another view about sound both of speech and of other kinds is given) — Sound though it is ever-existing is not experienced because it is too subtle. It is realised through the appropriate causal factors just as air is through fanning" (Pillai, 1971: 10)

[13] *Pāramparyādapabhraṃśā viguṇeṣvabhidhātṛṣu/Prasiddhimāgata yeṣu teṣāṃ sadhurvācakaḥ* || (VP.1.154)

"And where there are m current use, forms which have become current among corrupt speakers from generation to generation, in such cases, the correct form is not the one which conveys the meaning" (Pillai, 1971: 10).

[14] "*lokato'rthaprayukte śabda prayoge śāstreṇa*", (when people drawn by objects use words, restriction is made by *śāstra* (grammar) for the sake of merit) (*Mahābhāṣya* / Dasgupta, 1991: 38)

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

11

Patañjali, in his *Mahābhāṣya*, unequivocally defines the job of a *Śikṣākār* (phonetician) stating that "he should be able to use the (Vedic) speech with (properly inflected) words (pada), with (proper) accent (svara) and with the (properly articulated) speech-sounds (*varṇas*)[15]" (Ghosh, 1938: xxvi). Here, Pāṇini's emphasis in terms of varṇa is on the proper articulation of it, and further we can see that Manmohan Ghosh who translated the *Pāṇiniya Śikṣā*, refrains from using any other English equivalent already in use for varṇa but gives a neutral equivalent like 'speech-sound' to it. Madhav M. Deshpande also does not consider the term 'phoneme' as a suitable translation, instead he calls it misleading while reviewing Sumitra M. Katre's translation of the *Aṣṭādhyāyī* published as *Aṣṭādhyāyī of Pāṇini*, where he says, "One may also point out the term 'phoneme' used to render the Sanskrit term varṇa is somewhat misleading, since sounds like n, ñ, ṅ are traditionally considered to be distinct varṇas, though in modern phonemic analysis these would qualify only as allophones" (Deshpande, 1989: 646). W. S. Allen too does not concede to many of the English terms that are considered to be equal to varṇa. Talking about the translation of the term as phoneme, he states, "Whilst it there has much in common with the modern term 'phoneme', no phonemic theory is implied by it, and it would be reading at once too much and too little into the term thus to translate it" (Allen, 1953: 15). Rejecting the term 'sound-unit' as a translation of varṇa, he says, "The non-committal 'sound unit', by which we have thus far represented it, suffers from the disadvantage that, unlike varṇa, it is restricted to technical usage" (Allen, 1953: 15). Citing David Abercrombie, and A. F. Twaddell, Allen presents the term 'letter' as a happier rendering and states that it fits the Latin terminological tradition. Explaining the term 'letter' further, he states that "letters after

all come very near to being unselfconscious phonemes" (Allen, 1953: 16). But finally, he too comes closer to the widely accepted translation of the term varṇa considering it closer to letter that itself he calls as an unselfconscious phoneme. The term 'speech-sound' is also quite close to the term 'phoneme. However, the explanation given by Deshpande clarifies Allen's difficulty too in accepting this term to be an equivalent to varṇa. Though phoneme does not convey the same meaning as varṇa in entirety yet functionally it is the most suitable term in English to represent varṇa effectively, and therefore it is commonly used by the scholars (Lucyszyna, 2016: 304; Pataskar, 2016: 146; Colas-Chauhan, 2008: 428) to represent *varṇa*. K. A. Subramania Iyer too advocates the use of the term 'phoneme' for '*varṇa*' where he equates phoneme with *varna* as a unit of speech-sound and equates sound with *dhvani or nāda*. Further, Iyer cites Patañjali to add to the value of *varṇa*, and states, "Patañjali declares his real view by saying that the real phoneme or *varṇa* is the *sphoṭa* and that *dhvani* is a quality or attribute of it. To say that '*dhvani*' is a quality of *sphoṭa* means, according to the commentators, that it manifests the *sphoṭa*. The *sphoṭa* remains the same in all the speeds of utterance. It is the *dhvanis* or the manifesting sounds which differ in the different speeds of utterance" (Iyer, 1965: 49).

Deshpande dates standardised ordering of Sanskrit alphabet known as *akṣara-samāmnāya* to 700 BC. It was necessitated by the apparent loss of innate ability to articulate and recite Vedic hymns correctly (Deshpande, 2001: 9). If *akṣara-samāmnāya* presents distinction between vowels and consonants, the *varṇa-samāmnāya* adds descriptive techniques to the same. Pāṇini's grammar begins with the "*Varṇa-samāmnāya*"[16] in the form of the fourteen *sūtrās* known as *Śivasūtrā*. Many scholars opine differently, stating that Pāṇini did it to develop his

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[15] *yo vā imāṃ, padaśāḥ svaraṭśokṣaraśo vācaṃ vadadhāti sa ārtvijīaḥ* (*Mahābhāṣya*, Vol. I: 3).

[16] Sumitra M. Katre translates *Varṇasamāmnāy* as "Repertory of Phonemes" (Deshpande, 1989: 646).

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition...
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини...

12

grammar with brevity or it already was formed in this sequence. Patañjali, in his *Mahābhāśya's pratham āhnik* (first chapter), talks about "*Varṇa-samāmnāya*", asking its purpose emphasises on the fact that it is for introducing *śāstras*/grammatical science[17].

Saussure sees phoneme as a "corresponding number of written symbols" (Saussure, 1959: 15) which is quite similar to the theory of "*Varṇa-samāmnāy*" of Pāṇini, with which Indian grammarians/ phoneticians created a set of *varṇas* (alphabets), according to their division on the basis of places of speech-sounds. It is also mentioned in *Aṣṭādhyāyi* (*tulyāsya prayatnam savarṇam*, I.I.9.)[18], where "*savarṇam*" (homogenous) means a set of sound-system (*savarṇa*, literal meaning "of same colour or class"). It also underlines the understanding of Jones, where he considers phoneme as a family of sounds. Bloomfield and Sapir have opposite views in this regard. Bloomfield supports phonemes as a minimum unit of "distinctive features" (Bloomfield, 1957: 79), which apparently corresponds with fourteen *Śivasūtrās*. Sapir on the other hand did not accept the theory of distinctive feature. He argues that "the phonemic attitude is more basic, psychologically speaking, than the more strictly phonetic one" (qtd. in Dresher, 2011: 246). Sapir's theory prefigures in the *Pāṇiniya Śikṣā*'s sixth verse, where it is mentioned that *ātmā* with buddhi (psychological entities) "perceives things and sets the mind to an intention of speaking; the mind (then) gives impetus to the fire within

the body, and the latter drives the breath out".[19] The terms used Sanskrit Grammar are wider in scope and cover far beyond what the so-called equivalent terms project. Madhav Deshpande, further problematising this issue of the translation of the term states, "Often, the term *varṇa* is translated by the term 'phoneme' in modern expositions of Sanskrit phonetics. The Sanskrit grammarians do indeed discuss minimal pairs like *kūpa*/*sūpa*/*yūpa*. However, the term *varṇa* does not strictly refer to a phoneme in modern linguistics. For Sanskrit phoneticians, the sounds n and ñ are distinct *varṇas*, while they would be only allophones for a modern linguist. On the contrary, the sounds a and ā would be separate phonemes for a modern linguist, but they belong to the same *varṇa* for Sanskrit phoneticians and grammarians" (Deshpande, 2001: 15). He believes in the unique identity of the term to be true due upon the acts that the term performs.

Similarly, the term '*akṣara*' that is seen to be synonymous with Brahma who is beyond beginning and end, and from who all transactions of the world proceed, is not translated unanimously by the scholars. There are varied views on the word used in English for 'akṣara'. Deshpande uses 'letter, sound, syllable' as the equivalents to akṣara (Deshpande, 2001: 08). But J. A. B. van Buitenen who wrote an article solely on akṣara, defends it to be similar to a 'syllable'. He, in this regard, states, "In the Ṛgveda Samhita *akṣaraa* claims the position of a supreme principle, without how- even for a moment ceasing to mean "syllable"... Since the syllable is the smallest bit of speech that can be spoken and the first that must be spoken, it is conceived at once as the matrix and as the embryo of speech and all that can be affected by it. (Buitenen, 1959: 177-178). Further, he analyses the root of the word, and comments, "The etymology of the word *na kṣaratīti* has never been seriously questioned.

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[17] *Atha kimartho varṇānām updeśaḥ? Vṛtti-samavāyārtho varṇānām updeśaḥ|* (Patañjali, 1991:56, 59)

[18] tulyāsyaprayatnaṃ savarṇaṃ ‖ I.I.9. ‖ '(a pair of speech-sounds) which has the same articulatory effort in the mouth is (called) *savarṇa* "class-related" (with regard to each other).'… *Āsyaprayatna* taken in the sense of (articulatory) effort in the mouth involves both an articulatory (*kāraṇa*) and a place of articulation (*sthāna*). (Joshi & Roodbergen, 199: 13); "the word *āsya* 'mouth' is further explained as denoting the area beginning with the lips (*oṣṭha*) and extending up to but not including the *kākala* 'adam's apple'" (Sharma, 2000:14).

[19] *Ātmā buddhyā samartyārthān mano yuṅkte vivakṣayā / manaḥ kāyágnim āhanti sa prerayati mārutam* ‖ 6 ‖ (Ghosh 1938: 54)

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

13

An alternative etymology mentioned by Patañjali, from *Aś* with a suffixed *sara-*, has not found acceptance" (Buitenen, 1955: 204). Charles Li also uses 'syllable' as an equivalent to 'akṣara' stating that *śabdatattva* and *akṣara* are seen as Brahma by Bhartṛhari which accords '*akṣara*' two meanings— the first is the adjective meaning 'imparishable' and the second is a 'syllable' or 'sound' (Li, 2018: 449). Further, Buitenen speaks in this line and states, "The word started its career as an adjective, meaning "not flowing away, unperishing", seems obvious. But already in the most ancient source, the ṛgveda, the word is used in a specialized sense exclusively associated with Vāc, and Bergaigne for one would render the word everywhere with "syllable" <A. Bergaigne, Etudes sur le Lexique du Rigveda, J. As. 1883, pp. 480 ff., s. v. *akṣara*; a more qualified but substantially the same opinion gives H. Oldenberg, Vedische Untersuchungen 30, *akṣara*, *akṣara* in Rigveda (ZDMG, 63; 1909), pp. 293 ff.> (Buitenen, 1955: 204). Buitenen evidences his argument by citing the occurrences of *akṣara* with a meaning as 'syllable' in the Upanisads. He says, "Let us consider the other occurrences, BĀUp. 5,2,1; 3,1; 5,1; 5,3; 14,1-3; ChUp. 1,1.1; 5; 6; 7; 9; 10; 3,6-7; 4,1; 4-5; 2,10,3-4; 23,3; 8,3,5. In all these passages *akṣara* occurs in the sense of "syllable"(Buitenen, 1955: 205).

A syllable or *akṣara* is quite close to speech-sound has two components, "*svara*" and "*Vyañjana*" translated as "vowel" and "consonants" respectively. The Sanskrit grammar sees a vowel as self-ruling and consonant as a dependent on the vowel for its expression. Modern linguists also see a vowel as a syllable nucleus. Gleason, in this context argues, "We will call it a syllable nucleus, since it serves as the center of a syllable. A syllable nucleus will be defined as a vowel, or a vowel and a following semivowel" (Gleason, 1961: 28). In modern linguistics, syllables are classified as segmental, which are vowels and consonants; suprasegmental combines sound aspects other than consonants and vowels, such as pitch, accent and junctures, stress, and length of a language. Laver defines the phonological syllable as "a complex unit made up of nuclear (vowel) and marginal (consonant) elements" (Laver, 1994: 114). A grouping of segments forms a syllable, which has an onset, coda and nucleus, first two of which are formed by more constricted consonantal articulations, while the nucleus is formed by a vowel like more open articulation. However, Sanskrit '*akṣara*' and English 'syllable' like '*varṇa*' and 'phoneme' are not exactly similar to each other. Siddheshwar Varma in this context states "the Indian terms *Svara* and *Vyañjana* did not exactly correspond to the "vowel" and the "consonant" of modern phonetics. The Indian terms may have denoted "a syllabic sound" and a "non-syllabic sound" respectively. For the essential difference between *Svara* and *Vyañjana* lay in their relative dependence the *svara* was said to be "self-dependent," while the *Vyañjana* (literal meaning 'manifested by another' 'accessory')" (Varma, 1961: 57). Several western modern languages believe in the concept that a consonant can become an independent syllable occasionally (Varma, 1961: 56) for example, in the English language, *l* in tunnel, and ending *r* in rubber function as independent syllables. Varma, further states, "the general principle that a consonant could also form an independent syllable may have been recognized by Indian grammarians if they actually meant by *svara* "a syllabic sound", and not necessarily "a voiced sound accompanied by a free passage of air through the mouth, and not producing audible friction," which the modern term "vowel" signifies" (Varma, 1961: 57). To find the difference between consonants and vowels was quite tricky for modern linguists. Even Saussure, in one of his lectures, having provided a review of common sounds in European languages, admits that the difference between the vowels and the consonants is hard to determine (Joseph, 2012: 497).

However, Indian *śikṣākāras* (phoneticians) classified them in a better

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition...
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини...

14

manner a long time ago. Pāṇini never mentioned the name of any particular language in his treatise on the grammatical rules stating that his rules are specifically meant for this language, instead he used the term "*Bhāṣā*" (the literal translation of this is speech or language, but Pāṇini meant here "standard speech")[20], which also indicates that his grammar is not confined only to one language. Bronkhorst also concedes to this, and states, "His grammar is not an analysis of Sanskrit but a synthesis: it produces the words and sentences of the language, starting from their ultimate meaning-bearing constituents, essentially stems and affixes. To be precise, Pāṇini's grammar first furnishes stems and affixes on the basis of a semantic input, and these stems and affixes are subsequently joined together, and modified where necessary, so as to yield words and sentences" (Bronkhorst 1998: 138). In the *Pāṇiniya Śikṣā*, the classification of speech-sounds or *varṇa* is shown to have been based on five factors – namely, (a) according to the *svarataḥ* or pitch variation which the western knowledge system categorises under suprasegmental, the vowels are classified into three types, *udātta* (high pitch), *anudātta* (low pitch) and *svarita* (medium pitch) (b) *kālaḥ*, the literal translation of this term is time; but here it stands for quantity (*mātrā*) that maintains the time of articulation of a speech sound; on the basis of this factor, the vowels are again divided into three varieties, *hrasva* (short vowel), *dīrgha* (long vowel), and *pluta* (overlong vowel) (c) *sthānāt*, here means place of articulation which are eight in number – chest, throat, the roof of the mouth, root of the tongue, teeth, nostril, lips and palate (d) *prayatna* (primary effort), and (e) *anupradānataḥ* (secondary effort).[21] *Prayatna*

refers to primary efforts, efforts in adjusting the different parts of our mouth for articulation. The state before articulation is called *Prayatna* or primary effort, while after articulation, it becomes the secondary effort or *Anupradānataḥ*. Efforts are also divided into many types; primary efforts are five – *spṛṣṭa*, *iṣatspṛṣṭa*, *iṣatvivṛta*, *vivṛta* and *samvṛta* while secondary efforts are differentiated on the basis of sounds (*ghoṣa* and *aghoṣa*), breath system (*alpa prāṇa* and *mahā praṇa*) and pitch accents (*udātta, anūdatta*, and *svarita*) (Ghosh, 1938: 55-57).

(B) Production and classification of speech sounds: Indian and Western approaches

Modern Western linguists classified speech sounds into consonants and vowels. The consonant sounds are further divided into pulmonary and non-pulmonary sounds depending on whether the they are produced through lungs or without. The pulmonic consonants are further classified into voiceless and voiced sounds depending on whether there is vibration between vocal folds while producing the sound. These voiceless and voiced sounds are further categorised based on how they are produced and what organs are involved in their production, i.e.,

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…Which have fivefolded classification- according to their pitch, quantity, place of articulation, the primary effort and the secondary effort. So said those who wereversed in (pronouncing) speech-sounds. Learn this carefully (Ghosh, 1938: 54).

Udāttaś cánudāttaś ca svaritaś ca svarās trayaḥ | (11) PS.
"*There are three kinds of (pitch) accent: udātta, anudātta, and svarita*" (Ghosh, 1938: 58).

Hrasvo dīrghaḥ pluta iti kālato niyamā aci ‖ (11) PS.
"Among vowels short, long and *pluta* (super long) varieties are distinguished by their time (of articulation)." (Ghosh 1938: 58)

"*Aṣṭau sthānāni varṇānāṃ uraḥ kaṇṭhaḥ śiras tathā |*
jihvā-mūlaṃ ca dantāś ca nāsikóṣṭhau ca tālu ca ‖ (13) PS.
The speech- sounds have eight places (of articulation): chest, throat, roof of the mouth (lit. head), root of the tongue, teeth, nostril, lips and palate" (Ghosh, 1938: 59).

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[20] . Pāṇini himself does not use the name *saṃskṛta* for the language analysed and codified by him. He calls it simply *bhāṣā* 'speech', by which he means standard speech (Joshi and Roodbergen, 1995: 10).
[21] *Svarataḥ kālataḥ sthānāt prayatnánupradānataḥ |*
Iti varṇa-vidaḥ prāhur nipuṇaṃ taṃ nibodhata ‖ (10) PS.

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

15

manner of articulation and place of articulation.

When we compare the Indian and Western classification systems, we find that the Indian system is not only more robust and extensive, but also encompasses the Western system. The reason for saying this is that the majority of sounds in languages around the world are pulmonic consonants. And the system that engages with those sounds comprises mainly of 'place of articulation' and 'manner of articulation' along with whether they are voiced or voiceless sounds. As we discussed above, the Pāṇinian classification system already engaged with sounds and placed them in the sound chart according to their places and manners of articulation. However, there are other determinants to assess and place a pulmonic consonant sound in the traditional Indian system, such as the primary effort and the secondary effort. Since the Indian consonantal chart contains a number of aspirated sounds, they are placed right after their non-aspirated counterpart (k is followed by k^h, t is followed by t^h) in it. The voicing aspect is also taken care of by the Indian system as each voiceless sound is followed by its voiced counterpart, after the aspiration has been taken care of (k, k^h, g; t, t^h, d). Thus, the Western classification system of sounds has little to offer to the traditional Indian classification of sounds and even the early introduction of sounds in Indian context is done through a chart that is very precisely classified and categorised considering several of the phonetic parameters involved in the production of sounds. While Indian system of classification considers a range of factors to account for a sound's place in the phonetic chart, 'place of articulation' remains the key factor in its classification of consonants.

Aspiration is a very distinctive feature of Indian speech sounds, and the Indian consonantal chart places aspirated sounds right after their non-aspirated counterparts, as the two types of sound are produced in similar ways. The approaches of Pāṇinian grammar and the Western linguistics, when it comes to the analysis of aspirated sounds, appear slightly distinct. As in Pāṇinian system, voiced aspirated stops such as gh, jh, dh, ḍh, and bh have a 'h' sound at the end which is a type of emission known as '*hakara*'. Also known as "breathy voice", it occurs when due to the position of vocal cords between open and close, the voice or resonance combine with aspiration. While the Western system just uses the category of voicing to mark all voiced sounds. Indian ancient tradition characterised the voicing feature distinctly and uses two terms, instead of one, viz. *nāda* and *ghoṣa*. Vowels and *ghoṣavat* consonants i.e., voiced consonants, possess the nada feature. Many modern scholars agree that Sanskrit aspiration doesn't represent a unified phonetic phenomenon which stands valid for the statements of native Indian grammarians in the ancient phonetic treatises known as the *Pratiśākhya*, stating that the phonetic realization of the "voiceless aspirates" and the "voiced aspirates" have differences. Allen (1953: 38) explains, "the voiced aspirates are considered more fully voiced than the non-aspirates, and the voiceless aspirates more fully breathed than the non-aspirates", and if one uses only single cover feature "aspiration for both Th and Dh, then there will be a mismatch between the phonetics and the phonology of aspiration for the two sounds".

Thus, there are limitations to the structuralist analyses of sounds when it comes to explaining certain predominant features in Indian languages. What can be said very convincingly about the Western schools of linguistics is that even with the limitations in their analysis, a major portion of their concepts and theories find similarities and equivalence with that of the Indian traditional grammar. Manjali, in this regard, writes, "It has been noted by scholars that the Pāṇinian grammar was reborn in the last 150 years in three distinct and somewhat contrary interpretations. First, with William Dwight Whitney, it was understood as a grammar based on historical principles, then Bloomfield (who described Pāṇini's grammar as 'one of the greatest monuments of human

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition…
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини…

16

intelligence') viewed it is as a structural-descriptive grammar, and finally with Chomsky and his followers, it was reinterpreted as a generative grammar" (Manjali, 2012: 1). Since the foundational structure and idea of all the generative theories is structuralism and structuralist paradigm, as seen above, has been parallel with Pāṇinian views. These later theories also show a tendency to be influenced by Pāṇinian grammatical tradition. Before the 1950s, linguistics was more about the surface representation of language before the generative and cognitive movement stroke, i.e., what the speaker utters or produced. However, most of the current theories, such as Chomsky's generativism, deal with the intellect of the human brain, where the influence of the Pāṇinian school of grammar is very significant. Let us look at one of the modern theories of sound, which was developed in the 1960s, to understand the impact of Pāṇinian theories on this course of linguistics.

Distinctive features theory and the postulations of Pāṇinian grammatical system

The distinctive features theory came into light with *Sound Pattern of English* by Noam Chomsky and Morris Halle, published in 1968. It opposes the conception that phoneme is the minimal distinctive unit of a speech-sound system. This theory of distinctive features primarily developed in a collaborative work of Jakobson and Trubetzkoy in the 1930s during his stay in Czechoslovakia (Anderson 2021: 97, 137). It was Saussure's views on the role of segmental where he observes a contrast in visual signifiers and auditory signifiers as their elements are presented in succession forming a chain (Saussure, 1959: 70) offered a stronger ground for the succeeding linguists to accord features a more subtle place than a phoneme. In his *Course in General Linguistics*, Saussure addresses a phoneme as a linguistic feature, when he writes, "Take a linguistic feature *a* that can be replaced by *b*, *c*, *d*, etc." (Saussure, 1959: 197). However,

there were many differences between Saussure's propositions and the conceptions of the linguists who succeeded him. Roman Jakobson criticises Saussure severely (Jakobson, 1978: 97-107). Holdcroft, talking about Jakobson's criticism of Saussure, states, "These arguments turn on the fact that phonemes can be analyzed into bundles of features; /m/ and /n/, for instance, have the same features except for the fact that the latter is nasal and the former is not" (Holdcroft, 1991: 58). Further, to evidence his argument on Saussure's criticism by Jakobson, he cites Jacobson's words, "Bally, faithful to his master's doctrine, arrived at the thesis that it is impossible to pronounce two sounds at the same time! This argument is a *petitio principii…* Two phonemes cannot be emitted simultaneously. But it is perfectly possible to emit several distinctive features at the same time. Not only is this possible, it is what is normally done, since *phonemes are complex entities* <1978, 99>" (Holdcroft, 1991: 58). The term "distinctive" in distinctive feature theory is used to distinguish phonemes from features. This theory proposes that the most basic or minimal units of speech sounds are features, not phonemes, as the former cannot be broken into smaller units. One of the central propositions of this theory is that the linguistic features are stored in the brain as a "bundle of features". The distinctive feature theory talks about a binary feature that indicates the distinction by changing its values in plus (+) or (-) (Nelson, 2022. This (+) or (-) primarily replaces the existing system of classification on the basis of voicing of a sound. Here (+) represents the addition of voicing (+voice) to a sound which means a voiced sound, while (-) value indicates the subtraction (-voice) and it means a voiceless sound. These plus and minus values should not be mistaken as presence or absence of voicing rather addition or subtraction of these features. Similarly, this binary feature is used to represent the same situation in terms of nasality, syllabicity, level/type of constriction and sonority. The exponents of the theory claim that both plus

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

17

and minus groups of segments form natural classes. (+voice)/(-voice) represent such groups of segments.

The features, according to Halle and Clements (1983), and Sagey (1986), are divided into following four groups – (a) major-class features, where 'vowel' and 'obstruent' are the segment types that this feature classifies into. These features primarily serve to differentiate among consonants, vowels, and glides, explaining primarily about obstruction in the oral tract, syllabicity, and sonority. (b) The second called laryngeal features stipulate the glottal properties of the segments. These features are used for representing the glottal positions where it details whether the glottis is spread or constricted. (c) The manner of articulation or type of constriction is specified by the manner features. (d) The place features talk about the place of articulation (67). It goes unsaid that one of the primary concerns of the distinctive features theory is to present the speech-sounds in a more precise manner.

Now, if we turn to the Indian classical grammatical tradition and compare the theory and its purpose, Pāṇini's aphoristic style glimpsed through the *Śivasūtra* and his method of condensation called pratyahara take his *Aṣṭādhyāyī* to a unique pedestal, and reflects the motto precision from the beginning itself. His definition of '*savarṇa*' (homogenous) as "*Tulyasyaprayatnam savarṇam | (1.1.9)*" where it is explained that a sound which is produced with the same articulation effort (*prayatna*) from the same place of articulation (sthana) in the oral cavity as the other sound is stated to be '*savarṇa*' (homogenous) with the sound (Sharma, 2000: 13), offers a clear affinity with the natural class of the distinctive features theory[22].

Further, Madhav Deshpande in his article titled 'Pāṇini and the Distinctive Features' (1994-95), talks in detail about the whole set of features present in Pāṇini's grammar. What Patañjali states about substance is very much similar to the distinctive features proposed by Jacobson. Bimal Krishna Matilal talking about substance, cites Patañjali's view noted in Pāṇini-Sutra. He writes, "What Patañjali meant by substance here is what is called svabhāva 'own nature' or inherent nature of objects— something which is unique to each object and consequently accounts for its peculiarities" (1990: 384). Patañjali further calls it "a bundle of qualities, an integration of qualities" (Matilal, 1990: 385).[23] Further, the distinctive features theory seems to have its precedence even in Bhartṛhari's postulations. Bhartṛhari also proposes in his *Vākyapadīya* that the difference in *hrasva* (short), *dīrgha* (long), and *pluta* (prolate) vowels are due upon the features that are associated with the manner of articulation as the difference in *sphotaśabda* is due upon the difference caused by time as *ekmātrā*, *dvimātrā*, and *trimātrā*[24].

Thus, there is a range of undeniable similarities and precedence when one juxtaposes distinctive feature theory with the theories of Pāṇinian grammarians. While Bhartṛhari's distinctive feature theory may seem slightly metaphysical and hence tricky

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[22] Madhav Deshpande too talks on this and states, "The second kind of natural class results from Pāṇini's definition of the term 'homogeneous' (*savarṇa*), through which sounds having a common point-of-articulation feature and a common internal-effort feature are grouped together as homogeneous sounds. By this means short and long vowels are grouped together as a class (e.g., a and ā, I and ī, etc.); likewise

stops sharing a particular point-of-articulation feature (e.g., k, kh, g, gh, and /ṅ). Classes of this type are usually represented in rules not directly by featural terms, but by specified tokens to represent the types or classes" (90).

[23] "*anvarthaṃ khalvapi nirvacanaṃ—guṇasaṃdrāvo dravyam iti*"— Patañjali under Pāṇini-Sūtra 5.1.119. Also: "*guṇa-samudāyo dravyam*" - Patañjali under Pāṇini-Sūtra 4.1.3.

[24] *Svabhāvbhedānnityatve hrasvadīrghaplutadiṣu | prākṛtasya dhvaneḥ kālaḥ śabdsyetthupacaryate ||* (VP. 1.76.)
(With regard to the short, long and prolated vowels, since a speech-unit (here, a vowel) is (essentially) timeless, and (therefore) fundamentally different (from the speech-sound which reveals it), it is the time of the primary-sound which is metaphorically considered as belonging to the speech-unit) (Pillai, 1971:16).

Dwivedi P. S., Singh A. K. A Comparative Reading of Pāṇinian Grammatical Tradition...
Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини...

18

to fit in the modern schema of linguistics, Pāṇini's *Śivasūtras* are technical and completely compatible with the modern phonetic theory. This is despite the fact that Pāṇini grouped all these phonemes, and so the distinctive features seem secondary here. The code of language that the *Aṣṭādhyāyī* focused on was precision and economy of language. Thus, even the most modern theories of sounds based in the generative principle, such as that of Distinctive features, are not entirely free from the influence of Indian grammatical tradition, what we also see that the ancient theories from India still surpass their modern predecessors in a more comprehensive and precise analysis of linguistic units and their traits, such as a phoneme and its segmental and suprasegmental features.

Conclusion

In light of the above discussion, it is safe to state that modern linguistic theory owes a significant extent to Pāṇinian grammatical tradition. Oriental school of linguistics led by Sir William Jones when encountered the Indian grammatical tradition enriched a lot from it, which Jones admitted on several occasion, and that started a series of influences of Pāṇinian grammar on the European linguistic tradition. The structural philosophy of language in the West, which proved to be a benchmark for modern linguistics, finds its parallel with several theories of Pāṇini and other Indian scholars of Pāṇinian tradition. Saussure's great exposure with the texts of Sanskrit and the linguistic analysis presented in those texts shaped most of his discourse on the structural philosophy of language. Even in the theories that followed the structural theory of Saussure, the contributions of Pāṇinian postulations can be seen to a significant extent. Whether it was the generative theory that was put forward by Chomsky or the distinctive feature theory popularised by Chomsky and Halle, those find evident semblance with the ancient Indian linguistic theories of Pāṇinian tradition. The above discussion also neatly summarises the advancement of the Indian phonetic and phonological knowledge system over its twentieth-century European counterpart. Indian theories took into cognizance the value of systematizing speech sounds in consideration with their articulation and speech-time, which the western system has often ignored or has been a lot more revisionist in its approach. Thus, Sanskrit scholars and Sanskrit sound system represent a much deeper and nuanced understanding of *dhvani* which has only later been studied by the Western scholars and has influenced their own analysis and categorization of sounds in the European languages. Distinctive Feature Theory, which has been a significant revelation in the study of sounds, is deep-rooted in the Maheshwar Sutras of Pāṇini and class features have been very clearly described in the *Aṣṭādhyāyī*. Adding to that, the premise of Distinctive Features is built on considering phonemes as a bundle of features that has been attested by several linguists and has again been at the very heart of Pāṇinian grammar. Generative theory by Chomsky, which was considered to be a paradigm shift away from structuralism, is again covered by the Pāṇinian grammar, which also proves that while Western linguistic theories have been limited in their scope, Indian theories have more profound sophistication and complexity that makes them a precursor to several of the western theories which are considered fundamentally different in their scope and vision. Thus, there is no denying that starting from neogrammarian study to structuralism, and from the structuralism to the generativism, almost every significant development in phonetic and phonological theory that happened in the West goes through the road laid out by Pāṇini and his successors. And so, this fact cannot be overstated that in the absence of Pāṇinian grammar, the Western schools of linguistics would have remained devoid of a theoretical richness and practical refinedness. Lastly, it is also evident that the Western linguistics while owing to the rich Pāṇini a tradition lacks on several front when compared to the latter and thus just like the past, the future road of the Western linguistics might also be intertwined with the rich

Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

19

theoretical understanding that is encompassed in these ancient Indian texts.

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Двиведи П. Ш., Сингх А. К. Сравнительный анализ грамматической традиции Панини...

20

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Научный результат. Вопросы теоретической и прикладной лингвистики. Т. 11, №2 2025
Research result. Theoretical and Applied Linguistics, 11 (2). 2025

21

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