

Shabdabodha and the Machine: Mimamsa, Nyaya and Vyakarana Theories of Sentence Meaning as a Critical Framework for Large Language Models

Dr. Devendra Singh

Assistant Professor, Department of Sanskrit Language and Literature
Sanchi University of Buddhist-Indic Studies, Sanchi, Madhya Pradesh

Abstract: *The rapid rise of large language models has revived an old question in a new form: what does it mean to understand a sentence? The Indian Knowledge System (IKS) possesses one of the most sustained traditions of reflection on this question, developed over nearly two millennia by the Mimamsa, Nyaya and Vyakarana schools under the name shabdabodha, the cognition that arises from words. This paper undertakes a textual and comparative study of these theories and examines their relevance for evaluating machine-generated language. The Mimamsa definition of the sentence, the debate between abhihitānvayavāda and anvītabhidhanavāda, the holistic doctrine of Bharthari, the Nyaya conditions of akanksha, yogyāta, asatti and tatparya, and the classical account of how word-meaning is acquired are analysed from primary Sanskrit sources. It is argued that the contrast between static word embeddings and contextual transformer representations closely parallels the contrast between the Bhatta and Prabhakara theories of sentence meaning, and that the distributional learning of language models corresponds to only two of the eight classical means of grasping word-meaning. The central thesis of the paper is that machine-generated text can satisfy the formal conditions of shabdabodha while failing the conditions of shabda-pramāna, because the Nyaya criterion of the apta, the trustworthy speaker, is not met. On this basis a four-level diagnostic framework and the concept of superimposed intention (aropita-tatparya) are proposed. The study concludes that IKS offers not a nostalgic parallel but a rigorous evaluative vocabulary for the age of artificial intelligence.*

Keywords: Indian Knowledge System, Shabdabodha, Mimamsa, Nyaya, Bharthari, Testimony, Large Language Models, Sanskrit Semantics

1. Introduction

The National Education Policy 2020 calls for the integration of the Indian Knowledge System into higher education, not merely as heritage to be preserved but as a living body of thought capable of addressing contemporary problems [1]. A frequent weakness in the current literature on IKS is that it either catalogues ancient achievements or draws loose analogies between ancient ideas and modern technology. Neither approach does justice to the argumentative rigour of the śāstra tradition. The present paper attempts a different route: it takes one precise technical doctrine of Sanskrit philosophy of language, the theory of śābdabodha, and asks whether it can function as a critical instrument for analysing one of the most discussed technologies of the present age, the large language model (LLM).

Large language models such as those built on the transformer architecture [2] generate fluent, grammatical and contextually appropriate sentences on almost any subject. Their fluency has given rise to a sharp debate. One side holds that models trained only on linguistic form cannot, in principle, acquire meaning [3]; the other side points to their practical competence. The same models are also known to produce confident statements that are false, a phenomenon usually called hallucination [4]. Both the debate about understanding and the problem of hallucination are, at bottom, questions that the Sanskrit tradition has treated with great precision: what are the conditions under which a sequence of words produces a cognition of sentence-meaning, and under what conditions is that cognition valid knowledge (pramā)?

The R̥gveda already distinguishes between hearing speech and truly receiving it:

uta tvaḥ paśyan na dadarśa vācam uta tvaḥ śṛṇvan na śṛṇoty enām |
uto tvasmai tanvaṃ vi sasre jāyeva patya uśatī suvāsāḥ ||
(R̥gveda 10.71.4)

One sees speech and yet does not see it; one hears it and yet does not hear it [5]. The verse draws a line between the perception of linguistic form and the disclosure of meaning. The present study argues that later śāstra converted this poetic insight into an exact theory, and that this theory permits a distinction which is largely absent from current discussions of artificial intelligence: the distinction between śābdabodha (verbal cognition) and śabda-pramā (valid knowledge from testimony).

2. Objectives of the Study

The study has the following objectives: (1) to reconstruct, from primary sources, the principal Indian theories of sentence meaning in the Mīmāṃsā, Nyāya and Vyākaraṇa traditions; (2) to examine the classical account of how the relation between word and meaning (śakti) is learnt; (3) to compare these doctrines with the representational methods of contemporary language models, identifying both genuine correspondences and points of divergence; (4) to evaluate the epistemic status of machine-generated text in the light of the Nyāya theory of testimony and the Mīmāṃsā-Nyāya debate on the validity of cognition; and (5) to propose a diagnostic framework, grounded in śāstric categories, that may be useful in teaching IKS and in the critical assessment of AI-generated content.

3. Research Methodology

The study is qualitative and follows the textual-hermeneutic method customary in Sanskrit scholarship, combined with comparative-analytical reasoning. Primary sources consulted include the Mīmāṃsāsūtra with the Śābarabhāṣya [6], the Ślokaṇvārttika of Kumārila Bhaṭṭa [7], the Prakaraṇapañcikā of Śālikanātha [8], the Nyāyasūtra with the Bhāṣya of Vātsyāyana [9], the Tarkasaṃgraha of Annambhaṭṭa [10], the Śabdaśaktiprakāśikā of Jagadīśa Tarkālaṅkāra [11] and the Vākyapadīya of Bhartṛhari [12]. Each doctrine is first stated in its own terms, with the pūrvapakṣa and siddhānta where relevant, and only then placed beside a computational concept. Care has been taken to treat correspondences as structural analogies to be tested, not as claims of historical influence. No empirical experiments on particular software systems were performed; illustrative examples are constructed for the purpose of conceptual analysis.

4. Review of Literature

Modern scholarship on Indian semantics was consolidated by Kunjunni Raja (1963), whose survey remains the standard account of the theories of word-meaning, sentence-meaning and suggestion [13]. Matilal (1990) presented the Indian contribution to philosophy of language in dialogue with analytic philosophy [14], and Ganeri (1999) examined the relation between meaning and the means of knowing [15]. The epistemology of testimony received focused treatment in the volume edited by Matilal and Chakrabarti (1994) [16]. Bhartṛhari was studied comprehensively by Iyer (1969) [17] and within the Encyclopedia of Indian Philosophies edited by Coward and Kunjunni Raja (1990) [18]. The Mīmāṃsā system was expounded from its sources by Ganganatha Jha (1942) [19].

The computational relevance of Sanskrit was brought to wide attention by Briggs (1985), who compared the analysis of Sanskrit sentences by the grammarians with semantic networks in artificial intelligence [20]. Bharati, Chaitanya and Sangal (1995) developed a Pāṇinian framework for natural language processing based on kāraṇa relations [21], and Kulkarni (2019) built a Sanskrit parser explicitly on the theories of śābdabodha [22]. Recent introductions to IKS have included Indian linguistics as one of the major domains of the tradition [23].

On the computational side, the distributional hypothesis of Harris (1954) and Firth (1957) underlies the representation of words as vectors [24, 25], first as static embeddings [26] and later as contextual representations produced by transformer networks [2, 27]. The critique that form alone cannot yield meaning was advanced by Bender and Koller (2020) [3] and extended to questions of accountability by Bender, et al. (2021) [28]. It is observed that existing IKS studies have concentrated almost entirely on Pāṇinian grammar and its use in parsing. The later Mīmāṃsā and Nyāya debates on sentence meaning, and above all the Nyāya theory of testimony, have not been systematically brought to bear on generative language models. This gap is addressed in the present paper.

5. The Sentence as the Unit of Meaning in the Indian Tradition

5.1 The Mīmāṃsā Definition of the Sentence

Because the Mīmāṃsā school was concerned with extracting injunctions from Vedic sentences, it needed a clear criterion of where one sentence ends and another begins. Jaimini supplies it:

arthaikatvād ekaṃ vākyam sākāṅkṣam ced vibhāge syāt |
(Mīmāṃsāsūtra 2.1.46)

A group of words is one sentence when it serves a single purpose, and when its parts, if separated, would remain in mutual expectancy [6]. Two criteria are combined here: unity of purpose (arthaikatva) and mutual expectancy (sākāṅkṣatva). The first is functional and the second is structural. This double criterion is significant, because it anticipates the later distinction between a sentence that is merely well-formed and a sentence that serves a communicative purpose.

5.2 Abhihitānvayavāda and Anvitābhīdhānavāda

The most celebrated debate on sentence meaning took place within Mīmāṃsā itself. According to Kumārila Bhaṭṭa and his followers, the Bhāṭṭas, each word first expresses its own isolated meaning (padārtha); these word-meanings, once presented, are then connected with one another, and the connected whole is the sentence-meaning. This is abhihitānvayavāda, the theory of the connection of what has been expressed [13, 19]. The relation between the word-meanings is not itself denoted by any word; it is conveyed by the word-meanings through a secondary function.

Prabhākara and his follower Śālikanātha rejected this view. According to them, a word never denotes a bare, isolated meaning; it always denotes its meaning as already connected with the meanings of the other words in the sentence. The child learns language by watching elders act upon complete sentences such as “bring the cow”, and hence the word is learnt from the beginning as meaning something-in-relation. This is anvitābhīdhānavāda, the theory of the expression of the already-connected [8, 13]. On this view there is no stage at which isolated word-meanings exist in verbal cognition; the sentence-meaning is directly denoted, but each word contributes its part of it.

The difference between the two positions may be stated in modern terms as a difference between compositional build-up and contextual determination. For the Bhāṭṭa, meaning is assembled upward from independent units; for the Prabhākara, the meaning of every unit is from the outset a function of the whole in which it occurs.

5.3 Bhartṛhari and the Indivisible Sentence

The grammarian-philosopher Bhartṛhari goes further than either Mīmāṃsā school. For him the sentence is an indivisible unit of meaning (akhaṇḍa-vākya), and words and their meanings are abstractions made by grammarians for the purpose of analysis [17, 18]. The meaning of a sentence is

grasped in a single flash of understanding called pratibhā, which Bhartṛhari treats as the natural competence of every language user, present even in animals and children [12]. His well-known verse on the pervasiveness of language states:

na so 'sti pratyayo loke yaḥ śabdānugamād r̥te |
anuviddham iva jñānam sarvaṃ śabdena bhāṣate ||
(Vākyapadīya 1.123, Rau edition)

There is no cognition in the world that is not accompanied by the word; all knowledge shines as though interwoven with language [12]. Bhartṛhari also enumerates, in the second book of the Vākyapadīya, the factors that fix the meaning of an ambiguous word, among them association, dissociation, co-occurrence, opposition, purpose, context (prakaraṇa), the proximity of another word, time and place [12, 17]. This is, in effect, a classical theory of contextual disambiguation.

5.4 The Nyāya Conditions of Verbal Cognition

The Nyāya school, especially in its later form, systematised the conditions under which words produce a cognition of sentence-meaning. Annaṃbhaṭṭa states them concisely:

ākāṅkṣā yogyatā sannidhiś ca vākyārthajñāne hetuḥ |
(Tarkasaṃgraha)

Expectancy, compatibility and proximity are the causes of the knowledge of sentence-meaning [10]. Each term is then defined:

padasya padāntaravyatirekaprayuktānvayānanubhāvakatvam
ākāṅkṣā |
arthābādho yogyatā | padānām avilambenoccāraṇam
sannidhiḥ || (Tarkasaṃgraha)

Ākāṅkṣā (expectancy) is the inability of a word to produce a cognition of connection without another word; the classical counter-example is a mere list such as “gaur aśvaḥ puruṣo hastī” (cow, horse, man, elephant), which produces no sentence-meaning. Yogyatā (compatibility) is the absence of contradiction in the meaning; the counter-example is “vahninā siṅcati” (he sprinkles with fire), which is grammatically complete but semantically impossible. Sannidhi or āsatti (proximity) is the utterance of words without undue interval; words spoken one per hour do not form a sentence [10, 13]. To these three the tradition adds a fourth condition, tātparya, the intention of the speaker, summarised by Viśvanātha in the phrase “vaktricchā tu tātparyam”, intention is the wish of the speaker. Tātparya is needed to decide between possible readings, as in the case of “saindhavam ānaya” (bring the saindhava), where the word may mean salt or a horse and only the speaker’s intention, inferred from context, settles the matter [13, 14].

It is important to note that yogyatā is defined negatively, as arthābādha, the non-contradiction of the meaning. Non-contradiction is always relative to what is known through other means of knowledge. A sentence is yogya only in relation to a background of perception, inference and prior testimony. This point will prove decisive in the analysis of machine-generated text in section 8.

6. The Acquisition of Word-Meaning and Distributional Learning

How does a speaker come to know the capacity (śakti) of a word to signify its meaning? Jagadīśa Tarkālaṅkāra records the traditional answer in a well-known verse:

śaktigrahaṃ vyākaraṇopamānaśāptavākyād vyavahārataś
ca |
vākyasya śeṣād vivṛter vadanti sānnidhyataḥ siddhapadasya
vṛddhāḥ || (Śabdaśaktiprakāśikā)

The elders say that the meaning of a word is grasped from eight sources: grammar (vyākaraṇa), comparison (upamāna), lexicon (kośa), the statement of a trustworthy person (āptavākya), usage (vyavahāra), the remainder of the sentence (vākyāśeṣa), explanation (vivṛti) and the proximity of a word whose meaning is already known (siddhapada-sānnidhya) [11, 13].

This list offers a precise means of locating the learning procedure of language models. A model trained on large corpora learns what might be called the śakti of tokens almost entirely from vākyāśeṣa and siddhapada-sānnidhya, that is, from the words that surround a word and from co-occurrence with words whose use is already partly established. This is exactly the distributional hypothesis, according to which words occurring in similar contexts have similar meanings [24], and which Firth condensed into the dictum that a word is known by the company it keeps [25]. Vyavahāra in the classical sense, however, means observing the practical behaviour of people in response to sentences, as when the child sees the cow brought after the command “bring the cow”. The model has access only to the textual trace of vyavahāra, not to the action and its object. Upamāna, which requires perceptual recognition of similarity with a described object, and āptavākya, which requires a trustworthy teacher, are likewise absent in their full sense.

The classical list thus explains both the strength and the limitation of these systems. They are extraordinarily good at the two sources that are internal to language, and correspondingly weak at those that tie language to the world and to responsible speakers. The critique of Bender and Koller (2020) that meaning cannot be learnt from form alone [3] may be restated in śāstric terms: a learner restricted to vākyāśeṣa and sānnidhya lacks the grounding sources that the tradition regarded as necessary for a complete śaktigraha.

7. Comparative Analysis: Classical Theories and Language Models

The contrast between the Bhāṭṭa and Prābhākara theories finds a close structural parallel in the history of computational semantics. Early vector methods such as word2vec assigned each word a single fixed vector, learnt independently of any particular sentence [26]. The meaning of a sentence was then obtained by combining these independent vectors. This is structurally an abhihitānvaya model: isolated padārthas are first presented and then

connected. The transformer architecture changed this situation. Through the mechanism of self-attention, the representation of every token is computed in relation to every other token in the sequence [2], so that the same word receives a different representation in each sentence [27, 29]. There is no stage at which the word carries an isolated meaning inside the model; its representation is always already relational. This is structurally an anvitābhidhāna model.

The parallel is instructive because the Prābhākara argument for anvitābhidhāna was based precisely on how language is learnt: since words are learnt only within sentences, they are

never known in isolation. Contextual models are trained in the same manner, and their empirical superiority over static embeddings may be read as a modern vindication of the Prābhākara insight. At the same time, Bhartṛhari's doctrine of the indivisible sentence and pratibhā has no straightforward computational counterpart. Language models generate text token by token, and although their internal representations are holistic in the sense described above, the instantaneous and non-sequential grasp of meaning that Bhartṛhari calls pratibhā is a claim about consciousness which no present architecture can be said to satisfy. The correspondences are summarised in Table 1.

Table 1: Classical Theories of Sentence Meaning and Their Computational Analogues

Classical Doctrine	Core Claim	Computational Analogue	Degree of Correspondence
Abhihitānvayavāda (Kumārila)	Words express isolated meanings, which are then connected	Static word embeddings combined into sentence vectors	Strong structural parallel
Anvitābhidhānavāda (Prabhākara)	Words express meanings already connected with other words	Contextual representations through self-attention	Strong structural parallel
Akhaṇḍa-vākya and pratibhā (Bhartṛhari)	The sentence is an indivisible unit grasped in a flash	Whole-sequence representation, but sequential generation	Partial; pratibhā as conscious insight has no analogue
Contextual determinants (Vākyapadīya, book 2)	Context, co-occurrence and proximity fix ambiguous meaning	Contextual disambiguation of polysemous tokens	Strong functional parallel
Eight means of śaktigraha (Jagadīśa)	Word-meaning is learnt from eight sources	Learning from vākyaśeṣa and sānnidhya only	Partial; grounding sources absent

It must be stressed that these are parallels of structure and not claims of identity or influence. The Mīmāṃsakas were analysing human verbal cognition, which is a conscious event (jñāna) in a knower, whereas the computational systems manipulate numerical representations. The value of the comparison lies in the fact that the śāstric debate had already mapped the logical options with great clarity, so that the historical development of computational semantics can be seen as a movement from one classical position to another.

8. Śābdabodha Is Not Śabda-Pramā: Testimony and Machine-Generated Text

8.1 The Āpta and the Question of the Speaker

The Nyāyasūtra defines verbal testimony as a means of knowledge in five words: āptopadeśaḥ śabdaḥ | (Nyāyasūtra 1.1.7)

Śabda as a pramāṇa is the instruction of an āpta, a trustworthy person [9]. Vātsyāyana explains the āpta as “sākṣātkṛtadharmā yathādr̥ṣṭasyārthasya cikhyāpayiṣayā prayukta upadeśā”: the āpta is one who has direct knowledge of the matter and who is moved to speak by the desire to communicate the thing exactly as it has been known [9]. Three components can be distinguished in this definition: (1) direct acquaintance with the object (sākṣātkṛtadharmitva); (2) fidelity of the statement to what is known (yathādr̥ṣṭatva); and (3) the communicative motive (cikhyāpayiṣā).

The significance of this definition is that it separates two things which are often confused in debates on artificial intelligence. The first is the production, in the hearer, of a cognition of sentence-meaning. This requires only ākāṅkṣā, yogyatā, āsatti and an ascertainable tātparya. The second is

the validity of that cognition as knowledge. This additionally requires that the source be an āpta. The tradition is clear that false sentences also produce śābdabodha; a hearer understands a lie perfectly well. Understanding is one thing, knowledge another [16, 15].

Machine-generated sentences routinely satisfy ākāṅkṣā and āsatti, since they are grammatical and continuous. They usually satisfy yogyatā in the weak, internal sense that they contain no obvious contradiction, although yogyatā in the full sense of arthābādha can only be checked against other pramāṇas. With respect to the three marks of the āpta, however, the position is different. A language model has no direct acquaintance with the objects it describes; it has only the textual traces of others' acquaintance. Its statements are not produced by fidelity to something known, but by the selection of probable continuations. And it has no desire to communicate in the sense of cikhyāpayiṣā. It follows that the output of such a system produces śābdabodha in the reader but cannot, by itself, count as śabda-pramāṇa in the strict Nyāya sense. The phenomenon of hallucination [4] is precisely a case of fluent śābdabodha without pramā.

A further consequence concerns tātparya. Since the model has no intention of its own, the tātparya that the reader ascribes to its sentences is borrowed: it derives partly from the human prompt that initiated the generation and partly from the reader's own interpretation of context. The present paper proposes the term āropita-tātparya (superimposed intention) for this situation. The reader superimposes a speaker's intention upon text that was not produced by an intending speaker, just as, in the classical example of the rope and the snake, a property is superimposed upon a locus that does not possess it. Recognising the superimposition is the first step towards the responsible use of such text.

8.2 Intrinsic and Extrinsic Validity

The Mīmāṃsā and Nyāya schools disagreed on whether the validity of a cognition is intrinsic or extrinsic. Kumārila maintained intrinsic validity:

svataḥ sarvapramāṇānām prāmāṇyam iti gamyatām |
na hi svato 'satī śaktiḥ kartum anyena śakyate ||
(Ślokavārttika, Codanāsūtra 47)

The validity of all means of knowledge should be understood as intrinsic, for a capacity that is not inherent cannot be produced by something else [7]. On this view a cognition is accepted as valid by default and is set aside only when a contradicting cognition (bādhaka-jñāna) arises or when a defect in its cause (kāraṇa-doṣa) is known. The Nyāya school held instead that validity is established extrinsically (parataḥ), through verification by other means, such as successful action [14, 30].

It might appear that the Mīmāṃsā position licenses the acceptance of machine-generated statements until they are contradicted. A careful reading shows the opposite. Even for

Kumārila, the default acceptance is withdrawn when a defect in the cause is known. In the case of a language model, the nature of the cause is known in advance: the text is produced by probabilistic continuation without acquaintance or communicative intention. This is a standing, general knowledge of kāraṇa-doṣa. Hence, even on the principle of svataḥ-prāmāṇya, the default validity of such statements is suspended, and on the Nyāya principle of parataḥ-prāmāṇya verification is required in any case. Both schools therefore converge on the same practical conclusion: machine-generated statements must be treated as candidates for knowledge that await examination (parīkṣā), not as testimony in the full sense.

8.3 A Four-Level Diagnostic Framework

On the basis of the preceding analysis, a four-level framework is proposed for the critical reading of machine-generated text. The first three levels correspond to the classical conditions of śābdabodha and the fourth to the conditions of śabda-pramā. The framework is intended for use in classrooms and in the assessment of AI-assisted writing, and is presented in Table 2.

Table 2: A Śābdabodha-Based Diagnostic Framework for Machine-Generated Text

Level	Classical Condition	Diagnostic Question	Illustrative Failure
1	Ākāṅkṣā and āsatti	Is the text syntactically complete and continuous?	Fragmented lists or broken sentences (rare in current systems)
2	Yogyatā (arthābādha)	Is the meaning free from contradiction with perception, inference and reliable prior testimony?	A fabricated citation or a non-existent historical event stated as fact
3	Tātparya	Whose intention does the text express, and is the ascribed intention recognised as āropita?	Reading persuasive intent or authority into text that has no author
4	Āptatva (sākṣātkṛtva, yathādr̥ṣṭatva, cikhyāpayiṣā)	Has the claim been verified against an āpta source or another pramāṇa?	Accepting fluent output as knowledge without parīkṣā

A text that passes the first three levels yields śābdabodha: it is understood. Only a text that also passes the fourth level yields knowledge that may be relied upon. The framework thus formalises the Ṛgvedic insight with which this paper began: to hear speech is not yet to receive its truth.

9. Implications for Pedagogy and the IKS Curriculum

Three implications for teaching follow from this study. First, the theories of śābdabodha can be taught not as museum pieces but as a working analytical vocabulary. Students of computer science, linguistics and philosophy can be introduced to ākāṅkṣā, yogyatā, āsatti and tātparya as criteria that sharpen their understanding of what language models do and do not do. Second, the Nyāya theory of the āpta provides an indigenous foundation for information literacy. The habit of asking whether a statement comes from a source with direct knowledge, fidelity and communicative responsibility is exactly the habit required in an environment saturated with generated text. Third, the Bhāṭṭa-Prābhākara debate offers an unusually clear historical case study for courses on computational linguistics, showing that the choice between compositional and contextual models of meaning had been argued in depth long before it became an engineering question [21, 22].

It is suggested that an interdisciplinary module titled “Śābdabodha and Computational Semantics” be designed for undergraduate and postgraduate programmes, combining the reading of selected passages from the Tarkasaṃgraha, Ślokavārttika and Vākyapadīya with practical exercises in evaluating machine-generated text through the framework in Table 2. Such a module would meet the aim of NEP 2020 to integrate IKS with contemporary disciplines [1, 23] while preserving the textual rigour of Sanskrit scholarship.

10. Limitations of the Study

The study is conceptual and does not include empirical testing of particular systems. The correspondences proposed in section 7 are structural analogies and should not be read as claims that the ancient authors anticipated specific technologies. Verse numbering in the Vākyapadīya and other texts differs between editions, and the numbers cited here follow the editions listed in the references. The concept of āropita-tātparya is offered as a proposal for further discussion and would benefit from examination by specialists in Navya-Nyāya and Vedānta, where the theory of superimposition (adhyāsa) is developed in detail.

11. Conclusion

The Sanskrit tradition did not merely describe language; it analysed the conditions under which language becomes

knowledge. When its categories are applied carefully to a technology that produces language at scale, they reveal a distinction that popular discussion tends to blur. The Prābhākara insight that words are always meant in relation is confirmed by the success of contextual models, and Jagadīśa's list of the means of learning word-meaning shows precisely which sources such models possess and which they lack. Most importantly, the Nyāya separation of verbal cognition from valid testimony, supported by the definition of the āpta and by the shared recognition of kāraṇa-doṣa in both Mīmāṃsā and Nyāya, explains why fluent machine text can be understood without being trustworthy. Further research may extend this framework to the Alankāra theories of lakṣaṇā and vyañjanā, which concern figurative and suggested meaning, and to empirical studies that test the diagnostic levels on actual outputs. The study thus supports the claim that the Indian Knowledge System, read with rigour, can contribute a critical vocabulary of lasting value to the age of artificial intelligence.

Conflict of Interest

The author declares that there is no conflict of interest. The study was not sponsored by any organisation.

References

- [1] Ministry of Education, Government of India, "National Education Policy 2020", Ministry of Education, New Delhi, 2020.
- [2] Ashish Vaswani, et al., "Attention Is All You Need", Advances in Neural Information Processing Systems 30, 2017, 5998–6008.
- [3] Emily M. Bender, Alexander Koller, "Climbing towards NLU: On Meaning, Form, and Understanding in the Age of Data", Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics, 2020, 5185–5198.
- [4] Ziwei Ji, et al., "Survey of Hallucination in Natural Language Generation", ACM Computing Surveys, 2023, 55 (12), 1–38.
- [5] Rgveda-Samhitā with the Commentary of Sāyaṇācārya, Vaidika Saṁśodhana Maṇḍala, Poona, 1933–1951.
- [6] Ganganatha Jha (Trans.), "Śābara-Bhāṣya", Gaekwad's Oriental Series, Oriental Institute, Baroda, 1933–1936.
- [7] Kumārila Bhaṭṭa, "Śloka-vārttika", Dvārikādāsa Śāstrī (Ed.), Tara Publications, Varanasi, 1978.
- [8] Śālikanātha Miśra, "Prakaraṇapañcikā", A. Subrahmanya Sastri (Ed.), Banaras Hindu University, Varanasi, 1961.
- [9] Ganganatha Jha (Trans.), "The Nyāya-Sūtras of Gautama with the Bhāṣya of Vātsyāyana and the Vārtika of Uddyotakara", Motilal Banarsidass, Delhi, 1984.
- [10] Annambhaṭṭa, "Tarka-Saṁgraha with the Dīpikā", Yashwant Vasudev Athalye, Mahadev Rajaram Bodas (Eds.), Bhandarkar Oriental Research Institute, Poona, 1930.
- [11] Jagadīśa Tarkālaṅkāra, "Śabdaśaktiprakāśikā", Chowkhamba Sanskrit Series Office, Varanasi.
- [12] Bhartṛhari, "Vākyapadīya", Wilhelm Rau (Ed.), Franz Steiner Verlag, Wiesbaden, 1977.
- [13] K. Kunjunni Raja, "Indian Theories of Meaning", Adyar Library and Research Centre, Madras, 1963.
- [14] Bimal Krishna Matilal, "The Word and the World: India's Contribution to the Study of Language", Oxford University Press, Delhi, 1990.
- [15] Jonardon Ganeri, "Semantic Powers: Meaning and the Means of Knowing in Classical Indian Philosophy", Clarendon Press, Oxford, 1999.
- [16] Bimal Krishna Matilal, Arindam Chakrabarti (Eds.), "Knowing from Words: Western and Indian Philosophical Analysis of Understanding and Testimony", Kluwer Academic Publishers, Dordrecht, 1994.
- [17] K.A. Subramania Iyer, "Bhartṛhari: A Study of the Vākyapadīya in the Light of the Ancient Commentaries", Deccan College, Poona, 1969.
- [18] Harold G. Coward, K. Kunjunni Raja (Eds.), "The Philosophy of the Grammarians", Encyclopedia of Indian Philosophies, Motilal Banarsidass, Delhi, 1990.
- [19] Ganganatha Jha, "Pūrva-Mīmāṃsā in Its Sources", Benares Hindu University, Benares, 1942.
- [20] Rick Briggs, "Knowledge Representation in Sanskrit and Artificial Intelligence", AI Magazine, 1985, 6 (1), 32–39.
- [21] Akshar Bharati, Vineet Chaitanya, Rajeev Sangal, "Natural Language Processing: A Paninian Perspective", Prentice-Hall of India, New Delhi, 1995.
- [22] Amba Kulkarni, "Sanskrit Parsing: Based on the Theories of Śābdabodha", Indian Institute of Advanced Study, Shimla and D.K. Printworld, New Delhi, 2019.
- [23] B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R.N., "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning, New Delhi, 2022.
- [24] Zellig S. Harris, "Distributional Structure", Word, 1954, 10 (2–3), 146–162.
- [25] John Rupert Firth, "A Synopsis of Linguistic Theory, 1930–1955", Studies in Linguistic Analysis, Philological Society, Oxford, 1957, 1–32.
- [26] Tomas Mikolov, et al., "Efficient Estimation of Word Representations in Vector Space", arXiv preprint arXiv:1301.3781, 2013.
- [27] Jacob Devlin, et al., "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding", Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics, 2019, 4171–4186.
- [28] Emily M. Bender, et al., "On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?", Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency, 2021, 610–623.
- [29] Anna Rogers, Olga Kovaleva, Anna Rumshisky, "A Primer in BERTology: What We Know About How BERT Works", Transactions of the Association for Computational Linguistics, 2020, 8, 842–866.
- [30] J.N. Mohanty, "Classical Indian Philosophy", Rowman and Littlefield, Lanham, 2000.