

Propositional Logic fashion in Navya-Nyāya bequest

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Introduction

Propositional logic focuses upon the concept and features of proposition, complex and simple alike, in its extended postulation of truth-value appraisal. The problem of defining a proposition, in contrast with its counter-part expressions of exclamation and question, has been on the spotlight in the study of its logic. At the outset, a proposition is conceived to be a declarative sentence which has a truth-value of two constraints, *being true or false*. The definition of proposition is realized more with a view of the context of Syllogism alike. The branch of Propositional Logic aims to arrive at simple declarative sentences of most minimal expression, given complex propositions, not to be subjected to any more reduction of simple sentences. Together with this, a study of complex propositions which comprise of two or more simple declarative abstracts in its fold is made. Some of the “logical operators” which are truth-functionals (to exclude the ones like “necessarily”) associated in the formation of complex propositions are recognized as “And” (Conjunction), “Or” (Disjunction), “Not” (Negation), “If” (Condition) and “If and Only If” (Bi-Condition) are scrutinized on their operations with respect to the truth-value of a complex proposition relying upon that of the simple propositions. Quantifiers, however, are excluded from the purview of classical Propositional Logic. Western tradition, beginning with Aristotle, was developed to a greater width in the hands of Augustus DeMorgan, George Boole and others.

The Indian tradition of Navya-Nyāya interestingly had similar strains of thought in the appraisal of propositions. The present paper endeavours to make a study of the Navya-Nyāya tradition on Propositional Logic, noting upon the similarities and divergence of this approach. Logicians of Mithilā School such as Gaṅgeśa, followed by a host of eminent commentators, went a long way to arrive at the most possible rigorous definition of proposition. The expressions of exclamation and question were indeed excluded, similar to the approach the western thinkers had. The Axiomatic system of Navya-Nyāya in dealing with the proposition is the focal point of the Paper. Together with a note of propositions' role in the inference, the Navya-Nyāya technicalities like Pratijñā (Proposition), Ubhaya (Conjunction), Anyatara/ma (Disjunction), Abhāva (Negation), Viṣama-Vyāpti (Condition, synonymously used as Partial Invariable Concomitance), Sama-Vyāpti (Bi-Condition, synonymously used as Total Invariable Concomitance), Pariṣkāra (Compound) technique of combining simple declarative sentences and Anugama (Nested Compounds) are compared and contrasted with that of the western tradition. The affection of these factors in the manner of a complex proposition treated as a *definition*, with its classical factors of Samanvaya (Pervasion), Avyāpti (Under-Pervasion), Ativyāpti (Over-Pervasion) and Asambhava (Non-Pervasion) is also a matter of current study.

Paper

Propositional logic or first-order logic, as it is called, depends heavily upon the use of propositions and its appraisal in terms of truth-value. At the outset, the philosophy of logic not withstood serious attempts to arrive at the definition and explainable nature of declarative, technically called proposition, both in the western tradition and Indian tradition as well. The western tradition beginning with Aristotle took note of the Proposition as a declarative sentence which affirms or denies a predicate-value.¹ Sentences according place to logical positivism is characteristic of propositions. The structure of such sentences is closed in content, without any relative change in any language-context.

Efforts in Indian logic context were nowhere removed from any of the features of logical enquiry, the Syllogism, Fallacy, and Definitions as well. The Navya-Nyāya tradition considered many facets with which a proposition ought to be defined, which is note-worthy before a consideration of operators within a proposition. It may be observed that the bed-rock of Navya-Nyāya tradition, considered to be more overtly beginning with the Tattva-Cintāmaṇi of Gaṅgeśa, takes up the problem of arriving at a concrete idea of the Proposition, at the juncture of scrutinizing the steps of a typical five-membered syllogism namely: Pratijñā: Proposition, Hetu: Reason, Udāharaṇa: Illustration, Upanaya: Subsumptive Correlation, Nigamana: Conclusion. Commonly called as the *Avayava Grantha* of the Maṇi, the portion sets the stage towards an enquiry of the concept of

¹ “to say of what is that it is, and of what is not that it is not, is true”; and “to say of what is that it is not, or of what is not that it is, is false.” – Aristotle: *Metaphysics*, (IV.7.1011b25, Ross.) (Courtesy: IEP)

Proposition. The Navya-Nyāya tradition views the Proposition from diverging perspectives such as:

- i. Structural role²
- ii. Epistemological role in inference, on par with inferential knowledge³, excluding reason⁴
- iii. Stimulating a reason⁵
- iv. Ontology of Pratijñātva⁶
- v. Proposition in dialectics and syllogism⁷
- vi. Vipratipatti and Pratijñā (truth-value mode)⁸

It may be remarked safely here that such wide-spread treatment of Proposition is much advanced to a medieval time of India where Navya-Nyāya emerged, *not to be so vividly and sharply seen in the western tradition of the same time.*

The Navya-Nyāya tradition considers the proposition not independent of the syllogism, atleast in logical utility. It is defined as a sentence in which a Subject (Pakṣa) is qualified with the Probandum (Sādhyā). It is akin to Bertrand Russell's concept of proposition as "*structured entities with objects and properties as constituents*"⁹. This may be attributed to the reason that the Navya-Navya was oriented towards an enquiry into the

² taccānumānaṃ parārthaṃ nyāyasādhyamiti nyāyastadavayavāśca pratijñāhetūdāhāraṇaupanayanigamanāni nirūpyante. tattvacintāmaṇi Vol 2 Part 1 Page 689

³ uddeśyānumitihetuliṅgaparāmarśaprayojakavākyārthajñānanajanakatve sati uddeśyānumityanyūnānātirikṭavīṣayakaśābdajñānanajanakaṃ vākyam. Ibid. Page 705

⁴ ...liṅgāviśayakatvaṃ vā jñānaviśeṣaṇam... Ibid. Page 708

⁵ hetvabhīdhānanaprayojakajijñāsājanakavākyatvaṃ vā. Ibid. Page 709

⁶ pratijñātvaṃ jātiḥ ... tanna ... and others. Ibid Page 712 and further

⁷ Ibid Page 714 and further

⁸ Ibid Page 715 and further

⁹ <https://en.wikipedia.org/wiki/Proposition>

means of knowledge, as the very text of the Maṇi divides itself in sections of Pratyakśa (Perception), Anumāna (Inference), Upamāna (Comparison) and Śabda (Verbal Testimony)..

As inference forms the second major means of valid knowledge, the Proposition found its way intermixed with the other auxiliaries of the syllogism. Even the verbal knowledge (Śabda Pramāṇa) was found unsuitable to place the proposition for enquiry. Hence, “All men are mortal” or “Mountain has fire” (*Parvato Vahnimān*) had all the honour of being Proposition only in the context of the syllogism in Navya-Nyāya. The question of language-independence of a proposition’s expressive content is undebated in the Navya-Nyāya tradition which concentrated upon the structural role of a Proposition in terms of Subject (Pakṣa) and its Qualifier (Sādhya), which may be similarly expressed in any language of verbal competence of communication. Thus, the structural feature, independent of language dependency, answers some of the objections on the Proposition as universally inadequate, as W.V. Quine pointed it out as unworthy of any formal discussion as it is unsatisfying due to “*indeterminacy of translation*”¹⁰. Unlike the view of Strawson, the Proposition cannot be interchanged or renamed as a “Statement”¹¹; for the Navya-Nyāya tradition places it as a part of Syllogism at all cost.

The Navya-Nyāya tradition did not sharply draw the line of demarcation between logic and epistemology of inference, as they both were complimentary in nature. However, it recognized the need to deal with the formal nature of logic as such quite independent of the epistemological implications at times. The Proposition was looked

¹⁰ W.V. Quine; Two Dogmas of Empiricism, 1951

¹¹ A Hundred Years of English Philosophy, N. Milkov, Springer Science & Business Media, 11-Nov-2013, Page 182

upon as verbatim of having a similar structure with that of the epistemological “Inferential Knowledge” (Anumiti). Thus, to Navya-Nyāya, the Proposition “Mountain has fire”, when corroborated with suitable reasons and concomitance, should give rise to a very similarly structured Inferential Knowledge as “Mountain has fire”. Any change in the Proposition shall lead to a differing of structure in the Inferential Knowledge according to Navya-Nyāya, which conceived proposition as a part of syllogism. Hence, the proposition of “Fire exists in the mountain” properly supplemented with reasons should give rise only to a similarly structured “Fire exists in the mountain” knowledge and not “Mountain has fire” and vice-versa.

A notable feature of proposition in the Navya-Nyāya tradition analogous with the western tradition, lies in negating the clause of “reason” (Hetu) as not forming any connectivity or operation. Thus, “As” is not a determiner of truth-value of a proposition, just as “Necessarily”. On the other hand, a proposition is defined as “a sentence which may invoke a reason”. The “Mountain has fire” may call for a reason as “as it has the smoke”. Parallel to the western tradition, the Navya-Nyāya logicians did not consider the exclamatory sentence and questions as propositions. In keeping with their definition stated above by the Navya-Nyāya logicians, the exclamatory sentence such as “What a beautiful rose!” or the question-tone as “is this the city of Kāśi?” are not propositions since they do not invoke a reason as “why is the rose beautiful?” or “why is this the city of Kāśi?”.

Ontology of Pratignātva (genre-feature of a proposition) and proposition in dialectics and syllogism moves further in the Tattva-Cintāmaṇi of Gaṅgeśa, with stress on the use of polemical methods, though strictly not in the sense of western propositional logic. The

contrast of samśayādiḥnāna¹² and the Pratijñā is the seed factor for the use of operators in the proposition.

The five well-known logical operators:

- i. “and” (Conjunction),
- ii. “or” (Disjunction),
- iii. “not” (Negation),
- iv. “if” (Condition) and
- v. “if and only if” (Bi-Condition)

were recognized in the Navya-Nyāya tradition in their own terms as:

- i. Ubhaya (Conjunction),
- ii. Anyatara/ma (Disjunction),
- iii. Abhāva (Negation),
- iv. Viṣama-Vyāpti (Condition, synonymously used as partial invariable concomitance),
- v. Sama-Vyāpti (Bi-Condition, synonymously used as total invariable concomitance)

Some of the well-known examples to each may be noted respectively:

- i. “Bhūtaḥ Ghaṭapaṭobhayavat” (“The floor has both the pot and the cloth”):-
Ubhaya (Conjunction)
- ii. “Bhūtaḥ Ghaṭapaṭanyataravat” (“The floor has the pot or the cloth”):-
Anyatara/ma (Disjunction)
- iii. “Bhūtaḥ Ghaṭābhāvat” (“The floor has the negation of pot”):-
Abhava
(Negation)

¹² Ambiguity and other forms of invalid cognitions

- iv. “Yatra yatra dhūmaḥ tatra tatra vahniḥ” (“If smoke, then fire”):- Viṣama-Vyāpti (Condition, synonymously used as partial invariable concomitance)
- v. “Abhidheyatvaṃ padārthatvasamaniyataṃ” (“if and only if nameable, then substancehood”):- Sama-Vyāpti (Bi-Condition, synonymously used as total invariable concomitance)

The Navya-Nyāya logicians had a keen eye for looking at the smaller constituents which made the bigger ones. Hence, a numbers of axioms on propositional logic were made not excluding even the DeMorgan’s law. As it can be seen in the typical axioms of Navya-Nyāya as:

- i. “Ubhayābhāve anyatarayoḥ abhāvaḥ”:- “When both as a group is negated, it implies a negation of either of them”

This may be seen in the propositional logic of western tradition as:

$$\sim(p \& q) = \sim p \text{ or } \sim q \text{ (DeMorgan's theorem)}$$

Similarly,

- i. “Anyatarābhāve ubhayoḥ abhāvaḥ”:- “When either in a group is negated, it implies a negation of both”

This may be seen as:

$$\sim(p \text{ or } q) = \sim p \& \sim q \text{ (DeMorgan's Theorem)}$$

Similar axioms such as

- i. “Abhāvābhāvasya bhavarūpatvaṃ” (“negation of a negation implies the positive”)

are note-worthy.

Some of the unique postulations such as

- ii. “Bhedābhāvasya bhedapratyogitāvachedakadharmasvarūpatvaṃ” “negation of difference implies the positive of the delimiting adjunct of the counter-entity”¹³

are the central contributions of Navya-Nyāya tradition.

Theorem-styled maxims are very noteworthy in Navya Nyāya, diving deep into which unravels many unexplored axioms or simplification laws. Some of the prominent such ‘theorems’ are as follows:

- i. “Abhāvadbhedasya prathamābhāvapratyogisvarūpatvaṃ” (The difference of substratum of a negation implies the nature of the counter-entity of the first negation)
- ii. “Svabhinnabhedasya svatvasvarūpatvaṃ” (The difference of the different is of the nature of the counter-entity of the first negation)¹⁴

Several more advanced and novel ideas are rampant in the texts of Navya Nyāya which need to be explored by modern logicians, paving way new dimensions in the field.¹⁵

The whole gamut of these *Operators* and *Axioms*, in their own way, linguistically in the Sanskrit language gave scope for expansions and chiseling of expressions styled *Pariṣkāras*, in the Nyāya tradition which any acquaintance may be familiar with. It was in the backdrop of classical factors of *Samanvaya* (Pervasion), *Avyāpti* (Under-Pervasion), *Ativyāpti* (Over-Pervasion) and *Asambhava* (Non-Pervasion). It may be remarked that these factors were treated, resolved and developed by the *Operators* noted above, in Nyāya.

¹³ Mathurānātha differs and notes that it is of the nature of counter-entity. Vide Nyāyarasāyana, Page 424

¹⁴ Samanāiyatya or non-exclusive co-existence is the binding law for the Law of Identity in these cases.

¹⁵ This needs to be treated in detail in a separate paper

Conclusion

It is found and concluded that Navya-Nyāya tradition beginning with Gaṅgeśa was quite familiar with Propositional Logic fashions. In fact, the primary texts of Navya-Nyāya had dedicated space to deliberate upon various perspectives to look at how a Proposition ought to be defined, similar to the attempts of western logic, which though appeared later. The important role of Propositions in making of syllogistic logic was also noted by Gaṅgeśa quite clearly. Structural role, Epistemological role in inference, on par with inferential knowledge as excluding reason, Stimulating a reason, Ontology of Pratignātva, Proposition in dialectics and syllogism, and Saṃśayādi and Pratijñā (truth-value mode) are all advanced concepts pertaining to Proposition, the credit of whose originality and finding should go to the Nyāya thinkers than those of the west, historically. The logical Operators were also in vogue and Laws were derived out of it in the Nyāya tradition, very early. Thus, the credit of forging towards advanced facets of logic belongs to Nyāya tradition of India, for which this paper on Propositional Logic is but an illustrative attestation.

End of Paper

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