

HISTORICAL NOTES

A GLIMPSE OF RULE OF LOGIC IN GAUTAMA'S *NYĀYA-SŪTRA*

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Abstract

Ṛṣi Gautama's *Akṣapada* or *Nyāya-Sūtra* dealing with Rule of Logic written in c. 550 BC provides the concept of two valued logical system. Though primitive in nature it covers various definitions of logical aspects.

Key words: Mathematical Logic

Introduction

During the 550 B C Ṛṣi Gautama wrote his *Akṣapada* or *Nyāya-Sūtra* (Rule of Logic). In the *ślokās* of his *Nyāya-Sūtra*, we can get the concept of two valued logical system primitive in nature. We also get the various definitions of logical aspects: proposition, theorem, proof, contradiction etc. A detailed study of this *Nyāya-Sūtra* will be of great academic interest.

Two valued logical system was first seen in the work of *Paṇiṇi* (350 BC). But it appears that it was already there in the Indian Philosophy at least 200 years before *Paṇiṇi*.

A Few Quotes

A few *ślokās* with modern meaning in English language are discussed as under:

1. *pratyakṣa anumāna upamāna śabda*
"pramānāni".

(*Nyāya-Sūtra* 1.1.3)

Proof is the perception from inference and comparison. (Eng. Tr)

If we recall the definition of "proof" in Modern logical system (Hilbert System)—we first compare the inference rules with the help of axioms of a logic system, and then we use the knowledge of perception. So is *ślokā* roughly defining the definition of proof in modern logic.

2. *prasiddha-sādharmayāt –sādhanam*
"upmānām".

(*Nyāya-Sūtra* 1.1.6)

"Comparison is the knowledge of things, then its similarity to another thing is previously well known".

From the explanation of the *ślokā* 1.1.3, we get the idea of the implication rule—if we already have established or proved some facts. This *ślokā* actually lets us know how we apply the implication rule for the logical establishment of a fact or a theorem and actually we do this in our modern logical systems in the implication of implication rules for establishment of a fact or a theorem.

3. *āpta-upadeśāḥ "sabdāḥ"*.

(*Nyāya-Sūtra* 1.1.7)

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saḥ dvi-vidhāḥ "dr̥ṣṭa-adr̥ṣṭa-artha-tvat".

(*Nyāya-Sūtra* 1.1.7-8)

"*sabdaḥ*" or words or propositions are things well understandable and they are of two types seen (that is True) or unseen (that is False)".

One proposition is true? – if it occurs or seen or *dr̥ṣṭa*. And it is false? – if it does not occur or unseen or *adr̥ṣṭa*. So we can replace the word *dr̥ṣṭa* by True and *adr̥ṣṭa* by False. In two valued logical system propositions are of two types - True or False. And this is the base for two valued logical system. So here in this *ślokā* we get primitive concept of two valued logical system that every propositions are either True or False.

4. *tantra-adhikarana-abhyupagama-sām̐sthiḥ "siddhāntaḥ"*.

(*Nyāya-Sūtra* 1.1.26)

"*siddhāntaḥ* or a system of *Nyāya* (more precisely a logical system) rest on certain hypothesis and implication".

Actually this *ślokā* speaks out the Hilbert system of modern logical system. A century ago in the period, when the classical period of logic was turning to the modern axiomatic system, Hilbert proposed how we can establish a subject of study. In 1920 he proposed his approach known as Hilbert's program, he proposed to build own axioms of the subject and then apply the implication rule to establish the subject. We say Hilbert (David Hilbert, January 23, 1862-February 14, 1943) is the pioneer of the modern logic, but we think this concept of axiomatization was already in the Indian Philosophy long before (before 550 BC) the famous Hilbert. And this can be found in the above *ślokā* of Gautama. So we

can claim the R̥ṣi Gautama can be the pioneer of the modern systems of logic. It may also be possible that this concept was already known in the Indian Philosophy.

5. *sarva-tantra-aviruddaḥ-adhikritava "sarva-tantra-siddhāntaḥ"*.

((*Nyāya-Sūtra* 1.1.28)

"A *siddhāntaḥ* or system is universally accepted if it is not opposed by any one and claimed by at least one".

This means there were different types of axiomatic approaches of a logical system like that of modern system. In modern systems of axiomatic logic, different logician follows different set of axioms to study the same system. All the approaches are equivalent, because no one can oppose the others approach by his set of rules or implication rule and one is implied by the other approach.

Concluding Remarks

In fine, it may be said that the Indian philosophy had already established a strong basis to assess the correctness of theorists. Time has come when we look back to ancient literatures to unearth knowledge that was rediscovered thousands years before by our great ancestors. This undoubtedly will open new areas of research.

References

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