## Some common threads in Philosophy and Mathematics

## Sameer Chavan Indian Institute of Technology Kanpur

Harish Chandra Lecture Series 16 December, 2020 We present some bits of the history of Philosophy (Darshan) starting from the Vedic period and try to find their counterparts in the modern Mathematics.

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Thanks to Sanjay Sir for the invitation and for an opportunity to share my views<sup>1</sup> on this topic.

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• If you know the notions of "basis" from Linear algebra or "generators" from Group theory, you will have better idea; you know everything if you know these basic elements !

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• Pythagoras: A line can be made from points, plane can be made from lines, solid can be made from planes; so point (or number) is the basis of everything !

Question What was the origin of Darshan ?

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Question What was the origin of Darshan ? Why our ancestors felt the need ?

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• The problem of rule of three (Trai-rasika): If p (PramaNa) yields f (Fal), then what will i (lccha) yield ? (Problem: If 1 pala (4 karsa) and 1 karsa (10 gms) of sandalwood are obtained from ten and half panas, then for how much will nine palas and 1 karsa be obtained ?

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Poet and Vedic scholar Shree Dnyaneshwar (13th century) says: Pai Shoonya jai daavaave jaahale | te biMdule ek paahije kele | taise advait saaMgaave bole | tai dvait keeje || we put a dot  $\cdot$  to show 0, and similarly, to explain Advait, you need Dvait (Duality)! Poet and Vedic scholar Shree Dnyaneshwar (13th century) says: Pai Shoonya jai daavaave jaahale | te biMdule ek paahije kele | taise advait saaMgaave bole | tai dvait keeje || we put a dot  $\cdot$  to show 0, and similarly, to explain Advait, you need Dvait (Duality)!

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Philosophy Is there is a particle (point) of mass (measure) 0 ?

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- x + y = y + x for all  $x, y \in \mathbb{R}$
- (x + y) + z = x + (y + z) for all x, y, z ∈ ℝ
- x + 0 = x for all x ∈ ℝ
- for every x ∈ ℝ, there exists a unique y ∈ ℝ (denoted by −x) such that x + y = 0
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- for every nonzero  $x \in \mathbb{R}$ , there exists a unique  $y \in \mathbb{R}$  (denoted by  $x^{-1}$  or 1/x) such that  $x \cdot y = 1$
- $(x + y) \cdot z = x \cdot y + x \cdot z$  for all  $x, y, z \in \mathbb{R}$
- x < y, x = y or x > y for all x, y ∈ ℝ (exactly one possibility)

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The one property which makes real really real and differentiates  $\mathbb R$  from  $\mathbb Q$  is the LUB property.

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(What you were a moment before is different from what you are at this moment !)

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### Theorem (Incompleteness Theorem of Gödel)

We let P be the set of Gödel numbers of all the provable sentences and let d be the diagonal function. If  $\{n \in \mathbb{N} : d(n) \in \mathbb{N} \setminus P\}$  is expressible in  $\mathcal{L}$  and  $\mathcal{L}$  is correct, then there is a true sentence of  $\mathcal{L}$ not provable in  $\mathcal{L}$ . • Om Tatsditi Sootra

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- Brahma is structurally eternal (Anadi). Although Jagat is not structurally eternal, it is eternal by means of flow

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