II-13. Rational Consistency

Consistency that "shadows" reality contributes to rational behaviors.

Reality based representations (*satprarupana*) lead to viable and reliable insights where predictability follows the consistency. Possibly for such reasons, mathematics and logic has been a favorite occupation of the thinkers. Recall that around 3000 BCE Rishabhnath taught counting, use of calendar, and writing (Brahmi script) to his people. He developed the idea of conserved balance between the inputs, outputs, and the net. The world becomes a less scary place if we can name things and know their origins. World is a problem of measuring and counting. Deeper understanding follows from the power of the numbers represented in a systemic way, such as the place-based decimal system. Through such conceptual devices and tools, even very large quantities become manageable for expression and manipulation. Infinite seems within the grasp of the power relations.

The Nay adage is that systematic reasoning guided by the tangibles can do the same. The attribute of rational consistency is critical for going from disorder of the unknown to the known order and the order of the known. Restraints and constraints to ward off contradictions and inconsistencies increase reliability and predictability of behaviors. As rationality is equated with the consistency of behaviors, a trajectory of acts becomes a decided and determined course of actions and behaviors towards desired goal with better chances of success.

Rational numbers. Consistency is built into the place-based representation and manipulability of numbers. Could this be the origin of term rational numbers? I am not sure but have a look. Systematic and predictable variation of numbers has led to the characterization of the "real" numbers which can be whole or fraction, as well as positive and negative. In this class lie the subclass of rational numbers that are expressible only as the whole number, or as a fraction of the whole number. The whole numbers are expressed as:

1/1, 2/1, 3/1, 4/1 and so on.

Similarly, the fractions of a whole number are expressed as:

1/1, 1/2, 1/3, 1/4 and so on.

Among the number purists, from Pythagoras down, the numbers that behave "irrationally" have been enigma. These include the value of *pi* (π) or the square root of two.

As noted before the idea of rational consistency follows from the regularity of the sequence. To move the argument further, the rational numbers are defined as those that are expressed as a ratio of two whole numbers. It provides a way to express "the whole" in terms of the defined parts. The ascending sequence describes a class in terms of the unit. The descending sequence relates to the parts in the unit of the entity.

In the anugam tradition such dealings with the numbers is the penchant of a seamless rational argument. With the same panache, rational behavior is a reflection of the consistent and seamless harmony of the parts (acts and actions). It is a prerequisite to put together the parts into a whole. From this perspective it is easy to understand rational perception as*: If the whole is broken into parts, the whole must also come together from the parts. If this does not happen then there is logical doubt (syad) for which alternatives are to be considered (anekant).*

Nested-powers. There is something remarkable about the theme of representation through simple numbers nested as powers and exponents. In the normal place-based system we cover one at a time the range between 1 and virtually uncountable. Through the fractions we can find a rational representation of what may have multiple parts approaching uncountable. Fractionation of a set gives parts that are of the same kind. Through nested powers we can manageably represent the large numbers, and gain insight into sets of sets to arrive at the uncountable and the indivisible. A class converges to unity through fractions. On the other hand manipulations of 1 (unit) with the whole or fractional exponents do not change its value. Thus a number based representation can be operated upon as a "set" as well as a "unit." The paradox of "infinite divisibility" results on the way from a unit to zero. Therefore discreteness is an essential part of the representation of entities.

Space as boundless *nothing*. An entity exists in space that is represented as nothing, yet is the medium to represent every material with physical dimensions. How do we understand such nothingness? In number representation, by convention zero assumes a meaning in the context of the place-based numerals (II-12). It works a lot better than use of the 10 fingers to take stock of the universe. Virtually all entities, real and imagined, can be expressed in terms of numbers and then manipulated with operators. In the end, the smallest of the reality is always 1 (unit) of something. So how does it relate to the nothing or zero?

Paradoxically, if "it is" (zero exists) then "nothing" is something. It is in this sense the convention of zero assigns it a special property such as if placed to the right of a digit it increases

its value by 10-fold. If placed to the left, it doe not change value (also by convention) but it may still carry other information. In the absence of entities zero is like the available space. It provides a place for each and every entity. This is the assigned value. It does not change the values of the rest of the space that remains unoccupied and unassigned.

Space as zero without a place-value. Conception of *nothingness* is intriguing. It may be conjectural but it is not an observable with the attributes of a represented entity. It is not just absence of something, but space is something more than a place. Some ancient ideas are interesting:

(a) Space (*akash*) is conceptualized as *nothing* or boundless emptiness as the medium for representation. Its attributes are different than that of the material entities separated by space or the events delineated by time. Space exists whether or not anything exists in it. In this nothingness we may be able to place things without changing the content of the entity nor does it become an entity. However the space becomes an entity in the context of a bounded place, and in the context of other entities in relation to time. It would be interesting to see if this representation of space as a non-entity gets around some of the problem of defining space in modern physics.

(b) By placing entities in a space, it becomes a place (a world unto itself) with attributes of content, shape, size, dimensions, and units within the limits of the boundaries. Here the nothingness becomes a place by convention where a finite world order is created by introducing real entities (like the real numbers between 1 and 9).

(c) The concept of nothingness is also inherent in the *syad-nay*. In Nay reasoning, evidence-based response to a suitably worded

assertion can only be affirmed in the sense of existence. Inability to affirm does not necessarily mean a lack of existence but it could be lack of suitable assertion that can be affirmed. Such doubt calls for a continuing search for assertions that can be affirmed.
(d) Similar problem is encountered in the representations based on "implication," "negation," and "all." If the counts make the reality comprehensible. uncountable does not necessarily imply nothing or infinite. Exceedingly large is not infinite, and certainly all of reality is not infinite. By similar reasoning, the small may be exceedingly small, but the underlying reality never disappears but runs into limit of discreteness of the smallest represented entity. In this sense the problems of singularities, infinite regress and infinite divisibility are extrapolations that cross the bounds of reality into the realm of *nothing*, zero, or the space of bound less nothing.

Representation is rule-based grammar of the discreteness of entities. It shadows and coheres with the contours of reality. The deeper structures of discreteness may lay not only in the content but also the relations, operations and manipulations as cycles within cycles, hierarchy, and chaos. Such representations de-coheres (become irrelevant) if extrapolated beyond the limits of the very basis of representation of reality.

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