

S.R. RANGNATHAN'S PMEST CATEGORIES: ANALYZING THEIR PHILOSOPHICAL BACKGROUND AND COGNITIVE FUNCTION*

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In this paper a comparison is made between the *Vaisesika* categorial system and the subject architecture given by S. R. Ranganathan (SRR), namely, PMEST (Personality, Matter, Energy, Space, Time). Advances the thesis that Indian classificatory thinking is based on this cultural and philosophical background; and that SRR's theories themselves have been greatly influenced by this tradition. There are strict analogies between PMEST and *Vaisesika* categorial structure that are worth investigating more thoroughly. Our idea is to provide an additional stance for interpreting SRR's thought within the tradition of his own country. Some considerations about the role of categories both as foundation of the knowledge structure of a certain culture and as possible signs of a deeper biological and cognitive dimension of the human being are also made.

KEYWORDS: Subject structure; Categories; PMEST; Vaisesika categorial system

1 INTRODUCTION

Within the framework of Indian philosophical and doctrinal tradition not only has a metaphysical culture been developed, but schools of logic and dialectics have sprung up too. Although the former is perhaps less known outside India than the latter, it has played a significant role in the history of Indian thought. This paper advances the thesis that Indian classificatory thinking is based on this cultural and philosophical background; and that Shiyali Ramamrita Ranganathan's (SRR) theories themselves – even though he studied library science in UK – have been greatly influenced by this tradition.

Bearing this in mind, a comparison is made between the *Vaisesika* categorial system and SRR's PMEST. *Vaisesika* is one of the six *darsanas*¹ the orthodox philosophical viewpoints of Hinduism. It might be viewed as a kind of physical philosophy, which specifically focuses on the knowledge of 'things' in their individual and concrete manifestations, and identifies a limited set of fundamental categories under which all the elements of sensible reality can be subsumed.

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There are rather strict analogies between PMEST and *Vaisesika* categorial structure that are worth investigating more thoroughly. The idea is not to highlight a direct relationship, but rather to provide an additional stance for interpreting SRR's thought within the tradition of his own country.

Indeed, several authors (Freschi, 1998; Lavazza, 1996; Adhikary and Nandi, 2003) have stressed how the Colon Classification describes reality by imposing a model that is clearly attributable to the Indian *Weltanschauung*. Lavazza (1996) finds that Colon Classification embeds elements of the Jain tradition, and more generally of Indian philosophical thought, such as the concept of transitoriness relating to the ceaseless evolvement of the universe, and the idea that all phenomena tend towards a final common synthesis after passing the division of reality. Indeed, Indian philosophy has been always inclined to classify its objects. Other authors have stressed the kinship with the tradition of *Nyaya-Vaisesika* (Adhikary and Nandi, 2003). These hypotheses are not so incompatible. Various philosophical systems of the Indian tradition, *Nyaya-Vaisesika* and Jainism included, are built on an equivalent or similar system of categories.

Furthermore, a restricted number of basic categories, that are at least comparable with the *Vaisesika* system (and in a certain sense to SRR's PMEST), seem to reappear within the Indo-European linguistic and cultural framework in different ages and latitudes. The most important example is represented by Aristotle's *kategoriai*². Therefore an issue to analyze would be whether these categories are in some way associated with basic cognitive patterns, according to which our experience of the world is shaped by means of processes of categorization and classification. This argument is explored in section 4. The discussion might trigger a reflection on more general topics that however are not dealt with in the paper. The purpose of this contribution is limited to a preliminary investigation, which takes the risk of connecting and comparing systems belonging to different historical periods and socio-cultural environments. Further analyses are needed to verify or clarify the ideas here advanced.

2 VAISESIKA AND ITS CATEGORIES

According to the Hindu tradition, although the Supreme Reality (*Brahman*) is One, there are nonetheless six fundamental perspectives or *darsana* to describe it. All of these are grounded on the Vedas. Together with *Vaisesika*, these are: *Nyaya*, which is focused on logic and on the means of obtaining right knowledge; *Sankhya*, encompassing a description of the basic principles that determine the

manifestation of the universe; *Yoga*, revealing the means by which direct knowledge of *Brahman* can be achieved; *Purva-Mimamsa*, dealing with correct performance of Vedic rituals; and *Vedanta*, the most metaphysical system, aiming to investigate the ultimate nature of *Brahman*. *Vaisesika*, instead, deals with the analytical description of sensible reality in terms of its constitutive elements. The word *Vaisesika*, in fact, derives from *visesha* meaning “distinctive character”.

Another aspect that typifies the Indian philosophical tradition is the spread of categorial thinking. In fact, most classical Indian metaphysicians have described reality in terms of fundamental kinds or categories (Mohanty, 2000), although different terms (e.g., *tattva*, *prameya*, *jneya*, *visaya*, *vastu*, *sat*, *bhava*, *artha* and *padartha*) have been used for such a purpose (Kumar, 2009). The categories provide a definitive listing and classification of all kinds of things that exist in the universe. This position of pluralistic realism can be found also in *Vaisesika*. Its categories, which subsume various sub-groups of categories within themselves, are in fact not regarded as dependent upon human cognition for their existence, but rather as ontological primitives (Kumar, 2009).

The fundamental text of this school is the *Vaisesikasutra*, attributed to Kanada. As it often occurs in the Indian tradition, the name of the author is rather symbolic and represents a school or a lineage, which drew up this *darsana*. The exact date of compilation of *Vaisesikasutra* is still much debated: some authors say that it goes back to the 4th century B.C., whereas others insist that the date is later at about 1st century A.D. (Arena 1987).

Although we use the term category, in the original version of *Vaisesikasutra* Kanadā used the term *artha*, which is only partially comparable with the notion of category. Different meanings are ascribed to *artha*, such as “thing”, “object”, “meaning of a word”, “purpose”, and “aim”. The verb root *arth* means “to request the sense, to point out” (Grimes, 1996).

The term that is generally translated as category is, instead, *padharta*³. This was introduced only afterwards by Prasastapada, who lived approximately in 991 A.D.. Prasastapada was the author of *Padarthadharma-sangraha*, an exposition of *Vaisesika* that would introduce further changes in respect of the *Vaisesikasutra* original version and acquire in time a paradigmatic role for all the subsequent studies.

The original nucleus of categories in the *Vaisesikasutra* comprehends only three basic elements. The first and most fundamental category is *dravya*, which in

Western terms is often referred to as *substance*. *Dravya* is defined as the locus of qualities (*guna-s*) and actions (*karma-s*), and as the material or inherence cause of effect, i.e. "that in which the effect inheres" (Mohanty, 2000: 44). *Dravya* is not manifest and perceptible as such. It becomes manifest and perceptible only by means of its attributes (*guna-s* and *karma-s*). These latter are, in fact, the modes of substance, but in turn they require a *dravya* as a substratum in order to exist.

The second category is *guna*. It is depicted as *quality*, but it does not totally coincide with the Aristotelian category of *quality*, which has a narrower meaning. In fact, the *guna-s* correspond to all the inherent characteristics of things, i.e. the attributes that make *dravya-s* perceptible in the physical world. These characteristics should be intended as basically stable and permanent. They typify substance in a statical sense (Keith, 1977).

Karma is the third category. It can be understood as *action* (from the verb root *kr*: "to act, do, make"). It refers to the dynamical aspects related to substance, and then to motion. Motion inheres to substance and is the direct and immediate cause of conjunction and disjunction.

Dravya (substance)

Guna (quality)

Karma (action)

Table 1: *Vaisesikasutra* categories in the original Kanada version

The extension of the number of categories is a result of subsequent modifications. Prasastapada extended their number to six, whereas Sivaditya, a theoretician of the *Nyaya-Vaisesika* system, added another in his *Sapta-padharti* (Arena, 1987).

The added ones are basically categories of relationship. *Samanya* refers to *generality*: it is the generic characteristic residing in all the members of a class. An individual is a member of a class by virtue of possessing it. Instead *Visheha* is *particularity*: it is the characteristic which typifies a given substance and by means of which substances are distinguished from each other.

Samavaya may be labeled as *inherence*: it refers to the relationship between inseparables, i.e. things that cannot exist in separation from each other. These include quality and action with substance, universal and particular, eternal substance and particularity, and whole and parts.

S.R. Rangnathan's PMEST Categories:

The seventh category is *abhava*: meaning *non-existence* (from the verb root *bhu*: "to become, exist", and "a" = not), in contrast to *bhava* or *existence*, which is described by the other six categories.

Dravya (substance)

Guna (quality)

Karma (action)

Samanya (generality)

Vishesa (particularity)

Samavaya (inherence)

Abhava (non existence)

Table 2: *Vaisesika* categories according to Prasastapada and Sivaditya

The use of notions of *dravya*, *guna* and *karma* is not limited to the *Vaisesika* system. In fact, they function as basic categories of various other philosophical systems of the Indian tradition. Together with the other categories used in *Vaisesika* (or at least with some of them), they are included, for example, in *Prabhakara Mimamsa*, *Bhatta Mimamsa*, and *Dvaita Vedanta* (Grimes 1996). Jainism, too, makes use of the categories of *dravya* and *guna* to refer respectively to substance and to its fundamental qualities (Shah, 1993).

From the comparative viewpoint here adopted, this is rather significant since it underscores the importance of the nucleus of the three original categories of *Vaisesika*. And these are also the ones most relevant for a comparison with SRR's PMEST.

3 RANGANATHAN'S PMEST

PMEST categories are *Personality*, *Matter*, *Energy*, *Space* and *Time*. These categories should permit the analysis and classification of any phenomenon or object (Ranganathan 1952, 1967; Foskett, 2001).

Personality is used to express the central idea of a subject, but it is not easily defined in a positive manner. It can be identified by method of residue: "It is often only recognisable by elimination. After separating out the manifestation of time, space energy and matter in a subject the residue will often turn out to be personality. For the residual facet must be a manifestation of the other four fundamental categories and by assumption the manifestation of all the four fundamental categories have been separated out before reaching the residue, this

may be called the method of residues” (Ranganathan, 1952: 83). Accordingly, *personality* might be intended as the category that encompasses all the distinctive features of the analyzed object, and at the same time as the substratum that makes the application of all the other categories possible.

Matter is used to specify the characteristics of the examined entity. It does not refer only to the physical composition, but rather to the all relevant features of the entity. SRR further differentiated Matter into three subcategories: *Matter Material*, *Matter Property* and *Matter Method*.

Matter material refers to the material composition of the object (e.g., wood in a table made of wood).

Matter property is used to express the property of an entity (e.g., porosity as a physical property of soil).

Matter method could be used to refer to methods such as biological or chemical methods. However, it is not recognized by some authors, for which it could be better seen as a specification of action or *Energy* (Kumar, 1974).*

Energy allows the expression of the dynamical aspects associated with the entity, either spontaneous or human-induced actions. The Classification Research Group would differentiate them respectively as *processes* and *operations*.

Space and *Time* are the other categories.

Even intuitively, the kinship between the *Vaisesika* original categories and the first three PMEST categories is evident:

<i>Personality</i>	<i>Dravya</i> (substance)
<i>Matter (properties)</i>	<i>Guna</i> (quality)
<i>Energy</i>	<i>Karma</i> (action)

Table 3: mapping between the first three PMEST categories and *Vaisesikasutra* original categories. Resemblances with *guna* are more evident in respect to *matter property*.

Further mappings between *Vaisesika* categories and SRR's PMEST have been proposed. One of these is from Adikhary and Nandi (2003):

<i>Personality</i>	<i>Samanya</i> (generality) and <i>Vishesa</i> (particularity)
<i>Matter-material</i>	<i>Dravya</i> (substance) and <i>Abhava</i> (non existence)
<i>Matter-properties</i>	<i>Guna</i> (quality)

* qualifier (=Speciator) to Action (=Energy)

S.R. Rangnathan's PMEST Categories:

<i>Matter-method</i>	<i>Samavaya</i> (inherence)
<i>Energy</i>	<i>Karma</i> (action)
<i>Space</i>	<i>Dika</i> (space)
<i>Time</i>	<i>Kala</i> (time)

Table 4: mapping between PMEST and *Vaisesika* categories according to Adhikary and Nandi (2003). *Dika* and *kala* are not *Vaisesika* first level categories, but represent subtypes of *dravya*.

However in our opinion some asserts of this proposal appear rather arguable. For example, the conflation of *dravya* (together with *abhava*) and *Matter-material* – that, as stated above, specifies exclusively the physical composition of an object – entails a reduction of the extent of the meaning of *dravya*.. This latter is the principal category according to the *Vaisesika* school and a highly complex concept, which includes in it all living and non-living entities (Grimes, 1996). As stated by Mohanty (2000: 44), “those who, like the *Vaisesikas*, admit *dravya* as a category must, in addition, recognize it as the most fundamental category. For, entities belonging to the other categorial kinds, in some way or other, depend on *dravya*-s, and cannot be without either inhering in, or in some other manner being related to, a *dravya*. All others rest upon *dravya*-s”. Moreover, *dravya* is often defined in a way that resembles SRR’s definition for *Personality*: “Substance is a distinct genus, but a positive definition can only ascribe to it either the possession of qualities or action” (Keith, 1977: 182).

Other authors have underlined analogies between SRR’s and Aristotele’s categories (Glazier and Glazier, 2003), and the fact that the choice of terms such as *matter* and *energy* might be related to the vocabulary of the physics of the late 19th century and the philosophy of Herbert Spencer (Gatto, *pers. com.*).

4 CATEGORIES AND SYNTAX

Categories in the Colon Classification, although only five, can be applied recursively in the so-called rounds and levels, thus also allowing the expression of quite complex subjects (Ranganathan, 1967: Section RK7):

Distribution of pesticides by atomizer to prevent virulence of rice stem disease in the 1967 dry season in the Cauvery delta in Madras

Agriculture [basic facet] : rice plant [1P1] : stem [1P2] : disease [1M1] : virulence
 [1M2] : prevention [1E] : pesticides [2M1] : distribution [2E] : atomizer [3M1] :
 Madras [S1] : Cauvery delta [S2] : 1967 [T1] : dry season [T2] *

Since the 1950s, Ranganathan's innovative techniques have been spread in Europe by the Classification Research Group. From their experience with building many faceted special schemes, the Group members developed an apparently more detailed list of fundamental categories: object, kind, part, property, material, process, operation, agent, patient, product, by-product, space, time (Vickery, 1960; Broughton, 2004). Actually the fundamental sequence is similar, and corresponds to that of passive clauses in European languages: that is, it is believed helpful that the direct object of what happens be in the leading position, and that the other syntactical roles (predicate, subject, other objects) follow it. In knowledge organization systems, the grammatical subject is usually represented by the agent, which, unless not appearing among Ranganathan's categories, can be expressed as "Speciator to energy" (see footnote in the previous page). The typical facet formula of many disciplines in the Colon Classification indeed is.

The homologies between document subjects and syntactical structures in language are even clearer in the work of Derek Austin. For the CRG freely faceted classification project, and for the PRECIS subject headings, he identifies the following primary role operators: key system, action, agent, viewpoint/aspect, sample, document form, completed with other secondary ones. Indeed, Austin deliberately refers to linguistic theories, such as Chomsky's transformational-generative grammar, besides ontological theories, such as Bertalanffy's general systems theory. In fact, facets, roles, deep cases (Fillmore, 1968) and grammatical objects look like akin concepts, suggesting that a parallel study of facet analysis, philosophical categories and case theory would be fruitful (Gnoli, 2008).

5 CULTURALLY-BIASED CATEGORIES AND FUNDAMENTAL COGNITIVE PATTERNS

The purpose of this section is to explore whether it is possible to assign a cognitive function to very basic categories like those pertaining to PMEST or

* In the current version this will be:

Agriculture [basic facet] : rice plant [1P1] : stem [1P2] : disease [1MP1] : virulence
 [1MP2]: prevention [1E0-(using) pesticides [speciator 1 to (1E)]-(by) distribution
 [speciator to 'pesticides' - (using) atomizer [speciator to 'distribution']. Madras [S1] .
 Cauvery delta [S2] " 1967 [T1] " dry season [T2] *

Vaisesika. Statistical analyses on dictionaries have shown how dictionary definitions are based on a very limited sub-vocabulary including very general terms, such as *object*, *substance*, *action*, and *cause*. These terms could be barely defined within any dictionaries, no matter what the language. Conversely, the knowledge of the meaning of these terms is presumed in order to ensure the functioning of the dictionary (Wilks, 1977).

The question is whether terms like these, which could name primitives i.e. terms that "cannot be defined further", are only *organizational hypotheses* of a particular system (Wilks, 1977), or if they have a somewhat psychological basis.

As a matter of fact, all dictionaries, in all the considered languages, seem to use basically a very similar or comparable set of primitives. These exhibit then a trans-linguistic character, encouraging the idea of a more fundamental status to typify them. According to Violi (2001), these primitives could be seen as manifest linguistic traces in the lexicon, which relate however to fundamental experiences and dimensions in the linguistic and conceptual organization of human beings. In other words, even though they manifest themselves in the structure of language, these are however not part of the representational level. They inhere to a deeper level, as patterns underlying the perceptual and conceptual systems around which human experience is built⁴.

As members of the same biological species, all humans are likely to be typified by a common fundamental biological and cognitive structure, which ensures the minimum conditions for a mutual understanding and communication. Moreover, human beings share a natural impulse towards categorization, classification and hierarchization (intended here in a generic sense as the process of organizing data according to different levels). Establishing order is, in fact, necessary for managing the huge amount of stimuli to which we are exposed and thus fundamental for understanding. Categorization, classification and hierarchization are most probably implied in the strategy we employ to obtain such order and to memorize data. In this sense, they are intrinsically connected to the human cognitive approaches to reality. Even admitting the existence of trans-cultural cognitive structures, it is however very difficult to establish the threshold level beyond which the conditions for the emergence of cultural differences are created. In any case, it seems reasonable to suppose that the theoretical plausibility of the existence of a common structure implies that: (1) this structure is located at a very deep level and (2) it is not connected to any specific (linguistic

or conceptual) form. This is, at least, what suggests, the evidence of diversity in traditions, ways of living, and socio-cultural settings⁵.

Where should very fundamental categories like those treated here be allocated? And which relationship could be expected between them and the supposed fundamental cognitive patterns?

Categories like *substance*, *attribute* and *action* recur, albeit in different forms, in various systems of the Indian tradition, in Ranganathan's PMEST, and also in the Western tradition: for example, in certain attempts at classifying Aristotle's categories (Dahlberg, 1978). They have remained basically unchanged and established the common ground for most of the top conceptual structures that have been developed at different times and in different places within the Indo-European linguistic family. It might be that these categories are associated with a cognitive function, at least in the special case of this linguistic family.

Entities (<i>ousia</i> , "substance" or "essence")
Principles
Material objects
Immaterial objects
Properties
Quantity (<i>poson</i> , "how much")
Quality (<i>poion</i> , "what sort")
Relation (<i>pros ti</i> , "related to what")
Activities
Operation or Action (<i>poiein</i> , "doing")
State (<i>ekhein</i> , "having")
Process or Affection (<i>paskhein</i> , "undergoing")
Dimensions
Time (<i>pote</i> , "when")
Position (<i>keisthai</i> : "being situated")
Space (<i>pou</i> , "where")

Table 5: Aristotle's categories arranged by four fundamental categories (or *Ur-categories*) according to Dahlberg (1978)⁶. The Aristotelian category of substance (*ousia*) is differentiated into Principles, Material Objects and Immaterial Objects

S.R. Rangnathan's PMEST Categories:

Substance	<i>ousia</i>	<i>dravya</i>	
Quantity	<i>poson</i>	}	<i>guna</i>
Quality	<i>poion</i>		
Relation	<i>pros ti</i>	{	<i>samanya</i>
			<i>vishesa</i>
			<i>samavaya</i>
Action	<i>poiein</i>		<i>karma</i>
State	<i>ekhein</i>		
Affection	<i>paskhein</i>		
Time	<i>pote</i>		
Position	<i>keisthai</i>		
Space	<i>pou</i>		
			<i>abhava</i>

Table 6: A mapping between *Vaisesika* and Aristotle's categories according to Nakamura (1992, modified: only correspondences including categories from Kanada and Prasastapada's versions of *Vaisesika* are displayed). These categories are, in fact, reflected into the structure of language, too. Some Indian grammarians suggested, in fact, a connection between the first three categories of *Vaisesika* and the lexical categories respectively of noun, adjective and verb (Ambuel, 1998). Trendelenburg (1846) proposed that in developing his set of categories Aristotle referred to the structures inherent in language: the distinction between *substance* and the rest of the categories is built into the subject-predicate pattern, and a remarkable kinship between Aristotle's categories and the lexical categories of noun, adjective, verb and adverb is asserted as well.

Of course, this issue, which concerns also the comparative history of ideas, should be studied in greater detail than has been done so far. It could be reframed, for example, in terms of the debate on the assumptions of universality versus cultural relativity of top categorial systems. Clearly, this goes beyond the intention of this paper.

6 CONCLUSION

We have looked throughout this paper at Ranganathan's PMEST against the background of the Indian philosophical tradition, comparing it with the *Vaisesika*

categorial systems. We have been engaged with a case study that clearly attests the linkage between knowledge organization theories and thought systems, which are embedded themselves in the tradition of a given culture. Also as stressed by Hjørland (2003), in order to be fully understood any classificatory system should be regarded as part of a specific socio-cultural and philosophical context⁷. Accordingly, ontological and epistemological questions and methods should not be kept apart but incorporated into research on knowledge organization. At times, this might even imply the inclusion of a comparative analysis of the history of ideas, especially when very general issues are concerned.

NOTES

1. The verbal root of the Sanskrit term *darsana* is *drish*, whose principal meaning is “to see”.

2. In this regard it should be also considered that, as affirmed by Subbarayappa (1967: 23), “there are evidences to show that the Greeks and the Indians had sufficient contacts even before Alexander’s invasion. Some historians of science have pointed out that the origins of some of the Greek ideas can be traced back to India also. It is not suggested here that the Greeks were after all the borrowers of some of the Indian ideas, but it is rather difficult to be indifferent to a historical situation like the one stated above. It is not unlikely that the Vaisesika school with its bold and systematic assertions might have attracted and stimulated the attention of people from far and wide including the Greek thinkers”.

3. The word *padartha* literally connotes the meaning (*artha*) of a word (*pada*). It signifies also “what is referred by the words”. By extension in the framework of metaphysical discourse, it means the most general kinds of things, i.e. the highest genera of entities (Mohanty, 2000).

4. This position should be related to cognitive semantics, a theoretical view arisen around the Eighties with the works of Fillmore, Jackendoff, Lakoff and others and conceiving meaning as a cognitive pattern. According to this approach, the meaning of a word cannot be separated from our experience of the world, which is physical, mental, social, and cultural. Therefore, the study of the semantic aspects of language and communication should not be undertaken in isolation from other cognitive abilities, recognizing also that language interacts with perception, cognition, reasoning, and emotion. This implies also the “non-autonomy” of semantics in respect to both cognitive and cultural layers. Any semantic model should be equipped with psychological tenability, and it requires

conforming to actual processes of interpretation and linguistic communication as well (Anolli, 2005).

5. In this framework another concept to take into consideration is *form of life* (*Lebensform*) as conceived from Wittgenstein (1953, § 23): "the speaking of language is part of an activity, or a form of life". This notion has a wide range of meaning and may be applied in an anthropological sense, too: at one level, the different forms of life correspond to the different cultures, that is to that complex of activities typifying and giving a particular identity to them.

However, any cultural form of life is a local and diverse manifestation of a most basic human form. This common human nature - made up of given distinctive features and providing a basis for both communication and mutual understanding - establishes the limits for the possibility of manifesting and expressing this diversity (Andronico, 2002; see also Mazzocchi, 2008-9: 48-50).

6. Dahlberg considers the supercategories adopted to classify the ten Aristotle categories as *Ur-categories*. These represent the ultimate and universal logical foundation, i.e. the common final destination of any conceptual structure no matter the culture or the language in which the structure has been developed (what could differ is only their lexicalization).

7. In Hjørland's schematization Ranganathan is regarded as an exponent of the rationalistic tradition.

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