

Psychochemistry: the science of human interactions and relations

Mukta Sharma¹, R. S. Kaushal^{2*}, D. Parashar³

ABSTRACT

We use a Vedic framework to understand the entire gamut of psycho-processes at the most fundamental level that take place not only in each of us but also among us with reference to human relations and interactions. For this purpose, we explore here a philosophical atom-like (called the 'patomic') model of human Beings. This model, inspired from the philosophy of Srimad- Bhagvad-Gita, has bearing on some undeniable essences of life (EOLs) that we all carry till our death. As a matter of fact, these EOLs actively participate not only in establishing relations but also in interactions with other Beings and with the Nature as a whole. The concept of dressing of EOLs with the consciousness of an individual further adds new dimensions to these studies, particularly in fine-tuning the analysis of these psycho-chemical reactions. Here, instead of exchange of charged ions (as in atomic chemistry) or of colored ions (as in color-quark-chemistry) the exchange of 'tanmātrās' is considered. Attempts are also made to analyze the interactions taking place between two-, or among three- or many-human-Being systems within this framework. To this effect analogies from the theories of physics and chemistry are frequently borrowed wherever considered appropriate. These studies are expected to help in an all-round development of the personality of a person on the one hand and of a family or a society on the other, since the latter basically are the collective versions of individuals. Several examples are cited and representative cases are analyzed.

Keywords: *Essences of Life, Patomic Model, Dressing Rules, Human Interactions and Relations*

INTRODUCTION

Psychophysics and Psychochemistry

The subject of Physics basically deals with the theories of existence of matter, its structure and sub-structures and the associated interactions (energy) to this effect at different space-time scales. The subject of chemistry, on the other hand, deals with the theories of co-existence not only of different species of matter but also of their constituents. All this pertains to the inanimate matter, describable successfully in terms of space-time structure of

¹Department of Chemistry, FET, Manav Rachna International Institute of Research and Studies, Sector 43, Faridabad, India

²Formerly UGC Research Professor, Department of Physics & Astrophysics, University of Delhi, India

³Formerly Associate Professor, Department of Physics, ARSD College, University of Delhi, Delhi, India

*Responding Author

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Nature. Note that for the description of living Beings (animate matter), who do have an extra dimension of consciousness, one needs to evolve different aspects of physics and chemistry from that for the inanimate matter as far as the question of their existence/co-existence is concerned. These new types of physics and chemistry considerations either have to come from independent source (in the ‘top down’ approach) or could be modifications of the existing subjects for the additional concept of consciousness (in the ‘bottom-up’ approach). Naturally, in the former case a full-fledged formalism based on the entire gamut of human experiences and capable of coping with modern trends of these subjects, is required, whereas in the latter case some possible modifications for the phenomenon of consciousness have been pursued, which can only offer a piece-meal solution of the problem. In fact, the Vedanta philosophy is found to offer an elegant framework for the description of the first case (see, for example, *Kathopanisad*, *S'vetās'vatropanisad*, SMBG, and other related literature) and the same will form the basis for the present studies.

Even among the living Beings, the human Being has a special status for being a perfect creation of God, as its inner essences of life (EOLs), namely mind, intellect and ego or self-sense are capable of attaining unlimited potency to show wonders in the world. This trio of inner EOLs, in the presence of consciousness constitutes the micro-body of a person and the same prepares a seed for actions performed in the outer world. These EOLs in conjunction with the biological body and senses of knowledge and action of a person, in fact, are responsible for all sorts of interactions and establishing relations thereof with other entities. While such studies are desirable today, the seers in Vedic literature had already suggested such wisdom for a harmonious society thousands of years ago. In fact, while *Srimad-Bhagvad-Gita* (SMBG) offers a best possible philosophy for the vertical development of personality of any individual, some *Upanisads* (like opening and closing verses in *Kathopanisad* and *S'vetās'vatropanisad*), clearly offer wisdom for the co-existence of individuals through the verse:

*Aum sahanāva vatu ; saha nau bhunaktu ; saha viryam karavāvahei;
tejasvi nāva dhitamastu ; mā vidvisa vahei. Aum peace ! peace !! peace !!!*

“Oh God! give power to our co-existence or togetherness in the sense that: you take care of both (teacher and taught) of us together; you nurse and nurture both of us together ; we both attain (physical and mental) power to work together ; we both attain an enlightened intellect together; we both remain away from mutual envy. Let there be peace inside us, in the family and society, and in the world”.

Relations and interactions among human Beings

The word ‘interaction’ (also a synonym of ‘force’) means some resultant effect in intangible form that appears when two or more objects are present in close (!) vicinity or they co-exist. These objects could be living or nonliving ones. For inanimate objects these interactions, in ideal sense, are mediated through space time structure of Nature and again at different space-time scales, whereas for animate objects in general they could be mediated by space, time and consciousness. In fact, it is the presence of consciousness that makes the studies of interacting animate objects somewhat difficult yet realistic.

The four fundamental interactions, identified in physics are: gravitation, weak, electromagnetic and strong, in the order of their increasing strength. These interactions in general, are characterized by their range and strength. With regard to the range, the strong and weak interactions are of short range while the electromagnetic and gravitation are of infinite range. Unlike the contact force in classical physics, all these four interactions display

a common feature of action-at-a-distance (AAD), but not the features of action-at-a-time (AAT) or of action-at-a-distance-time (AADT) (Kaushal, 2011). The latter, namely AAT and AADT features work mainly for animate objects. Further, this huge difference in the strengths (of several orders of magnitudes) allows us to study a particular system in physics in isolation with reference to a particular interaction, i.e., by neglecting the effect of other interactions, if present. For animate objects, however, this is not the case. The plurality and all-pervading or all-covering character of consciousness comes in the way in this case. The presence of the additional AAT- and AADT- type forces between living objects, particularly between human Beings makes the studies of human interaction further complicated (Kaushal, 2011). No doubt, the ‘conscious’ interactions among the human Beings are of infinite range and of varying strength in physical space-time, but they have the property of converging or diverging or, in general, of all-pervading in the spiritual space of consciousness itself. In the lower strata while the consciousness is capable of creating physical space-time, however at higher strata of spiritual zone it goes beyond the physical space- time and it does wonders. Attaining the art of living in the higher strata of spiritual zone always and everywhere is not an easy task for everybody. Depending upon whether a person is body-conscious, mind-conscious, or soul-conscious, his interactions with the world or with other Beings change accordingly.

Note that in the background of an interaction there is always an exchange of energy in a discretized (quantum) form. (In the sense of physics they are the matter or field particles whereas in the sense of psychoscience they could be constituents of interacting objects or *tanmātrās*). In fact, the quality of exchanged energy also defines the characteristic of the interacting objects towards their identification. We shall return to these details in future sections. It may be mentioned that all known physical forces are still gross, they are not as subtle as the subtlest possible cosmic consciousness field (Kaushal, 2018a) or the cosmic essence of Vedic science. Even the recently established Higgs field, responsible for the generation of mass towards the gravitation field, is not as subtle as the consciousness field. In case of two interacting animate objects it is the consciousness that offers the background for conscious interactions of inner (mind, intellect and ego) or outer (biological body and senses of knowledge and action) EOLs.

Both interactions and relations among human Beings are binary operations (see, for example, (Simmons, 1963)). The former is composite, subtle and hierarchical whereas the latter is gross and unique. Both follow certain symmetries but in a restricted sense. The former appears natural whereas the latter is by assignment. In general, while both refer to co-existence of objects, the relations additionally refer to existence of an external observer. Recall the RST-category of binary relation (\mathbf{R}) for the elements a, b, c, \dots of a set \mathbf{S} (an abstract system) in pure mathematics. In particular, these properties are defined as

- (i) Reflexivity (\mathbf{R}) : $a \mathbf{R} a$, for every element a belonging to \mathbf{S}
- (ii) Symmetry (\mathbf{S}) : If $a \mathbf{R} b$, then $b \mathbf{R} a$, for all a, b belonging to \mathbf{S}
- (iii) Transitivity (\mathbf{T}) : If $a \mathbf{R} b$, $b \mathbf{R} c$, then $a \mathbf{R} c$, for all a, b, c belonging to \mathbf{S} .

The only example for this category of relations is $\mathbf{R} =$ “is equivalent to”, or in practical terms twin, triplet, quadruplet children of the same sex are the possible examples; otherwise, once the husband-wife relationship between two persons of opposite sex is established, other dozens of relations automatically follow in the two families in the Indian context oftentimes as a reality or sometimes as extrapolation. However, the nomenclature changes in different cultures.

In the next section we discuss the intangible contents in an individual in the light of philosophy of SMBG. In Sect. 3, we highlight the basic difference between a chemical and psycho-chemical reaction in view of the atomic model of human Being. Sect. 4 is devoted to discussions of psychochemistry of two-human-Being interactions. The exchanged quanta (*tanmātrās*) are analyzed at both crude and hyper-fine levels. In Sect.5, we briefly remark on the three-human-Being interactions and give a feeling for the complexity involved in this case in terms of possible exchanges and sharing. The effect of environment on these psycho-chemical reactions is investigated in Sect. 6 in terms of the dressed versions of EOLs of reactants with their respective consciousness. Viability of methods, particularly the statistical ones, employed in physics-phenomena is investigated for many-human-Being systems, in Sect. 7. As an example, the teacher-taught interaction is analyzed in detail in Sect. 8. Finally, future prospects of these studies are discussed and concluding remarks are made in Sect. 9.

For a quick and ready reference, we list below the symbols and abbreviations used in the text: [AAD = action-at-a-distance; AADT = action-at-a-distance-time; AAT = action-at-a-time; b = Being (or *Jiva* or life principle), B = biological body, \mathcal{C} = causal body, E = ego or self-consciousness, EOLs = essences of life , FOUs = faculties of understanding, Φ_{cc} = cosmic consciousness field, $G=B + SE$, \mathcal{G} = gross body, I = intellect, faculty of decision , M = mind, faculty of emotion, \mathcal{M} = micro-body, mindset function, μ = meditation variable/parameter , PMs = *panca mahābhūtās*, SE = senses of perception and action, SMBG = *Srimad-Bhagavad-Gita*, SO = soul or inner-most existence, τ = *tanmatrā* (quantum of interaction), WO = worldly objects or outer world of objects offering stimulants].

PSYCHOPHYSICS AND ATOMIC MODEL OF HUMAN BEING

As early as 1860, Gustav Theodor Fechner of Leipzig introduced (Fechner, 1860) the subject of psychophysics which, according to him, is an exact science of functional relations or the relations of dependency between body and mind or more generally between physical and psychic worlds. Thus, in historical perspective, psychophysics is the branch of psychology that deals with the relations between physical stimuli and sensory response. Unfortunately, in the Western way of thinking, while the sensory world is well understood through the subject of physics (for example, the sense eye takes over the subject of optics, the sense ear takes over the subject of sound, the sense skin takes over the subject of heat through touch, etc.), the psychic or mental world is not explored to the same extent. As a result, the development of the subject matter of psychophysics somehow has not been kept in tune with other philosophies of the mental world or of mental processes and also with the progress made over the years in physical theories and brain sciences as well. While neuroscience has already started investigating the processes of learning, feeling and thinking in terms of neuron (carriers of sensation or nerve impulses in human body) dynamics, the Indian philosophy, on the other hand, does offer (Kaushal, 2011) an elegant framework to study and analyze the entire gamut of human experiences in the finest possible manner and in terms of the so-called essence of life (EOLs). In fact, the same stimulant of the physical world can leave different imprints on the minds of different persons depending upon the level of development of their individual faculties of understandings (FOUs). As a result, the role of FOU's of an individual in the perception process needs to be understood prior to relying on any conclusion drawn from the observations on the stimulant. In what follows we briefly discuss a well-studied framework of Vedic science for this purpose.

Some undeniable facts about the human Being as per Vedic wisdom

(a) *Essences of life (EOLs) and their arrangement:* We all have biological body (B) consisting of inner and outer organs in it; we do have ten senses of knowledge and action

(SE) (five senses of knowledge or of perception are eyes, ears, nose, tongue and skin, respectively sensitive to light, sound, smell, taste and touch and five senses of actions or motor organs are hands, feet, speech, anus and copulatory organ). They, in conjunction with the stimuli from the worldly object (WO), constitute the set of outer EOLs. The other set of inner EOLs consists of mind (M), intellect (I) and ego (self-sense) (E) which respectively are responsible for defining the faculties of ‘emotion’, ‘decision’ and ‘memory’ inside the human Being. Notably they all are like inanimate objects but work and become functional only in the presence of another nonphysical element called ‘consciousness’ that originates from, what is termed as ‘soul’ (SO)– the innermost existence present in a Being and cannot be denied (since a dead body, in spite of having all these EOLs, cannot act and becomes functional in the absence of SO alone). A human Being (b) (also called as ‘Jiva’ or life principle) is a composite entity of all these inner and outer EOLs who, while having a strong base in SO, does work consistently in the field of WO.

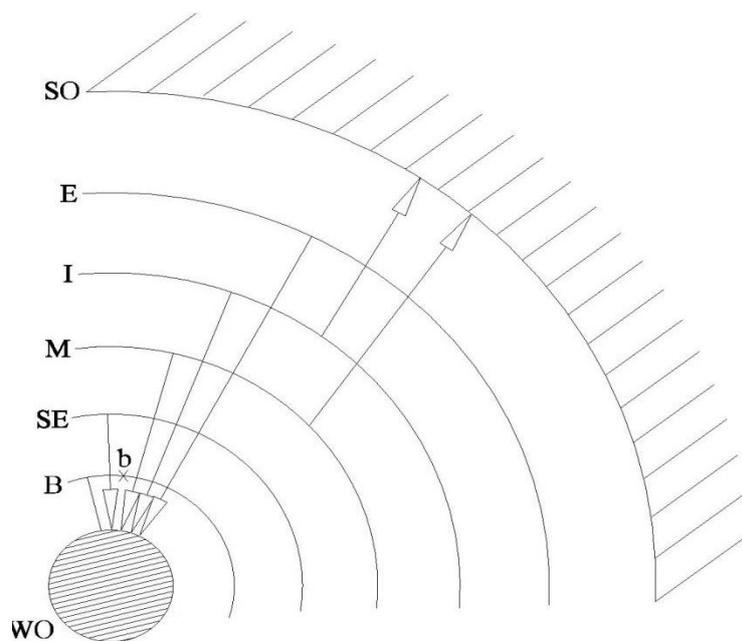


Fig. 1. Philosophical atom type model of human being

With regard to the arrangement of these EOLs in a human Being (cf. Fig. 1), they follow an atom-like picture at the mental level. For this purpose, a patomic (philosophical atom-type) model of human Being has been proposed earlier (Kaushal, 1990;1994;2011;2015) by one of the authors (RSK) in which the nucleus WO is in the centre and the discrete (energy) states B, SE, M, I and E are placed around it in accordance with their increasing fineness and the strength of the meditation. (Meditation is a process in which one uses the focused and/or directed consciousness or the so-called attention to peep into his own inner Self). Much beyond the state E it is all continuum of SO. In fact, this type of arrangement is also in tune with the philosophy of SMBG (see Verses 3.42 and 7.4). Note that this gradation of various states, in which an electron-like object b can stay and accordingly perform upward and downward transitions, is based on the scale of meditation (Kaushal, 2019) and not with respect to the physical space time. Further, while the upward transitions of b are rare, the downward transitions are natural

and more frequent. Even on the meditation scale the increasing spacing between successive states, in fact, analogously corresponds to a rigid binding/rigid rotator in quantum mechanics between the Being *b* and the worldly objects WO. In order to have a feel for the increasing spacing between successive levels in the above atomic model we analyze here a quantum rigid rotator model for *b*-WO binding. In analogy with the quantized energy (denoted by E_q) levels of (quantum) rigid rotator, viz.,

$$E_q = L(L+1)\hbar^2 / (2I_m), \quad (L=0,1,2,\dots), \quad (1)$$

where L is orbital angular momentum quantum number and I_m is the moment of inertia and $h = 2\pi\hbar$ is Planck constant, we can write energy levels for a philosophical quantized rigid rotator as

$$E_{ph} = J(J+1) g^2 / (2I_b), \quad (J=J_{\min}, J_{\min} + 1, \dots, J_{\max}), \quad (2)$$

where $g=2\pi g$ is a Planck-like constant in the meditation domain in much the same way as h is a constant in the space time world. Here J_{\min} and J_{\max} , for a common man remain arbitrary as each one of us is born with certain amount of rigid binding between *b* and WO, depending on the level of development of one's faculty of understanding. Here, the moment of inertia like quantity, I_b characterizes the individual efficiency and efforts that he makes towards his functional nature.

Further, note that such an arrangement of EOLs in a human Being that includes the role of SO in it, is subjected to expose to a finest possible cosmic consciousness field in the Universe, in the same way as a functional mobile handset (which contains a cell or battery in it) is exposed to the electromagnetic signal spread all over in the space. Interestingly, such a philosophical picture of a human Being has suggested several new dimensions of study in the personality creation and development theory of Jung (Jung, 1921; Kaushal, 2016a) with reference to the spirituality quotient (Rajoria et al, 2018).

- (b) **Grouping of EOLs simplifies understanding of the underlying mechanism responsible for human actions:** While trying to analyze the human behavior in terms of the dynamics of EOLs, no doubt the role of each EOL needs to be accounted for at a deeper level but some gross features of behavior and personality traits can be understood (see, (Kaushal, 2016a) and (Rajoria et al, 2018), and Chapter 9 of (Kaushal, 2015)) just by grouping the outer EOLs as gross-body (\mathcal{G}) as $\mathcal{G} = \{\text{WO, B, SE}\}$, inner EOLs as micro-body (\mathcal{M}) as $\mathcal{M} = \{\text{M, I, E}\}$ and the only EOL SO as 'causal' or astral-body (\mathcal{C}) as $\mathcal{C} = \{\text{SO}\}$ as per Vedic science. In this way the (perfect human) Being *b* basically is a union of \mathcal{G} , \mathcal{M} and \mathcal{C} , i.e., $b = \mathcal{G} \cup \mathcal{M} \cup \mathcal{C}$ or else it may be a set of all EOLs, i.e., $b = \{\text{WO, B, SE, M, I, E, SO}\}$. Further, recall that the absence of any one EOL, or more EOLs in *b* constitute the classes of physically or mentally challenged persons or of nonhuman Beings (cf. 'fractured' atomic model, in (Kaushal, 2011)). As a matter of fact such a grouping of EOLs has been helpful in explaining a variety of aspects of human actions, human and nonhuman interactions, etc. at least in the lowest order.
- (c) **Faculty of understanding and the level of its development in an individual:** In analogy with a generalized version of 'pancikaran' rule of Vedic science known for the perception of five cosmic element (*panca mahābūtās*) namely, earth, water, air, fire and ether, a 'tri-karan' rule for inner EOLs M, I and E and a 'dvi-karan' rule for the outer EOLs B and SE is proposed in (Kaushal, 2011). These rules in fact define the dressing of an object with consciousness in different orders through some sort of symbolic recurrence relations and thereby suggest a mechanism to differentiate clearly between

dressed (perceived) and undressed (unperceived or nascent) versions of entities which are generated in a self-consistent manner. These rules, have greatly helped (Kaushal, 2015) in understanding the perception process in a more logical manner. Here we consider this dressing through discrete evolution of an EOL with consciousness or as an effect of meditation. Also, we emphasize here only on the *tri-karan* rule for the dressing of inner EOLs from their nascent version M, I and E. As a matter of fact, the faculty of understanding of an individual is a composite (set) of differently dressed versions of his inner EOLs with his own consciousness, viz., $\tilde{F}^{(l,m,n)} = \{\tilde{M}^{(l)}, \tilde{I}^{(m)}, \tilde{E}^{(n)}\}$, where $\tilde{M}^{(l)}, \tilde{I}^{(m)}$ and $\tilde{E}^{(n)}$ are the l-th, m-th, and n-th order dressed versions of $M(\equiv \tilde{M}^{(0)})$, $I(\equiv \tilde{I}^{(0)})$ and $E(\equiv \tilde{E}^{(0)})$, respectively and according to the *tri-karan* rule they are given by the following symbolic recurrence relations

$$\tilde{M}^{(l)} = \frac{1}{2}\tilde{M}^{(l-1)} + \frac{1}{4}\tilde{I}^{(l-1)} + \frac{1}{4}\tilde{E}^{(l-1)}, \quad (3a)$$

$$\tilde{I}^{(m)} = \frac{1}{2}\tilde{I}^{(m-1)} + \frac{1}{4}\tilde{E}^{(m-1)} + \frac{1}{4}\tilde{M}^{(m-1)}, \quad (3b)$$

$$\tilde{E}^{(n)} = \frac{1}{2}\tilde{E}^{(n-1)} + \frac{1}{4}\tilde{M}^{(n-1)} + \frac{1}{4}\tilde{I}^{(n-1)}, \quad (3c)$$

where $l, m, n = 1, 2, 3, \dots, \infty$. (For the details of dressing rules see (Kaushal, 2018a), and Chapter 8 of (Kaushal, 2011)). Here, we have however demonstrated in a nut-shell that all three, mind, intellect and ego of an individual get enriched with their respective intrinsic characteristic when they are constantly exposed to his consciousness through the process of meditation.

In relations (3), the three limiting cases corresponding to $l, m, n \rightarrow \infty$, while separately define three ideal personalities, namely the most emotional, the most intelligent, the most learned, respectively, for a common man, however, one can define an index r as a set of integers l, m and n , viz., $r = \{l, m, n\}$ which characterizes the level of development of one's FOU. Further note that the order of dressing of an EOL, in general, is a measure of intensity of meditation attained by an individual. Such interplay of inner EOLs has already offered explanations of a variety of aspects of human behavior and experiences (Kaushal, 2011; 2015). We refrain ourselves from going into these details here. These dressing rules become an asset while defining the intensity of meditation (consciousness) (Kaushal, 2019) or looking for the coordinate-momentum coupling at the most fundamental level (Kaushal, 2016b).

(d) An interesting outcome of dressing rules: Origin of sub-(energy)-states in patomic model: In quantum mechanics, the discrete values of orbital quantum number give rise to sub-energy-levels in the atom. Here we have traced other alternative for this kind of discretization i. e., in terms of discrete dressing rules expressed through relations (3). Although a continuous evolution of mindset function (a function of attributes of M, I, E) with consciousness is also considered elsewhere (Kaushal, 2017), but we concentrate here only on discrete dressing (or, evolution) of inner EOLs with consciousness. This in fact leads to infinitely many discrete sub-levels of each of M, I and E, which are not equally spaced. This kind of extension of patomic model makes it more viable towards the studies of human/nonhuman behavior. This also suggests a possible explanation for distinct levels of development of FOUs for different individuals in this framework. Interestingly in the present mathematical setting, the spacing between successive sub-levels for each M, I and E decrease

by a factor of four at each order of dressing. We demonstrate this fact here for the EOL, M, for some low order dressings for simplicity.

Though the contribution of B and SE is necessary in the lowest order dressing (cf. see Chapter 8 of (Kaushal, 2011)) but we ignore it here and confine to pure *tri-karan* rule for the trio of M, I and E. According to this rule, the functional version of the EOL M, is the result of combination of 50% of the nascent mind M and the 25% of each of intellect I and ego E. If we denote n-th order dressing of M as $\tilde{M}^{(n)}$, then for n=0, $\tilde{M}^{(0)} = M$, $\tilde{I}^{(0)} = I$ and $\tilde{E}^{(0)} = E$, and symbolically, the functional mind $\tilde{M}^{(1)}$ in the lowest (first) order dressing is given by

$$\tilde{M}^{(1)} = \frac{1}{2}\tilde{M}^{(0)} + \frac{1}{4}\tilde{I}^{(0)} + \frac{1}{4}\tilde{E}^{(0)} = \frac{1}{2}M + \frac{1}{4}I + \frac{1}{4}E, \quad (4)$$

and similar relations for $\tilde{I}^{(1)}$ and $\tilde{E}^{(1)}$ with $M \rightarrow I \rightarrow E \rightarrow M$. Note that $\tilde{M}^{(1)}$, $\tilde{I}^{(1)}$ and $\tilde{E}^{(1)}$ are the functional forms of M, I and E in the lowest order of meditation. They become increasingly sharp as they are dressed with consciousness in higher orders using the relation like (3) recursively. Here, M, I and E are the inert or nascent versions, like unperceived *panca mahabhutas* of Vedic Science (Kaushal, 2011; 2018a).

Next we list the second, third and fourth order results of dressing of M viz., $\tilde{M}^{(2)}$, $\tilde{M}^{(3)}$, $\tilde{M}^{(4)}$, as follows:

$$\begin{aligned} \tilde{M}^{(2)} &= \frac{1}{2}\tilde{M}^{(1)} + \frac{1}{4}\tilde{I}^{(1)} + \frac{1}{4}\tilde{E}^{(1)} \\ &= \frac{1}{2}\left(\frac{1}{2}M + \frac{1}{4}I + \frac{1}{4}E\right) + \frac{1}{4}\left(\frac{1}{2}I + \frac{1}{4}E + \frac{1}{4}M\right) + \frac{1}{4}\left(\frac{1}{2}E + \frac{1}{4}M + \frac{1}{4}I\right) \\ &= \frac{3}{8}M + \frac{5}{16}I + \frac{5}{16}E, \end{aligned} \quad (5)$$

and similar results for $\tilde{I}^{(2)}$ and $\tilde{E}^{(2)}$ with $M \rightarrow I \rightarrow E \rightarrow M$. Similarly, one can derive results for $\tilde{M}^{(3)}$ and $\tilde{M}^{(4)}$ as

$$\begin{aligned} \tilde{M}^{(3)} &= \frac{1}{2}\tilde{M}^{(2)} + \frac{1}{4}\tilde{I}^{(2)} + \frac{1}{4}\tilde{E}^{(2)} \\ \text{or } \tilde{M}^{(3)} &= \frac{11}{32}M + \frac{21}{64}I + \frac{21}{64}E; \end{aligned} \quad (6)$$

$$\begin{aligned} \tilde{M}^{(4)} &= \frac{1}{2}\tilde{M}^{(3)} + \frac{1}{4}\tilde{I}^{(3)} + \frac{1}{4}\tilde{E}^{(3)} \\ \text{or } \tilde{M}^{(4)} &= \frac{43}{128}M + \frac{85}{256}I + \frac{85}{256}E. \end{aligned} \quad (7)$$

From results (4)–(7) it is not difficult to note that

$$\tilde{M}^{(4)} - \tilde{M}^{(3)} = \frac{1}{4}(\tilde{M}^{(3)} - \tilde{M}^{(2)}) = \frac{1}{4^2}(\tilde{M}^{(2)} - \tilde{M}^{(1)}) = \frac{1}{4^3}(\tilde{M}^{(1)} - \tilde{M}^{(0)}),$$

or, in general,

$$\tilde{M}^{(n)} - \tilde{M}^{(n-1)} = \frac{1}{4}(\tilde{M}^{(n-1)} - \tilde{M}^{(n-2)}) = \dots = \frac{1}{4^{n-1}}(\tilde{M}^{(1)} - \tilde{M}^{(0)}), \quad (8)$$

and similar expressions for the dressed versions of intellect ($\tilde{I}^{(n)} - \tilde{I}^{(n-1)}$) and of ego ($\tilde{E}^{(n)} - \tilde{E}^{(n-1)}$).

From these analyses following additional observations about patomic model are in order:

- (i) On the meditation scale, while the spacing between successive states B, SE, M, I, E and the continuum SO increases on the basis of common experience, the spacing between successive sub-levels of inner EOLs M, I and E decreases at a very fast pace, i.e. by a factor of 4 at each order of dressing. It is an interesting point to check whether the continuum achieved in the two cases, i.e. in the original case and in the limit when $n \rightarrow \infty$ in $\tilde{M}^{(n)}$, $\tilde{I}^{(n)}$ and $\tilde{E}^{(n)}$ (cf. eq.(8)) are the same or different. Obviously, for a good practitioner these limits are expected to be there in the same cosmic consciousness field (Kaushal, 2018), but they culminate at different end-points (seed) in it.
- (ii) Dressing with consciousness does not affect the outer (tangible) EOLs B and SE: According to *dvi-karan* rule, first order dressings of B and SE are given by

$$\tilde{B}^{(1)} = \frac{1}{2}B + \frac{1}{2}SE, \quad S\tilde{E}^{(1)} = \frac{1}{2}SE + \frac{1}{2}B.$$

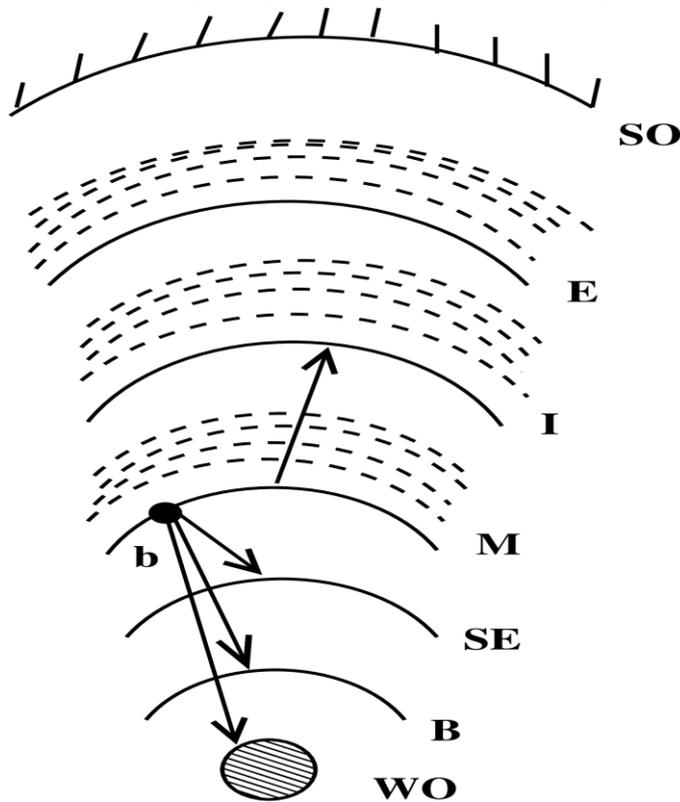


Fig.2: A modified version of patomic model

Also,

$$\tilde{B}^{(2)} = \frac{1}{2}\tilde{B}^{(1)} + \frac{1}{2}S\tilde{E}^{(1)} = \frac{1}{2}B + \frac{1}{2}SE;$$

$$S\tilde{E}^{(2)} = \frac{1}{2}S\tilde{E}^{(1)} + \frac{1}{2}\tilde{B}^{(1)} = \frac{1}{2}SE + \frac{1}{2}B,$$

implying,

$$\tilde{B}^{(2)} - \tilde{B}^{(1)} = S\tilde{E}^{(2)} - S\tilde{E}^{(1)} = 0,$$

i.e., B and SE are differently (permanently) inert with reference to consciousness.

- (iii) Now we have a new picture of atomic model (cf. Fig.2) in which the Being b has many, rather infinitely more choices (that include states and sub-states) to stay in different space-time situations, besides the meditation intensity.
- (iv) ‘Conscious’ mind(s) $\tilde{M}^{(n)}$ is (are) created on “unconscious” mind $\tilde{M}^{(0)}$ so are the ‘conscious’ intellect $\tilde{I}^{(m)}$ and the ‘conscious’ ego $\tilde{E}^{(r)}$. In fact, the states corresponding to $n \neq 0$ here are the states of enlightenment of an individual.
- (v) It is not difficult to realize that the concepts like ‘chitta’, ‘sankalpa’ (or for that matter other synonyms for intellect and ego of Vedic science) are the by-products of this new scheme of study. For example, ‘chitta’ belongs to the domain of $\tilde{M}^{(l)} \times \tilde{I}^{(m)}$, or ‘sankalpa’ belongs to the domain of $\tilde{I}^{(n)} \times \tilde{E}^{(r)}$. Even varieties of different states (including sub-conscious or supra conscious states) of mind, different types of intellects or memories discussed in Vedic, Jaina and other philosophies of the world can be accommodated in this scheme of study. As a matter of fact, it is the first enlightened state of mind, intellect or memory that takes time to attain; otherwise subsequent enlightened states of these EOLs become just a matter of a little effort to attain by a good practitioner in view of the relations like (8) for I and E as well.

PSYCHOCHEMICAL REACTIONS: REACTANTS AND PRODUCTS

Symbolically, a ‘reaction’ or a ‘process’ in physical sciences depicted on a board or on a piece of paper and further going on in the mind of a scientist, is represented conventionally by



The objects A and B on the left are termed as ‘reactants’ and C and D on the right as ‘products’. Note that this is the simplest and the first step to understand a complicated underlying reaction mechanism. This also represents a variety of processes taught in different branches of physics and chemistry, except for the fact that the meanings of reactants and products, the nature of underlying reaction- mechanism and interactions, and energy scales at which these processes occur, keep on changing in different disciplines. They appear mostly in an analogous manner. To be more specific, (i) the ‘objects’ A, B, C, D change with regard to their nature, shape, size, structure, etc., (ii) the ‘rules of the game’ change with regard to the nature of interaction between and among A, B, C, D in terms of their strength and range, etc., and (iii) the ‘scales’ change with regard to space and time and at the level of mind of the scientist as well (for details, see Chapter 5 of (Kaushal, 2003)).

Other remarks about the process (9) that are relevant in the present context are as follows:

- (a) The arrow towards right (left) in (9) is the ‘time arrow’ representing the process in the forward (backward) direction. The phrase(s) above and/or below the arrows represents the physical conditions (like temperature, pressure, etc.) favoring the occurrence of the process.
- (b) Only two objects in the initial and final states are shown in (9), mainly for simplicity; otherwise one can as well have more than two objects in either of the initial or the final states. Some particular cases of process (9) are the ‘production’ process in which either D or C is absent and (9) becomes ‘decay’ process where either B or A is absent.
- (c) Note that the objects A, B, C, D can be composite as well and their constituents can also participate in the process. In that case, one can question the elementarity of the

objects A, B, C and D and also the fundamentality of the process as the compositeness leads to several other sub-processes which, in turn, correspond to different types of interactions and energy scales.

- (d) It may so happen that the reactants and products could be the same but are in different (excited) energy states after the reaction, viz. $A + B \rightarrow A^* + B^*$.
- (e) Whether such a process occurs in physics or in chemistry, the interactions involved are the space-time mediated ones, i.e., they could be gravitational, weak, electromagnetic or strong. In other words, these interactions are generated only out of space and time and not from anything beyond like consciousness; secondly their nature is considered only as an AAD- type or at most contact-type in case of the physical contact of the participants. Participating members in the process, in fact, are assumed not to carry any memory, i.e., there is no scope of any action-at-a-time (AAT)- or action-at-a-distance time (AADT)- type forces.
- (f) At certain energy scales and for certain class of reactants the process (7) can also be expressed as Feynman-like diagram (Perkins, 1987) shown in Fig. 3.
- (g) In view of Remark (e) the entire process consisting mainly of inanimate (participating) objects proceeds as a 'closed' system, i.e., it does not interact with the surroundings except for those factors which are accounted for in the process.

As lessons from the above concepts of physical science, we rewrite below all the seven Remarks for the case of two interacting human Beings, which are now identified with the objects A, B, C and D of (9) and each of them is described by the atomic model.

(a') The place of 'time arrow' is now taken by the meditation variable, μ , which accounts for the evolution of consciousness of each of the participants. For a common man the processes, however, remain irreversible.

(b') For simplicity, we consider the interaction between two persons. Husband and wife trying to conceive a baby or a mother giving birth to a baby can be considered as examples of 'production' or 'decay', respectively in the present context.

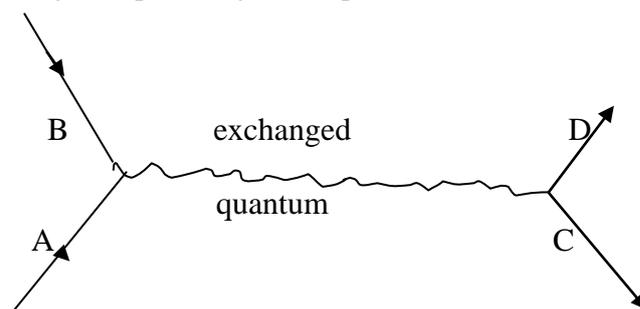


Fig. 3: At certain energy scales and for certain class of reactants the process (9) can also be represented by a Feynman-like diagram.

(c') Note that each participating member A, B, C and D is now composite; at crude level in terms of gross, micro and causal bodies and at subtle level in terms of detailed EOLs of each. Note that the interactions are going to be different at different levels.

(d') In physical appearance, the process, $A+B \rightarrow A^*+B^*$ for human Beings, is always effective but A^* and B^* can now differ from A and B in infinitely many ways due to the dressings of their different EOLs in different orders with consciousness as a result of interactions and hence putting A and B into different enlightened states (cf. Fig.2).

(e') In addition to the contact and AAD-type forces, the possibility of AAT and AADT type forces is always there for conscious participants.

(f') Feynman-like diagram can still be drawn but with reference to the μ -variable (Kaushal, 2019b) instead of the time variable. As a result, there arises a new class of *tanmātrās* (the quanta of interaction) in addition to the ones postulated in Vedic science for the interaction of a human Being with PMs (Kaushal, 2011).

(g') As the consciousness associated with an individual cannot be localized, the interacting system in the present case always remains an 'open' system. Therefore, there is no question of using existing physical laws as such in the present case in view of Remark (e').

INTERACTIONS BETWEEN HUMAN BEINGS

It is a common experience that when a single person is left in the field of PMs or in general that of WO, he alone feels and realizes the interactions with them, first through B and SE and later through M, I and E depending upon the development of his FOU. However, when two or more than two persons are present in a given environment, then in addition to individual's feeling and realization, there is also a tendency for sharing these feelings and realizations with other persons about the same WO. If the sharing persons are strange to each other (i.e., they are not biased or prejudiced) then the same sequence of interactions follows; otherwise the interactions can start at any subtle level and the same depends on the development of FOU's of the sharing persons. Although the interactions initiate at the most fundamental level through EOLs (bare case), the presence of PMs or of WO in the form of environment just dresses them up (dressed case). This enables the interactions to become more effective and the same leads to a success of the outward action. With a view to classifying and quantifying these interactions, we employ here the atomic model of human Being.

Interactions at the crude level

Consider two human Beings b_1 and b_2 each of them having described in terms of gross, micro and causal bodies (i.e., by the reduced version of atomic model of Sect.2.1(b)), viz.,

$b_1 \equiv \{C_1, M_1, G_1\}$, $b_2 \equiv \{C_2, M_2, G_2\}$. These persons are now placed within the range (!) of interaction. Unlike the physical forces, the range here is not defined in the space-time domain; rather it is characterized by the meditation variable μ . (In reality the meditation variables associated separately and jointly with participating persons need to be considered in the study, but in view of all-pervading, all-covering and plurality character of consciousness, we restrict the discussion here only to a single variable μ). In fact they have to have something common in their thinking in order to interact with each other. For example, the persons sitting next to each other in a train or bus may not interact for hours or even days unless the environment forces them to do so. On the other hand, the persons living far apart (distance-wise) can interact with each other either through thought process or through the material means like phone calls, etc. Similar is the case with the time variable. Persons sitting together may or may not go in the past or future but, if they wish, they can as well share their experiences of infinite past or infinite future (even though rare but it might include their past or future births provided they are capable enough) depending on the development of their FOU's. In case of distant persons while M, I of M play the important role, it is indeed the E of M which plays the role in case of persons sitting together.

The interactions between b_1 and b_2 are shown in Fig. 4 within the framework of reduced version of atomic model and with meditation variable μ in the upward direction. While the consciousness of each of the interacting person is separately evolving through their corresponding variables μ_1 and μ_2 , the variable μ accounts for the evolution of consciousness of the observer (Reader!). Before analyzing the possible quanta of exchanges in this figure, following points are worth noting:

- (i) Since \mathcal{C}_1 and \mathcal{C}_2 represent the second quantized version of the same all-pervading cosmic consciousness field Φ_{cc} (Kaushal, 2018b), they separately or jointly will only provide the background for a cognitive b_1 - b_2 interaction in general.
- (ii) In view of (i), \mathcal{M}_i , \mathcal{G}_i jointly or separately for $i=1$ and 2 are active in the presence of \mathcal{C}_1 and \mathcal{C}_2 , respectively.

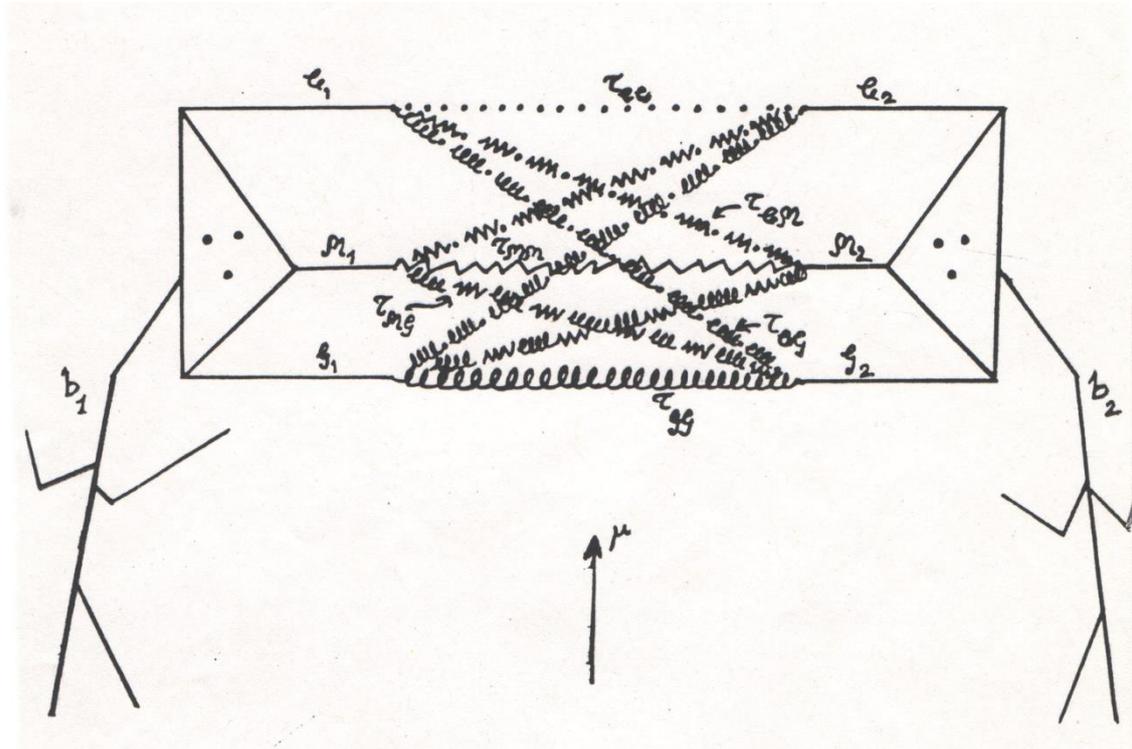


Fig.4: Interactions between human Beings at the crude level, i.e., at the levels of \mathcal{C} , \mathcal{M} and \mathcal{G}

(iii) In view of (i) and (ii) above, for the interaction of \mathcal{M}_1 with \mathcal{M}_2 or \mathcal{G}_2 , or of \mathcal{G}_1 with \mathcal{M}_2 or \mathcal{G}_2 (or vice versa) \mathcal{C}_1 and \mathcal{C}_2 separately remain in the background. Similarly, for the interaction of \mathcal{G}_1 with \mathcal{G}_2 (or of \mathcal{G}_2 with \mathcal{G}_1), \mathcal{M}_1 (or \mathcal{M}_2 in the reverse case) remains in the background (since the subtlety increases as one proceeds from $\mathcal{G} \rightarrow \mathcal{M} \rightarrow \mathcal{C}$).

(iv) Note that $\{ \mathcal{C}_i, \mathcal{M}_i, \mathcal{G}_i \}$ for $i=1$ and 2 , separately constitute individuals who can be in general in different mindsets. For a noticeable interaction between them there has to be an overlap in certain domains.

In general there are nine quanta of interaction (*tanmātrās*) which can exchange between b_1 and b_2 at crude level, namely $\tau_{e_1e_2}$, $\tau_{e_1M_2}$, $\tau_{e_1G_2}$, $\tau_{M_1e_2}$, $\tau_{M_1M_2}$, $\tau_{M_1G_2}$, $\tau_{G_1e_2}$, $\tau_{G_1M_2}$ and $\tau_{G_1G_2}$. Further, universality of \mathcal{C}_1 and \mathcal{C}_2 implies $\tau_{e_1e_2} = \tau_{e_2e_2} = \tau_{ee}$. In view of (iv) and because of peculiar features of cosmic consciousness field Φ_{cc} in which the concept of forward or backward processes is irrelevant (mainly because there is no ‘cause and effect’ distinction in Φ_{cc} at the level of its quantized version SO), it is reasonable to assume $\tau_{M_1e_2} = \tau_{e_1M_2} = \tau_{eM}$; $\tau_{G_1e_2} = \tau_{e_1G_2} = \tau_{eG}$; $\tau_{M_1M_2} = \tau_{M_2M_1} = \tau_{MM}$; $\tau_{G_1M_2} = \tau_{M_1G_2} = \tau_{GM}$; $\tau_{G_1G_2} = \tau_{G_2G_1} = \tau_{GG}$. Such symmetry considerations thus imply existence only of six quanta, namely τ_{ee} , τ_{eM} , τ_{eG} , τ_{MM} , τ_{MG} and τ_{GG} for b-b interaction. Out of these six; τ_{ee} (denoted by dotted line in the figure) will not contribute in view of the universal character of soul. Thus, there remain only

five *tanmātrās* to account for the b-b interaction. While τ_{GG} and τ_{MM} shown by spring-like and wave-like lines in the figure, τ_{eM}, τ_{eG} , and τ_{MG} are respectively shown by correspondingly mixed line segments.

Note that while the human Beings b_1 and b_2 will interact accordingly to their own μ_1, μ_2 parameters (or, the levels of development of their FOU), the observer will evaluate this interaction according to his own μ or the development of his own FOU, essentially remaining only as a spectator. Further remarks about the exchanged quanta between b_1 and b_2 are as follows:

- (i) The *tanmātrā* τ_{ee} may correspond to *turiya* state (a state of the human Being beyond the three commonly known aspects of consciousness on the substratum of Self, namely awaking, dreaming and deep-sleep).
- (ii) The *tanmātrās* τ_{eM} and τ_{eG} correspond to the case when the micro- or gross-body of b_1 is in direct communion with the SO of b_2 or vice versa. Similarly, τ_{MM} and τ_{MG} correspond to the cases when the micro-body of b_1 is in communication separately with the micro- and gross-bodies of b_2 , or vice versa, i.e., when b_1 can imagine/dream of the gross body actions of b_2 .
- (iii) In the b-b interaction, it is the τ_{GG} -type exchanges that lie within the purview of physical and/or biological sciences; otherwise as μ increases any or all nonphysical interactions corresponding to $\tau_{MG}, \tau_{MM}, \tau_{eG}$ and τ_{eM} start manifesting and eventually come into existence as a result of fine tuning of the interaction in the lowest order.
- (iv) Only good practitioners can realize the dynamics arising out of higher order fine-tuning, which is attributed to the constituents of \mathcal{M} and \mathcal{G} of each of the interacting persons. We demonstrate this in the next sub-section.

In summary, the conscious mind of one person is capable of activating different EOLs of the other person. As a matter of fact, the mindsets of b_1 and b_2 as a function of their individual μ_1 and μ_2 play a crucial role in the whole process of interaction in addition to the μ of the external observer.

Fine and hyperfine tuning of the b-b interaction

Next we use the finer details of \mathcal{G} , \mathcal{M} and \mathcal{C} as $\mathcal{G} \equiv (\text{B, SE})$, $\mathcal{M} \equiv (\text{M, I, E})$ and $\mathcal{C} \equiv (\text{SO})$ to analyze the “reaction” (or, the interaction process):

$$b_1 + b_2 \xrightleftharpoons{\tau_{b_1 b_2}} b'_1 + b'_2 + \tau_{b_1 b_2}, \quad (10)$$

essentially in the spirit of Fig. 3. Here b'_1 and b'_2 are the enlightened versions of b_1 and b_2 after the interaction(s). The *tanmātrās* $\tau_{b_1 b_2}$ satisfies $\tau_{b_1 b_2} = \tau_{b_2 b_1}$ for the reasons given before and correspond to the earlier composition of b as $b \equiv \{\mathcal{C}, \mathcal{M}, \mathcal{G}\}$, will now correspond to the composition of each of the Being b as $b \equiv \{\text{B, SE, M, I, E, SO}\}$. This will lead to twenty varieties of interactions mediated through $\tau_{B,B}, \tau_{B,SE}, \tau_{SE,SE}$ (correspond to τ_{GG}); $\tau_{B,M}, \tau_{B,I}, \tau_{B,E}, \tau_{SE,M}, \tau_{SE,I}, \tau_{SE,E}$ (correspond to τ_{GM}); $\tau_{B,SO}, \tau_{SE,SO}$ (correspond to τ_{Ge}); $\tau_{M,M}, \tau_{M,I}, \tau_{M,E}, \tau_{I,I}, \tau_{I,E}, \tau_{E,E}$ (correspond to τ_{MM}); $\tau_{M,SO}, \tau_{I,SO}, \tau_{E,SO}$ (correspond to τ_{Me}). Note that the interactions of the type $\tau_{SO,SO}$ do not form the part of this classification since it provides the basis for all the above interactions as argued earlier for τ_{ee} . Further, each of

these 20 interactions accounts for certain aspect of behavior arising out of the interaction of two human Beings.

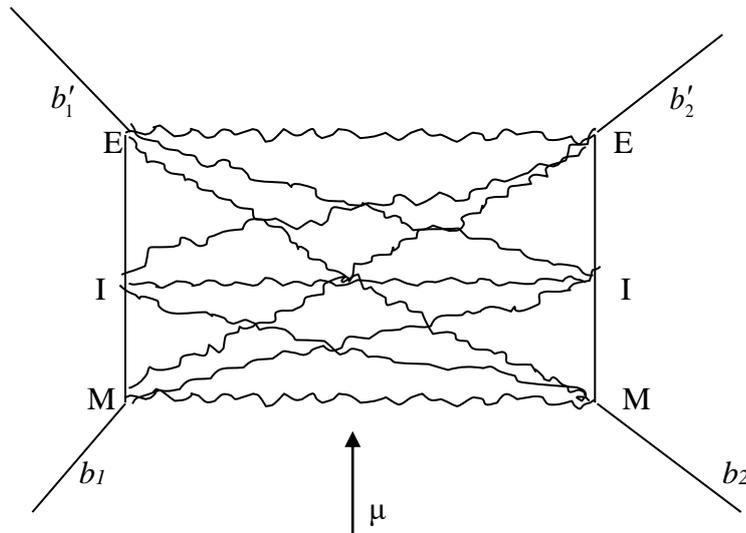


Fig. 5: An example of fine-tuning of b-b interaction mediated by τ_{MM} . In all there are six exchanges possible in this diagram after accounting for the symmetry considerations.

It is worthwhile to remind of an analogy here from Nuclear Physics. At the first stage of study of nuclear forces, their origin is considered due to the exchange of pions between nucleons (Yukawa theory). At the next sub-structure level, their origin is attributed to the gluon exchanges between the quarks; when both pion and nucleon are considered as composed of quarks. For details we refer to Chapter 9 of (Kaushal, 2011). In the same spirit, although we are using the same symbol τ here for the exchanges at the crude as well as at the fine-tuning levels but the fact is that these exchanges occur at different scales of meditation, even for the same pair of human Beings. Here, in what follows, we cite five examples —one corresponding to each of the five cases of gross *tanmātrās*.

Example 1 (τ_{gg}): Case of body-body interaction ($\tau_{B,B}$) without prejudices: certain instances can be, for example, in the wrestling of two wrestlers, meeting of husband and wife, or of two drunkards.

Example 2 (τ_{gM}): Case of body-mind interaction without the roles of I, E and SE (i.e. only emotions) ($\tau_{B,M}$): One can find many examples in a family but the most ideal one is that of mother-baby or, at times, if searched, in husband-wife interactions.

Example 3 (τ_{ge}): Case of body-soul interaction ($\tau_{B,SO}$): A person in *Samādhi* receiving the salutation of another person

Example 4 (τ_{MM}): Case of mind-mind interaction ($\tau_{M,M}$): Imagination of or dreaming the emotional exchanges between two persons like weeping of a lady when she watches the other lady weeping.

Example 5 (τ_{Me}): Case of mind-soul interaction ($\tau_{M,SO}$): A person in *Samādhi* noticing the emotions of the other.

In fact, Feynman-like diagrams can be drawn for each of the interactions described above and through Examples 1 to 5, but here we elaborate only on τ_{MM} class of exchanges, as shown in Fig. 5.

Keeping the underlying symmetry in mind, Fig. 5 suggests six exchanges, namely τ_{MM} , τ_{II} , τ_{EE} , τ_{MI} , τ_{IE} between b_1 and b_2 at the micro-body level. Many examples for this case can be sought in teacher-taught interactions (cf. Sect.7). Examples can also be sought in intellectual gatherings such as conferences and symposia, religious gatherings, etc. Note that the above discussed exchanges are between bare EOLs (not dressed and enriched with environment) of b_1 and b_2 . The examples cited above are accommodated only in a crude manner in the scheme of classification. In fact they suggest the cases of *ideal* interactions as far as the real life is concerned. In the next section, we shall account for the effect of environment and circumstances on these bare interactions in order to bring them to conform to a more realistic situation.

For animate objects, the process (9) in general evolves with respect to space, time and consciousness variables and the latter is accommodated through μ . Here, however, we have proceeded with the evolution of the system only with respect to μ , as the scales of space-time and of non- space-time mediated interactions are quite different. Moreover, the process (10) is just a symbolic representation as far as the physics content of reactants and products is concerned.

Lastly, we make a few remarks about the hyperfine-tuning of b-b interactions. For instance, this feature for the τ_{MM} class of exchanges described in Fig. 5, can be understood as follows. Note that each constituent of \mathcal{M} , namely M, I and E has subtle and gross components as argued in Sect. 3.1 of (Kaushal, 2015). If one considers such sub-divisions of M, I and E in the present τ_{MM} class of exchanges, it will further increase the number of exchanges to as many as 36 in general at the next hyperfine level. However, symmetry considerations will reduce this number to 21. In fact such hyper-fine tuning of exchanges is also possible for other fine classes of exchanges, namely those corresponding to τ_{GG} , τ_{GM} , τ_{GE} , and τ_{ME} with $\mathcal{G}=\{B, SE\}$. Such details of \mathcal{G} and also that of B (in terms of different inner and outer organs) and that of SE (in terms of different senses of knowledge and of action) will lead to a huge list of exchanges which, in turn, can account for additional finer aspects of two human Being interaction. We restrict ourselves herein from going into further details. However, an example pertaining to τ_{MM} would suffice in this respect.

Example 6: If a person has some prejudices against the other, it is all due to the storage of certain past memories in the subtle component of E, and this accordingly materializes the interaction between b_1 and b_2 . As a result, the person feels either joy or anger out of this interaction depending respectively upon the good or bad memories of the past stored in subtle E.

THREE HUMAN BEING INTERACTIONS: BRIEF REMARKS

Interactions at the crude level

Analogous to the b-b interaction discussed above, here we briefly extend the discussion to the case of three-human –Being interactions. No doubt, the methodology in this case remains the same but the number of situations to be analyzed in terms of exchanged quanta becomes rather large. If one resorts to the pair-wise interactions (by assuming the third person as a spectator) for a three-human-Being-system, then life becomes simple as it happens in

physical theories (Mitra, 1962;1969), where the contribution of three and higher-body forces (particularly in nuclear physics) are found to be relatively small. However, in case of human Beings this is not the case, three- and many-human Being interactions are equally or even more important, as we are now dealing with an ‘open’ system whose sub-systems again are no more the systems that are ‘closed’. In fact it becomes difficult for a common man to remain spectator but a man of perfection (the person who is living in spiritual (causal-body) zone can be considered as nearly an ideal spectator as possible. Therefore, we continue the analysis of an interacting three-human-Being-system described by

$$b_1 + b_2 + b_3 \xrightarrow{\quad} b'_1 + b'_2 + b'_3 + \tau_{b_j b_k} + \tau_{b_l b_k} \quad (11)$$

under some simplifying assumptions. This, in some sense, will suggest a guideline to analyse more realistic situations. Here in the process (9) $\tau_{b_j b_k}$ are the quanta corresponding to pairwise interactions and $\tau_{b_j b_k b_l}$ are the quanta corresponding to three-human-Being exchanges with $j, k, l=1, 2, 3$; but j is not equal to k and not equal to l in this case.

Further note that in the language of reduced version of the atomic model each of b_1, b_2, b_3 in the subscript of τ can be \mathcal{C}, \mathcal{M} or \mathcal{G} . However, by legitimately barring the cases like $\tau_{eee}, \tau_{eme}, \tau_{mee}, \tau_{eem}, \tau_{ege}, \tau_{gee}, \tau_{eeg}$ for the reasons given in the case of b-b interaction in terms of the universality of soul and also that they will not form good examples of three-human-Being interactions, results into twenty possibilities of three-human –Being exchanges, namely $\tau_{emm}, \tau_{emg}, \tau_{egm}, \tau_{egg}, \tau_{mem}, \tau_{meg}, \tau_{mme}, \tau_{mmg}, \tau_{mge}, \tau_{mgm}, \tau_{mge}, \tau_{gem}, \tau_{geg}, \tau_{gme}, \tau_{gmm}, \tau_{gmg}, \tau_{gge}, \tau_{ggm}, \tau_{ggg}$, contrary to just the five exchanges for the case of two human Being interactions, namely $\tau_{em}, \tau_{eg}, \tau_{mm}, \tau_{mg}$ and τ_{gg} . Further, note that out of these 20 possibilities the 12 cases, namely $\tau_{emm}, \tau_{emg}, \tau_{egm}, \tau_{egg}, \tau_{mem}, \tau_{meg}, \tau_{mme}, \tau_{mge}, \tau_{gem}, \tau_{geg}, \tau_{gme},$ and τ_{gge} qualify as the better choices in the spirit of the spectator model.

Fine- and hyperfine- tuning of b-b-b interactions

We first demonstrate here as to how the mind, M, initiates the interactions in a group of three human Beings. Recall that it is the presence of SO (or, of self-awareness or of the source of consciousness) existing already in a human Being that makes him functional through his EOLs. Let b_1, b_2, b_3 be the three human Beings characterized by (cf. Sect.2)

$$b_1 \equiv \{SO, E_1, I_1, M_1, SE_1, B_1\}; b_2 \equiv \{SO, E_2, I_2, M_2, SE_2, B_2\}; b_3 \equiv \{SO, E_3, I_3, M_3, SE_3, B_3\},$$

where E_j, I_j, M_j, SE_j, B_j , for $j=1,2,3$ are various EOLs present in the Being b_j . Note that the EOL SO is the same in all the three because of its cosmic character and the same offers a basis for their interaction. However, other EOLs are different and in general they are different in all human Beings for not completely independent reasons, namely (i) each Being has different *sanskārās* (tendencies) generated out of his *Prārabdha, Sancita,* and *Kriyamāna* components of actions, (ii) each has different levels of development of his FOU, and lastly (iii) each is affected differently by Nature-born three *Gunās* (or each lives in different environment and circumstances). In principle, one should analyze the b-b-b interaction keeping these reasons in mind but it has been found that it is the EOL, M, which acting as a bridge between \mathcal{M} and \mathcal{G} , also plays a dominant role in these interactions. In fact, to whichever SE, the mind M is attached, the same SE controls I of that person and accordingly his behavior gets affected (SMBG, 2:60; 2:67).

As for b-b interaction, the fine tuning of b-b-b interaction in terms of constituents of each \mathcal{G} and \mathcal{M} corresponding to each interacting person can also be carried out in principle but as a whole it becomes a very complicated dynamics. In fact, this complexity increases further if one wants to analyze the dynamics of four- or more-human-Being interactions, with the result there is a need to follow other methods for this case. We shall refer to one such method based on statistical description of the system in the next section. The bare exchanges discussed above among three individuals take place only under ideal conditions as was the case for the b-b interaction; otherwise in real life it is the superposition of different exchanges out of 20 *tanmātrās* that need to be considered. In fact, the same environment is perceived differently by the three interacting individuals depending upon the level of development of their respective FOU's and this also suggests a basis for the interaction among them.

In analogy with the exchanges in Fig.5, one can have some glimpses of the complexity of b-b-b interactions, particularly when one considers the possible exchanges among the constituents of three mindsets $\mathcal{M}_1, \mathcal{M}_2, \mathcal{M}_3$. In this case the fine tuning of interactions associated with the *tanmātra* $\tau_{\mathcal{M}\mathcal{M}\mathcal{M}}$ arises due to the constituents of \mathcal{M} (namely, M, I, and E) (Kaushal, 2011). Hyperfine tuning is also possible here by considering the gross and subtle components of each of M, I, and E (see Sect. 3.1 of (Kaushal, 2015)) and for each individual.

DRESSING-UP OF b-b AND b-b-b INTERACTIONS: EFFECT OF ENVIRONMENT

What has been discussed above in Sects. 4 and 5 are the (bare) b-b and b-b-b interactions generating basically from the bare EOLs of each Being. These interactions (or, their measure in the form of associated *tanmātrās*, namely τ_{b,b_k} or τ_{b_j,b_k,b_l}) get dressed up in the presence of WO in general or PMs in particular. Actually the external environment consists of two aspects, namely the presence of kith and kin (or a third person) and/or the PMs. In either case, the b-b and b-b-b interactions get modified or dressed up and may enrich the awareness of the participants in terms of the development of their individual FOU's and hence affect the corresponding interactions. Note that the presence not only of PMs, but also of a third Being (human or nonhuman), if that happens to be a relative, a pet or even a stranger, affects the b-b or b-b-b interaction accordingly. Although, the latter forms the case of three-Being interaction but as long as the third human Being remains a spectator the b-b interaction will only be marginally affected. Thus, in the presence of environment all the five exchanges $\tau_{e\mathcal{M}}, \tau_{e\mathcal{G}}, \tau_{\mathcal{M}\mathcal{M}}, \tau_{\mathcal{M}\mathcal{G}}$ and $\tau_{\mathcal{G}\mathcal{G}}$ (for b-b case) or the 20 exchanges (for the b-b-b case) get dressed up. It may be mentioned that the 'dressing' here means enriching the quota of sharing among b_1, b_2 and b_3 or enriching the FOU of each of b_1, b_2 and b_3 .

Dressing up of b-b interaction, in fact, is a two step process: In the first stage, each of b_1 and b_2 gets enriched by the presence of WO through the dressed *tanmātrās* $\tilde{\tau}_{ea}, \tilde{\tau}_w, \tilde{\tau}_a, \tilde{\tau}_f, \tilde{\tau}_{et}$, associated with the interaction of a human Being with *panca mahābhūtās* (Kaushal, 2011) and then in the next step such enriched FOU's of b_1 and b_2 interact mutually (Kaushal, 2015). Similar is the case with the dressed b-b-b- interaction. It may be mentioned that the bare *tanmātrās* whether they are τ_i 's (with the subscripts $i = ea, w, a, f, et$, corresponding to five cosmic elements, namely earth, water, air, fire, and ether), τ_{ij} 's (with $i, j = b_1, b_2$) or τ_{ijk} 's (with $i, j, k = b_1, b_2, b_3$) type, could be more or less the same for all human Beings but the dressed ones $\tilde{\tau}_i$'s, $\tilde{\tau}_{ij}$'s, or $\tilde{\tau}_{ijk}$'s, may differ from individual to individual, pair to pair or for trio to trio of human Beings. This is mainly because the EOLs of each of us react with the environment differently even if B and SE may appear to be the same at the gross- level but

the personalities are definitely different at the levels of M, I and E. If one also accounts for such differences (which at times are very crucial) then the assumption, $\tilde{\tau}_{b_1b_2} = \tilde{\tau}_{b_2b_1}$ breaks down in spite of $\tau_{b_1b_2} = \tau_{b_2b_1}$. We shall consider some real-life applications and examples of these situations in the forthcoming sections.

MANY HUMAN BEING INTERACTIONS

We have seen that the magnitude of complexity of interactions among human Beings increases with increasing number of interacting members. No doubt, for these many-human-Being systems, the starting b-b interaction, in its general form, still remains in the background but at the same time the environment and circumstances demand many-human-Being interactions to be equally important unlike the case with physics- many-body systems. Social, political and economic sciences are full of such examples of interacting many-Being systems. In fact, the knowledge of b-b or b-b-b interactions as such cannot be extrapolated to a system of many-human Beings in a straightforward manner. In this context, recall a common experience, “two perfect persons may not be perfect for each other”. As a matter of fact when two or more than two persons perfectly adjust to co-exist several new interactions start appearing and their perfection becomes a big question-mark. The many-human-Being features that evolve are co-existence, co-operation, coordination and the like and the same, at a higher level of description, are more pronounced in the present case than for a physical many-body system where the nature of many-body forces is quite different. However, to analyze an interacting many-human-Being system, once again we use analogies from physical sciences and employ the same to the present situation with regard to certain concepts and methodology, of course after appropriate modifications.

Some methods to understand many-human-Being systems and their behavior

Here we highlight briefly a couple of methods to handle many body systems in physical sciences and discuss their viability for the case of many-human-Being systems through atomic model.

- (a) **Core-valence picture:** In both atomic and nuclear physics the role of core-valence picture is pretty well known. It is found to work successfully to understand both individual atoms and nuclei and also their collective versions. In this case, inert or partially inert part of the system behaves as ‘core’ (which in some sense is considered to be inactive in the reaction) whereas the particles outside this core, termed as ‘valence’ participate actively in the interactions with other atoms or nuclei, as the case may be. These are the certain number of electrons (or nucleons) that pair up to form the core in case of atoms (cf. magic numbers in shell model of nucleus). When we extend this analogy of core-valence picture to atomic model a word of caution is necessary.

In fact human Being is a perfect creation of God in terms of his EOLs and note that (i) in atomic model a core is formed at every level of description, namely at B, SE, M, I and E levels, mainly due to the plurality and all-pervading characters of consciousness—an attribute of SO, and (ii) in most cases these are the outer EOLs, B and SE that come out first for interactions and participate in the reaction as compared to the inner EOLs M, I, and E. Here the case of ‘inside out’ dominates over the ‘outside out’ unlike the situation in physical science (Kaushal, 2015). Another way to note the viability of core-valence picture in atomic model is through ‘gross’ and ‘subtle’ components of M, I and E (cf. Sect. 3.1 of (Kaushal, 2015)) where gross component of micro-body comes first to interact with, mainly in fast processes.

As examples of this core-valence picture we can find several situations in a society. In fact, caste, union and associations are formed on the basis of what they share among themselves out of the levels of B, SE, M, I and E and accordingly their actions. For details we refer to Chapter 12 of (Kaushal, 2015).

(b) Statistical approach to many-body systems: In physical sciences, depending upon the nature of the valence particles, the collection of these particles from different atoms or nuclei in certain cases also constitutes a new many body system which in turn educates about the nature of original many body systems (e. g., Fermi gas models of metals and nucleus or interacting boson models in nuclear physics). The type of statistical description of this new many-body system, at times, becomes crucial for experiments. Similar is the case with many-human-Being systems. Depending upon whether the collection or assembly of people B-, SE-, M-, I-, or E- level description dominated, personalities of the groups are identified. Starting from the wrestler category (B-dominated) to highly intellectual categories (I- and E- dominated groups) are found to exist in society, mainly on the basis of their expertise. This perhaps is the basis for the existence of four-caste system in the Indian context,

One-to-many and many-to-one human Being interactions

In view of the fact that human Beings do have extra dimensions of emotions, decision making and memory in considerable proportions, certain b-b and b-b-b systems have achieved special status in comparison to others over a period of evolution of human race. For example, the interactions of the type husband-wife, mother-child, father-child, teacher-taught (one-to-one), two best friends, mother-in-law vs. daughter-in-law, etc. in the b-b case and father-mother-child, the trio of best friends, the trio of business partners, etc. for the b-b-b case can be identified with certain peculiarities in a society. These interactions, in fact, are responsible for assigning and maintaining the so-called human relations. Further, unlike the case with physical systems, here the importance of one-to-many and many-to-one human Being interactions are also interesting. While we continue with the example of teacher-taught interaction (one-to-many case) in the next section, here we highlight a few other cases of one-to-many and many-to-one human Being interactions in daily life.

In fact, when a teacher in the class, a political leader in the congregation of masses or a spiritual leader in the meditation class, etc. is showered with questions and queries at the same time from the audience, such situations arise. If this conversation is one-to-one, then life becomes simple for the speaker; otherwise the speaker becomes puzzled because of the variety of quality of questions posed. Imagine the scene when a truck driver is caught by public over an accident on the road involving his truck, particularly when some casualty has occurred.

TEACHER-TAUGHT INTERACTION: SEARCHING THE BEST PERFORMER IN A CLASS ROOM

In this section, we analyze a case and try to find the answer of an important question as to how much a mob get educated when addressed by a teacher or a leader? For this purpose we shall dwell on Saha's ionization formula. About 90 years ago, Indian physicist Megh Nath Saha studied ionization of gases by thermal excitation. In particular, the question as to what happens when the gaseous mass consisting of atoms is heated to very high temperatures (like the ones that appear in the formation of stars) was discussed by Saha (Saha & Srivastava, 1931; Rumer & Ryvkin,1980), In some sense this formula is also based on the statistical description built in the system.

Note that after the husband-wife and mother (or father)-child among various b-b interactions, teacher-taught-interactions is the next important one as far as the maintenance of ethical values and the order in a society is concerned. While the student is already at a receiving end by way of having desire to evolve his inner EOLs, an ideal teacher, on the other hand, is one who has evolved and enlightened M, I and E to his/her maximum capacity and the given circumstances with regard to the understanding of the world/cosmic order. In this case τ_{MM} dominates at the primary level of education and later τ_{ME} , τ_{MI} , τ_{II} , τ_{IE} start dominating step by step during the secondary, senior secondary, college and university levels of education.

Saha suggested a formula for computing the fraction of the number of (r+1)-times ionized atoms to r-times ionized atoms and the same was derived in terms of pressure, temperature and internal energy of the system. Here, within the framework of atomic model, we use this formula for a system in which the gaseous mass containing many atoms is replaced with a system of conscious human Beings in an analogous manner. Like in Saha's theory the collection of atoms in a hot gas consists of atoms in their different mode of excitations, the same is the case here in a mob of persons. The persons in the mob or gathering, in general, are obviously all not like-minded, i.e., they are not in the same degree of 'ionization'. When such a mob or gathering is exposed to the same external stimulant, then the constituents of this system of living Beings react differently. Note that this stimulant can either be a human Being (like a teacher, political leader, sermon delivering saint, etc) or a nonhuman Being (like lion or any other wild animal) or an inanimate object (like storm or cyclone, etc.). Individuals in the mob react differently according to the level of development of their respective FOU and thus undergo different excitations. Life is easier for all the situations except when the stimulant is a human Being in the sense that during or after the reaction with stimulant the mob maintains order or else it becomes disordered. In case of human stimulant, this in fact depends on the development of his FOU to guide the mob accordingly. In return some persons in the mob will derive the inspiration to work at the level of B, some at the level of senses of action, some at the level of senses of knowledge, while others at the level of M, and so on, while exposed to the same stimulant and in the given circumstances. At subtle level, however, the excitations of b even from sub-states (cf. Fig. 2) in atomic model can also take place.

Again a physics-law enters here, i.e., when the external forces are strong (i.e. in terms of pressure and fear in physical sense or in moral sense) then the mob will attain orderliness over a period of time, of course after a continuous exposure to the stimulant. If the internal forces become strong (compared to those created by the stimulant) then the many-human-Being system becomes disordered and may reach a stage of break down.

Here we demonstrate the application of a Saha-like formula to compute the evolution (excitation) of a single EOL as a result of imposition of such a collective thinking expressed by a collective meditation variable, μ_c (on a par with the external temperature in Saha's theory). The fraction α , defined as $\alpha = N_+ / N_0$, where N_+ is the number of beneficiaries in terms of evolution of any one of their EOLs (including sub-levels) and N_0 is the number of persons in the mob initially ready to undergo such an exposure at a given space-time, can be written in the spirit of Saha's ionization formula as (Rumer & Ryvkin, 1980),

$$\alpha(\mu_c, \sigma) = -\phi(\mu_c, \sigma) + [\phi^2(\mu_c, \sigma) + 2\phi(\mu_c, \sigma)]^{1/2} \quad (12)$$

with

$$\phi(\mu_c, \sigma) = \left(\frac{\mu_c}{\mu_c^0} \right)^{3/2} \exp(-\chi_s^\sigma / \mu_c) \quad .$$

Here χ_s^σ is a measure of the negative efforts (in appropriate units consistent with μ_c) made by an individual in the given circumstances σ to achieve the s-th level in the atomic model (in the spirit of inside-out-type interactions) and μ_c^0 is the measure of initial mindset of the human stimulant (transmitter) prevailing and derived by judging the nature of the mob (receiver).

The behavior of the fraction of beneficiaries in the audience is shown in Fig. 6 as a function of the collective meditation variable μ_c (in the units of μ_c^0) for three typical values of χ_s^σ , namely solid, dashed and dotted curves correspond to $\chi_s^\sigma = 0.1, 1.0$ and 10.0 respectively, in the units of μ_c^0 . Note that (i) in general α increases with μ_c and then slowly attains the value unity rather asymptotically irrespective of the nature of efforts. (ii) For a given μ_c , α is large

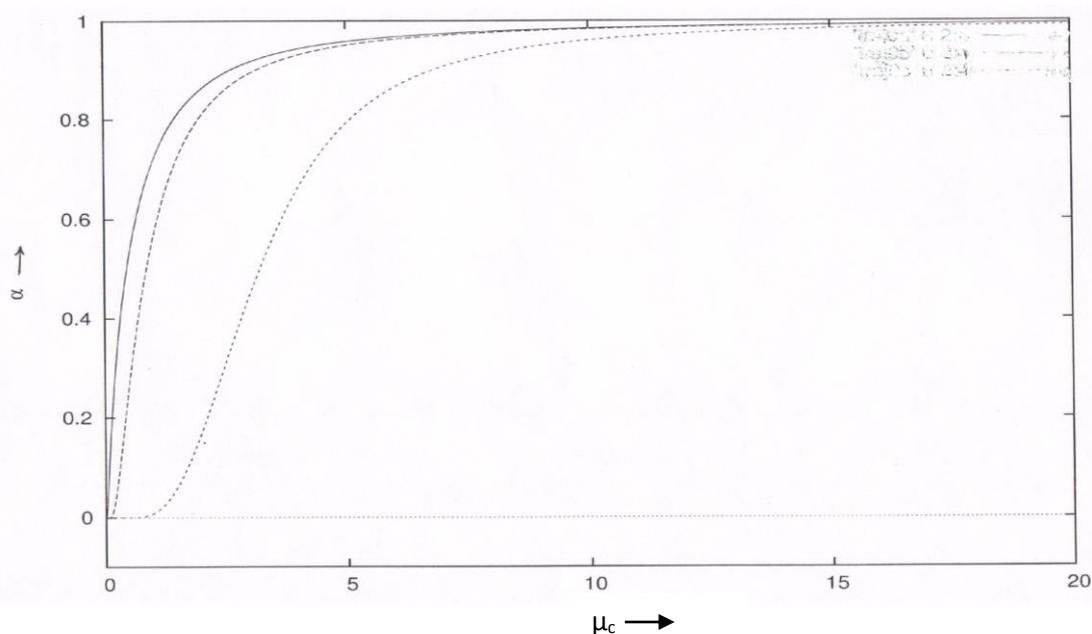


Fig. 6: Behavior of α as a function of (μ_c / μ_c^0) for different efforts of individual. Solid, dashed and dotted curves respectively correspond to $\chi_s^\sigma = 0.1, 1.0, 10.0$ (in units of μ_c^0).

for small values of χ_s^σ , implying that if μ_c is compatible with μ , i.e., if there is a matching of mindsets of the transmitter and of the receiver, then most beneficiaries are those who have never made an effort (or made negative effort) in the past but now they are conscious to learn or to gain from the given transmitter. (iii) The limiting value of α as unity is an ideal situation and the same is hardly attained by a group of audience, but for those who have small χ_s^σ , such a limit is achieved rather quickly. From such an analysis it is not difficult to trace the most beneficiary student in a classroom.

FUTURE PROSPECTS AND CONCLUDING DISCUSSION

Attempts are made here, perhaps for the first time, to develop the subject of psychochemistry on a par with atomic chemistry of physical science and in accordance with the psychophysics in its new incarnation (Kaushal, 2017b). The subject is developed at the most fundamental level within the framework of Vedic wisdom. With a view to help the understanding the

intricacies of human interactions, behavior and relations, a possible modification to the original (Kaushal, 1994) atomic model is discussed in terms of the dressing of EOLs with consciousness (cf. Fig. 2). A basis is sought for assigning the relations and forming the groups, subgroups and castes in a society. Instead of exchange of (Coulomb charge) ions as in atomic chemistry or (color charge) ions as in quark physics (Harari, 1983), here the exchange of ‘*tanmātrās*’ (quantum of various human interactions) are considered. A galaxy of these ‘*tanmātrās*’ for two-, three- and many-human-Being interactions are identified and analyzed. This enables one to resolve the intricacies of human relations.

Vedanta philosophy emphasizes a rigid and strong binding between ‘*Jiva*’(b) and ‘*Prakriti*’ (WO) in the space of meditation. This supports the use of a rigid-rotator model of quantum mechanics in understanding the uneven spacing between different levels of description in atomic model. Further, the designed dressing rules offer the basis for uneven spacing between sub-levels associated with M, I and E (cf. Fig. 2).

It is argued that like in physical theories, the three- or higher-human-Being interactions in a many-human-Being system cannot be neglected, rather they become more important. In spite of all this the viability of certain concepts and tools of many-body physics is demonstrated in the present case. Some important results arrived at in this Article are as follows:

- (i) At crude level there arise five quanta of exchanges (*tanmātrās*), namely τ_{eM} , τ_{eG} , τ_{MM} , τ_{MG} and τ_{GG} which mediate the interaction between conscious human Beings and are capable of covering their entire gamut of experiences and actions at least in the lowest order. For the pair-wise interaction among three conscious persons this number, however, becomes large. These numbers become even larger, if one also accounts for the circumstances in which the interaction is taking place, in addition to considering the dressed versions of G and M with consciousness.
- (ii) For the simultaneous interaction among the three conscious persons, the number of quanta of possible exchanges (*tanmātrās*) is computed at the crude level (i.e., using the reduced version of the atomic model) as 20 in number, and they turn out to be τ_{eMM} , τ_{eMG} , τ_{eGM} , τ_{eGG} , τ_{MEM} , τ_{MEG} , τ_{MME} , τ_{MMM} , τ_{MMG} , τ_{MGE} , τ_{MGM} , τ_{MGG} , τ_{GEM} , τ_{GEG} , τ_{GME} , τ_{GMM} , τ_{GMG} , τ_{GGE} , τ_{GGM} , and τ_{GGG} .
- (iii) Mainly to demonstrate the underlying complexity in understanding the fundamental processes in human behavior and experiences, the fine tuning of the interactions mediated only through τ_{MM} in the b-b case are analyzed and discussed (cf. Fig. 5).
- (iv) A new basis for the socialization of persons in a society is suggested in this work at the most fundamental level within the framework of atomic model of human Being. In fact, in view of the core-valence picture the formation of various groups, sub-groups and further sub-divisions of sub-groups or those of castes, sub-castes, etc. in a society can be understood on the basis of valence-sharing mechanism among the interacting people.
- (v) A basis for finding the fraction of beneficiaries in the case of one-to-many human Being interactions is suggested here using the Saha-like ionization formula for a collection of conscious (excited) human Beings. This might help in searching the best performer in a class room.

A plausible question that immediately comes to mind is whether the psychochemistry developed here will work for non-human or for physically or mentally challenged people! The answer is yes! The only thing is that in this case one has to use the ‘fractured atomic model’ (Kaushal, 2011) and account accordingly for the permissible interactions in the given case to predict or understand the resultant behavior. Further, the cases may differ on the basis

whether the non-humans are pet or wild, or tamed or untamed, etc. In these cases, in fact, the role of the trainer through a spectator type model (Mitra, 1962; 1969) also becomes important.

The psychochemistry developed here is capable of explaining many human experiences and of answering many questions of daily life in the most fundamental terms. For example, the meaning of the phrase, “two perfect people may not be perfect for each other” is clearly elaborated in Sect.7 in the present scheme of study. In the same way, one can as well look for the meaning of the phrase like “I love you”, or the theories of “first love”, “love at first sight”, and “the love for the lifetime” between two people, including the search for the theories of processes like ‘greeting’, ‘wishing’, etc. While some such attempts have already been made (Kaushal, 2015), further studies are desirable.

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Conflict of Interest

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