

### III-25. Science-based Conduct?

Science is a way to teach how something gets to be known, what is not known, to what extent things are known (for nothing is known absolutely), how to handle doubt and uncertainty, what the rules of evidence are, how to think about things so that judgments can be made, how to distinguish truth from fraud, and from show.

- Richard Feynman

Not long ago, in a magazine somebody wondered out aloud: "*I find that science never validated Jainism to the degree I needed to convince myself...*" This sentiment is not much different than that expressed by Queen Juliana of The Netherlands: "*I don't understand it. I don't even understand the people who understand it.* Is it a praise that is not convincing or a condemnation from nowhere? I guess it is matter of mixing cultural metaphors of perceptions.

In most ancient cultures world is a process rather than an object. Mothers of Kabuli tribe of New Guinea emphasize words for requesting or offering, but not the objects. American Indians teach their children to be silently respectful. Middle class American culture places a high value on precocity, display of knowledge, and on competing for answers.

Science and technologies are egalitarian and democratic pursuits by the participants. On the way to internalize shared knowledge, for good or bad, thick descriptions of science and tools of the technology challenge the essential of a person at the center of perceptions. Beliefs are for self-validation that calls for interactions with reality. The ad hoc and mis-represented stifle.

The quality of perception depends on the inputs (method) and criteria as well as stages of personal, intellectual, social, and ethical development.

Since science is part of the human behaviors the very thought of validation of human behavior by science is misguided. Behaviors are validated by practice. Scientific methods are useful for evaluation of the outcome. The basics of science invalidate certain assertions about the reality as the contradictory states. At this level science is about toy-problems and thought-experiments that extend the reach of mind in the plane of objective reality.

Thick-descriptions or hermeneutics technique of science may challenge the essentials of the individual, but that is not the purpose. As is clear from the scientific justifications and rationalizations from the human history (III-14, 15, 29-31) bad-science is no substitute for no-science. And methods and results of science are aids for making personal choices, decisions and judgment calls. It can hardly be over-emphasized that use of knowledge in the affairs of man requires judicious choices without submitting ones own responsibilities. Choices of the market-place may be attractively packaged, however it is prudent to make choices for their utility.

**Behaviors are evaluated by outcomes:** Reality-based facts, choices and decisions guide behaviors. Science can be helpful in weeding out premature-, pseudo-, quasi- and omni-sciences. Yet useful behaviors and guides evolve long before the scientific basis for the practices are known:

- Nonviolence for conflict resolution was practiced long before the ideas of survival instinct and health consequences were articulated.

- Health and other benefits of vegetarian food habits are beginning to be scientifically articulated. For example, compared to a pound of pasta or bread, a pound of red meat is responsible for 20 times the land use, 17 times the water pollution, 5 times the water use, and 3 times the green-house-gas emission.
- Safe drinking water (filtered and treated) was used long before bottled water became a wasteful fad.
- Negation of certain behaviors as social norm came long before the concept of law and justice was formulated.
- Negation of alcohol and tobacco came before their adverse effects on human health were established.
- Effects of excess empty (malnutrition) caloric (potato and sugar) intake were noted long before concerns about weight gain and obesity came to be touted by the medical community.
- The word democratic may not have been in public consciousness, but diverse inputs and rule based methods for dealing with doubt are at the root of virtually all lasting and enduring institutions. Shared goal thrive only in such environments.
- Nothing stays under wraps for ever. Importance of quality, integrity, honesty, and admitting failures in open dealings is widely recognized way to success. Only fools rely on secrecy to stifle truth.
- Even when scientific evidence is established, not everybody practices, or even appreciates, the significance of behavior modifications.

**It is not easy to spot contradictions.** How many people can spot violation of: material reality cannot be created or destroyed;

everything tangible in the time-space-concept continuum is finite; real world entities obey rules and criteria for representation that are explored with questions that begin with what, when, where, how and others; law of conservation of matter, energy or information. Unless one spot such violation one can not stop believing in stripes of omniscience. People do not seem to abandon behaviors even when it is clear that the belief does not work.

### **Medical costs**

Great advances made in medicine during the last few decades are available to those who can pay. Heroic measures to deal with acute episodes have raised the average life expectancy in US by about 75 days at a cost that is 75% of the total expenditure on all health measures. More significant advances (over the last 100 years) that have reduced mortality and improved the quality of life for many more at a much lower cost are in preventive care with better nutrition, exercise, breast-feeding and other traditional practices. Such behavior modifications called for curtailing abuse of food, medicine, drugs, alcohol, tobacco, sugar, caffeine, and wars. Of course, these are long-term measures. There are many beneficial short-terms measures that also call for modification of habits, such as getting enough (but not too much) sleep. When do people pay attention?

**Why do we not heed?** With an emphasis on the ever increasing resolving power of our means and methods, tremendous progress of modern science remains focused on the validation of testable reality at all levels of organizational and mechanistic hierarchy. This is justly so. One cannot conceive of another way to the reality based practices.

A limitation is implicit in the practice of science. Although not explicitly acknowledged in the scientific methods, it is a method of after the fact analysis. Scientific conclusions are rarely made on the real-time basis. There is luxury of repeating the observations to assure their permanence. In this sense the practice of science of is an artifact of isolated reality where the distinction between past, present and future is intentionally blurred in a probabilistic description. Albeit it is a reliable artifact which can be used in the deterministic world of living individuals provided relevance is found and established in their perceptions.

From the analytical perspective the challenge of what an individual represents for itself is far more ambitious. It requires guiding the particular of the past and present behaviors for the future in real time. By relying on the consistency of a set of assumptions about the nature of reality, we can develop and entertain consistent models to guide future behaviors. However, both the assumptions and the inputs for the model depend on the real-time constraints and perceptions. Science does not deal with such issues, except in the realm of probabilities. Scientific methods do not and should not dictate individual behaviors. Decisions and responsibilities for individual behavior lie with the individual. Of course, individuals may choose to use scientific knowledge and methods to arrive at a meaningful behavior. Unfortunately, even when armed with adequate knowledge, most people refuse to act rationally.

Study of the real-time individual behavior is also outside the realm of science. Such studies would require constraining the individuals and their actions. Also information about the behavior of a single individual is not very useful. It is like starting rumors based on a single unverified sighting. Information from the study of groups of individuals can be used to predict future

behaviors of a comparable group. Improving reliability of the prediction requires knowledge of all the inputs and rules of the game.

Then the rules have to be applied correctly in the suitable deterministic context. This is nearly impossible even for a simple physical or non-living system. Scientific information on group behaviors is probability based. In the modern game-theory sense we can improve the chances of success through certain behaviors. Such models do attest that reliance on the reality-based facts about the situation is far more desirable than taking risk of random success with a single try. A trajectory of acts, amounting to a goal directed action, improves the chances of success. Enlightened social institutions and home environment also paves the way. Yet in the end, the decisions lie with individuals.

**It is a matter of perception.** Real-time events rarely offer luxury of looking back. Invariably decisions to act, or not to act, have to be made on short notice - that too with incomplete information. It leaves little time for real-time analysis of strategies and consequence evaluation. With such constraints real-time decisions are guided by perception of the unfolding events coupled with the perceptions established from the prior experience. Since such a decision always amounts to risk-taking, the main issue is what is at risk.

We are beginning to make progress in understanding what shapes our behaviors. With increasing resolving power we know of many in-born limitations to human abilities and skills. We also know of environmental risk factors and social experiences that influence or interfere with normal functions of living organisms. The nature versus nurture debate also continues. In spite of impressive progresses. Do we know everything that we need to

know? Certainly not. More to the point is the question, can we benefit from what we know? Certainly yes, and such choices should be offered. Should the society make decisions for you? Absolutely not.

**Dark corner of non-linearity.** Individual concerns do not easily yield to generalizations. Also richness of choices can conflict with individual conscience and insight that takes us out of morass. It gives a novel meaning to the paradox: *Nonlinearity giveth chaos, and nonlinearity taketh it away.*

Behavior is a response to large arrays of concerns. Such systems can only be handled empirically, whether through the evolutionary lessons, the market forces, or the numerical models, or computer simulations. In the end these are the exploratory tools – like a flashlight in darkness. Insights into the modular choices can come from theories, observations, or practice. No matter where we perch on such issues, no one else but only the individual can make a decision about their suitability.

Of course, we will be better served in our choices if we are not brain-washed with barrage of propaganda and self-serving pronouncements. That is unlikely to happen in the battle for your pocket book and resources though your mind. It is the mind that guides us through the maze of events and choices. It will remain relevant as long as we believe that we can influence consequences of our behaviors.

**Learning as a non-linear action.** All aspects of how we learn are not known. What little we know is based on our own personal experiences. The rest is from the psychological studies with rats, monkeys, school children, and college freshman. These descriptive results at best identify the mechanics. Are you surprised?

It appears that whether or not we acknowledge virtually all of our lives are spent learning and we learn with every act. We learn even while asleep or making the same decision again based on known facts. Learning is a way to deal with the tentativeness of our perceptual grasp of reality that changes every moment of our life. That is why decisions change unless we totally succumb to our habits.

**Do all people learn the same way?** To appreciate the role of inputs and assumptions in active learning considers: Are all tasks learnt the same way? When do things go wrong? Why do such attempts fail? Do we use what we learn? For better appreciations consider the choices we make for food, health or choosing a mate. How often are we guided by the best available knowledge? Are such choices dictated only by rational considerations?

Together, there is ever present need to address doubt and certainty to chart behaviors. It is part of living, and necessary to thrive. Chances of success improve if our motifs are verifiable and real, if we apply reality base criteria to defined attributes, and nothing else. Centuries ago this approach was useful to fight hegemony of ad hoc. It is also at the root of scientific methods that we can hardly live without.

#### **Chaos ways of sciences**

\* Invention, strictly speaking is little more than a new combination of those images that have been previously gathered and deposited in the memory.

\* Conceptual understanding is powerless to correct or modify even clearly bizarre perceptions. What goes into a world picture is a matter of beliefs. Logic can not compel belief in a real outer world, or in a pre-established harmony between thought and



things, or in an asymptotic coincidence of the world picture and the real world (*Max Planck*).

\* Experts give their opinion not the objective opinion. Experts are searching, they do not know (*Morarji Desai*).

\* One does not have to believe in an equation to use it. Belief has nothing to do with truth, and beliefs are closed by virtue of aesthetic considerations. There is enough mystery in the content so as not to create mystery of semantics (*Joseph Berger*).

\* It is not contrary to reason to prefer the destruction of the world to the scratching of ones fingers.

\* So irrelevant is the philosophy of quantum mechanics to its use, that one begins to suspect that all the deep questions about the meaning of measurement are really empty, forced on us by our language, a language that evolved in a world governed very nearly by classical physics.... The more the universe seems comprehensible, the more it also seems pointless (*Steven Weinberg*).

\* Any mingling of knowledge with values is unlawful, forbidden. (*Jacques Monod*)

\* For nomination to Prussian Academy, Max Planck summed up Einstein's contribution as: ... *in the spirit of know-nothingness, we need to reexamine fundamental concepts that invoke that light behaves as a wave and as a particle. His hypothesis of light-quanta (later called photons) cannot really be held too much against him.*

\* Do not talk a talk if you cannot walk a walk (*a Vermont saying*).

\* The scientist has a lot of experience with ignorance and doubt and uncertainty. We take it for granted that it is perfectly consistent to be unsure - that is it is possible to live and NOT know (*Richard Feynman*).

# Against Gods and Humbug

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