

**Editorial:****Illusion and reality: correlative neurophilosophy**

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The remarkable feature of our knowledge of the physical world in all its beauty and grandeur is that it seems so easy! This very experience that our perception of the world is so easy and immediate is an illusion. We were not certain of this illusion until we made the machines that could ‘do’ perception and imaging technologies which gave us information about what goes on in which location(s) within the brain.

It has been believed for ages both by the philosophers and the academicians that our perception of the world is an illusion, a *mithya* in the eastern tradition, and that we have an indirect view through the representations of the reality in our brains. This view was based on intuitive thinking, logical deduction and keen observation of life. However, technological advances in recent decades, especially those which enable us to delineate the functioning of the brain such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) have begun to unravel the truth behind the age old belief. And we have today a scientific basis of this archetypal storyline, the illusory nature of perception, that “our brains construct the world and it exists inside them”

Perceptions stream not just through the senses only, but are processed through body *mandala* (peripersonal space–kinesphere) to render your perceptions in terms of affordances. A region in the premotor cortex is involved in transforming visual, auditory etc., and semantic information (knowledge of meaning and utility) about the perceived objects directly into motor commands.

The initial acquisition of information by all sensory modalities begins with the process of Transduction by which forms of physical energy alter the electrical state of the sensory neurons. Photo transduction occurs in the retina, the outputs thereof are carried by the ganglion cells to distinct termination sites in the brain for elucidating different facets of vision through more than 30 ensembles of neurons. Von Bekesy’s studies of the structural features of the cochlea and their role in neuronal frequency coding of sound is historical.

Hierarchical processing is a feature of the sensory system. Multiple hierarchially organized processings through incoming sensory information is represented in increasingly complex and abstract forms.

Interaction between external stimuli and neuronal activation and the meaning there of is granted by the associative interactions between neurons carrying different types of information as the sensory impulses travel up interacting with centres at various levels (bottom up process). The already experienced information is integrated with the upcoming impulses(top down process). The models are formed in the brain. The implications of association for the establishment of the neural basis of perception are profound.

Thus the brain creates models of the physical world by combining signals from the senses and prior expectation, based on Bayes’ Theorem of probability. It is precisely these models which we are aware of (consciously perceived). Through associative learning and verifying the models constructed

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thereof the brain constructs maps of the world—maps of value, eg. maps that locate objects of high value and viceversa. Maps indicating actions of high value (behaviour) are likely to be successful. These maps provide the basis for top down impulses which react with new impulses processed upwards in the next sensory experience to form new models and this phenomenon continues.

The world is therefore inside the brain. Colours are in the brain. We see a red coloured object, say a rose or an apple. There is no redness in the object as such. The ‘red’ object absorbs all the rays in the light spectrum except those of the red, a narrow band of specific wave length of light which falls on the retina. The cones responsible for the colour vision are sensitized and the nerve impulse is generated and transmitted via the optic pathways to the primary visual area, V1 in the occipital cortex and thence to visual areas concerned with colour perception and we see the ‘red colour’!

The sound of music: music, as well as all auditory experiences take place in the brain in response to the pattern of nerve impulses reaching the brain via the ears. The vibrations set in motion in the air from the source have no identity of their own as speech or music. It is only when they strike the ear drums and set into motion a series of changes in the middle and the inner ear (cochlea) where they are translated into electric impulses and transmitted along the various auditory centers that air waves become meaningful. There is no music ‘out there’!

How do we see similarly? Over millennia of evolution human brains got wired similarly so that perception in all brains respond in like manner so that the world out there is best described to an astonishingly high degree of accuracy. Immanuel Kant, the German idealist philosopher called the real world ‘thing in itself’ (*Ding an Sich*) and believed that it is not directly knowable.

Our only access to the world is indirect through our perceptual filtering organs and embodiment through neuronal distillation. We mistake our conceived external reality to be the real one due to failure to distinguish between knowing and knowing about the neurological fact that we have access only to the representations, information filtered through the fine filigree of the nervous system. We can have only perspectives on reality ie. We only ‘know about’. The objective truth—‘knowing’ remains elusive because it is illusive!

Science in the most advanced stage now is closer to *Vedanta* than ever before.

*Alfred North Whitehead*

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