

A model of modern science and its working: Dual Feedback-Loop Operator

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Origin of science and its working may be traced back to the nature of a primitive creature sensing the environments and reacting towards better adaptation for survival succession. The basic cognitive mechanism of interaction between the life and its environment may be neuron networks and their informational interactions in molecular level. The modern science is interpreted as one of the advanced type of interaction between the natural world and anthropoid society in which so many individuals contribute to create collective intelligence. Now, we can utilize the collective intelligence as if it is a tool kit, or practically a set of black-gray box tools

The proposed model of science is operational, whereas it is different in its utility from the operationalism proposed by Bridgman (1927). The present idea is a phenomenological macro model, in which the environmental world(W) is regarded as an input through observation, and the output is a set of 'likely model(M) of the World and its extent of uncertainty', mapped onto our cognitive space as a collective intelligence for anthropoid. In short, we write $M = \text{dFLO} \times W$, where dFLO is a mapping operator with dual feedback loops: (1) OBL (observation loop) to provide the better information acquired by observation on W, and (2) WHL (working hypothesis loop) to provide the information on what could be compared with those from OB loop. (dFLO: acronym of dual feedback loop operator). The main body of dFLO generates the better model M of W than before by innovation through the comparison of information provided by the two loops and also generates two types of command information to two feedback loops for their innovation. Successive innovation of M leads to the evolution of M together with dFLO. This feature appears to fit very well with the intuition by most working scientists. We note that the dFLO model of science possesses the internal structures; nesting of many dFLOs of various hierarchy levels in many different disciplines including not only science but also technology, etc. as the essential tools to run the operator. The present model of science may be a substantially innovated version of hypothetico-deductive method.

The forthcoming research works on this model of science will be the application of dFLO of respective disciplines of our interests. At the developmental stage in a particular field, most of the works may be data collection in a way of classic natural history within the OBL, without active commitment of WHL to interpret the data in terms of the origin and/or mechanisms of what we have observed. Later WHL is activated as a consequence of new theories and/or new type of output from OBL, etc. Further development may lead this discipline to be a black box tool ran by a group of specialists and other outside scientists utilize only the outcome without committing the technical and theoretical details in this field. A typical example may be the study of physical properties of relatively simple materials, which are now computed numerically on the basis of the first principle theory referring to quantum physics with less involving the OBL. Once an indication of new phenomenon yet to know is suggested either from OBL, WHL, the dFLO starts to evolve differently.

Additional type of evolution of dFLO is differentiation to the sub-disciplines with their proper dFLO as a result of too much expansion to be followed by individual scientists. This situation is demanded by saving the human brains in a way of division of expertise. Another type of evolution of dFLO may be the collaborative coagulation of dFLO in different disciplines supported by different expertise towards the formation of collective intelligence.

A swarm or cloud of all of dFLO in efficient mutual interactions can be regarded as a sound and active 'collective intelligence' for our anthropoid society.

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