Research & Reviews: Journal of Pure and Applied Physics

e-ISSN:2320-2459
p-ISSN:2347-2316

Development of Demarcation and Case of Electromagnetic Information Transfer (EMIT)

Elham Rezazadeh[1*], Iman Rad[2]

[1]Department of Physics, Institute of Science and new Technology, Tehran, Iran
[2]Physics Department, Stemcell Technology Research Center, Tehran, Iran

HYPOTHESIS

Received date: 15/10/2021
Accepted date: 28/10/2021
Published date: 08/11/2021

***For Correspondence**

Department of Physics, Institute of Science and new Technology, 1955633411, Tehran, Iran.

E-mail: elhamrezazadeh7@gmail.com

Keywords: Inductive reasoning, Logical positivism, Demarcation criteria, Electromagnetic Information Transfer (EMIT), Pseudoscience, Transduction

ABSTRACT

Physicochemical features, as consequential outputs of biomolecular interactions, are sensible indices that describe biological property of entities. During Electromagnetic Information Transfer (EMIT), property of original molecule delivers to water and then transfers to target biological entity. Here, we tried to evaluate scientific accuracy of EMIT phenomenon by using major demarcation criteria, including inductive reasoning and logical positivism. Results of our Delphi analysis confirms that EMIT phenomenon matches with all of regulations of demarcation criteria. Therefore, the current paradigm in science that explains biomolecular interactions needs to be revised. Further, properties are not necessarily located in their instances (e.g. biomolecules).

INTRODUCTION

Properties are those entities that could be predicated of things or being attributed to them. The universal property nature brings up this ambiguity that "how could a single thing be wholly present in widely separated instances"? [1, 2]. So, the definition of property is more universal than particulars [3].

In order to verify precision of the claims, either in support or opposition of EMIT, inductive reasoning and logical positivism demarcation criteria were used. This approach was supposed to bold both scientific and ono-scientific aspects of the propositions that explain EMIT [4].

In this study, we aligned the prominent demarcation criteria against propositions that deal with the concept of EMIT, using a 3-round Delphi study. Aim of our survey was to find which propositions explain different aspect of water memory according to the "inductive reasoning" and "logical positivism" demarcation criteria point of views.

DEMARCATION CRITERIA

Here we review major ideas of empiricism and logical positivism during the history of philosophy of science to point out their demarcation criteria that were used to differentiate science from non-science.

David Hume (1711–1776), who is known for his system of philosophical empiricism, presented problem of induction [5]. As an empiricist, he argued that all knowledge has its origin in sense experience, which then stressed on the role of epistemology (rather than semantic), as foundation of reasoning. Later, he suggested there is no logical way to generalize a finite number of empirical confirmations to a universal statement [6]. Instead, one can find the relation between cause and effects by empirical experimentation. He then expanded this statement that "The same effect never arises but from the same cause [7].

During 1920–1930 several prominent members of the Wiener Kreis (Vienna circle), known as logical empiricist (positivist), took a syntactic or logical approach to the matter, rather than epistemology [8]. Logical positivists of Vienna circle used to categorize statements either as synthetic or analytic [9]. Logical positivism does not explain phenomena such as metaphysics

e-ISSN:2320-2459
p-ISSN:2347-2316

[10,11]. To overcome this barrier, Karl Popper (1902–1994) proposed to consider such terms, i.e. metaphysics, as non-scientific instead of meaningless. By this manner, only analogical reasoning is eligible to explain scientific phenomena [12]. Therefore, a scientific method must be progressive, and theoretical development should grow faster than experimental development. By time, demarcation developed by terms of falsifiability, proposed by Karl Popper, beside former theory of verificationism [13]. Carl Gustav Hempel (1905–1997) reported an update to logical empiricism in 1950. He mentioned that a sentence is considered cognitively meaningful assertion only if it is either (1) analytic (it is not self-contradictory) or (2) capable, at least in principle, of experimental test. By this regard, inductive reasoning must cover three conditions of entailment, consequence and consistency [14].

Thomas Samuel Kuhn (1922-1996) introduced a new concept named as "normal science" in 1962. In Kuhn's view of demarcation, astronomy is a puzzle-solving activity and therefore a science, while astrology has not such a quality. Besides, he explained "paradigm shift" as way of understanding what have never been considered valid by scientists [15]. Then, steps of normal science formation explained by him, as a matter of not just being limited to "empirical approval" [16]. Further, formation of a scientific trend is considered as an "emerging paradigm". He adds that development of science contains several steps including pre-science, normal science, crisis, revolution, new normal science and new crisis. So, utility of a scientific paradigm for puzzle-solving, defines by its ability of suggesting solutions to the new problems [17].

Imre Lakatos (1974-1992), as one of the famous critics of Popper, developed a weaker and more sophisticated form of falsificationism. Methodological falsificationism prescribes to repeat the experiment, which then paves confirmation of "observational theory" by any scientist. Lakatos introduced concept of the "research programme" in 1978, as a descriptive unit of scientific achievement instead of an isolated hypothesis. Besides, he added that individual creativity or rational criticism plays no essential role, as well as what Hegel and his followers agree on. He also claimed that science is not simply trial and error, but is a "heuristic" research programme [18].

OUTSTANDING PREPOSITIONS

The concept of "memory of water" points out the properties of an aqueous preparation, which depends on the previous history of the sample [19].

Proposition 1

Pioneering work of Jaques Benveniste introduced Electromagnetic Information Transfer (EMIT) from pharmacological molecules to the target cell [20]. By information, he meant property of original pharmacological molecule, which delivered to the water and then transferred to the target cell. Further, of major claims about the authenticity of EMIT method, was the replicability of the transfer *via* a two-step process, using water as an intermediary medium.

Proposition 2

Modes of electromagnetic radiation will make water molecules oscillate their electric dipoles synchronously. Oscillating dipoles facilitate permanent electric polarization in a cage of H-bonded water molecules [21]. Both short range H-bond and electric dipole-dipole interactions were considered as consequences of the molecular interactions that occur with Extremely Low Frequency Electromagnetic Fields (ELF-EMFs) over an extended region called Coherence Domain (CD) [22]. Spontaneous formation of CDs occurs due to phase locking between the solute structure and the hydrating water molecules. External supplies of energy will not destroy consolidated CDs, due to their non-trivial topology [23].

Proposition 3

In this model, a hologram generates properties of DNA, which reproduces what is tentatively interpreted as replica image of DNA sample [24]. Later, De Aquino presented a possible explanation for the phenomenon based on the quantum gravity. It claimed when the gravitational mass of the two water volumes was simultaneously reduced using ELF electromagnetic fields, the DNA genetic information could have been imprinted the structure of the DNA molecule in pure water [25].

Proposition 4

Another concept that is called scalar waves attributes toward earth and Schumann resonances at ELF range. The scalar part of the wave equation describes longitudinal electric waves, which is very interesting in terms of their possible application in information and energy technology [26].

Proposition 5

Electrostatic interactions in liquids typically occurs in the nanometer range and result from coulombic forces between solvent and solute particles, while large-scale self-organization Quantum Electrodynamic (QED) occur in order of micrometer following interactions between the quantized electromagnetic (EM) field and the matter quantum wave field [27,28].

Proposition 6

Molecular Resonance Effect Technology (MRET) says the subtle low frequency electromagnetic field imprints into the water, which gives MRET water certain properties such as what is seen in EMIT phenomenon. In another terminology, exclusion zone

e-ISSN:2320-2459
p-ISSN:2347-2316

Table 1. Evaluation of suggested propositions using logical empiricist (positivist) demarcation criteria.

Demarcation criteria	Proposed theories	Question number	Compatible (+1)	Irrelevant (0)	Incompatible (-1)	Total Compatibility (%)
Q1: Is the statements analytic? Does the essence of Proposition is reflected in the meanings of the constituent terms? Is it not self-contradictory? Q2: Is the statements synthetic? Does the Proposition indirectly confirm its logicist conception and its principle are needed to be experimentally tested? Q3: Is the Proposition falsifiable? Have other scientist reproduced the same results from the scratch? Q4: Is the growth of theoretical development faster than experimental development? Q5: Does the Proposition cover three conditions of entailment, consequence and consistency? Does Proposition specifies at the expense of which intervening conditions the experimental testing is reproducible? Q6: Is the Proposition puzzle-solving? Does it suggest solutions to the new problems? Q7: Does the Proposition suggest a new scientific trend that is capable of being an "emerging paradigm" in its scope? Q8: Does the Proposition is promising enough to be a "heuristic" research program?	Proposition No. 1	Q1	0%	0%	100%	52.10 ± 15.50
		Q2	100%	0%	0%	
		Q3	41.70%	0%	58.30%	
		Q4	33.30%	0%	66.70%	
		Q5	66.70%	0%	33.30%	
		Q6	33.30%	0%	66.70%	
		Q7	66.70%	0%	33.30%	
		Q8	75%	0%	25%	
	Proposition No. 2	Q1	0%	0%	100%	45.80 ± 16.40
		Q2	83.30%	0%	16.70%	
		Q3	0%	58.30%	41.70%	
		Q4	66.70%	0%	33.30%	
		Q5	33.30%	0%	66.70%	
		Q6	66.70%	0%	33.30%	
		Q7	41.70%	0%	66.70%	
		Q8	75%	0%	25%	
	Proposition No. 3	Q1	100%	0%	0%	63.5 ± 16.50
		Q2	0%	0%	100%	
		Q3	41.70%	41.60%	16.70%	
		Q4	100%	0%	0%	
		Q5	50%	8.30%	41.70%	
		Q6	75%	0%	25%	
		Q7	75%	0%	25%	
		Q8	66.70%	0%	33.30%	
	Proposition No. 4	Q1	50%	0%	50%	56.23 ± 11.08
		Q2	50%	0%	50%	
		Q3	50%	0%	50%	
		Q4	33.30%	0%	66.70%	
		Q5	33.30%	0%	66.70%	
		Q6	58.30%	0%	41.70%	
		Q7	100%	0%	0%	
		Q8	75%	0%	25%	
	Proposition No. 5	Q1	66.70%	0%	33.30%	63.50 ± 16.50
		Q2	33.30%	0%	66.70%	
		Q3	33.30%	0%	66.70%	
		Q4	16.70%	41.70%	41.60%	
		Q5	91.70%	0%	8.30%	
		Q6	100%	0%	0%	
		Q7	0%	0%	100%	
		Q8	75%	0%	25%	
	Proposition No. 6	Q1	0%	0%	100%	43.10 ± 17.00
		Q2	100%	0%	0%	
		Q3	33.30%	0%	66.70%	
		Q4	8.30%	0%	91.70%	
		Q5	33.30%	0%	66.70%	
		Q6	75%	0%	25%	
		Q7	75%	0%	25%	
		Q8	75%	0%	25%	
	Proposition No. 7	Q1	25%	0%	75%	55.20 ± 20.8
		Q2	75%	0%	25%	
		Q3	0%	0%	100%	
		Q4	58.30%	0%	41.70%	
		Q5	91.70%	0%	8.30%	
		Q6	91.70%	0%	8.30%	
		Q7	0%	0%	100%	
		Q8	100%	0%	0%	

e-ISSN:2320-2459
p-ISSN:2347-2316

Table 2. Evaluation of suggested propositions using philosophical empiricism demarcation criteria.

Demarcation criteria	Proposed Propositions	Question number	Compatible (+1)	Irrelevant (0)	Incompatible (-1)	Total Compatibility (%)
Q1: Does the relation between cause and effects confirm by empirical experimentation? Q2: Does the same effect arise from the same cause?	Proposition No. 1	Q1	0%	8.30%	91.70%	8.35 ± 5.90
		Q2	16.70%	25%	58.30%	
	Proposition No. 2	Q1	25%	8.30%	66.70%	16.65 ± 5.90
		Q2	8.30%	16.70%	75%	
	Proposition No. 3	Q1	0%	50%	50%	41.70 ± 29.48
		Q2	83.40%	8.30%	8.30%	
	Proposition No. 4	Q1	0%	33.30%	66.70%	50.00 ± 28.87
		Q2	100%	0%	0%	
	Proposition No. 5	Q1	75%	0%	25%	75.00 ± 0.00
		Q2	75%	0%	25%	
	Proposition No. 6	Q1	91.70%	0%	8.30%	62.50 ± 20.64
		Q2	33.30%	0%	66.70%	
	Proposition No. 7	Q1	100%	0%	0%	100.00 ± 0.00
		Q2	100%	0%	0%	

"EZ" is discussed, which explains increment of coalescing phases adjacent to the hydrophilic surfaces. The EZ water then has diminished radiant energy, which implies reduced charge displacements and increased structural order [29].

Proposition 7

Electric dipole moments of water can store biochemical information. Therefore, biological properties will depend on electric and magnetic dipole moments within the water solvent, which brings this idea that biological wireless connection may exist [30]. Then, rotation of a molecular dipole in a magnetic field could be the basis of "Sample-source radiation". Empirical experiments that were designed on the basis of this assumption had replicable findings [31].

STUDY DESIGN

We designed a qualitative approach in attempting to explore how the prepositions that deal with EMIT, are either compatible or incompatible with the demarcation criteria. For this purpose, two different trends of well-known demarcation criteria where presented in **Tables 1 and 2**. Prominent demarcation criteria aligned against proposed prepositions that deal with EMIT, using a Delphi study. This method of assessment was adopted from a previous study by Bond, et al. [32]. After a comprehensive literature review about the propositions that explained water memory or EMIT phenomenon, seven major prepositions have been chosen that explain the aforementioned phenomena from different aspects. Compatibility of the seven main prepositions with two major demarcation criteria (i.e. empiricism and logical empiricism "positivism") was scored as a matter of "Compatible: scored as +1", "Irrelevant: scored as 0" and "Incompatible: scored as -1" in **Tables 1 and 2**.

RESULTS OF THE DELPHI STUDY

During Delphi study, the demarcation criterion questions (first column from the left in each table) were aligned with the proposed proposition (second column from the left in each table). Then, the assigned scores were averaged and presented as percentage (third column from the left in each table). The rows rights to the each of prepositions represent the corresponding assigned score of the questions in demarcation criteria. "Total compatibility" is the average of compatible scores that proposition has acquired. The total compatibility index gives us a perception of how much the proposed proposition is in agreement with the demarcation criterion of interest. The results of this study provide insight into the strengths and weak points of each proposition as a matter of scientificity. It then helps us to find out which aspect of water memory is explained properly by the corresponding prepositions. At the end, we try to depict an image of the inclusive theory that explains "water memory", and tells which explanations are in right place and which parts are missed.

DISCUSSION

Evaluation of propositions using empiricism and logical positivism demarcation criteria revealed that empirical criteria bold

e-ISSN:2320-2459
p-ISSN:2347-2316

the differences of propositions much more than logical empiricism ones. Details of this conclusion are explained in the following paragraphs.

According to the results of proposition no. 1 evaluation, the idea of biological information transmission *via* dilution/shaking is more logical than empirical. Same story applies to the case of proposition no. 2 and 3 that explain electric polarization over CD, and reduction of quantum gravitational mass by ELF-EMFs, respectively. However, proposition no. 6 and 7 that refers to structural ordering ELF-EMFs and electric dipole moments of water, is more empiricist than logistic.

On the other hand, in proposition no. 4 and 5 that refer to structure forming scalar waves and liquid water in the frame of QED, respectively, both logical and empirical aspects of phenomena are covered equally.

In conclusion, proposition no. 5 and 7 had the highest average of total compatibility among other propositions. Besides, their empiricist content was more prominent. These two lines of findings suggest that a proposition that is a combination of more inductive and less deductive reasoning might have a decent chance of being accepted by the mainstream scientific communities.

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e-ISSN:2320-2459
p-ISSN:2347-2316

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