LOGICAL FOUNDATIONS OF PHYSICAL THEORIES *

In process

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Abstract

DO: ... Finish this section.

keywords. Anthropocentrism; Rationalism; Logic

PACS. ***

Contents

*Dedicate to seminal ideas of Aristotle, Bacon, Bohr and Heisenberg.

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1 Premise

Thesis 1. Logic is (physical) *domain* specific, that changes from domain-to-domain; there is **no** universal (natural) logic that suffices for all domains of nature.

Logic lies in the roots of knowledge, and both drives and hinders it at some extent. A child develops logic gradually from his every-day-life experience. A growing child further founds his thoughts on the logic already well founded from past childhood experience. Some people develop a blind faith in their childhood logic, and are too stubborn to renounce it. The childhood logic is erroneously termed *natural logic*.

The term *natural logic* certainly appears to be misnomer in this context, in that nature extends beneath and beyond our immediate experience [1]; I rather choose to call it *anthropocentric logic*. Anthropocentric logic is developed during a child perceives the world around him via sensory systems, and reinforced when a grown-up recapitulates it. Natural languages are founded on anthropocentric logic, and are thus inappropriate for theories extending in other domains. Natural logic pertains logic of the nature, and ideally embraces logics of all domains. Bohm found mathematics as mere extension of natural languages. Mathematics could possibly be considered a substitute of natural languages for physical theories, if it accommodates extension of logic.

As nature extends beyond anthropometric measures, one devises instruments and probes merely as extension of sensory perception. An electron microscope is extension of the human eye in nanoscopic domain. The perceiver extends itself in order to grasp the mild extension of nature. This process is termed evolution of sciences.

The extension of experience from one domain to another drives extension of the underlying logic; from anthropocentric to more rational [or natural]. Von Neumann seems to be first to notice the extension of logic in planckian domain. Ironically, extension of logic is largely ignored by many practitioners. Some are too stubborn to renounce the precedent logic. This drives the sole hindrance physical theories are plagued today with.

The situation is very demanding. Logic works as ground for the framework or subjectivity of theorization process. Changing or extending logic is comparable to changing the ground during construction; Finkelstein calls such experiments *suicidal*. Many people choose to fix appearing anomalies within the theory without changing logic, for safety and economic reasons; they merely extend the syntax. Quantum mechanics is a by-product of this syntactic extension in planckian domain. Paradoxes and semantic inconsistencies are inevitable if this path is chosen. A semantically consistent theory in planckian domain can hopefully be founded on *bimodal pragmatic logic* [2].

The quest of physics is to extend logic, and found theories on the extended logic. Precision and consistency are somewhat more relevant to physicists, than economy and safety.

2 Anthropocentrism

DO: `... Heuristic!`

3 Rationalism or Naturalism

DO: `... Heuristic!`

4 Mathematics as Extension of Natural Languages

4.1 Anthropocentric Mathematics

DO: `... Heuristic!`

4.2 The Quest of Rationalization of Mathematics

DO: `... Heuristic!`

5 Evolutionary Aspects of Physical Theories

5.1 The Baconian Thesis

Assimilating phenomena in certain domain from perspective of the anthropocentric logic, Bacon calls *anticipation of nature* [1]. Assimilations from perspective of extended logic, Bacon calls *interpretation of nature.* Dogmatic interpretations of quantum theories are anticipations of nature in planckian domain. Copenhagen theories are true interpretations in Baconian sense.

5.1.1 The Empiricistic Quest

DO: `... Heuristic!`

5.2 The Cartesian Thesis

5.2.1 The Mechanistic Quest

DO: ... Heuristic!

5.2.2 The Locality Quest

The notion of non-locality is based on divergent physical processes, that finite physical experience despises.

Field theories are often founded on locality *guiding* principle, though yet have divergent consequences. Locality alone does not suffice to finitize divergent physical theories; it is merely a semi-finitizer.

DO: ... Heuristic!

5.3 The Copenhagen Thesis

5.3.1 Bimodal Pragmatic Logic

DO: ... Heuristic!

6 Logics of Physics

6.1 Pragmatic Logic

Pragma is a notion emerging from perception in certain domain, like *state-of-being* in the domain of relevance of classical physics.

6.2 Dogmatic Logic

Dogma is reality prior to perception, on which most experimenters would agree. A pragma is reinforced into dogma, for further investigation in certain different domain, in the regime of subjectivity. Bacon terms it *idol of the theater* [1], a false absolute entailed into the regime of subjectivity. It is a kind of consensus, taken for granted from past experience, without further investigation. Dogma remains reality in the domain it was a pragma; the notion of state-of-being suffices in classical physics. It gradually ceases its relevance in other domains, if taken for granted without putting it on test. Dogmatic entities are those, which persist prior to experimentation on a system-under-study, from anthropocentric experience. Examples are *subject, verb, object* from anthropocentric languages, which are pragma in anthropometric domain, dogma in other domains. Objects and state-of-being are dogmatic entities in planckian domain, absurdifying semantics of quantum theories.

The notion of *object* and its bi-product *state-of-being* are formed when a child ignores minuscule changes in appearing systems, and deceptively finds some systems as they are in their own essence (like the Moon). The ignorance of precision

gives rise to false notions, which can have some limited relevance in the quest of survival.

6.3 Mereological Logic

DO: ... Heuristic!

6.4 Higher Order Recursive Logic

DO: ... Heuristic!

7 Semantics of Physics

7.1 Higher Order Semantics

The interpretations of quantum theories are anticipations of *higher* order phenomena, based on *linear* semantics. Measurements in planckian domain are higher order processes; interpreting quantum models founded on linear logics owes semantic error. Interpretations of quantum theories are higher order models anticipated in first order language. A consistent semantics requires higher order language for physics.

8 The Hierarchy of Physics

DO: ... Heuristic!

References

[1] Francis Bacon. *The New Organon*. 1620.

[2] Saurav Dwivedi. Pragmatic relativity. 2011. In progress. Online: http://www.geocities.ws/dwivedi/data/pqr.pdf.