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RANDOM AND ARBITRARY CONTINGENCIES IN HISTORY OF SCIENCE AND TECHNOLOGY [9] – A REVIEW

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ABSTRACT

In science and engineering, many unexpected random and arbitrary factors such as pure chance, unexpected occurrence, unintentional historical factors, or random probability etc. are attributed in their conceptual developments and/or establishments. Their importance can be found in many areas of science and engineering achievements.

KEYWORDS: pure chance, arbitrary and random factors, history of science and engineering, random probability, historical contingencies, unexpected occurrence

INTRODUCTION

In this series of investigations, it has been shown that the fundamental frameworks of science and engineering can be understood in term of random and arbitrary contingencies such as pure chance, unexpected occurrence, unintentional historical factors, or random probability. However, these aspects of science and engineering are never mentioned explicitly in their official descriptions of their works. Instead, they always emphasize their rationality and causality in the works. Although scientists never acknowledge, many cases in history of science and technology seem to imply random and arbitrary contingencies in their conceptual developments and/or establishments.

Random and Arbitrary Contingencies

The first case discussed was the initial singularity of Big Bang cosmology. The initial singularity is supposed to cause the big bang, the beginning of the universe. But, there is no physical process possible to cause the big bang in or outside the singularity. The big bang itself can only be initiated by random pure chance. It was just an unexpected occurrence, as pointed out by Hoyle who believed the big bang as a pseudo physical process.

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The second case was the natural selection in Darwinian theory of evolution, which denies any teleological progress, or predetermined goals and purposes. Rather, the natural selection is totally arbitrary and random. In other words, it only depends on pure chance, questioning the role of ethics in human behavior because random and arbitrary natural selection does not guarantee any ethical responsibility for humans.

The third was Copenhagen quantum mechanics which refuses any causal relations or ontology in the sub-atomic world. According to Copenhagen, all occurrences of quantum phenomena are random and arbitrary. In other words, they are all dependent on random probability i.e. on pure chance. Einstein never accepted Copenhagen's non-causality, anti-realism and indeterminism.

The fourth was the invention of the steam engine which was not based on the available scientific knowledge, the so-called Newtonian modern science. It was possible by pure luck, a random and arbitrary historical contingency. In fact, Newton's laws of motion are totally useless in inventing the steam engine. It was thermodynamics of late 19th century that could finally explain the principles of the steam engine.

The fifth was the random and arbitrary cultural motivations for the Heliocentrism, and the sixth was the historical contingencies for the establishment of the sun-centered universe. The motivation and establishment of the sun-centered universe by Copernicus in 1543 (Copernicus, 1939) were related by some arbitrary and random contingent factors, including Renaissance Heliocentrism, Occam's razor, neglecting the absence of stellar parallax, the sudden death of Tycho Brahe, and Osiander's last contribution on the publication of the sun-centered universe. These unexpected random and arbitrary factors of historical contingence all contributed to the motivation behind the sun-centered universe and, on top of it, its successful establishment, too.

The seventh was the marginal status of Bohmian quantum mechanics since its announcement in 1950s. Its marginality was caused by a one big random and arbitrary historical contingency. Bohm's quantum mechanics was announced a generation later after the establishment of the standard quantum mechanics in 1925, causing a systematic neglect in the physics community (Cushing, 1994).

These cases reveal that science and technology are strongly tied with random and arbitrary contingent factors both in their theoretical frameworks and in their historical establishments.

CONCLUSION

Many cases in astronomy, biology and physic imply random and arbitrary contingencies in their conceptual frameworks and in their historical establishments. In science and engineering, the random and

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arbitrary contingencies include pure chance, unexpected occurrence, unintentional historical factors, or random probability. However, scientists and engineers today never deeply acknowledge these important aspects of their works.

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