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God and Demon, Stories and Legends

Literature

KEYWORDS :

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ABSTRACT

Isaac Newton developed part of his laws of mechanics in an age where philosophers had a vision of space and time united with divinity, that is, the physical phenomena were governed by God. Pierre Simon Laplace, French mathematician, on the other hand, raised the idea of the devil, who, knowing the position and velocity of every particle in the universe, predict the future. Thus, science would be sufficiently able to construct a theory indicating the behavior of nature and making inferences about their developments. In addition, other scientists such as Einstein, Descartes, Maxwell, Mendel and Kekule made curious analogy between science and mysticism. God, devil, snake and apple served to illustrate some curious pages of Science. It may be that these curiosities can be useful in teaching science, in terms of overall culture.

INTRODUCTION

Nobody knows if it´s real or not[1], but what is told in Science classes is that Newton was in his family´s farm when an apple fell from a tree in front of him.

In that occasion, Newton started to elaborate an imaginative theory, maybe the most powerful resource in a theory development, which would be the basis of the universal gravitation.

Newton´s mental image from the apple fall[17] was generalized to the bodies fall, including speculations about strength´s nature which maintains the Moon orbiting the Earth.

In order to elaborate this question better, Newton, who has enunciated the mechanical laws, has also produced the law of universal gravitation for planetary system.

In other title Newton justifies planets attraction as being established by Jeova, e.g., God has leaded field strength from one planet to another. Newton´s conception[11] for absolute space is related to technological ideas. He has presented the space as a God´s sense. In this way, God would have sensorial organs which would lead spatial dimensions.

Leibniz[12] keeps spatial deification, he idealizes the Monads, invisible parts, with no extension, that were created by God. For him, they had all properties of the universe inside themselves, contain eternal truths and fulfill the space.

Descartes didn´t believe in action at a distance, so he didn´t admit the existence of an empty among Earth and other planets. Descartes´ mechanic supposed, among other things, that the universe would be fulfilled for a "mosaic of spins" or vortexes that would generate energy for creating matter. The initial vorticity would be a God impulse. The generated vortexes would drag Sun, stars, planets and comets in their pathways.

In 1662, Descartes published *The World, or Treatise on Light*[13], presenting his cosmological philosophy, describing vortex theory in order to explain universe´s matter creation and the universal gravitation. In his original theory, Descartes describes that universe would be recover for a mosaic of vortexes which maintains in each vortex subtle matter in rotation.

Planet systems would be maintained by vortexes which, in the solar system case, set the Sun in the system core and lead the planets in these pathways around the Sun.

Descartes didn´t believe in action at a distance. So, he couldn´t admit there was a vacuum around the Earth, but some matter which would be the way through strength could be transferred. Descartes´ mechanic[10] supposes the universe filled in matter that, due to any initial movement, established itself as a vortex system that drags Sun, stars, planets and their satellites, and comets in their pathways. Vortex theory intended to explain plants movements, which ones would be dragged by vortex ether. The initial movement would be a God impulse[4].

DEMONS

Summarizing all prior ideas, cited in previous paragraphs, it can be argued that Newton´s laws were the classical tool for describing universe´s macroscopic phenomena. According to Newton[19], nothing happens without a specific cause; so, in the same initial conditions, identical causes would always produce the same effects. The universe could be seen as a big machine anyway.

Laplace[14] took extremely this condition saying: "We have to face the present state of universe as an effect of the previous state and as a cause of the following state. In this manner, an intelligence that, at a certain instant, knows all strengths which animate nature could connect in the same formula all movements of the greatest celestial bodies and the smallest atoms. So, nothing would be uncertain; future and past would be focused by the view of this *supercreature,* named Laplace´s demon, establishing scientific determinism.

MAXWELL

Later, inspired in Laplace´s demon idea, the British James C. Maxwell has suggested an analogue character for thermal sciences from an imaginative experience. It´s considered an ideal tank separated in two portions, A and B, for a partition with a small hole. Maxwell´s demon[9] is an hypothetical one. He lays in a hole between A and B portions, allowing only fast molecules to flow on a direction, the warm sector (with no run waste), and the slow molecules flow to the cold part. This is an *antidisorder* demon that resist to disordered molecules movement, producing a more organized tank´s state.

Maxwell has created a being whose power is so keen that can conduct each molecule on its way. That being, whose attributes are so finite as ours, would be able to do what is impossible for us. It´s known that molecules in a recipient filled by air at a uniform temperature move at an irregular speed. Now, supposing a receiver separated in two portions, A and B, by a divider with a small hole, and that a being who can see individual molecules, open and close that hole allows only the fastest molecules to pass from A to B, and only the slowest ones pass from B to A. So, with no effort, it will increases B temperature and decreases A temperature, in opposition to the Second law[9] of Thermodynamics.

However, it´s noticed that for selecting fast molecules, demon would be capable to see them, but, it´s in a balanced place un-

der constant temperature, making it a black body. So, demons can´t be the molecules, it can´t handle the trapdoor, and it can´t violate the second law. By the other side, Heisenberg[6] has demonstrated that it´s impossible determine particles´ position and speed simultaneously, because there always is a uncertainty toward this purpose. Thus, the demon would have a "probable" idea of the molecule location. Contrary to Laplace´s and Maxwell´s have believed, even the demon wouldn´t know determine the accurate position of little particles.

Mendel, a Maxwell´s contemporary, was an Agustin abbot with a great interest in biology. He cultivated peas on monastery Garden, and when he was researching this issue, he found out genetic laws. Who is his demon?

According to the *Mendel´s Demon*, by Mark Ridley[11], this being is a deviation of Maxwell´s demon. In this case, it´s decisive in genetic features. The creature stays in front of each progenitor´s gene and decides if this gene will or won´t be passed to the next generation.

KEKULÉ AND THE SNAKE

Friedrich August Kekulé was one of the pioneers in organic chemistry, master in matter structure - a theme that always fascinated men. Molecules´ structure was always among first philosophic Science speculations, ideas about atoms and molecules have a long history. Around 1860, chemists have been studying how atoms combine themselves to form molecules. A long analysis and search for structural formulas of substances has been originated. The German Friederich Kekulé[2] was one of the researchers who was interested in a significant problem evolving a compound named benzene. Researchers knew this molecule was made by six atoms of carbon and six atoms of hydrogen, but the challenge was to group them properly for justifying the properties displayed by benzene. It was thought the six atoms of carbon were joined in a straight or in a branched way, with no closed links, originating a regular, straight or linear chain. However, from this configuration on, calculations conduced to a more complex situation for benzene in opposition to its stability.

People normally can get a perception of any phenomena for unconscious processes generated by dreams as the referred case.

The controversy solution has arisen in a Kekulé´s dream[2]. When a big snake appeared in that dream, it was biting its own tail; spinning in its circular form, it was suggesting him a configuration in ring form, e.g., a cyclical carbonic chain. He associated immediately the cyclical form of his vision with his researched atoms setup, obtaining the benzene spatial formula.

The following text was part of a Kekulé´s speech at the city hall of Berlim, in 1890, in the 25th anniversary of benzene´s formula report: "My mental eye, which became sharper by repeated visions, can distinguish now bigger structures with multiples shapes: long lines, sometimes narrower, all together, paired and interlaced, keep moving like a snake. But, see! What was that? One of the snakes took its own tail, and this form spun in front of my eyes. I woke up as if a flash of light laid on me, and then, I passed the rest of the night developing the hypothesis consequences. So, it´s created the benzene ring.

A chain with at least one benzene ring, or benzene nucleus, is denominated aromatic. A benzene ring has a C6 H6 formula. The six atoms of carbon that form the ring have alternated single and double bonds.

That finding opened a huge field for synthesizing new products, pharmaceutical industry uses benzene in many medicines.

FINAL CONSIDERATIONS : GOD PLAYS DICES?

In 1927, Werner Heisenberg[6] defined one of the basis of Quantum Mechanics named uncertainty principle. According to this, it´s impossible determine the particle position and speed at the same time and accurately. For previewing a particle position and speed at a posterior moment is necessary to measure current position and speed. It´s necessary make a light beam over particle for observing it; in this way, the photon will disturb particle movement; knowing its speed will be possible only with an uncertainty about its position. According to the particle speed, it´s probable position can be known or vice versa. Heisenberg demonstrated that the uncertainty in position (Δx) multiplied by the uncertainty in movement quantity (Δp) can´t be lower than a given quantity – Planck´s constant.

In this way, it´s impossible to predict the future accurately, as well as it´s impossible to measure the Universe state precisely. There are probabilities to each one of the world´s possible future states and even the demon couldn´t determine particles' position and speed.

By the other side, Einstein, who didn´t agree with chaotic states existence and probability idea, believed in a hidden variable[18] for explaining cause and effect relationship behind microphysics indetermination. If we know those variables, what are statistical phenomena, until now, could be predictable, being value for any microscopic phenomenon. According to Einstein, the indetermination of a particle´s position and simultaneous speed happened due to the inability of measuring gadgets and not a natural feature. His views were summed up in his phrase: "God does not play dices".

It seems that Einstein[5] has noticed uncertainty as a nature covering, which has presented a secret reality where particles would have positions and speeds well defined and would develop according to deterministic laws as in Newton´s movement theory. This subjacent reality is known by God, but microphysics´ quantum nature prevent us from seeing, unless in a confusing way and distorted by mirrors.

For many, even God, who is omniscient, is limited by Uncertainty Principle, which seems to be a natural condition although Einstein has affirmed the opposite.

Stephen Hawking[10] has a different opinion, he clarifies in his teaching: "Not only does God play dices, but...he sometimes throws them when they cannot be seen". God really plays dice with the universe and the science evidences shows he´s an expert player, he plays dice in every possible occasions and circumstances in order to determine things´ course through probability.

CONCLUSION

In the end, everything is motivating for researching. The cover´s illustration of Basic Physics I (2003), by Moysés Nussenzveig[20], can be an example. This cover suggests the Newton´s apple fall, remembering motivating stories told by professors to start the Gravitation theme. Real or legend, the fact is that illustration leads to identification of attractive force between Earth and apple, in which many students learned the first concepts associated to gravitational force. Then, Newton´s[12] apple remains alive as a motivational tool as for history of Science as for specific studies of mechanical laws. This paper intends to present concepts, ideas and discussions that make students curious, leading them to advanced studies, enhancing ideas, waking up their minds for something new. Physical Sciences are always opened to new theories since the results can be confirmed experimentally.

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