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VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

Does randomness really exist?

At Vilnius Gediminas Technical University

Subject: Philosophy

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1 Introduction

It is a question that people have been dealing with since they have enabled their mind to do so, and thus a fundamental problem of human existence: is life and its course predestined, or is it all by accident?

The question of the existence of the principle of casualty and randomness goes back to the beginnings of philosophy and is still being discussed. The following example should serve as an illustration of the problem.

Maria arrives at 3:00pm at the airport of Berlin and meets her old college John who happens to have a flight at the same time to get to a business meeting. John's boss who wanted to go to the meeting by himself got ill unexpectedly and instructed John to take part in the meeting instead. On the other hand, Maria wants to fly to Hawaii since she won a holyday trip in the lottery. They start talking to each other about old times and exchange phone numbers. After their trips, they start meeting each other and fall in love which leads to a marriage and creating a family.

Randomness, causality or maybe fate? Does randomness really exist and if yes how does it affect our life's? To approach this question, it's necessary to define important terms such as randomness and the principle of casualty.

In the Dictionary **randomness** is defined as a quality or state of a pattern or principle of organization – unpredictability.[1] For example an event happens without any specific aim or method. Furthermore, the term "**contingency**" is often used synonymously in the field of philosophy. In the initial stages of classic philosophy (for i.e. Greek philosophy) the term contingency is strictly contrasted with necessity.[2] **In a necessary world there is no chance or contingency**. Everything that happens is necessitated, determined by the laws of nature. There is only one possible (necessary!) future.[3]

1 https://en.oxforddictionaries.com/definition/randomness

2 Grube D. (2008), S.2-3 - Religions Challenged by Contingency

3 http://metaphysicist.com/problems/necessity/

On the other hand, **causality** is generally understood as the assumed lawful connection between two successive events, one of which (the former) is called the cause and the other (later) the effect.[4] According to this assumption there can be no effect without a cause. Therefore, causality is opposed to any kind of contingency. If any event is caused by randomness, then indeterminism (opposite of determinism) would be true. [5] For example, an experiment always should have the same result under the same conditions – any variance of the result can only be caused by a mistake of the observation.

I'm personally interested in this question because it contains the question of the world view. Precisely because **randomness is closely related to the free will**. A free decision is based on influenceability and being undetermined. How can someone have a free will when (with knowledge of all possible influence factors) every decision and event could be precisely determined. The goal of this work is not to answer the question of man's possibility of a free will in the field of biology and psychology, but to discuss the existence of randomness both in the everyday life and in the cosmos**.**

Furthermore, the concept of randomness/ contingency **is being studied and investigated in various sciences**. Within the mathematics and statistics an attempt is made to quantify (i.e. probability calculation) and reconstruct (generating random numbers) randomness. But also in other sciences such as physics, psychology and sociology, the understanding of randomness plays a key role.

Lastly it is interesting to **observe the different views** of both philosophers, physicist etc. and “ordinary” people regarding this topic. Especially the debate about the creation of the universe and the origin of life is still an unsolved mystery (and most likely will be in the future) and probably the most debated question in the history of humankind.

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4 http://www.wissen.de/lexikon/kausalitaet-philosophie

5 http://metaphysicist.com/problems/necessity/

2 Literature

The opinions about the question which deals with the existence of randomness and thus simultaneously the question about an already determined future, as assumed are very different – **different enough that I would even speak of a clear split of views**. I tried to collect some data by asking the question about whether randomness exists to some people and got following answers (note: interviewed several people with similar answers to avoid repetitions I selected the most common 3, furthermore the asked people were “ironically” not chosen – statistically speaking - at random)

Martina, 21, Business Management Student: “I don’t know. Sometimes there seems to be no connections between two events, but It’s possible that we don’t have excess to all relevant information because we are human”.

Ignacio,20, Engineering Student: “Yes, because I believe the existent of life is caused by a random event. In life, all the events have an explanation but some of them are random from the point of view of the spectator”.

Artisom,25, Economy Student: “Randomness doesn’t exist because everything that happens according to God’s will. In this way, everything is determined already. Free will is an illusion”.

These data reflect very precisely most of opinions on philosophy discussion websites such as philosophieblog.de and philosophy.stackexchange.com. According to these data it’s possible to classify the opinions in roughly three categories (also for the sake of convenience)

- The first group consists of the **advocates of the causality principle.** The core believe is that the course of the world is perfectly determined and that any states of the world are fixed by laws of nature, so that there is exactly one probable future at any given time. Events that do not conform to the principle of causality can therefore only be justified by in adequate or incorrect information.

  The **belief in determinism** (of nature / matter) which arose under the influence of classical physics, is determined by deterministic equations and (at least in principle) **completely predictable**, if one knows all the details.

- The other group believes in the existence of randomness. Followers of **libertarianism believe in the free will of humankind** which is not incompatible with determinism.[6]

- The last group represents the **opinion of compatibilism** which offers a solution to the classic free will problem which is contrary to determinism. **Compatibilism is the thesis that free will is compatible with determinism**. Because free will is typically taken to be a necessary condition of moral responsibility, compatibilism is sometimes expressed as a thesis about the compatibility between moral responsibility and determinism.[7]

After reviewing few opinions on randomness by "ordinary people" - below, the opinions of some selected philosophers and physicists will be briefly presented:

6https://www.philosophie.hu-berlin.de/de/lehrbereiche/anthro/mitarbeiter/keil/pdfs/d26voll

7 https://plato.stanford.edu/entries/compatibilism/

Aristotle: One of the first philosophers to deal with the question of coincidence and the principle of causality was Aristotle. In his 2nd book Physics Aristotle states his opinion about randomness. He defines randomness as follows:

"If something happens in the realm of events that occur in the strict sense of something and whose cause lies outside of them, something that is not to be brought into a disproportionate relationship with the result, then we call this accidental".

Following quote shows the rather determinism view of randomness

"For much is and is by chance and by about that of us, knowing that everything can be traced back to a cause of becoming, as the old saying says, which denies chance, yet all say it is by accident, while we say in another, it is not by accident."

"The causes by which the accidental may happen must be indeterminable. Therefore, chance seems to belong to the indefinite and unclear to man"[8] [9]

Max Planck could be categorised in the group of compatibilism.

"Would you be on a logical contradiction
when you come to the causal relationship once
wanted to think away? A simple reflection shows
us, that this question is decidedly negative. Because
we can very well think that a heard noise
has no natural cause. In such a
Trap we speak of a miracle or magic.
Already the simple reference to the existence of a large
and rich world literature proves to us that
Make you think miracles" - Public Speech at the Prussian Academy of Sciences at, 1923[10]

8 http://www.madeasy.de/2/zufallo.htm#ari

9 Aristotle's Concept of Chance: Accidents, Cause, Necessity, and Determinism

10 Max Planck (1923), P. 9

It highly depends on the interpretation of his quotes but the shown quote suggests that he also believes in the existence of something beyond the explanation of the causality principle.

3 Methodology

The approach to get an insight into this topic was relative complicated. Just finding the right sources has turned out to be very difficult.
At first, I thought about the possible contents and examples before I started to research. Afterwards I tried to get a rough idea of the topic, and mainly used the internet for this. Due to the large circumference of the sources which sometimes contained several hundred pages, I tried to evaluate the contents and sort out accordingly. The introduction to the thematic should show the basic concepts and their definitions. then I tried to delve deeper into the matter and started to read various scientific publications. Unfortunately, most of the works have dealt with randomness in a different Context or other angle so to say, which were not relevant for my approach.

After finding some suitable sources, it was important to me personally to ask other people for their opinion on the topic and to record the result. I mainly asked friends about me. After some "interviews" I found that I often get the same answers. A pattern emerged, with most responding to the question of the existence of coincidence with yes or possibly. Only a few believed that the future was set in advance, which surprised me. After I interviewed the people who otherwise have little to do with philosophy, I tried to explore the opinion of known public persons such as Max Planck to create a certain balance.

Depending on the topic I have reworded the data question. Specifically, I've just asked the opinions of certain people, while the opinions on philosophy forums were relatively simple to find with the original question. I thought about most of the examples beforehand which lead to my decision to take this specific question. First in

foremost I was interested about the creation of the universe and the impact of randomness on the course of human life. for the examples i tried to cover different topics. On the one hand, areas such as physic and biology, but also things that affect us at any time in our day-to-day life. Lastly It was also important to me to discuss topics where there is still a lack of clarity about the existence of randomness or even areas where randomness is recognized

4 Data

1. According to the zero-energy universe hypothesis the universe was created by seemingly random appearance of quantum fluctuation. There is no other explanation other than absolute randomness.

2. Radioactive decay is the process by which an unstable atomic nucleus loses energy. This process seems to be completely random and It seems to be impossible to predict when an atom will decay regardless of the knowledge of its genesis time.

3.A human saying random numbers that come up in his his/her head. Are they really random or connected to previous experiences?

4. A person is winning the jackpot in lottery. The odds are 1:50. Million. Is randomness the reason this person won?

5.The science of statistics is based on randomness. For example, for surveys, individuals are or randomly selected with the help of random number digits to obtain the most realistic and representative results possible. How random can these computer-generated numbers be?

6.The Heisenberg's uncertainty principle also known has Heisenberg's indeterminacy principle, is any of a variety of mathematical inequalities limiting the precision with which certain particles such as position and momentum can be known. The Position of the particles seem to randomly move and appear in various places.

7.In Biology the modern evolutionary synthesis is based on some form of randomness, namely the apparition of qualitatively new behaviors, which lead to a certain diversity of life due to seemingly random genetic mutations followed by natural selection.

8. An Example of randomness in finance is the random walk hypothesis. According to this hypothesis stock market prices evolve according to a random walk, which implements that the prices are changing randomly and thus cannot be predicted.

9. Some of our human characteristics to some extent depend on genes and the environment. The density of freckles that appear on someone skin is controlled by genes and exposure to light – but the exact locations seem to be random.

10. The odds of getting hit by a lightning strike is very low. Is it a numbers game that I get hit by a lighting?

11. Does my grade of this philosophy paper depend to an extent on random events such as the sleeping quality of my lecturer in this specific night?

12. Did the first bacteria on earth which lead to the production of oxygen and thus pave the way for humanity which later can philosophize about questions happen randomly?

13. My shoe laces suddenly open up while I cross the street. I bend down and try to lace them up again when out of nowhere a drunken guy drives over a red traffic light and kills 3 joggers which happen to be just 2 meters in front of me. Did randomness just save my life or was it fate?

14. The Chaos Theory describes the behavior of dynamical systems that are highly sensitive to the smallest events. Someone from the other side of the world could theoretically do something seemingly unimportant and still affect your life somehow. Is it just a bunch of complex events that are connected to each other or does it happen randomly?

15. Someone having a good business idea happens to be at the right time at the right place and talking to the right people and getting rich. Did it happen randomly or by hard work?

16. A child having a uncurbable disease from birth. None of her relatives seem to be affected by this kind of disease. The doctors can’t find any reason. Does randomness punish people?

17. Choosing your Erasmus destination country…seems to be partly random. Why did you choose Lithuania often gets answered with “I really don’t know”?

18. The first day of University or a new high school- the first person you decide to talk to or “randomly” get into a conversation with turns to be your best friend for the next 20 years. What if you had decided to sit to someone else on that specific day.

19. Out of 100 Egg boxes you happen to choose one seemingly random box. All other eggs were infected with a high and dangerous amount of salmonella.

20.America was discovered by Columbus by a mistake. How would the world possible look now without this seemingly random mistake?

5 Analysis

Some of these examples could affect each of us one day (i.e. 13) while others are just theoretical assumptions (i.e.1). Some of these examples are in the view of one or just a couple of persons (i.e. 4,19etc.) while others appear in sciences and are heavily researched by thousand persons.

A criterion for ordering these examples is the information available. You must ask yourself the question, if you would still think randomness plays a role in these examples, you had the necessary information from the outset. In some of these cases, mankind probably will never get the necessary information to answer this question (i.e. 1). Others could be solved by science in the near future for example the cause of some seemingly random occurring diseases (often happened in the past) or

Furthermore, some of these examples are based on mathematical and statistical probability. I have intentionally written them in such a way to create a personal reference to the case. I think if you relate to yourself especially if something bad or even good happens to you – you start to hide the logical facts and start searching for other explanations such as divine or fate while they are based on probability and the principle of causality.

The following table should show which examples likely are based on probability and the principle of causality and which of these examples could be possibly be the result of “real” randomness (based on my personal research and therefore opinion) .

	Likely based on probability / causality	Possibly caused by randomness
Nr. of examples	3,4,5,10,11,13,14,15,16,17,18,19,20	1,2,3,12
∑	16	4

6 Conclusion

Based on my research, such a complex factual situation is currently impossible to answer with a clear answer. it is impossible to answer this clearly with yes or no, because there simply is not enough information available. Nevertheless, possible phenomena that are influenced by chance can almost certainly be distinguished from cases with pseudo-randomness. Most of the examples I have listed can be counted to last. For the remaining examples, the question of randomness cannot be answered unequivocally. Even if possible theories can be set up in the near future, the question of the origin of the universe or humanity may never be determined. In my opinion, many things with the help of Mathematic can be determined exactly. However, the laws of nature do not necessarily correspond to our knowledge. An example cited here was the emergence of the universe, which philosophers consider to be a randomly-born phenomenon.