DO YOU MAKE YOUR OWN LUCK?

Spyridon Manolidis

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Introduction

Purpose of the Essay

This is an essay regarding the question 'Do you make your own luck?' for the Oxplore essay competition. This is an incredibly important question because it asks whether humanity can truly achieve meritocracy or whether we will always be plagued by random probabilistic events which can change the course of our lives. This essay will be perceptive by considering many different viewpoints but the main arguments will be linked with physics, maths and philosophy.

Definition of Luck & Fate

Before exploring the different viewpoints to the main question, we should define a few of the key-words we will use frequently throughout the essay. A good place to start is the main theme of this essay, luck. Luck is defined as 'a person's apparent tendency to have good or ill fortune.' [1] This 'apparent tendency' is often labelled chance and is based on the seemingly randomness essence of nature. Somewhat similarly, fate is defined as 'an uncontrollable power which can decide the course of events.' [2] Fate is often used to explain the random aspect of luck. Philosophically, many believe that fate is determined by a greater power such as God (in Christianity), determined by your past actions (karma in Hinduism) or the circumstances in which you were born (such as social class and natural ability).

Evidently, most cultures can agree that no matter your actions and/or intent, there is always a key aspect of fate within luck – thus you cannot make your own luck entirely. So that concludes this essay, right? But we cannot make our judgment simply on speculation – only through perceptive, coherent and logical explanations can we truly pin down the beast of philosophy that is luck and reach a sensible and rational (but perhaps not entirely complete) conclusion. Hence, the bulk of this essay will be dedicated to proving through physics that there truly is randomness in nature, proving fate. Then, mathematical, philosophical and theological arguments will be made to support the idea that fate is only a tiny aspect of luck and that despite randomness, we can still decide the majority of it.

The Quantum Argument

Understanding the Butterfly Effect

The Butterfly Effect is a mathematical concept in chaos theory which describes "the fact that small causes can have large effects" [3]. In other words, if even a perplexingly small change is made to a system, over time this change can compound and give a completely different end result.

Quantum Physics

When Thomas Young [4] conducted his infamous 'Double Slit' experiment, his results were astonishing: instead of behaving like a normal particle which could be predicted using a deterministic model, light behaved according to a probabilistic model (see Figure 1 part (c)). This revealed that photons did not travel in the normal path a normal particle would, but quantum phenomena caused them to interfere with themselves. This gave the photons a property of

randomness (at least in our eyes), as even when doing the experiment with single photons, the results still appeared to have this intrinsic random property.[1]

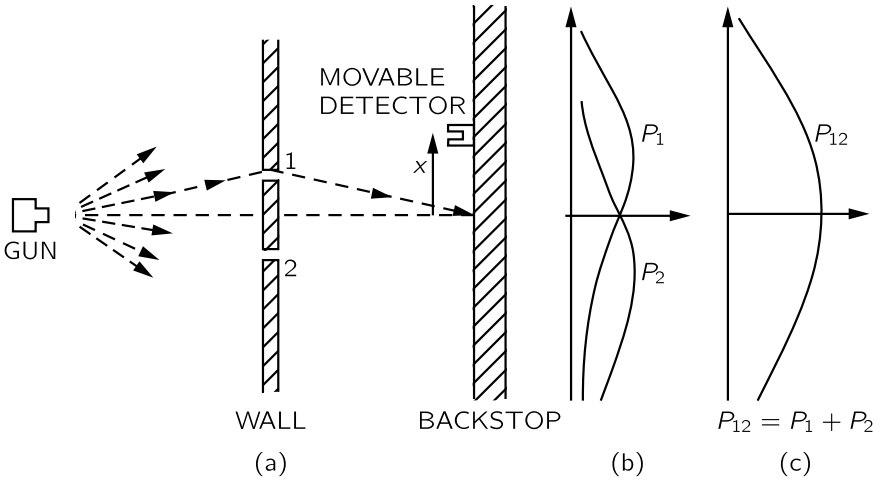

Figure 1: Double Slit Experiment [5]

Interestingly, the same interference pattern was found when the experiment was repeated using electrons instead of photons [6]. This subsequently revealed that electrons, which were previously thought to be particles also have this wave-particle duality and this property of 'randomness' (at least in the given experiment, until observed).

A similar randomness is found in our sunglasses. A common misconception is that when light passes through polarising filters (the filters in sunglasses to let less light through), some of the light gets absorbed by the filters whilst some of the light is let through. But this is incorrect! Because of Max Planck and Albert Einstein's discoveries regarding the photoelectric effect [7], it was found that light energy travels in discrete packets (particularly, the energy comes in quanta that are multiples of hf, where h is Planck's constant[2], and f is the frequency of the light wave). This means that it is impossible for some of the light to get absorbed and some of the light to be let through. Instead, what actually happens is that sometimes the light is let through with all its energy and sometimes the light is absorbed with all of its energy.

Again, this is something that cannot be predicted with a deterministic model. Even if we know everything about the light wave, we will never know if it goes through the filter or if it's absorbed until we observe it – it's completely up to fate![3]

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[1] In other words, if you had a ray shooting light/electrons through two slits (as shown in Figure 1 part (a)), you'd expect the electrons/light to be detected at the place right behind the wall, as two strips. What actually happens is that they interfere with each other (or with themselves) and can end up anywhere in the backstop, with some places more probable than others (as shown in Figure 1 part (c)). This means that we don't know where a given photon/electron is going to end up for certain. What we instead can do is say where it's most likely to end up using probabilities. This reveals that nature is not certain, but has an inherent randomness to it.

[2] For reference, $h \approx 6.63 \times 10^{-34}$ joule second [10].

[3] With the exception of the light wave being perfectly perpendicular or parallel to the polarising filter, but this requires precision that we cannot get in reality.

Linking Quantum Physics' Randomness to Luck

This is important because it shows that even if we perform the same action as someone else in the exact same way with the exact same circumstances[4], the fundamental randomness in nature shown above means that we will not always get the exact same result. Furthermore, even though the variance might be trivial sometimes, the butterfly effect can cause this seemingly negligible difference to compound and give a completely different outcome.

For example, say we have two universes A and B, with two corresponding people, Person A and Person B. Even if these two universes were identical and Person A was identical to Person B, differences can still occur. Consider Person A and Person B taking a walk on a nice sunny day (at the exact same time, place, etc.). Being the same person, they both decided to wear their sunglasses to protect their eyes. For any given moment in time because of light's randomness, a light ray might pass through Person A's sunglasses whilst simultaneously not pass through and get absorbed by Person B's sunglasses. Again, this may seem like an unimportant difference but that single light ray could go into Person A's eyes which could stimulate a neuron in their brain. This neuron could then send signals to other parts of the brain and soon enough a completely new thought has formed. Person A could then act on this thought, perhaps stopping to buy some ice cream on the way or stop to admire the serene view. Either way, Person A and Person B were identical people in identical universes but even so, a different outcome was produced.

Therefore from a quantum physics viewpoint, we cannot make our own luck. Even if we perfectly replicate other people, there will always be a certain randomness in nature which will limit us (or in some cases push us). The example given above is oversimplified and perhaps a bit stretched out but it shows that different things can arise from the exact same situation. The thought above that was caused from randomness was trivial but what if it's something like a great scientific breakthrough? It's not that Person B doesn't have the capacity or isn't under the right circumstances to think the same as Person A but this element of 'luck' built into physics just simply decides that Person A achieves something Person B doesn't.

Mathematical, Theological and Philosophical Counterarguments

This 'randomness' in nature is not simply a theory – it has been proven experimentally and is even used to calculate random numbers. [8] Even so, perhaps this fundamental trait of nature isn't as damaging as we thought.

Firstly, even though there is this quantum randomness at the microscopic level, at a more realistic level, many of these quantum effects are happening billions of times a second and they tend to cancel each other out. Using the example above, we cannot accurately predict the behaviour of a single photon. However, take billions of photons going through each second and we can accurately predict the number that will go through and the number that won't. Hence, because we are made of billions of atoms, it is not illogical to assume that much of the randomness cancels itself out.

Secondly, even if this randomness is unavoidable, surely our attitude matters more? When presented with unfortunate circumstances, we as a species have shown unique resilience and

[4] Which, for reference, is impossible because the entropy in the universe is always increasing [11].

have taken initiative therefore making our own luck. Perhaps it was some randomness that sparked the industrial revolution but the thousands of inventors that followed did not rely on randomness – they took the lead and made their own luck. Yes, Alexander Fleming discovered penicillin by chance, but it was *his* choices which led him to become a biologist and without them, perhaps we would not have this life saving substance today.

Lastly, from a theological point of view, fate is God's plan. We are given free will and rationality, the abilities needed to make the majority of our own luck but religion[5] teaches us that the transcendent, omnipotent, omniscient and **invisible** God sometimes puts us through pain and suffering (despite us likely not wanting it) to make us better, more resilient and more accepting people.

Conclusion

In conclusion, we have proved that randomness is a fundamental trait of nature and hence no, we cannot entirely make our own luck. Even so, "you miss 100 percent of the shots you don't take," [9] and it is pointless to blame this 'randomness' if we all experience it yet some of us can still drive through it. Truly, there are some extreme misfortunes which some of us have to face or some excruciating disabilities which some are born with – but this randomness can sometimes have the opposite effect and grant us pleasures we could never have imagined. We can make our own luck, we will just always have a bit of randomness and fate mixed in for good measure; this is what makes life beautiful.

References

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