

On Laplace's Evil Demon

Marquis De Laplace (1749-1827)

Laplace, in his *A Philosophical Essay on Probabilities*, expounds on his notion of **the analytical theory of probabilities**. Laplace points out that most of our knowledge is problematical, and for the few things that we can know with certainty, even for the mathematical sciences, the principle means for figuring out the truth are **induction** and **analogy** which are based on probabilities. Therefore, the whole system of human knowledge is concerned with the theory of probabilities.

All events, even those which apparently do not appear to conform to the laws of nature {cause and effect} on account of their insignificance, are, nevertheless, the result of these laws as necessarily as the revolutions of the sun. Because we are ignorant of the connections which unite such events to the entire system of the universe, they have been thought to depend on final causes {providence} or accidents, depending respectively on their regularity of appearance, or absence of such order. However, these imaginary causes have gradually given way in the face of the growing scope of our knowledge, and disappear completely before sound philosophy {science}—which regards them only as expressions of our ignorance of the true causes.

Present happenings are tied with preceding ones by a connection based upon the principle that something cannot occur without a cause. This principle which is known as the **principle of sufficient reason** includes even those actions which are considered trivial/accidental. The freest will is incapable of doing anything without a determining motive. Given two scenarios with exactly the same circumstances, but with the difference that the will is active in one but not active in the other, we mistakenly say in the case of the active will that it is an effect without a cause {free will in fact}. But actually this seems to be a pure accident. Laplace points out that this notion of free will is just an **illusion** which does not take into consideration the causes of choice of the will.

We ought to take the present state of the universe to be to be an effect of the past state of the universe—the cause of the universe that is to follow. If a **vast intelligence** {evil demon} who could comprehend all the forces of nature and the respective situation of the beings which comprise it, a vast intelligence capable of analyzing this data, it would include in one formula “the movements of the greatest bodies of the universe and those of the lightest atom.” (4) For this intelligence, everything would be certain, and the future and past would be present to its eyes. The human mind offers a feeble example of this intelligence, in the predictive competency it has been able to give to astronomy so far. Humanities discoveries in mechanics and geometry, and universal gravity, have enabled it to understand the connection between the past and future states of the world. Applying the same scientific method to other fields of knowledge, it has been able to discover general laws determining observed phenomena and has been able to make valid predictions based on these. All these efforts on behalf of the quest

for the truth “tend to lead humanity back continually to *the vast intelligence*” (4) previously mentioned. This unique tendency of the human race is that which makes it superior to the animals.

Let us remember that in the not too distant past, an extreme drought, or unusual rain, a comet with a very long tail, an aurora borealis, and, in general, all unusual phenomena were considered to be signs of heavenly disapproval. So heaven was invoked to evade their negative effects. No one prayed to have the sun and planets stopped in their courses, and observation soon made clear the futility of such prayers. Yet because these phenomena occurred and disappeared at long intervals apparently upsetting the order of nature, it was thought that Heaven, angered by the crimes of the earth, had made them to announce its vengeance. So the very long tail of the comet of 1450 caused terror throughout Europe. This celestial body, after four visits, has provided a very different kind of excitement for scientists. The knowledge of the laws of the system of the world has dissipated the fears derived from ignorance “of the true relationship of man to the universe.” (5) Halley, having identified this comet with those that appeared in 1531, 1607, and 1682, predicted its return in 1758-1759. So the educated world awaited this return which was to confirm one of the most important discoveries made in science. Latter astronomers (Clairaut 8) then calculated the perturbations of motion which the comet had undergone from the influence of the planets Jupiter and Saturn, and so refined the prediction of the return of Halley’s comet to 1759.

The curve traveled by a simple molecule of air or vapor is controlled in a manner that is just as certain as the planetary orbits—the only difference here comes from our ignorance.

“Probability is relative, in part to our ignorance, in part to our knowledge.” (6) We know that of three or a larger number of events, a single one of them can occur, but nothing leads us to believe that one of them will occur rather than another. In this state of indecision, it is not possible for us to predict which one will happen with certainty. It is, however, likely that one of these events chosen randomly will not happen because the equal possibility of all the other events excludes its occurrence while only one possibility favors it.

The *theory of chance* involves reducing all events of the same kind to a certain number of equally possible cases. Thus, we may be equally undecided about their existence. The ratio of favorable cases to all possible cases is the measure of this probability, “which is simply a fraction whose numerator {top number} is the number of favorable cases and whose denominator {bottom number} is the number of all the cases possible.” (7)

This notion of probability assumes that when we increase the same ratio of the number of favorable cases together with the number of all possible cases, the probability stays the same. When all the cases are favorable to the occurrence of an event, the probability becomes certainty. Given these considerations, figuring out *certainty* and *probability* are much the same thing, although there might be a difference between the two mental states when a truth is painstakingly demonstrated to it, or when it still perceives a small margin of error.

Hence, a claim made to a large audience provokes varying degrees of credence in accordance with the extent of knowledge of different members of that audience, because they are thinking of it in terms of probability. If the man who reports it is completely convinced, and because of his character and position, inspires great confidence, this statement, no matter how extraordinary, will have for the audience who lacks the same information the same degree of likelihood as an ordinary statement made by the same man, and they will believe it. But if one of them knows that the same claim is rejected by other equally trustworthy people, they will be in doubt and the claim will be discredited by the enlightened audience, who will reject it even if it's true.

It is by the influence of the opinion of those who the masses judge most informed and thus, authorities regarding the most important matters of life that the propagation of errors is due in ignorant times. Astrology and magic are two good examples. These errors learned in infancy, adopted without analysis, and having as their only foundation, universal belief, have maintained themselves for a very long time.

But the progress of the sciences has annihilated these errors in the minds of enlightened people, whose opinion has, therefore, caused them to vanish among the common people by the power of imitation and habit. This power, the richest asset of the moral world, establishes and conserves in a whole people beliefs that are completely contrary to those it upholds in other nations with equal authority. What degree of indulgence should we have for opinions different from ours, when this difference is only based upon the different points of view that we all have as a result of where chance has placed us? Let us teach those who we find insufficiently instructed. But we need first to critically analyze our own opinions and, importantly, weigh their respective probabilities.