

# Chapter 32

## The Ontology of Randomness

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### ABSTRACT

*This chapter reviews the existence of randomness, focusing on it existing in terms of what it is not, order. Included are a survey of current views and history of randomness, relevant concepts of whether something exists (ontology), how we know (epistemology), entropy, foundations of order, statistics, prediction, time, and scientific methods. Randomness is tied to determinism, and determinism becomes an issue of free will. Thus, discussions of free will cycle back to whether everything is laid out before us, but this is controversial, at best. We may only act as though there is randomness, similar to acting as though there were free will, even after being told that the universe, indeed, may be deterministic. Such a method is comparable to doing a logic proof in drawing an assumption line and displaying the consequences. Alternate worlds are referenced in which randomness may be seen in a different light.*

### INTRODUCTION

“Random” commonly is associated with determinism, order, prophecy, and the future. Starkly put by one philosopher, “Randomness is unpredictability” (Eagle, 2005), quoting mainstream logician Suppes in saying “Phenomena that we *cannot predict* must be judged *random*” (Suppes, 1984, p. 32). People rely upon uncertainty (encryption and defeating bias). Tables of random numbers are based on the supposition that humans subconsciously create patterns and cannot generate randomness. Gambling casinos are about the “luck of the draw”. Human survival depends on remembering patterns of past events in order to adapt to the changing environment, as well as on randomness in science.

Our focus is not only on considering whether randomness exists, i.e., ontology, but the reason for it. Turmoil in the field of experts is expressed by “... there is no such thing as a random number - there are only methods to produce random numbers...” (Von Neumann, 1951; Fiorini and De Giacomo, 2014, p. 5). How can one create something that cannot exist? Yet, at the most basic building block level of existence, Planck scale, there is inherent uncertainty (perhaps immanent in the macro world) with which persons have difficulty accepting.

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A new view of randomness will be presented here, based on the often neglected philosophy of dialectics, apprehension of something in terms of what it is not, a process understanding, rather than one of identifying objects.

This short space allows only a small sampling of approaches to the ontology of randomness for the reader to explore in depth through cited references. If one can begin to think beyond the mechanics (as in random number generators) then this encyclopedia entry will have accomplished its purpose.

## **BACKGROUND**

The Ontology of Randomness in this *Encyclopedia of Information Science and Technology*, focuses more on the thinking underpinning science, more specifically, whether randomness even exists, i.e., its ontology (Feibleman, 1951). Tests for randomness appear to assume what is trying to be shown, i.e., there is indeed randomness, begging the question of whether there is innate structure, or order, in the universe.

Because of very limited space, extended tutorials and discussions about ontology (the nature of existence), epistemology (how we know), the problems of induction (Hume, 1888; Mill, 1843; Russell, 1919; Ramsey, 1929; Keynes, 1921, pp. 305-314; p. 24 et seq.), stochastic analysis (series of random variables), and the problems of representation (Plato's cave allegory as the philosophical foundations of statistics) have been omitted. Also omitted is a discussion of the role of randomness in logical scientific exploration (Popper, 1934; hypothetico-deductive, 2015; Copi, 1979; Rosser, 1953; Mendelson, 1997; Whewell, 1847; Feyerabend, 1975), as well as discussions of Abraham de Moivre (bell curve), Pierre-Simon Laplace (calculus of probabilities), and martingales (Birnbaum and Lukas, 1980). There are many other conversations about the differences between probability, chance (Keynes, 1921; Eagle, 2010), and randomness that would enrich a more complete treatment of the subject. This says nothing of the hundreds of mainstream works of probability theorists and their views on randomness. Instead, given here is somewhat analogous to a brief literature search, with a focus on summarizing several main views of what people think randomness is and considering the implication of its existence status. If such can get the reader to think beyond technology, focusing more on the "why", then this chapter will have accomplished its goal.

## **A Historical Perspective**

Prediction for an early hunter meant being able to survive any challenge in the wild, that ability being taught to others. One thinks of shamans, soothsayers, and prophets being among the more esteemed members of various cultures.

Randomness came in the form of early games (Wolfram, 2016), a symbolized way of acting out in anticipation of meeting unpredictable events. As societies became more organized, those more skilled in correctly anticipating events led the military. Athletic competitions and often games emerged as simulations of military combat (History of Sport, 2016). In modern times, sophisticated modeling and simulation techniques describe, analyze, and plan for unexpected situations (MSBOK, 2016).

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