MATHEMATICS AND UNCERTAINTY

BY JAMES D. NICKEL

> "That nothing happens by accident is, of course, a chief tenet of the Christian religion, according to which not even a sparrow falls to the ground, or a hair is bent on our head, without our Heavenly Father willing it. That nothing happens by accident–that is, by sheer chance, that is, really without a cause–is also a chief tenet of science about the material universe. For if anything were truly accidental, there could be no consistency, and without consistency there could be no laws, not even statistical laws, because even they imply one or two parameters which imply consistency."[1]

Foundational to mathematical statistics, probability is the study of chance occurrences, and probability theory seeks to formulate rules that describe random variations. A discipline foundational to the study of probability is the theory of combinations and permutations.[2] Some of the seminal historical thinkers in this realm were the Frenchmen Pierre de Fermat (1601-1665), Blaise Pascal (1623-1662),[3] and Pierre-Simon de Laplace (1749-1827).

Understanding and using probability engages considerations of an ethical nature. Most people link probability to gambling, and historically, probability theories were originally developed in the context of games of "chance" (e.g., dice games). The gambling conglomerate (either private or State) makes use of probability theory, playing on the "get rich quick" paradigm embraced by the fools who inhabit their establishments, in order to ensure that the "house" always wins. The "get rich quick" worldview blinds the participant to the laws of probability (the odds are overwhelmingly against one obtaining this chimera). Many Biblical proverbs speak directly or indirectly to this flight of fancy and its underlying rejection of the Biblical work ethic:

> The soul of a lazy man desires, and has nothing; but the soul of the diligent shall be made rich (Proverbs 13:4).
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> The desire of the lazy man kills him, for his hands refuse to labor. He covets greedily all day long, but the righteous gives and does not spare (Proverbs 21:25-26).
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> Will you set your eyes on that which is not? For riches certainly make themselves wings; they fly away like an eagle toward heaven (Proverbs 23:5).
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> A man with an evil eye hastens after riches, and does not consider that poverty will come upon him (Proverbs 28:22).

While some people succumb to the fallacy of disregarding low probabilities in order to obtain beneficial outcomes, others foolishly discount the low probabilities of inexpedient events. Many people disregard planning for such seeming contingencies (e.g., earthquakes, floods, tornadoes, accidents, health problems, our certain and eventual death, etc.). When such events happen to the unprepared, the results are often tragic. Proverbs 22:3 (NIV) warns, "A prudent man sees danger and takes refuge, but the simple keep going

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[1] Stanley L. Jaki, *The Absolute beneath the Relative and Other Essays* (Lanham, MD: University Press of America, 1988), pp. 68-69.

[2] In review, the theory of combinations refers to the number of possible ways of arranging objects chosen from a sample size of *n* if you do not care about the order in which the objects are arranged. Mathematically expressed, the number of *n* things taken *j* at a time is n!/[(n - j)!j!] where ! stands for factorial (e.g., 5! = 5·4·3·2·1). Permutations are like combinations except that order is important. In this case, the formula is n!/(n – j)!.

[3] It is significant to note that Pascal used a probability wager as an "apologetic" for the existence of God. Pascal's "wager" is as such: If you cast your lot on the side of God, then you have nothing to lose in this life and everything to gain in the life to come. But, if you deny God's existence, then you jeopardize yourself for all eternity should God actually exist. In essence, Pascal was challenging men to "gamble" their lives on a fifty-fifty chance that Christianity might be true (not a very satisfactory argument for belief in God).

and suffer for it." We, being finite in our knowledge, must take responsibility for these "possible" outcomes in conjunction with trust in our all-knowing God.

In this context, we must bear in mind that the future is *not* in the hands of random chance happenings. Although the theory of probability enables one to prepare (with the help of insurance companies) for uncertainties that are outside of our finite and incomplete predictive capabilities, we must know with certainty that the future, and whatever it may bring, is in the hands of God and His providence.[4] The God who "numbers the hairs on our head and the stars in the sky" knows the future exhaustively (Luke 12:7; Psalm 147:4). Those who love Him can trust in His beneficial providence (Romans 8:28). God does not act according to the laws of probability, for He governs even the casting of lots:

> The lot is cast into the lap, but its every decision is from the Lord (Proverbs 16:33).

Probability theory is essential to business and science. For example, life insurance companies make special use of probability (in coordination with statistical studies) in the preparation of rate schedules (actuarial science) helping the provident to prepare for the uncertain future. Auto and health insurance companies base their rates (premiums) on probabilistic outcomes of the population as a whole (with a wide variety of factors considered–geography, personal history [i.e., driving record, health history, family history], age, sex, etc.). In business, on average, about 2% (2 out of every 100) of individuals will respond to an advertisement or a request for help or funds. In the logic of computer programs, an understanding of combinatorics is critical if one wants to code for all logical possibilities of given conditions.[5] In the biological and chemical fields, an understanding of these basic principles is foundational to research in genetics.

I recognize that some Christians are offended by "games of dice" and the whole context of gambling. They are convinced that any "association" with these vices is sin. I respect that attitude, but I do not agree that a Christian should remain ignorant of the laws of probability. As Biblical Christians, we must understand the nature and mathematics of gambling in order to better understand how probability theory and statistics can be applied to other areas of life (as part of the dominion mandate calling). As Biblical Christians, we reject the "get rich quick" gambling schemes because (1) we know the teaching of Scripture and (2) we know that the confirming nature of the theory of probability.

Some define probability as the measure of "chance." Chance often means "luck or fortune." It sometimes means "risk or hazard." It can mean "without plan or intent; accidentally." It sometimes means "possibility." It can mean the "absence of any cause of events that can be predicted, understood, or controlled."

Many people say we live in a "chance world." The Biblical Christian knows that a good and just God governs all things; nothing happens haphazardly. Instead of using "chance" in working with probability theory, it is better for the Biblical Christian to use "uncertainty." Uncertainty acknowledges that the Biblical Christian does not know exhaustively; i.e., many things about life are puzzles that we cannot fully answer. Even if life at times "feels" uncertain, the Biblical Christian's faith rest in the certainty of Who God is, the anchor of the soul (Hebrews 6:19). The Biblical Christian "lives by faith" (Romans 1:17) that the God of Scripture "works out all things for good for those who love Him and are called by Him" (Romans 8:28-29).

[4] Probability theory is useful to "scale" events like accidents, death, etc.

[5] From the author's personal experience as a computer programmer and analyst, he affirms that these conditions can be both numerous and complex. An understanding of combinatorics is a programmer's "life-saver."