

CHRISTIANITY FOR THE TECHNICALLY INCLINED: Risk Assessment, Probability and Prophecy

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Every day our physical safety is affected by the probability of failures associated with machines that we use. Designers of machines for use with the public follow probabilistic approaches in determining whether a machine is safe to use. If we accept this as a rational approach to self-preservation (and we do), then it seems reasonable to apply the same probabilistic criteria to the analysis of the Bible. ¹

Risk Assessment and Machines

An example of public safety and the consequences of machine failure comes from the use of public transportation, in particular trains and subways. In modern railroading, equipment on the trains and equipment on the ground communicate to form a sophisticated collision avoidance system. If these systems fail to perform their function, trains can collide with deadly consequences.

Elements of these sorts of collision avoidance systems (called *signaling* in railroad jargon) date back to 1829. At that time, hand signals, flags, and lanterns were used on the B & O Railroad.² As time has advanced, machines have taken the place of humans in railroad signaling. Not only have machines replaced humans, but also the machines themselves have become complex.

When everything in a signaling system is working correctly, trains do not collide. Designers of signaling systems must also consider what happens when things break. One approach to this is to begin by making a list of every possible failure that can occur. Then, for every failure, assess two things. First, assess the severity of the consequences of the failure. Second, assess the probability of the occurrence of the failure. With these two pieces of information, one then determines whether the risk associated with each failure is acceptable or whether the machine must be re-designed in some way.³

The basic process is a formalized method of doing that which we do every day. We look at the consequences or rewards of a situation and evaluate the probability of occurrence. Consider the case where you spot a one hundred dollar bill in the middle of a highway. One considers the reward (\$100) and the probability of success (no cars are in sight). As the reward changes (say \$1) or the probability of success changes (rush hour traffic), one makes a different evaluation as to whether to run into the street.

The basic process for our railway failure analysis is illustrated in the table below (See Appendix II for a more detailed view). Find the column for the severity, find the row for the frequency, and assess the risk associated with each conceivable failure by noting the region where the row and column intersect.

Risk Assessment		Severity			
		Really bad (e.g.; many deaths)	Bad (e.g.; death)	Minor Injuries	Everything's OK
Frequency	Occurs all the time	1	2	3	3
	Occurs sometimes	2	2	3	4
	Very rarely occurs	3	3	4	4
	Virtually never occurs	4	4	4	4

Where: 1 = Correct this As Soon As Possible!
2 = Correct this reasonably soon!
3 = This could be a problem. Caution!
4 = Acceptable risk.

Risk Assessment and Christianity

How is train safety relevant to discussions of Christianity? The first point is that our very lives are affected by probabilistic calculations, and we expect to survive on the basis of those calculations.⁴ In our example, we board trains and travel from place to place with every expectation of reaching our destination. Whether we are aware of it or not, our expectations of surviving the trip without a collision are realistic, based on probabilistic calculations performed by the designers of public transportation systems.⁵ If we use these analytical tools to evaluate life and death issues in the secular world, it would be hypocritical or prejudiced to discredit or fail to use the same tools in the investigation of theology.

The second point is to consider how an investigation into the truth of Christianity fits into the risk assessment matrix. Consider the severity of the issue. In addition to affecting us in the here-and-now, Christianity states that there is life after physical death and the nature of that life is dependent on whether one is truly a Christian. Not only is one's individual eternal destiny affected, but also the eternal destiny of loved ones and others whom one might have affected. This corresponds to the most severe column of the risk assessment matrix. Now, consider the probability. In the technical risk assessment, the probabilities were related to the frequency of failures. In the Christianity risk assessment, the probabilities are associated with whether Christianity is true.⁶ Using only the most severe column and modifying the row definitions for this discussion, consider the following table:

Christianity Risk Assessment		Severity
		Eternal Destiny
Probability	Christianity is very likely to be true	1
	Christianity may well be true	2
	Christianity probably isn't true	3
	Christianity is very likely not to be true	4

Where: 1 = Detailed investigation into Christianity is needed As Soon As Possible!
2 = Detailed investigation into Christianity is needed reasonably soon!
3 = I won't dismiss Christianity, but there isn't sufficient reason to investigate it now.
4 = Christianity isn't relevant to me. Maybe I'll go to a restaurant tonight.

Probability

There are different approaches to assessing the probability associated with the truth of Christianity. In this essay, we'll be considering prophecy (more on that later). To do that, some math is involved (but less than half a page).

Consider an event E1. Now consider that the probability of E1 actually happening is P1. We can write an equation for the probability of E1 as:

$$P(E1) = P1$$

Now consider that there are a several independent events E1 through En, with corresponding probabilities of P1 through Pn. We can write an equation for the probability of all these events occurring simultaneously as:

$$P(E1...En) = (P1 * P2 * P3 * ...P4)$$

As long as the events are independent, you derive the probability that they occur simultaneously by multiplying the probabilities of each event.⁷ For a simple case, consider several events that each have the same probability Pe. The probability that all of those events occurring simultaneously is:

$$P = Pe^n, \text{ where } n \text{ is the number of events}$$

Prophecy

There are many prophecies in the Bible, that is, cases where a particular thing was predicted in advance of it actually occurring. Consider five criteria to use in evaluating prophecies and fulfillment.⁸ They are:

1. Clarity: The prophecy must not be ambiguous.
2. Prior Announcement: The prediction must clearly be made before the fulfillment.
3. Independence: The prophet must not be able to cause the prophecy to occur.
4. Likelihood: The prophecy can't be just a good guess.
5. No Manipulation: The one fulfilling the prophecy cannot be manipulating the circumstances.

The discussion in this essay will be restricted to an evaluation of Old Testament prophecies concerning Jesus and those prophecies which are indicated to have been fulfilled in the New Testament.⁹ Appendix I provides a basic list of 25 such prophecies.

A reading of the prophecies demonstrates the first criteria (clarity), the fourth criteria (likelihood) and the fifth criteria (no manipulation) of the set. As a result of the time difference between the writing in the Old Testament and the time of Jesus' life, these examples meet the second criteria (prior announcement) and third criteria (independence).

There is no clear basis for assigning individual probabilities to the individual prophecies. So, one could consider some reasonable typical number. For arguments sake, say that there's a one in four chance (or 25% probability) for each prophecy to be true in Jesus life and person. That is, there is 25% probability that some prophecy would actually happen by random chance.¹⁰

Using the numbers above, the probability that all of these prophecies would be fulfilled in one person is:

$$\left(\frac{1}{4}\right)^{25} = \frac{1}{10^{15}} = 10^{-15}$$

So, there is an extremely small probability that these prophecies could have all been fulfilled by random chance. Since there are actually more than 25 prophecies, this calculation is conservative. And the 25% probability for each individual prophecy is certainly conservative.¹¹ So, one would conclude that the fulfillment of Bible prophecies offers objective grounds for believing the Christian truth claims.¹²

Back to Risk Assessment

On the basis of fulfilled prophecy, it's reasonable to eliminate at least the last two rows of the proposed Christian Risk Assessment Matrix. That leaves us with the following, depending on one's personal evaluation:

Christianity Risk Assessment – Reduced		Severity
		Eternal Destiny
Probability	Christianity is very likely to be true	1
	Christianity may well be true	2

- 1. Detailed investigation into Christianity is needed As Soon As Possible!***
- 2. Detailed investigation into Christianity is needed reasonably soon!***

Recap

A risk assessment matrix is a formalized way of evaluating risk. One considers the consequences of an event and compares that to the probability that the event will occur. If the severity of the consequences is low and the probability of the event is low, then one can ignore the risk. Conversely, if the severity of the consequences is high and the probability is high, then one must not ignore the risk. This is a rational approach to risk assessment, and one that is codified through formal standards and used for public safety.

The severity of the consequences associated with Christianity is high. A probabilistic evaluation of prophecy shows that Christianity is very likely to be true. Analyzing this data by using the same risk assessment approach that is used to assure that public transportation is safe, one is left with the conclusion that Christianity must be seriously investigated, and soon! Endnote 13 offers accessible resources for any reader who wants to investigate Christianity and investigate further evidence for its truth.¹³

Appendix I – Old Testament Prophecy and New Testament Fulfillment

Lists of fulfilled prophecies can be found in various sources. A short list of thirty-eight prophecies about Jesus is found in the Thompson Chain-Reference Bible.¹⁴ Twenty-five prophecies from that list are duplicated below, to correspond to the probability calculation in this essay. Note that some of the greater prophecies (e.g.; virgin birth, resurrection) are not in the list below so that the reader does not have to accept or analyze the testimony for those miraculous events prior to evaluating the argument herein (although there is no studied reason not to include them). If there are prophecies in the list below that a reader finds objectionable for some reason, there are other prophecies that can be used to make up the twenty-five. Note that the Bible contains many more prophecies that are not directly related to historical events about Jesus.

	Prophecy Reference	Fulfillment Reference	Subject
1	Genesis 18:18, 17:19, 28:14	Matthew 1:2, Luke 3:34	Promised offspring of Abraham, Isaac, & Jacob
2	Genesis 49:10	Luke 3:33	Of the tribe of Judah
3	Isaiah 9:7	Matthew 1:1	Heir to the throne of David
4	Micah 5:2	Matthew 2:1	Place of Birth
5	Daniel 9:25	Luke 2:1-2	Time of birth
6	Jeremiah 31:15	Matthew 2:16	Slaughter of infants
7	Hosea 11:1	Matthew 2:14	Escape into Egypt
8	Isaiah 9:1-2	Matthew 4:12-16	Ministry in Galilee
9	Isaiah 53:3	John 1:11	His rejection by the Jews
10	Zechariah 9:9	John 12:13-14	His triumphal entry
11	Psalms 41:9	Mark 14:10	Betrayed by a friend
12	Zechariah 11:12	Matthew 26:15	Betrayed for thirty pieces of silver
13	Zechariah 11:13	Matthew 27:6-7	Money returned for a potter's field
14	Psalms 27:12	Matthew 26:60-61	False witnesses accused him
15	Isaiah 53:7	Matthew 26:62-63	Silent when accused
16	Isaiah 50:6	Mark 14:65	Struck and spit on
17	Psalms 69:4	John 15:23-25	Hated without cause
18	Isaiah 53:12	Matthew 27:38	Crucified with sinners
19	Psalms 22:16	John 20:27	Hands and feet pierced
20	Psalms 22:6-8	Matthew 27:39-40	Mocked and insulted
21	Psalms 109:4	Luke 23:34	Prays for his enemies
22	Zechariah 12:10	John 19:34	His side to be pierced
23	Psalms 22:18	Mark 15:24	Soldiers cast lots for his clothing
24	Psalms 34:20	John 19:33	Not a bone to be broken
25	Isaiah 53:9	Matthew 27:57-60	Buried with the rich

Appendix II – Failure Modes and Effects Criticality Analysis ¹⁵

For those who would like more depth on the approach to risk assessment, the tables below provide more precise definitions. Feel free to skip this page. There are variations on these tables, within the safety community, but the versions below illustrate the concept.

Hazard Severity Categories		
Description	Category	Definition
Catastrophic	I	Multiple fatalities; multiple serious injuries; system or equipment loss; or severe environmental damage.
Critical	II	Fatality; severe injury or severe occupational illness; or major system, major environmental, or major equipment damage.
Marginal	III	Minor injury or minor occupational illness; or minor system or minor equipment damage (damage that can be repaired with minor disruption to service).
Negligible	IV	System, environmental, or equipment damage that does not significantly reduce safety; injuries or illness that do not require first aid or medical attention.

Hazard Probability Levels		
Description	Level	Likelihood
Frequent	A	Very High – likely to occur frequently. (Many times per year)
Probable	B	High – Likely to occur occasionally. (Once per year)
Occasional	C	Medium – Likely to occur under unusual circumstances. (Once per 1-10 years)
Remote	D	Low – Likely to occur over lifetime of the system. (Once per 10-100 years.)
Improbable	E	Very Low – Could occur, however, not likely over the lifetime of the system.

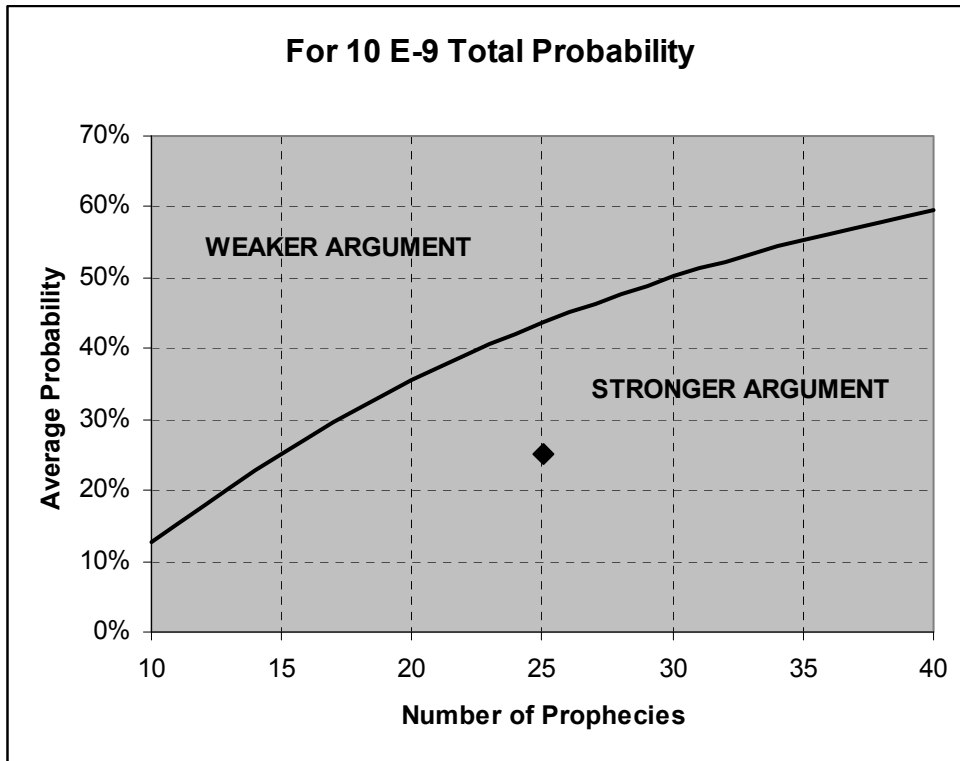
Hazard Risk Index Matrix				
Hazard Probability Level	Hazard Severity Category			
	Catastrophic I	Critical II	Marginal III	Negligible IV
Frequent – A	1	1	2	3
Probable – B	1	1	3	4
Occasional – C	1	3	4	4
Remote – D	3	4	4	4
Improbable – E	4	4	4	4

Hazard Risk Assessment		
Risk Index	Description	Criteria
1	Unacceptable	Must be mitigated with engineering and/or administrative controls to a Risk Index of 3 or 4 as soon as possible.
2	Undesirable	Should be mitigated with engineering and or administrative controls to a Risk Index of 3 or 4 within a reasonable period of time (one year).
3	Acceptable with controls	Should be verified that the procedures or controls cited are in place and periodically checked.
4	Acceptable as is	No action to mitigate mishap is required.

Notes:

- ¹ John Warwick Montgomery, *Tractatus Logico-Theologicus* (Bonn, Germany: Verlag für Kultur und Wissenschaft, 2002), 128-131. In *Tractatus*, Montgomery establishes the underlying approach of evaluating probability and prophecy. This present essay adds the concept of technical risk assessment to both intrigue the technically inclined and to demonstrate the relevance of the method to those who employ technical risk assessment concepts.
- ² *Elements of Railway Signaling* (General Railway Signal, 1979), 6.
- ³ For readers who would like more detail on this methodology, the Reliability Analysis Center, in Rome, NY, offers a publication titled *Failure Mode, Effects, and Criticality Analysis (FMECA)*. They can be reached at rac@rome.iitri.com.
- ⁴ Kenneth Ross and Bruce W. Main, *Risk Assessment and Product Liability* (For the Defense, 2001, and web article at www.bowman-brooke.com/a-risk_assess.htm). In this article, Ross and Main discuss the need to formally conduct and document a risk assessment to improve product design, reduce accidents, and curb liability exposure. The authors describe that this process is becoming common-place in many industries.
- ⁵ And yet, we periodically hear of train crashes. One might consider separating these crashes into four categories: a) non-automated systems with human error, b) legacy systems that were not designed to today's evolving standards and are awaiting replacement, c) improperly analyzed designs, and d) the one-in-billion set of circumstances.
- ⁶ Blaise Pascal, *Pensées*, Translated by A. J. Krailsheimer (New York, NY: Penguin Books), 121-125. Pascal, born in 1623, was, along with Fermat, a founder of the mathematical theory of probability [E.T. Bell, *Men of Mathematics* (New York, NY: Simon and Shuster, 1937), 86]. In "Pascal's Wager", Pascal, in *Pensées*, argued that if you believe in God, then if you are correct you win everything and if you are incorrect you lose nothing. Diminish your passions against belief and follow in the path of believers. What have you got to lose?
- ⁷ Paul L. Meyer, *Introductory Probability and Statistical Applications* (Reading, MA: Addison-Wesley, 1970), 36 - 44.
- ⁸ John Warwick Montgomery, *Evidence for Faith* (Probe Ministries International, 1991). The first four criteria for evaluating prophecy are from the essay *Truth via Prophecy* by John Bloom. In *Tractatus Logico-Theologicus*, op. cit., 128-130, Montgomery addresses these points and adds the fifth point.
- ⁹ *ibid.* Essays in *Evidence for Faith* also address other types and aspects of prophetic fulfillment. These are significant, but outside the scope of this essay.
- ¹⁰ John Warwick Montgomery, *Tractatus Logico-Theologicus*, op. cit., 129-130. In *Tractatus*, Montgomery starts with an arbitrary average probability of $\frac{1}{2}$, and concludes that the number is too high. So, he uses an average probability of $\frac{1}{4}$.
- ¹¹ In safety related analysis, a probability of $10 \text{ E-}9$ is considered to be safe enough for events with even the most severe consequences. There is no analytical formula that derives $10 \text{ E-}9$ as the right number. It is based on minimizing death, but is nevertheless subjective. Should this same number be used in the evaluation of the truth claims of the Bible? Apart from an answer to that question, $10 \text{ E-}9$ is

used in the graph below to illustrate the relationship between the number of events and the average probability. Our example (25 prophecies, 0.25 average probability, and $10 \text{ E-}15$ total probability) is shown as a single reference point. The 'x' axis only goes up to 40 prophecies. While this is suitable for this discussion, there are many more prophecies, especially those not directly related to Jesus.



¹² Another area of probabilistic study is that of confidence levels and confidence intervals. This sort of analysis is done when analyzing medical trials and opinion polls, where data is sampled. More work could be done to illustrate how this area of probability theory could be used to demonstrate confidence in the truth of Christianity.

¹³ For additional resources regarding the truth of Christianity from philosophical, historical, legal, and scientific points of view, consider the Canadian Institute for Law, Theology & Public Policy web site at www.ciltpp.com. For additional resources regarding Christian theology, consider the Wisconsin Evangelical Lutheran Synod web sites at www.wels.net and www.whataboutjesus.com.

¹⁴ Frank Charles Thompson, *Thompson Chain Reference Bible*, New International Version (Grand Rapids, MI: Zondervan Bible Publishers, 1983), 1567-1570. Included in this Bible are various resources such as a list of prophecies about Jesus.

¹⁵ US Department of Defense, *MIL-STD-882D, Standard Practice for System Safety* (US Department of Defense, 10 February-2000). This standard describes the process of failure modes and effects criticality analysis. The earlier version, *MIL-STD-882C*, provides more examples of the process.