

God and Statistics

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I would like to open this morning with a couple of scripture passages:

Scripture Readings¹ and Opening Prayer

Ecclesiastes 9:11

Again I saw that under the sun the race is not to the swift, nor the battle to the strong, nor bread to the wise, nor riches to the intelligent, nor favor to the men of skill; but time and chance happen to them all.

Matthew 5: 43-45

You have heard that it was said, 'You shall love your neighbor and hate your enemy.' But I say to you, Love your enemies and pray for those who persecute you, so that you may be sons of your Father who is in heaven; for he makes his sun rise on the evil and on the good, and sends rain on the just and on the unjust.

Opening Prayer²

Blessed Lord, which hast caused all holy Scriptures to be written for our learning; grant us that we may in such wise hear them, read, mark, learn, and inwardly digest them; that by patience and comfort of thy holy word, we may embrace, and ever hold fast the blessed hope of everlasting life, which thou hast given us in our savior Jesus Christ. Amen.

Introduction

Good morning. I am both flattered and humbled (and maybe just a little bit frightened) to have been given this opportunity to speak with you today in convo. Bob Hogg, a distinguished statistician at the University of Iowa, is credited with having said, "If it moves, it's biology; if it changes color, it's chemistry; if it breaks, it's physics; if it puts you to sleep, it's statistics." Given that the word 'statistics' appeared in the billing for this event, I'm just thrilled that anyone is here, at all. If I succeed at keeping you awake, I'll consider it a bonus. Statistics has often been defined as decision making in the face of uncertainty. Today I would like to present to you what I can only describe as a challenge to my faith; the process I would like to recount for you this morning forced me to make decisions in the face of uncertainty. But note the disclaimer: As will become all too evident, I am not a theologian, but rather a statistician.

God and statistics; this may be the first time that you've heard these two words uttered in the same breath. It took many years before I saw a connection between my academic specialty (statistics) and my Christian faith. I am more convinced than ever that despite our frequent but superficial acknowledgment that our faith informs all that we do, most of us function day-to-day

by compartmentalizing our faith and our professional lives. Whether we realize it or not, our faith imbues (that's for you, Dean Taylor) all that we do, even the scholarly discipline that each of us academicians struggles with day in and day out.

Let me begin this morning by telling a story.

God and L'Express 508³

"[On July 10, 1991, L'Express] Flight 508 crashed while conducting an instrument landing system approach to runway 5 at the Birmingham Airport, Birmingham, Alabama. Flight 508 was a Beech C99 on an instrument flight rules flight plan. The captain of the flight and one passenger survived the crash in Ensley, a residential area in southwest Birmingham. The first officer and the remaining 12 passengers aboard the flight were fatally injured. The airplane was destroyed by the impact and post crash fire. Two homes and two automobiles were also destroyed.

"The National Transportation Safety Board determines that the probable cause of this accident was the decision of the captain to initiate and continue an instrument approach into clearly identified thunderstorm activity, resulting in a loss of control of the airplane from which the flight crew was unable to recover and subsequent collision with obstacles and the terrain."⁴

One cold Wednesday evening in November of 1991 I took my four-year-old son to cherub choir practice at church. I will confess that I did not regularly participate in Wednesday evening church activities; rather, I would drop off my son and find a quiet nook where I could read. This night, however, was different. On my way to my reading spot I overheard a gentleman describing his long recuperation in a local hospital after having survived a plane crash. My curiosity got the best of me and I stopped, propping myself up against the door jam in the rear of the fellowship hall; I listened. The man who was speaking was Mabry Rogers, a local attorney and the lone passenger to survive the crash of L'Express Flight 508 described in the excerpt just recited from the accident report. I would like to tell you what he said that night; for me it has turned out to be one of those life-changing events that we all experience but often don't realize until years after the fact. This is his story.

Mabry Rogers had been on an uneventful flight from New Orleans to Birmingham; a commute he made frequently. As he recalled, the sky was clear with small white fluffy clouds; the flight was routine, uneventful. As they approached Birmingham he could see a large, dark cloud – he watched as his plane flew directly into it. Soon it was clear that something was wrong and that the plane was in trouble. He recollected seeing treetops, then rooftops, and finally waking up in a hospital bed where he spent an extended period of time recuperating. During that time he learned that he was one of two survivors – the pilot and only other survivor, had been thrown through the cockpit window and into the living room of a home. No doubt both men experienced 'survivor's guilt while bedridden. Additionally, Mr. Rogers spent vast amounts of time reflecting on what had happened.

Always a believer in God's intervention in history, Mr. Rogers continued to believe that God can (that is, has the power to) intervene; after all, doesn't the Bible tell us that not even a sparrow falls without his knowing? Could God have prevented this plane crash? Of course; the Creator is all-powerful! He then asked, "Do bad things occur to innocent people, despite God's power?" Answering his own question he suggested that the answer was obvious: bad things do occur to innocent people. And sometimes in despair and anguish, we say with the Psalmist [Psalm 22: 1-2]:

"My God, my God, why hast thou forsaken me? Why art thou so far from helping me, from the words of my groaning?"

Do bad things happen to innocent people *because* of God's power? Mr. Rogers asked his audience to recall the story in John 9 (1-3), often suggested as evidence for predestination:

"As he passed by, he saw a man blind from his birth. And his disciples asked him, 'Rabbi, who sinned, this man or his parents, that he was born blind?' Jesus answered, 'It was not that this man sinned, or his parents, but that the works of God might be made manifest in him.'"

In other words, Mabry Rogers, giving a clue as to his evolving train of thought, interpreted the passage to mean that this man was there by happenstance which provided an opportunity for Christ to reveal God's power through his healing of his blindness by spitting on mud.

Mr. Rogers then stopped and came to the point: he asked those in attendance that evening, "How many [of you] believe God intervened personally to save me? That is, my survival was a miracle, meaning God's intervention into human time and space... violating some 'law' of 'nature' or 'science.'" He then proceeded to delineate five ways that we commonly look at God's relationship to human suffering, something he'd given great thought to while confined to his hospital bed:

1) God is a righteous judge who gives people exactly what they deserve.

While this is a neat explanation, its limitation is that it creates guilt where there is no basis for guilt. And, as seen in the book of Isaiah, the righteous do not always prevail ("Tell the righteous it shall be well with them," Isaiah 3: 10-11) and it is not even true that the righteous prevail in the long run, as is the theme of Psalm 92 (6-8, 13). In other words, he concluded that the wicked *may* get their punishment, but that does not mean the righteous will ultimately prevail. God rarely, if ever tells the 'good' person what 'wrong' is being punished; such 'unclear' guilt can be debilitating.

2) God has his reasons, reasons that we are in no position to judge.

This can be comforting because it suggests that there is some pattern or reason for the suffering. But, we cannot see or understand the pattern, and it is a cruel God who takes a sacred individual life because it supposedly contributes to a divine plan. Mr. Rogers appealed to the following analogy: If a human politician made a child die or suffer because it contributed to a larger plan of his, we would hardly condone it

without at least understanding the plan. Why would we apply a *lower* standard to God's acts?

- 3) God does it to educate us, to give us a better understanding.

Again, this is comforting, but it does not help the sufferer or explain his suffering, because there is no information about what we are to change or learn. Mr. Rogers believed that this was primarily a way of defending God, of making excuses on behalf of God.

- 4) God creates suffering in innocent people as a test, as in the case of Abraham.

If this is true, however, God does so knowing that most of us fail; if God is only giving us burdens we can bear so as to strengthen us, as was the case with Abraham, God often seems to miscalculate.

- 5) God creates suffering which liberates us from this world to the Promised Land; the innocent will be compensated for their suffering later.

Mr. Rogers suggested, however, that one can believe in the hereafter with God and not find it necessary for God to hurt or cause suffering to innocent people now. It is not Christian doctrine that suffering "earns" heaven; that is Islamic. We need only accept Jesus' grace to be saved.

So, which of these explanations of human suffering did Mabry Rogers adopt? Well, to my surprise that evening, he embraced none of them; rather, he concluded that his survival was completely **random**. God created free will (allowing for the pilot's poor judgment); God created nature (including the storm that led to this cataclysm, the plane crash); and, God created humankind. Many times these three will interact to cause tragedy and unfair suffering as they did on July 10, 1991.

Let me make it clear, however, that Mr. Rogers did not subscribe to the theory of random suffering by way of saying that God is limited or less than all-powerful. He continued to believe in miracles, that God can intervene and prevent suffering, though God does not always do so with respect to each and every human event.

To say the least, I was stunned by what I had heard that evening. It would be a monumental understatement to say that up to that point in my life I had given such theological matters little thought. That evening, though, Mabry Rogers, the Christian, stepped out of his world of courtrooms and law books and into my realm of uncertainty, probability, and randomness. It took a lawyer's near-death experience to show me that even my discipline of statistics interfaces with the Christian faith.

The Chance Worldview

So, I started reading. I began with a little book called, "God of Chance," written by an internationally-respected British statistician who happened also to be a circuit-riding Methodist minister.⁵ I must have read that book a dozen times. Slowly but surely I began collecting the

sources cited in that book and reading them. Before long it became abundantly clear to me that we live in a culture of chance, in fact, a culture *dominated* by chance.

In the ancient Greek culture science was conceived, but was stillborn. It's clear that the ancients lived with a Chance Worldview – unexplained, random events were blamed on capricious gods, including the goddess of chance, Tyche. With the appearance of Christ and the eventual conversion of the Roman Empire, the Chance Worldview was supplanted by the Christian Worldview which came to dominate western culture. The 18th century saw science, conceived thousands of years before, finally come to full term with the advent of the Enlightenment. Determinism ruled: the universe was mechanical and predictable; it was only a matter of time until the mind of man would discover and solve God's equations. Sir Isaac Newton put it this way: "He is the God of order and not of confusion."⁶ This growth of rationalism led to the scientific revolution and the eventual displacement of the Christian Worldview by the Scientific Worldview. Things seemed to be rocking along quite well. But, along came Darwin and Einstein and Heisenberg and Bohr and uncertainty and what has been referred to as "the struggle for the soul of science."⁷ As the historian Henry Brooks Adams once put it, "Chaos was the law of nature; order was the dream of man."⁸

In the mid-19th century Charles Darwin proposed a mechanism for biological evolution, natural selection, that used random mutations as its source of creativity, variety. In 1971, the Nobel Laureate Jacques Monod, in his best-selling book *Chance and Necessity*, described natural selection at the molecular level this way:

We call these events accidental; we say that they are random occurrences. And since they constitute the *only* possible source of modifications in the genetic text, itself the *sole* repository of the organism's hereditary structures, it necessarily follows that chance *alone* is at the source of every innovation, of all creation in the biosphere. Pure chance, absolutely free but blind, at the very root of the stupendous edifice of evolution: this central concept of modern biology is no longer one among other possible or even conceivable hypotheses. It is today the *sole* conceivable hypothesis, the only one that squares with observed and tested fact. And nothing warrants the supposition -- or the hope -- that on this score our position is likely ever to be revised.⁹

In a later interview he added:

Biological proof of the absence of a master-plan and belief in a universe in which man was destined to appear is contrary to modern biology.¹⁰

It wasn't just the biological sciences that were being shaken by uncertainty. In the early twentieth century Einstein, Heisenberg, Bohr and others did the pioneering work in what would become quantum theory in physics. It was when it was clear that physics was becoming less deterministic and more probabilistic, more uncertain, that Einstein wrote to Max Born saying, in frustration, that "I would rather be a cobbler or even a casino worker than a physicist" if uncertainty was to become the hallmark of physics.¹¹ In 1992, a French physicist, Charles Ruhla, concluded his book, "The Physics of Chance," by saying

...today, physics is progressing much faster by the use of random than of deterministic models: so much so that chance is bound to become more and more part of the language and eventually of the paradigms of physics. This book will have achieved its aims if it can help the reader to make the conceptual leap from common sense to the wisdom of physics, and from determinism to chance.¹²

Whether in the natural, the physical or the social sciences, many significant scientific theories have, at their core, an element of randomness or uncertainty. This led respected Australian philosopher Phil Dowe to conclude that "...for better or worse, the conceptual leap [referred to by Ruhla in his book "The Physics of Chance"] has already been taken in our culture, and that the Chance Worldview has already taken hold of the popular mind."¹³ In other words, "our universe is intrinsically chaotic in the sense that its development from moment to moment depends on chance events. The world does not know in full detail where it is going next."¹⁴ Consider the path of intellectual development that I have just outlined, from the ancient Greeks to modern culture -- humankind has come full circle. Whereas the ancients once adhered to the Chance Worldview, again we find ourselves face-to-face with that same Chance Worldview; as David Bartholomew has put it, "[n]ow the gods have been dethroned but the uncertainty remains."¹⁵

Lest you have any doubt that we live with a Chance Worldview, think with me for a moment about how chance permeates our culture. Consider the many options our language gives us to express our recognition of the serendipitous aspects of reality: "[c]hance, luck, fortune, uncertainty, probability, risk, likelihood, odds, randomness, unpredictability, caprice, accident, coincidence, lottery, fluke, hazard and fate."¹⁶ I'm sure that you can think of others. A few years ago the *New York Times* published an article titled, "As Luck Would Have It: From Nursery School to the White House, More of Life is Left to Chance."¹⁷ This piece documented the ubiquitous nature of chance in our culture from the use of lotteries to assign such things as new gates at La Guardia International Airport and organ donor recipients to tossing a coin to start a football game. Gambling, insurance and board games all incorporate chance. In theater there are the plays by Tom Stoppard such as *Hapgood*¹⁸ and Michael Frayn's Tony award-winning production *Copenhagen*, to be performed here at Samford in March – I would strongly encourage you to attend. This fascinating story explores the human and ethical dimensions of the development of the atomic bomb in World War II from the perspective of two of quantum theory's greatest, but most conflicted, minds. Movies such as *The Butterfly Effect*, *Run, Lola, Run*, *Sliding Doors*, and even the chick flick, *Little Black Book* use our everyday encounters with chance as plot devices and mental stimulants. Consider the words of the main character, Stacy Holt, in the waning moments of the film *Little Black Book*:

I believe we write our own stories, and each time we think we know the end, we don't. Perhaps luck exists somewhere between the world of planning, the world of chance, and in the peace that comes from knowing that you just can't know it all. Ya know, life's funny that way; once you let go of the wheel you might end up right where you belong.¹⁹

There is world-class literature such as *Middlemarch* by George Eliot²⁰ and *Chance* by Joseph Conrad²¹ and television shows like old *The X-Files*²² and the current CBS hit *Numb3rs*, all of

which address the role of uncertainty, unpredictability and indeterminism in our lives. Scholars have written about the role of chance in history in books such as *For Want of a Horse: Choice & Chance in History*²³ and *The Hinge Factor: How Chance and Stupidity Have Changed History*²⁴. Weather forecasters talk about the probability of rain, your Ipod shuffles using a pseudo-random number generator algorithm and even musicians such as the rock group *Rush* can't resist commenting on the contingent aspects of life:

There are those who think that life has nothing left to chance,
A host of holy horrors to direct our aimless dance.

A planet of playthings,
We dance on the strings
Of powers we cannot perceive
"The stars aren't aligned -
Or the gods are malign"
Blame is better to give than receive.

You can choose a ready guide in some celestial voice.
If you choose not to decide, you still have made a choice.
You can choose from phantom fears and kindness that can kill;
I will choose a path that's clear-
I will choose Free Will.²⁵

God and Chance

Over the years I have asked my students to react to everything they hear or read with the question, "So what?" Now it's my turn to take my own advice. I have spent the sixteen years since the crash of L'Express 508 trying to reconcile orthodox (that's orthodox with a small 'o') Christian theology with a creation I see around me that appears to be chock full of random processes and chance events. That is, I have been trying to figure out how one can believe in a providential God (personal, unchangeable, all-powerful and all-knowing with complete foreknowledge) and yet accept a world with chance. And, as a person educated in the sciences I happen to believe that "[w]hat [God] says in the Bible is illuminated rather than contradicted by science."²⁶

"With a little help from my friends" [Lennon and McCartney, 1967, *Sgt. Pepper's Lonely Hearts Club Band* album],²⁷ most notably two colleagues here at Samford, Dr. Fisher Humphreys and Dr. Bill Collins I have become familiar with the theologies of Leonard Hodgson and St. Thomas Aquinas, respectively. Hodgson has taught me that there are three fundamental kinds of events in our world: determined, chance and free²⁸. I'm indebted to Dr. Humphreys for framing Hodgson's ideas in these terms²⁹. Determined events are such things as when a cathedral gargoyles weathers over the centuries and comes loose; it falls off to the ground below – we can attribute this to simple physics, cause and effect. Chance events might include hurricane Katrina that devastated New Orleans but left Mobile relatively unharmed. Still other events are chosen freely, that is they are purposeful, as when I choose to see a movie rather than go out to dinner because I prefer to be entertained, than to be fed (though I can make a meal on movie theater popcorn...). St. Thomas has taught me that "God wills some things to happen *necessarily*

and other things to happen *contingently*."³⁰ For example, in the book of Genesis God necessarily commands, "'Let there be light,' and there was light."³¹ God willed it to definitely happen. On the other hand, God might will that you develop your mind to its fullest potential... contingently. Contingent on what, you might ask... contingent on your freedom to choose. Is it not possible that God uses chance to achieve his purposes just as we do to achieve ours? Aquinas argues that willing events contingently in no way diminishes God's power. To prove his point, I would suggest that you are perfectly free to reject Aquinas' argument for necessary and contingent will.

Conclusion

So, what have I learned over the past sixteen years since the crash of L'Express 508? Well, I've learned a good bit of philosophy and theology, a few more analytical procedures and I think I'm coming to the understanding that probability and statistics may not be so much an expression of human ignorance about creation as it is a reflection of God's creative genius. But mostly, I've learned about faith, especially my faith.

Some have suggested to me that all of these questions I've been exploring should simply be relegated to a matter of faith, that such queries are either inappropriate or unattainable with my finite mind. Yes, ultimately for Christians, all of this does come down to faith; yet, I challenge anyone in this chapel to dispute my contention that curiosity is an intrinsic quality of human nature – I believe that it is a God-given instinct, if you will. Has asking tough questions weakened my faith over these sixteen years? On the contrary, it has never been stronger. I believe that the theologian Paul Tillich put it well when he said, "Doubt isn't the opposite of faith; it is an element of faith."³² Faith is defined by *Webster's* as "unquestioning belief that does *not require proof or evidence* [emphasis added]."³³ This doesn't square with my personal experience but rather is akin to the definition given by the evangelical atheist Richard Dawkins, who defines faith as "blind trust, in the absence of evidence, even in the teeth of evidence."³⁴ Francis Collins, former director of the Human Genome Project, calls Dawkins' understanding a "caricature of faith"³⁵ and unlike the faith experienced by most serious believers. I agree.

Faith is powerful precisely because it cannot be fully duplicated outside of the religious context. This point was brought home to me a little more than a week ago when my wife, Mary Lyn, asked me to sit down and watch a movie with her; the movie was "Beyond the Gates," the true story about the 1994 schoolhouse massacre in Rwanda, part of the genocide in that country that took more than 800,000 lives. The movie develops two characters, one religious, Father Christopher (the head master of the school) and one not, Joe Connor (a kind-hearted, do-gooder from Britain). Both men deal with the growing tribal tensions between the Hutu and the Tutsi in their own way. Without giving away the story, it is interesting to note that whereas Joe wants to do right, ultimately he is conquered by his humanity; Father Christopher, on the other hand, musters the will to love in the purest sense, to sacrifice self for another. In its review of the movie *The New York Times* concludes succinctly that, without question, "faith trumps mere altruism."³⁶ Think about that for a moment – *faith trumps mere altruism*. This is a surprisingly deep insight for an organization like *The New York Times*.

So, do I have the complete answer to my question about how a providential God operates in a world of chance? No, but I'm getting closer and the search has been satisfying, even fulfilling. I have no doubt that my questions are better than they were sixteen years ago and in a

limited sense that is what we're all about at a university. But while my intellect has benefited, so too has my faith, and that's a model of the university that belongs to ages past; do not underestimate how rare it is in our modern culture to be at a university where both intellect and faith may be tested yet may flourish. Thank God every day for this blessed opportunity; yes, it is true that "time and chance happen to them all,"³⁷ but an environment such as Samford is the luxury of a blessed few.

Closing Prayer³⁸

Before Study (St. Thomas Aquinas frequently recited this before he dictated, wrote, or preached)

Ineffable Creator,

Who, from the treasures of Your wisdom,
have established three hierarchies of angels,
have arrayed them in marvelous order
above the fiery heavens,
and have marshaled the regions
of the universe with such artful skill,

You are proclaimed

the true font of light and wisdom,
and the primal origin
raised high beyond all things.

Pour forth a ray of Your brightness

into the darkened places of my mind;
disperse from my soul
the twofold darkness
into which I was born:
sin and ignorance.

You make eloquent the tongues of infants.

Refine my speech
and pour forth upon my lips
the goodness of Your blessing.

Grant to me

keenness of mind,
capacity to remember,
skill in learning,
subtlety to interpret,
and eloquence in speech.

May You

guide the beginning of my work,
direct its progress,

and bring it to completion.
You Who are true God and true Man,
who live and reign, world without end.

Amen.

¹All scripture passages are from the *The Holy Bible*, Revised Standard Version - Catholic Edition, (San Francisco, CA: Ignatius Press, 1966).

² Barbee, C. Frederick and Zahl, Paul F. M., *The Collects of Thomas Cranmer*, (Grand Rapids, MI: William B. Eerdmans Publishing Company, 1999), 4.

³ Liberally borrowed from the notes of E. Mabry Rogers' account of his experience with the crash of L'Express Flight 508 presented at St. Luke's Episcopal Church, November, 1991. (Much of this section is presented in his own words.) Appreciation is expressed to Mr. Rogers for his permission to utilize these notes; much of the language in this section, though not quoted, is closely paraphrased.

⁴ National Transportation Safety Board. *Aircraft Accident Report: L'Express 508 Beech Near Birmingham, Alabama*, (Washington, DC: National Transportation Safety Board, March 3, 1992), vi.

⁵ Bartholomew, David J., *God of Chance*, (London: SCM Press Ltd, 1984).

⁶ Lindley, David, *Einstein, Heisenberg, Bohr, and the Struggle for the Soul of Science*, (New York: Doubleday, 2007), i.

⁷ Ibid.

⁸ Adams, Henry Brooks, *The Education of Henry B. Adams*, (Oxford: Routledge, 1983), 1132.

⁹ Monod, Jacques, *Chance and Necessity*, (New York: Alfred A. Knopf, 1971), 112-113.

¹⁰ Monod, Jacques, from a conversation recorded in June 1972 and broadcast on BBC 3.

¹¹ Lindley, David, *Einstein, Heisenberg, Bohr, and the Struggle for the Soul of Science*, (New York: Doubleday, 2007), 102.

¹² Ruhla, Charles, *The Physics of Chance: From Blaise Pascal to Niels Bohr*, (Oxford: Oxford University Press, 1992), 214.

¹³ Dowe, Phil, "Chance and Providence," *Science & Christian Belief*, 9:1 (1997): 3-20.

¹⁴ Ibid, 3.

¹⁵ Bartholomew, David J., *God of Chance*, (London: SCM Press Ltd, 1984), 1.

¹⁶ Ibid, 66.

¹⁷ Collins, Glenn, "As Luck Would Have It: From Nursery School to the White House, More of Life is Left to Chance," *The New York Times*, Section 1, Column 2 (2000): 57.

¹⁸ Stoppard, Tom, *Tom Stoppard: Plays 5 Arcadia – The Real Thing – Night & Day – Indian Ink – Hapgood*, (London: Faber and Faber Ltd, 1999).

¹⁹ Murphy, Brittany, Hunter, Holly, Bates, Kathey, Livingston, Ron and Nicholson, Julianne, *Little Black Book*, (Sony Pictures, 2005).

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- ²⁰ Eliot, George, *Middlemarch*, (New York: Signet Classics, 2003).
- ²¹ Conrad, Joseph, *Chance*, (Charleston, SC: BiblioBazaar, 2007).
- ²² In particular, see the 1999 episode entitled, "Monday," (originally aired on February 28, 1999) that incorporates chaos theory.
- ²³ Merriman, John M., *For Want of a Horse: Choice & Chance in History*, (Lexington, MA: The Stephen Greene Press, 1985).
- ²⁴ Durschmied, Erik, *The Hinge Factor: How Chance and Stupidity Have Changed History*, (New York: Arcade Publishing, 1999).
- ²⁵ From the 1980 album by *Rush* entitled, "Permanent Waves."
- ²⁶ Bartholomew, David J., *God of Chance*, (London: SCM Press Ltd, 1984), 15.
- ²⁷ Lennon, John and McCartney, Paul, *With a Little Help From My Friends*, (Apple Records, on the album "Sgt. Pepper's Lonely Hearts Club Band, 1967).
- ²⁸ Hodgson, Leonard, *For Faith and Freedom*, (Oxford: Basil Blackwell, 1956), I:136-145.
- ²⁹ Humphreys, Fisher, *Determinism, Chance and Freedom*, (presentation to a Samford University symposium on Einstein, October 11, 2007).
- ³⁰ Renick, Timothy M., *Aquinas for Armchair Theologians*, (Louisville, KY: Westminster John Knox Press, 2002), 44.
- ³¹ Genesis 1: 3.
- ³² Tillich, Paul, *The Dynamics of Faith*, (New York: Harper & Row, 1957), 20.
- ³³ Agnes, Michael, ed., *Webster's New World College Dictionary*, fourth edition, (Cleveland, OH: Wiley, 2005), 510.
- ³⁴ Dawkins, Richard, *The Selfish Gene*, second edition, (Oxford: Oxford University Press, 1989), 198.
- ³⁵ Collins, Francis S., *The Language of God: A Scientist Presents Evidence for Belief*, (New York: Free Press, 2006), 164.
- ³⁶ "From a Schoolhouse in Rwanda, Wrenching Lessons About Genocide," *New York Times*, March 9, 2007.
- ³⁷ Ecclesiastes 9:11b.
- ³⁸ Anderson, Robert and Moser, Johann, eds., *The Aquinas Prayer Book: The Prayers and Hymns of St. Thomas Aquinas*, (Manchester, NH: Sophia Institute Press, 2000), 40-43.