Catholic Physics - Reflections of a Catholic Scientist - Part 23
The Pearl of Great Price-- Pascal's Wager Revisited

- 1200's

- Authority on physics, geography, astronomy, mineralogy, chemistry, zoology, and physiology

- "The aim of natural science is not simply to accept the statements of others, but to investigate the causes that are at work in nature"

- He understood that the Church is not opposed to study of nature

- Patron Saint of Scientists

The Pearl of Great Price -- Pascal's Wager Revisited

"Again, the kingdom of heaven is like a merchant in search of fine pearls who, on finding one pearl of great value, sold all that he had and bought it." (Matt 13:45,46, RSV).

Blaise Pascal

INTRODUCTION.

Among the pile of Pascal's papers that were to be the "Pensees" was found a proposition that has kept philosophers and theologians occupied for the last 350 years, Pascal's wager: betting on God is the prudent option. (Notes, below, 1-8) What new insights can one bring to this, then, after all this time? I will try to understand the wager from a perspective of contemporary decision analysis, for which the wager was possibly the first instance, and also comment on what happens after one accepts the wager.
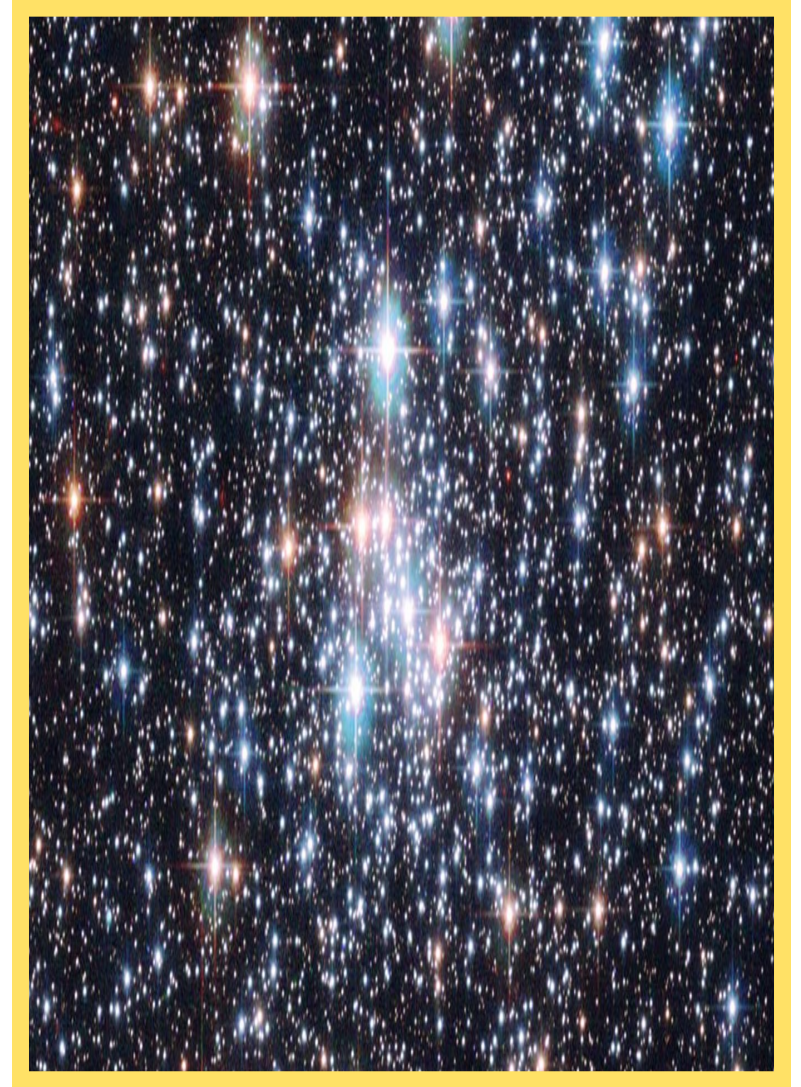
First, some background: it is important to keep in mind that although Pascal was a mathematician and physicist of the first order, he did not believe it was possible to show from reason alone that God exists (so much for Anselm and Aquinas!) :

"If there is a God, He is infinitely incomprehensible, since having neither parts nor limits, He has no affinity to us. We are then incapable of knowing either what He is or if He is."

On the other hand we can know God by faith:

"But by faith we know His existence; in glory we shall know His nature."

The last part of this quote shows the route Pascal wants us to follow: there is an afterlife, and its benefits are infinite. This being so, the odds for following God are infinite; whatever one might lose in believing, even if there were no God, is finite, whereas that which one can gain from belief, if there is a God, is infinite:

"But there is here an infinity of an infinitely happy life to gain, a chance of gain against a finite number of chances of loss, and what you stake is finite."

Pascal spoke as a counselor of gamblers, for whom (with Fermat) he had developed the first quantitative version of probability analysis. It will be useful, before the wager is recast in a more quantitative format, to give some mundane examples.

THE WAGER AS A PROBLEM IN DECISION ANALYSIS.

In contemporary decision analysis one can proceed in two ways:

1) to examine possible gains and losses for various options, in the absence of known probabilities, and to choose that option

which would correspond (psychologically or economically) to a preferred strategy:

2) to use known or estimated probabilities for various outcomes and to choose the option with the maximum expected value (see below). Let's first assume that probabilities aren't known, and see what considerations might be involved in choosing an option. Here is the example:

Investing 10,000 units (dollars or ??) in

1) a savings account at 2% interest;

2) a conservative stock portfolio paying 6% in a good market, and losing 10% in a bad market;

3) a sure thing—an unreported diamond mine in Northern Scotland that your Uncle Angus has told you about—you'll double your investment.

The table below summarizes the possible outcomes; the columns represent "state of nature", that is "good" outcome for a particular option and "bad" outcome (a – sign means a loss), the rows, the different options.

OPTION	Good	Bad	Possible Loss
Savings Account	200	200	0
Conservative Stock	600	-1000	-1000
Diamond Mine	20,000	-10,000	-10,000

"...at each step you take on this road you will see so great certainty of gain, so much nothingness in what you risk, that you will at last recognize that you have wagered for something certain and infinite, for which you have given nothing."

Ed. Note:

Blaise Pascal was a French mathematician, physicist, inventor, writer and Catholic theologian. He was a child prodigy who was educated by his father, a tax collector in Rouen.

From a series of articles written by: Bob Kurland - a Catholic Scientist

We emphasize again that the argument of Pascal's wager is addressed to the prudential man—the agnostic who believes in the possibility of an afterlife (and God)--and is willing to act so as to gain that reward, even in the midst of doubts. Is belief then a matter of will? The agnostic accepts the premise of the wager, but says

" I am so made that I cannot believe. What, then, would you have me do?"

Pascal responds:

"Endeavor then to convince yourself, not by increase of proofs of God, but by the abatement of your passions. You would like to attain faith and do not know the way; you would like to cure yourself of unbelief, and ask the remedy for it...There are people... who are cured of an ill of which you would be cured. Follow the way by which they began by acting as if they believed, taking the holy water, having masses said, etc."

Now can one "fake it until you make it" as Pascal suggests? Or will the sacraments be ineffective, because the motive of the recipient is mercenary? Which of the Catechism dicta are appropriate,

(1131)"The sacraments are efficacious signs of grace....They bear fruit in those who receive them WITH THE REQUIRED DISPOSITIONS." (emphasis added)

or

(1128)"The sacrament is not wrought by the righteousness of either the celebrant or the recipient, BUT BY THE POWER OF GOD." (emphasis added).

The second suggests that if one prays for faith, then the "top-down" approach will work, starting from the head and eventually through to the heart 15, or, as Pascal suggests:

If you're an optimist, you would of course choose the diamond mine. If you are a pessimist or risk-averse, you would choose the option with the least possible loss, the Savings Account (you would follow what is called the mini-max principle in decision analysis(9), choosing the option with minimum possible loss).

Now suppose Uncle Angus was right about the diamond mine—you'd berate yourself for not having invested in it. This regret is quantified in a decision analysis scenario and used to justify a "mini-max regret" approach (10) for decision making. For each state of nature (column) you subtract the best outcome to give a negative figure for "regret". You then list the worst (that is most negative) regret for each row (option) and choose that option with the least negative worst regret, as shown in the following table:

OPTION	Regret for "Good"	Regret for "Bad"	Worst Regret
Savings	200-20,000=-19,800	200-200=0	-19,800
Conservative Stock	600-20,000=-19,400	-1000-200=-1200	-19,400
Diamond Mine	20,000-20,000=0	-10,000-200=-10,200	-10,200
Best Result	20,000	200	

The option with the least negative worst regret is the diamond mine, so if you were to follow a mini-max regret approach you would choose that option. Clearly this is the restatement, in contemporary decision analytic terms, of Pascal's choice for belief, absent a known probability for the existence of God.   Put as a table one would have, symbolically:

OPTION	Regret (God Exists)	Regret (God Doesn't Exist)	Worst Regret
Belief	X-X=0	-Y-Z	-Y-Z
Non-belief	Z-X (negative)	Z-Z=0	Z-X (most negative)
Best Result	X (belief, very large)	Z (non-belief, not so large)	

There aren't numbers here, but clearly the value for belief in the existence of God (and the afterlife), X, is much greater than Y (the loss -Y one sustains by belief) or Z (the gain of a possibly hedonistic life that one sustains by unbelief), so the minimum worst regret (least negative) is that for belief in God.

If probabilities for outcomes are known or can be estimated, another approach is to use expected values for each option and choose the option with the maximum expected value. To get an expected value you multiply each outcome value by the probability for that outcome and sum these products for all the outcomes for a given option.

Pascal did not presume to give a probability for the existence of God and the afterlife. However he relied on the infinite value of the out- come to give an infinite expected value—any number (however small as long as it's not zero) times infinity is infinity. And as long as the imputed loss is finite, the expected value will be infinite. This assumption has raised the hackles of philosophers, and counterexamples—such as mixed strategies(2,10) and the "St. Petersburg Paradox"—have been proposed to show how the assumption of an infinite value outcome leads to problems. In particular, suppose one follows the strategy of choosing the toss of a coin to decide whether to believe. The probability will be half that you will choose to believe, so the expectation value will be infinite, even though there will still be a probability of one-half that you have chosen not to believe. In my opinion these are valid objections, but they ignore the thrust of Pascal's argument, that the gain from belief is so large, that for any non-zero probability of an afterlife, the prudent person will believe. The statement can be best put in the forms of odds for the existence of God and an afterlife:

If the odds are greater than the possible loss to gain ratio, then one should make the wager. For example, if you believe that the odds for Great Britain winning the World Cup are 2 to 3 and the bookmakers are giving 1 to 8 odds for Great Britain (win 8, lose 1), you should bet for, and not against Great Britain.

WHO WON'T ACCEPT PASCAL'S WAGER AND WHAT HAPPENS AFTER.

Who are those who would not accept the wager? According to Nicholas Rescher (1), the following:

1) the hard-core atheist (if you don't believe in God, you wouldn't believe in the possibility of an afterlife);

2) "the all-out hedonist" (Dr. Faustus?);

3) "the all-trusting disbeliever", that is, one who believes everyone goes to heaven, that as in St. Teresa's prayer, Jesus will lead all souls to heaven, especially those most in need of his mercy;

4) "the radical skeptic" who disbelieves in all knowledge;

5) theists (e.g Buddhists, Hindus) who believe in God but have a different conception of the afterlife;

6) those who believe in an afterlife but in their evil, like Satan, would rather live in Hell than serve the Lord.