

Faith in the Numbers: Statistical Applications as Tools for the PNCC

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PNCC Scholars Conference

April 18, 2026



About the Author

- Tonsured in 2004 and ordained a deacon in the BCC in 2006
- Incardinated to the Central Diocese two years ago.
- Assigned to Holy Cross PNCC, Woodland Park NJ
- CPA, State of NJ
- Associate Professor of Accounting Practice, Moravian University SOBE
- Work with Catholics on Campus Club Moravian University
- Three Children and Five Grandchildren.



Academic Training

- D.Litt. Drew University 2011 in Eastern Christian Spirituality. Dissertation on the Sacrament of Penance and Holy Wednesday Anointing
- D.Min Moravian University School of Theology May 2026. Dissertation (Major Project) on Statistical Applications in congregational settings.
- Speaker at the Mercersburg Convocation and Diocese of Patterson Diaconate Program among others. Taught Constantine the Great



Incardination to the
Cenral Diocese

Major Premise

- Statistical applications and decision sciences have been underutilized in religious denominations. They can be a cost-effective method of gaining critical information for use in congregational management and evangelization purposes.
- This paper will suggest just a few
 - Decay rates
 - Attribute sampling
 - Bayesian statistics



Some Recent Sampling Applications

- **1. Pew Research Center – Religious Landscape Study (RLS):**
 - **2007, 2014, and 2023–24**
The RLS surveys more than 35,000 Americans about religious affiliation, beliefs, and practices, with results published after each wave.
- **2. Pew Research Center – Survey on Why Americans Go to Religious Services:**
 - **December 4–18, 2017**
This survey focused on reasons for attending religious services and was published in August 2018.
- **3. Southern Baptist Convention – Cooperative Program Survey:**
 - **Fall 2023**
Lifeway Research conducted a survey of Southern Baptist congregations regarding participation in the Cooperative Program.
- **4. Evangelical Lutheran Church in America (ELCA) – Congregational Vitality Survey:**
 - **Ongoing since 2009**
The ELCA has developed and published results from congregational vitality surveys since 2009, with various reports and updates over the years.
[Source](#)
- **5. Catholic Church – Parish and Diocesan Surveys:**
 - **Annual and periodic**
Examples include the Annual Catholic Survey (2024), the Diocese of Columbus Pastoral Planning Survey (July 2025), and parish-level surveys such as the one at Mary, Mother of Martyrs Parish (2024–2025).
[Sources:](#) [Annual Catholic Survey, 2024], [Diocese of Columbus Pastoral Planning Survey, July 2025](#), [Mary, Mother of Martyrs Parish, 2024–2025](#)

Some Recent Uses of Statistics in a Denominational Setting

- **1. United Methodist Church (UMC) – Membership and Attendance Trends**
- The United Methodist Church has systematically collected and analyzed membership and attendance data to understand trends and inform decision-making.
- Between 2000 and 2019, the UMC used statistical analysis to identify a 22% decline in membership and a 32% decline in attendance.
- These analyses have helped the denomination address issues such as aging constituencies, regional differences, and the impact of cultural shifts on church participation. The findings have influenced strategic planning, resource allocation, and outreach
- **. Presbyterian Church (U.S.A.) – Comparative Statistics and Congregational Studies**
- . The denomination's Research Services department publishes annual Comparative Statistics reports, which analyze trends in membership, giving, and participation. For instance, between 2000 and 2019, statistical analysis revealed a 48% decline in membership and a 53% decline in attendance.
- These insights have been used to guide denominational restructuring, inform leadership training, and develop new ministry models to address changing demographics and participation

Some Tales of Woe

- **United Methodist Church (UMC):**
- **2024 (Current):**
 - U.S. membership: **Approximately 6.3 million** (2020 data: 6,268,310; recent trends indicate continued decline, so the 2024 number is likely slightly lower, but the most recent official figure is from 2020).
- **2004 (20 years ago):**
 - U.S. membership: **About 8.2 million** (2000: 8,411,503; 2010: 7,679,850; interpolated for 2004).
- **Presbyterian Church (U.S.A.) (PC(USA)):**
- **2024 (Current):**
 - Membership: **Just above 1 million** (expected to drop below 1 million in 2025; 2024 report shows a loss of 48,885 members from the previous year) or about 5%.
- **2004 (20 years ago):**
 - Membership: **About 2.4 million** (PC(USA) membership in 2000 was 2,525,330; 2010 was 2,016,091; interpolated for 2004)

Some Take Aways and Observations

- **Decisions were made assuming Leadership understood the “view from the pew”.**
- Progressive viewpoints led to division in the denominations
- Revision of theology accelerated the trend. (Ex. Presbyterian: “to the best of our knowledge, Christ is the way to salvation”



Adaptive Challenges vs. Technical Fixes

- Brainchild of Ronald Heifetz et. al from the Kennedy School at Harvard University
- All challenges can be broken down into **adaptive challenges** and **technical fixes**.
- There are other ways of describing organizational challenges, but this is a simple analytical structure for this presentation.



Adaptive Challenge Vs. Technical Fixes

Adaptive Challenges

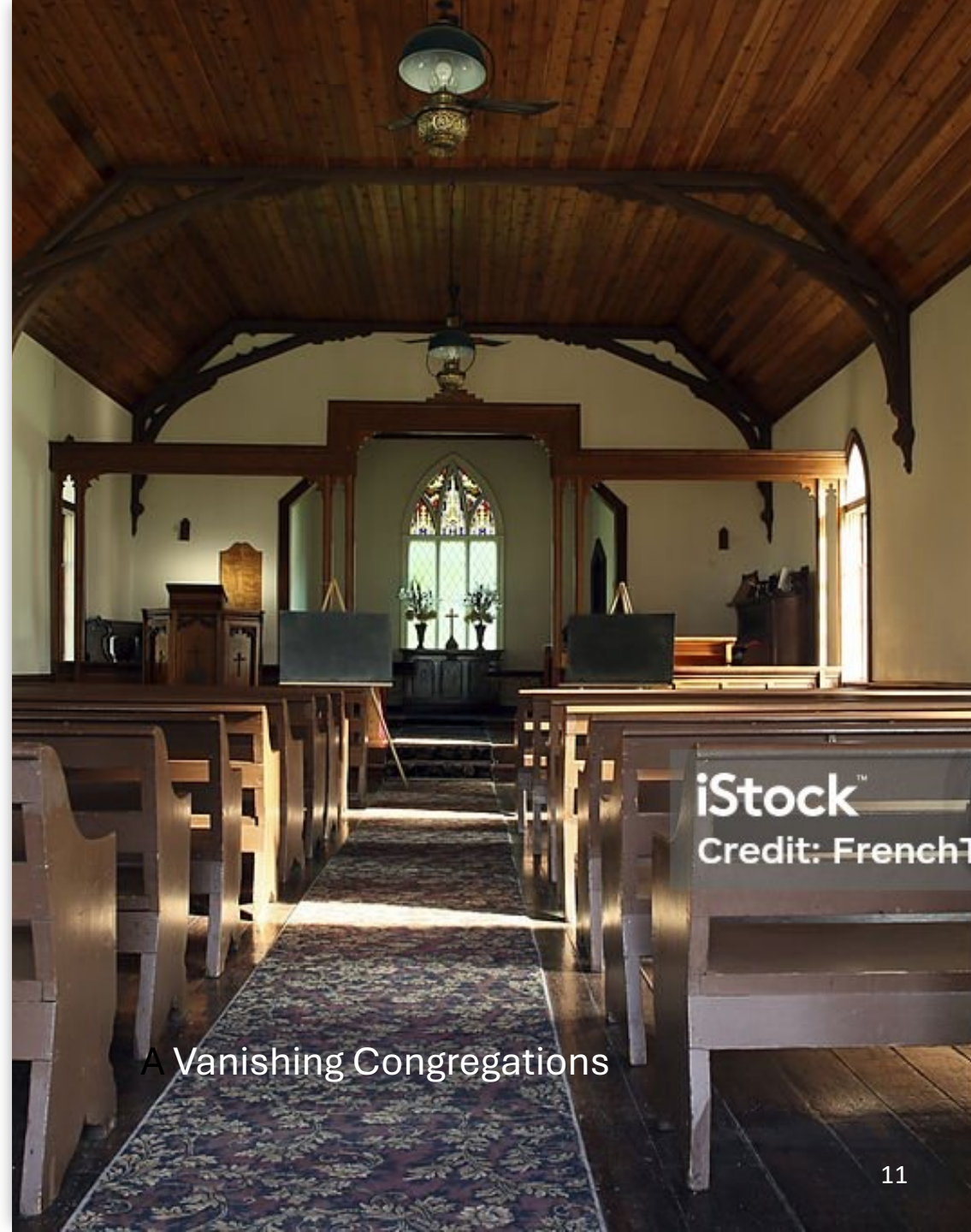
- Require changes in values, beliefs, roles, relationships, and approaches
- Cannot be solved by experts alone
- Require learning and experimentation
- Often involve loss and resistance
- Example: Changing organizational culture

Technical Fixes

- Have known solutions
- Can be solved by experts or authorities
- Require applying existing knowledge
- Example: Fixing a broken computer system

The Challenges Ahead

- Our current adaptive challenges:
Attendance and membership. How do we effectively spread the Word and evangelize?
Many initiatives underway.
- Church leadership has addressed many of the “technical fixes”.
- **Second Thesis: There are features of the PNCC that are attractive to new and current members. How to discern these?**



A Vanishing Congregations

Methodology—Three Examples of Statistics

Decay Rate Computation

- Grounded research study unfolding in stages.
- Use a **decay rate function** to estimate “half-life” of current membership.
-

Attribute Sample and Bayesian Statistics

- Calculate estimated attribute sample size
- Generate a survey instrument to be administered with ecclesiastical approval.
- Undertake survey and analyze results
- Determine if the use of Bayesian statistics is appropriate for results.

Decay Rates

- Calculation used to determine atomic half lives, how long it takes money to double, etc.
- Slavic-based Catholic Churches (including the PNCC) appear to have approximately a 2% decay rate per year since 1900.
- Note: this is a long term average rate of decline and not a specific prediction
- This results in a half-life of membership in about two generations
- That rate is probably accelerating as the overall rate includes periods of immigration.

Exponential Decay Formula

$$x_t = x_0 \times (1 + r)^t$$



Another Way of Calculating the Decay Rate

- Use the Rule of 72, that is derived from the natural log e .
- This works “forward and backwards.”
- A loss of 2% per annum results in a half life of 36 years.
- 3% per annum: 23 years.
- 4% per annum: 18 years.

“Compound interest is the eighth wonder of the world. He who understands it, earns it...he who doesn't...pays it.

ALBERT EINSTEIN



Computational Notes

- BCC and UCC membership estimates from the the semi-official website catholic-hierarchy.org.
- Some fuzziness in the original numbers because the BCC and OCC were not separated until 1924. An estimate was made about the starting position of each.
- PNCC stats based on immigration and estimates of original PNCC numbers



Bishop Soter ortvnsjy

Other “Slavic Church” Decay Rates

- Decay rate for the BCC is 2.4% annually.
- Decay rate for the UCC is 1.7% annually.
- The three decay rates are not statistically significant at a 95% confidence interval.
- Historic unreliability of church membership numbers also could produce a variance in the numbers.
- Reason for selecting these three churches
 - Similar sizes
 - Similar ethnic background
 - Experienced the same reception when they began in the United States.
 - Orthodox churches (also organized along ethnic or “national” lines not available.
- Suggestion: our solutions may be exportable to similar denominations.

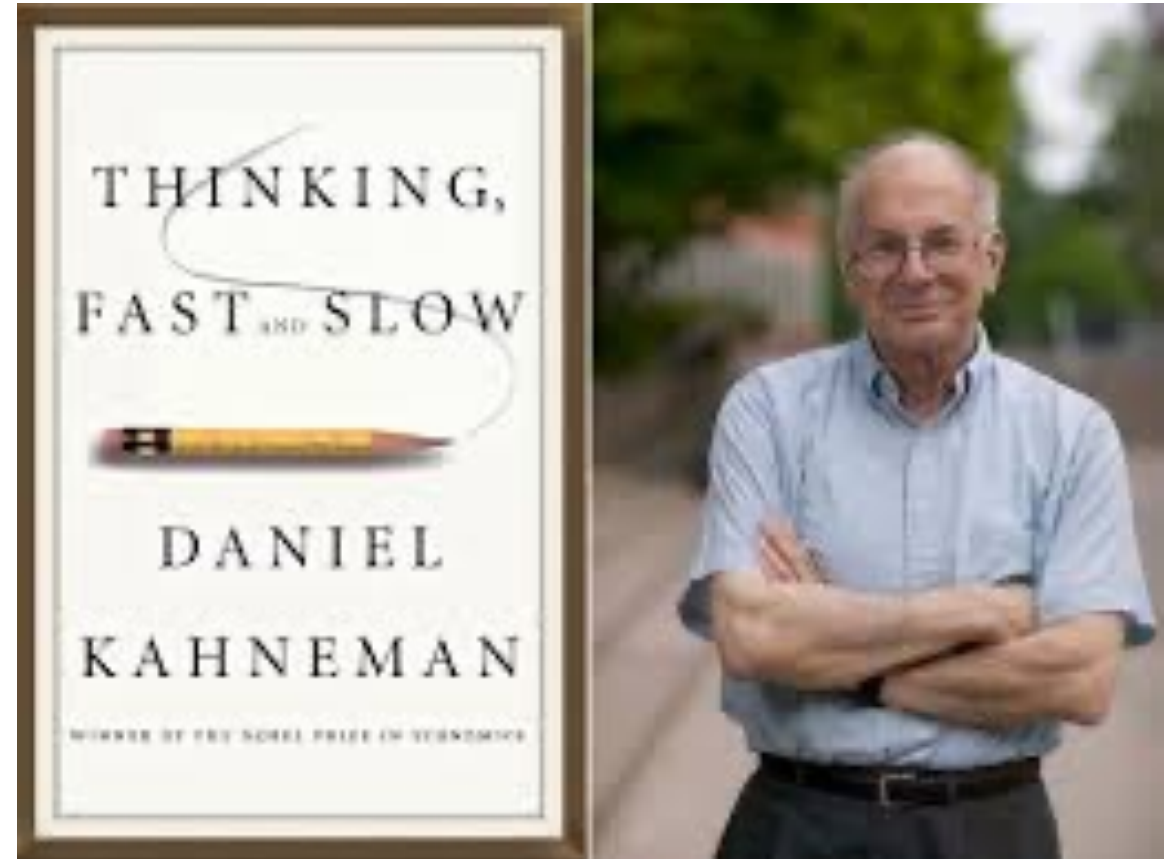
Potential Impact on the PNCC and Other Denominations

- Our judgements and estimations of situations are affected by biases and noise.
- Attribute sampling is a cost- effective way to challenge our assumptions about what is really happening in the pews.
- Small sample size is easily attainable.
- Methodology can be used for similar denominations.



Biases and Heuristics in How We Process Information

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- **Confirmation Bias**
The tendency to search for, interpret, and remember information that confirms our preexisting beliefs, while ignoring or discounting evidence that contradicts them.
 - **Anchoring Bias**
The tendency to rely too heavily on the first piece of information encountered (the "anchor") when making decisions, even if it is irrelevant.
 - **Availability Heuristic**
The tendency to overestimate the importance or likelihood of events based on how easily examples come to mind, often influenced by recent exposure or vividness.
 - **Overconfidence Bias**
The tendency to overestimate our own abilities, knowledge, or the accuracy of our predictions and judgments.
 - **Hindsight Bias**
The tendency to see events as having been predictable after they have already occurred, often leading to an oversimplified understanding of cause and effect.



Attribute Sampling

- Requires a binary answer: Yes or No
- Sample size is very small or approximately 96. This could be administered across congregations or through cluster sampling.
- Attribute sampling is used in marketing survey, including
 - A/B testing
 - Lead qualification
 - Customer satisfaction
 - Quality control in direct marketing
- All of these involve a binary answer.

Danger Will Robinson!

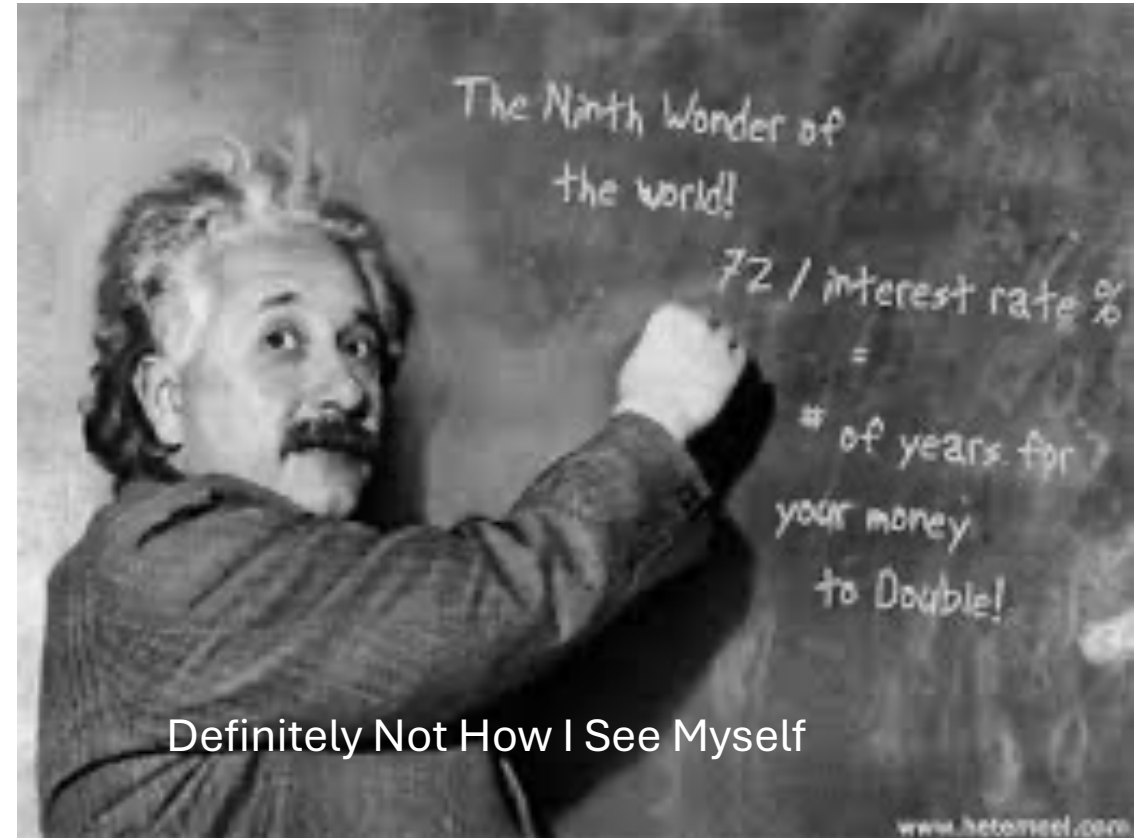
- Any survey generated by this study would not and can not be used to question basic Church doctrine. Notice what happened to the PCUSA and Methodist Churches.
- The doctrinal beliefs of the Church can't be voted away or negotiated.
- The intent of the sample is simply to find what features of the PNCC may be attractive to current and potential members.



Robot From Lost in Space TV Show

Next Steps

- Research why decay rates of Slavic Catholic Church are so similar. Consider other national churches.
- Further refine statistical techniques and survey instruments. Determine sample size and administer sample.
- Use **Bayesian Statistics** to Update our information.



Definitely Not How I See Myself

Bayesian Statistics

- The last step in the process would be to employ Bayesian statistics to update beliefs.
- Bayesian statistics has been called the foundation of all rational thinking.
- In this case it would combine expert knowledge with additional information to improve decision making.



Bayesian Statistics

1. **Prior (Expert) Belief:**

The bishops have an initial belief (the "prior") about the congregation's dynamics, based on their experience, intuition, or past data.

2. **New Evidence:**

A poll or survey is conducted, providing new data about the congregation's views.

3. **Updating Beliefs:**

Bayesian analysis allows the bishops to **update their prior (expert) beliefs** with the new evidence from the poll, resulting in a "posterior" belief that combines both sources of information.

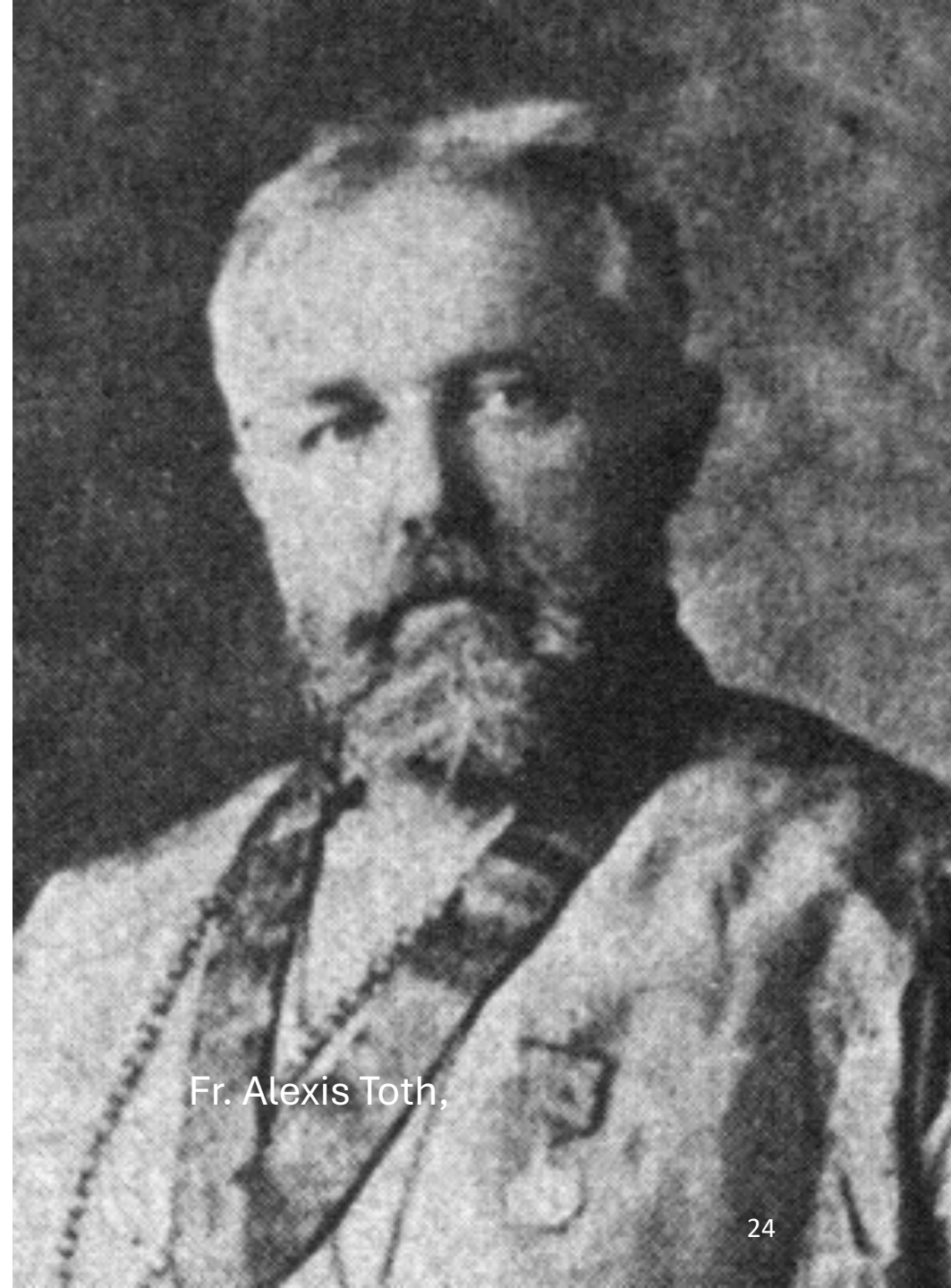
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$$P(A|B) = \frac{P(B|A) P(A)}{P(B)}$$

Note: I prefer to use decision (probability) trees to figure out Bayesian computations.

Other Interesting Questions— Fertile Areas For Future Research

- Alexis Toth and Francis Hodur were active in Scranton at the same time. Were they aware of each other and did they influence each other? Did their movements influence each other?
- Did the Old Catholic Church influence Heidegger? There was an Old Catholic Section at the University he taught at. (note: no connection to his support of National Socialism is implied).



Fr. Alexis Toth,

Regrets, I Had a Few... Too Few to Mention...

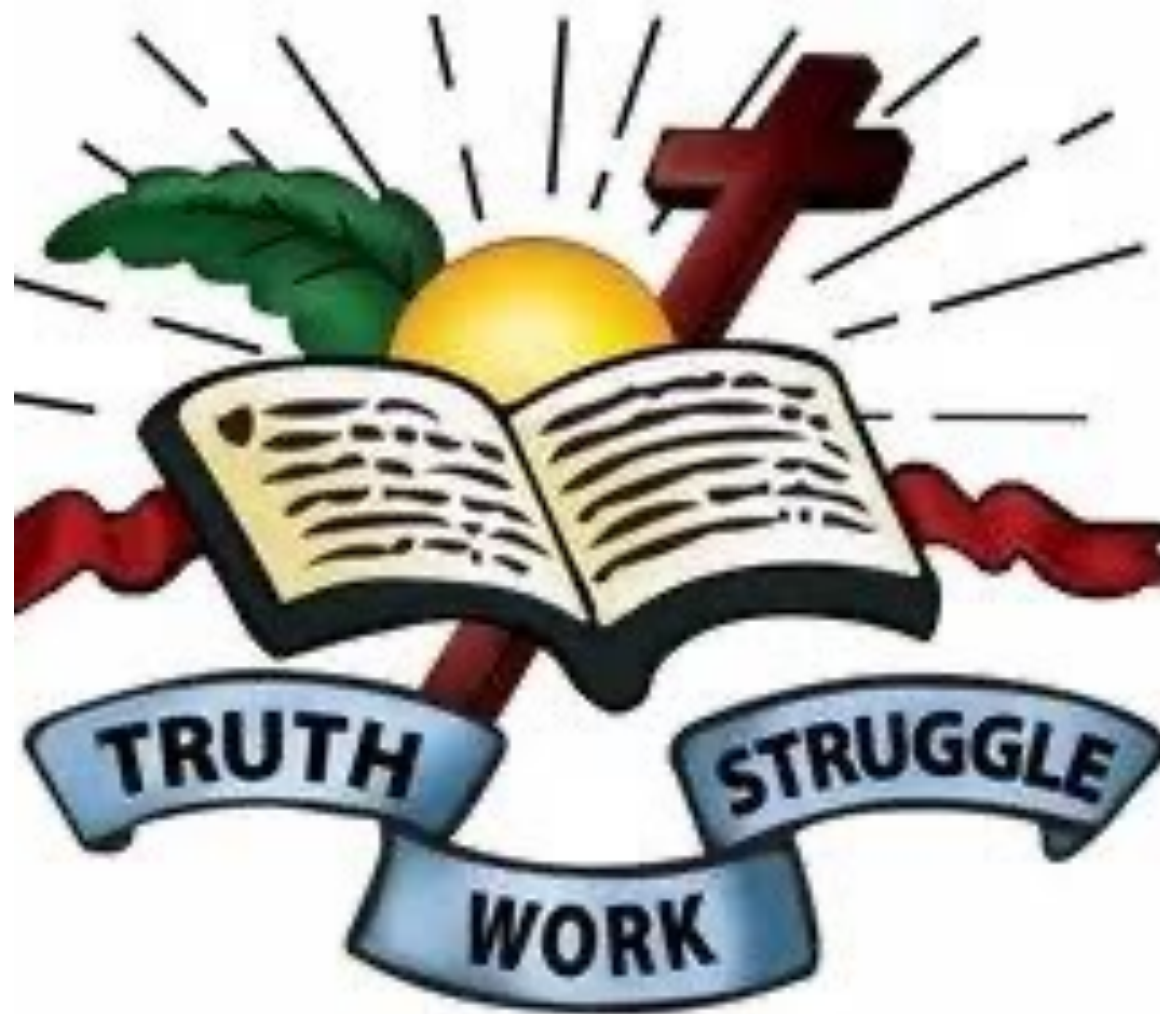
- I had planned to perfect the survey instrument and actually conduct the planned survey after receiving permission.
- Unfortunately, personal circumstances prevented from having the necessary time to do so.
- This required me to restrict my scope to finish this year.



Suggested Reading

1. Carroll, Jackson W., Carl S. Dudley, and William McKinney, eds. *Handbook for Congregational Studies*. Nashville: Abingdon Press, 1986.
2. Dunaetz, David. "Sampling Methods and Sample Size in Church-Based Research." *Great Commission Research Journal* 16, no. 1 (2024): 5–18.
3. Roozen, David A., and C. Kirk Hadaway. "Projecting Protestant Congregational Change: Insights from Statistical Modeling." *Review of Religious Research* 41, no. 1 (1999): 3–22.
4. Woolever, Cynthia, and Deborah Bruce. *A Field Guide to U.S. Congregations: Who's Going Where and Why*. Louisville: Westminster John Knox Press, 2002.

PNCC Emblem





Thank You For Your
Time and Attention!

Questions?

Special Thanks To...

- My colleagues at the Moravian University School of Business and Economics
- The faculty of the Moravian School of Theology, especially to Rev. Drs. Barrett, Jodrey, and Kuchma
- My family and my friends
- And course, my beloved wife Sue, of blessed memory, who encouraged me to seek incardination and to finish the D.Min.

