"*Constructive Skepticism*" Volume 3 – Notebook #I: *Model Risk* – Chapter 2: Recurring Patterns of "*Spinach*"

This second chapter of Volume 3 - Notebook #I takes another step in the development of "*Spinach*" as an analogy that can help us understand Model Risk in decision-making. This step starts with reading a 2019 paper by ***Michael Mielewczik and Jeanine Moll*** and titled "*Spinach in Blunderland: How the myth that spinach is rich in iron became an urban academic legend*?"

Mielewczik & Moll (***M&M***) have academic profiles on ResearchGate.net that show combined areas of expertise in Ecology, Botany, Agricultural Plant Science, Zoology, Parasitology, Chemistry, and Nanotechnology. This suggest that when it comes to researching "*Spinach & Iron*" their "*Perspective*" would differ from ***Sutton's*** focus on Criminology. Further, ***M&M*** appear to have direct access to French and German sources, thus opening up some of the record that ***Sutton's*** could not read himself, and had called for an eventual translation in English. Finally, publishing their work nearly 10 years after ***Sutton***'s first paper, they benefited from the sustained interest and feedback that he generated.

Starting with its use of the word "*Blunderland*" in its title, ***M&M***'s paper sports a humorous tone as they set to develop the "*Historical Lineage*" of "*Iron & Spinach*". "*Blunderland*" evokes the 1973 book by ***Thomas Lyle Martin, Jr.***, and titled "*Malice in Blunderland*", a significant reference book for those of us that collect the various expressions of "*Murphy's Law*". This makes reading their paper more pleasant than most, even with the impression that one may not always get some of the puns and allusions.

M&M make it clear that they see the history of "*Iron & Spinach*" an analogy to understand how academic urban legends [Popular but erroneous beliefs] achieve dominance in the "*Mind-Maps*" of various audiences. ***M&M*** achieve their goal by taking "*Methodology*" and data above and beyond the level reached by ***Sutton***. Quoting from note 23 on page 65 of ***M&M's*** pasper: "*To locate relevant literature a multitude of Search Engines and literature databases were consulting in a fuzzy search approach. Literature databases consulted included besides others: ANNO (AutriaN Newspapers Online), Bibliotheque Nationale the France (Gallica Digital), Biodiversity Heritage Library, British Library Main Catalogue, British Newspaper Archives, California Digital Newspaper Collection, DIFMOE (Digitales Forum Mittel- und Osteuropa), Google Books, Google Scholar, Google Historical News Archive, Hathi Trust, Imperial College Library Search, Internet Archive (archive.org), JSTOR, …* " and more than a dozen other sources of the same caliber.

This quantitative change in data creates a qualitative change in "*Perspective*", leading to the discovery of additional narratives that include:

- "*Variant 1: Gustav von Bunge (1844 -1920), a Swiss scientist at the end of the 19th century made a decimal error, which led to a tenfold overestimation of the iron content.*

- *Variant 2: Emil von Wolff (1818 – 1896), a German scientist, made a decimal error in his compilation of mineral contents of vegetables and plants, which led to a tenfold overestimation of iron in spinach.*
- *Variant 3: In early biochemistry at some point the iron content presented as per dry weight was confused with the plants' fresh weight."*

Compare these three variants with ***Sutton's*** matching questions:

- *"Who is von Wolff, and where are his erroneous findings recorded? And where exactly is the evidence that any other scientists, such as von Bunge, and others up until the mid-1930s misplaced a decimal point in their presentation of findings regarding the iron content of spinach?"*
- *"Who were the 1930s chemists that discovered the decimal place error and where are their findings recorded?"*

To illustrate the value of "*Iron & Spinach*" as an analogy, the "*Perspective*" changing "*Effect*" that comes from improving the "*Historical Lineage*" of data shows up in other research papers, including papers that can change one's thinking about retirement planning best practices. In a recent paper (2023) by ***Edward F. McQuarrie***, and titled "*Stocks for the Long Run? Sometimes Yes, Sometimes No*" uses similar improvements in data quality to produce a similar "*Effect*": The reversing a foundational belief.

In the case of ***McQuarrie***'s paper "*Iron in Spinach*" becomes the "*Equity Risk Premium*", and the 10x overstatement of the iron content in spinach becomes the expectation of a positive and stationary "*Equity Risk Premium*":

- A traditional belief in a positive, stationary "*Equity Risk Premium*" favors retirement planning best practices centered on the client's investment portfolio, and the possibility of optimization.
- On the other hand, a new belief in a positive or negative non-stationary "*Equity Risk Premium*" would favor retirement planning best practices centered on the client's household balance sheet, and the prudent exchange of risks across a range of assets and liabilities.

For instance, and under this new "*Perspective*", one could look at equities as buying the residuals of growth, and bonds as buying payment promises. The household balance sheet shows how to balance out growth residuals, and payment promises from the client's "*Practical Meaning*" of their assets & liabilities as contrasted with the portfolio's "*Statistical Meaning*" of the investment vehicles.

Back to ***M& M***, and moving on from "*Perspective*", "*Domain of Knowledge*", "*Historical Lineage*", and "*Purpose*" to look at "*Methodology*" about data quality, and "*Methods*" for data manipulations. Using their larger dataset, ***M&M*** applied measurement "*Methods*" that include citation frequencies and citation genealogies.

Using these "*Methods*" on ***M&M***'s larger dataset extended ***Sutton***'s timeline for the first measurements of "*Iron in Spinach*" from the ***Emil von Wolff*** in 1865 to ***Louis Saalmüller*** in 1846. This extension made it possible to see a series of recurring patterns that involved experimenters focused on measurements as well as propagandizers focused on a cause – economic or otherwise.

- Measurements bring patterns of statistical doubt, clinical ambiguity. In the case of "*Iron in Spinach*", problems about statistical doubt came from low powered experiments involving as few as a single spinach plant. Problems about clinical ambiguity came from a lack of clarity about the types of measurements that could range from fresh weight, dry weight or ash weight. Finally, additional problems about clinical ambiguity came from hard-to-compare measurement choices that could range from iron, absorbable iron, iron-oxide, iron-phosphate, and phosphorous iron-oxide. According to ***M&M***, this resulted in misunderstandings that looked like moving a decimal point but most likely came from the quantitative equivalent of comparing apples to oranges, and getting confused.

- Spinach propaganda [The decision-problem as contrasted with the measurement problem] started in 1850, when ***Jacob Moleschott*** included ***Saalmüller***'s measurements in a book about nutrition, and also in a matching 1852 entry in an encyclopedia. ***Moleschott*** had strong ideas about nutrition, and the value of "*Iron in Spinach*". Propagandizing addresses the decision-making problem by providing answers to the question "Why?" However, it creates such answers by filtering the "*Statistical Meaning*" of measurements into "*Practical Meaning*" through "*Willful Ignorance, Error & Deceit*". In the case of "*Iron in Spinach*" these filters came from economic incentives such as advocacy for medical treatments for anemia (e.g. "***Blaud's*** *iron pills*"), and ***Moleschott*** reputation and publications about nutritional advice.

Finally, ***M&M*** showed that these recurring patterns of experimental doubt and ambiguity as well as economic interests took place in the greater context of changing religious, philosophical, and scientific worldviews.

- For instance, ***Moleschott*** advocated "*Materialism*" in the "*Historical Lineage*" of ***Spinoza***, and ***Hegel***, and as contrasted with the "*Idealism*" of ***Kant***. In biology, "*Realists*" that reduced thought to chemistry - e.g. ***Moleschott***'s quip "*No thought with phosphor*" - fought fiercely with "*Vitalists*" that held a greater view of human nature – e.g ***Justus von Liebig*** (1803–1873).

These cycles in the timeline of the myth of "*Spinach & Iron*" (i.e, The empirical, the economic, and the cultural) repeated from the days of ***Saalmüller*** and ***Moleschott*** in Germany, to the days of ***Nachlass von Gustav von Bunge*** (1844-1920) in Switzerland, and ***John Harvey Kellogg*** (1852-1943) in the United States of America, and up to the present times. ***M&M*** describe this historical series of patterns in great detail, and the list of colorful characters includes ***Lewis Carroll, Freud, Dickens****, the daughter of President* ***Theodore Roosevelt, Shirley Temple, Popeye***, and more.

The cycles repeat because we cannot walk in the shoes of prior generations in order to understand how they looked at the data. This inability to see reality from their point of view can reach the point of making old data uninterpretable from our point of view. We forget the lessons of the past, and they sink in the sands of ***Shelley***'s "*Ozymandias*". However, we can reason by analogy, once again, by using the idea of "*Deformation Professionelle*", a French pun on "*Formation Professionelle*" [Worklife training and experience] to show that professional training, as well as the idea of one's "*Metier*" [One's occupation].

This analogy shows how a "*Perspective*" can narrow an individual's "*Perceptions*" down to the job's requirements, and at the exclusion of everything else, thus making it hard to communicate with people in other professions. This cross-sectional view [A balance sheet-like freeze-frame across contemporary generations] can work as a proxy for a longitudinal view [A historical timeline across the arc of life of multiple generations] in order to develop a sense of the un-interpretability of data across generations.

The chart below, a Mapping of "*Metiers*" and Matching "*Professional Deformation",* connects ***Ergodicity Economics*** (***EE***), common job descriptions, and evolutionary behaviors to show how data, inputs, "*Observations*", "*Perceptions*", and even measurements can become un-interpretable across professions, so that we can use it as an analogy to understand un-interpretability of data across generations.

Metiers" and Matching "*Professional Deformation*

Seeing decisions through the lens of an **additive growth dynamic**, i.e., expected monthly income payments. The optimal strategy is to lever-up exposures because it is possible to recover from zero income.	Power Brokers (Politicians, Crime Bosses)	**Conformity Enforcers** "stamp similarities into group members to give it an identity"
	Guardians (Army, Police, Priests, Teachers, Professors)	
	Healers (Doctors, Counselors, Coaches)	**Resource Shifters** scale trends up and in the direction of current popularity
	Managers (Commercial, Industrial, Financial, Government, and Homemakers)	
	Communicators (Marketing, Journalists, Entertainment)	
	Workers and Engineers (Factory workers, Tradesmen, Technicians, Programmers, Architects, Consultants)	
Seeing decisions through the lens of a **multiplicative (growth) dynamic**, i.e. uncertain livelihood from returns on capital. The optimal strategy is cautious exposures because there is no recovering from zero capital.	Investors	**Diversity Generators** "spawn variety of hypothesis in the communal mind"
	Entrepreneurs (Start-ups, Small Business, Farmers)	
	Creatives (Artistes, Writers, Explorers)	

Using ideas from ***Ole Peters' Ergodicity Economics***, the top-half of the left column refers to employment with a set monthly salary, it regroups "*Metiers*" with an additive "*Growth Dynamic*". Looking at this from a retirement planning "*Perspective*", note how an additive "*Growth Dynamic*" corresponds to a bond's payment promises.

The bottom-half of the left column refers to occupations with uncertain returns from human or from financial capital, thus it regroups "*Metiers*" with a multiplicative "*Growth Dynamic*". Note how a multiplicative "*Growth Dynamic*" corresponds to the residuals of growth one can receive from equities.

Next, using ***CTRI's*** list of "*Metiers*", the middle column ranks "*Metiers*" based on an estimated gradient of conformity related to the right column. Finally, using ***Howard Bloom***'s 2000 book "*The global brain: the evolution of mass mind from the big bang to the 21st. century",* and his typology of participants in evolutionary systems, the right column completes this cross-sectional mapping of "*Metiers*" with three categories that include "*Conformity Enforcers*", "*Resource Shifters*", and "*Diversity Generators*".

As shown in the 2020 paper by ***Francois Gadenne,*** and titled *"Ergodicity Economics in Plain English*", ***EE*** shows that seeing a decision in a "*Task Environment*" with a multiplicative "*Growth Dynamic*" through the lens of a "*Decision-Maker*" with an additive "*Growth Dynamic*" leads to over-aggressive expectations & behaviors. Conversely, seeing a decision in a "*Task Environment*" with an additive "*Growth Dynamic*" through the lens of a "*Decision-Maker*" with a multiplicative "*Growth Dynamic*" leads to over-cautious expectations & behaviors. Can an individual with additive incentives understand an individual with multiplicative incentives? Further, the following questions connect the cross-sectional with the longitudinal: What "*Growth Dynamic*" dominates the incentive structure and cultural make-up of a specific generation? How does this change over time?

Additionally, ***Howard Bloom*** shows us that "*Conformity Enforcers*" and "*Diversity Generators*" take opposite positions in terms of comfort with "*Willful Ignorance, Error & Deceit*", and that "*Resource Shifters*" move their center of gravity from one side to the other based on their "*Perception*" of what is popular. Can a "*Conformity Enforcer*" understand a "*Diversity Generator*"? Further, the following questions also connect the cross-sectional with the longitudinal: Do "*Resource Shifters*" determine whether "*Conformity Enforcers*" or "*Diversity Generators*" set the cultural tone of a generation? How does this change over time?

Finally, and coming back to the change in "*Perspective*" from ***McQuarrie***'s paper on the "*Equity Risk Premium*": What differences would you expect to see between the household balance sheet of a "*Conformity Enforcer*" with additive economic incentives, and the household balance sheet of a "*Diversity Generator*" with multiplicative economic incentives? How would this affect their respective understanding (i.e. Their "*Mind-Map*", model of reality, and "*Perception* of Model Risk) of what constitutes a prudent exchange of risks for retirement planning?