

How Geoscience Built the Louisiana Coast
A Hermeneutic Approach to Data Integration
Reducing Bias and Improving Accuracy in a Never-Right World
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1 - The Hermeneutic Interpretation Process

Introduction

Louisiana Board of Professional Geoscientists

Practice of the Practice of Geoscience Interpretations

Purpose/Objective of the Board

Define Best Practice procedures (A check list manual for improving accuracy of geologic interpretations) in a way to maximize the expectations of accuracy in required geoscience components of project evaluations while ensuring public interests are safely protected. Project goals and economics will determine those procedures necessary for an accurate evaluation.

While part of the Boards mission to educate the public, it is also important the LBOPG licensee recognize and accept the relevance of geology to ensure public safety of engineering and environmental projects in Louisiana.

These Best Practice procedures will be published on the LBOPG website and explained in terms everyone from practitioners to regulators to the public at large can understand. A link to address questions or concerns will also be available.

Geology, the interactions of physical and chemical and biological processes that mold and modify the planet, is dynamic and influences most of the human species' (or all species?) activities. Most (or maybe all?) other scientific and specialty disciplines contribute to and are better understood by integrating diverse data to visualize relevant connectivity and potential to influence and/or improve our understanding of the world around us.

*Integration of multi-discipline data improves understanding.
Improving understanding increases interpretation accuracy.*

The scientific method, an Historical perspective.

Once upon a time when it was possible for individuals to learn and understand the sum of all knowledge, integration was simple and routine. Individuals with universal knowledge would be able to accurately interpret data but were subject to knowledge-based biases. Information storage (printing) provided access for learning by other individuals lacking universal data/knowledge but whose input helped moderate biases.

Knowledge-base – using others work once we can no longer know everything. Knowledge integration and technology advancements provided more data and improved hypothesis testing methodologies. Increasing data volume and number of investigators made it impossible for individuals to maintain a sum-of-universal-knowledge, giving rise to the age of specialization.

Data and specialization overloads make it particularly difficult to keep abreast of discipline improvements. Time constraints placed on new investigations forces acceptance of past interpretations as foundations to build on instead of new integrations improving hypothesis accuracy. Such modification is difficult/impossible if the old data is not available. Without this review there is potential for inaccuracy in past published works.

Who's wrong when everybody's right? - How rightness versus wrongness gets in the way of project integrity. The essay, "*Why Most Published Research Findings Are False*" by John P. A. Ioannidis (2005), discusses research on this topic.

It can be proven most claimed research findings are false.

There are several factors listed: interpreter bias, lack of repeatability testing for confirmation, competition within the discipline for recognition (publish or perish) and/or between groups for monetary considerations, etc., that impact research result accuracy. False findings in this context implies wrongness. The message I wish to convey is **not-rightness**, an opposite perspective to wrongness.

Review of others work for completeness prior to integration is necessary to establish relevance. Update that work for expanded project goals including new data, technology and/or perspectives. (Fisk's Alluvial Valley Deltas improved with Frazier's age dated Delta Lobe Model).

Ethics - Freedom to choose becomes a Responsibility to choose wisely.

Moral/ethical behavior defines rightness as a philosophical social activity/behavior. Society can change right thinking into wrong behavior by changing the rules (Roe versus Wade). Right is only what the majority condones and/or dictates. This black and white divide separates us, restricts data access and interferes with building interpretation accuracy.

Disclaimers – How we express opinions and keep an escape clause. Most investigators accept possible/probable errors in accuracy from a lack of data and/or knowledge of diverse specialty subject matter. Disclaimers become a way to excuse future wrongness accusations, to challenge hypothesis testing and/or to explore perspectives. Examples follow:

Default - “I reserve the right to modify my conclusions in the case that new or additional information becomes available in the future.” **Between-the-lines** - Which sounds like “In case I don’t have it right, give me a get out of jail free card if it gets updated”.

Gagliano (2003) - “Some of the interpretations and results presented in this report may be controversial. This is to be expected, as the findings challenge (several) conventional concepts and basic assumptions. We recognize the far-reaching implications of these findings, and do not present them lightly. The authors have interpreted the data to the best of their ability but are not infallible. It is assumed that the research community will rise to the challenge of testing new ideas that depart from convention.” **Between-the-lines** - We’re applying new thinking and seeing things in different ways while maintaining integration of all the data. We are not challenging convention but suggesting an alternative interpretation for review and testing. Please add your perspective to help us integrate the new information and improve interpretation accuracy.

Max Planck - “when we change the way we look at something, that thing we look at changes.”

Coleman (2014) - “To a large extent, geology is a science of solving inverse problems based on some data and scientific principles. Solutions to these types of problems are not unique, especially when using different data, invoking different principles, or both. It is not surprising that the discussant and we have reached different conclusions on the same specific issue of land loss along the coast of Louisiana because we use different observations and view those observations in a different context. The objective of this reply is to orient the reader, who then can decide which approach is more likely to be the correct analysis.” **Between-the-lines** - Here the scientific method is recognized as integration of All-the-Data with Geologic Knowledge (Tearpock). This was a response to an alternative interpretation of a published paper. Different interpretations result from inclusion/exclusion of different data (confirmation bias, i.e., not using all-the-data), or from different reviewer’s background interpretation experience, observing the same data from an alternative perspective. Instead of integrating diverse perspectives (as requested by Gagliano) we now have a contest expected to be resolved by a voting jury (this is a Reason-Based-Choice Bias not using all the data). If this jury is better qualified to choose, why weren’t they consulted first? (Lane, 2002, agreeing to disagree.)

How-voting-works - A disagreement between perspective views always generates two (2) interpretations. “Most scientists cling to their favorite hypothesis until proved (to be right) or (until they are) discredited.” (Lane) This is a typical Argumentative Theory tactic; avoid finding the Truth by using intimidation to win the Argument. “Only fresh data could point a way out of the impasse.” (from Lane and see Coleman above.) Nobody wins these right vs wrong arguments.

Rightness is not a scientific criterion.

Scientific investigations are **never-right** in this moral/ethical context. Interpretation accuracy (degree of rightness) is a function of data access and the interpreter’s experience-based data integration skills. Both interpretations are equally accurate from diverse perspectives application to addressing project goals.

Scientists know **never-right** is real because we risk our conclusions and/or qualify better results with disclaimers. Disclaimers typically preserve the author’s future editorial access for interpretational changes but may also provide protection from legal actions.

Most (or is it all?) Geologic interpretations will have multiple plausible results/conclusions even without opposing perspectives. Continuing to postulate outcomes for each question asked allows us to risk alternative choices and select the most likely (less risky) interpretation.

This is not only a part of the scientific method but is supported by the First Amendment to the Constitution of the United States, **Freedom of Expression**. In Linda R. Monk’s (2003) book, “*The Words We Live By, Your Annotated Guide to the Constitution*”, she opines.

“Democracy is very difficult without freedom of speech. Unless there is a free exchange of opinions and ideas, the people do not have the information they need for effective self-government.”

This free exchange of ideas with respect for contrary opinions is mirrored in how we interpret the data in scientific investigations. Lack of idea exchange becomes discipline discrimination that adversely impacts rightness.

Discipline discrimination.

I witnessed intentional separation (or segregation) of professionals into caste systems defined by education and college degree. Making coworkers competitors for the next raise/promotion encouraged secreting data. Information was power over others.

Dan Tearpock at Subsurface Consultants and Associates listed 10 Principles in the book, “Applied Subsurface Geological Mapping”. He referred to these as commandments because he wanted this text to be the industry’s Bible for improving interpretation accuracy. The two most important principles are Geologic Knowledge and All-the-Data, integration of discipline knowledge with multi-discipline data. **Accuracy** of this integration process is best facilitated with input from the discipline experts.

While teaching (and learning) I began to understand integration’s value and how the lack of multiple interpreter input in the integration process can and does do great harm. In my teaching role I modified Dan’s most important Principles into 1.) Geologic Knowledge (I call Geowledge), 2.) All-the-Data (Hermeneutics), 3.) Time and 4.) Documentation.

Time is a major impactor to All-the-Data. “Research and related (data) that have (interpretation) influence are not accessed because of time.” (Lane, 2002). Dan’s remaining six (6) Principles deal with the application of procedures to improve mapping accuracy. None included integration of multi-discipline data/concepts with potential influence/impact on the interpretation process, but they should.

Tearpock - “If you don’t have the time to do it Right (or Maximize Accuracy), where will you find the time to do it over? (we don’t)”

The realization of the importance of integration was a multistage process.

- 1.) First was discovering a term from literature describing a process of interpreting literary works. **Hermeneutics** (see below) is about integrating the big-picture/little-picture for interpretation accuracy improvements. “Results only make sense seen in context to a big picture. The big picture perspective is obliterated by a too confined view.” (from Lane.) Teaching a class in subsurface mapping techniques required researching topics to improve my presentation accuracy. Student feedback added insight improving my Geowledge further enhancing presentation accuracy. The process became hermeneutic.
- 2.) Second, the “10th man” was noted from the movie “World War Z”. The 10th man promotes contrarian investigations to determine and define options for conditions where 90% of investigators agreed to a consensus opinion when the 10% solution may be the least risky (less biased & more accurate). This led to an article titled “**The Argumentative Theory**” in “*Brain and Science Magazine*” (Sperber, 2011). This scientifically tested theory concludes.

“We do not use reason to find the truth, but to win arguments”.

The Argumentative Theory lists two (2) bias-based choices used to win arguments. These choices intentionally lack all-the-data integration, some data is ignored or discarded (**Confirmation Bias**) and some data is outvoted (**Reason-based Choice Bias**). The second principle, “All-the-Data” is violated. Neither choice represents an accurate interpretation.

Choosing wisely to improve accuracy is an ethical responsibility.

Perfectionism

“Perfectionists approach the world in black and white terms.”, but “perfection is an impossible goal” (Razzetti, 2019). Argumentative Theorists manipulate data for a must-be-right pursuit of rightness perfection that is biased by ignoring negatives. But our work is **never- right** and we must acknowledge the biases in our interpretations.

Hermeneutics includes the integration of diverse perspectives to improve understanding and accuracy. This integration is also the best way to moderate biases. Recognizing multiple alternatives this way improves understanding risk and how to get a “good enough” evaluation.

Accepting grayness as a degree of accuracy allows us to understand not being right is **not the same** as being wrong. Edison knew we only improve by making mistakes. When asked about progress on his light bulb experiments, he responded “Progress? I now know a thousand things that do not work.”

The hermeneutic process of integrating all-the-data with diverse disciplines “Maximizes” understanding the three-dimensional component critical for “maximizing” project evaluation accuracy. As this is a new (possibly to everyone) concept, examples of its application are included below. But maybe you already noticed hermeneutics at work here.

Turn good enough into your new perfect.

Hermeneutics – Diverse data integration

Defined as a specific system/method/theory for interpretation of any number of objects (originally texts in literature), understanding an object **hermeneutically** develops and improves interpretation accuracy.

The Hermeneutic method presented establishes a Geologic interpretation process consistent with Tearpock’s principles of knowledgeable integration with all-the-data. Other interpreter analog perspectives become additional integrated data for improving interpretation accuracy.

Hermeneutic Concepts – from Scholz, 2015

1.) Theory (conception) of Understanding.

a. Hermeneutic Circle –

- i. **Scalar and Fractal**- Circular, whole & parts cross reference each other.
- ii. **Cultural and Historical**- Outside interpreter's experience base.

b. Hermeneutic Dynamics –

- i. **Geowledge**- What you know.
- ii. **Perspective**- What others know and when.
- iii. **Time**- Relevance to knowledge and experience.

2.) Methodology of Interpretation.

a. Goals - Conception of the Aims of Interpretation.

b. Procedures - System of Principles of Interpretation.

c. Interpretation techniques

- i. Integrating diverse disciplines – all the data
- ii. Understanding basic processes and their influence
- iii. Focused on discipline analysis vs answering questions.

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