

THE FOUNDATIONAL REMAINDER:

What Every Founding Discovery Left Behind

A Methodology for Mining Invisible Assumptions in Scientific Frameworks

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ABSTRACT

Every founding scientific discovery opens one door. In doing so it makes other doors invisible — not because they do not exist, but because the framework built from the founding observation redefines what counts as a question worth asking. This paper introduces the Foundational Remainder: the portion of a founding observation that the founder's framework rendered permanently invisible to subsequent workers. A four-step methodology is proposed for identifying and mining the Foundational Remainder of any established scientific framework. Historical case studies — Newton's gravity, Faraday's electromagnetic induction, Darwin's natural selection — are examined to demonstrate the method. The paper argues that the next generation of scientific breakthroughs is more likely to emerge from the Foundational Remainder of existing frameworks than from incremental progress within them.

1. INTRODUCTION

Science has a well-documented problem with its own history. The polished published paper — the Principia, the Origin of Species, the paper on electromagnetic induction — presents a cleaned, linearised account of discovery. The confusion, the abandoned approaches, the questions considered and discarded — all of this disappears in the publication process. What remains is the formula.

The formula is a tombstone. It marks where the living confused thinking was buried. It is enormously useful as a tool. It is useless as a map to the next discovery.

This paper proposes that every founding scientific framework contains a Foundational Remainder — a set of observations, phenomena, and questions that were present at the original discovery event but were not incorporated into the founding framework. These remainders were not ignored due to incompetence. They were invisible — rendered unaskable by the very framework that the discovery created.

The methodology proposed here provides a systematic approach to finding and mining the Foundational Remainder of any established scientific framework.

2. THE FOUNDATIONAL REMAINDER — DEFINITION

The Foundational Remainder is defined as: all phenomena, observations, and implicit questions that were present in the original discovery context, that the founding framework did not incorporate, and that the founding framework's subsequent dominance made difficult or impossible to formulate as scientific questions.

Three properties distinguish the Foundational Remainder from ordinary scientific unknowns:

- Presence at origin: The remainder was observable at the moment of founding discovery. It was not absent — it was unselected.
 - Framework invisibility: The remainder became difficult to formulate as a question after the founding framework was established, because the framework redefined what counts as a legitimate question in that domain.
 - Temporal asymmetry: The remainder is more visible from the future than from the founding moment. The founder could not see it. We can.
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3. THE FOUR-STEP METHODOLOGY

Step 1 — Return to the original observation

Identify the raw phenomenon that the founder observed before any theoretical framework was applied. Not the formula. Not the published paper. The thing that was seen, heard, or measured. Newton's apple falling. Faraday's compass needle deflecting near a wire. Fleming's contaminated petri dish.

The critical discipline: strip the theoretical interpretation entirely. Describe only what a video camera at the scene would have recorded.

Step 2 — Map the founding framework's selection

Identify precisely what the founder chose to focus on and what they chose to ignore. What aspect of the raw observation became the founding theory? What aspects were present but not incorporated?

Newton observed an apple falling. He focused on: the direction of fall (toward Earth), the universality of the phenomenon, the mathematical relationship between mass and distance. He did not focus on: the apple's internal chemistry during impact, the specific air resistance profile, the acoustic signature of the fall, the soil disturbance on landing.

Most of these unselected aspects are trivial. But some may not be. The methodology does not prejudge which are trivial.

Step 3 — Identify the invisible assumption

Every founding framework contains at least one assumption so fundamental that the founder did not state it as an assumption. It appeared as background reality — so obvious it was invisible.

Newton's invisible assumption: time is absolute. One second is one second for every observer everywhere. So obvious it was never stated. So foundational that the entire Newtonian edifice rested on it.

Einstein's move was not to attack Newton. It was to notice this invisible assumption and ask: what if this is a choice, not a necessity? What follows if we remove it?

The Foundational Remainder lives inside the invisible assumption. Once the assumption is removed, the observation can be re-examined without the framework's constraints.

Step 4 — Follow the logic without flinching

Remove the invisible assumption. Return to the original observation. Ask what it now implies without the assumption as a constraint. Follow the new logic wherever it leads — even if it contradicts the established framework.

Einstein followed the removal of Newton's time assumption to special relativity, general relativity, and $E=mc^2$. He did not stop when the implications became uncomfortable. The logic was followed to completion.

The discipline required here is Zero Cache Thinking: the deliberate suspension of inherited framework assumptions during the derivation process, allowing the original phenomenon to generate its own implications without predetermined direction.

4. CASE STUDIES

4.1 Newton and Gravity

Original observation: Objects fall toward Earth. Moon does not fall away from Earth.

Founding framework: Universal gravitation. Mass attracts mass. Inverse square law. Time and space as absolute neutral backdrop.

Invisible assumption: Time is absolute. Space is absolute. Neither participates in gravitational interaction.

Foundational Remainder: What if time and space are not neutral backdrop but active participants in the gravitational interaction?

Mining result: Einstein's general relativity. Spacetime curvature as gravity. GPS satellites require relativistic time corrections to function. The Foundational Remainder of Newton contained a century of physics.

4.2 Faraday and Electromagnetic Induction

Original observation: Moving magnet near coil of wire produces electric current.

Founding framework: Electricity and magnetism are distinct phenomena that interact. Lines of force. Field concept.

Invisible assumption: Electricity and magnetism are fundamentally separate things. The interaction is real but the separation is assumed.

Foundational Remainder: What if electricity and magnetism are not separate phenomena but two aspects of a single phenomenon?

Mining result: Maxwell's unified electromagnetic theory. Later — the entire electromagnetic spectrum. Radio, X-rays, light as the same thing. The Foundational Remainder of Faraday contained the unified field theory.

4.3 Darwin and Natural Selection

Original observation: Species vary. Variation is heritable. Some variants survive and reproduce more than others. Over time — speciation.

Founding framework: Evolution by natural selection. Gradual change. Survival of the fittest. Evolution as progress.

Invisible assumption: Evolution has direction — from simple to complex, from primitive to advanced. Evolution selects for fitness improvement.

Foundational Remainder: What if evolution has no direction? What if fitness is purely local and temporary — no improvement, just differential reproduction under current conditions?

Mining result: Modern evolutionary theory — punctuated equilibrium, neutral evolution, evolutionary game theory, evo-devo. The Foundational Remainder of Darwin contained the entire modern synthesis.

5. RELATIONSHIP TO EXISTING WORK

Hidden assumption research exists in complex systems engineering, focusing on identifying undocumented assumptions in current systems. This work is distinct in focusing on historical founding discoveries rather than current systems, and in treating assumption invisibility as a feature of framework dominance rather than documentation failure.

Philosophy of science has addressed paradigm shifts and incommensurability of frameworks. The Foundational Remainder methodology complements this literature by providing a practical four-step method for identifying the specific assumptions that generate paradigm boundaries.

The Mandatory Author Self Critique standard proposed by the same author provides a complementary mechanism: requiring founders to document their pre-discovery confusion, abandoned approaches, and unresolved questions at publication time — creating a permanent record from which future workers can identify the Foundational Remainder without historical reconstruction.

6. IMPLICATIONS

The Foundational Remainder methodology implies that the most productive frontier in any mature scientific field is not at the leading edge of current research — where incremental progress within the established framework is the norm — but at the original observation, re-examined without the framework's constraints.

This is not anti-science. The founding frameworks are correct within their domains. Newton's mechanics works. Darwin's selection operates. The Foundational Remainder does not

invalidate the framework. It extends it by recovering what the framework's success made invisible.

The methodology is applicable across all scientific domains. Any field with a founding observation, a founding framework, and a history of incremental progress within that framework contains a Foundational Remainder that has not been mined.

7. AUTHOR'S SELF-CRITIQUE — MASC STANDARD

In the spirit of Mandatory Author Self Critique (Budinny V, 2026), the following limitations are disclosed:

- The case studies selected are the most famous examples of successful Foundational Remainder mining. Less successful cases — where removing an invisible assumption led nowhere — are not examined. Selection bias is possible.
 - The methodology assumes that invisible assumptions can be identified retrospectively. In practice, identifying the invisible assumption before it has been mined by a subsequent discoverer may be significantly harder than it appears from historical examples.
 - Zero Cache Thinking — the deliberate suspension of inherited framework assumptions — is described as a discipline. Whether it can be taught or reliably practised by researchers embedded in their fields is an open question.
 - This paper was conceived by a mechanical engineer with no formal philosophy of science training, derived entirely from first principles. The author acknowledges this as both the paper's limitation and, potentially, its methodological demonstration.
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"The polished formula is a tombstone. The confused process before it is where the Foundational Remainder lives." — March 14, 2026