Do

“It’s All About Evidence—But What Is The Evidence?”
A Philosophical Inquiry into the Foundations of Scientific UAP Studies

Durham Law School

AGENDA

01 Historical Problem of Evidence

02 Two Modes of Inquiry

03 Philosophical Foundations for the different modes

04 Galileo Moment

05 SETI/Astrobiology Connection

06 Mesoscopic Frontiers

07 What Anomaly?

08 Excess(ive) Remainder

09 Institutionalize UAP Science

10 Towards a science of the unknown

01

The Evidence

Historical Problem of Evidence

- Post-facto documentation
- Heavy reliance on eyewitness testimony
- Weak empirical reproducibility

02

Modes of Inquiry

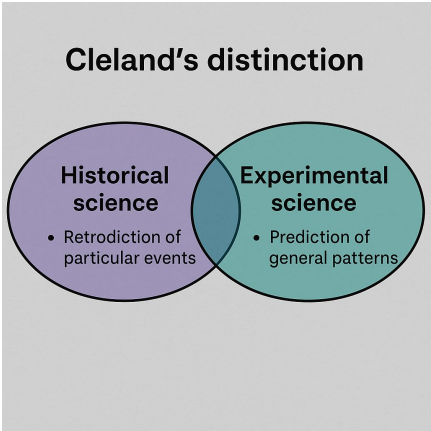
The Two Modes

Core Contrasts Here:

- Retrospective → Prospective
- Testimony → Instrumentation
- Forensic → Observational/Experimental

"classical ufology"

traditional sciences



Ideal: Virtuous Empirical Circle

Moving into strategic alignment:

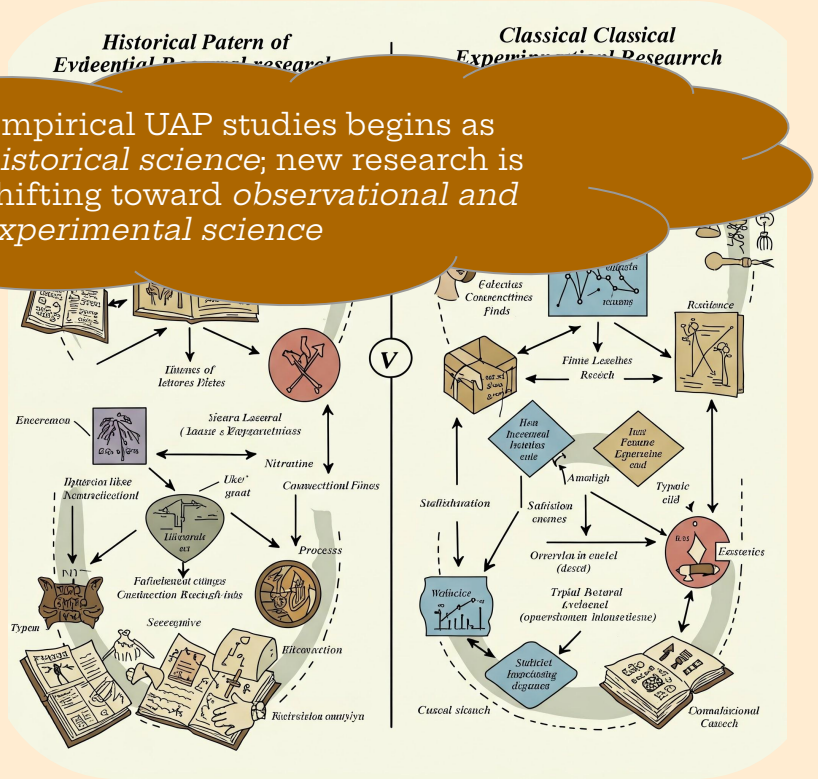
- Classical ufology is split from traditional science
  >> divided, conquered (by unending skepticism, dismissal, etc.)
- Ideal: unity/virtuous empirical circle: testimony → field work informing obs./exp., all informing each other
  >> requires systematic operational integration, institutionally supported
- This unified empirical circle is then foundational for the theoretical component of UAP Science: from targeted hypothesis (event-level) to higher-level/fundamental theory (seeking systematic unification)

03

Philosophical Foundations

"Scientists engage in two very different patterns of evidential reasoning… one pattern predominates in historical research and the other in classical experimental research [...] grounded in an objective and remarkably pervasive time asymmetry of nature."

—Carol E. Cleland, *Philosophy of Science*, Vol. 69, No. 3 (2002), p. 474



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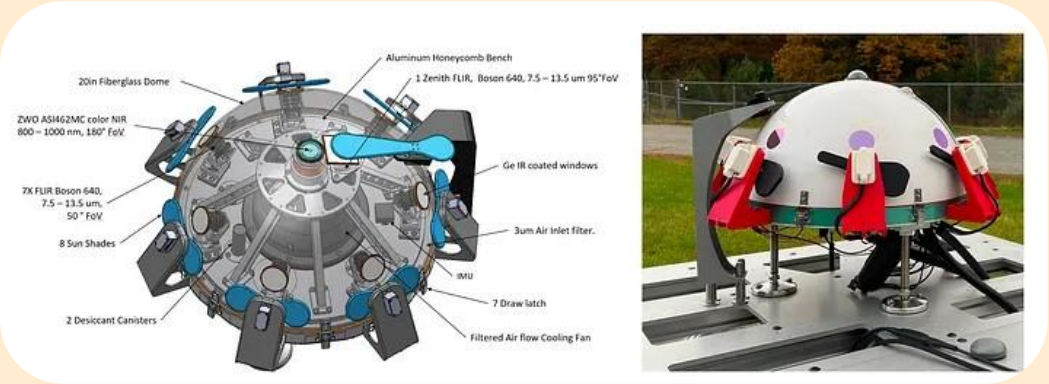
Galileo Moment



Galileo Project "Dalek" Observation Module

- Calibrated multi-modal sensors
- Traceability matrix
- Anomaly classification pipelines

Wesley A. Watters *et al.* "The Scientific Investigation of Unidentified Aerial Phenomena (UAP) Using Multimodal Ground-Based Observatories." ***Journal of Astronomical Instrumentation*** 12, no. 1 (2023): 2340006. https://doi.org/10.1142/S2251171723400068

This is what scientific UAP studies actually looks like

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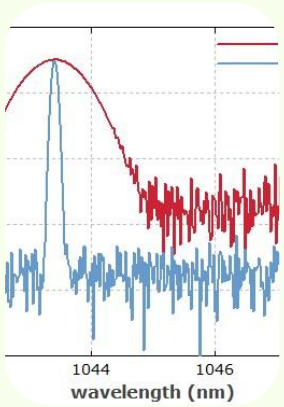
SETI/Astrobiology & UAP

Connective Tissue?

01



Shared Epistemic Structure

Each field must distinguish rare, potentially significant signals from a vast background of natural noise without prior knowledge of what, exactly, it is looking for.

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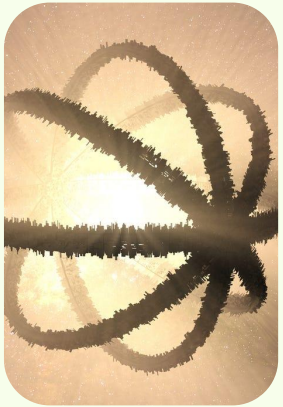

Signal Detection Logic

Like SETI and biosignature research, UAP science relies on probabilistic frameworks, anomaly classification, and multi-tiered criteria to evaluate whether a signal might represent something truly novel.

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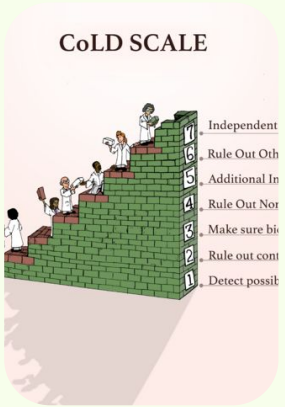


Confidence-Based Evaluation Frameworks

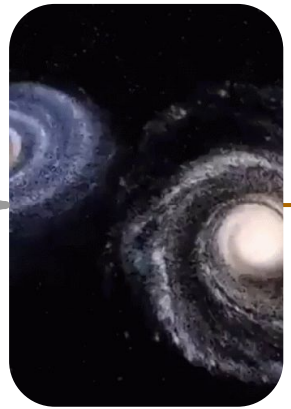
The move away from binary “proof” toward graduated confidence levels—pioneered in astrobiology—provides a model for how UAP science can structure its claims with epistemic discipline.

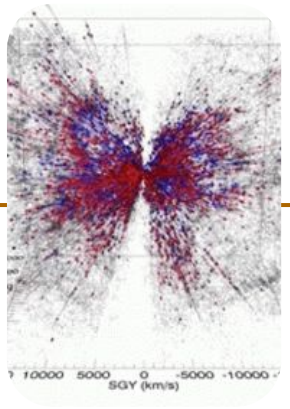
Science	Astronomy	Particle Physics	Geology	Biology (Experimental)	SETI / Astrobiology	UAP Science
Object of Study	Distant celestial bodies	Subatomic particles	Earth's physical history	Life processes (cells, organisms)	Extraterrestrial signals, biosignatures	Transient, uncontrolled aerial/atmospheric events
Control Over Phenomena	None	High	None	Moderate–High	None	None
Control Over Instruments	High	Very High	High	High	High	Variable
Epistemic Method	Theory-guided observation	Hypothesis-driven experimentation	Retrodictive inference from traces	Experimental manipulation	Signal modeling + filtering	Post hoc analysis + statistical outlier modeling
Type of Reasoning	Deductive + Abductive	Deductive	Abductive	Deductive	Abductive + inferential filtering	Abductive + anomaly classification
Data Character	Passive, precision-calibrated	Actively generated	Trace-based, geospatial	Highly repeatable, controlled	Passive, signal-based, low incidence	Often low resolution, incomplete, rare
Theoretical Framing	Strong (EM, GR, etc.)	Very strong (QFT, SM)	Strong (plate tectonics, geochron.)	Strong (molecular biology, evolution)	Moderate–speculative	Weak or speculative
Mode of Legitimacy	Observational fit with theory	Experimental replication	Coherence of multiple traces	Causal inference, experimental repeatability	Signal uniqueness, probabilistic argument	Cross-modal corroboration and statistical inference
Primary Goal	Understand/explain observed systems	Confirm theoretical entities	Reconstruct historical processes	Understand causal biological processes	Detect plausible technosignatures	Detect and characterize unclassified phenomena
Hypothesis-Driven?	Yes	Yes	Yes (via theory-informed reconstruction)	Yes	Partially (dependent on target signal type)	Rarely—typically anomaly hunting
Anomaly-Hunting?	Only at discovery frontier	No (hypothesis-focused)	Rare (unless unusual strata found)	Rare (except in disease surveillance)	Yes—central to early-stage detection	Yes—central methodological approach

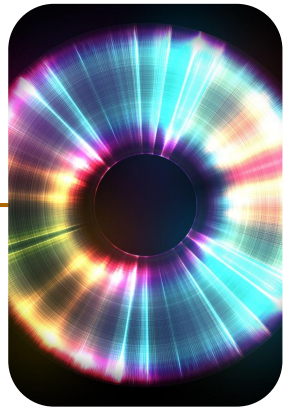
06

Mesoscopic Frontier

Observational/Investigative Regimes







Micro

Structure and nature of matter.
Quantum Field Theory
Standard Model

Meso

Classical Mechanics
Chemistry
Biology

Macro

General Relativity

MegaMacro

General Relativity

Psycho-Physical?

If what some in phil of mind suggest is true, we could have a different observational parameter space, with the observation/detection of mind-matter relations...

UAP & SETI/Astrobio live here

Down to Earth–

- Earthbound, atmosphere-crossing phenomena are *under-mapped* (drones debacle)
- UAP Science as a terrestrial bio- and human-technosignatures project first

07

Anomaly Detection

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In [12]: #boxplot of lot configuration vs sale price for different year sold
         sns.catplot(x='LotConfig',y='SalePrice',data=house_price,hue='YrSold',height=5,aspect=3,kind='box')
Out[12]: <seaborn.axisgrid.FacetGrid at 0x26163f41ec8>
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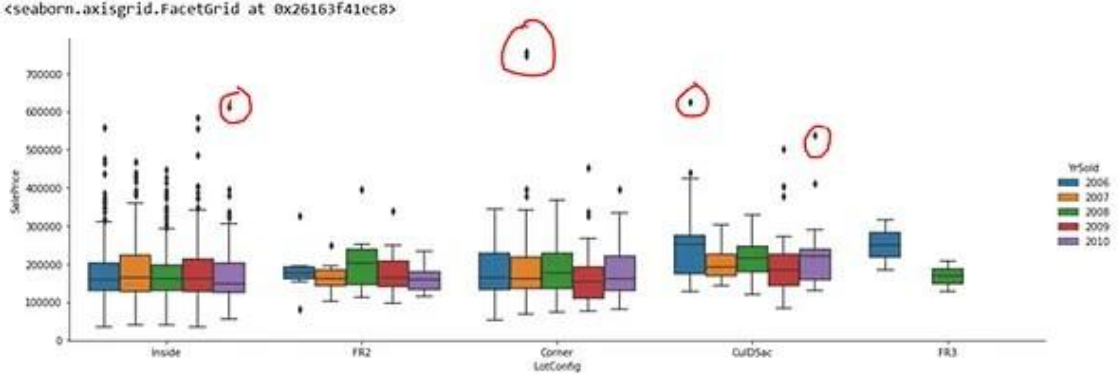


What Counts?

"Most approaches to outlier detection involve computing an outlier score for each feature vector… An outlier detected with only one measurement modality cannot on its own constitute a scientific anomaly… Feature vectors that exhibit multiple outlier values… are called n-fold outliers… Corroborated outliers that survive this rejection step are designated candidate statistical anomalies."
—Watters *et al.*, *Journal of Astronomical Instrumentation*, Vol. 12, No. 1(2023), p. 2340006-12

08

Excessive Remainder

Data Channels

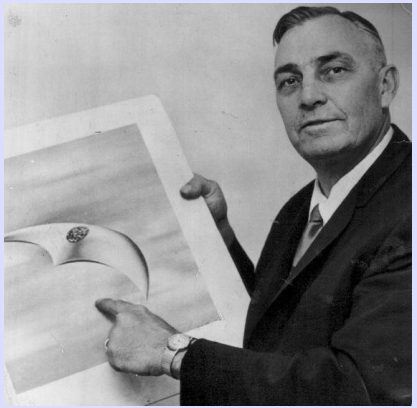
Core: Instrumental

Middle: Forensic/archival (narrative)

Outer: Experiential

09

Institutionalize UAP Science



Arnold Sighting – 1947

"Modern" era of the UFO begins

Dr Edward Condon – 1969

Closure of "Blue Book" and end of official U.S. gov't interest

Pentagon ODNI Report – 2021

Video evidence disclosed as authentic but unresolved; Galileo Project Announcned

In Time

Legitimation through method

Cross-disciplinary compatibility

Need for funding and infrastructure

10

Toward a New Science?

SEQUENCE OF POTENTIAL CHANGE

Progression to new science – local or global change?

Conventional Science

Phenomena first represented in ordinary science; conventional methods deployed.

Anomaly Detection

Systematic exploration of the parameter space; baseline determination; departure from baseline observed (perhaps not); if so, what is the exact character of departure?

Anomaly Acceptance

Observed and recorded fact, data generated based on generally accepted standards, have to be accepted widely – at first neutral w.r.t. hypotheses. Data integrity and interoperability crucial here.

Expansion/Accommodation

By means of the introduction of hypotheses to account for the data, to the extent that the data radically depart from baseline theory, to this extent will the science need to be expanded by expanding theory. But theory building is a network process: one adjustment affects other assumptions/theory elsewhere, etc.

11

Closing Reflections