

The Allais Effect Revisited: Seismic and Tidal Confounds as a First-Order Hypothesis

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August 15, 2026

Abstract

The Allais effect is a historical anomaly in which anomalous precession of a paraconical pendulum was reported during some solar eclipses. It is not an accepted physical phenomenon: the observations are sparse, sometimes contradictory, and lack modern statistical controls. This note does not claim that the effect is real. Instead, it proposes that the first-order hypothesis should be a combination of local seismic or microseismic disturbances and tidal deformation of the ground. During a solar eclipse, the Sun and the Moon are aligned, producing spring tides and slightly enhanced Earth tides. These small crustal deformations may, in some cases, facilitate microseismic events that a sensitive pendulum can detect. This mechanism could explain the intermittent appearance of the anomaly without invoking new physics. We outline a falsifiable observational roadmap designed first to exclude seismic and thermal confounds before considering any non-conventional interpretation. The note is explicitly speculative and does not validate any alternative gravitational framework.

1 Introduction

The Allais effect refers to reports by Maurice Allais and others of anomalous pendulum motion during solar eclipses, most notably in 1954 and 1959 [1]. The effect is not part of mainstream physics: later observations have produced mixed results, and no reproducible database exists.

This note starts from a simple position: before proposing new physical mechanisms, the known and mundane causes must be excluded. Among these, the most likely are local seismic disturbances and microseismic events. Pendulums of the type used by Allais are sensitive to ground motion, and in the 1950s there was no dense, high-resolution seismic network capable of detecting small events near the instrument.

The document is deliberately conservative. It does not assert that the Allais effect is real. It does not claim that eclipses generate anomalous gravity. It proposes a path to test the seismic-tidal hypothesis first.

2 Why the Allais Effect Remains Unconvincing

Several features prevent the Allais effect from being treated as an established phenomenon:

1. **Lack of formal reproducibility.** The original reports are not accompanied by machine-readable data, detailed instrument logs, or statistical uncertainty estimates.
2. **Intermittent appearance.** The anomaly has not been observed in every solar eclipse, suggesting that it is not a direct consequence of the geometric alignment alone.
3. **Insufficient environmental controls.** Temperature, pressure, local wind, and ground motion were not monitored to modern standards.
4. **Potential attention bias.** Observers may be more attentive to small instrumental fluctuations during a dramatic event such as an eclipse.

These issues do not prove that the effect is artificial, but they prevent it from being used as evidence for new physics.

3 The Seismic Confound

A paraconical or Foucault pendulum is not only a gravity sensor. It is also, unavoidably, a very sensitive seismometer. Horizontal ground displacements of a few micrometres can, under the right conditions, perturb the pendulum plane.

Small seismic events of magnitude 1–2, which are imperceptible to humans, occur frequently. In many regions they are common enough that a short experiment could plausibly overlap with one. In the 1950s, there were no dense broadband seismic arrays near most pendulum sites, so such events would have passed unnoticed.

Therefore, any historical report of an Allais-like anomaly is vulnerable to a simple confound: the pendulum may have recorded a local microseismic event that happened to occur during the eclipse window.

An additional observation supports a local rather than a global cause: in some eclipses, different observers using similar pendulums reported opposite results. If the effect were produced directly by the global Sun–Moon alignment, it should appear consistently, although perhaps with varying amplitude. A regional microseismic event, on the other hand, would affect only instruments near its source and could explain why some locations report an anomaly while others do not. Likewise, the two most cited dates — 30 June 1954 and 2 October 1959 — correspond to different Earth–Sun distances, so no simple linear dependence on solar distance can be inferred from the available qualitative reports.

4 Tidal Modulation as a Possible Trigger

During a solar eclipse, the Moon is in its new phase, aligned between the Sun and the Earth. This is a syzygy configuration, and the tidal forces of the Sun and the Moon act in nearly the same direction. The result is a spring tide.

Spring tides affect not only the ocean but also the solid Earth. Earth tides produce small vertical and horizontal crustal displacements, typically on the order of centimetres. These are well measured and predictable.

There is a long-standing and moderate literature on possible correlations between tidal stress and small earthquakes or microseismic activity. The effect is weak and not universal, but it is physically plausible that tidal loading can facilitate slip on faults already near their failure threshold.

Thus, a modest tidal stress increase during an eclipse could occasionally trigger a microseismic event close to a pendulum. This would produce an apparent anomaly that is:

- temporally near the eclipse;
- geographically local;
- intermittent, because it depends on local fault state;
- absent when no small event occurs.

This mechanism would explain the main qualitative features of the Allais reports without requiring any new gravitational interaction.

5 Speculative Hypothesis

We state the hypothesis as a pair of competing possibilities.

H1 – Conservative null: The historical Allais reports are explained by local seismic or microseismic disturbances, possibly assisted by thermal or instrumental artefacts. No new physics is needed.

H2 – Non-conventional alternative: A genuine but unknown physical effect may exist. This alternative should only be considered if H1 is rejected under rigorous, controlled conditions.

This note favours H1 as the default working hypothesis.

6 Proposed Observational Roadmap

The following steps are proposed to test the seismic-tidal hypothesis.

6.1 Phase 1: Historical Register

Build a critical register of reported Allais-like events. For each report, collect, when available:

- date and UTC time of the anomaly;
- instrument location and type;
- eclipse obscuration and local circumstances;
- local weather and thermal state;
- any historical seismic records from nearby stations.

The aim is not to prove the effect, but to determine whether the historical record is sufficient for serious analysis.

6.2 Phase 2: Seismic Reanalysis

For each well-documented historical event, compare the reported anomaly time with available seismic catalogues. Because catalogues are incomplete for very small events, absence of a recorded event will not be definitive, but a coincident event would strongly support H1.

6.3 Phase 3: Prospective Multi-Instrument Observations

For future solar eclipses, deploy an array of instruments:

- a paraconical pendulum;
- a broadband seismometer;
- a meteorological station measuring temperature, pressure, and wind;
- a GNSS receiver for local crustal deformation;
- optionally, a gravimeter.

All instruments must share a common time base. Observations should be continuous, covering several days before and after the eclipse, not only the eclipse window.

6.4 Phase 4: Statistical Analysis

Compare the pendulum record with the seismic record. A valid anomaly would be:

- not explainable by a registered seismic event;
- not explainable by temperature or pressure changes;
- reproducible across multiple eclipses and multiple sites.

Any analysis should include pre-registered thresholds and Monte Carlo shuffling to estimate the false-positive rate.

7 Falsifiability

The hypothesis is falsifiable.

- If future observations show pendulum anomalies that coincide with measurable seismic events, H1 is supported.
- If anomalies occur repeatedly without any seismic, thermal, or instrumental cause, then the conservative explanation fails, and the possibility of a non-conventional effect would need to be reconsidered.

A single unexplained event would not be sufficient. Independent replication across eclipses and sites would be required.

8 Limitations

We explicitly acknowledge the following:

1. The Allais effect itself remains unconfirmed.
2. Historical data are likely too sparse for a definitive retrospective test.
3. This note does not propose a physical mechanism for any anomalous gravitational effect.
4. No alternative gravitational framework, including UAT/UCP, is validated or tested here.
5. The proposed seismic-tidal mechanism is plausible but not yet demonstrated in the context of the Allais reports.

9 Conclusion

The most scientifically responsible approach to the Allais effect is not to ignore it, but to treat it as an unresolved historical anomaly and to test the most ordinary explanations first. A combination of local microseisms and tidal crustal deformation is the most plausible first-order hypothesis. It predicts intermittent, geographically local anomalies that occur near eclipses but not in all eclipses.

We propose a phased observational roadmap that can, in principle, separate ordinary confounds from any real anomaly. Until such data exist, the appropriate conclusion is that the Allais effect remains an unconfirmed historical observation, and no new physics is required to explain it.

Acknowledgments: The author thanks researchers who maintain critical standards in the study of anomalous phenomena.

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