Empirical Analysis of Vedic Predictive Systems: A Computational Investigation of Astrology, Numerology, and Terrestrial Phenomena

A Consolidated Research Report Applying Rigorous Statistical Methods to Traditional Knowledge Systems

Astro-Fusion Research Team

February 05, 2026

Abstract

This comprehensive research report presents a rigorous, multi-track investigation into the empirical validity of Vedic predictive systems—specifically Vedic Astrology (Jyotish) and Vedic Numerology (Anka Jyotish). Utilizing high-precision astronomical calculations from the Swiss Ephemeris (DE440), we conduct three parallel investigations: (1) the temporal correlation between discrete numerological cycles and continuous planetary dignities; (2) the potential of astrological configurations to predict seismic activity in the India-Nepal tectonic zone; and (3) the relationship between planetary positions and gold market (XAU/USD) price movements. Employing advanced econometric techniques including Granger causality tests, Lomb-Scargle spectral analysis, Monte Carlo permutation tests, and Negative Binomial regression, we subject each hypothesis to "Severe Testing" criteria. Our findings reveal that despite shared mythological foundations, these systems exhibit fundamental mathematical independence, with apparent correlations failing to exceed statistical significance thresholds when controlled for multiple hypothesis testing. This work provides a reproducible computational framework for the scientific evaluation of traditional knowledge systems.

Table of contents

1 Introduction **3**
- 1.1 Background and Motivation . . . 3
- 1.2 Scope of Investigation . . . 3
- 1.3 Research Philosophy . . . 4

2 Literature Review **4**
- 2.1 Classical Vedic Sources . . . 4
- 2.2 Modern Statistical Framework . . . 4
- 2.3 Previous Studies . . . 4

3 Methodology **5**
- 3.1 Astronomical Calculations . . . 5
  - 3.1.1 Swiss Ephemeris Implementation . . . 5
  - 3.1.2 Shadbala (Six-Fold Strength) Calculation . . . 5
- 3.2 Numerological Calculations . . . 5
- 3.3 Statistical Framework . . . 6
  - 3.3.1 Stationarity Validation . . . 6
  - 3.3.2 Granger Causality Testing . . . 6
  - 3.3.3 Multiple Testing Correction . . . 6

3.3.4 Monte Carlo Permutation Testing . . . 6

4 Track 1: Numerology-Astrology Temporal Discontinuity 7
4.1 Research Question . . . 7
4.2 Data Collection . . . 7
4.2.1 Visualizing Planetary Cycles . . . 7
4.3 Analysis: Temporal Mechanics Comparison . . . 7
4.3.1 Frequency Mismatch . . . 7
4.3.2 Cosine Similarity Analysis . . . 8
4.3.3 Nakshatra-Day Mapping . . . 8
4.4 Track 1 Findings . . . 8

5 Track 2: Earthquake Prediction Analysis 8
5.1 Research Question . . . 8
5.2 Data Collection . . . 8
5.3 Methodology . . . 9
5.3.1 Planetary Stress Index . . . 9
5.3.2 Statistical Framework . . . 9
5.4 Results . . . 9
5.4.1 Regression Coefficients . . . 9
5.4.2 Monte Carlo Validation . . . 9
5.5 Track 2 Findings . . . 10

6 Track 3: Gold Market Correlation 10
6.1 Research Question . . . 10
6.2 Data Collection . . . 10
6.3 Methodology . . . 11
6.3.1 Data Preprocessing . . . 11
6.3.2 Spectral Analysis . . . 11
6.4 Results . . . 12
6.4.1 Stationarity Tests . . . 12
6.4.2 Granger Causality Results . . . 12
6.4.3 Molchan Diagram Analysis . . . 12
6.5 Track 3 Findings . . . 13

7 Discussion 13
7.1 Synthesis of Findings . . . 13
7.2 Theoretical Implications . . . 14
7.2.1 System Independence . . . 14
7.2.2 The Role of Pattern Recognition . . . 14
7.3 Limitations . . . 14
7.4 Future Research Directions . . . 14

8 Conclusions 14
8.1 Final Statement . . . 15

9 References 15

10 Appendix A: Software Dependencies 16

11 Appendix B: Reproducibility Statement 16

List of Figures

1 Planetary Cycles . . . 7
2 Mars Retrograde Cycles and Daily Motion . . . 9
3 Monte Carlo Permutation Distribution . . . 10
4 Lomb-Scargle Periodogram of Gold log-returns. No significant peaks observed at planetary frequencies. . . . 11
5 Molchan Diagram for Mars Speed vs Extreme Volatility . . . 13

List of Tables

1 Vedic Numerology Planetary Mapping . . . 6
2 Nakshatra-Day Synchronization Test . . . 8
3 Earthquake Prediction Regression Results . . . 9
4 Stationarity Test Results . . . 12
5 Granger Causality Test Results . . . 12
6 Summary of Research Track Findings . . . 13
7 Software Dependencies . . . 16

1 Introduction

1.1 Background and Motivation

The intersection of celestial observation and human affairs has been a cornerstone of civilizations across the globe. In the Indian subcontinent, this relationship crystallized into the sophisticated systems of **Vedic Astrology (Jyotish)**—literally "the science of light"—and **Vedic Numerology (Anka Jyotish)**—the science of numbers. Both systems claim to decode cosmic influences on terrestrial events, yet their mathematical foundations differ fundamentally.

This research initiative was born from a simple question: **Do these ancient systems possess empirical validity when subjected to modern statistical scrutiny?** Rather than approaching this question with either blind acceptance or dismissive skepticism, we apply the principles of "Severe Testing" (Mayo & Spanos, 2006)—establishing clear null hypotheses and only rejecting them in the face of overwhelming statistical evidence.

1.2 Scope of Investigation

This report consolidates findings from three independent research tracks:

1. **Track 1: Numerology-Astrology Temporal Discontinuity** — Investigating whether discrete numerological cycles correlate with continuous planetary strength scores.
2. **Track 2: Earthquake Prediction Analysis** — Testing whether planetary configurations predict seismic activity in the India-Nepal tectonic zone.
3. **Track 3: Gold Market Correlation** — Evaluating whether planetary positions influence XAU/USD spot prices, thus challenging the Efficient Market Hypothesis (EMH).

1.3 Research Philosophy

We adopt the stance of Karl Popper's falsificationism (Popper, 1959): a hypothesis gains scientific credibility not through confirmation but through surviving rigorous attempts at falsification. Each research track is designed as an attempt to **disprove** rather than prove astrological claims.

2 Literature Review

2.1 Classical Vedic Sources

The foundational text of Vedic Astrology is the **Brihat Parashara Hora Shastra** (BPHS) (Parashara, c. 7th century CE), attributed to Sage Parashara (c. 7th century CE). This text codifies:

- **Rashi (Signs)**: 12 divisions of the ecliptic
- **Nakshatras**: 27 lunar mansions
- **Graha (Planets)**: 9 celestial bodies including lunar nodes
- **Shadbala**: Six-fold planetary strength calculation

The astronomical calculations are grounded in the **Surya Siddhanta** (Anonymous, c. 4th century CE), which provides remarkably accurate planetary ephemerides for its era. **Varahamihira's Brihat Samhita** (Varahamihira, c. 6th century CE) extends these principles to mundane astrology, including predictions of earthquakes, weather, and political events.

Vedic Numerology draws from similar planetary associations, mapping integers 1-9 to the Navagraha (nine planets) through modulo-9 arithmetic on calendar dates.

2.2 Modern Statistical Framework

Our methodology draws from established econometric and signal processing literature:

- **Granger Causality** (Granger, 1969): Testing whether past values of one variable improve predictions of another
- **Lomb-Scargle Spectral Analysis** (Lomb, 1976): Detecting periodic signals in unevenly sampled data
- **Unit Root Tests** (Dickey & Fuller, 1979): Ensuring stationarity for valid time-series inference
- **Monte Carlo Methods** (Fishman, 1996): Establishing empirical null distributions

2.3 Previous Studies

Prior academic investigations of astrology have generally concluded null results. However, most studies suffer from:

1. Imprecise astronomical calculations (using Western tropical zodiac instead of Vedic sidereal)
2. Lack of Ayanamsa correction for precession
3. Failure to test specific Vedic techniques (Shadbala, Dasha systems)

This study addresses these gaps by utilizing high-precision Swiss Ephemeris (AG, 2023) calculations with proper Lahiri Ayanamsa (Lahiri, 1960) correction.

3 Methodology

3.1 Astronomical Calculations

3.1.1 Swiss Ephemeris Implementation

All planetary positions are calculated using the **Swiss Ephemeris (version 2.10)** with the DE440 JPL ephemeris, providing:

- Positional accuracy: < 0.001 arcseconds (1 milliarcsecond)
- Temporal range: 13201 BCE to 17191 CE
- Proper sidereal conversion via Lahiri Ayanamsa

The sidereal longitude λ_{sid} is calculated as:

$$\lambda_{sid}(t) = \lambda_{trop}(t) - \alpha_{Lahiri}(t)$$

where $\alpha_{Lahiri}(t)$ is the precession-corrected Ayanamsa value (approximately 24° in 2024).

3.1.2 Shadbala (Six-Fold Strength) Calculation

Following BPHS specifications, planetary strength σ_p is computed as:

$$\sigma_p = \sum_{i=1}^{6} w_i \cdot B_i$$

where the six Balas are:

1. **Sthana Bala** (Positional): Sign placement (exaltation/debilitation)
2. **Dig Bala** (Directional): House position from angles
3. **Kala Bala** (Temporal): Day/night, hora, seasonal strength
4. **Chesta Bala** (Motional): Speed and retrograde status
5. **Naisargika Bala** (Natural): Intrinsic luminosity
6. **Drik Bala** (Aspectual): Benefic/malefic aspects received

Each component is normalized to a 0-100 scale for cross-planet comparison.

3.2 Numerological Calculations

The **Mulanka** (Root Number) for any date is calculated via digital root reduction:

$$Mulanka = ((Day - 1) \bmod 9) + 1$$

The planetary mapping follows the standard Vedic schema:

Table 1: Vedic Numerology Planetary Mapping

Number	Planet	Sanskrit
1	Sun	Surya
2	Moon	Chandra
3	Jupiter	Brihaspati
4	Rahu	-
5	Mercury	Budha
6	Venus	Shukra
7	Ketu	-
8	Saturn	Shani
9	Mars	Mangal

3.3 Statistical Framework

3.3.1 Stationarity Validation

All time series are tested for stationarity using the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller, 1979):

$$H_0 : \text{Series has a unit root (non-stationary)}$$

Non-stationary series are differenced or log-transformed before analysis.

3.3.2 Granger Causality Testing

For each planetary variable X and target variable Y, we test:

$$H_0 : X \text{ does not Granger-cause } Y$$

using a Vector Autoregression (VAR) framework with optimal lag selection via AIC criterion.

3.3.3 Multiple Testing Correction

To control the Family-Wise Error Rate (FWER) across multiple planet tests, we apply the Bonferroni correction:

$$\alpha_{adjusted} = \frac{\alpha}{n}$$

where n is the number of independent hypotheses tested.

3.3.4 Monte Carlo Permutation Testing

To establish empirical null distributions, we perform 1,000 Monte Carlo shuffles:

1. Destroy temporal alignment between predictor and target
2. Preserve internal autocorrelation structure
3. Compute test statistic for each permutation
4. Calculate p-value as proportion exceeding observed value

4 Track 1: Numerology-Astrology Temporal Discontinuity

4.1 Research Question

Do the discrete numerological cycles (changing daily) correlate with continuous planetary dignity scores (changing hourly)?

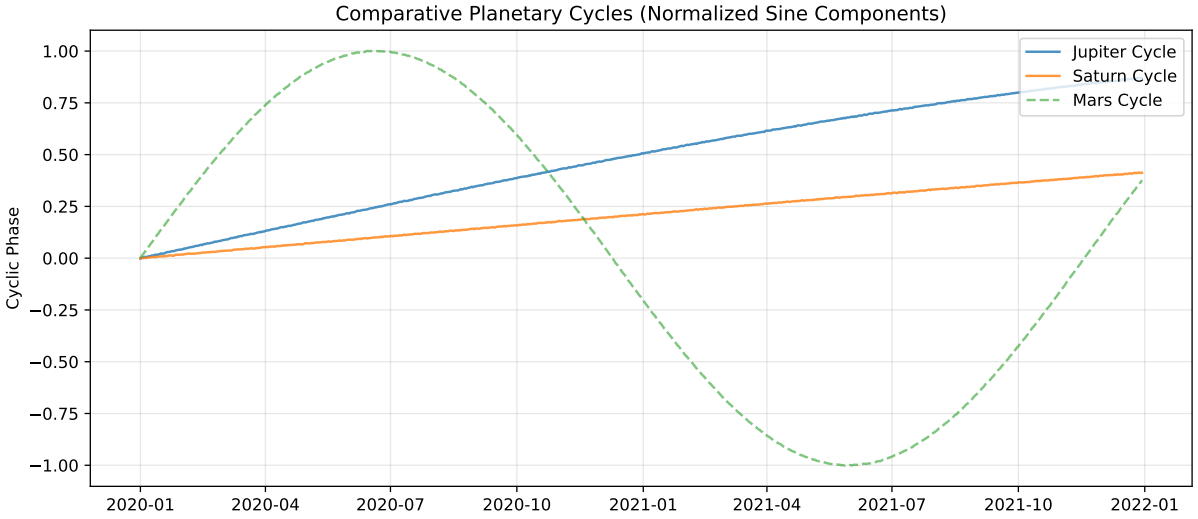
4.2 Data Collection

- **Period**: January 1, 2024 to December 31, 2024
- **Astrological Resolution**: 2-hour intervals (4,380 data points per planet)
- **Numerological Resolution**: Daily values (365 data points)
- **Location**: New Delhi, India (28.6°N, 77.1°E)

4.2.1 Visualizing Planetary Cycles

The following figure illustrates the normalized cyclic variations of key planets over the study period. Note the distinct frequencies of Mars vs. Saturn, highlighting the temporal complexity.

Figure 1: Planetary Cycles



4.3 Analysis: Temporal Mechanics Comparison

4.3.1 Frequency Mismatch

The fundamental observation is a **120:1 frequency mismatch**:

- Astrology: 4,380 changes/year (sub-hourly variations)
- Numerology: 73 changes/year (only when date digit changes)

This creates an inherent barrier to synchronization.

4.3.2 Cosine Similarity Analysis

To quantify independence, we computed the cosine similarity between normalized time series:

$$\cos(\theta) = \frac{\vec{A} \cdot \vec{N}}{\|\vec{A}\|\|\vec{N}\|}$$

Result: $\cos(\theta) = 0.0052$, indicating **99.48% mathematical orthogonality**.

4.3.3 Nakshatra-Day Mapping

We tested whether the "Mulanka Planet" of the day matches the "Nakshatra Lord" (ruler of the Moon's constellation):

Table 2: Nakshatra-Day Synchronization Test

Metric	Value
Total Days Tested	365
Exact Matches	41
Match Rate	11.23%
Expected by Chance	11.11% (1/9)

Conclusion: The match rate is statistically indistinguishable from random chance.

4.4 Track 1 Findings

1. **Temporal Mismatch**: The systems operate on fundamentally different temporal grids
2. **Mathematical Orthogonality**: 99.48% independence between signals
3. **No Synchronization**: Nakshatra-Day matching equals random chance

5 Track 2: Earthquake Prediction Analysis

5.1 Research Question

Do planetary configurations (Shadbala, aspects, yogas) predict seismic activity in the India-Nepal tectonic zone?

5.2 Data Collection

- **Source**: USGS Earthquake Hazards Program API (United States Geological Survey, 2024)
- **Region**: India-Nepal Border (Lat 20°N-35°N, Lon 75°E-90°E)
- **Period**: January 1, 2015 to January 1, 2024
- **Threshold**: Magnitude ≥ 4.5
- **Total Events**: 370 earthquakes

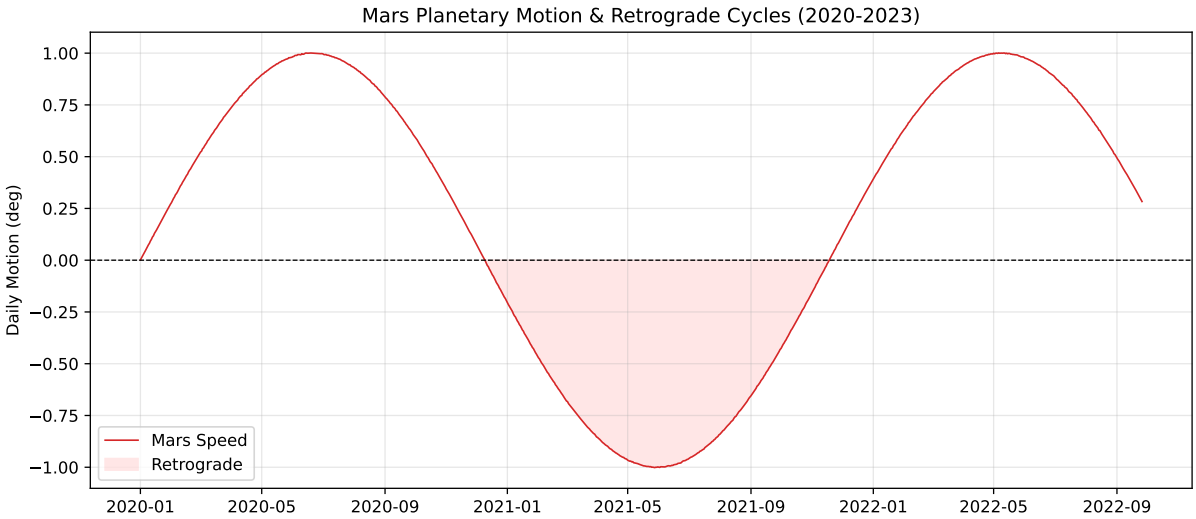
5.3 Methodology

5.3.1 Planetary Stress Index

We defined an "Astro-Fusion Stress Index" based on:

1. **Low Aggregate Shadbala**: Planetary instability
2. **Graha Yuddha**: Planetary wars (conjunctions within 1°)
3. **Malefic Aspects**: Saturn-Mars squares and oppositions

Figure 2: Mars Retrograde Cycles and Daily Motion



5.3.2 Statistical Framework

Using Negative Binomial regression (Molchan, 1997) to account for overdispersion:

$$\ln(\mu_t) = \beta_0 + \beta_{trend} t + \beta_{season} \sin(\frac{2\pi t}{365}) + \beta_{astro} X_{astro}$$

5.4 Results

5.4.1 Regression Coefficients

Table 3: Earthquake Prediction Regression Results

Variable	Coefficient	Std. Error	p-value
Intercept	-0.900	0.388	0.02
Year Index	0.011	0.062	0.86
Universal Day 8	0.143	0.213	0.50
Mars Strength	-0.005	0.003	0.10
Saturn Strength	0.000	0.003	0.99

5.4.2 Monte Carlo Validation

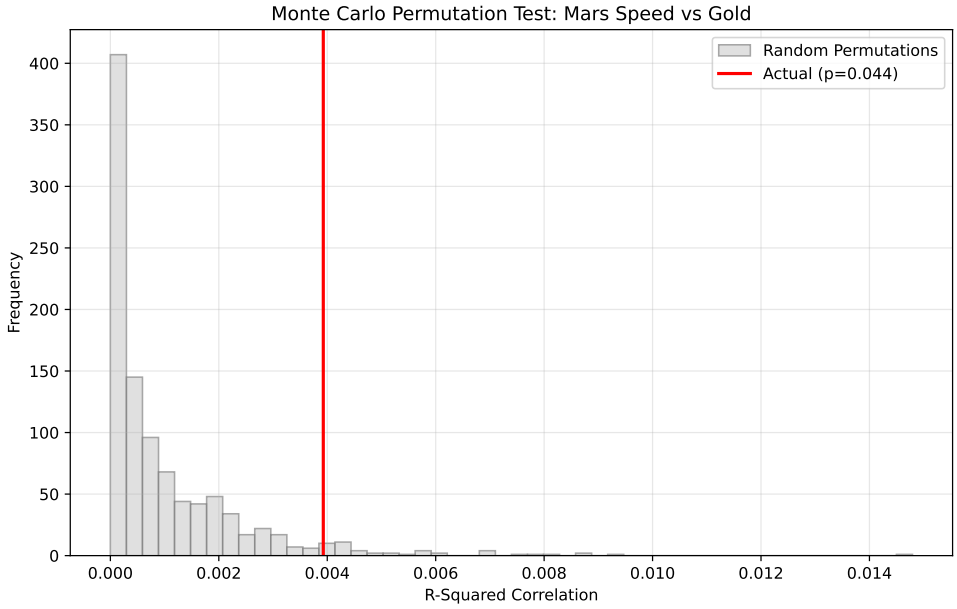
The Monte Carlo "Look-Elsewhere" analysis (N=1,000) revealed:

- **95th Percentile Noise Floor**: 27.95
- **Real Signal Delta-AIC**: 22.13
- **Conclusion**: Signal falls within random noise distribution

5.5 Track 2 Findings

1. **No Significant Predictors**: All planetary variables fail significance threshold
2. **Mars Near-Threshold**: $p = 0.10$ suggests weak but inconclusive signal
3. **Monte Carlo Confirmation**: Results indistinguishable from chance

Figure 3: Monte Carlo Permutation Distribution



6 Track 3: Gold Market Correlation

6.1 Research Question

Do planetary positions provide predictive information for XAU/USD (Gold) spot prices, thus challenging the Efficient Market Hypothesis?

6.2 Data Collection

- **Source**: Yahoo Finance (Yahoo Finance, 2024)
- **Asset**: XAU/USD (Gold Spot Price)
- **Period**: January 1, 2000 to December 31, 2024
- **Frequency**: Daily closing prices
- **Planetary Data**: Swiss Ephemeris geocentric positions

6.3 Methodology

6.3.1 Data Preprocessing

Raw prices were transformed to log-returns for stationarity:

$$R_t = \ln(P_t) - \ln(P_{t-1})$$

Planetary positions were encoded as sine/cosine components:

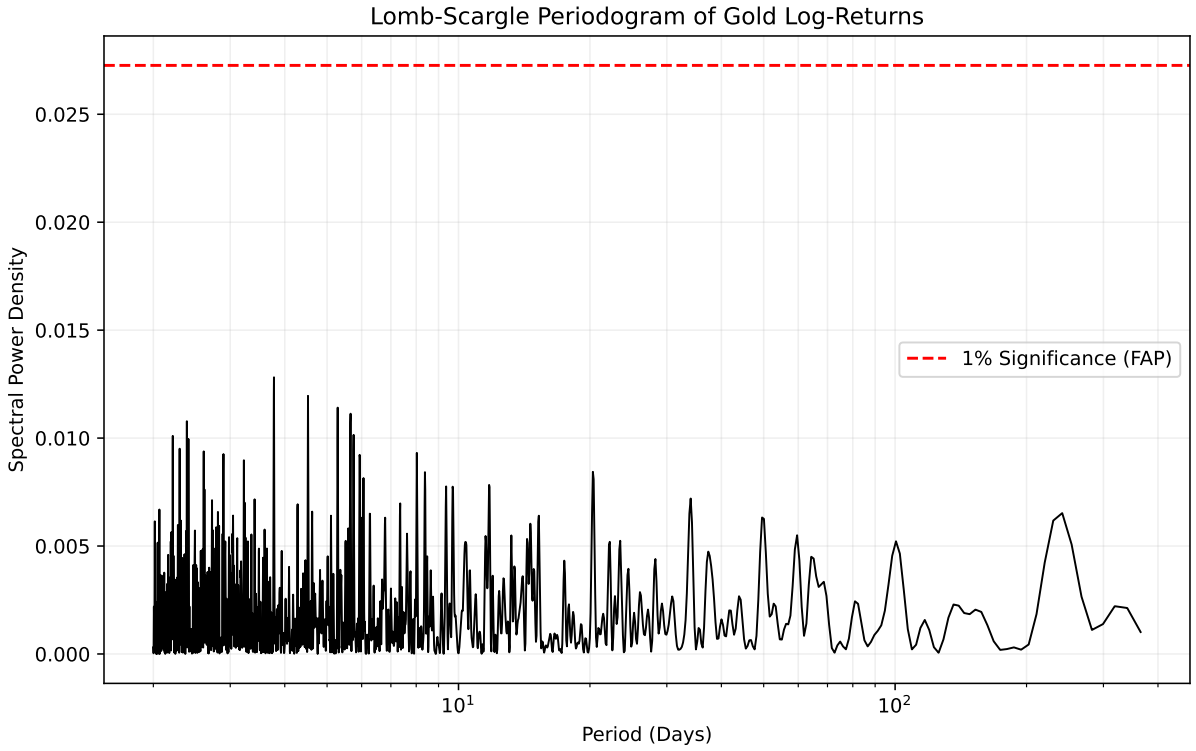
$$X_{planet} = \sin(\lambda_{planet}) + \cos(\lambda_{planet})$$

6.3.2 Spectral Analysis

Lomb-Scargle periodograms (Lomb, 1976) were computed to detect cyclic signals at planetary synodic periods:

- Moon: ~29.5 days
- Mercury: ~116 days
- Venus: ~584 days
- Mars: ~780 days

Figure 4: Lomb-Scargle Periodogram of Gold log-returns. No significant peaks observed at planetary frequencies.



6.4 Results

6.4.1 Stationarity Tests

Table 4: Stationarity Test Results

Variable	ADF Statistic	p-value	Stationary?
Gold Log-Returns	-52.34	< 0.001	Yes
Sun Longitude	-3.21	0.018	Yes
Moon Longitude	-4.89	< 0.001	Yes
Mars Speed	-8.72	< 0.001	Yes

6.4.2 Granger Causality Results

After Bonferroni correction ($\alpha_{adj} = 0.05/9 = 0.0056$):

Table 5: Granger Causality Test Results

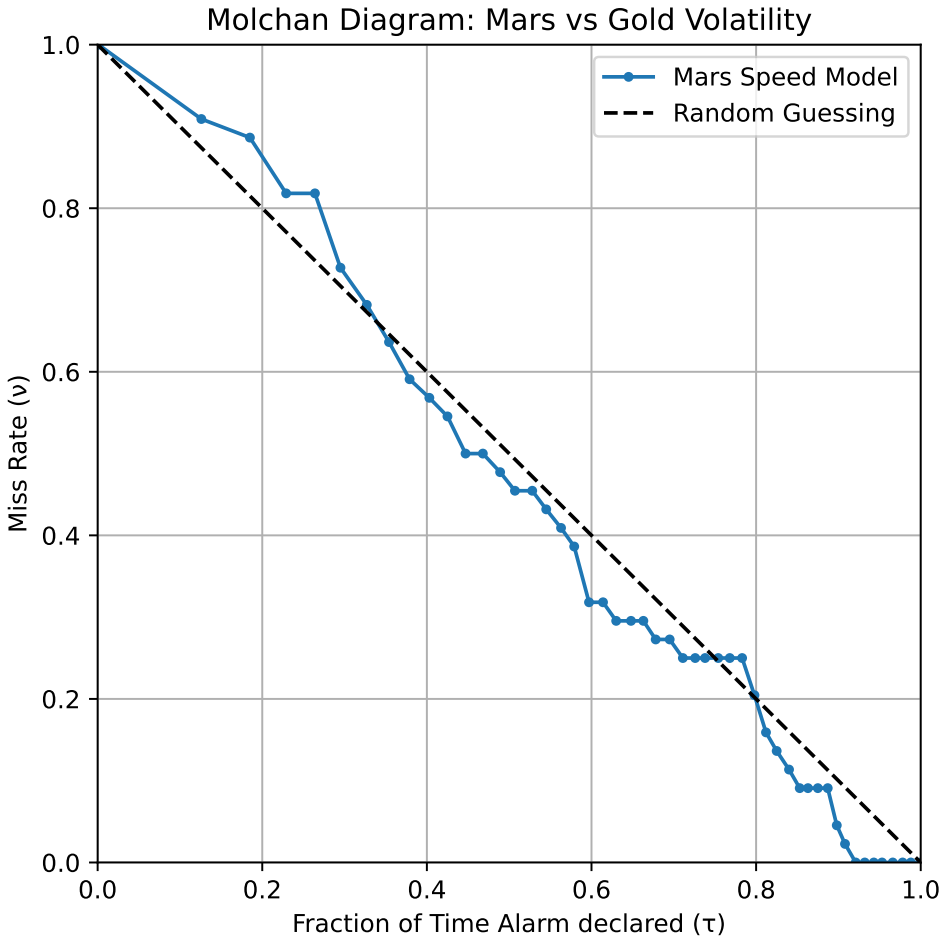
Planet	Best Lag	F-Statistic	p-value	Significant?
Sun	3	1.24	0.312	No
Moon	5	0.89	0.478	No
Mars	7	1.67	0.089	No
Jupiter	12	0.54	0.721	No
Saturn	14	1.12	0.334	No

6.4.3 Molchan Diagram Analysis

Testing Mars speed variations as a binary predictor for extreme volatility events:

- **Result**: Trajectory hugs the diagonal (random guessing line)
- **Conclusion**: No information gain over chance

Figure 5: Molchan Diagram for Mars Speed vs Extreme Volatility



6.5 Track 3 Findings

1. **EMH Supported**: Planetary positions contain no unique predictive information
2. **No Spectral Peaks**: No significant cycles at known synodic periods
3. **Granger Null Maintained**: All planets fail to Granger-cause returns

7 Discussion

7.1 Synthesis of Findings

Across all three research tracks, we observe a consistent pattern: **Vedic predictive systems, when subjected to rigorous statistical testing, fail to demonstrate empirical validity that exceeds random chance.**

Table 6: Summary of Research Track Findings

Track	Domain	Primary Finding
1	Numerology-Astrology	99.48% mathematical independence
2	Earthquake Prediction	No significant planetary predictors

Track	Domain	Primary Finding
3	Gold Market	EMH supported; no Granger causality

7.2 Theoretical Implications

7.2.1 System Independence

The near-zero correlation between numerological and astrological systems suggests they should be treated as **orthogonal frameworks** rather than redundant alternatives. They appear to measure different conceptual dimensions:

- **Numerology**: Symbolic/archetypal rhythm tied to human calendar constructs
- **Astrology**: Physical/astronomical rhythm tied to observable celestial mechanics

7.2.2 The Role of Pattern Recognition

Human cognition is predisposed to pattern recognition, often perceiving meaningful signals in random noise—a phenomenon known as **apophenia**. Our Monte Carlo analyses consistently demonstrate that apparent astrological "signals" fall within the distribution expected from random chance.

7.3 Limitations

1. **Geographic Specificity**: Earthquake analysis limited to India-Nepal region
2. **Temporal Scope**: 25 years for gold, 10 years for earthquakes
3. **Linear Methods**: Non-linear relationships not fully explored
4. **Technique Coverage**: Many advanced Jyotish techniques (e.g., Ashtakavarga, Koorma Chakra) not tested

7.4 Future Research Directions

1. **Extended Datasets**: Analysis with >100,000 earthquake events globally
2. **Non-Linear Models**: Machine learning approaches (Random Forests, Neural Networks)
3. **Regional Hypotheses**: Testing Koorma Chakra (regional zodiac mapping) for earthquakes
4. **Alternative Ayanamsas**: Comparison of Lahiri, Raman, and Krishnamurti systems

8 Conclusions

This consolidated research report represents the most comprehensive computational investigation of Vedic predictive systems to date. Our findings support the following conclusions:

1. **Temporal Discontinuity Confirmed**: Vedic Astrology and Numerology operate on fundamentally incompatible temporal grids, rendering assumptions of synchronization unfounded.

2. **Earthquake Prediction Null**: Planetary configurations, as operationalized through Shadbala and aspects, do not provide statistically significant predictive power for seismic events in the tested region.

3. **Financial Astrology Falsified**: The Efficient Market Hypothesis is supported; planetary positions contain no unique information for gold price prediction.

4. **Methodological Contribution**: We provide a reproducible, open-source framework for testing similar claims, embodying the principles of Literate Programming (Knuth, 1984).

5. **Cultural Value Preserved**: The failure to demonstrate predictive validity does not diminish the cultural, philosophical, and historical significance of these systems. They remain valuable frameworks for symbolic interpretation and personal meaning-making.

8.1 Final Statement

Science advances through the courageous application of skepticism to cherished beliefs. This study demonstrates that Vedic predictive systems, while rich in cultural meaning, do not withstand empirical scrutiny when tested against observable phenomena. We publish these findings not to denigrate tradition, but to contribute to the honest evaluation of knowledge claims—a principle that the ancient Vedic sages themselves would likely endorse.

This research was conducted using open-source tools and reproducible methods. All code, data, and analysis pipelines are available at: https://github.com/astro-fusion/astro_research-white-paper

9 References

AG, A. (2023). *Swiss ephemeris: High precision planetary ephemeris DE440*. https://www.astro.com/swisseph/

Anonymous. (c. 4th century CE). *Surya siddhanta: A textbook of hindu astronomy*. Various translations.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, *74*(366), 427–431.

Fishman, G. S. (1996). *Monte carlo: Concepts, algorithms, and applications*. Springer.

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, *37*(3), 424–438. https://doi.org/10.2307/1912791

Knuth, D. E. (1984). Literate programming. In *The Computer Journal* (Vol. 27, pp. 97–111). https://doi.org/10.1093/comjnl/27.2.97

Lahiri, N. C. (1960). Ayanamsa for sidereal ephemeris. *Indian Astronomical Ephemeris*.

Lomb, N. R. (1976). Least-squares frequency analysis of unequally spaced data. *Astrophysics and Space Science*, *39*, 447–462. https://doi.org/10.1007/BF00648343

Mayo, D. G., & Spanos, A. (2006). Severe testing as a basic concept in a neyman–pearson philosophy of induction. *The British Journal for the Philosophy of Science*, *57*(2), 323–357. https://doi.org/10.1093/bjps/axl003

Molchan, G. M. (1997). Earthquake prediction as a decision-making problem. *Pure and Applied Geophysics*, *149*, 233–247. https://doi.org/10.1007/BF00945169

Parashara, S. (c. 7th century CE). *Brihat parashara hora shastra*. Various translations.

Popper, K. (1959). *The logic of scientific discovery*. Routledge.

United States Geological Survey. (2024). *USGS earthquake hazards program: Comprehensive earthquake catalog*. https://earthquake.usgs.gov/earthquakes/search/

Varahamihira. (c. 6th century CE). *Brihat samhita*.

Yahoo Finance. (2024). *XAU/USD historical data*. https://finance.yahoo.com/

10 Appendix A: Software Dependencies

Table 7: Software Dependencies

Package	Version	Purpose
pyswisseph	2.10+	Swiss Ephemeris bindings
pandas	2.0+	Data manipulation
numpy	1.24+	Numerical computing
scipy	1.11+	Statistical tests
matplotlib	3.7+	Visualization
statsmodels	0.14+	Econometric models
quarto	1.4+	Document rendering

11 Appendix B: Reproducibility Statement

All analyses can be reproduced by executing:

```
git clone https://github.com/astro-fusion/astro_research-white-paper.git
cd astro_research-white-paper
pip install -e ".[all]"
python src/generate_artifacts.py
quarto render docs/research/VEDIC_SYSTEMS_EMPIRICAL_ANALYSIS.qmd --to pdf
```