On the Emergence of Self-Referential Structure in Torah-Derived RSA System

Udi Ben Zvi
Independent Researcher
Email: flytoeilat@gmail.com

Research Mentor: Rabbi Oren Evron

Introduction

One of the most fundamental problems in human communication is authorship: how can a message prove, beyond assertion, who stands behind it? Modern cryptography was developed to address precisely this problem of trust. Digital signature systems such as RSA provide a mathematically precise mechanism for producing publicly verifiable markers of identity—outputs uniquely determined by their signer.

The present study asks what happens when such a signature formalism is instantiated not from engineered cryptographic keys, but from numerical values embedded in an ancient sacred text. A twentieth-century mechanism of mathematical authorship, designed for digital communication, is here applied to parameters drawn from a text transmitted for more than three millennia. If the resulting signatures were to exhibit systematic alignment with a claimed author identity—under fully pre-declared rules and beyond matched null expectations—one is led to a natural and unsettling question: how could such convergence arise? Is it merely numerical coincidence, or does it reflect deeper structural organization within the text itself?

RSA (Rivest–Shamir–Adleman), introduced in 1977 and published in 1978, was the first practical and widely deployed public-key cryptosystem and continues to underpin cryptographic infrastructure on the modern internet. It is built around modular exponentiation with a semiprime modulus $n=pq$: the public key consists of the pair (n,e), where e is typically chosen as a Fermat prime, while a corresponding private key enables the inverse operation. RSA has two standard uses—encryption and digital signatures—and the present study focuses exclusively on the signature setting.

Unlike encryption, whose purpose is confidentiality, digital signatures are designed to produce a public and verifiable marker of authorship. The signature framework is therefore the natural RSA setting for an authorship-focused question, and provides a concrete computational lens through which to examine the possibility of a text-embedded “signature.” RSA is used here not for security claims, but as a standard and well-defined algebraic mechanism for mapping text-derived integers into reproducible outputs.

In a digital-signature framework, the private signing key represents the authorial identity underlying the signature. If such a system is instantiated deterministically from text-derived numerical anchors, two structurally natural questions arise: first, whether the derived signing key aligns with a candidate author identity; and second, whether the resulting signature output exhibits self-reference to that same identity. Framed this way, the problem becomes an identity-consistency test across both key and signature levels.

This study grows out of earlier numerical work by Rabbi Evron on the Torah’s opening verse (“בראשית ברא אלהים את השמים ואת הארץ”). He reported structured correspondences between gematria values drawn from the verse and partial sums of the digits of π (3.14159…). Two examples were central: the sum of the first 611 digits of π equals 2701, linking 611—the regular gematria of “תורה”—with 2,701, the regular gematria of the opening verse; and the sum of the first 17 digits equals 82, linking 17—the small gematria of “תורה”—with 82, the small gematria of the opening verse.

Independently, and from a cryptographic perspective, the value 2701 is immediately striking because it is semiprime:

$$2{,}701 = 37 * 73$$

Semiprimes are not merely arithmetical curiosities in cryptography: they are the defining footprint of RSA, whose modulus must have the form $n=pq$. This observation suggested that RSA could serve as a natural formalism through which to test structured numerical behavior within the text.

These findings prompted further discussion with Rabbi Evron and led to a refinement of the study’s starting point. The earlier work on the opening verse and π had asked a different question: what might be learned about the relationship between the Torah’s opening description of creation and the mathematical constant π, using modern mathematical tools to examine numerical structure in the text. The central research question in the present work is not about that creation-focused inquiry, nor about cryptographic structure itself, but about authorship: whether a mathematical signature-like structure could point to the identity behind the book. This question—who stands behind the Torah—has been asked in historical and theological discourse for millennia. In the present study, the technological lens shifts from π-based analysis to digital-signature formalism, which is directly connected to the concept of authorship—that is, to identifying the sender behind a message—not for cryptographic security claims, but as a deterministic algebraic mapping from text-derived integers to reproducible outputs. Because the question concerns the identity behind the book itself, the natural starting point is the most fundamental textual anchor: the name of the work—"תורה". In the case of the Torah, the alignment is especially clean. The regular gematria of "תורה" is 611, and

$$611 = 13 * 47$$

a semiprime modulus of the RSA form n=pq. Its small gematria is 17, a Fermat prime. Together, these values supply exactly the two public parameters required to instantiate an RSA system, defining (n,e)=(611,17).

Because the goal of the construction is to examine authorship, the research design specifies in advance the expected author-linked values associated with the authorship question. The question of who authored or gave the Torah has accompanied human inquiry for millennia. Within the Jewish tradition, the answer is explicit: the Torah is attributed to יהו״ה and is therefore commonly referred to as "תורת יהו״ה." Accordingly, if a signature-like structure were present, the natural expectation would be to encounter the Divine name itself. The regular and small gematria of יהו״ה are 26 and 17, respectively. In traditional reading practice, however, this name is not pronounced directly but is vocalized as אדני, whose regular and small gematria are 65 and 11. Consequently, the research expectation established in advance allowed for the appearance of either 26 (יהו״ה) or 65 (אדני) as possible author-linked values. To allow additional degrees of freedom in a conservative manner, further Divine names that might reasonably be associated with authorship—such as אלהים, שדי, and אל—were also included among the candidate identities.

Under this framework, the RSA system defined by (611,17) determines a private signing key whose numerical value is 65. This value corresponds exactly to the regular gematria of אדני. In classical Torah literature, 65 (אדני) is canonically paired with 26 (הויה) as two aspects of a single Divine identity. The derived private key therefore does not yield an arbitrary number; it yields a value traditionally associated with the very author of the book.

Having established the identity alignment at the key level, we then examine the corresponding signature behavior. In a digital-signature framework, the natural message to sign when testing authorship is the author's name itself. Accordingly, we encode יהו״ה

by regular gematria as an integer m and compute its RSA signature using the derived private signing key d=65, asking whether the resulting output relates back to the signed author value under pre-declared algebraic rules.

However, a single construction—even one arising from unusually clean numerical parameters—cannot by itself distinguish structural organization from coincidence. The essential question is not whether one carefully chosen anchor produces a suggestive alignment, but whether such alignments arise more frequently than would be expected when the same construction rules are applied uniformly across the Torah's vocabulary.

For this reason, the present study embeds the תורה construction within a broader randomized framework. Rather than privileging specific canonical locations in the text, we treat Torah words themselves as potential RSA anchors. Words are sampled uniformly from the Torah's distinct vocabulary and tested for RSA admissibility under the same numerical conventions. Only those whose regular gematria forms a semiprime modulus and whose small gematria yields a valid Fermat-prime exponent are retained.

For each RSA-valid instance, multiple candidate author names are sampled from the same vocabulary, and the instance is retained only if the RSA-derived private key coincides with one of them; only then is the signature computed and tested under the pre-declared pattern catalog.

In this way, the Torah case anchored in תורה is no longer examined in isolation. It becomes one instance within a large generative experiment governed by the same algebraic constraints. The question then shifts from anecdotal alignment to statistical structure: does the Torah reference outcome arise with unusual rarity when compared to uniformly generated corpus-based controls?

Preliminaries

Gematria Conventions and Transforms

Throughout this paper, Hebrew text is mapped to integers using fixed gematria conventions. These rules are defined once here and applied uniformly in all subsequent constructions.

Regular Gematria (mispar hechrechi)

We use the standard gematria system in which Hebrew letters are assigned values from 1 to 400:

$$\text{א} = 1, \text{ב} = 2, \text{ג} = 3, \ldots, \text{י} = 10, \ldots, \text{ק} = 100, \text{ר} = 200, \text{ש} = 300, \text{ת} = 400.$$

Final letter forms are assigned the same values as their non-final counterparts. The regular gematria of a word or phrase is the sum of its letter values.

Small Gematria (mispar katan)

Small gematria is defined by removing trailing zeros from each letter's regular gematria value. For example:

$$\text{צ} = 90 \rightarrow 9, \text{ק} = 100 \rightarrow 1, \text{ר} = 200 \rightarrow 2, \text{ש} = 300 \rightarrow 3, \text{ת} = 400 \rightarrow 4.$$

RSA Signatures: Parameters and Notation

Key generation and parameters

An RSA signature system begins by choosing two distinct odd primes p and q and forming the modulus

$$n = pq$$

Let φ(n) denote Euler's totient function. For n=pq,

$$\varphi(n) = (p - 1)(q - 1)$$

The public key value e is chosen so that

$$1 < e < \varphi(n)\ and\ gcd(e, \varphi(n)) = 1$$ (e is coprime with φ(n))

The private key d is defined as the modular inverse of $e\ modulo\ \varphi(n)$:

$$ed \equiv 1 (mod \varphi(n))$$

In practical implementations, the public key value e is chosen from the Fermat primes because these values make verification especially efficient. The known Fermat primes are

3, 5, 17, 257, and 65,537

with 65537 widely used as a modern default (and smaller values such as 3 and 17 appearing historically).

Signature And Verification

RSA signatures operate on an integer message value m.

The signer uses the private signing key d to compute the signature

$$s = m^d mod n$$

The pair (m,s) may then be transmitted.

Verification is performed using the public exponent e. The verifier computes

$$v = s^e mod n$$

and compares v with the claimed message value m. If v=m, the signature is accepted as valid. In other words, the public-key check succeeds, and the message is treated as originating from the holder of the private signing key.

Methodology

Pipeline Overview

This section describes the randomized signing-and-scoring pipeline used throughout the study. Each run—whether the Torah reference case or a Monte Carlo control trial—follows the same deterministic procedure; only the sampled Torah vocabulary items differ.

Each trial begins by selecting a single Torah word and treating it as a candidate “book name.” The restriction to a single-token book name is intentionally conservative (see Appendix F for empirical justification). From this word, RSA public parameters are derived directly via regular and small gematria. The regular gematria supplies the modulus candidate and must factor as a semiprime $n=pq$ with distinct odd primes. The small gematria supplies the public exponent and must be one of the standard Fermat-prime values used in RSA. The assignment of gematria types to RSA parameters is not interchangeable: reversing the mapping—using regular gematria for the exponent and small gematria for the modulus—produces no RSA-valid instances in the Torah vocabulary and therefore introduces no additional degree of freedom in the pipeline.

A book-name word is considered RSA-valid when this modulus–exponent pair satisfies the standard structural requirements of RSA and uniquely determines a private signing key (see Appendix A for the formal RSA validity conditions). Trials that do not yield such a valid RSA system cannot produce a private signing key; consequently, the pipeline cannot continue beyond this point, and these trials are recorded as no-match instances.

For RSA-valid instances, a symmetry-controlled author selection stage is applied. Five distinct Torah words are sampled uniformly from the same vocabulary and designated as candidate author names—one primary and four secondary. The RSA-derived private signing key must coincide with the regular gematria of at least one of these five names, implementing the identity-alignment condition; otherwise, the trial is discarded (see Appendix A for the formal trial construction).

The observed reference alignment occurs with אדני, the most a priori secondary identity traditionally paired with יהוה. Methodologically, the construction could therefore have been restricted to a primary author name and a single secondary candidate. Instead, the pipeline allows five candidate names, introducing additional degrees of freedom. These additional candidates are not required for the reference case; rather, they expand the opportunity space available to the control trials, making the null model more permissive and the overall analysis conservative.

For surviving trials, the RSA signature of the primary author name is computed and evaluated under a fully pre-declared catalog of algebraic match rules (see Appendix B). These rules test for structured self-reference between the signature output and the gematria values of each candidate author identity in the set (primary and secondary). Each satisfied rule produces a labeled outcome; the set of all recorded labels constitutes the trial's pattern-set.

In the Torah reference case, exactly one rule is satisfied, so the reference pattern-set contains a single recorded outcome. Rarity is assessed by comparing this reference pattern-set to those generated under large-scale Monte Carlo trials executed under the identical pipeline.

A naïve Monte Carlo approach might score trials by simply counting how many rules are satisfied, or by assigning weights to different rule families. We do not adopt such scoring. Many rule outcomes are algebraically related and are therefore not statistically independent; simple match-counting risks overstating evidence by implicitly treating dependent structures as separate signals. Weighted scoring introduces subjective choices that are difficult to justify.

Instead, rarity is evaluated using a subset-support statistic. This method treats the reference pattern-set as a structured object and asks how often the null model produces pattern-sets that contain it. By evaluating containment rather than raw counts, the procedure avoids implicit independence assumptions and removes the need for arbitrary weighting. The formal definition of the subset-support score and Monte Carlo p-value is given in Appendix C.

Reference Case Within the Pipeline

The Torah reference case is evaluated under the identical RSA construction described above. The book name תורה yields the RSA system (n,e)=(611,17), which satisfies the RSA-validity conditions.

For the reference instantiation, the candidate author set consists of the principal Divine names that are traditionally associated with the identity of the author of the Torah:

יהוה, אדני, אלהים, שדי, אל.

As defined in the pipeline, the instance proceeds only if the RSA-derived private signing key matches the regular gematria of at least one name in this author set.

For the system (611,17), the RSA private signing key is

$$d=65$$

Since 65 is the regular gematria of אדני, the reference case satisfies the author–key alignment requirement and proceeds to signature computation.

The RSA signature of the designated primary author name יהוה (regular gematria 26) is then computed and evaluated under the same pre-declared catalog of algebraic match rules used in all Monte Carlo trials.

Results

Signature Outcome for the Torah Reference Case

Under the RSA system (n,e) = (611,17), the private signing key is (d = 65). The designated primary author name is יהוה, whose regular gematria value is

m = 26.

The RSA signature is computed as

$$S = 26^{65} \, mod \, 611 = 442$$

Since

$$442 = 26 * 17$$

the value factors as **26 × 17**, the regular and small gematria values of the Divine name **יהו״ה**, representing the name multiplied by itself in its two standard gematria encodings. Additional interpretive observations are collected in Appendix G.

No further matches are observed.

The signature value 442 corresponds only to the primary author and not to the four secondary names—שדי, אלהים, אדני, and אל.

The Torah reference pattern-set therefore contains a single recorded outcome.

Monte Carlo Significance

To assess rarity under the identical pipeline, we generated

N=100,000,000,000 Monte Carlo trials (100 billion).

The reference subset-support score was

R_ref = 5,843.

Across all trials, 24,693 control trials exhibited subset-support scores less than or equal to R_ref. The resulting Monte Carlo p-value is therefore

$$P = 2.46 * 10^{-7}$$

corresponding to approximately one occurrence in 4,049,730 trials under the null model.

The observed outcome lies several orders of magnitude below conventional thresholds for statistical rarity.

Exploratory Deterministic Extensions

Although the statistical analysis above is restricted to the randomized book-name pipeline, the same RSA framework can be extended deterministically to additional canonical textual anchors. In practical digital-signature systems, the public exponent is typically fixed, while distinct signature systems arise from varying the modulus. We mimic this structure here: the exponent e=17, derived from the most a priori textual anchor—the book name—is held fixed, and additional signing systems are generated by substituting moduli derived from the next most a priori elements of any book, namely the opening word and the opening verse. Under this fixed-exponent framework, further structured correspondences emerge.

Deterministic Anchor Variants

In addition to the base anchor values derived from regular gematria, we consider a small set of simple deterministic variants. These include the Sum-of-Thousands (SoT) reduction, a capital-letter (rabbati) gematria convention, and a center-point transform. The SoT and center-point transforms appear in earlier analyses of the Torah's opening verse by Rabbi Evron, where they participate in several structured relationships derived from the opening text.

For example, **2,701 → 2 + 701 = 703** under the SoT reduction, an operation referred to in the kabbalistic literature as **חזרה חלילה**, and the center-point of **2,701** is **1,351**.

The capital-letter variant reflects a traditional scribal feature of the Torah text, in which certain letters appear in enlarged (rabbati) form. In the Torah's opening word, the initial letter **ב** appears as a **ב רבתי**, which under a capital-letter gematria convention contributes **2,000** (since 2 = ב), thereby increasing the opening-verse gematria from **2,701** to **4,699**.

Opening Word RSA (בראשית)

The opening word “בראשית” has regular gematria 913, with factorization

$$913 = 11 \cdot 83$$

Using e = 17, the resulting RSA system is:

$$n = 913,\ e = 17,\ d = 193$$

Signing the author value gives:

$$signature(26)\ = 26^{193} mod 913\ = 702$$

Since

$$702\ = 26\ *\ 27$$

the output again factors through the author value. Additional interpretive observations are collected in Appendix G.

Opening Verse RSA - Regular Gematria

The first verse, “בראשית ברא אלהים את השמים ואת הארץ”

has regular gematria 2,701, and

$$2{,}701 = 37 \cdot 73$$

Using e=17, the resulting RSA system is:

$$n = 2{,}701,\ e = 17,\ d = 305$$

Signing the author value gives:

$$signature(26)\ = 26^{305} mod 2701\ =\ 232$$

The value **232 (רל״ב)** equals the sum of the four traditional spellings of **יהו״ה**

ע״ב + ס״ג + מ״ה + ב״ן

as described in classical kabbalistic literature.

Opening Verse RSA - Sum of Thousands (SoT)

Applying SoT to 2,701 yields 703, and

$$703 = 19 \cdot 37$$

Using e=17, the resulting RSA system is:

$$n = 703,\ e = 17,\ d = 305$$

Signing the author value gives:

$$signature(26) = 26^{305} mod 703 = 676$$

Since

$$676 = 26^{2}$$

The signature lands exactly on the author value squared.

Opening Verse RSA - Capital Beit (ב׳ רבתי)

Under the rabbati convention, the opening verse value adjusts to 4,699, and

$$4{,}699 = 37 \cdot 127$$

Using e=17, the resulting RSA system is:

$$n = 4{,}699,\ e = 17,\ d = 1{,}601$$

Signing the author value gives:

$$signature(26) = 26^{1601} mod 4699 = 1,231$$

The value 1,231 equals the regular gematria of the traditional kabbalistic written-form of the number 26, “עשרים וששה”, as noted in the work **גינת אגוז** by Rabbi **Joseph ben Abraham Gikatilla** (13th century). Additional interpretive observations are collected in Appendix G.

Opening Verse RSA - Center Point

Applying the center-point transform to 2,701 gives:

$$1,351 = 7 \cdot 193$$

Using e=17, the resulting RSA system is:

$$n = 1,351,\ e = 17,\ d = 881$$

Signing the author value gives:

$$signature(26) \; = \; 26^{881} mod 1351 \; = \; 1,081$$

The value 1,081 is the gematria of תפארת, the sefira canonically associated with יהו״ה. Additional interpretive observations are collected in Appendix G.

Statistical Scope and Structural Recurrence

These deterministic extensions are not included in the Monte Carlo subset-support analysis reported above, and therefore do not contribute to the computed p-value. They are presented as structural continuations of the same fixed-exponent RSA framework. While the statistical test is anchored strictly in the randomized book-name pipeline, the recurrence of author-linked structure across independently derived moduli from the opening word and opening verse strengthens the coherence of the overall construction. The observed pattern is therefore not confined to a single anchor but reappears across the text's most a priori structural elements.

Discussion

This study examined whether RSA signature systems instantiated from Torah book-name candidates—words sampled uniformly from the Torah's distinct vocabulary and mapped to RSA parameters via gematria—exhibit author-linked structure beyond what would be expected under matched randomization of the same corpus.

The Torah reference case is obtained by taking the book name תורה, which defines the RSA system (n,e) = (611,17). Within the pipeline, this construction satisfies a two-level identity-consistency question natural to digital signatures: whether the derived private signing key aligns with a candidate author identity, and whether the resulting signature output exhibits algebraic self-reference to that same identity under pre-declared rules. In the Torah reference instantiation, the derived signing key is (d=65) (אדני), and signing (m=26) (יהוה) yields a signature value that factors through the author's gematria structure.

To evaluate whether such an outcome could plausibly arise under corpus-matched randomness, we implemented a large-scale Monte Carlo null process that applies the identical pipeline to uniformly sampled Torah vocabulary items. Under this null model, the observed reference pattern-set occurs with estimated probability

$$P = 2.46 * 10^{-7}$$

corresponding to approximately one occurrence in 4,049,730 trials.

The statistical inference rests entirely on the randomized book-name pipeline and the subset-support significance test. Within that defined framework, the Torah reference outcome is highly unlikely to arise under corpus-level random variation.

The deterministic extensions to the opening word and opening verse are presented separately and are not included in the Monte Carlo p-value computation. They nonetheless reinforce the structural coherence of the framework by demonstrating recurrence across independently derived moduli under a fixed exponent, mirroring the architecture of practical digital-signature systems.

What is striking is the direction of fit: a twentieth-century public-key signature formalism, instantiated from Torah-derived numerical encodings under fully pre-declared rules, yields outputs that repeatedly point back to candidate author identities. The framework was specified in advance and applied uniformly across randomized controls.

If the defined null model fails to account for the observed structure, then the most parsimonious interpretation is that the organization is not incidental but intentional—that the text exhibits deliberate self-referential numerical architecture detectable even through mathematical tools developed millennia later.

Appendix A. Trial Construction and RSA Validity

This appendix provides the formal specification of a single trial under the randomized signing-and-scoring pipeline.

A.1 Book-Name Selection

A single word is sampled uniformly from the set of distinct word-types appearing in the Torah corpus. This word is designated as the candidate “book name” for the trial.

No weighting by frequency is applied at this stage; sampling is uniform over unique vocabulary items.

A.2 RSA Parameter Derivation and Validity

For the sampled book-name word, define:

- n = its regular gematria value (candidate modulus),
- e = its small gematria value (candidate public exponent).

The candidate word is considered RSA-valid only if all of the following conditions hold:

(1) Semiprime Modulus

The regular gematria value must factor as:

$$n=pq,$$

where p,q are two distinct ($p\neq q$) odd primes.

(2) Fermat-Prime Exponent Constraint

The small gematria value must satisfy:

$$e\in\{3,5,17,257\}$$

(3) RSA Invertibility Condition

Let $\varphi(n)$ denote Euler's totient function. For $n=pq$,

$$\varphi(n)=(p-1)(q-1)$$

The exponent must satisfy:

$$1<e<\varphi(n) \text{ and } \gcd(e,\varphi(n))=1$$

(4) Private Signing Key Existence

When the above conditions hold, the private signing key d is defined as the modular inverse of e modulo $\varphi(n)$:

$$ed\equiv 1 \pmod{\varphi(n)}$$

If any of the above conditions fail, the candidate book name is not RSA-valid. The trial is recorded as a no-match instance and does not proceed to author selection or signature testing.

A.3 Author Selection and Identity Alignment

For RSA-valid instances, five distinct words are sampled uniformly without replacement from the same Torah vocabulary and designated as candidate author names:

- one primary author,
- four secondary authors.

The trial proceeds only if the RSA-derived private signing key d equals the regular gematria of at least one of these five candidate author names.

If no such equality occurs, the trial is discarded and recorded as a no-match instance.

This identity-alignment requirement implements the author-consistency condition described in the main text.

Appendix B. Signature Match Rules and Recording Conventions

This appendix defines the pre-declared algebraic rule families used to evaluate RSA signature outputs.

Let:

- m = regular gematria of the primary author
- s = RSA signature value of m
- For each candidate author a:
  - $a_{reg} = regular\ gematria$
  - $a_{small} = small\ gematria$

Each rule is tested against all five candidate authors (primary and four secondary).

B.1 Rule 1 — Regular Gematria Exact Power

The signature satisfies Rule 1 if:

- $s = a_{reg}^{i}$, *for some* $i \geq 1$

Label format:
REGULAR_EXACT_POWER_I{i}_COUNT{c}

where c is the number of authors (out of five) satisfying the same exponent i.

B.2 Rule 2 — Regular × Small Exact Powers

The signature satisfies Rule 2 if:

$s = author_{regular}^{i} * author_{small}^{j}$ $i, j \geq 1$

Label format:
REGULAR_MULT_SMALL_EXACT_POWERS_I{i}_J{j}_COUNT{c}

If multiple decompositions exist, the maximal regular exponent i is recorded.

B.3 Rule 3 — Regular Power with Arbitrary Multiplier

The signature satisfies Rule 3 if:

$s = k * a_{regular}^{i}, \; i \geq 1$, k >1

Label format:
REGULAR_POWER_ARBITRARY_MULT_I{i}_COUNT{c}

The multiplier k is not recorded.

Rule 3 is evaluated only if Rule 2 does not match, since Rule 2 is algebraically contained within Rule 3. If multiple exponents are possible, the maximal i is recorded.

B.4 Rule 4 — Small Gematria Exact Match

The signature satisfies Rule 4 if:

$s = a_{small}$

Label format:
SMALL_EXACT_VALUE_COUNT{c}

B.5 Rule 5 — (Regular + Small) Exact Power

The signature satisfies Rule 5 if:

$signature = (a_{regular} + a_{small})^{i}, i \geq 1$

Label format:
REGULAR_PLUS_SMALL_EXACT_POWER_I{i}_COUNT{c}

B.6 Rule 6 — (Regular + Small) Power with Arbitrary Multiplier

The signature satisfies Rule 6 if:

$$s = k * (a_{regular} + a_{small})^{i}, i \geq 1, k > 1$$

Label format:
REGULAR_PLUS_SMALL_POWER_ARBITRARY_MULT_I{i}_COUNT{c}

The multiplier k is not recorded. If multiple exponents are possible, the maximal i is recorded.

B.7 Recording Policy and Overlaps

All rule families defined above are evaluated for each of the five candidate authors in a trial.

Rule 3 (regular power with arbitrary multiplier) is evaluated only if Rule 2 (regular × small exact powers) does not match, since Rule 2 is algebraically contained within Rule 3 and would otherwise produce systematic double-counting.

No other gating conditions are applied. If a signature satisfies multiple distinct rule families, all applicable matches are recorded. Such overlaps arise only from specific numerical relationships between an author's regular and small gematria values and are treated as meaningful structural outcomes rather than filtered artifacts.

For each rule label, the COUNT{c} component records the number of candidate authors (out of five) satisfying the same rule structure within the trial. Higher values of c therefore indicate stronger multi-author agreement under that rule.

The set of all recorded labels constitutes the trial's pattern-set.

Appendix C. Subset-Support Statistic and Monte Carlo p-Value

This appendix defines the statistical procedure used to evaluate the rarity of the Torah reference outcome under the null model.

C.1 Trial Output Representation

Each trial that survives RSA-validity and identity-alignment produces a pattern-set, defined as the set of all rule labels triggered by the signature evaluation stage.

Trials that fail RSA-validity or identity-alignment produce the empty pattern-set.

Let:

- P_i denote the pattern-set of trial i.
- P_{ref} denote the pattern-set of the Torah reference case.

C.2 Subset-Support Definition

A control trial i is said to **support the reference outcome** if:

$$P_{ref} \subseteq P_i.$$

That is, every label appearing in the reference pattern-set must also appear in the control trial's pattern-set. The control may contain additional labels.

C.3 Reference Subset-Support Score

The reference subset-support score is defined as:

$$R_{ref} = \#\{\, i : P_{ref} \subseteq P_i \,\}$$

the number of Monte Carlo trials whose pattern-sets contain the full reference pattern-set.

Smaller values of R_{ref} indicate greater rarity under the null.

C.4 Symmetric Trial Scoring

For symmetry, each Monte Carlo trial i is assigned its own subset-support score:

$$R_i = \#\{\, j : P_i \subseteq P_j \,\}$$

This ensures that the reference outcome is evaluated under the same containment rule applied to all trials.

C.5 Monte Carlo p-Value

Let N denote the total number of Monte Carlo trials.

The Monte Carlo p-value is defined as:

$$p = \#\{\, i : R_i \le R_{ref} \,\} \,/\, N.$$

This definition measures how often a randomly generated trial yields a subset-support score at least as rare as the reference outcome under the same containment criterion.

Appendix D. Text Preprocessing and Anchor Extraction

All computations in this study are performed on canonical unvocalized Hebrew text. Niqqud and punctuation marks are removed prior to gematria evaluation. Final letter forms are assigned the same values as their non-final counterparts, consistent with the conventions stated in the Preliminaries.

Anchor extraction is deterministic: the “opening word” is defined as the first token of the book’s canonical opening verse under the traditional split, and the “opening verse” is defined as the full first verse under standard segmentation.

Appendix E. Implementation Notes

Monte Carlo simulations were implemented in Python 3.9. Large-scale simulations were executed in parallel for computational efficiency. Each worker process initializes its pseudorandom number generator with an independent seed to avoid overlapping random streams. Parallelization affects runtime only and does not alter the definition of the null model or the statistical procedure.

Appendix F. Conservativeness of the Single-Token Book-Name Design

The Monte Carlo pipeline restricts candidate book names to a single Torah word. This design choice is intentionally conservative.

To quantify how the number of tokens in a candidate title affects the likelihood of producing an RSA-valid parameter pair, we conducted an auxiliary experiment in which candidate titles were constructed by randomly sampling words from the Torah's distinct vocabulary and concatenating them into titles of fixed length. For each title length, **100,000,000 random samples** were generated and evaluated under the same gematria conventions and RSA-validity conditions used in the main pipeline.

The observed approximate probabilities of generating an RSA-valid system were:

Tokens in candidate title	Approximate probability of RSA-valid system
1 token	~1 in 84
2 tokens	~1 in 2,537
3 tokens	~1 in 1,149,425

These results show that the probability of producing RSA-valid parameters decreases sharply as the number of tokens increases. Restricting the null model to single-token titles therefore **raises the baseline rate of RSA-valid constructions**, making successful matches easier to obtain under the null model and thus rendering the statistical test more conservative.

To compare this restriction with real-world title structure, we analyzed Hebrew book titles from the online catalogs of the Israeli retailers **צומת ספרים** and **סטימצקי**. Titles were collected through automated catalog extraction, supplemented by approximately **150 additional titles aggregated with the assistance of Gemini 3** to broaden catalog coverage.

Titles containing non-Hebrew characters were excluded. Entire titles were also filtered out if they contained tokens associated with edition metadata, volume indicators, publishing information, format descriptors, educational materials, or marketing labels (e.g., “מהדורה”, “כרך”, “תרגום”, “קומיקס”, “תרגול”, “מבצע”). Titles longer than six tokens were excluded, and duplicate titles were removed. After applying these filters, the dataset contained **14,342 unique titles**.

The distribution of title lengths was:

Tokens	Count	Percentage
1	1,808	12.61%
2	5,793	40.39%
3	3,923	27.35%
4	1,819	12.68%
5	726	5.06%
6	273	1.90%

In this dataset, **87.39% of titles contain two or more tokens**, while only **12.61% consist of a single token**.

Consequently, the experimental design used in this study—restricting candidate book names to a single token—allows RSA-valid anchors to arise far more frequently than would occur under typical multi-token title formation. The null model therefore provides a relatively permissive baseline, reinforcing the conservative character of the statistical test.

Appendix G. Interpretive Notes

This appendix collects interpretive observations associated with several signature values reported in the main text by signing the primary author name יהו"ה. These observations are noted for context only and are not included in the Monte Carlo p-value calculation.

G.1 "Torah" RSA construction: signature value = 442

Classical Jewish sources speak explicitly in the language of a divine signature, most famously in the Talmudic statement: "חותמו של הקב״ה אמת" ("the seal of the Holy One, blessed be He, is truth"; Shabbat 55a). In this interpretive light, the value 442 is notable because it corresponds to the gematria of 441 = אמת with hakolel.

G.2 "Opening-word" RSA construction: signature value = 702

Beyond being a simple multiple of 26, the value 702 admits several additional self-referential readings. It may be written as 26 · 26 + 26, suggesting a triple appearance of 26. In addition, since hakolel adds 1 to a value, 27 may be read as "26 with hakolel," so that 26 · 27 may be interpreted as the author value multiplied by the author value with hakolel. The value 702 also equals the gematria of שבת, and the Zohar (Parashat Yitro) describes שבת as a Divine name.

״מהו שבת? שמא דקודשא בריך הוא, שמא דאיהו שלים מכל סטרא״. (זוהר פרשת יתרו)

In that sense, the appearance of 702 resonates directly with the present signature framework, since authors ordinarily sign their works with their names.

G.3 "Capital-letter opening-verse" RSA construction: signature value = 1,231

In addition to its identification in the main text as the gematria of **״עשרים וששה״**, the value 1,231 has a further numerical reduction: its Sum-of-Thousands form is 1 + 231 = 232, returning again to רל״ב.

G.4 "Center-point opening-verse" RSA construction: signature value = 1081

The center-point construction also resonates with traditional terminology: תפארת is described as עמודא דאמצעיתא ("the central pillar"), which aligns naturally with a system derived from the verse's center point. The center-point modulus itself is also suggestive: 1,351 is the regular gematria of "תורת משה," and the same value equals the combined spelling totals of "משה" across three milui schemes (446 + 450 + 455 = 1351).