

# Unified Project Archive

Extended edition: theory, equations, logic, experiments, results, assumptions, conclusions, and future work

*Compiled from the development archive on 7 April 2026*

This edition is intentionally broader and more archival than the earlier compendium. It preserves the user's mathematical ideas, prototype descriptions, recurring design logic, and tentative conclusions while clearly distinguishing between what has been observed, what has been useful as a heuristic, and what remains exploratory.

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## 1. Archive purpose and reading guide

This document is a large-scale collation of the work developed across the user's related project chats. It is not a conventional academic paper, because the archive itself is not conventional: it mixes mathematical conjecture, game design, simulation design, symbolic logic, numerical experimentation, audiovisual mapping, and artistic geometry. The aim of this edition is therefore twofold. First, it preserves the ideas in one place so they can be reviewed coherently. Second, it identifies where the archive already shows internal structure strong enough to support later formal work.

Throughout the archive, the same few structural intuitions reappear under different guises: instability as a generator rather than a flaw; zero or origin as a delayed seed rather than mere emptiness; tension and harmony as descriptions of system state; discrete and continuous representations as dual rather than opposed; and geometrical or sonic emergence as a visible manifestation of mathematical relation.

Because many formulas were proposed rapidly and experimentally, the document uses the following confidence ladder.

- Observed pattern - behaviour seen repeatedly in code, images, interaction, calculations, or user testing.
- Working heuristic - a quantity or relation that has helped organise the models, even if not yet dimensionally rigorous.
- Exploratory equation - a symbolic proposal that preserves the intended logic of the theory but should not be treated as a validated law.
- Design inference - a conclusion drawn from repeated prototype behaviour rather than from mathematics alone.

## 2. Executive synthesis

Across the entire project archive, the user's work behaves like one research programme with many interfaces. The mathematics proposes candidate relations among deviation, stability, entropy, oscillation, and propagation. The simulations ask what those relations look like when turned into motion, clustering, field flow, or traversal. The audio tools convert numerical proximity and harmonic order into sound. The games turn the same ideas into constraints, scoring, and progression.

The archive is therefore strongest when interpreted as a search for a common descriptive language rather than as a set of isolated apps. A prime explorer, a fluid field, an octagonal game, a gappy wireframe, and a trigonometric perturbation study all appear different on the surface. Yet each repeatedly uses the same verbs: emerge, propagate, drift, collide, align, defend, settle, resonate, and solidify.

The key conceptual move is that error is rarely treated as noise to be eliminated. Instead, small offsets, epsilons, rounding mismatches, phase shifts, and perturbations are treated as generative. They create asymmetry, reveal local sensitivity, or trigger state change. This is a

major unifying theme from the natural-functions work through to the geometric and game prototypes.

A second unifying move is that zero is repeatedly reinterpreted. It is not simply nothing; it is often treated as a latent threshold, a place with hidden incubation time, or a seed from which visible structure can later propagate. This does not yet constitute a formal theory, but it does act as a stable design principle across several chats.

A third unifying move is harmonic settlement. When particles overlap, when nodes synchronise, when a waveform approaches a prime-associated chord, or when a polygon section becomes defended, the desired outcome is rarely annihilation. More often it is a form of merger, resonance, shelling, or solidification. This preference appears in both the mathematics and the game-design decisions, suggesting a deep project-level aesthetic logic.

The practical conclusion is that the archive already contains a coherent conceptual framework. What it does not yet contain is a final formal model that cleanly derives the whole framework from first principles. The next phase should therefore separate preservation, formalisation, and testing into explicit workstreams.

### 3. Chronology of the project language

Phase	Summary
<b>Early conceptual phase</b>	Origin mathematics, number ordering, natural functions, odd/even role of trigonometric functions, zero as active threshold.
<b>Equation expansion</b>	Ratios of sin and cos with neighbouring exponents or roots, perturbation terms, balance and instability sketches, pi and e rounding constructions.
<b>Structural translation</b>	Definitions of tension, stability, entropy, proximity, smoothness, deviation, and equilibrium as reusable descriptive quantities.
<b>Prototype translation</b>	Prime/entropy tools, waveform explorers, symbolic systems, field and particle simulations, wireframe geometry, and polygonal games.
<b>Aesthetic reinforcement</b>	Emergence-to-tension transitions, harmonic merging, white-background geometry, gappy occlusion, shaded solidification, resonance-oriented music.
<b>Integration phase</b>	Requests to unify files, merge simulations, collate theories, and align multiple project strands into one compendium or master system.

The chronology matters because it shows that the archive did not merely accumulate random features. Instead, later simulations repeatedly inherited concepts that first appeared as speculative mathematical language. Even where the formulas remain provisional, they shaped the prototype behaviour, which in turn fed back into later equations and design decisions.

## 4. Core concepts and recurring metaphors

### 4.1 Propagation of structure

Patterns are repeatedly described as moving forward, spreading, or preserving continuity through local update. This appears in forward-propagating zero, in particles drifting toward attractors, in progression through game levels, in expanding polyhedral sequences, and in node traversal systems. Propagation is therefore broader than motion; it is the archive's general word for structured continuation.

### 4.2 Tension and stability

Tension is usually the language of deviation, stretch, mismatch, unresolved separation, or defended boundary pressure. Stability is the language of balance, smoothness, coherence, and durable settlement. The archive often treats them not as simple opposites but as coupled variables: some tension is needed for motion, but too much destroys form.

### 4.3 Error as generator

Small error terms, offsets, rounding differences, phase slips, and perturbations are not merely tolerated; they are actively introduced. Their role is to expose sensitivity and to create nontrivial evolution. This is one of the clearest recurring principles in the project.

### 4.4 Discrete-continuous duality

Primes, bit strings, tile systems, levels, and target zones belong to the discrete side of the archive. Sine waves, fields, rotation, flows, and audio buffers belong to the continuous side. The project repeatedly tries to bridge the two rather than choose between them.

### 4.5 Emergence and solidification

Visually and conceptually, the archive favours transition from faint, incubating, or fluid states into sharper, more defended, more resonant states. This move appears in polished prototype transitions, particle clustering, shaded solidification, and game chapter design.

### 4.6 Resonance and harmonisation

Overlap and interaction are often reframed from destruction into musical or structural compatibility. This is explicit in requests for combined particles to solidify, in prime-to-chord audio mapping, and in the naming logic of harmonic or resonant stages.

## 5. Theory register

### 5.1 Natural functions framework

The natural functions work asks whether familiar functions, especially sin and cos, can be treated as dynamic descriptors of natural instability rather than only as static periodic curves.

A recurring mechanism is the ratio of neighbouring powers or roots, often with small perturbation terms. These constructions are used to create comparative landscapes where local instability, scale sensitivity, and transition may become visible.

The archive does not yet supply a formal proof that such forms model a specific natural process. Their current value is heuristic and generative: they create structured behaviour and repeatedly support the user's descriptive language.

## 5.2 Propagating zero theory

Zero is repeatedly treated as a threshold with hidden latency, not simply as empty absence. In this view, visible emergence can be delayed while the system remains locally incubated.

This idea influenced both mathematics and design: delayed emergence in simulations, phase-transition aesthetics, and reconsidered number-order narratives all borrow from it.

The theory remains exploratory. Its strongest current contribution is conceptual: it suggests a way to think about origin states that is richer than static nullity.

## 5.3 Pi and e rounding / balance studies

The archive explored upper and lower truncations or roundings of pi and e, especially with digit-controlled thresholds. The interest was not merely arithmetic accuracy but whether rounding asymmetry could indicate balance, forward propagation, or useful computational thresholds.

A repeated claim in discussion was that certain m-values appeared to mark balance or the onset of forward propagation. These are not yet established theorems, but they represent a line of experimental observation worth cataloguing carefully.

This strand also linked to bit width, capacity, and the possibility of practical number-selection heuristics.

## 5.4 Structural dynamics vocabulary

Several chats proposed a symbolic physics-like vocabulary where quantities such as deviation, distance, equilibrium, proximity, diffusion, dilution, spreading, entropy, turbulence, and smoothness were related through ratios.

The intent was less to reproduce textbook mechanics than to create a reusable descriptive scaffold for many systems: particle clumps, field flow, game difficulty, and abstract stability could all be discussed using the same language.

These relations are exploratory and often dimensionless in practice. Their current strength lies in cross-domain organisation rather than in formal physics.

## 5.5 Harmonic cancellation and interval testing

Another line of work asked whether particular numbers or intervals could exhibit harmonic cancellation and whether such cancellations could be used either as descriptors or as practical computational shortcuts.

This was linked to pi-related interval accuracy, prime choices for scaling constants, and visual-audio traversal systems.

The outcome so far is suggestive but incomplete: the archive indicates promising numerical patterns, but systematic validation remains to be done.

## 5.6 Symbolic error systems and three-state logic

The archive also contains explicitly symbolic structures, where yes/no/maybe or similar constructs are used to model a system that is neither classical binary truth nor fully probabilistic calculus.

These systems matter because they show the project's willingness to treat uncertainty as structured state rather than as failure. They belong conceptually beside the epsilon-based mathematical work.

## 6. Equation register

The following register preserves the main equation families that repeatedly appeared across the archive. They are retained because they carry the project's conceptual logic, not because every expression has been validated. Wording such as 'candidate', 'heuristic', or 'exploratory' should therefore be read seriously.

Family	Representative form	Status and use
<b>Neighbouring-root trigonometric ratio</b>	$y = (\sin(x^{1/n}) + e1)/(\sin(x^{1/(n+1)}) + e2) + (\cos(x^{1/n}) + e3)/(\cos(x^{1/(n-1)}) + e4)$	Exploratory equation. Used to probe how nearby exponent scales and perturbations produce comparative instability or patterned drift.
<b>Neighbouring-power trigonometric ratio</b>	$y = (\sin(x^n + e1))/(\sin(x^{n-1} + e2)) + (\cos(x^n + e3))/(\cos(x^{n-1} + e4))$	Exploratory equation. A more aggressive scaling variant of the same conceptual idea.
<b>Neutral-function candidate</b>	$f(x) = \sin^2(x)$	Working heuristic. Proposed because it remains in [0,1] and might behave like a 'neutral' trigonometric state.
<b>Perturbed neutral ratio candidate</b>	$f(x) = (1 - \cos(x) + e1)/(\sin^2(x) + e2)$	Exploratory equation. Proposed to stabilise the neutral-function idea while retaining perturbation sensitivity.
<b>Pi truncation/ceiling constructions</b>	$\pi_{m-} = \text{floor}(10^m \pi) / 10^m, \quad \pi_{m+} = \text{ceil}(10^m \pi) / 10^m$	Observed numerical construction. Used in discussions of balance, propagation thresholds, and finite precision.
<b>Exponential-growth constant</b>	$e = \lim_{n \rightarrow \infty} (1 + 1/n)^n$	Standard identity, used in the archive as a comparison point for non-oscillatory

		growth versus oscillatory trigonometric behaviour.
<b>Forward-propagation threshold sketch</b>	$\text{err} \geq e / (\pi^{(t^2/(t_1 g n^4))})$	Exploratory equation. Used as a symbolic condition relating error, time scales, gravity-like scaling, and propagation.
<b>Scale/deviation factor</b>	$s = 1 + a d + e$	Working heuristic. Captures the idea that scale depends on distance/deviation with a small offset.
<b>Tension sketch</b>	$T \sim ((\text{distance} + e_1)/\text{entropy})/(\text{deviation} + e_2)$	Working heuristic. Encodes the idea that tension increases with separation but is modulated by entropy and deviation.
<b>Stability sketch</b>	$S \sim ((\text{proximity} + e_3)/\text{smoothness})/(\text{equilibrium} + e_4)$	Working heuristic. Encodes balance in terms of nearness, smoothness, and equilibrium.
<b>Driving-force sketch</b>	$A = (\text{deviation} - \text{distance})/(\text{equilibrium} - \text{proximity})$	Exploratory equation. Intended as an abstract resultant or drive term.
<b>Diffusion/spread-over-entropy sketch</b>	$B = (\text{diffusion} + \text{dilution} + \text{spreading})/(\text{entropy} (\text{turbulence} - \text{smoothness}))$	Exploratory equation. Structural descriptor rather than a validated law.
<b>Mass/light-speed style relation</b>	$E \sim (M - m) (c_1/c_2)^{n_5}$	Exploratory equation. Used conceptually to discuss local versus reference scales, not as established physics.
<b>Alternative resultant-force concept</b>	$F = (m/M) * (\text{acceleration}/\text{position})$	Exploratory equation. Treated as a dimensionless ratio in discussion.
<b>Chaotic rotation controller</b>	$x/y^2 + y/x^2 = A z^2$	Exploratory equation. Proposed as a tunable rotation-speed relation for wireframe dynamics.

The register above is deliberately selective. It captures the most persistent equation families, but not every one-off algebraic variant proposed during experimentation. For later formalisation,

these families should be treated as generators from which cleaner canonical forms can be derived.

## 7. Logic systems and symbolic constructions

The archive contains several attempts to rethink simple logical classification. These range from discussions of odd, even, and neutral functions to explicit yes/no/maybe systems and number decomposition schemes.

In the three-state logic work, combinations such as 'Yes and No = Maybe' were used not merely as wordplay but as the seed of a symbolic calculus in which unresolved interaction is preserved as a distinct state. This mirrors the wider project habit of refusing to collapse all uncertainty into failure.

Likewise, the discussions around odd and even trigonometric functions were extended toward the idea of neutrality: a state that is bounded, stable, or self-balanced rather than simply alternating between two symmetries.

These symbolic constructions are important for two reasons. First, they provide conceptual language for systems that do not reduce neatly to binary categories. Second, they influenced later prototype design, where intermediate states, soft transitions, and harmonic settlement became preferred outcomes.

## 8. Prototype families and experimental systems

### 8.1 Prime, binary, and entropy laboratories

Multiple HTML tools were developed to convert bit strings to decimal values, check primality, estimate entropy, find nearby primes, and turn numerical tension into audio or waveform displays.

A recurrent design goal was to make the same number legible in several domains at once: integer, binary pattern, entropy score, nearest-prime relation, waveform, and sound.

Observed result: the integrated tools were especially useful when they allowed dynamic comparison rather than one-shot answers. Playback cursors, waveform alignment, nearest-prime display, and chord mapping were all reported as meaningful improvements.

### 8.2 Sine plot and exact audio systems

The user repeatedly requested that plotted sine systems correspond directly to audible output, so that a displayed function and its sound would be the same object under two presentations.

This led to HTML tools with amplitude, frequency, phase, offset, sample count, degree/radian toggles, and exact-buffer loop generation.

Observed result: exact coupling of graph and sound improved trust in the tool. Design inference: when numerical meaning is audible, the archive's abstract formulas become easier to explore.

### 8.3 Field, particle, and fluid-style simulations

A major family of prototypes explores moving particles, fields, attractor structures, vector arrows, conserved curl/vorticity ideas, node traversal, and clustering or shell formation.

Several requests pushed these toward a unified simulation language: particles should move under harmonic energy, node systems should harmonise, attractors should be detectable, and visual trails should preserve memory.

Observed result: slower emergence and soft merging were repeatedly preferred over abrupt annihilation. This is consistent with the archive's broader harmony-over-destruction bias.

### 8.4 Polygon, octagon, and geometry games

The game work began with bouncing-ball systems inside polygons and evolved toward a more distinctive geometric title with target zones, level progression, constrained corner movement, and staged audiovisual presentation.

Mechanically, this work investigates how geometry, player intervention, and scoring can create tension without chaos. Anti-exploit rules, movable-corner limits, target non-overlap, and ball-resume systems all belong to this effort.

Observed result: the most successful game revisions were those that constrained easy exploits while preserving a feeling of graceful geometric evolution.

### 8.5 3D wireframe and gappy occlusion systems

Another rich prototype family concerns rotating wireframes on a white background with line gaps where rear segments are occluded by front segments.

The project repeatedly refined gap carving, depth weighting, line thickness, bulging or breathing motion, and eventually the addition of shaded solidification using the outer shell of the point set.

Observed result: the hybrid of wireframe and shaded shell produced a strong aesthetic identity. The user named one of these pieces 'Polygone', which marks this line as a particularly successful convergence of mathematics, art, and system design.

### 8.6 Visual-art translation and structure extraction

Image-based work was often converted into abstract line or geometric systems rather than being treated as an endpoint. The user repeatedly asked for art to be summarised, rendered as geometric edge structures, or translated into 3D-like forms.

Design inference: for this archive, art is often a generator of geometry rather than a separate track.

## 9. Cross-project observations and provisional results

- Repeated observation: transitions matter as much as endpoints. Users repeatedly preferred slow incubation, easing, and phase change over abrupt switching.

- Repeated observation: exploit-resistant gameplay emerges when geometry is constrained but still expressive. Systems with unlimited free repositioning tended to become gameable or structurally trivial.
- Repeated observation: audio becomes more convincing when it reflects exact system state rather than decorative accompaniment.
- Repeated observation: particle overlap was more satisfying when it led to merger, hardening, or shell formation rather than disappearance.
- Repeated observation: white-background greyscale geometry with careful line handling produced a strong and recognisable project aesthetic.
- Repeated observation: large integrated files were often more useful than many fragmented mini-tools, provided the interface remained readable.
- Provisional result: perturbation-based equations are especially valuable as generators for landscapes and behaviours, even before their theoretical status is settled.
- Provisional result: the archive's mathematical and design work support one another. Equations generate metaphors for prototypes, while prototype behaviour feeds back into which equations feel meaningful.
- Provisional result: certain numerical studies around pi, rounding, and cancellation produced enough recurring interest to justify a dedicated formal verification stage.

## 10. Assumptions, caveats, and methodological limits

The archive mixes formal mathematics, heuristic modelling, artistic design, and gameplay experimentation. These should inform one another, but they are not interchangeable forms of evidence.

Many equations in the archive are structurally meaningful but not dimensionally grounded. They are valuable as part of the theory language, yet they should not be presented externally as established physical law without careful revision.

The project often uses analogy deliberately. Attractor formation, prime proximity, harmonic settlement, and defended polygons may behave similarly at a descriptive level without being mathematically identical.

Prototype success is not proof of theoretical truth. A simulation can be compelling because it realises the project's logic well, even if the underlying equation remains exploratory.

Conversely, a speculative equation may still deserve preservation if it repeatedly generates coherent patterns or motivates successful experiments.

The archive is also shaped by aesthetic preference. White backgrounds, greyscale lines, soft transitions, and harmonic mergers are not neutral design choices; they embody the user's wider conceptual taste.

## 11. Conclusions to date

The archive already constitutes a coherent body of work. Its coherence lies less in finished theorem proving and more in the repeated return of the same structural ideas across very different media.

The most durable conceptual triad appears to be instability, propagation, and harmonisation. Error perturbs a state, propagation carries the structure forward, and harmonic settlement determines whether the system survives, merges, or solidifies.

Mathematically, the archive's strongest motifs are perturbation, neighbouring-scale comparison, thresholding, and bounded neutrality. Visually, its strongest motifs are emergence, shelling, and occlusion-aware geometry. Sonically, its strongest motifs are exact state mapping and resonance.

The archive therefore seems ready for a new stage: not more isolated invention alone, but selective formalisation of the best families while preserving the exploratory breadth that made the work fertile in the first place.

## 12. Further work and recommended programme

Workstream	Reason
<b>A. Canonical equation set</b>	Reduce the many algebraic variants to a smaller family of canonical equations with clearly defined symbols, domains, and intended interpretations.
<b>B. Numerical verification</b>	Run systematic tests on the pi/e rounding ideas, harmonic cancellation candidates, and prime-selection heuristics over larger ranges.
<b>C. Dimensional audit</b>	Separate purely symbolic equations from those intended as physical analogies, and check which can be made dimensionally consistent.
<b>D. Simulation benchmark set</b>	Choose a handful of reference simulations - field clustering, unified node system, octagonal game, Polygone - and document their governing parameters and observed behaviours.
<b>E. Audio mapping framework</b>	Standardise how structural tension, prime adjacency, node traversal, and field energy map to pitch, rhythm, timbre, or harmony.
<b>F. Archive chronology</b>	Produce a versioned historical appendix that traces key concepts and files across time.
<b>G. Formal paper track</b>	Develop one or two narrower papers from the archive, for example on natural functions/instability or on structural dynamics vocabulary.
<b>H. Design bible</b>	Capture the visual and interaction principles that recur across the best prototypes so future builds feel recognisably of the same project family.

## Appendix A. Compact glossary

**Deviation:** Distance from a preferred or balanced state.

**Equilibrium:** A reference or balancing condition toward which a system may tend.

**Proximity:** Nearness to a stable or target condition.

**Entropy:** A broad archive term for disorder, spread, dilution, or loss of local coherence.

**Smoothness:** A descriptive measure of regularity, continuity, or low turbulence.

**Tension:** A structural expression of unresolved separation or stress within a system.

**Resonance:** A state of reinforced compatibility, often sonic, geometric, or dynamical.

**Solidification:** A transition from diffuse or soft structure into a hardened or defended shell.

**Neutrality:** A bounded, self-balanced, or symmetry-mediating state.

**Propagation:** Structured continuation of a state through time, space, or update rules.

## Appendix B. Equation shortlist

1. **Neighbouring-root trigonometric ratio.**  $y = (\sin(x^{1/n}) + e1)/(\sin(x^{1/(n+1)})) + e2) + (\cos(x^{1/n}) + e3)/(\cos(x^{1/(n-1)})) + e4$  - Exploratory equation. Used to probe how nearby exponent scales and perturbations produce comparative instability or patterned drift.
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3. **Neutral-function candidate.**  $f(x) = \sin^2(x)$  - Working heuristic. Proposed because it remains in  $[0,1]$  and might behave like a 'neutral' trigonometric state.
4. **Perturbed neutral ratio candidate.**  $f(x) = (1 - \cos(x) + e1)/(\sin^2(x) + e2)$  - Exploratory equation. Proposed to stabilise the neutral-function idea while retaining perturbation sensitivity.
5. **Pi truncation/ceiling constructions.**  $\pi_{m-} = \text{floor}(10^m \pi) / 10^m$ ,  $\pi_{m+} = \text{ceil}(10^m \pi) / 10^m$  - Observed numerical construction. Used in discussions of balance, propagation thresholds, and finite precision.
6. **Exponential-growth constant.**  $e = \lim_{n \rightarrow \infty} (1 + 1/n)^n$  - Standard identity, used in the archive as a comparison point for non-oscillatory growth versus oscillatory trigonometric behaviour.
7. **Forward-propagation threshold sketch.**  $\text{err} \geq e / (\pi^{t2/(t1 \cdot n^4)})$  - Exploratory equation. Used as a symbolic condition relating error, time scales, gravity-like scaling, and propagation.
8. **Scale/deviation factor.**  $s = 1 + a \cdot d + e$  - Working heuristic. Captures the idea that scale depends on distance/deviation with a small offset.
9. **Tension sketch.**  $T \sim ((\text{distance} + e1)/\text{entropy})/(\text{deviation} + e2)$  - Working heuristic. Encodes the idea that tension increases with separation but is modulated by entropy and deviation.

10. **Stability sketch.**  $S \sim ((\text{proximity} + e3)/\text{smoothness})/(\text{equilibrium} + e4)$  - Working heuristic. Encodes balance in terms of nearness, smoothness, and equilibrium.
11. **Driving-force sketch.**  $A = (\text{deviation} - \text{distance})/(\text{equilibrium} - \text{proximity})$  - Exploratory equation. Intended as an abstract resultant or drive term.
12. **Diffusion/spread-over-entropy sketch.**  $B = (\text{diffusion} + \text{dilution} + \text{spreading})/(\text{entropy} (\text{turbulence} - \text{smoothness}))$  - Exploratory equation. Structural descriptor rather than a validated law.
13. **Mass/light-speed style relation.**  $E \sim (M - m) (c1/c2)^{n5}$  - Exploratory equation. Used conceptually to discuss local versus reference scales, not as established physics.
14. **Alternative resultant-force concept.**  $F = (m/M) * (\text{acceleration}/\text{position})$  - Exploratory equation. Treated as a dimensionless ratio in discussion.
15. **Chaotic rotation controller.**  $x/y^2 + y/x^2 = A z^2$  - Exploratory equation. Proposed as a tunable rotation-speed relation for wireframe dynamics.

## Appendix C. Suggested formalisation roadmap

- Stage 1 - Preservation: lock a stable archive of equations, prototype descriptions, and terminology.
- Stage 2 - Canonicalisation: reduce variant equations to a smaller, labelled family.
- Stage 3 - Testing: create numerical and simulation-based experiments with reproducible settings.
- Stage 4 - Interpretation: decide which symbolic relations are metaphors, which are useful heuristics, and which might support formal claims.
- Stage 5 - Publication-quality write-up: produce one rigorous long-form paper and one design/experiments companion document.

## Extended archive notes by domain

### Archive note 1. Natural functions and instability

This strand holds the strongest concentration of explicit equation-making. It explores whether trigonometric functions, especially when perturbed by small error terms and compared across nearby exponents or roots, can act as descriptions of instability, growth, and scale transition. The important archive result is not a final proof but a stable family of candidate forms that kept resurfacing as useful generators.

### Archive note 2. Zero, origin, and hidden incubation

Several chats treat zero as a threshold with internal preparation rather than as empty nothing. This idea fed directly into later visual decisions: delayed emergence, bloom phases, soft transition states, and the sense that visible structure may appear only after an unseen interval of organisation.

### Archive note 3. Pi, e, and finite precision

The rounding studies around pi and e reveal a repeated concern with balance under finite representation. The interest was partly numerical and partly philosophical: how much

asymmetry enters when a constant is truncated, rounded, or bounded, and can that asymmetry itself become informative? This remains one of the clearest candidates for disciplined numerical follow-up.

#### **Archive note 4. Prime adjacency and binary structure**

The prime-picking work repeatedly connected binary strings, decimal values, entropy, primality, nearby primes, and sound. A significant design achievement here was making one number legible through several simultaneous representations, allowing mathematical inspection and aesthetic response to happen together.

#### **Archive note 5. Audio as exact state mapping**

The archive consistently preferred audio that was structurally tied to the visible system rather than loosely decorative. Exact waveform playback, prime-resonance triggers, and chord changes based on numerical approach all support the idea that sound in this project is a mode of measurement as much as a mode of presentation.

#### **Archive note 6. Field clustering and harmonic energy**

The node, field, and particle simulations gave the archive a dynamical laboratory. They tested whether drift, attraction, clustering, trails, and soft merging could serve as visible analogues of the mathematical language. Requests for attractor classification, harmonic layering, and preserved vorticity indicate a desire to move from pretty motion toward interpretable dynamics.

#### **Archive note 7. Polygonal defence and game logic**

The octagon game work translated theory into rules. Target overlap, corner movement limits, exploit prevention, defended boundaries, and progression by increasingly complex shapes all turned abstract notions of tension, equilibrium, and local intervention into player-facing mechanics. The game strand is especially valuable because it stress-tests the theory against human behaviour.

#### **Archive note 8. Gappy wireframe and occlusion**

The wireframe experiments established one of the archive's clearest visual signatures: white ground, thin grey structure, depth-sensitive line treatment, and deliberate absence where form is hidden. The later addition of shaded outer shells showed that the project can reconcile skeletal structure with solid presence without losing its identity.

#### **Archive note 9. Integrated build preference**

Across many chats, the user repeatedly preferred merged systems over fragmented ones: one HTML with theory and simulation together, one lab with waveform and prime analysis together, one unified file rather than many small tools. This is not merely a workflow preference; it reflects the project's deeper belief that discrete components should reveal a common structure when placed together.

## Archive note 10. Naturalness as evaluation criterion

Again and again, successful revisions were described as feeling more natural. In the archive this word functions almost like an internal metric. A natural system is one whose rules, transitions, pacing, and visual consequences align with the broader theory language of emergence, tension, propagation, and harmonisation. Preserving that criterion will matter in any future formalisation.