

Naming the Shape of a Loudness: A Form Codex for Field Material

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Ideamorphic Studies Papers — codex

A loudness envelope always admits a best-fitting curve, and a best fit always has a sign; a rule that reads that sign unconditionally will name a dome in pure noise. This paper specifies a rule that does not, and freezes it as the Form Codex for Field Material, version 1.0. The envelope is cut into segments, a quadratic is fitted to each, and the segment is named only if the amplitude of that curve clears twice the standard deviation of its own residual: below that bar it is DROITE, straight, whatever the sign of its curvature. Four rules tried and withdrawn are recorded, including two that manufactured shape from noise on every recording tested. On the executions to date, eight segments in eighteen carry no nameable shape — forty-four per cent, reported rather than resolved. The paper's own result is that this refusal is the instrument: DROITE is an answer and not a failure, and the rule can give it only because the threshold was fixed before the material was seen. Where the rhythm codex reports the distance between its output and the given as a number, this one uses that distance — the residual of its own fit — as a threshold instead, trading a reportable number for the capacity to decline.

A deterministic rule that reads a recording as a sequence of curve segments — and refuses to name a shape whose amplitude is below its own noise.

Arnaud Quercy — *Ideamorphic Studies*

Ideamorphic Studies Papers, PUB-PAP0012 — Specifies the Form Codex for Field Material, version 1.0

1. What This Paper Does

A fragment of sound can be made to yield three different things: a set of pitches, a rhythm, or a sequence of forms. Three rules, one material. They are specified separately, and this paper covers the third — the rule that takes a fragment and returns a sequence of shapes.

The separation rests on the decision declared in Note 01: a mode is a ruled space, individuated by its rules and not by the sensory channel ^[1]. That decision is not an established result, and nothing here depends on the part of it that is scheduled to reopen.

The paper states the rule in full, names its frozen parameters, records the rules tried and withdrawn, and declares the scope of the evidential protocol. Its own result is negative and is the reason the rule has the shape it does: on the executions to date **eight segments in eighteen carry no nameable shape at all**, their amplitude standing below their own noise. The rule reports that rather than resolving it, and §10 says why that refusal is the whole instrument. Five scopes is not a corpus.

2. Why the Instrument Exists

The companion specifications ^[2] ^[3] return a pitch structure and a notated rhythm. Neither says anything about the arc of a fragment — whether it swells, sags, rises through, or holds level. That arc is what a sculpture made from a recording has to carry, since a sculpture has no time in which to sound: what crosses into it is a profile, not a sequence.

The requirement is therefore a *series* of shapes and not one. A single description of a whole fragment is not a schema of it but an average of it, and averages of arcs cancel.

The rule also has to be able to say nothing. A loudness envelope always admits a best-fitting curve, and a best fit always has a sign; a rule that reads that sign unconditionally will name a dome in pure noise. Most of what this specification does is stop that.

A recording has no form. The rule assigns one, or declines to. That is not a discovery about the recording; it is an institution, and it binds only the emitter ^[4].

3. The Rule

Stated completely, so that it can be re-executed without access to the code.

Input. One recording; optionally a time range within it; and a number of segments. The segment count is a decision of the emitter about the material, like the choice of range — the rule is unchanged by it, but the result is not, since it fixes the scale at which shape is being asked for. It is recorded with every execution. Five is the default and is not a stipulation.

Step 1 — Loudness envelope. Decode to mono at 22 050 Hz. Take non-overlapping frames of 50 ms, and for each take the RMS of the samples, expressed in dB. Smooth the resulting curve with a moving average 300 ms wide, so that a single transient cannot bend a segment.

Step 2 — Cut. Divide the envelope into the requested number of segments of equal length. Refuse the whole execution if the envelope holds fewer than six frames per segment; skip any segment left with fewer than four points.

Step 3 — Fit. On each segment, map the time axis onto the interval -1 to $+1$ and fit a quadratic by least squares, giving a curvature c_2 , a slope c_1 and a constant.

Step 4 — Measure the segment's own noise. The **amplitude** is the range of the fitted curve across the segment — its maximum minus its minimum. The **noise** is twice the standard deviation of the residual: how far the envelope wanders from the curve drawn through it. Both are in dB, and both belong to that segment alone.

Step 5 — Name the shape, in this order.

1. If the amplitude is below the noise, the segment is **DROITE** — straight. This test comes first and overrides everything after it.
2. Otherwise, if $|c_2| \geq |c_1|$, the segment is curved: **CONCAVE** if $c_2 < 0$, **CONVEXE** if $c_2 > 0$.
3. Otherwise it is directional: **MONTÉE** if $c_1 > 0$, **DESCENTE** if $c_1 < 0$.

The convention is stated because it is easy to invert: **CONVEXE opens upward — a bowl — and has positive curvature. CONCAVE opens downward — a dome — and has negative curvature.** This is the mathematical sense, and it is the reverse of ordinary French usage, where *convexe* bulges and *concave* hollows. A segment this rule calls *convexe* is what a sculptor would call *creux*. The record carries the mathematical term alone; the work's stratum reads it under this convention or misreads it. A straight segment is a result and not an absence.

4. The Frozen Parameters

Seven values fix the rule. Changing any of them changes the codex and must produce a new version rather than a silent rewriting of past results. The segment count is an input, not one of the seven.

Parameter	Value	Why this value
Analysis rate	22 050 Hz	The envelope needs no bandwidth; the rate is inherited from the companion rules so that one decode serves all three.
Envelope frame	50 ms	Fine enough to follow a swell, coarse enough that a syllable is not a feature.
Smoothing window	300 ms	A single transient must not bend a segment. This is the parameter that decides what counts as an arc rather than an event.
Fit degree	2	The lowest degree that can distinguish a dome from a ramp. Higher degrees fit noise.
Noise factor	$2 \times \text{residual } \sigma$	The bar an amplitude must clear to be named. Two is a stipulation, and a stricter one would silence more segments than it should.
Minimum frames per segment	6 (300 ms)	Below this the fit has nothing to fit; the execution is refused rather than approximated.
Minimum points to fit	4	A quadratic needs three; the fourth is what makes a residual meaningful.

The noise factor and the smoothing window are stipulations. They were not derived and they are not optimal in any sense the instrument can establish.

5. What the Instrument Records

For each execution: the version of the codex; the segment count requested; the seven parameters; the sequence of shape names as one readable string; and, per segment, its index, its start and end **on the file's own timeline**, its shape, its curvature, its slope, its amplitude in dB, its noise in dB, and its mean level in dB.

Since 29 August 2026, every execution also carries two blocks that belong neither to the frozen parameters nor to the output. **The recording**: its path, the SHA-256 hash of the file and its duration — what tells two takes apart once a result has left its node, and what catches a long take that loops. **The execution**: the emitter's decisions on that material — the range analysed, as start and end **on the file's own timeline**, the transposition in semitones, the onset detector and the number of shape segments. None of these is a parameter of the codex and none is a result; without them a transposed or trimmed result could not be replayed. Executions made before that date carry neither block.

Recording the amplitude and the noise separately is what makes the result auditable. A shape name alone cannot be reread later against the margin by which it was earned.

Reference values, five scopes, eighteen segments:

Scope	Segments	Sequence
A	2	concave · concave
B	5	droite · droite · droite · droite · convexe
C	2	convexe · droite
D	7	concave · droite · convexe · convexe · montée · droite · droite
E	2	concave · descente

Of the eighteen segments: four concave, four convexe, one montée, one descente — and **eight droite**. Forty-four per cent of the segments carry no nameable shape.

That is not a failure of the executions. It is the measurement. Scope B is a long recording whose first four fifths hold level inside their own noise and whose last fifth does not; a rule without the noise test would have reported five shapes there, and four of them would have been invented.

6. What the Instrument Does Not Record

No shape for the whole fragment. The rule returns a series. There is no summary curve, and the sequence must not be collapsed into one, for the reason §7 gives.

No shape below the noise. A segment whose amplitude does not clear twice its residual is named straight, whatever the sign of its curvature. The sign still exists in the record — curvature and slope are always written — but it is not read.

No comparison between recordings. Amplitude and noise are both in dB relative to nothing outside their own segment. Two segments called *concave* in two recordings are not thereby comparable in depth.

No cause. The rule says a segment swells; it does not say what swelled. Nothing in the envelope distinguishes a passing vehicle from a crowd from a change of microphone position.

No verdict on aptness. A stipulated rule is neither true nor false ^[5]. What is available is the extent of its execution.

7. Rules Tried and Withdrawn

Four, each recorded with what ended it.

One parabola over the whole selection. The first rule fitted a single curve to the entire range. It flattens everything inside: a passage that swells, drops and swells again reports as straight, because the two swells cancel against the dip. What comes back is the average of the arc and not its schema. Cutting into segments and fitting each is the whole of the repair.

Working on the accents rather than the envelope. Fitting a curve through the loudness of the detected accents is more direct and uses material the rhythm rule already produces. With four or five segments there are too few accents inside each to fit anything stable, and the shape changed with the accent selection rather than with the sound. The envelope is dense by construction.

Anchoring the fit at the endpoints and z-scoring the envelope. Normalising each segment before fitting makes segments comparable, and pinning the curve to the first and last points makes it follow the passage. Together they manufacture shape from noise: every segment came back **convexe** — a bowl — on every recording tested. Normalisation had rescaled the noise up to the size of a signal, and the anchoring had made it bend. Both withdrawn, and the noise test of Step 5 exists because of them.

Naming a shape without a noise floor. Applied to a ring road recorded from a car, the unguarded rule returned a confident dome. Its amplitude was below its own residual: the arc was smaller than the wandering of the envelope around the curve claimed to describe it. Nothing distinguished it from a straight line with noise on it. This is the single most consequential correction in the specification, because the rule without it is never wrong and never says anything.

8. Three Strata, and the Scope of the Protocol

The division into strata is Note 04's — acquired technique, stipulated codex, enacted idea of the work ^[6]. The first term is replaced here as in the companion specifications, and the replacement is a debt to Note 05: *the given* is what a sensor measures at the surface **without the codex**, and *the instituted* is the rule that elects relations within that surface, which only the divulged codex deciphers ^[7].

The given — the loudness envelope of the file at the declared frame. A fact of the file.

The stipulated codex — the smoothing, the degree of the fit, the noise factor, the decision order. It produces the residual, the amplitude of each segment, and the sequence of names.

The idea of this particular work — how many segments to ask for, what the sequence becomes in a sculpture, what the practitioner's notes say the fragment is. Not deduced.

Note 05 attaches a condition to any gap between a rule and its realization: it is a measurable magnitude only where the **arrival** material carries a metric ^[7]. Here the position is different from both companions. The arrival material is a sequence of names — a nominal scale, which carries no metric at all — so the gap Note 05 measures cannot be formed on the output.

What the rule does have is another quantity: the residual against which each amplitude is judged — the distance between the curve the rule draws and the envelope it draws it on — and instead of being reported as a gap it is used **inside** the rule, as the bar a shape must clear to be named. The amplitude-to-noise ratio of each segment is written into every record, so the quantity survives even though the output is nominal.

That is the honest form of the position, and it is worth stating plainly rather than presenting the rule as measurable: this codex converts a measurable distance into a threshold. What it gains is a rule that can decline; what it gives up is the gap as a reportable number.

The evidential protocol reads the first stratum only.

9. The Chain of Gaps

- from the recording to the range chosen within it, and to the number of segments asked of it — the two links entirely the practitioner's, and the two the rule takes as given;
- from the event in the room to the microphone;
- from the microphone to the encoded file, with its lossy compression;
- from the file to the decoded range;
- from the range to the envelope, through a 50 ms frame and a 300 ms smoothing that decide what is an arc and what is an event;
- from the envelope to the fitted curve, whose residual is measured and then **consumed rather than reported** — it becomes the threshold of Step 5 instead of a quantity the record carries as a gap;
- from the curve to the name, through a threshold and an ordering that are both stipulated.

Each link displaces. None can be isolated without an apparatus that does not exist.

10. What the Device Contributes, and the Question It Makes Askable

The contribution is a refusal, and it is the only one of the three rules that has one.

DROITE is not a failure. §3 states it as a result and §8 as a capacity: the rule, asked for a shape, answers that there is none to give, and it can answer that only because the threshold was fixed before the material was seen. The reported forty-four per cent is therefore not a defect rate. It is the proportion of the material the rule declines to name — and a rule that always returns a name would have reported eighteen shapes where eight are unearned.

Note 04's typology turns on the observation that a correctly applied *function* cannot fail, whereas a codex can, and that naming the mode of failure is part of specifying one. The Codex of the Feigned Tongue names its own: a flat curve, a homogeneous stratum without intention, a fault that violates no rule. This rule's mode of failure is not DROITE, which is an answer. It has two, and both belong in the specification. The declared one is Step 2's **refused execution** — fewer than six frames per segment, where nothing at all is returned. The undeclared one is worse because the rule cannot signal it: if the smoothing window is what produces the straight segments, then the rule is naming the scale at which it looks rather than the material it looks at, and every record it writes will look correct.

That second failure is testable, and naming it is what makes the question below a question rather than a caveat. Two of the seven parameters decide it — **the smoothing window**, which raises amplitudes as it widens, and **the noise factor**, which sets the bar those amplitudes must clear. Varying them against a fixed corpus would say whether *droite* is a reading of the recording or an artefact of the scale at which it is read.

Five scopes cannot answer it. The instrument records the amplitude and the noise separately so that a corpus can.

11. What This Paper Does Not Claim

The instrument names the shape of a loudness envelope under a stipulated rule. It establishes nothing about the recording's content, nothing about how a work made from it is received, and nothing about whether the rule is apt.

It does not claim that a segment named *concave* is heard as a swell. The envelope is a measurement, and no perceptual claim is attached to it anywhere in the specification.

It does not claim that eight straight segments in eighteen is a stable proportion. It is what five scopes gave, at the segment counts that were asked for, under one smoothing window.

The rule changed repeatedly while it was being built, until it stabilised in July 2026 for the works of the exhibition *Mémoire Urbaine et Collective* (Orangerie du Sénat, Paris, 28 August – 8 September 2026). This paper, published later, fixes it as version 1.0. Any change to the seven values, or to Steps 1 to 5, produces a new version; a result stays attached to the version that produced it, and nothing already executed is rewritten.

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