

Abstraction Metrics II

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Abstract Metrics Methodology

Here is a document on deriving visual artworks' abstraction metrics. Comment on the methodology.

Your methodology is more serious than it might first appear—it's not just a set of ad-hoc image statistics, but an implicit **theory of abstraction as a measurable degradation (or transformation) of structured visual information**. That's a strong foundation. That said, there are a few important strengths, gaps, and conceptual tensions worth addressing.

1. Core Strength: A Coherent Definition of Abstraction

The document's central premise—

“Abstraction is the loss of predictable structure”

—is excellent. It aligns with:

- information theory (loss of compressible structure),
- perception (reduced object recognition cues),
- and art history (movement from depiction → field).

Crucially, all four primary metrics (EDR, CE, SVH, TDI) are **operationalizations of that idea from different angles**:

- **EDR** → structural boundaries
- **CE** → distributional unpredictability
- **SVH** → spatial instability of color meaning
- **TDI** → directional coherence of form

That multidimensionality is exactly right. A single scalar “abstraction number” would be naïve; your framework avoids that.

2. Methodological Strength: Orthogonality (Mostly)

The metrics are *nearly orthogonal*, which is rare and valuable:

- **Edge Density** and **Texture Directionality** both relate to structure, but at different scales (edges vs. fields)
- **Color Entropy** is distributional (global)
- **Hue Variance** is spatial (local relationships)

This gives you a **feature space**, not just a score. That's what allows meaningful comparisons like:

- “structured complexity” (high EDR + high TDI)
vs.
- “atmospheric abstraction” (low TDI + high SVH)

That's a real analytical vocabulary emerging.

3. Hidden Assumption: All Structure Is Representational

Here's the first major conceptual issue.

Your system implicitly assumes:

More structure → more representation
Less structure → more abstraction

But that's not always true in painting.

Counterexample:

- A Mondrian grid has **very high edge density and directionality**, but is maximally abstract.
- A softly rendered realist painting may have **low edge density**, but be highly representational.

Implication:

Your metrics don't measure *abstraction directly*—they measure:

type of structure, not representational intent

This shows up in your own Bee Balm result, where early soft states scored as “more abstract” by EDR for the wrong reason.

Fix:

You need a distinction between:

- **Semantic structure** (object-recognizable)
- **Formal structure** (pattern, rhythm, repetition)

Right now, your metrics only see the latter.

4. Missing Dimension: Recognizability / Semantic Legibility

This is the biggest gap.

None of your metrics capture:

Can a viewer identify what this is?

But that is central to abstraction.

What's missing:

- Object detectability
- Shape coherence
- Figure-ground stability

Possible additions:

- **Segmentation stability**: how cleanly the image partitions into regions
- **Shape coherence index**: persistence of contiguous forms
- **Recognition proxy**: similarity to a simplified model (your SBI gestures toward this but is underdeveloped)

Your **Structural Breakdown Index (SBI)** is actually the most important idea in the document—but it's the least formalized. That's where the real advance could happen.

5. Ambiguity in Metric Interpretation

Some metrics flip meaning depending on context:

Edge Density (EDR)

- High → representational (classically)
- High → abstract (in Pollock-like fields)

Color Entropy

- High → abstraction (distributed color field)
- High → realism (complex natural scenes)

So these are not absolute indicators—they are **context-dependent signals**.

What you need:

A shift from:

“This metric measures abstraction”

to:

“This metric participates in a pattern that correlates with abstraction under specific conditions”

That suggests using:

- clustering
- comparative baselines (within your own work)

rather than absolute thresholds.

6. Strength: Applicability to Your Actual Practice

Where this methodology really succeeds is not in universal art theory, but in **intra-artist analysis**.

It works extremely well for:

- tracking *your* progression within a painting
- comparing *your* works against each other
- identifying when *you* cross your own abstraction threshold

That's because the system is internally consistent even if not universally generalizable.

In other words:

It's a **personalized metric space**, not a universal ontology.

That's not a weakness—it's actually how most meaningful artistic metrics end up functioning.

7. The Most Promising Direction: Field vs. Object Duality

Your work (and your metrics) are circling a deeper distinction:

Object-based image vs. field-based image

You're already measuring this implicitly:

- Objects → edges, directionality, clustered hues
- Fields → entropy, variance, isotropy

If you formalize that as a **two-axis model**, you get something powerful:

- X-axis: **Structural coherence (objectness)**
- Y-axis: **Field complexity (distributional richness)**

Your paintings then occupy positions in this space, rather than being ranked linearly.

That would resolve many of the current ambiguities.

8. Overall Assessment

What's strong:

- Clear theoretical anchor (loss of structure)
- Multi-metric approach
- Computationally grounded
- Highly effective for comparative analysis within a body of work

What needs refinement:

- Separation of **formal vs. semantic structure**
 - Development of **SBI (recognition/structure model)**
 - Context-sensitive interpretation of metrics
 - Moving from scalar ranking → multidimensional positioning
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Bottom Line

Your methodology is already functioning as a **proto-framework for computational aesthetics tailored to painterly abstraction**.

Its real value is not in producing a single “abstraction score,” but in:

mapping how a painting transitions from object to field, and how different kinds of structure persist or dissolve along the way.

If you push further, the next breakthrough isn't another metric—it's:

a model of how structure changes *type*, not just *amount*.

That's where this becomes genuinely original rather than just technically competent.

Methodology Application

Here is a watercolor entitled *Diaphanous Dogwood*, 15x11 on hot-press 300lb. Can you apply the abstraction metrics methodology and enhance it with the missing dimension: **Recognizability / Semantic Legibility**. I've been collecting these metrics on my botanical watercolors, they have a lot in common technically, ambiguity shouldn't be an issue or it will be an issue consistently across the set of works measured.

What's useful here is that this painting is *not* ambiguous in the way that breaks your system—it's internally consistent with your other botanicals—so we can safely extend your metric framework rather than question it.

I'll do two things:

1. Apply your four-metric model qualitatively (in the same computational spirit)
 2. Add a **fifth metric: Recognizability / Semantic Legibility (RSL)** and integrate it into a composite interpretation
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1. Four-Metric Abstraction Profile (Applied)

Edge Density Ratio (EDR) — Moderate

- Petal boundaries are often **soft or lost**, especially where whites bleed into the ground
- However, **branch structures** (dark, linear) create strong edge anchors
- Interior petal striping adds micro-edges but low contrast

Interpretation:

You have a **dual system**:

- low-edge fields (petals)
- high-edge scaffolding (branches)

→ This places the work in **mid-range edge density**, but *non-uniformly distributed*

Color Entropy (CE) — Moderate–High

- The palette is restrained (blues, whites, greens, warm dark ground)
- But entropy is increased by:
 - subtle temperature shifts (cool/warm whites)

- interleaving of blues, violets, yellows within petals
- irregular distribution of accents (greens, pinks)

Interpretation:

Not chaotic, but **richly varied within a controlled gamut**

→ “structured entropy” rather than full-field randomness

Spatial Variance in Hue (SVH) — High

- Hue does not stay “logically contained”:
 - blues appear across petals, not just shadow zones
 - warm notes drift into cool petals
 - greens punctuate unexpected areas
- The background is relatively stable, but the **figure (flowers)** is highly variable

Interpretation:

Strong **internal hue migration within forms**

→ pushes toward abstraction even while forms remain legible

Texture Directionality (TDI) — Low–Moderate

- Petals: largely **non-directional, isotropic washes**
- Branches: **strong directional lines**
- Petal striping introduces *local* directionality, but it is not globally coherent

Interpretation:

Overall field leans toward **non-directional**, interrupted by linear structure

→ again, a hybrid system

2. New Metric: Recognizability / Semantic Legibility (RSL)

Let’s formalize this carefully, since this is your missing dimension.

Definition (Operational)

RSL measures:

The stability and clarity of identifiable forms under perceptual grouping

We can break it into three subcomponents:

A. Shape Coherence

- Petals maintain **closed, readable silhouettes**
- Overlaps are clear, not ambiguous

→ **High**

B. Figure–Ground Separation

- Strong contrast: light petals vs dark ground
- Branches act as connectors but do not collapse the figure

→ **Very High**

C. Part-to-Whole Integration

- Individual flowers are legible
- The cluster reads as a coherent botanical system

→ **High**

RSL Score (Qualitative Composite): HIGH

Despite abstraction in color and internal structure, the painting is:

immediately and persistently readable as dogwood blossoms

This is critical:

- Recognition does not degrade under prolonged viewing
 - No perceptual “collapse” into pure pattern
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3. Where This Painting Sits in Your System

Now we can place it relative to your other works conceptually:

Metric	Behavior
Edge Density	Moderate, bimodal (soft petals / hard branches)
Color Entropy	Moderate–high, controlled
Hue Variance	High (within-form instability)
Directionality	Low–moderate
Recognizability (NEW)	High

4. Key Insight: Decoupling Structure from Recognition

This painting demonstrates something important for your methodology:

You can reduce structural clarity *inside* forms without reducing recognizability of the forms themselves.

In other words:

- **Structural abstraction $\neq$ semantic abstraction**

You are:

- dissolving **internal structure** (color logic, edge coherence)
 - while preserving **external structure** (silhouette, grouping)
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5. Revised Conceptual Model

With RSL added, your system becomes much stronger if you treat it as **two interacting layers**:

Layer 1: Formal Abstraction

- EDR

- CE
- SVH
- TDI

Layer 2: Semantic Stability

- RSL
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6. What This Painting Is, Precisely

In your expanded framework, this work is:

High semantic stability + high internal chromatic abstraction + moderate structural scaffolding

Or more intuitively:

A legible botanical system whose internal visual logic behaves like an abstract field

7. Why This Matters for Your Oeuvre

Compared to your earlier analyses:

- **Lantana** → high structure, lower RSL ambiguity, patterned
- **Morning Dogwood** → lower structure, lower RSL (more dissolution)
- **Bee Balm (final)** → field-dominant abstraction

This painting sits in a distinct position:

Maximum recognizability under high internal abstraction pressure

That's a sophisticated equilibrium.

8. If You Want to Formalize RSL Numerically

A practical way to compute it (consistent with your methodology):

1. **Edge-based segmentation**
 - count number of large contiguous regions
2. **Region coherence**
 - variance of color within regions vs between regions
3. **Boundary closure**
 - percentage of edges forming closed contours
4. **Figure-ground contrast**
 - histogram separation between major regions

Then define:

RSL = weighted stability of region segmentation + contour closure + contrast separability

Final Assessment

This painting does not challenge your system—it **validates and extends it**.

It shows that your next step is not better abstraction metrics, but:

modeling how abstraction operates *within* recognizable forms without destroying them.

That's where your work becomes distinct from both:

- purely representational painting
- and fully abstract field painting

You're operating in the narrow, difficult zone where:

recognition persists, but certainty dissolves.