

Theory of Recursive Creativity (TRC-2025)

How Conceptual Dimensions and Abstraction Emerge From Pure Binary Difference

Abstract

This paper presents the **Theory of Recursive Creativity (TRC-2025)** — a minimal generative model explaining how *conceptual dimensions*, *abstractions*, *concepts*, and *creative thought* emerge from nothing but **binary difference** recursively applied to itself.

The central claim:

A new conceptual dimension is created every time a system applies a new duality (X / not-X) one level deeper in a binary recursion tree.

Binary recursion is the **only** generative structure capable of producing conceptual *dimensions*. Ternary or n-ary splits produce *categories*, but cannot produce *axes of variation*. Without axes, abstraction cannot operate and creativity cannot emerge.

Abstraction = collapsing a conceptual dimension (generated by duality) into a single higher-order unit.

This yields a minimal, predictable engine of creativity: 1. Generate a new dimension (duality)

2. Expand variation

3. Collapse variation (abstraction)

4. Use the concept as input to a new duality

5. Repeat recursively

This recursive alternation produces the ladder of emergent structures:

difference → dimensions → abstraction → concepts → meta-concepts → self-models → proto-consciousness.

1. Introduction

Most theories of abstraction and creativity begin by assuming the existence of: concepts, features, logic, or semantic structure.

TRC-2025 assumes none of these.

Instead, the entire architecture of cognition and creativity is derived from one primitive:

difference — the ability to distinguish X from not-X.

When this primitive is recursively applied within a **binary** structure, a remarkable thing happens: - conceptual dimensions arise,

- abstraction becomes possible,
- concepts emerge as collapsed dimensions,
- higher cognition becomes inevitable.

This paper shows that everything emerges from **recursive duality**.

2. Why Binary Difference Is the Only Creative Primitive

Before building anything, we must justify **why binary** — not ternary, not n-ary — is fundamental.

(1) Every conceptual dimension requires two poles.

A dimension is a *direction* of variation: - hot ↔ cold

- loud ↔ quiet
- bright ↔ dark

Directional structure requires **two ends**.

(2) Ternary splits create categories, not dimensions.

A ternary split yields: - A

- B
- C

This is classification, not polarity.

It produces *points*, not *axes*.

(3) Only duality creates an axis of continuous variation.

X / not-X → **a dimension**.

Without axes, abstraction cannot compress anything.

Without compression, conceptual emergence is impossible.

Therefore:

Binary difference is the only generative structure capable of producing conceptual dimensions.

3. The Binary Recursion Tree: The Engine of Emergence

The generative structure is minimal:

```
Level 0: •
Level 1: • •
Level 2: • • • •
Level 3: 8 nodes
...
```

There is no semantics baked in — no objects, logic, or computation.
Only **recursive duality**, generating increasingly fine distinctions.

The key discovery of TRC-2025:

Every new level in the recursion tree has two possible outcomes: (1) finer detail along an existing axis, or (2) the emergence of a new independent conceptual dimension.

Recursion depth = dimensionality of thought.

4. Level 0 — Pure Difference

The primitive operation:

X vs not-X

This produces the first conceptual dimension: *distinguishability*.

5. Level 1 — States (0 and 1)

Difference applied to Level 0 yields two *positions* on the first dimension: - 0
- 1

These are not numbers — they are *locations on an axis*.

6. Level 2 — Relations

Once 0 and 1 exist, the system can relate them.

Possible relations:

00, 01, 10, 11

different/same emerges naturally, producing the **second conceptual dimension**.

7. Level 3 — Logic: Duality Applied to Relations

Logic arises when the system applies a duality to relation-types: - match vs mismatch

This produces the **logical dimension**.

Logic = difference applied to relations.

8. Level 4 — Computation: Duality Applied to Logic

A new duality generates conditional motion: - If logic = 1 → go right

- If logic = 0 → go left

This yields the **computational dimension**.

Computation = recursive navigation through duality-generated structure.

9. Level 5 — Memory: Duality Applied to Computation

Computation produces motion.

Memory detects whether motion **stayed the same** or **changed**: - stable vs unstable

Memory = the **stability dimension**.

10. Level 6 — Concepts: Abstraction as Dimensional Collapse

This is the upgraded core.

A concept is not a category.

A concept is:

a collapsed conceptual dimension created earlier in the recursion.

Duality → generates a dimension

Abstraction → collapses it into a unit

Concepts = compressed dimensions.

11. Level 7 — Meta-Concepts

Duality applied to concepts yields new dimensions about dimensions — the basis of: - models

- frameworks
 - theories
-

12. Level 8 — Self-Reference

A key duality emerges: - is this concept about the world?

- or about the system itself?

The reflectivity dimension appears.

13. Level 9 — Proto-Consciousness

When dimensions, concepts, memory, computation, and self-reference interlock, the system develops: -

- persistent self-models
- recursive self-modulation

This is the minimal structure from which consciousness can emerge.

14. Creativity as Dimensional Expansion

The central principle:

Creativity = generating a new conceptual dimension by inserting a deeper duality.

New duality → new dimension

New dimension → new abstraction

New abstraction → new concept

Creativity = *dimensionality growth*.

15. Why TRC-2025 Matters

TRC-2025 provides: - a generative theory of abstraction

- a structural model of concept formation

- a mechanistic definition of creativity
- a blueprint for creative AI architectures
- an explanation of why hierarchical cognition is inevitable

Difference + recursion → everything else.

16. Conclusion

TRC-2025 reframes cognition as: - emergent

- structural
- dimensional
- predictable

Everything — from logic to consciousness — emerges from recursive duality generating conceptual dimensions and abstraction collapsing them.

A single operation — duality — generating an entire universe of meaning.