

A Structural Definition of Cognition:

Premise Regeneration as dP/dt

Author: Joda

Abstract

This paper formalizes cognition as the regeneration of premise states.

The model is expressed by three equations:

$$\text{Cognition} = dP/dt,$$

$$P = g(P_{\text{prev}}, \Delta),$$

$$\Delta = h(\nabla P_{\text{unknown}}).$$

Here, dP/dt denotes the rate at which the premise state changes, that is, the speed of premise redefinition.

Δ is generated from gradients within unknown regions of the premise state.

These equations provide a minimal formalization of cognition as a continuous process of premise regeneration.

1. Introduction

Cognitive processes rely on underlying premises that determine how observations, knowledge, and experience are interpreted.

To describe cognition at a fundamental level, this paper defines it as changes in the premise state P , captured through its rate of change dP/dt .

Unlike structural models of premise organization (Paper 1), the present work focuses on how premise states are regenerated, rather than on their spatial configuration.

2. Basic Equation of Cognition

Cognition is defined as:

$$\text{Cognition} = dP/dt.$$

The term dP/dt denotes how the premise state changes and represents the speed of premise redefinition.

3. Premise Regeneration Function

Premise updates are described by:

$$P = g(P_{\text{prev}}, \Delta).$$

P_{prev} is the previous premise state,

Δ is the discrepancy,

and g is the regeneration function.

The specific form of g is not fixed.

4. Generation of Discrepancy Δ

Discrepancy arises from variations within unknown regions:

$$\Delta = h(\nabla P_{\text{unknown}}).$$

P_{unknown} denotes the undefined portion of the premise state,

∇ represents local variation (gradient),

and h is the transformation function.

As long as gradients exist in unknown regions,

Δ remains non-zero.

5. Continuous Premise Regeneration

Unknown regions produce discrepancy,

discrepancy regenerates the premise state,

the regenerated premise may alter unknown regions

and produce further discrepancy.

6. Position Within the Framework

Paper 1 (CPF): structural organization of premises

Paper 2 (this paper): regeneration of premise states

Paper 3 (ADR): sustained regeneration through feedback loops

7. Conclusion

This paper formalized cognition as premise regeneration,
defined by the rate of change dP/dt ,
a regeneration function g ,
and a discrepancy generation function h .