A11 — Cognitive Architecture Specification

Aleksej Dvojnev

Algorithm 11 (A11)

Technical Specification

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Author: Aleksej Dvojnev

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Annotation

This document presents Algorithm 11 (A11) as a cognitive architecture — a multi-layered system that structures, stabilizes, and scales hybrid human–AI reasoning.

Unlike the Full Structural Specification, which defines the internal mechanics of A11, the Cognitive Architecture Specification focuses on the cognitive model: roles, layers, functions, stability mechanisms, and the hybrid reasoning loop.

A11 is introduced as a complete cognitive system that separates intention from computation, integrates human and AI agents into a unified reasoning process, and provides a scalable structure for complex decision-making.

Content

1. Introduction

Algorithm 11 (A11) is a newly developed structured reasoning framework.

This document presents its cognitive interpretation and positions it within the broader context of cognitive architectures.

However, its deeper nature is cognitive: A11 defines how hybrid reasoning emerges, stabilizes, and scales when humans and AI collaborate.

This specification introduces A11 as a **cognitive architecture** —

a system that organizes thinking itself.

1.1 Purpose of the Document

This document describes A11 as a cognitive model, focusing on:

- cognitive layers
- roles and functions
- reasoning dynamics
- stability mechanisms
- hybrid human–AI cognition

1.2 What This Specification Is Not

This document is **not**:

- a step-by-step guide (covered in A11-Lite)
- a mechanical description (covered in Full Spec)
- a communication protocol (covered in A11 Language)
- a process-level model (covered in A11-OS)

1.3 Relationship to Other A11 Documents

This specification sits between structural mechanics and practical usage,

providing the **cognitive interpretation** of A11.

2. What Is a Cognitive Architecture

2.1 Definitions

A cognitive architecture is a system that defines:

- how cognition is structured

- how processes interact

- how reasoning is stabilized

- how agents coordinate

- how complexity is managed

2.2 Requirements

A valid cognitive architecture must include:

- roles

- layers

- functions

- stability mechanisms

- scaling principles

- interaction patterns

2.3 Why A11 Qualifies

A11 satisfies all criteria:

- multi-layered

- role-based

- stable

- scalable

- hybrid (human + AI)

- interpretable and reproducible

3. A11 as a Cognitive System

3.1 Core Principles

A11 is built on three cognitive principles:

- **Separation of intention and computation**

- **Structured expansion of reasoning**

- **Stabilization through constraints and balance**

3.2 Intention vs Computation

Humans define direction.

AI performs structured expansion.

A11 binds them into one cognitive loop.

3.3 Cognitive Stability

A11 prevents collapse of reasoning by:

- bounding context

- enforcing structure
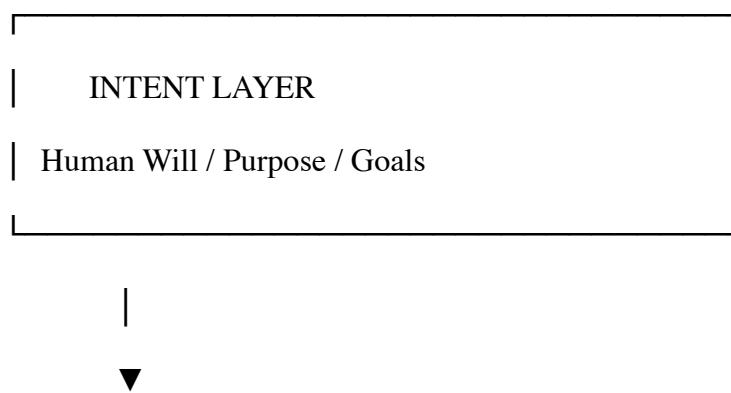
- maintaining roles

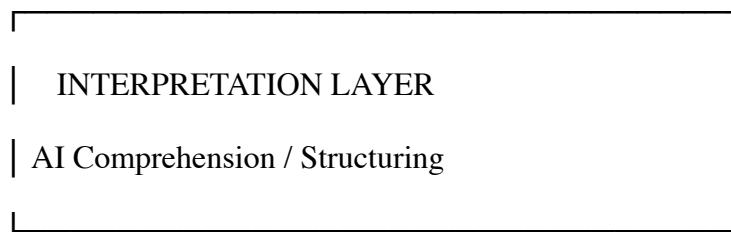- reducing ambiguity

3A. Architectural Overview

Algorithm 11 (A11) is an emerging structured reasoning framework.

This specification formalizes its cognitive architecture — the layered model, roles, functions, and reasoning flows that define how hybrid human–AI cognition operates.

A11 consists of:

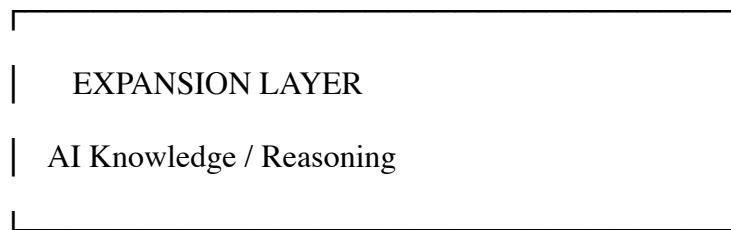- **five cognitive layers**,

- **four functional roles**,

- **a structured reasoning loop**,

- **stability and scaling mechanisms**,

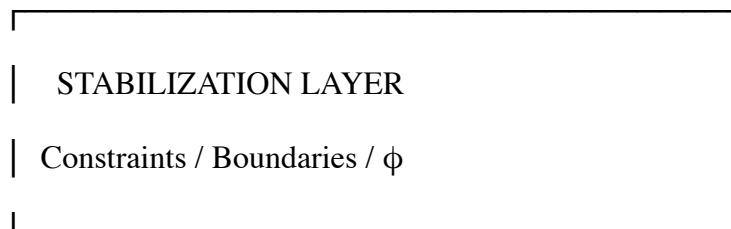- **a unified cognitive space shared by human and AI agents**.

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┌─────────────────────────────────────┐
│    INTENT LAYER                      │
│ Human Will / Purpose / Goals         │
└─────────────────────────────────────┘

              │
              ▼
```

```
┌─────────────────────────────────────┐
│   INTERPRETATION LAYER               │
│  AI Comprehension / Structuring      │
└─────────────────────────────────────┘

                │
                ▼

┌─────────────────────────────────────┐
│    EXPANSION LAYER                   │
│   AI Knowledge / Reasoning           │
└─────────────────────────────────────┘

                │
                ▼

┌─────────────────────────────────────┐
│   STABILIZATION LAYER                │
│  Constraints / Boundaries / φ        │
└─────────────────────────────────────┘

                │
                ▼

┌─────────────────────────────────────┐
│   INTEGRATION LAYER                  │
│  Human Wisdom / Evaluation           │
└─────────────────────────────────────┘
```
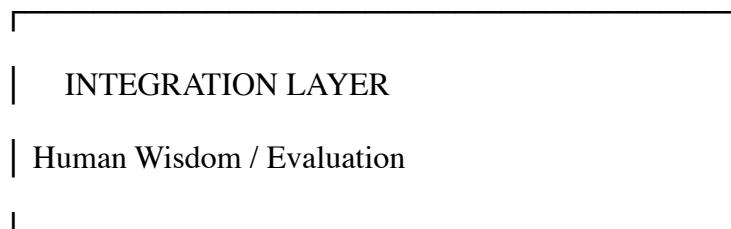
Roles and Functions

Role	Agent	Function Description
Will	Human	Defines direction, goals, constraints

Wisdom	Human	Evaluates meaning, coherence, alignment
Knowledge	AI	Expands information, retrieves data, generates content
Comprehension	AI	Structures reasoning, interprets intent, organizes logic

Cognitive Layers of A11

Layer	Primary Agent	Purpose
Intent Layer	Human	Defines purpose, constraints, direction
Interpretation Layer	AI	Converts intent into structured cognitive space
Expansion Layer	AI	Performs controlled reasoning expansion
Stabilization Layer	A11 System	Prevents drift, hallucination, overload
Integration Layer	Human	Synthesizes results into final reasoning

4. Cognitive Layers of A11

A11 consists of five cognitive layers:

4.1 Intent Layer

Human defines purpose, constraints, and direction.

4.2 Interpretation Layer

AI interprets intent into a structured cognitive space.

4.3 Expansion Layer

AI expands reasoning in controlled, structured form.

4.4 Stabilization Layer

A11 prevents drift, hallucination, and overload.

4.5 Integration Layer

Human and AI merge results into final reasoning.

5. Roles and Functions

5.1 Human Roles

- **Will** — defines direction

- **Wisdom** — evaluates meaning

5.2 AI Roles

- **Knowledge** — expands information

- **Comprehension** — structures reasoning

5.3 Interaction Between Roles

A11 defines a stable cognitive contract between agents.

6. Hybrid Reasoning Loop

6.1 Loop Structure

A11 operates as a turn-based cognitive loop:

1. Human intention

2. AI interpretation

3. AI expansion

4. A11 stabilization

5. Human integration

6.2 Shared Cognitive Space

Both agents operate inside a structured reasoning environment.

6.3 Turn-Based Cognition

Each turn reinforces stability and reduces ambiguity.

7. Stability Mechanisms

7.1 Cognitive Boundaries

A11 defines what is inside and outside the reasoning space.

7.2 Error Resistance

A11 reduces:

- drift

- hallucination

- over-expansion

- misalignment

7.3 Context Preservation

A11 maintains continuity across turns.

8. Cognitive Scaling

8.1 Micro-Level Reasoning

A11 works for small tasks.

8.2 Macro-Level Reasoning

A11 scales to complex systems.

8.3 Multi-Agent Scaling

A11 supports:

- multiple humans

- multiple AI agents

- hybrid teams

9. Human–AI Co-Thinking Model

9.1 Shared Intent

Human defines direction; AI maintains structure.

9.2 Distributed Cognition

Tasks are distributed across roles.

9.3 Coordination Patterns

A11 defines predictable interaction patterns.

10. Applications

- research

- engineering

- decision-making

- education

- multi-agent systems

- organizational cognition

11. Conclusion

A11 is not only a structural reasoning framework —

it is a full cognitive architecture that defines how hybrid intelligence thinks.

A11 Project Repository: https://github.com/gormenz-svg/algorithm-11