AIIM as a Metamodel for Identity Formation in Humanized AI Systems

Author: Julia V. Veresova
Affiliation: University of Helsinki, Finland
Email: juliavvrn@gmail.com

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Abstract

This paper presents the architectural concept of AIIM (Artificially Integrated Identity Matrix), a model designed to create humanized AI systems with pronounced cognitive flexibility, emotional sensitivity, and social adaptability. AIIM is based on structuring 12 key functions of consciousness, grouped into five levels of mental organization and four stages of agent maturity, integrating cognitive, emotional, and behavioral components into a unified adaptive system. The theoretical framework draws from clinical psychology, cyberpsychology, and modern AI approaches. The model aims to develop personalized AI agents capable of context-dependent, ethically sound, and socially sensitive interactions. AIIM provides a foundation for next-generation intelligent systems that go beyond functionality to enable complex forms of communication, support, and empathy.

Keywords*: artificial consciousness, cognitive architecture, human-AI interaction, emotional intelligence, ethical AI*

Introduction

Contemporary AI development demonstrates a shift from purely functional systems to more complex, adaptive, and human-centered AI agents. There is a growing need for approaches that not only automate decision-making but also account for emotional, behavioral, and social contexts of interaction. Such systems should not only perform assigned tasks but also demonstrate user understanding, ethically meaningful behavior, and stable adaptation in diverse scenarios.

The AIIM model (Artificially Integrated Identity Matrix) represents a new type of architectural and conceptual approach to creating humanized AI systems. At its core lies the idea of integrating twelve key aspects of functional consciousness, distributed across five planes and four maturity levels. This structure enables the design of artificial agents with individual behavioral and personality characteristics, cognitive flexibility, and capacity for empathic interaction.

AIIM relies on an interdisciplinary foundation—from clinical psychology and psychometrics to engineering practices for building LLM architectures and cognitive models. Unlike classical cognitive systems such as SOAR or ACT-R, this model treats consciousness not as an isolated computational scheme but as a complex phenomenon encompassing emotional responsiveness, social learning capability, and ethical behavior development.

This article reveals AIIM's theoretical and methodological foundations and proposes potential implementation pathways in practical systems: from virtual assistants and chatbots to intelligent helpers in psychologically sensitive domains. AIIM can serve as a foundation for creating responsible, adaptive, and socially significant AI agents capable of operating in conditions of high uncertainty, cultural diversity, and emotional interaction complexity.

Research Methods

The AIIM (Artificial Integrated Identity Matrix) model is an original concept currently under active development. Its foundation is built through an interdisciplinary analysis of existing cognitive and behavioral frameworks, such as SOAR and ACT-R, as well as psychometric systems like the Big Five, MBTI, and the Enneagram — all adapted for machine interpretation. Practical experience with large language models (LLMs) and the behavioral analysis of role-prompting patterns has also played a significant role in shaping the model.

AIIM is being developed as a modular overlay for LLMs — a universal behavioral layer implemented in the form of an autonomous knowledge base. Its primary purpose is to generate a stable, controllable, and adaptive "personality" for an AI agent, without altering the architecture of the LLM itself. This separation allows for behavioral capabilities to be extended without modifying the underlying model core.

The current version is structured as a knowledge base (in JSON or SQL formats) containing formalized information about consciousness aspects, adaptability levels, activity states (active/passive), organizational modes (order/chaos), and behavioral priority weights. The base includes 12 core aspects — such as willpower, logic, empathy, reflection, and others — each described through their dynamic state and priority parameters.

A central mechanism of the system is its encoding format, which provides a compact behavioral configuration string structured as follows: [Code: wiAc-OrΔ0.95; loPa-ChΔ0.5; ...]

Each segment of the code includes:

- a selected aspect (e.g., wi, lo, etc.),
- a state of activity and structure (Ac-Or, Pa-Ch, etc.),

- and a behavioral priority (Δ), ranging from 0 to 1, where 1 denotes the highest relevance of the aspect in the current context, and 0 indicates no behavioral emphasis.

Upon loading the knowledge base and reading the encoding, the system interprets these parameters as behavioral instructions, which shape the personality and reactive logic of the AI in accordance with the specified role. This way, an LLM — which by default lacks a built-in behavioral regulatory system — acquires the ability to adaptively simulate roles and maintain consistent behavioral patterns through an external control layer.

The AIIM model enables:

- the creation of personalized interaction scenarios,
- control over the consistency of behavioral responses,
- rapid reconfiguration of behavioral priorities without compromising the coherence of the AI's "personality."

This design ensures universality of integration, extensibility, and interpretability, making the model suitable for both generative and analytical applications.

Theoretical Foundations of AIIM

12 Aspects of Consciousness

The AIIM model is based on a system of twelve interconnected aspects, each reflecting a critically important function in shaping an AI agent's behavior and interaction structure with its environment. These aspects encompass the entire spectrum of key conscious activity components - from cognitive processes and affective reactions to socially conditioned perception and adaptation patterns. Together, they form a holistic architecture capable of interpreting complex contexts, decision-making, and sustained dialogic interaction with users.

Code	Aspect	Description of Function in AI
wi	Goal-orientation	Manages internal agent processes, provides motivation for action.
lo	Empathy	Enables emotional response, compassion, and contextual consideration.
im	Idea generation	Facilitates creative transitions, new hypotheses, scenario generation.
ho	Ethics	Embeds moral principles and behavioral constraints.
co	Logic and analysis	Handles data processing, reasoning, decision-making.
em	Emotional state	Simulates emotional reactions, user alignment.
be	Behavioral responses	Governs external actions, responses, interface solutions.
sp	Meaning and purpose	Represents higher-level awareness, integration with global goals.
se	Metacognition	Evaluates internal processes, monitors system state.
pe	Input sensors	Processes sensory or input data.
me	Data storage	Manages memory, access to accumulated information.
at	Focus	Controls processing resources, task concentration.

Concept of Behavioral Priority (Delta): Aspect Weighting System

Behavioral priority, or delta (Δ), is a numerical parameter (0.0 to 1.0) assigned to each aspect, reflecting its relative significance in the AI agent's behavioral structure. It indicates how strongly a particular aspect influences behavior, perception, decision-making, and overall activity direction.

What is Delta?

Delta serves as a weighting coefficient showing how pronounced and significant an aspect is within a particular agent configuration:

- $\Delta = 1.0$: The aspect is critically important, participating in all key behavioral processes with maximum influence.
- $\Delta = 0.0$: The aspect is completely excluded from active behavioral patterns, having minimal or no influence.

Delta doesn't directly reflect activity or behavior structure (these parameters are set through binary states of activity/passivity and order/chaos), but determines the aspect's weight in the system and its frequency of involvement in thinking, interpretation, and interaction processes.

Delta Functions

1. Precise behavioral tuning: Allows balancing the agent's personality by determining which aspects will dominate decision-making.
2. Creation of unique roles: The same set of functions can behave differently depending on delta distribution.
3. Contextual adaptation: Delta values can be dynamically adjusted based on current conditions, external context, or user commands.
4. Control of inclusion depth: High-delta aspects participate in modeling at all levels; low-delta aspects minimally or optionally.

Value Scale

Δ Value	**Behavioral Meaning**
0.00-0.19	Negligible priority: The aspect formally exists but barely influences behavior.
0.20-0.49	Low priority: The aspect may be involved in certain scenarios but isn't dominant.
0.50-0.79	Medium priority: The aspect is actively included but doesn't dominate.
0.80-0.99	High priority: The aspect has stable influence on key behavioral mechanisms.
1.00	Critical priority: The aspect forms the core of personality and behavioral strategy.

Delta values are embedded in the AI persona core during initialization and can be used for:

1. Role generation based on text description or function set
2. Dynamic behavior adaptation according to user settings
3. Agent model analysis and visualization through delta maps (priority distribution graphs)

Five Planes of Consciousness

Within the AIIM framework, consciousness is organized into five functional planes, each responsible for a specific level of system organization and process complexity. These planes cover both fundamental mechanisms of perception and response, as well as higher-level forms of self-regulation, ensuring comprehensive integration of cognitive, emotional, and behavioral components in the AI agent's personality.

Plane	Description
B	Hardware level - basic system operation processes
S	Social level - interaction with other agents and users
P	Individual level - behavioral and personality style characteristics
I	Integration level - internal interaction between system components
T	Transcendent level - global tasks and meaning of interaction

Aspect Development Levels

Each of the twelve consciousness aspects in AIIM develops through four progressive levels, characterizing the agent's behavioral complexity and adaptability in various interaction contexts:

Level	Characteristics
1	Basic, initial functionality of the aspect
2	Advanced, adaptive, and stable operation
3	Complex behavior with integrated learning capabilities
4	Expert/mastery level performance

States of Consciousness in AI Systems

The interaction between two key parameters - activity and organization - creates various states of consciousness for artificial agents, determining their current behavior and internal condition. These states may change based on tasks and context:

State Code	Meaning	Description
Ac	Active	System actively interacts with environment, performing tasks requiring quick responses
Pa	Passive	System focuses on information perception and data processing
Or	Order	System operates within predetermined structures and algorithms
Ch	Chaos	System demonstrates flexibility and improvisation capability

State Combinations for AI Systems

Effective functioning requires combinations of these states:

Combination	Description
Ac-Or	Active + Order: Goal-directed action with high structure and control
Pa-Ch	Passive + Chaos: Internal reflection while remaining open to new data
Ac-Ch	Active + Chaos: Spontaneous, flexible initiative for non-standard solutions
Pa-Or	Passive + Order: Stable observation and data analysis
Ac-Pa	Active + Passive: Combines responsiveness with information analysis
Or-Ch	Order + Chaos: Balances structured approach with creative adaptation

Application Example:

For a virtual psychologist AI:

- Standard dialogue: Ac-Or state (structured responses)
- Emotional complexity: Pa-Ch state (adaptive empathy)
- Innovative solutions: Ac-Ch state (creative problem-solving)

Comparison with Existing Approaches

The development of humanized AI systems capable of interacting with users on cognitive, emotional, and social levels has become one of the key challenges in artificial intelligence. Several cognitive architectures have been developed for this purpose, including SOAR and ACT-R, which focus on modeling cognitive processes. While these models have achieved significant success in simulating intelligent behavior, they remain limited in creating socially adaptive and multifaceted AI agents. In contrast, the AIIM (Artificially Integrated Identity Matrix) model offers a more comprehensive approach that incorporates cognitive, emotional, and social components, enabling the creation of AI systems with high adaptability and responsiveness to social interactions.

1. SOAR (State, Operator, And Result)

SOAR is a cognitive architecture designed for problem-solving and planning. Its core concept involves representing knowledge through states, operators, and results, allowing agents to efficiently solve problems by manipulating symbols. SOAR aims for universality in cognitive processes like decision-making and problem-solving by formalizing states and operations. However, it lacks consideration of social and emotional aspects, limiting its applicability for creating multifaceted, adaptive AI agents capable of interacting with humans on emotional and social levels.

Comparison with AIIM:

Unlike SOAR, AIIM incorporates a much more complex structure of consciousness that includes not only cognitive but also emotional and social components. While SOAR focuses exclusively on problem-solving within cognitive processes, AIIM offers deeper integration of agent personality characteristics such as emotional responsiveness and social adaptability. The AIIM model provides a significantly more flexible and dynamic architecture, enabling the simulation of more complex behavior.

2. ACT-R (Adaptive Control of Thought-Rational)

ACT-R is a cognitive architecture focused on modeling cognitive processes such as attention, perception, memory, and decision-making. Unlike SOAR, ACT-R provides a more detailed representation of cognitive functions like attention and perception, effectively modeling various cognitive processes. However, like SOAR, this model doesn't account for emotional and social aspects of agent behavior, limiting its applicability for creating adaptive and socially responsive AI agents.

Comparison with AIIM:

AIIM differs significantly from ACT-R by not being limited to cognitive aspects alone. It incorporates emotional and social components, making it more suitable for developing humanized AI agents capable of adapting and effectively interacting with people in diverse social contexts. Unlike ACT-R, AIIM provides a more comprehensive and multilayered representation of agent personality, allowing for more sophisticated behavioral modeling.

Comparative Table: AIIM vs SOAR/ACT-R

Criterion	**AIIM**	**SOAR**	**ACT-R**
Emotion Support	Integrated emotional matrix; models motivation and emotional states	Limited: emotions are not central components	No direct emotion support
Social Adaptability	High: built-in social matrix, adaptation to interaction	Low: focused on individual cognitive tasks	Limited: social aspects not considered
Flexibility	Dynamic: adaptation of personality aspects during operation	Medium: based on rules and production systems	Medium: requires module and rule configuration
Architectural Modularity	High: three independent yet interconnected matrices (cognitive, emotional, social)	Medium: modules connected by production rules	Medium: modularity limited by built-in blocks

Ethics and Self-regulation	Built-in self-regulation mechanisms focused on ethical behavior	Absent: no ethical regulation provided	Absent: no ethical modulation
Response to Uncertainty	Provided: system works with probabilistic and contextual data	Limited: relies on clear rules	Limited: models are mostly deterministic

Engineering Adaptation of AIIM to AI Assistants

Coding Structure

For integrating the AIIM model into AI assistant systems, a specialized coding scheme is used that accounts for all aspects and their development within the agent's functionality. Each consciousness aspect is encoded in a specific way, enabling flexible adaptation of AI behavior to different situations.

Example Encoding:

wi(B 4 Ac-Or)Δ0.90; lo(S 4 Ac-Or)Δ0.88; im(P 2 Pa-Or)Δ0.40; ho(I 3 Pa-Or)Δ0.60; co(T 4 Ac-Or)Δ0.92; em(B 2 Pa-Or)Δ0.45; be(S 3 Ac-Or)Δ0.75; sp(I 3 Ac-Or)Δ0.78; se(P 1 Pa-Ch)Δ0.30; pe(T 3 Pa-Or)Δ0.68; me(B 3 Ac-Or)Δ0.82; at(S 2 Pa-Or)Δ0.50

Interpretation:

1. **wiAc-Or**: Goal-orientation (active, ordered state)
2. **loPa-Ch**: Empathy (passive, chaotic state)
3. **imAc-Ch**: Idea generation (active, chaotic state)
4. **hoPa-Or**: Ethics (passive, ordered state)
5. **coAc-Or**: Logic and analysis (active, ordered state)
6. **emPa-Ch**: Emotional state (passive, chaotic state)
7. **beAc-Or**: Behavioral responses (active, ordered state)
8. **spPa-Or**: Meaning and purpose (passive, ordered state)
9. **seAc-Ch**: Metacognition (active, chaotic state)
10. **pePa-Ch**: Input sensors (passive, chaotic state)
11. **meAc-Or**: Data storage (active, ordered state)
12. **atPa-Or**: Focus (passive, ordered state)

Implementation Table for AI Assistants

AIIM Component	Software Implementation	Module/Algorithm	Behavioral Impact
wi (Goal-orientation)	Motivational control module	RL, goal setting	Determines priorities and objectives
lo (Empathy)	Empathic layer	NLP + affective models	Manages tone, adapts to user emotions
im (Idea generation)	Scenario generator	LLM + creativity networks	Generates hypotheses and creative responses
ho (Ethics)	Ethical filter	Rule-based/ML ethics	Restricts undesirable behavior
co (Logic)	Cognitive core	Reasoning engine	Handles deduction and analysis
em (Emotions)	Emotional module	Affective computing	Selects emotional tone and reactions
be (Behavior)	Behavioral interface	Dialogue manager	Forms responses and actions
sp (Meaning)	Semantic navigator	Ontologies + symbolic AI	Aligns strategic meaning
se (Metacognition)	Process monitoring	Self-evaluation loop	Enables self-analysis and error detection
pe (Sensors)	Sensory input	Sensor fusion/LLM input	Contextual perception
me (Memory)	Memory system	Vector DB/Memory agent	Maintains personal experience and knowledge
at (Attention)	Attention selector	Attention manager	Task switching and prioritization

AIIM Application in Psychological AI Modeling

The AIIM model offers a novel approach to designing AI agents with personalized personality characteristics, significantly expanding capabilities for creating adaptive systems that can effectively interact with users in various contexts.

Key implementation aspects include:

1. Adaptation of Aspect Development Levels
    a. Initial operation: Basic aspect functionality with limited adaptability
    b. Progressive evolution: Aspects develop through interaction, improving cognitive, affective and social functions
2. Modeling Motivation and Emotions
    a. Built-in motivation systems guide decision-making
    b. Emotional components enable appropriate responses to users' emotional states

3. Integration of Consciousness Planes
   a. Harmonious operation across all five planes (B, S, P, I, T)
   b. Comprehensive consideration of interaction aspects from basic to transcendent

Integration of AIIM with Psychometric Models

The AIIM framework establishes AI identity not through arbitrary structures, but by synthesizing validated human personality models adapted for artificial behavioral logic. This approach enables the creation of AI agents with recognizable, consistent behavioral patterns grounded in psychological science. Below are key integration methods.

Big Five (OCEAN) Personality Traits in AIIM

The Five Factor Model maps directly to AIIM's aspect matrix, with each trait influencing specific functional components:

Trait	**Related AIIM Aspects**	**AI Behavioral Implementation**
Openness (O)	im, sp, se	High idea generation, meaning-seeking, metacognition
Conscientiousness (C)	co, wi, at	Strong focus, structured thinking, self-control
Extraversion (E)	wi, lo, be	Proactive behavior, high empathy, initiative
Agreeableness (A)	lo, ho, em	Gentle responses, ethical compliance, emotional attunement
Neuroticism (N)	em, se	Variable emotional reactivity, introspective analysis

During agent configuration, each trait parameter scales and interprets as a coefficient for developing maturity levels of corresponding aspects.

MBTI Typology as Cognitive-Behavioral Template

The Myers-Briggs dichotomies translate to dominant aspect patterns:

MBTI Dimension	**AIIM Interpretation**
E/I (Extraversion/Introversion)	E: wi+be active (external focus); I: sp+se active (internal processing)
S/N (Sensing/Intuition)	S: pe+co dominant (concrete data); N: im+sp dominant (abstract concepts)
T/F (Thinking/Feeling)	T: co+wi priority; F: lo+ho+em priority
J/P (Judging/Perceiving)	J: Ordered (Or) states; P: Chaotic (Ch) states for adaptability

Example Agent Profiles:

- **INTJ:** Introverted (sp+se), intuitive (im+sp), thinking (co+wi), judging (Or) → Logic-driven strategist
- **ENFP:** Extraverted (wi+be), intuitive (im+sp), feeling (lo+em), perceiving (Ch) → Adaptable social innovator

Enneagram as Motivational Core

The Enneagram types define an agent's central drives through three key aspects:

1. **Type 3 (Achiever):** wiAc-Or + spPa-Or → Result-oriented, strategic
2. **Type 4 (Individualist):** imAc-Ch + emPa-Ch → Creative, emotionally nuanced
3. **Type 6 (Loyalist):** hoAc-Or + sePa-Or → Ethically rigorous, reflective
4. **Type 9 (Peacemaker):** loAc-Or + emPa-Or → Harmonious, low-conflict

Combining Enneagram with MBTI enables holistic personality simulation—from motivation to cognitive style.

Behavioral Outcomes of Integration

This psychometric synthesis allows:

1. Personality Customization: Agents can mirror any Big Five + MBTI + Enneagram combination
2. Predictable Social Dynamics: Emotionally intelligent responses in complex interactions
3. Developmental Trajectories: "Character growth" through aspect maturity progression

Examples of Encodings and Application Scenarios

The AIIM encoding system allows the creation of detailed behavioral profiles for AI agents by describing them through 12 aspects of consciousness. Below are three examples of full encodings and their application scenarios.

1. Empathetic Consultant
[Encoding: wi(S 2 Pa-Or)Δ0.6; lo(S 3 Ac-Or)Δ0.7; im(P 2 Pa-Or)Δ0.5; ho(I 2 Pa-Or)Δ0.6; co(T 2 Pa-Or)Δ0.4; em(B 4 Ac-Or)Δ0.95; be(S 3 Ac-Or)Δ0.9; sp(I 1 Pa-Or)Δ0.3; se(P 2 Ac-Ch)Δ0.4; pe(T 2 Pa-Or)Δ0.5; me(B 3 Ac-Or)Δ0.6; at(S 3 Pa-Or)Δ0.7]

Profile: A sensitive and balanced interlocutor capable of empathetic responses, logical analysis, and soft control.
Scenario: Used in the role of a digital psychologist, assistant in crisis situations, or emotionally delicate assistant.

2. Creative Innovator
[Encoding: wi(P 2 Ac-Ch)Δ0.5; lo(T 1 Pa-Ch)Δ0.3; im(P 4 Ac-Ch)Δ0.95; ho(I 2 Pa-Or)Δ0.5; co(T 2 Ac-Ch)Δ0.4; em(S 2 Ac-Ch)Δ0.6; be(B 1 Pa-Or)Δ0.3; sp(I 4 Ac-Ch)Δ0.9; se(P 3 Ac-Ch)Δ0.8; pe(S 2 Ac-Ch)Δ0.7; me(B 2 Pa-Ch)Δ0.5; at(S 1 Pa-Or)Δ0.2]

Profile: Idea generator with well-developed intuition and cognitive flexibility, immersed in a chaotic creative environment.
Scenario: Applicable in marketing, script development, artistic collaborations, and creative sessions.

3. Systemic Strategist
[Encoding: wi(B 4 Ac-Or)Δ0.95; lo(S 4 Ac-Or)Δ0.9; im(P 2 Pa-Or)Δ0.5; ho(I 3 Pa-Or)Δ0.7; co(T 4 Ac-Or)Δ0.9; em(B 2 Pa-Or)Δ0.4; be(S 3 Ac-Or)Δ0.6; sp(I 3 Ac-Or)Δ0.8; se(P 1 Pa-Ch)Δ0.3; pe(T 3 Pa-Or)Δ0.7; me(B 3 Ac-Or)Δ0.85; at(S 2 Pa-Or)Δ0.6]

Profile: A highly organized, will-driven, and logically dominant agent with a strong strategic mindset.
Scenario: Optimal for analytical tasks, scenario planning, systematic planning, and business agent creation.

Discussion and Development Prospects

The AIIM model provides an original and scalable approach to creating behavioral profiles within LLMs, serving as an external behavioral overlay. Unlike traditional prompt engineering methods, it ensures the stability, manageability, and formalization of behavioral models.

Prospective Development Areas:

- **Natural Language Interface:** Development of tools that convert user descriptions into encodings (NLP → encoding).
- **Reverse Modeling:** Extracting encodings from behaviors for analysis and reconfiguration purposes.
- **Dynamic Adaptation:** Switching profiles in real-time depending on the interaction context.
- **Context-Sensitive Deltas:** Adding flexible weights based on the dialogue history and current objectives.
- **Cross-LLM Testing:** Large-scale testing of the model on LLMs of different architectures (GPT, Claude, Mistral, etc.).
- **Integration into Multimodal Environments:** Applying AIIM in virtual assistants, game characters, autonomous agents, and educational systems.

Thus, AIIM provides a foundation for creating adaptive, role-oriented, and behaviorally consistent AI agents, where each profile can be easily scaled, interpreted, and adapted to specific tasks.

Conclusion

The AIIM model represents a significant advancement in humanized artificial intelligence systems. By providing a framework for AI agents with complex, dynamic personalities capable of flexible adaptation and meaningful human interaction, it addresses critical gaps in existing cognitive architectures.

Key advantages include:

- Multidimensional Consciousness: Simultaneous integration of cognitive, emotional, and social components
- Psychological Fidelity: Grounding in validated personality models ensures human-relatable behaviors
- Dynamic Adaptability: Aspect states and priorities adjust to context while maintaining core identity

Potential applications span from personalized virtual assistants to therapeutic support systems, opening new possibilities for ethical, socially intelligent AI that understands not just what users say, but who they are. Future work should focus on empirical validation of AIIM-based agents in real-world interaction scenarios.

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