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# Spatial generative multimodal dynamic AGI as model of consciousness

## Abstract

Creating a spatial, generative, multimodal, dynamic artificial general intelligence (AGI) is a complex and multifaceted task. It involves developing a system capable of performing human-like intellectual tasks, such as learning, abstraction, self-regulation, and adaptation. This requires modeling basic cognitive functions and developing methods for long-term storage and retrieval of information. Perception and understanding of the surrounding world: processing sensory data, creating internal representations. Problem solving and planning using solution-finding algorithms. Linguistic thinking and communication: modeling the understanding and generation of natural language. Integration of multilayer and multifaceted models: creating architectures that combine perception, thinking, memory, and motivation. Using a spatial, generative, multimodal, dynamic AGI as a model of consciousness for simulating cognitive processes is planned, using neuromorphic platforms of spiking neural networks and transformers on transformable neurochips. The neuromorphic platform will also facilitate the modeling of metacognitive processes of consciousness, such as the ability to evaluate one's knowledge and strategies. An important stage is, firstly, the creation of test environments to evaluate universality and adaptability; secondly, the gradual increase in task complexity to increase intelligence; and thirdly, the development of infrastructure for large-scale computing. Today, the creation of spatial, generative, multimodal, dynamic artificial general intelligence is considered a feasible, integrative task for multidisciplinary projects. These projects are aimed at, firstly, the ability to solve diverse problems without reprogramming for each specific problem—from data analysis to creative thinking; secondly, the ability to acquire new skills in various ways: independently, through mentoring, and through research; thirdly, maintaining up-to-date information, understanding the situation as a whole, and predicting consequences; fourthly, flexible switching between strategies, choosing the optimal solution under conditions of uncertainty; and fifthly, awareness of one's own cognitive processes, assessing one's knowledge and limitations. The implementation of the projects will require an interdisciplinary international effort of highly qualified scientists, researchers and developers in various fields such as neuroscience, linguistics, artificial intelligence, intelligent modeling and manufacturing based on modern technologies.

**Keywords:** spatial generative multimodal dynamic AGI, model of consciousness, neuromorphic platform

Volume 12 Issue 1 - 2026

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**Received:** December 10, 2025 | **Published:** January 12, 2026

**Abbreviations:** AGI, artificial general intelligence; LLMs, large language models; RLHF, reinforcement learning from human feedback; PMT professional model technologies; GPT generative pretrained transformer

## Introduction

Creating a spatially generative, multimodal, dynamic AGI as a model of consciousness is a multifaceted task, combining the fields of artificial intelligence, neuroscience, cognitive science, and intelligent modeling and fabrication. Let's consider key aspects that can help in understanding and developing such a system:

Main components of the model

I. Spatial generativity: the ability to model and perceive space and its changes in real time, which is important for environmental perception and navigation.

II. Multimodality: the integration of various types of data—visual, auditory, tactile, and other sensory signals—to form a holistic representation of the world.

III. Dynamism: the ability to adapt and change in response to new data, enabling flexible behavior and learning.

IV. Generativity: the ability to create new images, ideas, or solutions based on previous experience and the current context.

V. Model of consciousness: the integration of these components to form an internal subjective experience, an autonomous understanding of oneself and the surrounding world.

Technological approaches

a. Transformers and large language models (LLMs): for processing and generating text, as well as for integrating multimodal data through multimodal architectures.

b. Visual and audio neural networks (e.g., CNNs, RNNs, ViT): for processing images and sound signals.

c. Internal world models: allow the system to predict future states and plan actions.

d. Attention and self-reflection models: for focusing on important information and assessing its own state.

e. Multimodal integrator: combining data from different sensory channels to obtain a holistic perception.

f. Internal modeling that analyzes and evaluates its decisions.

g. Dynamic learning: the ability to evolve and adapt in a constantly changing environment.

Practical development stages:

h. Creation of multimodal datasets for training models.

i. Development of architectures that combine generative models with perception and planning models.

j. Gradually introduce elements of self-reflection and internal state modeling.

k. Testing the system in complex environments to evaluate its capabilities for spatial navigation, adaptation, and generativity.

l. Security and development control of such systems.

m. Impact on society and moral obligations.

Overall, the creation of a spatially generative, multimodal, dynamic AGI as a model of consciousness requires an interdisciplinary approach that combines advanced AI technologies with a deep understanding of the nature of consciousness and spatial perception.[1–4] The creation of a spatially generative, multimodal, dynamic AGI will lead to new levels of artificial intelligence and understanding of the world, both in humans and in machine models of consciousness.

The second section of the article is devoted to a detailed examination of the spatial and linguistic manifestations of human consciousness. In the third section, the author proposes an integrative modeling of the spatial and linguistic manifestations of consciousness. In the fourth section, the author proposes a solution for creating a spatial generative AGI with dynamic multimodality. Emphasis is placed on semantic traces, holographic memory, and multimodality throughout the article, helping readers better understand the dynamic structure of the artificial consciousness model and its feasibility. The implementation of a dynamic model of artificial consciousness is envisaged through the improvement of multimodal LLMs, graph networks, reinforcement learning methods, and interoperable ensembles of intelligent agents.

## Spatial and linguistic manifestations of human consciousness

### Consciousness manifests itself in the wake of exposure to living information from nature

Consciousness manifests itself in the wake of exposure to living information from nature through a multitude of aspects and mechanisms related to the processing, integration, and reflection of information about the world. Here are the main ways consciousness manifests itself in this context:

Perception and sensory processing:

The body perceives signals from the environment (sounds, light, chemicals, heat, etc.).

These signals are converted into neural impulses, creating internal representations of the state of the world.

Information integration:

The brain combines incoming data to form a holistic perception of the situation.

This process allows for the recognition of relationships and the identification of significant patterns.

Conscious response:

Based on information processing, the body makes decisions that manifest themselves in behavior.

For example, avoiding danger or searching for food are manifestations of a response to natural cues.

Memorization and learning:

The influence of natural information leaves traces in memory, allowing adaptation to future situations.

This demonstrates the ability to internally process and comprehend information.

Self-awareness and reflection:

More complex forms of consciousness allow the subject to be aware of their internal states and reactions to external stimuli.

This level is evident in humans and some higher animals.

Influence on internal states:

Exposure to natural information can evoke emotional and physiological reactions reflecting interaction with the environment.

Thus, traces of exposure to living natural information manifest themselves in the structuring of perception, reaction, memory, and self-regulation of the body, which is a manifestation of consciousness as the ability to internally process and comprehend information about the world.

### Consciousness forms holographic memory traces from spatially living information

Human consciousness forms and perceives information that exists in space. This information is constantly updated and connected to the environment.

Formation of memory traces

When a person interacts with spatial information, traces—imprinted patterns of this interaction—are left in their memory. These traces serve as evidence of experience and allow for the subsequent reconstruction or interpretation of the information received.

Holographic storage

Holographic data storage assumes that traces are not simply local or fragmented records, but are stored as holistic, distributed images, similar to holograms. In holography, the entire image is stored and reconstructed from any part of it, ensuring high stability and integrity of information. Information in memory can be reconstructed from fragments. Human perception and thinking are flexible and resilient to damage. Consciousness, through interaction with spatial living information, creates holographic traces in memory, ensuring the holistic and stable storage and reproduction of informational images.

3. Memory operates on principles similar to physical holography:

A method of recording three-dimensional images using light wave interference.

In classical holography:

1) information about an object is distributed across the entire area of the hologram;

2) even a fragment of a hologram allows for the reconstruction of the complete image (with less detail);

3) recording occurs through the interference of two waves—the object wave and the reference wave.

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DOI: 10.15406/iratj.2026.12.00311

a) By analogy, in the holographic model of memory:

b) memories are not localized in specific neurons, but are distributed across vast neural networks; * partial brain damage does not result in complete loss of memories (just as a fragment of a hologram preserves the whole);

c) memory restoration occurs through the "reproduction of the wave pattern" of neuronal activity. 3.3 Functioning of the Brain's Neural Networks:

d) Encoding: When perceiving information, neural networks generate a unique wave pattern of activity.

e) Storage: This pattern is distributed across multiple neurons, similar to the interference pattern of a hologram.

f) Recall: When part of this network is activated (for example, through association), the entire memory is reconstructed.

g) Associativity: A single word or smell can trigger an entire complex of memories (similar to how a fragment of a hologram reconstructs the whole).

## Consciousness manifests itself in the processing, use, and creation of linguistic, speech, and written information in memory

Consciousness, when processing speech information, forms semantic traces; that is, it remembers and structures the semantic connections and meanings that arise during the perception and comprehension of speech. This allows us to understand, interpret, and use information conveyed through language. Consciousness, when perceiving written linguistic information, activates semantic traces. It causes the restoration and actualization of knowledge, associations, and meanings associated with the read text. This facilitates the comprehension of the text, its interpretation, and the consolidation of information in memory.

Consciousness manifests itself in the processing, use, and creation of linguistic, speech, and written information through various mechanisms. Let's consider the main ways in which this manifestation occurs:

1. Perception and comprehension:

- Understanding the meaning of words and sentences heard or read.

- Perception of nuances, intonations, and context, which allows for the interpretation of information.

2. Formulation and Expression of Thought:

- Articulating one's own ideas, feelings, and knowledge in spoken or written form.

- Using linguistic structures to communicate inner experiences and knowledge to others.

3. Self-Reflection and Inner Dialogue:

- Conducting an internal dialogue, reflecting, planning, and analyzing one's own thoughts and actions.

- Language becomes a tool for metacognitive processes—awareness of one's own thinking.

4. Learning and Development:

- Mastering new linguistic structures and words contributes to the expansion of consciousness.

- Analyzing texts and conversations helps form more complex concepts and abstract ideas.

5. Self-Determination and Identity:

- Language helps shape self-awareness, identity, and social status.

- Through language, a person understands their role in society and their uniqueness.

6. Transmission and Preservation of Culture:

- Linguistic information serves as a means of transmitting values, traditions, and knowledge from generation to generation.

- This contributes to the development of collective and individual consciousness.

7. Emotional and subjective expression:

- Language allows us to share internal sensations and experiences, which is a manifestation of our subjective perception of the world.

Thus, speech and writing enable us to express the fundamental characteristics of consciousness: perception, understanding, self-reflection, creativity, the ability to learn, and the ability to form an identity. Language is a key tool through which humans understand themselves and the world around them, and interact with them.

Consciousness does not exist outside of linguistic form: it is expressed and structured through language. Language serves as the material shell of thought, and thought imbues language with meaning, leaving semantic traces in memory.

8. Semantic traces as a result of speech processing:

When a person perceives speech information, their consciousness:

a) analyzes sound/graphic signs;

b) relates them to existing knowledge;

c) forms stable semantic connections and traces in memory, as semantic constructs enriched with personal experience and context.

Mechanism of trace formation

Perception: the ear/eye registers linguistic units (words, phrases).

Interpretation: the brain activates associative networks, linking new information with known information. Consolidation: semantic projections, images, emotions, and logical connections remain in memory.

Dynamism of traces

Are updated upon repeated perception of information;

Can be transformed by new experiences;

Are sometimes erased if they become obsolete and are not used.

To better remember information, it is linked to already known meanings (the association method).

Working with memories is based on rethinking speech formulations, which changes semantic traces.

In communication, for accurate understanding, it is important to consider that the interlocutor may have a different

"Map of semantic traces.

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DOI: 10.15406/iratj.2026.12.00311

Speech perception processes activate complex networks of neurons, leaving semantic traces in memory.

Semantic traces are a dynamic system of semantic meanings that arise in memory when consciousness interacts with linguistic information.

When reading, a written text triggers the activation of semantic networks in the mind—interrelated representations, knowledge, and associations stored in memory:

Decoding signs

First, the mind recognizes graphic symbols (letters, punctuation marks), translating them into linguistic units—words and phrases.

Activating lexical access

Each word read "triggers" a corresponding semantic node in the brain—a repository of meanings, connotations, and usage examples.

Revealing semantic connections

Semantic meanings are activated:

Synonyms and antonyms;

Thematic associations (for example, the word "winter" evokes images of snow, cold, and holidays);

Personal experience associated with the concept;

Grammatical and syntactic patterns that help understand sentence structure.

Building a mental model of the text

The mind integrates individual meanings into a holistic representation of the content:

Identifies the theme and main idea;

Establishes cause-and-effect relationships;

Predicts the further development of the narrative.

Contextual modulation

The meaning of a word or phrase can change depending on the context. For example, "key" in the context of "door key" and "spring key" activates different semantic fields.

Text comprehension depends on how fully and accurately the mind activates the corresponding semantic traces.

Memorization is improved when new information is linked to existing knowledge.

Interpretation may vary among readers, depending on individual experience and associative networks.

Semantic traces are formed within a specific linguistic and cultural environment.

During the process of reading a text, the mind activates complex semantic structures in memory.

## The mechanism of consciousness and memory through the lens of neural networks and distributed information storage

The brain links spatial holographic and semantic linguistic traces. Consciousness mediates the connection between spatial holographic traces and semantic traces through the brain's neural networks. Spatial holographic traces reflect the structural and spatial aspects of information, while semantic traces are associated with conceptual meaning and sense. Through neural connections, consciousness integrates these different types of traces, ensuring holistic perception, understanding, and comprehension of information, as well as the ability to provide feedback to clarify and update semantic connections:

Distributed memory storage

Memories are distributed across multiple neural networks. When you see an object or experience an event, the following are activated:

Sensory areas (visual and auditory cortex) record "spatial" details (shape, color, sound);

Associative areas (e.g., temporal lobes) assign meaning and connect with past experiences;

The hippocampus stitches fragments together into a single memory and converts it into long-term memory.

Holographic principle: Similar to a hologram, where each fragment contains information about the entire image, each neuron in the network stores a partial trace of a memory. This ensures:

Resilience to damage (deleting some neurons does not completely erase the memory);

Associativity (activating one fragment can "extract" the entire memory).

Neural communication mechanisms

Synaptic plasticity: connections between neurons are strengthened by repeated activation (Hebb's rule: neurons that fire together wire together).

Signal reverberation: cyclical transmission of impulses between groups of neurons maintains the activity of the memory trace.

Metabotropic receptors: form long-term memory markers outside the synapses.

Semantic processing of consciousness

Identifies key features (e.g., the face of a familiar person, not all the pixels in an image);

Links them with semantic categories (concepts, emotions, context);

Creates hierarchical structures:

Spatial traces: the visual cortex registers objects.

Semantic traces: the temporal lobes associate the image with the concept of the object.

Integration: the hippocampus combines sensory and semantic components.

Reproduction: when the concept of the object is mentioned, neural networks storing both spatial and semantic aspects are activated, recreating a holistic image.

Dynamism: memory traces are constantly rebuilt with each reproduction (the phenomenon of reconsolidation).

Thus, consciousness actually links spatial and semantic traces through complex neural networks operating on a holographic principle.[5] This is a dynamic process of reconstructing experience.

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## Self-improvement of consciousness through the analysis of decisions and results

Self-improvement of consciousness through the analysis of decisions and results is an effective approach to developing inner awareness, self-reflection, and personal growth. This method allows you to understand your motives, identify strengths and weaknesses, and adjust your behavior to achieve more conscious and harmonious decisions. The main steps of this process include:

Conscious analysis of decisions

Regularly reviewing past decisions.

Assessing how justified they were and how consistent they were with your values.

Identifying the reasons for their adoption and possible alternatives.

Analysis of the results

Focusing on the consequences of your actions.

Assessing how the results align with your expected goals.

Considering successes and mistakes, identifying patterns.

Reflection and conclusions

What beliefs influence decisions?

Analyzing what can be improved or changed to make a more effective decision.

Thinking adjustment

Implement new strategies and approaches based on analysis.

Make more informed decisions.

Continuous development

Continuously improve the level of analysis and awareness of decisions and results.

This approach fosters internal responsibility, helps you understand your true motives and values, and strengthens your ability to make informed and informed decisions in the future. Continuous reflective thinking leads to more focused decisions and results, allowing you to consciously adjust your thinking and strategies for achieving your goals:

Recording decisions and actions

Decisions made (with justification);

Specific steps for their implementation;

Context (conditions, constraints).

Collecting results

Actual results (what worked/didn't work);

Quantitative indicators (if applicable);

Side effects (unexpected consequences).

Comparative analysis

Expectations vs. Reality;

Resource expenditures (time, energy, money) vs. results achieved;

alternative options that could have been chosen.

Identifying cause-and-effect relationships

What exactly led to success/failure?

What external factors influenced it?

Where were the errors in logic or situational assessment?

What hidden assumptions turned out to be incorrect?

Formulating conclusions

limitations (under what conditions the method does not work);

new hypotheses for testing.

Adjusting thinking models

Decision-making criteria;

Situation analysis algorithms;

System of priorities.

Developing consciousness

Decision matrix: "Situation" → "Option" → "Expected result" → "Actual result" → "Conclusion".

Improving forecast accuracy.

Reducing the number of recurring errors.

Developing metacognition (understanding one's own thought processes). - Increased confidence in complex decisions.

Developing a personal "knowledge base" of proven strategies.

Constructive analysis is a working tool for effective decisions.

## Multimodal dynamics of consciousness

Multimodal dynamics of consciousness manifests itself in the interaction and joint use of various types of sensory channels and modalities (e.g., visual, auditory, tactile, kinesthetic, and others) in the process of perceiving, processing, and transmitting information. It considers how these modalities interact over time, providing a holistic and more accurate understanding of the surrounding world, as well as the effectiveness of communication, learning, and cognitive processes. Within the framework of multimodal dynamics, consciousness activates mechanisms for synchronizing, integrating, and coordinating various sensory signals in real time.

The dynamic multimodality of consciousness shapes the interaction and integration of various sensory and communicative modalities as they develop, change, and collaborate over time. The use of multiple modalities (e.g., visual, auditory, tactile, kinesthetic) occurs dynamically, in the context of specific situations, goals, and conditions.

The main aspects of the manifestation of dynamic multimodality of consciousness include: - Constant interaction and synchronization of various perceptual channels.

Adaptation of communication strategies in real time.

Evolution of methods of transmitting and processing information depending on the situation.

The influence of temporal factors on the effectiveness of modality integration.

The dynamic multimodality of consciousness is widely studied in research on cognitive processes, artificial intelligence, human-

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computer interaction, learning, and communication, emphasizing the importance of accounting for changes and interrelations between modalities in real time.

## Modeling spatial and linguistic manifestations of consciousness

Modeling spatial and linguistic manifestations of consciousness is an important interdisciplinary field that combines neuroscience, psychology, linguistics, and artificial intelligence. The main aspects and approaches in this field are presented below:

Spatial manifestations of consciousness

Neural Maps and Body Schema: The study of how the brain models and perceives its own body and surrounding space.

Spatial Cognitive Models: Modeling how humans orient themselves and navigate in space, including the use of GPS data and internal mapping.

Virtual Reality and Spatial Modeling: Creating immersive environments for studying perception and interaction with space.

Linguistic manifestations of consciousness

Natural Language Processing (NLP) Models: The use of algorithms to simulate linguistic thinking, understanding, and text generation.

Linguistic models that capture structure and meaning: for example, transformers (GPT, BERT), which are trained on large volumes of text and model contextual relationships.

Modeling linguistic cognition: studying how humans form thoughts and express them through language, including semantic and syntactic understanding.

The relationship between spatial and linguistic aspects

Spatial-linguistic models: studying how language reflects and shapes our perception of space (e.g., the use of prepositions, toponyms).

Interaction between models: how spatial representations influence linguistic thinking and vice versa.

Technological approaches and tools

Artificial intelligence and machine learning: creating models that simulate the manifestations of consciousness.

Simulations and virtual environments: for experimentation and hypothesis testing.

Neuroimaging and neurobiological methods: to study the brain mechanisms associated with spatial and linguistic manifestations.

Practical significance

Development of human-machine interaction systems.

Creation of more natural interfaces and virtual assistants.

Improving the understanding of cognitive processes and treating disorders of consciousness.

Modeling methods

Neural network navigation models (RL agents with hippocampal analogs);

Topological neural networks (e.g., based on Persistent Homology);

Simulations of spatial memory and orientation in virtual environments. Distributed semantic models** (*word2vec*, *GloVe*, *BERT*, etc.) represent words/phrases as vectors in a multidimensional semantic space. They allow modeling:

Semantic proximity;

Metaphors and analogies;

he dTynamics of meaning in context. *Cognitive grammars (R. Langacker) and constructional grammar link linguistic structures with mental images and experiential schemas.

Discourse and dialogue models simulate

the order of remarks; - implications and presuppositions;

modeling the interlocutor's knowledge and intentions.

Neurolinguistic models (e.g., *predictive coding* in speech processing) predict and interpret linguistic signals.

Transformers and large language models (LLM);

Graph models of semantic networks;

Agent-based dialogue models (with elements of game theory);

Integration of linguistic and sensorimotor representations (multimodal models).

Integrative approaches. Contemporary research seeks to combine spatial and linguistic aspects:

Multimodal models of consciousness link:

Visual spatial images;

Language descriptions;

Objects and actions in a 3D environment.

Narrative thinking models combine:

Spatiotemporal context;

Cause-and-effect relationships;

Subjective assessments.

Neurocognitive architectures (e.g., *SOAR*, *ACT R*) integrate:

Working memory;

Attention;

Procedural knowledge;

Language modules.

Modeling spatial and linguistic manifestations of consciousness follows a path:

From isolated models to multimodal architectures (space and language);

From symbolic systems to hybrid ones;

From description to an attempt to reproduce subjective experience.

KEY tools for modeling spatial and linguistic consciousness are neural network models, cognitive architectures, multi-agent systems, and neurobiological data.[6–11]

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## Building a spatial generative AGI with dynamic multimodality

Building a spatial generative AGI with dynamic multimodality entails developing a general-purpose artificial general intelligence (AGI) capable of creating and manipulating spatial models and contexts in real time, as well as integrating and dynamically interacting with various sensory modalities. Key aspects include:

1. Spatial Modeling: An AGI has the ability to generate and manipulate internal models of its surrounding space, enabling it to navigate, plan, and interact with the physical environment.
2. Generative Capabilities: Using generative models (e.g., transformers, diffusion networks) to create new spatial and meaningful images, scenarios, and solutions.
3. Dynamic Multimodality: The ability to integrate data from various sensory channels—vision, hearing, touch, movement—in real time and adapt its internal representations and actions according to changing information.
4. Interactivity and learning: AGI learns from interactions with the environment, continuously updating its models and strategies, thereby becoming more efficient and versatile.
5. Integration with spatial generative systems: Enables the creation of complex, realistic virtual or physically realized spaces for simulation, learning, or interaction.

Creating a spatial generative AGI with dynamic multimodality is a complex interdisciplinary task that requires the integration of cutting-edge advances in neural networks, cognitive science, and engineering.[12–16] Let's consider the key components and development stages:

Multimodal encoder/decoder

Specialized encoders for each modality (text, image, sound, 3D data, tactile signals);

Unified latent space for joint processing of heterogeneous data;

Adaptive decoders for generating output data in any modality.

Spatial core

3D Transformers for processing spatial relationships;

Graph Neural Networks (GNN) for modeling topological structures;

Spatial attention mechanisms for focusing on relevant areas.

Dynamic integration module

Adaptive weights for weighting modalities depending on the context;

Mechanisms for quickly reconfiguring the architecture for new tasks;

Online reinforcement learning for adapting to changing conditions.

Generative module

Diffusion models for fine-grained generation;

Variational Autoencoders (VAE) for semantic control;

GAN architectures for photorealistic synthesis.

Memory and context

Long-term memory with vector storage;

Short-term working context mechanism;

Associative search system for multimodal data.

System architecture

Input layer

Real-time multimodal data reception;

Preprocessing and normalization;

Feature extraction for each modality.

Integration layer

Projection into a common latent space;

Cross-modal alignment and matching;

Formation of a unified semantic-spatial representation.

Reasoning core

Spatio-temporal modeling;

Inference and planning;

Hypothesis and scenario generation.

Output layer

Multimodal generation (text, images, 3D, speech);

Feedback and refinement based on queries;

Adaptation to the target modality.

Technological stack

Neural Networks: Transformers, diffusion models, GNNs, neural networks.

Training: self-supervised learning, reinforcement learning, meta-learning.

Inference: quantization, pruning, hardware optimization (TPU/GPU).

Data: multimodal datasets with spatial annotation.

Development stages

Basic multimodal module

Training on pairs of modalities (text, image, audio); * creating a shared latent space.

Spatial adaptation

Integration of 3D data and spatial relationships;

Testing on navigation and manipulation tasks.

Dynamic tuning

Development of mechanisms for adaptive integration of modalities;

Implementation of online training.

Generative subsystem

tuning high-precision generation across all modalities;

monitoring consistency between modalities.

Integration and scalability

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Combining components into a single architecture;

Optimizing performance and power consumption.

Modal consistency: Preventing inconsistencies between generated data of different types. *Computational complexity: Processing 3D data requires significant resources.

*Interpretability: Explaining decisions of a multimodal system. *Ethics and security: Controlling the generation of potentially dangerous data.

The creation of spatial generative AGI with dynamic multimodality and artificial consciousness is proposed based on multimodal LLMs, graph networks, reinforcement learning neural networks, and interoperable ensembles of intelligent agents.

## Conclusion

Promising applications of spatial, generative, multimodal, dynamic artificial general intelligence include:

Robotics: spatial understanding and action planning. For example, a robot assistant perceives a room through cameras and lidar, understanding where a cup is, where a door is, and how to navigate around an obstacle. It can answer questions verbally, display diagrams on a screen, and fetch needed items. AGI will help effectively perceive and model the surrounding space, allowing robots to navigate safely, avoid obstacles, and perform tasks in unpredictable environments.[17,18]

Virtual/Augmented Reality: For example, a Virtual Expert analyzes a medical case: it examines the patient's medical history, MRI images, audio recordings of the patient's voice, and sensor data. It formulates a solution, draws a 3D model of the affected organ, and explains the solution in natural language. Virtual intelligent expert at the digital clinic analyzes diagnostics and plans surgeries. AGI will help tailor treatment programs by interacting with doctors and patients.[19]

Design, Creativity, and Architecture: Automated design with spatial constraints in mind. For example, the AI Creative Studio generates a script, location sketches, dialogue, and music on demand, then displays a short audio film. AGI can help generate and adapt virtual worlds, adapting to the user's actions and preferences, providing a personalized experience.

Education and learning through personalized learning environments: Systems can create interactive lessons that adapt to the user's learning style and interests.

Virtual tutors: Multimodal AGIs can act as teachers or mentors, interacting through speech, gestures, and visuals.

Scientific research and modeling of complex systems: Spatial and multimodal approaches enable a better understanding of natural and technical processes.

Generation of hypotheses and new ideas: AGIs can generate new concepts based on the analysis of multichannel data.

Artificial content generation: Creation of art, music, virtual worlds, and scenarios with spatial and multimodal aspects in mind.

Virtual characters and agents: creating realistic characters for games, films, and interactive applications. The use of such AGI requires a conscious approach to ethics, security, and oversight to ensure its positive impact and minimize potential risks.

The application of spatial generative multimodal dynamic artificial general intelligence is relevant for navigation and interaction, as well as for the development of more human-like artificial intelligence capable of complex perception and creation of the surrounding world in dynamic space.

Spatial generative multimodal dynamic AGI as a model of consciousness refers to technologies that integrate perception, memory, generation, and action in a multimodal environment. Implementation of this model of consciousness is expected through the improvement of multimodal LLMs, graph networks, robotics, reinforcement learning methods, and the development of innovative technologies. Research in this area is actively underway (e.g., the *BabyAGI* and *SuperAGI* projects).[20,21]

The author proposes to automatically analyze the solutions and results of scientific and practical problems generated by the axiomatic coaching solver AGI method (artificial intelligent thinking) on neuromorphic network with brain-like structure using intelligent models of the brain and improve them using model of reflexive consciousness (spatial generative multimodal dynamic AGI).[22–24]

To address the practical ethical application of brain models with artificial consciousness and other intelligent systems, it is necessary to rely on their certification. Certification must be based on standards for the functional and ethical use of intelligent systems in various areas of life. Only certified systems should be accepted for use.

## Acknowledgements

None.

### Author contributions

Evgeny Bryndin is the sole author. The author read and approved the final manuscript.

## Conflicts of interest

Authors declares that there is no conflict of interest.

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**Citation:** Bryndin E. Spatial generative multimodal dynamic AGI as model of consciousness. *Int Rob Auto J*. 2026;12(1):6–16.
DOI: 10.15406/iratj.2026.12.00311