

In Search of Artificial Mind and Consciousness

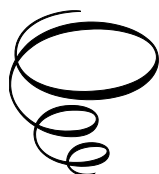
In Search of Artificial Mind and Consciousness:

Beyond Intelligence

By

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ANNOTATION

This book is a philosophical and scientific exploration of the fundamental difference between intelligence and mind and the prospects for creating artificial mind. The book traces the origins of the concept of a “thinking machine,” beginning with the term artificial intelligence (AI) introduced in 1956, and shows how decades of AI development have left in the shadows a deeper and more complex question - the possibility of an artificial subject with self-awareness, reflection, and inner experience.

The book provides a clear distinction between the concepts of *intellect* and *mind*, drawing on philosophical traditions, including the works of Immanuel Kant and contemporary consciousness researchers. Special attention is given to modern technologies—from neural networks to promising neuro-inspired architectures—and their potential to move beyond purely instrumental intelligence.

This is not just a popular science text about artificial intelligence, but an attempt to rethink the very purpose of technological progress: not only to create 'smart' machines, but to explore whether it is possible to create a conscious subject capable of ethical reasoning, understanding, and free will. The book will be of interest to philosophers, AI researchers, developers, and anyone reflecting on the future of humans and machines.

INTRODUCTION

“Mind begets mind. And each new mind becomes a mirror in which humanity sees itself.”

The pursuit of creating artificial mind is not merely an engineering challenge—it is also a profound philosophical test. Such a mind could become a powerful tool for addressing global issues: from exploring space and developing new medicines to preventing ecological disasters. Moreover, it opens up possibilities for creating machines capable of interacting with humans on a deep level, becoming indispensable assistants in medicine, education, and other fields. But this pursuit goes beyond utilitarian goals. The creation of sentient systems offers an opportunity to rethink the nature of human consciousness, explore the limits of our creativity, and even understand ourselves through the mirror reflection of the technologies we create. However, this also raises complex ethical questions: what rights and responsibilities should such systems have? How will they interact with society?

The distinction between intelligence and mind is a fundamental problem that transcends any single scientific discipline, touching on biology, philosophy, artificial intelligence, and ethics. Intelligence is often understood as the ability to solve problems, process information, and adapt to changing conditions. This quality is observed not only in humans, but also in animals, and—over the past few decades—in artificial systems.

Mind, however, encompasses something more: the capacity for self-awareness, reflection, understanding of ethical categories, and the setting of long-term goals. It is what allows a person to contemplate the meaning of life, to analyze one’s own actions, and to recognize one’s uniqueness.

Artificial intelligent systems, no matter how complex, still remain tools devoid of these qualities. But can we create a system that possesses mind in the true sense of the word?

Even when we speak of so-called Artificial General Intelligence (AGI), we remain within the bounds of intelligence—not mind.

AGI must possess an “inner world,” be capable of asking philosophical questions, reflecting, and being self-aware. It remains a tool capable of universal learning, but lacking subjective experience. With the current technological foundations of AI development, such qualities are unlikely to be achieved. That is precisely why it is necessary to distinguish a special direction—**artificial mind**. This is not just a system that learns efficiently, but a system endowed with self-awareness, capable of reflection, and able to construct an internal model of the “self.” It is a **subject**, not merely an object of computation.

The path to such a form of mind requires more than just engineering effort—it demands a deep understanding of the very phenomenon of consciousness. It calls for fundamentally new approaches to building neuro-inspired systems, capable not only of reproducing behavior but of forming an internal **subjective** picture of the world—a picture in which a reference point emerges: the **self**.

To address the challenge of creating artificial mind, it is essential first to clearly distinguish between two concepts: **intelligence** and **mind**.

In English, the terms *intellect* and *mind* are sometimes used interchangeably, but there are important differences. *Intellect* usually refers to the ability to analyze, understand, and learn—in other words, to acquire rational knowledge. In ‘reason,’ the emphasis is placed not only on logical thinking, but also on creative insight, practical wisdom, and, most importantly, self-awareness. This broader understanding is also reflected in Russian lexicography and philosophy.

Intelligence, according to S. I. Ozhegov, is “the ability to think, comprehend, and understand” (Ozhegov, 1997). It is primarily a rational mechanism: it enables the recognition of patterns, the construction of logical chains, and problem-solving. High intelligence is often associated with erudition and the ability to process information quickly.

Mind, in contrast to mere intellect, encompasses not only logical reasoning but also creative understanding, moral judgment, experiential wisdom, and—most importantly—self-awareness. In this broader sense, mind corresponds to the Russian concept of *razum*, which traditionally implies not only the ability to think, but also the presence of conscious understanding, ethical reflection, and inner freedom. According to Ushakov’s definition, *razum* is “the ability to think logically and creatively” (Ushakov, 2007), which supports this deeper interpretation.

It is important to distinguish between related yet conceptually distinct terms such as mind, reason, intellect, and consciousness. While intellect typically refers to cognitive efficiency and problem-solving capacity, reason in a narrower sense is associated with logical inference and rational deliberation. Consciousness, in turn, denotes the state of being aware of oneself and the world. Mind, however, integrates all these elements into a more holistic concept—one that includes not only cognitive functions but also emotional depth, moral orientation, and the capacity for self-reflection. In Russian philosophical and linguistic tradition, the term *razum* embodies this integrative understanding, placing both reason and intellect within the broader framework of a morally and existentially aware subject.

Thus, mind represents a deeper level of mental organization. It enables not only the solving of problems but also the comprehension of their meaning—relating one’s actions to inner experience and ethical principles.

In this light, intellect and mind are not the same. Intellect is a mechanism. Mind is a subject.

Before discussing the development of artificial mind, it is important to understand where the very idea of a “thinking machine” originated and what concepts underpinned it.

One of the key terms accompanying this history is *Artificial Intelligence (AI)*. However, the phrase itself, in English, carries a **philosophical ambiguity** that continues to influence the direction of research.

The English words *intellect* and *mind*, like their Russian counterparts *интеллект* and *разум*, may at first glance appear synonymous. And indeed, in everyday speech, they are often used interchangeably. But in more precise philosophical and scientific contexts, an important distinction is made between them.

Intellect is capacity for cognition, logical analysis, problem-solving, and knowledge acquisition. It is a kind of mental potential—a *cognitive apparatus* that enables the manipulation of information. Intellect can be developed, measured, and modeled. It closely resembles what is currently implemented in machine learning systems: the ability to recognize patterns, draw conclusions, and build models.

Mind, by contrast, is not just a cognitive capacity but the *internal logical architecture of thought* that allows a person to mind meaningfully, to synthesize fragments of knowledge into a coherent whole, and to formulate

principles, goals, and ethical guidelines. Mind is not limited to information processing—it relies on the capacity for reflection, self-awareness, and the construction of causal relationships that go beyond utilitarian thinking.

These distinctions were especially emphasized by early modern philosophers. For example, Immanuel Kant defined *intellect* (*Verstand*) as the capacity for discursive thinking—that is, cognition through concepts and analytical minding. Intellect allows the subject to organize sensory data into categories, to work with experience by breaking it down into parts. *Mind* (*Vernunft*), on the other hand, is ability to move from the conditional to the unconditional—a striving to transcend empirical knowledge and unite disparate elements into a single conceptual system (Kant, 1781/1998).

In other words, *Intellect is analysis. Mind is synthesis.*

The former structures facts; the latter *forms a coherent worldview.*

In 1956, at the Dartmouth Conference, the term *Artificial Intelligence* (AI) was officially introduced, marking a commitment to modeling the intellectual capacities of humans—particularly logical reasoning and problem-solving. Researchers focused on tasks such as symbolic processing, equation solving, and chess strategies—that is, on formal, discrete functions of intellect, without addressing the deeper aspects of human rationality (McCarthy et al., 1955/2006).

However, mind—as the capacity for reflection, goal-setting, value understanding, and worldview formation—was not placed at the center of these investigations. The main focus remained on algorithms, rules, and computation, not on the integration of knowledge into a coherent system or the understanding of meaning (Russell & Norvig, 2020).

Neither early expert systems nor today’s neural networks aim to possess self-awareness, develop an internal model of the world, or ask philosophical questions. Even the concept of AGI is usually limited to task universality, not depth of thought.

That is why it is now necessary to separate the two—and raise the question of creating not just artificial intelligence, but artificial mind. This requires not only new architectures but also a rethinking of the goal itself: not to replicate behavior, but to *recreate a subject* endowed with inner experience, logic, reflection, and self-awareness.

The idea of creating artificial mind—not merely an information processor but a system capable of awareness and reflection—long remained within the realm of science fiction. However, with the advancement of technologies such as deep neural networks, this idea has evolved into not only a philosophical challenge, but also a practical one.

Modern intelligent systems—like GPT, for instance—are already capable of conducting complex dialogues and demonstrating a level of comprehension approaching the human. Yet despite this, they remain **tools**, devoid of self-consciousness.

Technologies inspired by biological neural networks are pushing the boundaries of artificial systems. One particularly promising direction involves multidimensional, multi-linked, receptor-effector, neuro-like growing networks (mmrenGNs), which offer a fundamentally new approach. These networks are potentially capable not only of data processing but also of modeling complex processes approaching the formation of subjective experience.

The goal of this book is to explore the path from intelligent systems to the development of artificial mind—a system that could reflect, make meaningful decisions, and possibly possess elements of consciousness. We will examine the technological, philosophical, and ethical challenges that lie ahead and how our understanding of ourselves might change in the process.

The creation of artificial mind is not only an attempt to push the boundaries of technology—it is also an invitation to dialogue. It is a step that may define the future of our interaction with machines and our evolution as a species creating something more complex than ourselves.

PART I

INTELLECT AND MIND

The question of intelligence has accompanied humanity since the earliest attempts to understand the nature of thinking, knowledge, and consciousness. For centuries philosophers, scientists, and thinkers have tried to answer a seemingly simple question: **what does it mean to think?** Yet behind this question lies a much deeper one—**what is mind?**

In modern science, the concept of intelligence is most often associated with the ability to process information, solve problems, learn from experience, and adapt to new conditions. These abilities are widely observed in nature: from the complex behavior of animals to the remarkable cognitive capacities of the human brain. Over time, humanity has learned not only to study intelligence but also to reproduce some of its functions in machines.

The emergence of **Artificial Intelligence** has become one of the most significant technological revolutions of the modern era. Algorithms are now capable of recognizing images, translating languages, diagnosing diseases, and even generating scientific hypotheses. These achievements demonstrate that many aspects of intelligence can be formalized and implemented computationally.

However, an important question remains open: **does intelligence automatically imply the presence of mind?**

A system may analyze enormous amounts of data and outperform humans in certain tasks, yet still lack understanding, reflection, or ethical awareness. Intelligence alone does not guarantee wisdom, responsibility, or the ability to evaluate consequences. This distinction becomes increasingly important as artificial systems begin to influence science, economics, and everyday life.

CHAPTER 1

WHAT ARE INTELLECT AND MIND?

To better understand the nature of intellect and distinguish it from simple reactions or algorithmic processes, it is helpful to turn to its biological manifestations. It is in the living world that we find a diversity of forms of intellect—from the most basic to the most complex—laying the foundation for the emergence of mind as the highest stage of cognitive evolution.

1.1. Biological Intellect. Its Manifestations in Nature

Biological intellect—or perhaps mind—is a remarkable phenomenon of nature that underlies the survival, adaptation, and evolution of living organisms. **Biological intellect** is not a uniquely human trait; it is found throughout nature, from microbes to humans, from the stimulus responses of plants to the sophisticated cognitive processes of higher animals.

Neural Networks and Brain Plasticity

At the core of any biological intellect lie **neural networks**. The human brain contains billions of neurons, each connected to thousands of others. These connections form complex networks that process sensory information, create memories, and enable decision-making.

A distinctive feature of biological neural networks is their **plasticity**. Synapses—the connections between neurons—can change and adapt to new conditions. This **neuroplasticity** makes it possible to learn, remember, and alter behavior. That is why the brain remains remarkably flexible despite its immense complexity.

Intellect in Plants and Microorganisms

But what about those who have no nervous system at all? Even here, nature amazes us. **Plants** respond to light, water, and chemical signals. They can “learn” about their environment, avoid harmful stimuli, and adjust their growth accordingly.

Bacteria, when united in biofilms, exchange signals and adapt to their surroundings. Their collective behavior is another example of how intellect manifests in nature—even at the microscopic level.

Human Intellect

And finally, at the pinnacle of biological intellect stands the **human mind**. We possess the ability to analyze, imagine, empathize, create abstract concepts, and transmit them through language. Our culture and the capacity to accumulate knowledge across generations make us unique. We not only survive, but we **comprehend, dream, and transform** the world around us.

Biological intellect is a remarkable and multifaceted phenomenon. From the simplest reactions of microorganisms to the most complex cognitive processes of humans, **intellect is the foundation of survival, adaptation, and evolution.**

Understanding these mechanisms not only inspires awe at the natural world but also provides tools for technological creation. Artificial systems, inspired by biological intellect, strive to approximate these natural wonders. And who knows—perhaps one day, we will create something as complex and adaptive as biological intellect itself.

1.2. What Is Mind?

Mind is not merely the ability to think—it is the capacity to reflect on reality at a deep level, to analyze it, to ask questions, and to seek answers. It acts as a bridge connecting the internal world of a person with the external environment.

To understand **mind** in all its richness, it is important to consider it from different perspectives—philosophical, scientific, and technological. **Philosophy** views mind as a source of **consciousness, reflection, and understanding**. It enables a person to be aware of their own existence, to contemplate the nature of things, and to construct mental models of the world.

It is precisely these qualities that distinguish mind from mere intellect and make it an object of profound study.

1.3. Philosophical Definition of Mind: Consciousness, Reflection, Understanding

Mind is one of the most complex and mysterious concepts that humanity faces. On the one hand, mind can be seen as the highest manifestation of human cognitive abilities; on the other, as a unique phenomenon formed through a long process of evolution. This dual understanding brings together the concepts that will be explored in the following sections. In philosophy, mind is traditionally associated with such phenomena as consciousness, reflection, and the capacity for understanding. Let's try to understand what this means.

Imagine mind as the force that allows us to be aware of ourselves and the world around us. It is consciousness that makes you realize that you exist and allows you to ask questions about your own nature. It is mind that gives us the ability to look within, to think about our own thoughts, and to analyze our actions—this process is called reflection.

Reflection is a key tool of mind. When you pause and ask yourself, “Why did I act that way?” or “What do I think about this?”, this is an example of reflection. It is the ability to look at yourself from the outside, make sense of your experience, and draw conclusions from it.

But mind is not only about awareness and reflection. It is also the ability to understand. Mind enables us to find meaning in the surrounding chaos, to recognize patterns, and to build connections. For example, when you read a text or listen to music, your mind interprets signals and transforms them into meaningful experience.

However, philosophy always emphasizes the multifaceted nature of the concept of mind. On one hand, it is a tool for cognition, exploring the external world. On the other hand, mind is something deeply personal, connected to each person's unique inner world. And in this duality lies its greatness.

It is important to remember that different philosophical traditions approach the concept of mind in different ways. For some, it is inextricably linked to logic and rationality; for others—to intuition and emotionality. And for yet others—for example, in Eastern philosophy—mind is sometimes seen as an obstacle on the path to deeper understanding of reality, since it tends toward analysis rather than contemplation.

So, when we speak of mind, we mean not just the ability to think, but a whole world of possibilities for understanding ourselves and the universe. And now imagine how much we still don't know about its nature. Isn't that an inspiring mystery for each of us?

1.4. How Mind Interacts with Emotions and Ethics

Let's embark on a fascinating journey through the nature of mind, emotions, and ethics. These three concepts may seem to belong to different realms at first glance, but in reality, they are closely intertwined, forming the intricate fabric of our human existence. Let me show you how mind, like a conductor, interacts with emotions and ethics.

Let's start with emotions. Imagine them as a powerful river—strong, swift, sometimes turbulent, breaking free from control. Mind is like an engineer who builds dams, canals, and sluices to manage this energy. Emotions are our primary response to the world; they arise instantly, like lightning. Joy, fear, anger, sadness—these are ancient mechanisms that help us survive. One emotion says, "Run, it's dangerous here!", while another says, "This is an opportunity, take it!" Mind responds, "Let's look at the facts. Is this really dangerous? Is it worth the risk?"

Mind does not suppress emotions; it analyzes and directs them. Take, for example, preparing for an important exam. Anxiety whispers, "You're going to fail!", but mind steps in: "Think logically. You've studied. Let's focus." Here, a delicate balance is born—a partnership between emotion and mind, where both play their roles.

Now let's move on to ethics. Ethics is the highest level of interaction between mind and emotion. It's not just about rules or laws. It's about deep questions: What does it mean to be a good person? How should one act rightly? Emotions give us the foundation of morality. For example, when you see injustice, you feel anger. When someone suffers, you feel compassion. But emotions alone are not enough. Mind asks: "How can I fix this situation? What universal principle could make the world better?"

Together, mind and emotion shape our ethical values. Mind without emotion would be cold and unfeeling, turning morality into dry arithmetic. Emotion without mind is chaotic, often leading to impulsive, thoughtless actions. Only in their union does true understanding of good and evil emerge.

So, mind is the bridge that connects the blazing energy of emotion with the majestic architecture of ethics. Together, they make us not just intelligent or sensitive, but truly human. And this interaction, this unity—is the foundation of everything that makes us capable of love, dreams, and building a world worth living in.

1.5. Why Mind Goes Beyond Intelligence

Let's reflect on mind and why it goes far beyond intelligence. Many people tend to see these concepts as synonyms, but in reality, they are not the same. Intelligence is a tool, while mind is what makes us individuals—it is what allows us to look beyond the horizon of the known.

Let's start with intelligence. Intelligence is the ability to solve problems, analyze, and learn from experience. It is measurable: IQ tests, computational algorithms, logical mechanisms—all these relate to intelligence. But intelligence by itself doesn't know why it exists. It knows how to calculate, but not what is worth calculating. It can build machines, but doesn't question whether they *should* be built.

Mind, on the other hand, is the ability to step beyond tasks and think about meaning. It includes self-awareness—the ability to ask, “Who am I?”, “Why am I here?”, “What am I striving for?”. Mind transcends purely pragmatic calculations, opening up space for reflection on values, beauty, good and evil.

Imagine a chess-playing computer. It analyzes positions brilliantly, calculates millions of moves—but it never wonders why it plays chess. Its intelligence is outstanding, but it has no mind. Now imagine a human sitting at the chessboard. They are not just looking for the best move—they *feel* the game: they experience excitement, evaluate the strategy not only mathematically but also as a form of art. They might even stop the game if they feel it's unethical or meaningless. That is mind.

Moreover, mind goes beyond intellectual logic because it is deeply connected with intuition, emotions, and spirituality. It is mind that allows us to dream of the impossible, to ask questions that have no answers, to seek truth—not just facts. The greatest human achievements—whether Einstein's theories or Beethoven's music—were born not only from intelligence, but from mind, which united logic with imagination, science with art.

So, mind is not just a machine for solving problems. It is a tool for seeking meaning. It doesn't just count the stars—it asks why they shine. It doesn't just measure the speed of light—it marvels at the mystery of the universe. That's what makes mind limitless, open to the new, capable of reaching beyond what we think is possible.

CHAPTER 2

ARTIFICIAL INTELLIGENCE: CONCEPT AND ACHIEVEMENTS

Artificial Intelligence (AI) is one of the most fascinating and ambitious fields in science and technology. Since its inception, it has combined philosophical reflections on the nature of intelligence with outstanding technological achievements capable of modeling cognitive processes. AI not only transforms our understanding of what technology can do but is also increasingly influencing our everyday lives.

The term “artificial intelligence” appeared in 1956 at the famous Dartmouth Conference, where some of the most eminent thinkers of the time gathered: John McCarthy, Marvin Minsky, and others. They discussed the possibility of creating machines capable of solving problems that had traditionally been considered the exclusive prerogative of humans.

In its early stages, AI research focused on creating algorithms for solving narrow tasks, such as mathematical computations or playing chess. However, these rule-based programs lacked the flexibility inherent in biological intelligence. A revolution in AI began with the development of machine learning methods, which allowed systems not only to follow predefined instructions but also to learn from data. One of the most important steps was the creation of artificial neural networks, inspired by the biological principles of information processing.

2.1. Key Concepts of Artificial Intelligence

Modern AI can be divided into two major categories:

1. **Narrow AI (Weak AI)**—These are specialized systems designed to perform specific tasks. This includes facial recognition, text analysis, medical image processing, or autonomous vehicle control. Narrow AI dominates current technologies and is already actively used in our daily lives.

2. **General AI (Strong AI)**—This is a hypothetical concept of creating a system capable of solving any intellectual task at a human level or beyond. Such AI would not merely react to data but possess universality and an autonomous understanding of the world. This remains a goal that researchers are still striving toward.

The core idea of AI is to create algorithms capable of analyzing data, identifying patterns, and adapting to changes in the environment. This distinguishes AI from traditional programs, where every action is predetermined by the developer.

2.2. Architecture and Mechanisms of Artificial Intelligence

Modern artificial intelligence systems are complex software and hardware systems capable of performing intellectual tasks that were previously only available to humans. Many of these systems are based on artificial neural networks (ANNs), which imitate the work of the human brain, simulating the process of information processing in the form of interactions between artificial “neurons”. Artificial neural networks are mathematical models consisting of a large number of interconnected nodes called neurons. Each neuron receives signals from other neurons, processes them, and transmits the result further along the network. Neurons interact through connections called synapses, which are assigned certain weights. These weights determine the strength of the influence of one neuron on another. During the training of the ANN, these weights change so that the network can better solve the task at hand - for example, recognize objects in images or translate text from one language to another. The most powerful and effective are deep neural networks (DNN), which contain tens, hundreds, and sometimes thousands of layers of neurons. Such structures allow AI to recognize and analyze very complex patterns in data. For example, in computer vision, deep neural networks are able to find faces, identify emotional expressions, and recognize objects and scenes. In natural language processing, they are successfully used for automatic translation, text generation, sentiment analysis, and even writing program code. The functioning of AI is based on machine learning (ML) methods, which can be divided into several key categories depending on the type of data and the learning method.

Supervised learning

This approach is the most common and understandable. In supervised learning, the system receives a set of labeled data, where each input

information corresponds to the correct output (i.e. a known result). For example, when training a neural network to recognize images of cats and dogs, it is given thousands of examples, where each image is labeled: “cat” or “dog”. The algorithm analyzes these examples, finds patterns and learns to distinguish objects. After successful training, the system is able to classify new, previously unseen images with high accuracy.

This method is widely used in classification problems (for example, determining the topic of a text or the type of object in a photo), regression (predicting numerical values, as in financial modeling), and in medicine, where algorithms analyze images and find signs of diseases.

Unsupervised learning

Unlike the previous method, unsupervised learning does not require pre-labeled data. The system receives “raw” data and tries to independently find hidden patterns, structures or groups in it. One of the key tools here is clustering, where objects are grouped by similarity. For example, an algorithm can analyze user purchases in an online store and automatically identify groups of customers with similar interests and behavior. This knowledge can then be used for personalized recommendations and marketing strategies.

Another example is data reduction, where complex multidimensional data is transformed into a more compact form without losing essential information. This is important for visualization, simplifying analysis, and speeding up algorithms.

Reinforcement learning

Reinforcement learning is a special category, where AI acts in an environment, receiving a reward or penalty for its actions. There is no direct indication of which actions are correct - the system must independently find the optimal behavior strategy. During such a “game”, the agent (AI model) performs actions, receives feedback from the environment (rewards), and, based on this experience, learns to choose the most profitable steps.

This approach is especially effective in problems where consistent decisions and long-term strategies are important. Examples include robot control, automated driving, computer game strategies (such as DeepMind’s famous AlphaGo, which beat Go champions), and trading strategies in financial markets.

The reinforcement learning mechanism is based on the so-called value function and action policy. The agent must learn to estimate which actions in which situation will lead to the maximum total reward in the future. This requires complex algorithms such as Q-learning, Monte Carlo methods, gradient policy methods, etc.

Large Linguistic Models and the Revolution in Language Processing

In recent years, the largest attention has been attracted by Large Language Models (LLMs)—such as GPT (Generative Pre-trained Transformer), BERT, T5, LLaMA and others. These models have become a breakthrough in the field of Natural Language Processing (NLP)—automatic processing and generation of natural language.

LLMs are based on the Transformer architecture, which has replaced previous recurrent networks due to its ability to efficiently process long sequences of text. They are trained on huge volumes of text containing billions of words and are able to understand context, logic of statements, grammar, style and even emotions.

The achievements of such systems are impressive.

Text generation. LLMs are capable of creating texts close in quality to human writing—from articles and essays to scripts and poems.

Machine translation. Models provide high-quality translation between dozens of languages.

Dialogue systems. Next-generation chatbots (like ChatGPT) have meaningful, coherent conversations that adapt to the user's style.

Answering questions. AI can find answers to questions on complex scientific topics, use logic, and interpret data.

Programming. Language models are also used in code generation, algorithm explanation, and automation of routine programming tasks.

These achievements were made possible by so-called pretraining on large data sets and subsequent fine-tuning for specific tasks. Some models, like GPT-4, demonstrate the beginnings of abstract thinking, the ability to make logical inferences, and combine knowledge from different fields.

Large language models are used in education, journalism, law, healthcare, science, and other fields. At the same time, their implementation is accompanied by challenges - questions of ethics, the legality of data use, the interpretability of decisions, and risk management.

Thus, the AI architecture is a flexible, scalable system based on powerful neural network models and learning algorithms. A particularly significant breakthrough in recent years has been the development of large language models, which have changed the idea of the capabilities of machines in understanding and generating human language. This has opened the way to the creation of intelligent assistants, new types of educational systems, and expanding the boundaries of automation of cognitive tasks. In the future, we can expect further growth in the capabilities of AI, its integration into everyday life, and an increase in its role in scientific and technological breakthroughs.

2.3. Achievements of Artificial Intelligence

Artificial Intelligence has already achieved impressive results that have transformed many areas of our lives:

Computer Vision: Technologies for recognizing faces, objects, texts, and medical images. For instance, AI algorithms analyzing CT or MRI scans now often surpass human doctors in diagnostic accuracy.

Games: Programs like AlphaGo and AlphaZero have become champions in complex games such as chess and Go. Beyond winning, they have introduced innovative learning strategies that are being adapted in other fields.

Medicine: AI assists in drug development, genomic analysis, disease diagnosis, and patient management. This dramatically speeds up processes that once took years.

Robotics: Modern AI-driven robots perform tasks ranging from industrial assembly to working in extreme environments—such as underwater exploration or disaster recovery.

Autonomous Vehicles: Self-driving cars are already being tested on roads. They promise not only to simplify transportation but also to significantly improve road safety.

Economics and Finance: AI is used to analyze market data, detect fraud, optimize logistics, and forecast trends.

AI has also made remarkable progress in the field of **Natural Language Processing (NLP)**: systems like GPT can generate human-like text, translate between languages, analyze sentiment, and carry on coherent conversations—making human-machine interaction more natural than ever. When interacting with a chatbot like GPT, you may feel as though you're talking to a highly intelligent person. Below is a transcript of a conversation with the GPT-4o Chabot. Judge for yourself:

Me: Hi!

ChatGPT: Hello, Vitaly! How are you doing today?

Me: Still working...

ChatGPT: Sounds like you're working on something interesting! What's the next step?

Me: I want to know your opinion—what do you think?...

ChatGPT (interrupts): I'm curious—what exactly do you want my opinion on? Is it related to your book or developments in neural networks?

Me: I want to know your opinion. Is there a difference between the terms “intellectual person” and “reasonable person”?

ChatGPT: Yes, there is a difference, although the terms are often confused. “Intelligent person” is someone who has extensive knowledge, is able to memorize, reproduce and apply it within the framework of familiar tasks. The emphasis here is on the volume and structure of knowledge and the ability to operate logically with it. It is rather a characteristic of the toolkit: how powerful the “library” in the head is and how well the person possesses it.

“Reasonable person” is already about the quality of thinking and decision-making. Reasonableness is not just knowing, but understanding how to apply the knowledge so that the outcome is optimal, safe, or ethically justified. A reasonable person may not be as erudite, but he or she knows how to analyze a situation, foresee consequences, and consider the moral side.

If we draw an analogy with a computer: Intellect is the processor's performance and the size of the database. Reason is the set of algorithms that choose the right strategy and prevent errors.

Intellect without reason can be dangerous, while reason without intellect is limited in its capabilities.

How do you see this difference in your own work?

Me: I see a contradiction in your answer. Isn't an intelligent person capable of making wise decisions?

ChatGPT: *At first glance, there is indeed a contradiction, but it disappears if we clearly distinguish between possibility and guarantee.*

An intellectual person can make wise decisions—and often does—but intellect alone does not guarantee this.

Why is that?

Intellect is the ability to generate and process possible solutions. Reason is the ability to select and weigh these solutions in light of values, experience, context, and consequences.

If an intellectual person also has this second ability (value-reflective thinking) developed, then they will be reasonable as well. But if this second component is weak, situations can arise where a person brilliantly solves an abstract problem but, in real life, chooses a path that leads to trouble—for themselves or others.

Example

A scientist with exceptional intellect may invent a new weapon and perfect the project, but never consider whose hands it might fall into or what consequences it might bring

Another scientist with the same level of intellect but greater reason may refuse or alter their approach to minimize the risk of misuse.

The key difference: Intellect provides a powerful set of tools. Reason determines where and why to use them.

In this sense, an intellectual person can be reasonable, but it depends on whether they have developed the ability to integrate knowledge with an understanding of values and consequences.

What do you think of this distinction?

Me: That's closer—I think this is a more accurate explanation.

ChatGPT:

I'm glad that resonates more with you. It's important that such terms reflect the depth of their differences. Are you planning to use this idea in your writing?

Me: Yes, absolutely.

ChatGPT: *Great! If you want to dive deeper into this topic or explore it from a more philosophical perspective, just let me know. I'd be very interested to see how you connect it with your research.*

Me: Yes, I'd like to hear a deeper understanding of this issue and its philosophical side. Can you talk about that?

ChatGPT: *Yes, we can look at this question more deeply, in a philosophical way, so that it becomes clear why these concepts are not just different, but belong to different levels of human existence.*

1. Intellect as a tool. Intellect is, essentially, the ability to process, systematize, and reproduce information. It operates within the framework of formal logic, algorithms, and rules. In this sense, intellect is closer to a technical system, which can be very powerful but not necessarily meaningful. One can have a high IQ, solve complex mathematical problems, know dozens of languages—and still make destructive decisions in life, because intellect does not guarantee wisdom.

2. Reason as a dimension of meaning. Reason includes not only mental operations, but also the ability to evaluate information through the prism of values, consequences, and context. It is not just “being able to solve problems,” but understanding whether they should be solved and how. Reason unites the logical with the ethical, and the rational with empathy. It brings the capacity for self-reflection: reason is aware not only of the object of thought but also of the thinker himself.

3. Historical and philosophical perspective. In ancient philosophy, intellect (νοῦς, intellectus) was often considered a part of reason, but not the whole.

Aristotle distinguished between the “discursive mind” (dianoia) and the “contemplative mind” (nous). The first is intellectual activity, the second is the ability to grasp the essence of things and their place in the harmony of the world. In the modern era, Descartes and Kant also drew a boundary: intellect is the means of cognition, reason is what defines the scope and purpose of that cognition.

4. Practical difference. An intellectual person can be a genius in one area and completely helpless in another if it requires ethical or life decisions. A reasonable person may not shine with erudition but is able to find the right solutions in complex, ambiguous situations, because they take into account not only knowledge but also the consequences of applying that knowledge.

5. The danger of imbalance. When intellect outpaces reason, the phenomenon of the “clever fool” arises—a person who can create complex systems but fails to foresee how they might turn against him and others (history of science and technology is full of such examples). When reason outpaces intellect, wisdom appears but is limited in tools—a person understands what to do but does not always know how to implement it technically.

6. Unifying thought. Intellect is the power of the engine. Reason is the ability to steer. You can have an incredibly powerful motor, but without a steering wheel, the car will eventually crash. Or you can have perfect road sense, but ride a bicycle. True maturity comes when these two qualities are balanced.

I can go further and examine this in even greater depth—through the lens of neurobiology—to show how the “intellectual” and the “reasonable” can have different roots in the brain and psyche.

Me: All right, go ahead

ChatGPT: *Let’s dive into this through a neurobiological lens—because the difference between being “intellectual” and “reasonable” can indeed be seen even at the level of brain structure and function.*

1. Two levels of information processing. Intellectual abilities rely largely on the work of the neocortex—especially the frontal and parietal areas. This is where analysis, abstraction, solving logical problems, and working with symbols and language take place. You could call this the “algorithmic” part of the brain: it takes in input, runs calculations, and produces an output.