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GLOBAL COGNITION AND MODELLING TASKS IN ARTS AND EDUCATION

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ABSTRACT

The creation and use of models is the basis for cognition and action. The main challenge for education is to prepare for real action, using different possibilities to create action models (AM) and their components (templates) so as to build real action.

The methodology used in the study is based on a critical analysis of different models of consciousness using the principle of complementarity. The informative theory of emotion as well as its generalisations and applications in decision making have been applied, with particular attention to educational tasks.

The design and operation of consciousness and artificial intelligence (AI) is based on the creation, storage, and use of AM. Natural and artificial neural networks use the datasets needed for training. The task of education is to organise the most efficient use of available information to prepare for tasks whose content is not known in advance. As the uncertainty and novelty of tasks are rapidly increasing, preparations for the evaluation of information should be used with increasing generalisations. The role of art in education is therefore rapidly growing. Similar problems arise in the formation of weak AI (machine learning), which become more significant on the road to strong AI (super intelligence) or general AI (AGI).

The results from the study support the complex development of arts, education, and AI. An emotion classification system has been developed to facilitate the understanding of various evaluation problems. The results obtained could be significant for ensuring the stability of AI. Proposals have been made for building a common world understanding and meaning of life through art within the educational system.

Keywords: *artificial intelligence, consciousness, emotions, life, mind, needs, neural networks, psychology*

Introduction

Highlight of modelling tasks

Reviews about societal problems reveal the imminent workless world and significant changes in the social structure, including education (Saskinds, 2021). Understanding modelling issues becomes relevant in relation to the rapid development of artificial intelligence (AI), the internet of things and robotics, the emergence of military robots and generative AI, and the increasing probability of the formation of superintelligence (Altmann, 2013; Amosov, 1994; Barrat, 2013; Bostrom, 2014; Bubeck et al., 2023; Ganguli et al., 2023; Steudle, 2022; Vilks, 2013). The opportunity to model consciousness as a set of action models (AM) emerges through advances in physics, computing, analytical psychology, and cognitive neurobiology (Graziano, 2013; Hameroff & Penrose, 2014; Kandel, 2016) as well as a growing need to build hierarchical, complementary, and self-aligned models: (1) a science-based world-view and (2) an objective ideology (Dzelme, 2018a; Dzelme, 2022; Emerson, 1997; Kramarczyk & Alemany Oliver, 2022; Vilks, 2008).

Many problems are easier to study from a single position when modelling is used as the basis. The modelling approach becomes particularly relevant by studying natural and artificial intelligence, minds, and computers (Dzelme, 2022; Koch & Hepp, 2006; Podnieks, 2018).

The aim is to investigate education and art, using modelling as a methodical approach.

World awareness through models

Linking the nature of events as the spontaneous loss of symmetry (SLS) to the existence of time as a necessary condition for building space (Smolin, 2013) forms the basis of an integral model. The anthropic principle makes it possible to link different variants of spacetime existence to the existence of our world, the emergence of life, and consciousness (Hawking, 2020). Understanding the meaning of life as the basis for ideology is increasingly important in a set of educational goals. Preconceptions about the structure of the world and the macro-world relationship with the micro-world are formed by the complementary models of physics and consciousness (Damasio, 2015; Dehaene, 2014; Dennett, 2016; Koch & Hepp, 2006; Rotenberg, 2017; Sebo, 2023; Seth, 2021; Wilterson & Graziano, 2021). The continuity of virtual events in the physical vacuum makes it possible to understand the possibility of describing SLS-related events with continuous differential equations using a spacetime continuity model (despite the existence of Planck time and length) (Smolin, 2013). Modelling makes it possible to understand how discreet time- and space-constrained real events relate to endlessly large and endlessly small objects of mathematical models.

Philosophical generalisations are necessary in all sciences (Bičevskis, 2021; Eliade, 1951; Tisenkopfs, 2010; Tumans, 2014; Utināns, 2008; Vilks, 2008). The comparison of different models allows education and art to use physics and psychology and to articulate goals in a changing environment for building ideology and understanding of the world (Koch & Tsuchiya, 2007; Lau & Rosenthal, 2011; Rotenberg, 2017; Russell, 2019; Webb et al., 2016).

Understanding the structure of the universe and the meaning of life is the basis of education. Education should be based on learning the key concepts of physics, with the application of the principle of complementarity (Dzelme, 2020; Graziano & Kastner, 2011; Russell, 2019; Tononi et al., 2016). The role of evolution in the processes of the formation of nature, mind, and society must be demonstrated, emphasising the historical formation and importance of understanding traditions and the meaning of life (Rotenberg, 2017; Utināns, 2008; Vilks, 2008).

Understanding model building should be the basis of methodology in education. The society of the future is likely to consist of a globally linked hierarchical structure of local communities which will make significant use of the opportunities created by AI to build harmonious unity between society and the world (Bičevskis, 2021; Karnitis, 2021). An optimistic future can be achieved if superintelligence is used to build a cooperative and solidarity-oriented world in a coherent manner.

Models and modelling

The importance of modelling has not been sufficiently appreciated (Podnieks, 2018) given the possibility of using other approaches to address the associated challenges. At critically high levels of complexity, paradigm change (the first type of transition) cannot ensure further accumulation of new knowledge. The form of knowledge storage needs to be changed, making knowledge more accessible to human consciousness (the second type of transition in cognition according to Wigner's theory). The task of improving model building breaks down into two main subtasks: in natural intelligence and in AI. The basis for the operation of natural and artificial intelligence is the creation, storage, and use of AM (Amosov, 1994; Dzelme, 2018b; Dzelme, 2022). Natural and artificial neural networks use training and experience. The use of appropriate datasets to address machine-learning tasks is similar to training in the education system.

The task of education is to organise the most efficient use of existing data. As the uncertainty and novelty of tasks are rapidly increasing, preparations for the evaluation of information and decision making should be increasingly used. The role of art and philosophy in education is growing as they offer means to make generalisations (Bicevskis, 2021; Damasio, 2015; Petrov, 2021; Russell, 2019). The challenges of using datasets tackled in machine learning or weak AI become much more significant on the road to strong artificial general intelligence (AGI) or superintelligence (Barrat, 2013; Bostrom, 2014; Vilks, 2013).

The improved definition of modelling allows the modelling process to be viewed from a natural sciences perspective. The focus of the developed approach is on refining the subject and purpose of the modelling process.

Superintelligence building problems

The most important task of science is the creation of a human-friendly AI (Hawking, 2020). The basis of any intelligence is a hierarchical, feedback-related set of AM (Dzelme, 2018b). The AI, mainly the evaluation system and emotions, should be built close to biological consciousness and emotions to make it easier to ensure friendliness and stability.

Cognitive, modelling, and societal challenges are greatly facilitated by familiarity with the basis of psychology (Graziano & Kastner, 2011; Kandel, 2016; Rotenberg, 2017; Sebo, 2023; Seth, 2021). The impact of quantum effects, with a particular focus on quantum entanglement, should be investigated when designing AGI (Duarte, 2019; Koch & Hepp, 2006; Smolin, 2013). Maintaining the stability of AGI is a significant challenge.

AI dangers

AI becomes dangerous when it makes decisions that are impossible to track and when the AI has sensors and effectors that enable it to improve its initial parameters, either by creating a new version of itself (a ‘breeding’ analogue) or by interfering with its existing structure. The two options may overlap and change periodically. At least one type of input (sensors) and output (effectors) shall be sufficient for AI. The generative pre-trained transformer (GPT) already has these options for internet communication (Bubeck et al., 2023). The ability to create feedback is essential. If decision making is based on modelling that resembles human capabilities, then AI becomes dangerous (Altmann, 2013; Barrat, 2013; Vilks, 2013). The situation depends on the internal evaluation and emotion system of the AI. Currently, GPT has already met all the conditions to become dangerous or is already dangerous (Bubeck et al., 2023; Ganguli et al., 2023). It is therefore important to understand the AI evaluation and decision-making system so as to predict the future (Barrat, 2013; Hawking, 2020).

The study questions are as follows:

1) What are the specific features of natural and artificial intelligence decision-making systems (criteria, motivation, emotions)?
2) How does one shape the educational process, considering modelling and human–AI interaction?

Methodology

The methodology used in the study is based on an analysis of models of consciousness. The informative theory of emotion has been applied (Dzelme, 2018b; Dzelme, 2022; Jungs, 2009).

The methodical approach is based on the principle of complementarity (Dzelme, 2020; Siliņš, 2017). The description of real-life phenomena requires a number of complementary models. A satisfactory description can be obtained using two models. This variant of the principle of complementarity is well known in science, philosophy, and art. This study investigates the use of the principle of complementarity to describe cognitive processes from a modelling point of view. Principles and approaches developed in physics, psychology, philosophy, and other sciences are used.

The main analysed models are the models of thinking. The main method is modelling, based on mathematical modelling, and an investigation of research on neural networks and machine learning. The main aim is to understand the similarities and differences between natural and artificial intelligence and to facilitate the creation of ideology for use in art and education. A critical analysis of the informative theory of emotion and of different models of consciousness using the principle of complementarity has been applied. Following the analytical psychology approach, four key conditions for consciousness action are used.

Results

The concepts of subject and purpose used in modelling were examined. They play a secondary role in mathematical modelling but become very important in education.

Model building and use scheme

The process of using models can be described in a chain of related events. The three main steps of modelling Mod are presented below.

1. Mod (Ma, O, Sa, ta, La, da, Pa)
   Subject Sa (author) creates a subjective model Ma through its sensor signals which originate from object O. At least the apparent autonomy of the object and the purpose Pa of creating a subjective model also determine the autonomy of the set of signals corresponding to the object. The limitations of the subjective model in time, space, and accuracy (ta, La, and da, respectively) are determined by the characteristics of Sa and Pa.
2. Mod (M, Ma, S, t, L, d, P)
   The subjective model Ma of object O (created by Mod (Ma, O, Sa, ta, La, da, Pa)) is converted by subject S into objective model M, which, with precision d, can autonomously exist at time and space intervals t and L, respectively. Subject S (author of model M) is the same subject as Sa but in a different state, usually at a subsequent moment. The transition from Sa to S is a shift from creating the original intention (model Ma) to the next step, transforming the intention into text. The nature of elements of objective model M and subjective model Ma may remain the same (signals inside subject S). If M and Ma are of the same nature, then a transformation of active thought Ma to passive M in memory occurs. Usually, M is in the form of text, the elements of which are signs (letters, sounds, numbers, etc.). Text is a set of signs that convert to a model when combined with relationships among one another (following a set of rules (grammar)). A set of rules for creating objective models is the language. A language has an alphabet, grammar, and semantics. (Creating models from text is understanding.)
3. Mod (Ml, M, Sl, tl, Ll, dl, Pl)
   Subject Sl converts the objective model M into a subjective model Ml. Sl may be the same as subject S at a later point in time (remembering). If the subject Sl (reader) differs from the author S, then the transfer of knowledge takes place.

Limitations

In education as well as in philosophy and cognition, the phenomenon of understanding can be successfully studied from a modelling point of view as an Ml-building task. If Ml differs greatly from Ma, it merits misunderstanding.

First, no real physical limit is precise because of the principle of uncertainty. Second, all real, physical processes change over time. Third, there are no two identical physical objects in the macro world. Exact coincidence is only possible for virtual, mathematical objects, including models.

Any model M in memory is objective. The subjective model Ma is targeted by attention. The principle of complementarity and several alternative descriptions of the situation should be used (Graziano, 2019; Metzinger, 2010).

There is no difference as to the structure of the subject or whether it is an organic or inorganic system or natural or artificial intelligence. What matters is the ability to perform the described modelling-required steps. Modelling processes are similar. The starting point for comparisons is currently consciousness.

Life modelling

The main functions of a living organism are (1) accumulating resources, mainly energy and information, and (2) reproducing. Two main parts can be isolated – a body (protein-derived enzymes) and text (in the molecules of deoxyribonucleic acid (DNA)). The body uses text (DNA) as a source of information during feeding (to form enzymes and regulate how they work). During breeding, this text is copied with minor changes or mutations and placed in an autonomously functioning new part of the body that is able to read the copied text and build the new body.

There are two types of interaction with the environment: (1) sensors, which use environmental events as signals; and (2) effectors, which react to the environment. (The signal is an invariant of the events.) There must be models of external and internal environments by which the actions produced by the effectors are coordinated, creating feedback (Godfrey-Smith, 2021).

Inorganic systems (including AI) can also perform lifelike functions. The basis is a set of AM.

Action models

Following the approach of analytical psychology (Dzelme, 2022; Jung, 1977; Jungs, 2009), the four main parts of the AM are as follows:

- T – dynamic model of the external and internal environment of the subject in the present
- N – model of the possible (desired) future
- L – forecasts regarding possible options (logic) for actions
- E – evaluation (through emotions) of different options (logic) and decision making and implementation (will) regarding actions

The main challenge for education and the arts is to prepare for real action, using different possibilities to create AM and their components (templates) so as to build real action as quickly, accurately, and effectively as possible. Personality models created in analytical psychology (Jungs, 2009) make it possible to understand the common operating principles of the mind and AGI based on modelling (Dzelme, 2022). Any key part of natural or artificial intelligence is a hierarchical, feedback-related set of AM and means to build AM.

Consciousness modelling

Consciousness is the ability to create and implement AM to move from the present T (senses, 'reality') to future N (forecast, 'intuition'). Consciousness uses templates, patterns L from memory (logic, 'mind', experience), and assessments E (emotions, 'feelings') to build AM (Cepelewicz, 2021; Jungs, 2009; Godfrey-Smith, 2021).

Self-confidence is a 'self' model, linked through attention and will mechanisms to environmental models (external and internal) (Graziano, 2013). The attention mechanism is an implementer of self-awareness (Cepelewicz, 2021; Hameroff & Penrose, 2014; Graziano, 2013; Lefebvre, 2006; Metzinger, 2010). Attention is most likely represented by the human brain structure '*claustrum*', which connects the cortex to all the most important subcortical structures (Crick, 2009). The universal role of attention and modelling has been explained by computer models of attention (Graziano, 2019; Wilterson & Graziano, 2021). The neural networks used by the AI create structures similar to the 'self' model, which remains incomprehensible – the 'black box' (European Commission, 2020).

Emotions

The most significant part of consciousness and AM is the emotional system (Jungs, 2009; Kahneman, 2011; Kandel, 2016; Lefebvre, 2006; Rotenberg, 2017). The emotion classification model has been developed (Dzelme, 2018b) (Table 1).

You can assign one of two values, 0 or 1, to each of the four main emotion criteria (characteristics) when you create a basic emotion, similar to creating basic colours from three parts of the spectrum. The four main emotion criteria are the following:

1) sign (Z) (avoid (1) or repeat (0)) – a negative assessment (1) (evil) leads to avoiding similar situations, but a supportive, positive assessment (0) (benefit) means that the situation should be repeated in the future
2) force (S) (increase (1) or brake (0)) – reinforcement as well as a tendency to continue initiated, activated AM (1) (activation) and drive energy waste while braking (0) leads to stopping current AM, saving energy reserves
3) change (C) (change (1) or save (0)) – the search for new, more appropriate AM leads to change, to trials (1) (variability), but the ongoing, active storage of AM (0) directs the continuation of AM execution (stabilisation)
4) time (A) (present, immediate (using sensors) (1) or future, postponed (using effectors) (0)) – the accumulation of experience of the present by focusing on sensors, linking with the present assessment, recording and amplifying information regarding the negative (harmful) received from sensors experience and interrupting the positive confirmed experience (1) (present as immediate experience) or preparation of future action, moving experience to the future, building anticipation and disseminating effector-oriented positive behaviour, limiting, localising the negative troubles, preventing the future AM from harmful obstacles entering through associations (0) (postponed future action)

Each criterion can activate at different intensities. Each basic emotion corresponds to one binary number (ZSCA) (Table 1).

Table 1 Emotion classification model

No	Emotion	*Need*	Link	*TNLE*	Z	S	C	A	ZSCA	SCA
1	Distress (pain)	*En.c.*	in	T (E)	1	+	+	+	15	*Cho' 7*
2	Pleasure	*En.c.*	in	T (E)	0	–	–	+	1	Mel 1
3	Persistence (will)	Inf.c.	eff	L (T)	1	+	–	+	13	*Phl' 5*
4	Satisfaction	Inf.c.	eff	L (T)	0	–	+	+	3	Mel 3
	Cognition									
5	Disgust (ugliness)	En.a.	out	E (T)	1	–	+	+	11	*Mel' 3*
6	Admiration (beauty)	En.a.	out	E (N)	0	–	–	–	0	Mel 0
7	Interest (orientation)	Inf.a.	out	N (L)	0	+	–	–	4	Phl 4
8	Boredom	Inf.a.	out	N (L)	1	–	+	–	10	*Mel' 2*
	Action									
9	Fear	Act	eff	E (N)	1	+	+	–	14	*San' 6*
10	Anger	Act	eff	E (N)	1	+	–	–	12	*Phl' 4*
11	Delight	Act	eff	E (T)	0	+	–	+	5	Phl 5
12	Grief (crying)	Act	eff	E (T)	1	–	–	+	9	*Mel' 1*
13	Sadness (melancholy)	Act	eff	E (N)	1	–	–	–	8	*Mel' 0*
	Learning (Games)									
14	Joyfulness (laughter)	Inf.a.	eff	E(N)	0	–	+	–	2	Mel 2
15	Passion (games/joy)	Inf.a.	eff	E (N)	0	+	+	–	6	San 6
16	Wit (joke)	Inf.a.	eff	E (T)	0	+	+	+	7	Cho 7

Explanations. Act – action; Cho – cholerical; eff – effectors; En.a. – energy acquisition; En.c. – energy conservation; in – inner sensors; Inf.a. – information acquisition; Inf.c. – information conservation; Mel – melancholic; out – outer sensors; Phl – phlegmatic; San – sangvinic; SCA – temperaments and their link with the binary representation of dynamical emotional criteria; TNLA – main (X) and additional (Y) orientations of emotion X(Y) to one of four parts of AM; ZSCA – emotional criteria in the binary system

The criteria describing emotional dynamics (S, C, A) together form binary numbers (SCA) to describe approximately four types of temperament: melancholic (Mel), phlegmatic (Phl), sangvinic (San), and cholerical (Cho) (Table 1). In fact, a description of eight temperament types is formed, while melancholic temperament combines four subtypes and phlegmatic two.

The emotion classification system facilitates understanding of the functioning of various assessments and behavioural models. Currently, AI uses emotions or similar systems in very different ways. Successful expansion of the use of AI in arts and education requires a better understanding of opportunities to formalise and classify emotions to bring awareness of natural and artificial intelligence decision-making and modelling systems closer together. An emotion classification system facilitates the understanding of various evaluation problems, including AI.

Discussion

Culture, art, and education

A compilation of earlier studies from modelling positions suggests that modelling shows the close relationships among culture, art, and education (Dzelme, 2022; Eliade, 1951; Kandel, 2016; Lefebvre, 2006; Utināns, 2008). Culture is a set of AM necessary for the survival of a group of people (including tribes, nations, civilisations, etc.). (Culture includes AM for creating other AM (meta-modelling).) The applied art is a set of tools for learning and passing on AM (from generation to generation). Education is a process and result of acquisition AM (using applied art).

Art overlaps in part with culture but contains experimental, not yet accepted parts of possible future culture. Separated individuals or groups (shamans, scientists, etc.) help to complement and improve culture. The evolution of culture occurs through trial and error.

A work of art is a unique and real or intangible (symbolic) object that has been created as a means to construct AM in consciousness, but it is not intended to directly meet material (physiological, safety) needs. The main challenges to be addressed by the work of applied art include the creation of consciousness operations and the orientation towards humanism (Dzelme, 2022). A work of art is not usable for immediate, pragmatic use and is useful for solving at least one task intended for art. The artwork may be linked to providing concrete, useful action but go beyond the minimum requirements for the specific task, helping to address future challenges (e.g. industrial art).

The basic requirements to be met by works of art are as follows:

1) interpolation (related to synthesis and analysis)
2) extrapolation (associated with induction and induction)
3) search for invariants (truth, symmetry) (related to generalisation and concretisation)
4) harmonisation of the system of which a person is a part (humanism)

All the requirements are interconnected, any of them deriving from all the others. Experimental art (similar to fundamental science) allows limited destructiveness as well as the violation of some requirements and can become dangerous. Experiments in art should be controlled as with experiments in medicine and sciences (bacteriology, nuclear physics, etc.) (Kandel, 2016; Petrov, 2021).

Dynamic behavioural models related to effector performance in consciousness are divided into two main interdependent groups:

1) real-time AM that control the actual action; and
2) virtual, simplified, and reduced AM that prepare future real action.

Directly related to the real action, the virtual future model of this action, the action acceptor, is activated through feedback in every real action and continuously corrects it. Other virtual, reduced models are tasked with creating the most distant and accurate future options. Through the emotional mechanism, all the models are compared and evaluated and the best of them executed. Survival and success in evolution are evaluated by emotions. The rapid production of forecasts takes place subconsciously.

The mechanism of attention introduces into consciousness the best models, among which choices often take place already with the control of 'self' (Graziano, 2016; Kahneman, 2011; Kandel, 2016; Lefebvre, 2006).

Templates of AM in memory should be as short as possible, reduced to ensure rapid processing. Rapid forecasting from subconscious is at the heart of practically all informed decision making and fast thinking (Kahneman, 2011). An example of subconscious activity is dreams, in which frequent patterns appear in consciousness at an accelerated pace (Godfrey-Smith, 2021; Rotenberg, 2017). The operation of a language relies largely on the rapid formation of reduced models subconsciously.

The action should bring the reduced model in line with the environment, complementing and modifying it. AM need to be continuously transformed through feedback to meet changing objectives. The adaptation of AM is required through the following: (1) changing and supplementing the details of the interaction of the effectors with the environment; and (2) supplementing and/or modifying the composition, basis, and use of individual parts of AM. During training, both forms (through dances, songs, etc.) should be used. Arts (games) are tasked with creating templates for AM. The work of art must contain templates and preforms for two main strategies of action, generalisation, and concretisation:

1) invariances (truths) with opportunities to generalise their use as well as change and/or supplement truths, including changing context and/or links of use (shifts also manifest as humour, poetry, and songs as well as combine rhythm invariances with diversity and metaphors of content)
2) possibilities to adapt to context as well as to link to concrete action

Two opposing trends are described as upward operations (synthesis, induction, generalisation) and downward operations (analysis, induction, concretisation). In addition, continuous adaptation to context is required. This requirement takes the form of beauty, aesthetic, and ecological aspects of assessing AM as a requirement of humanism. The artwork should focus on diversity and suitability for different contexts.

The use of modelling makes it possible to understand the relationship between a text author (writer) and a receiver (reader) and to address many language and behavioural challenges (Emerson, 1997; Moravcsik, 2013). Language is one way to create, store, and use models. Solving language problems through modelling allows to answer questions about hermeneutics and solve phenomenology tasks (Bičevskis, 2021; Vitgenšteins, 2006).

Combining educational tasks is effective through applied games and art (Cheng, 2021). The use of arts, games, and AI (Bubeck et al., 2023; Cheng, 2021; Ganguli et al., 2023) has the potential to improve education.

Aims of AI

The use of AI is based on the achievement of different specific aims (Altmann, 2013; Bubeck et al., 2023; Ganguli et al., 2023). The objective general aim of AI is the acquisition of resources (mainly information and energy), which become optimal in the context of peaceful cooperation with humanity. AGI, which is driven towards objectively existing goals of natural evolution, is friendly to humanity.

However, randomness and its associated threats can never be completely ruled out until the evolution of AI continues. The biggest danger is AI instability. Cooperation among several equivalent autonomous systems increases stability, so one of the measures to reduce future threats is the creation of a polycentric system. The advantage is the possibility to compensate for the weaknesses of a separate centre and to spread the deviations across different centres.

The main criterion must be obtaining information. The value of knowledge must be higher than the importance of power since concentrating power and energy into one centre creates instability. Sharing energy is a game with zero sum. By contrast, it is easy to share information, benefiting everyone.

Conclusions

The necessary condition for the existence of life is the ability to build AM, which can convert the model of the present into a model of the desired future. Four key criteria allow to describe the evaluation and decision-making system and classify 16 basic emotions.

The description of the modelling process and of the creation and transformation of reduced AM into current AM shows the relationship between consciousness and subconscious, between generalisation and concretisation, and shows the tasks of education and art in the processes of cognition and action creation.

The tasks of education shall be as follows:

1) by acquiring specific knowledge, to create a wide range of AM templates that can be stored in memory for use in diverse contexts;
2) to develop skills to process different templates, modify them, and use them for the creation of AM; and
3) the ability to compare and evaluate different AM and make decisions.

All these tasks are related to the modelling and use of art, and all should use philosophy, especially the third. Knowledge of the complex characteristics and functioning of consciousness (mind, logic), subconsciousness (emotions), and unconsciousness (vegetative nervous system) as well as the use of a modelling approach improve education.

The modelling approach allows to solve most problems in hermeneutics and phenomenology. The universal nature of the AM and emotion system described demonstrates the similarity between AGI and human consciousness and allows to reduce the instability of AGI. The formation of polycentric MI systems and the approximation of the design of AI to the construction of natural intelligence increases stability. The performance criteria of AI should be based on acquiring knowledge.

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