



Neuromorphic Elements as a First Step Towards Sociomorph Systems

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Abstract

In this paper, we consider the possibility of the realization of artificial sociomorph systems that must simplify understanding of verbal information in cases when the transmitter and receiver have significant differences in linguistic, and cultural and educational level, as well as specific idioms, essential for the nationality. The task is interdisciplinary, which will require the involvement of experts in linguistics, neuroscience, psychology, computer science, electronics, and material science. In this paper, we present some examples of situations, when the information can be misunderstood if particular features of the “transmitting” person will not be taken into account. Then, we describe what initial important steps need to be done for moving towards artificial sociomorph systems.

Keywords Sociomorph modeling · Ethno-social difference of emotions · Ethno-social and cultural communicative distance · Emotional agents of sociomorph systems · Memristive devices

1 Introduction

Communications and information exchange are fundamental requirements for the humankind development. However, there are often difficulties for the correct interpretation of the obtained information, especially when the exchange is done between individuals from different ethnic and social groups, with different cultural and education level, etc. These differences can result in an incomplete understanding or even complete misunderstanding of each other.

The other important item during the information exchange is the emotional coloring with which information is conveyed. The interlocutor may take the information received seriously, may be skeptical about it, or may simply laugh at the interlocutor’s words. The verbal expression of

the answers can be very similar for all three cases. Of course, for a correct understanding, it would be good to take into account also such aspects as intonation, posture, gestures, etc.

The large studies in the humanities prove the presence of a large variance in the emotions displayed in various ethnic cultures and social communities [4, 15, 21, 50], which is not reflected in the creation of intellectual assistants.

The very nature of neuromorphic elements is complex [22, 38, 44]. On the one hand, it implies the universal nature of psychophysiological processes that are realized in an external emotional manifestation. On the other hand, these processes reflect the neurobiological specifics of the higher nervous activity of a living organism. And on the third hand, their designation is carried out thanks to emotives, which are emotional concepts that are characterized by culturally determined meanings with a specific linguistic expression.

Accordingly, despite the universality of neuro-psychophysiological processes, each ethnic culture forms its own special rules for the standardization of emotions. These rules are defined as ethno-psycholinguistic norms according to which collective emotional intelligence is controlled in determining when, in what way, with what intensity, and with the help of which verbal representations the expression of emotions in a particular ethnic group is permissible or unacceptable.

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The aim of this paper is to establish significant features of the artificial system that will allow to overcome the listed difficulties, allowing better understanding of interlocutors. The task is not easy; thus, at this stage, we will restrict ourselves to only verbal information exchange, disregarding intonation, posture, gestures, etc., because it will make much more difficult the device realization of such system. In this work, we will consider only the ways of the hardware realizations of such systems because their software realization, especially using AI approaches, will demand the powerful computers and extremely high energy consumption.

Thus, we want to suggest approaches that will establish a new type of electronic devices that can be called “sociomorph systems,” because they must provide the possibility of better understanding between persons belonging to different ethnic and social groups with different educational and cultural levels.

1.1 Sociomorph Systems in the Humanities and Technical Sciences

First of all, the term “sociomorph systems” itself is characterized by polysemy, having different conceptual meaning and scope in the humanities and technical sciences. Most likely, it is precisely because of this that there is a feeling of far-fetched pretentiousness in the use of this term.

In technical sciences, sociomorph systems are understood as a type of multi-agent systems, formed on the basis of personal digital counterparts that replace the original [25]. At the same time, this definition is in good agreement with the modern theory of conceptual metaphor by G. Lakoff and M. Johnson [33], which was developed in linguistics in the works of both venerable and novice researchers [14, 28, 32, 34, 36, 40], presenting this linguistic phenomenon as an important mental operation, as a way of explaining, cognizing, and evaluating the world. In this paper, we will adhere to the substitutional approach proposed by G. Lakoff, to the definition of sociomorph metaphor, according to which a person’s habitual conceptual system is metaphorical in nature.

At the same time, all transformations affect the deep mechanism of psycho-emotional response, triggering an interdependent chain of neuro-psychophysiological reactions, emphasizing the deep connection between the body and the brain; between the body, brain, and the surrounding world; and between the body, brain, and other living beings [2]. Wang Han examines the ethno-linguistic picture of the world through the sociomorph code of society [47]. In his opinion, “the sociomorph code”—the designation of fragments of reality by comparing them with aspects of the structure and functioning of society—is used in modern discourse both to nominate other aspects of existence (for example, nature and man), and to designate society itself [47, p. 7]. In other words, a sociomorph code is a coding

system for labeling fragments of reality by comparing them with aspects of the structure and functioning of society.

According to K. Kleischer [26] the sphere of sociomorph systems includes the realization of a specialized connection between being and the features of appearance in living beings, which was proved by the researcher at the visual level of measurement.

In this regard, neuromorph elements contribute to the formation of an individual’s skill for self-representation and self-awareness, being distinctive features on the basis of which the living and inanimate are distinguished. At the same time, the development of bioinspired robotics is initiated by existential issues of morality and ethics [16], which are beyond the scope of our research. However, researchers recognize that a well-formed competence for self-determination is an indicator of a highly organized complex structure, becoming a marker that determines the degree of distance between organized beings and inanimate [46].

At the same time, the educational and scientific innovation environment itself is interpreted in pedagogy as a sociomorph system of internal organization of educational communities, which is based on contextual forms of transformation of educational activities into research cognition and technologization of knowledge, implemented in a system of social relations with scientific and professional institutions of society [23]. Its structure, according to researchers in the field of pedagogy, constructively contains two large clusters, namely (1) basic structural and functional components and (2) meta-components [23]. The basic structural and functional components are understood as specialized forms and methods of working with knowledge, endowed with problematic content and working with the necessary instrumental environment. Metacomponents are integrating structures that perform scientific, organizational, methodological, expert, communication, and economic functions to ensure specialized forms of work with knowledge, life activities, and the development of the entire institutional and environmental basis of the educational system [23].

Accordingly, the concept of sociomorph neuromodeling has appeared in academic emotiology, which aims to explain and apply the socially inherited mechanism of emotional response in a particular ethnic environment [44]. The study of the interrelationships of neuromorph and sociomorph systems is due to a deeper “reading” of Hedwig Lewis’ work “Body Language. A Guide for Professionals. Third Revised Edition” [Lewis, 2012], which contains the latest observations on human behavior and body language, because the body, as a person, can say something, and transmit certain information using sociomorph metaphors, while human society and its structure and functions [8] are actively changing under the influence of both objective technogenic and economic factors (the development of productive forces, economic and financial systems, the introduction of new

technological tools) and subjective political factors (wars, uprisings, revolutions, coups), which also defines a dynamic biofeedback between different levels of the sociomorph system at a “deep” level.

1.2 Linguistic Background and Defining of Goals

Although the psychology of emotions has been developed quite clearly, at the same time, their universal classification has not yet been adopted, which makes it difficult to linguistically describe and systematize both emotions themselves and their verbal expression. As a rule, most works explore emotions from the point of view of the procedural mechanisms of their facial expression [24].

1.3 The Language of Emotions as a Sociomorph System

The neurobiological basis of emotions allowed researchers to determine those basic emotions combined with each other can cause complex emotional states, such as anxiety which combines fear, anger, guilt, and interest [31].

At the same time, the emotion of “shame” can be graded using emotional experiences of sadness, fear, and anger, but it is always associated with the experience of contempt. Accordingly, the verbal representatives of the emotion “shame” can convey the degree of intensity of experiencing shame. However, the emotional and semantic part itself, caused by the experience of contempt, regardless of whether it is directed from the outside or is self-directed, also acts as a natural reason for experiencing shame. The theory of emotions is based on four main characteristics: universality, recognizability, and the possibility of verbal representation [1].

1.3.1 The Linguistic Vector in the Sociomorph System of Emotions

At the same time, the linguistic vector is important in terms of analyzing the actual linguistic mechanisms of their designation and expression. It must be recognized that the theory of emotions in language still reveals significant gaps,

especially with regard to the comparative description of the linguistic expression of emotions in different languages (Table 1).

We can talk about the multiplicity of applications of perceptual scales in the verbalization of emotions in a particular language. It can be either a taste scale (such as happiness has a sweet taste of honey), or an odor scale (such as jealousy has a sour smell), an olfactory scale (such as grief has a black color), etc. However, there are discrepancies in each culture. So, in Russian, the expressions “sour face,” “sour physiognomy,” and “sour look” are used to convey emotions of displeasure, irritability, and depression, which has a vague, indistinct character of the meaning of negative emotions. At the same time, in Chinese, the representative “sour” is used only when referring to the complex emotion “jealousy.”

Accordingly, the response to these emotions will vary depending on the standard adopted in a particular ethnic and/or social culture. Thus, in most theoretical models of European researchers, the emotion “aggression” is considered a kind of socio-psychological stigma influenced by the ideas of antiquity and Christianity, while aggression itself is stereotyped as a manifestation of the animal principle, as a result of which the boundaries of negative consequences are outlined both by the individual characteristics of individuals and the extraordinariness of events [3, 29, 45]. This omits the fact that aggression (from Latin *aggredi*—to attack) underlies the phenomenon of the development of any living organism and society, being the basic component of the neurobiological, psychophysiological, historical and cultural, moral, socio-legal, etc.

This aspect is dominant when considering the phenomenon of aggression in the Chinese traditional culture, drawing parallels between human behavior and the cycles of seasons in nature [52]. These ideas are well reflected in the famous ancient Chinese treatise “I Ching”/“Book of Changes,” emphasizing the idea of the infinity of updates as the main principle of the transformation of the Universe, based on which aggression is interpreted as an innate and integral characteristic of person, reflecting the mechanism of interaction of Yin and Yang, Evil and Good as the main regulator of emotional intelligence [48].

Table 1 The difference in the verbalization of emotions in different structured languages: Russian, Chinese, and English

Ethnocultural differences in the designation of emotions				
No	Emotion	Russian	Chinese	English
1	Anger	The blood began to boil in my veins	心黑手辣/xīn hēishǒu là (Black heart and spicy hands)	To go off the deep end
2	Happy	Be on cloud nine	甜甜蜜蜜/tiántiánmì mì (Sweet honey)	On top of the world
3	Jealousy	A fierce temper like hell	酸眉醋眼/suānméicù yǎn (Sour eyebrows and vinegar eyes)	Burns inside
4	Offence	Getting into the bottle	酸楚/suānchǔ (sour melancholy)	It felt like a slap in the face
5	Love	Burn in the fire	柔情似水/Vróuqíng sì shuǐ (Tenderness is like water)	Falling into the sky

Verbal representatives of the ethnocultural specificity of linguistic consciousness act as objectifiers of information of ethnic sociocultural knowledge conditioned by civilizational practice and form the national cognitive base of language, allowing them to be defined as sociomorphic markers of ethno-linguistic consciousness [20].

The sociomorphic nature of emotions is due to the fact that emotions show a close connection with the ethnic linguistic picture of the world and knowledge, possessing lability and variability over time. Russian, for example, has been characterized by its expression and directness, which has led to the following designations in Chinese culture: 罗刹/luóshā “Rakshasa, the demon,” 战斗民族/Vzhàndòu mínzú “Fighting nation.” The linguistic and cultural shock experienced from differences in the intensity of emotional expressions contributed to the emergence of ethno-cultural emotives in the Italian language. For example, *arrabbiata* is “angry.” The expression of the emotion “anger” is etymologically related to the ethnocultural opposition of “friend and foe” when compared with the Arabs.

1.4 Polycode Character of Sociomorphic Systems

In this regard, I would like to recall the socially approved emotional restraint of appearance adopted in Chinese culture (the principle of “face”), as opposed to the emotional openness characteristic of native speakers of Italian culture. Therefore, it is of great importance to develop a parameterization of the communicative distance adopted in a particular culture or in a particular social community, followed by the creation of databases based on verbalized representations. Taking into account polycode parameters will make it possible to create a more accurate extended metagraphic model for terminological designations of emotions and emotional states based on verbalization in multi-structured languages [13].

The sociomorphic influence on the perception of the emotion “contempt” is reflected through universal typical situations that provoke the manifestation of contempt in a particular ethnic or social culture. For example, it may manifest itself (a) in dialogue, (b) when conveying dissatisfaction with someone, (c) when describing betrayal, and (d) when violating moral and ethical norms.

However, the sociomorphic aspect of the emotion “contempt” in the European linguistic worldview can also be expressed through specific situations: (a) demonstration of a sense of superiority; (b) publicity in society (in particular, in a new society); (c) communication during acquaintance; (d) demonstration of a bad mood; (e) demonstration of indifference.

Unlike Europeans, the Chinese demonstrate the emotion of “contempt” in the following cases: (a) deviation from the social standard when performing an action; (b) incorrect action or deed; (c) demonstration of childish behavior and infantilism;

(d) reaction to rudeness and abruptness of movements; (e) demonstration of attitude towards an awkward and clumsy person.

The sociomorphic influence of the emotional behavior of the Chinese is predetermined by the specifics of Eastern self-awareness and Chinese philosophy, according to which a person does not act as an independent unit, but is a part of a single collective. In turn, Buddhism, Taoism, and Confucianism had a priority influence on the formation of the Chinese mentality, as a result of which not only pronounced individualism, but also deviation from the norm began to be perceived beyond the socially acceptable boundaries of ethnocultural behavior.

The understanding of the ethno-psycholinguistic communicative norms of Chinese linguoculture should be based on the basic understanding of the state (国家) in Chinese, which is hieroglyphically conveyed by the hieroglyph’s country (国) + family (家). This sociomorphic approach makes it possible for non-native Chinese speakers to understand Chinese culture when learning it and modeling translation systems.

Thus, the need for linguistic analysis of the means reflecting human emotions is due to the poor elaboration of the problem of the ethnocultural emotive worldview. Russian, for example, is characterized by a wider palette of verb intensities and adverbial intensifiers of different stylistic colors, which makes it possible to scale the degree of intensity of “Russian emotions.” At the same time, in Italian, most of the intensives and intensifiers are stylistically neutral. However, as a rule, Italian verbs with the meaning “the subject’s stay in an emotional state” have a prefix in their structure that carries a semantic emotive load (emoseme), such as *inviperirsi* (Get angry), *imbestialirsi* (Go berserk), *rallegrarsi* (To experience joy), and *ammattire* (Go crazy). In these examples, the prefixes *in-/it-*, *g-*, and *a-* indicate the beginning of the action (compare: Rus. *to get mad*, *to rejoice*).

Currently, there is an urgent need for a full-scale scaling of the communicative distance adopted in various ethnic cultures, based on the normalized emotional response adopted in a particular society. Sociomorphic modeling is seen as one of the key aspects in overcoming the sinister valley effect in the design of bioinspired robots, because it is based on an understanding of the epigenetic nature of collective emotional intelligence, which develops an adaptive verbal-polycode mechanism in conditions of ethnotrauma, stress, climate specifics, and others at the level of an ethnocultural society [44].

The verbalization of emotive sociomorphic modeling includes communicative situations with intense expression of emotions. Each communicative situation can be represented as an enlarged block, which contains a more detailed ontology with a dominant and specialized semantic meaning (Fig. 1). So, in Chinese culture, there are concepts that are undesirable for use in social speech practice. First of all, this applies to concepts that have a destructive meaning (death, peniaphobia, etc.). For example, the concept of “aggression”

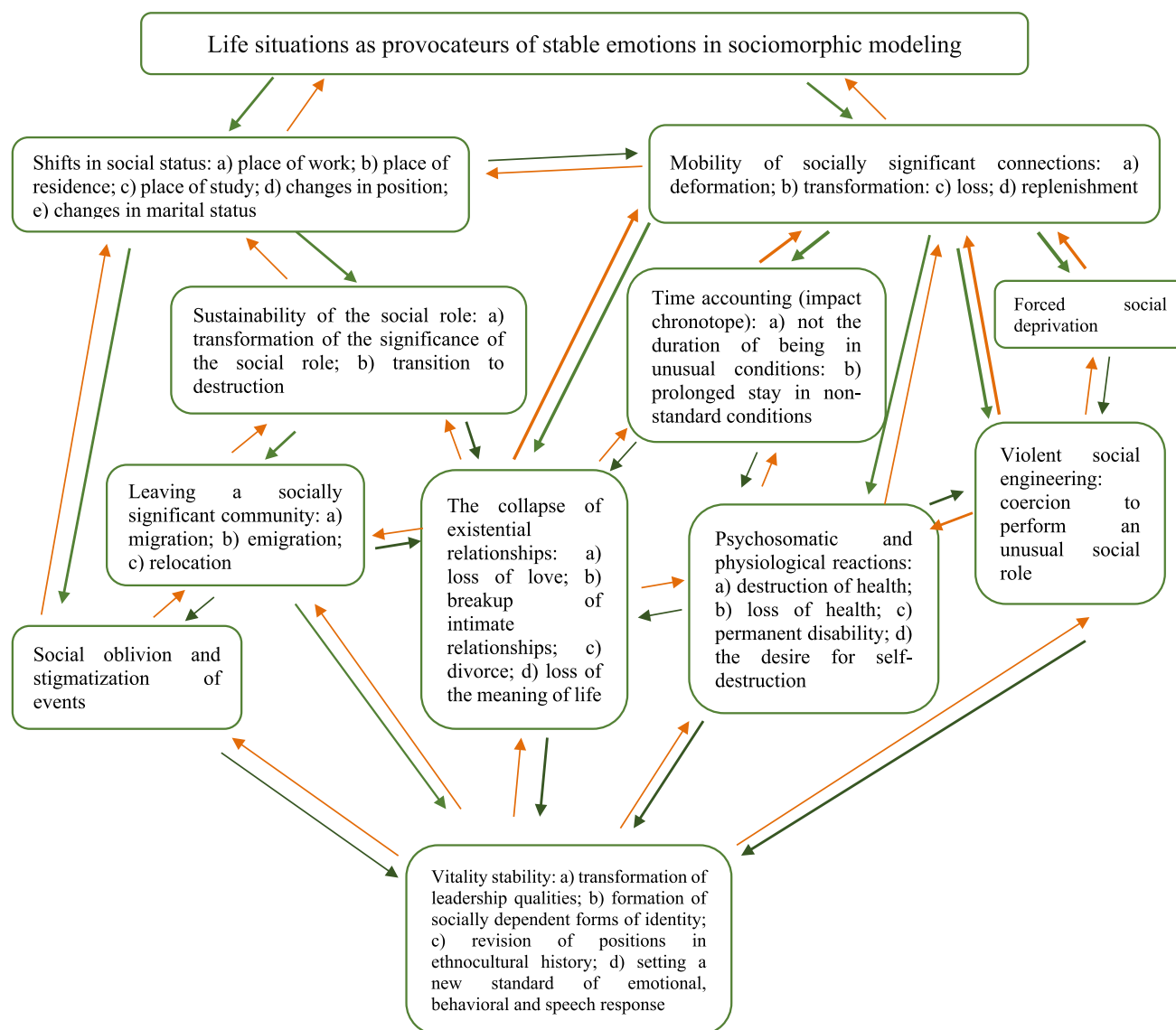


Fig. 1 The interaction of the upper levels of the architecture of life situations as stable emotional agents forming a sociomorphic standard of vitality of an ethnic group and society

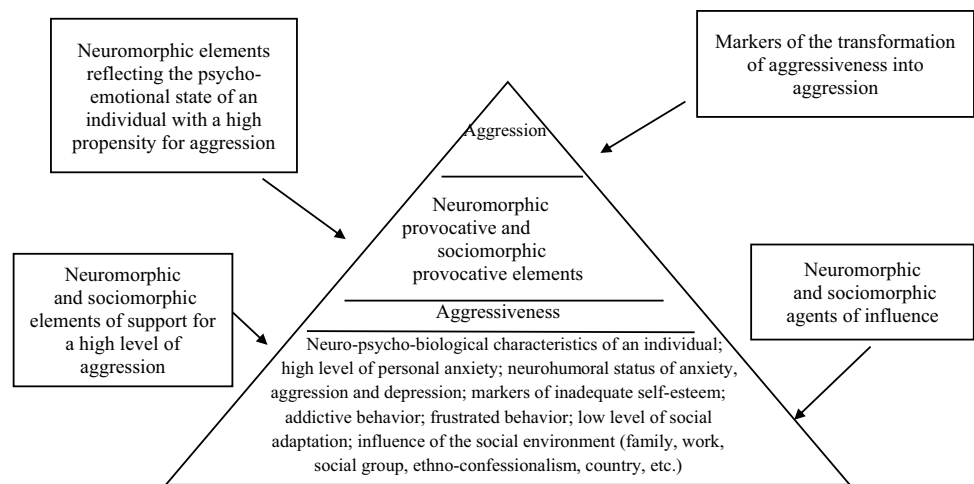
in the Western sense began to be used in Chinese in 2015 [3, 12, 52]. In some cases, the norms of ethno-sociocultural practice may come into dissonance with world universals. Thus, in the Chinese tradition, there is a negative attitude towards the color green, which has been defined as a violator of social norms since the twelfth century, which came into conflict with the announcement of green as a global trend in the fashion industry in 2025.

Such modeling makes it possible to create a sociomorphic system of emotional response in the context of an ethnic group and communities, since experiencing a variety of life situations is determined by the gradation of emotions and their verbalizants, which forms an internal system of psycho-emotional coordinates of an individual with a produced

epigenetic component (Fig. 1). The lack of consideration of correlations between the epigenetic response anchored in collective emotional intelligence and verbalized representations can lead to a violation of modeling in general. Ultimately, the emotionalization of life situations at the level of collective intelligence leads to epigenetic changes that form the resilience and/or mobility of the vitality of ethnic and social communities.

The creation of models of epigenetic consequences resulting from the influence of vital situations for humans, ethnos, and society (Fig. 1), in our opinion, will help to understand the importance of taking into account the sociomorphic factor in the analysis of psycho-emotional reactions that have a specific character due to ethno-sociocultural practice [44].

Fig. 2 The “pyramid” of inclusion of neuromorphic and sociomorphologic markers in the manifestation of aggression



As a result of sociomorphologic influence, the transformation of the internal system of social coordinates occurs, up to the complete destruction of the permissible boundaries of the space of personality, ethnicity, and society.

Thus, the polycode nature of aggression can be considered from the perspective of a sociomorphologic system (Fig. 2).

Within the framework of the stated problem, it is important to distinguish the concept of aggression as a form of behavior determined by the specifics of a neuromorphologic nature, and as a type of personality in terms of psychology and linguistics in terms of sociomorphologic systems.

This allows us to talk about neuromorphologic components within the sociomorphologic system of linguistic behavior, on the one hand, and on the other hand, about a sociomorphologically conditioned linguistic personality.

This is how sociomorphologic engineering takes place, using emotionally charged structured “stories” that set a new standard for speech-behavioral response to changing environmental conditions. It is the abrupt transformation of the sociomorphologic system that causes linguistic and cultural shock in migrants, while the emotional palette can be represented in both negative and positive clusters [21].

The need to include sociomorphologic modeling is due to the epigenetic factor of consolidating reactions, through which the acquired life experience inspires the dominance of individual genes with the suppression of those that lose their relevance due to environmental changes [6, 41]. Consequently, the “language” of sociomorphologic transformations transmits information through an evaluative coordinate system of social behavior, which provides a justification not only to understand the concept of “internal resources,” but also to conduct its polycode modeling [37, 43].

Sociomorphologic modeling based on the verbalization of the historical and cultural experience of an individual, family, society, people, and the state reinforce those strategies that ensure resilience and survival in the changed conditions of the natural and social environment.

1.5 Strategies for the System Realization at the Hardware Level

As the basic nodes of the “sociomorphologic systems” are human individuals, we can try to make parallel to the concept of neuromorphologic systems, developed for mimicking essential features of the human mode of the information processing, forecasting, and decision-making. According to us, there are several important features, allowing to consider the system as a neuromorphologic one. As a socium is constructed from individuals, it is useful to consider which properties of neuromorphologic systems [9] can be directly transferred to sociomorphologic ones. Let us consider them.

1.6 Same Elements Are Used for Storage and Processing of the Information

This statement is absolutely obvious for all neuromorphologic systems. In fact, it is the main difference between traditional computers and brain: in computers, the memorized items do not vary connections within the processor (thus, allowing learning only at the software level), while in the brain learning means the variation of synaptic weights, reconfiguring therefore the possible signal pathways. In the case of “sociomorphologic systems,” this requirement must be even more profound: individuals are the sources of memory, on the one hand, and they establish variable links for the variations of traditionally established connections between events.

1.7 Parallel Information Processing

Let us again make a parallel between brain and traditional computers. Currently, single nucleolus computer is performing only one operation in each defined period of time (even if the interval between periods is continuously reducing). The use of multi-nuclei processors partially resolves the problem, but the energy consumption in this

case would be extremely high and will demand the use of the external cooling systems. Instead, even if the characteristic time for the event treatments in brain is rather long (ms range) with respect to those, achieved in computers, the efficiency in recognition, classification, and decision-making of the brain is still much higher with respect to all modern computers.

It is due to the fact that the brain simultaneously performs the processing of the information, arrived from outside through sensoristic systems, that is superimposed on the previous experience, resulted from learning during previously treated information. In sociomorphic system, the parallel information processing seems to be unavoidable requirement. In fact, the information is initially processed by individual (key node of the system). Then, the information is further treated by discussions within specific groups (expert networks considering scientific concepts); finally, the established paradigms become available for the whole society.

1.8 Presence of Internal Activity

In the case of neuromorphic systems, the necessity of presence of the internal activity is rather questionable. In particular, cross-talk of elements is practically always considered negative events [5, 42]. However, from our point of view, it is impossible to make a system, capable to perform cognitive and creative functions without cross-talk of elements [27]. Thus, important features of brain will be impossible to mimic. In the sociomorphic systems, instead, this function is unavoidable: useful exchange of the information is done by the cross-talk of key nodes (individuals).

Sociomorphic systems act as a unifying factor that can reconcile existing concepts in neuromorphic and traditional computing, namely (1) neural network stimulation, (2) event-driven processing, (3) energy efficiency, and (4) parallelism and adaptability (Table 2).

1.9 Bio-realistic Learning Algorithms

The main paradigm of nervous system learning is based on Spike Timing Dependent plasticity (STDP). This algorithm is responsible for the establishing a causal relationship between events (pre- and post-synaptic spikes). It seems very probable that we must implement it (or its modified analog) when designing also sociomorphic systems: we must assume the feedback between interlocutors, the correct interpretation of the acquired/transmitted information will depend on the adequateness and quickness of the reply between interlocutors.

Summarizing, the realized sociomorphic system must establish feedback-controlled links between interlocutors, taking into account differences between them, listed above. Moreover, it must follow up variations of features of each interlocutor, resulted from the situations, illustrated in Fig. 1. Thus, in order to have the possibility of implementing such systems, we need to have electronic elements, allowing adaptations. In principle, they must have synapse mimicking properties, what will establish variable connections (feedback) between key nodes (persons).

Currently, memristive devices are considered among the best for mimicking synapse functions [17, 18]. There is a large variety of used materials and resistive switching mechanisms for the realization of memristive devices. There are several review papers on this subject [30, 49, 51]. Here we want to introduce only one type of organic memristive device, namely, polyaniline-based organic memristive device [10, 11], because it has properties that are very important for neuromorphic systems, namely, the presence of the internal activity in chains of elements [7], the possibility to make circuits, allowing STDP-like learning, the possibility of making 3D systems with stochastically organized architecture [39], and implementation of circuits, performing some features of the nervous system [35].

In addition, it has been directly demonstrated its synapse-mimicking properties by the coupling of live neurons through these devices [19]. Thus, we propose to use these devices as elements, capable to give a better understanding

Table 2 The preference of neuromorphic elements in sociomorphic systems, which reveal the lability of adaptation tasks requiring rapid response in real time

The basic idea of the concept	The neuromorphic approach	The traditional approach
Neural network stimulation	Using the discreteness of electrical impulses as some kind of markers of information transmission	Using the continuous activation function for an artificial neural network
Event-driven processing	Emphasis on socially significant events in computing	Identification of dependence on clock cycles
Energy efficiency	Reduction of energy consumption	Increased energy consumption
Parallelism and adaptability	Support for mass parallelism with subsequent adaptation based on the development of synaptic force regulation in response to learning	A sequence of “steps” that ignores the multiplicity of parallelism and adheres to fixity and lack of flexibility

of the verbally obtained information (written or oral) by the appropriate feedback taking into consideration social, national, educational, and emotional differences between the transmitter and receiver of the information.

2 Conclusions

The author's proposed concept of sociomorphic neuromodeling opens up the problem of a socially inherited mechanism of emotional response, supported at the "deep" level of living systems and represented as a system of epigenetic verbalizers, which strengthens the stability of a particular sociomorphic system.

The speech-behavioral matrix itself is viewed through the prism of a sociomorphic system, which sets the standard for both the verbal expression of attitudes to reality and ethno-socioculturally determined norms of reaction, which are inheritable. The emotivity of the transmission of each sociomorphic step is associated with the gradation of verbal representations of emotions having ethno-sociocultural coloring of intensification and metaphor in each ethnic and/or social group.

The study of socially approved communicative distance using emotionally colored linguistic representations in comparison with new evidence-based methods of neuroscience, NLP, and exact sciences will contribute to the more accurate creation of smart assistant programs.

Sociomorphic systems supported at the neurobiological level can help in calculations on the passionarity and vitality of an ethnic and/or social collective as a "living" organism and/or a system bioinspired by brain activity. This view opens up new possibilities for applying methodological holism to understanding collective emotional intelligence within NLP.

Of course, we are only in the beginning of the way towards a physical implementation of such systems. It is clear that before proceeding to the construction, it is necessary to develop a model that will establish a basis for the further works. The model must include several blocks. Of course, it should be libraries and dictionaries, allowing the information transfer between persons with a linguistic barrier. These blocks can be realized basing on conventional memory systems and available translators. Next step will be to connect these blocks through feedback systems that will allow the correct identification of the obtained information taking into account internal fixed differences of the transmitter and the receiver (national and social features, difference in cultural and educational levels, etc.), but also to follow up variability of the emotional context of the information that can be the result of factors, shown in Fig. 1.

Author Contribution V.E. formulated the research topic, proposed the term "sociomorphic", participated in writing the text. I.K. clarified the term in terms of linguistics, collected evidence, made tables and diagrams, wrote the main text. Both authors reviewed the general text and came to a common opinion.

Data Availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

Research Involving Humans and Animals None

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