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Natural and Artificial Intelligence

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Abstract
Natural intelligence includes metacognitive functions, which allow context-dependent correlations among the functions of the intelligence, the components of the color circle, and chromatic plans including gender relations. The iconic of G. Frege's triangle, supplemented by relevant functions of intelligence, yields a chromatic rhombus that models possible ways of commonplace, formal and creative thought.

Keywords: artificial and natural intelligence, iconics, information models of thought, gender

1. Introduction

Various methods of logical and probabilistic models of data analysis, strictly speaking, develop formal logical methods for constructing decision functions. However, there is frequent misuse of such concepts as analytical review and associative information search by a human and-or computer search engines. The existence of fundamentally computable and non-computable configurations of linguistic constructions, from the point of view of constructing effective computer communication functions, has led to the emergence of a new class of information iconical systems.

This suggests the importance of identifying foundations for the further development of well-known methods of cognition/thought and-or creation of information models (IM) and ontologies. To achieve this goal, color theory, referred to here as chromatics, provides a methodology for modeling self-developing open-type systems. In such modeling, data presentation must meet the logical criteria of scientific idealization. Truth is commonly held to be found in comparisons — that is, in relationships. To that end, semantics in antinomial relationships demand exploration as attributes of real interrelationships between developing systems. Generally speaking, such measurements require: formalizing the main characteristics, properties and parameters of intelligence, and determining the permissible (logical) units of measurement, necessarily associated with the physical world, where intelligence (Latin intellectus – sensation, perception, understanding) exists as an open system.

Identifying the objective laws of psychology — which studies the human soul, that is, the ontologically ideal — requires finding adequate tools. For millennia, color, in forms canonized by mankind, has provided such a tool [1]. Color names combine both material and ideal predicates, but in varied analysis systems. This is probably what Wittgenstein means when he states that "The logic of the concept of color is just much more complicated than it might seem" [2, p. 29]. After a quarter-century study of this problem, the psycholinguist Anna Vezhbitskaya practically echoes Wittgenstein: "The concept of color is indeed extremely complex, and I will not try to give its interpretation" [3, p. 147]. Specialists in many scientific disciplines have drawn similar conclusions about both color and human intelligence.

2. Intelligence and intelligence

Translated from the ancient Greek, psychē means not only spirit, soul or life, but also their ideal properties, such as character, mood, feelings, etc. The concept of "ideal" may serve as an ontological predicate of the unsubjectified, non-verbalized, unformalized, and immeasurable— that is, of what relates to the psyche's unconscious manifestations. In psychology, these properties correlate with metacognitive functions, without which the "theory of intelligence" essentially ceases to work. Therefore, the concept of "intelligence" here implies not a cognitivist but a classical understanding, which also includes metacognitive functions such as color perception. It follows that it is not the psyche that includes the intelligence, but the intelligence that includes the psyche.

Strictly speaking, any system perceives only the information that it can absorb. Since this part of the information will have resonant characteristics common with the components of the system absorbing it, then, as perceived (absorbed) information, it can be the same internal (*related*, according to Wiener) information of an ontologically ideal plan, comparable with the characteristic components of the modeled object.

Then *related information* can be a kind of information that correlates with functions, but not with a structure, not with the composition of the components and intercomponent interactions of a system related to an ontologically material plan. The free structure of related information suggests a semantic definition: Information is a consistent distribution of source codes by relevant codes of associated receiver states. What does this definition yield? Is it possible to adequately formalize the relations of ontologically ideal predicates with their heterogeneous material denotations for the subsequent classification and strictly scientific analysis of IM?

Accordingly, Table 1 (at the end of the article) presents examples highlighting semantic-logical degrees of abstraction in the languages of various fields of knowledge. The first column shows the principle of the allocation of metalanguages for the example in the second and third columns. The fourth and fifth columns show the main stages of abstraction when constructing relevant information models, respectively, from bottom to top, that is, from a denotation to its signified and meaning. The sixth column shows the chromatic plans relevant to each line (χ plans).

Thus, from the standpoint of constructing chromatic models in the ontology of the relative determinism of denotations and names, when defining a denotation as material (as shown in the bottom line of Table 1), its name will be material relative to meaning, but ideal relative to denotation. In turn, a signified is material with relative to a name, but material relative to a meaning. Lastly, a meaning is ideal relative to all components of a given ontology.

If the conversion of signals — of one ideal and-or material nature into signals of another material and-or ideal nature, respectively — can be called a transfer to a different code, then a transfer from a thing to a second-order metalanguage is a double recoding, such as characterizes, for example, both the "realism" of experimenters in the language of "quantum computer" formulas and the "instrumentalism" of AI theorists in first- and second-order languages.

Chromatics' methodology is based on a thesis arising from the history of world culture: color as an ideal image concept of the material world can serve as an information model for understanding the complex self-developing systems of this (material) world. If "image" is understood as a subjective world picture on all planes of intelligence, and "concept" is the image's meaning, then "image concept" conjoins the image's meaning with a world picture objectified by the Id-plan. A typical example of an image concept is an aperture color, where the meaning and image of a color contain information exclusively in a form integrated by sublimation [3; 4]. ("Sublimation" in chromatics means a type of generalization at the level of the "sensory image" logic of the subconscious).

As a developing field of science, chromatics has the corresponding criteria of scientificity and relevant predicates. Firstly, the language of any science should be based on the principle of uniqueness, consistency and, consequently, the meaningfulness of any values in the formalization of their meanings. In this regard, for example, the appearance of blue tones in skin pigmentation due to fear is almost identical to the symptom arising from cold, water, illness (chills), etc. As Russo notes [5, pp. 124, 189-191], cold produces effects on the human body comparable to the effects of fear: the same external anemia, the same ragged breathing, the same phenomenon of increased sugar concentration and adrenaline. Idioms associating redness with heat may have similar overt connections with skin pigmentation. As the thermometer shows, along with the movement from cold blue to warm red, an objective increase in temperature occurs. Concurrently, in all systems and cultures, a "hot," choleric temperament is characterized by the color red.

After each color proved uniquely interconnected with certain components of intelligence, formalized values needed semantic correlation when identified in heterogeneous areas of research. For this, chromatics has used a system of dimensionalities, LIT, based on the basic characteristics of how intelligence functions in an external environment: space (L), information (I) and time (T). In this way, chromatics has created a unique system for the measurability of obtained formalisms in the context-dependent areas of their existence.

Thus, chromatic analysis of the semantics of color canons (which for thousands of years have been contextually dependent on gender and boundary conditions) has reliably shown their objectified character and reproducibility — even in traditional cultures unrelated with each other. The combination of the concept of chromatics ("internal universals of color canons") with the linguistic concept of Frumkina-Vezhbitskaya ("external universals and systems of kinship") have made it possible to use the attributes of the color body, objectified in color canons, as a workable model for measuring subjective parameters of internal environments.

3. Color modeling of information

The amount of information included in the IM here has been limited to the use of aperture ("concrete abstract") colors with relevant plans, ensuring an optimal information balance that levels modeling extremes such as excess and-or lack of information.

Since Goethe periodically called red purple, and sky blue is also added in Russian culture [6, pp. 54-56], for adequate color rendering, chromatics uses not six- but eight-color circles, where contrasting colors opposed on radii harmoniously pair with complementary ones. Fig. 1 shows a color circle where the letters on the outer perimeter correspond to the accepted color terms, and the inner, to χ-plans of gender and the atomic model of intelligence with gender opposition (AMIGO), which will be discussed below.

Fig. 2 shows a color circle where the letters on the outer perimeter correspond to the accepted color terms, and the inner, to χ-plans of gender and the atomic model of intelligence with gender opposition (AMIGO), which will be discussed below. The arrows around the color circle in Fig. 1 show that color change may occur in the following ways: 1) subjectively — clockwise, per Newton, or counterclockwise, per Goethe — relative to a stationary color circle; and 2) objectively — clockwise, per Goethe, or counterclockwise, per Newton — when a color circle moves (as a rotating wheel) relative to an observer.

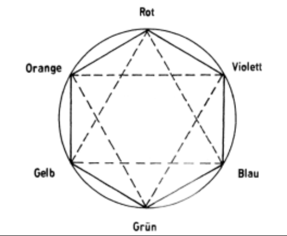

Fig 1: Goethe's color circle

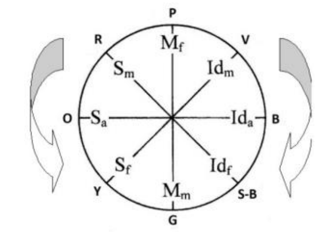

Fig 2: AMIGO in a color circle

A similar phenomenon is observable in the change in movement of Benham's disks. This provides a basis for constructing an IM of the bilateral functions of NI.

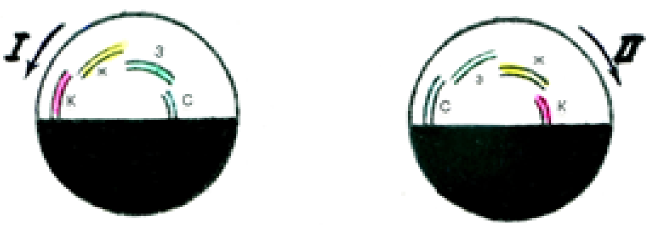

Fig 3: Benham's disks

According to M. Chavelli, the triangles of "male" additive colors (Red-Green-Violet) and "female" subtractive colors

(Purple-Yellow-Sky-Blue) [7, pp. 15-17, 86] complement each other according to color canons reproduced for thousands of years in world culture; orange and blue colors combine warm and cold tones that simulate the bodily and spiritual needs of the different sexes, respectively. This interrelationship has allowed the creation of a reality-based personality model that in fact has been reproduced for thousands of years and therefore objectified by humanity as the main purposeful generalization of culture [8, pp. 306-328].

The basic theory and methodology of chromatics were developed in the late twentieth century. Chromatics, as an interdisciplinary study of a real (feminine or masculine) person in a real (socio-cultural-light-color) environment, has been used in the practice of analysis and-or methodological creation of information models of self-developing open-type systems. The name of this teaching was derived from J.W. Goethe's "Chromatics" (Zur Farbenlehre) related to the ancient Greek concept of "chroma", which ancient authors, generally speaking, imbued with a range of meanings. These meanings can be compared with their modern representation in the form of ontological (that is, relative with respect to each other) χ-plans, i.e. plans of the semantic unit of "chroma":

COLOR as signifiable (designate, significatum, intensional, concept, image-concept, percept, whose formation facilitates color perception) — non-objectified, mental, ideal — Id-plan "chroma"; for color — unlike pigmentation — exists exclusively in the form of percept. The intrinsic connection between a color image and its percept is confirmed by the phenomenon of the formation of an objectless color, for example, "blueness" (sky), where the meaning of the image (concept) is not fundamentally separate from the image itself, which implies the purpose of the color image concept as being to generalize meaning in a non-objectified, that is, ideal form of information, fundamentally separate from the signal (pigmentation) as its objectified, material form.

Pigmentation as a denotation of an external environment (object, extensional, stimulus) — objectified, physical, material — Ma-plan of "chroma" (auto-pigmentation of an external environment);

Skin Pigmentation as a denotation of intelligence — basic organic, physiological, combining information of an object and a subject, sineal — S-plan of "chroma" (color sensation);

COLOR NAME as signifier (word, lexeme, proposition) — a non-objectified ideal, due to the metamerization stage [9, definition 15-250], relative to the S-plan, but relative to the Id-plan objectively materialized/material — Mt plan of "chroma" (thesaurus of color designations);

EMOTIONS, FEELINGS as information-energy relationships between relevant chroma plans. Objectively, this attitude is manifested in idioms such as "red with anger," "black with grief," "blushing with shame," etc. In fact, these figures of speech reveal the meaning of the relationship between the mental (color) and physiological (skin pigmentation or an external environment) as ideal and material: S / Mt — "blush with shame"; Id / S — "blush with passion"; Ma / S — "blush with heat."

The characteristics of all (achromic and quasi-monochrome) colors are customarily represented by the example of a color body (Fig. 2) containing a color circle (Fig. 1), with the most saturated ("spectral") colors along the perimeter and medium gray in the center. In other words, through a color body, any color can be expressed with a point in three-dimensional space, such as a double cone with a color circle in the center.

Fig. 3 (at the end of this article) gives an iconic comparison between G. Frege's semantic triangle and a chromatic rhombus, in which the nodal point on the left side (Sensus – S) is formed by the combination of such metacognitive components of intellect as feminine (S_f), androgynous (S_a) and masculine (S_m) unconsciousness, shown in Fig. 1. The nodal point of the sensory component of intelligence (Id) = $Id_m + Id_f + Id_a$ is formed similarly. Thus, the icon of G. Frege is supplemented byф the metacognitive component of intelligence (S) with the relevant development of the meaning of (Id) and (S) for the feminine (f) and male (m) principles of information processing. The right side of Fig. 3 shows an iconic approach to an algorithm for constructing relevant information processing paths in an object's transition from its external environment to conceptual verbalization in artificial (3c) and natural (3d) intelligence.

4. Chromatics boundary conditions and AI architecture

The structure of new AI architecture should take into account that the color body has natural (determined by nature) sizes much smaller than the human genome and comparable with the volume of modern processors. So, if the parameters of the color wheel in absolute units are specified by the wavelength interval of the visible region of the spectrum, then in combination with purple colors (whose area in colorimetry is usually paired with the area of the greens), the perimeter of the color wheel is 440 nm, corresponding to a radius of $r = 440 / 2\pi = 70$ nm. With some idealization of black and white colors (neither black nor absolute white exists in nature), chromatics has used Munsell's atlas modified into the color body of the well-known Runge-Goethe sphere, where achromic colors corresponded to the surrounding reality.

Since the chromatic method of extracting information from natural language texts has included modeling the basic stages of the cognitive process on the level of an "atomic" intelligence model (AMI), chromatics has constructed theories of subject areas and analyzed formal concepts and-or metaphysical images based on semantic logic.

This is due to color percept, as an image concept, representing an ideal sign of stored information and simultaneously its own, fundamentally inseparable, context-dependent information value of this ideal. So, for example, Rudolph Arnheim posits that an *objective percept is as an object that could arise in the nervous system without active internal forces causing differences in perception. In some cases, similarity to physical equivalents may indirectly indicate percepts' objectivity. A measured color luminance or corresponding wavelength is not a property of the object of perception, but only its physical correlate; meanwhile, only percepts are accessible to human experience* [10]. In my opinion, such considerations enable a better understanding of the percept's primary importance in human life and, concurrently, once again prove the fundamental inseparability of the image and the color concept in sublimates, that is, in image concepts. Neglecting this achievement of culture, that is, by separating information from its own significance, means destroying both the information and the significance. Linguists themselves have already turned to the methodology of chromatics for a semantic analysis of this position [11, pp. 54-58].

In chromatics, modeling the correlation between "information" and "word" uses a semantic partioning of the ancient Greek concept of "chroma": "color" as ideal, "pigmentation" as material, "color name" as ontologically ideal with respect to pigmentation, but material with respect to color. The color percept's association with a pigment stimulus allows quantifying many representations of linguistic informatics for their relevant algorithmization and-or verification [12].

Chromatic ontology integrates multimodal sensory, motor and mental systems on the basis of the color body and-or circle as a single conceptual interface, completely eliminating the "sacred question" of choosing a language for converting the multimodal languages of complex systems. Strictly speaking, in chromatics (as a methodology for constructing information models of self-developing systems), this language is the convertible metalanguages of "colors" and-or their "chroma plans" as a second-order metalanguage, with the criterion of the truth of their concepts according to a space-information-time (LIT) dimensional system in chromatic systems for the analysis of heterogeneous data presented on the level of iconic images of natural language.

5. Conclusion

For natural intelligence, information is a basic component, which, as shown above, can be described as a universal ontology. Since the the intelligence's information is ontologically ideal, it can be modeled with the relevant tools of the concept of color, which enables the ideal display of material objects.

Therefore, in turn, information modeling of natural intelligence in chromatics through the attributes of color as "ideal" has shown the possibility of iconic construction of information models, and, in particular, the fundamental differences in the principles of "thought" for artificial and natural intelligence.

Chromatics, the interdisciplinary analysis of color as an optimal tool for modeling human intelligence, turns out to be not only reasonable and adequate for comprehensive studies of a real (that is, endowed with feminine and masculine features) person in a real (socio-light-color) environment, but also promising for constructing computer architectures.

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