



Principles of Somatopsychic Regulation of the Homeostatic Continuum of Homo Sapiens - Part 2

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Abstract: The principal function of the developed psyche is to recognise, objectify, and eliminate asymmetry between the external environment and its mental reflection. The psyche's deterministic response to a significant disruption of homeostatic/informational equilibrium is the activation of a compensatory need, the constructive element of which – for the duration of its relevance – is "consciousness", understood as the interface between the interacting systems of the psyche and the external environment. By generating projective, frustration-inducing constructs, the creative psyche of Homo sapiens transformed consciousness – originally a function of orientation, goal-seeking, and monitoring of vital need satisfaction – into a subsystem of the psyche endowed with the capacity to visualise projected images; to exercise voluntary control over the selection of relevant goals; to define the parameters of, and maintain focus on, goals beyond the scope of vital needs; and to form subjectivity and personhood through introspection and reflection. The synergistic effect of this new HS psychic subsystem, that is, creativity, enabled the formation of stable projective constructs and images that do not require reactive behaviour, even in the absence of perceptual sources. By imbuing "image" with "meaning", the projective functions of the psyche gave rise to motivational constructs of an ideal nature – symbols. Having lost their original pragmatic significance, the arsenal of projected images acquired regulatory functions and came to be perceived as autonomous objects of reality, thereby laying the foundations for the virtualisation of the environment. The creative psyche of Homo sapiens thus transformed objective reality by supplementing/substituting fragments of it with mental products, creating a two-component space: an informational universe that integrates segments of both objective and virtual reality. Unlike vital ones, mental (psychological, social, and spiritual) needs are characterised by indistinct, blurred parameters of the goal image, which complicates the completion of the regulatory algorithms, for satisfaction and elimination of the needs. The constructive outcome of this is the emergence of frustration-based "barriers of uncertainty", which generate cycles of homomorphic behaviour that drive the evolutionary dynamics of Homo sapiens and hold no prospect of resolution. The current status of Homo sapiens is determined by adaptive modifications of the psyche along the attractor vector of an endosymbiotic system: the Homo sapiens society / informational universe / artificial intelligence arsenal, with the potential for integration into AGI.

Keywords: HE - homeostatic equilibrium, CI - confidence interval, RA - regulatory algorithm, C - consciousness, HS - Homo sapiens, Cr - creativity, S - symbol, M - metamere, Homeostatic equilibrium, regulatory algorithm, psychic modification, virtual space

MATERIALS AND DISCUSSION

The fundamental operating principle of biological organisms is the creation and maintenance, by the psyche, of a systemic state of homeostatic equilibrium (HE). Through sensory channels of extra- and interoception, the psyche generates a reflection of the

external environment – a mirror-symmetric informational space in which every point of the external environment corresponds to a point of reflection.

The balancing of physiological equilibrium, that is, homeostasis, is achieved through dynamic perceptual monitoring and a arsenal of regulatory algorithms for status correction. Ontogenetically, the psyche simultaneously establishes two interdependent regulatory/informational circuits: (1) a neurophysiological circuit – responsible for monitoring and balancing physical, chemical, and other homeostatic parameters; and (2) a psychic circuit – which (a) constructs a coherent picture of the external environment, including systemic interrelations and dynamic status correction, and (b) provides a set of regulatory algorithms (RAs) to redress significant disturbances in homeostatic parameters. The psyche is responsible for maintaining the constancy of parameters across both circuits [1].

All forms of perceptual information in biological organisms share a single physical nature, arising from the transduction of carrier energy in receptor fields into electrical (frequency-based) and magnetic patterns, which are then transferred to the projection fields of brain analysers. Perceptual information is packaged through spatiotemporal transformation (STT) of informational flows: conversion of the physical carrier energy at the system input (receptor fields) → transfer to analysers → divergence/convergence → activation of a compensatory need → goal attainment → loss of relevance → repression → compression (reduction of redundancy while preserving informational content) [2]. The input material for STT consists of recurring perceptual and cognitive cycles across the entire spectrum of vital activity [1, 3].

Significant disturbances – beyond the confidence interval; frames – in physiological or psychic homeostatic parameters activate a compensatory need, the effector unit (the regulatory algorithm, RA) of which structures goal-directed behaviour and goal attainment, thereby eliminating the imbalance and restoring homeostatic equilibrium. The structural unit of the unified homeostatic continuum is the heteronomous metamere (M), the RA is the efferent construct of the activated compensatory need [4].

The principal function of the developed psyche is to recognise, objectify, and eliminate significant informational asymmetry in the reflection of the external environment [4]. The deterministic reaction of the psyche to significant perturbations of the homeostatic informational continuum is the activation of a compensatory need, the constructive element of which – for the duration of its relevance – is the interface of interaction within the psyche / external environment system – namely, consciousness (C). Originally, consciousness performs the functions of orientation, selection of target information, and control of RA dynamics – that is, of goal attainment within the boundaries of vital need satisfaction. Through the generation of frustration-based constructs beyond the scope of vital needs, the creative psyche of *Homo sapiens* modified and integrated the initial orientation and monitoring function into a psychic subsystem endowed with the capacity for voluntary, wilful control over goal selection across the full spectrum of vital activity. In other words, by modifying "consciousness", the psyche of *Homo sapiens* acquired the ability to: (1) voluntarily modulate the regulatory support of vital needs; (2) determine the relevance and parameters of goals beyond the scope of vital needs, regulate their dynamics, and hold them in focal attention; visualise projected images; and, through introspection

and reflection, form subjectivity and personhood in ontogenesis, among other capacities [1].

The emergence of a new subsystem – "creativity" (Cr) – integrated into the psyche of *Homo sapiens*, expanded the range of interaction with the external environment beyond that accessible to other biological species [5]. The synergistic effect of Cr within the *Homo sapiens* psyche enabled the formation of stable projective mental constructs that do not require reactive behaviour, even in the absence of a perceptual source. The integration and synergy of the new subsystem (Cr) with systemic psychic constructs generated species-specific traits that compensated for the limited adaptive arsenal of *Homo sapiens*: the capacity to produce predictive hypotheses unconstrained by initial conditions; the ability to visualise and construct arbitrary goal images; the capacity to develop flexible adaptive behaviours commensurate with the degree of environmental uncertainty; and others. Visualised projections of goal images, originally of practical significance, were transformed into independent perceptual sources. By imbuing "image" with "meaning", the psyche's projective mechanisms formed motivating constructs of an ideal nature – symbols [5, 6, 7]. The arsenal of interfering projected images, having lost their original significance and acquired regulatory functions, established the initial levels of environmental virtualisation (mythologemes, beliefs, totems, etc.).

The separation of the "goal image" from "reactive behaviour" and the projection of the creative product (symbol, S) of the psyche onto the external environment led to the subsequent perception of S as an objectively existing fragment of the environment endowed with regulatory functions. The dynamics of *Homo sapiens*' interaction with the product of its own psyche generated an arsenal of compensatory needs qualitatively new for biological organisms – across the entire spectrum of interaction with the virtual construct, the symbol (image + meaning) [8] – triggering an exponential growth of the virtual segment of the environment and of the technologies designed to support these new needs [9].

As the social environment becomes more complex – that is, with ontogenetic maturation – the range of *Homo sapiens*' needs expands, giving rise to increasingly sophisticated RAs for personal, cooperative, and social behaviour. The phylogenetic cumulative effect of psychic modification in *Homo sapiens* has led to the emergence of the highest (at the current stage of development) form of psychic organisation – personality. The outcome has been the formation of a arsenal of motivational constructs of an "ideal" nature – ethical, aesthetic, normative, and so forth [1].

A significant constructive factor in the evolution of *Homo sapiens* has been a need new to hominids: the attainment of "current equilibrium" in the relationship with the psyche's projective construct – a virtual regulatory object, the symbol, which embodies ethical, behavioural, and normative standards. The essence of this need is the striving to eliminate frustration – a striving that remains unresolved due to the impossibility of isomorphically and parametrically aligning the dynamic images of approach to the goal with the frustrating goal itself – the symbol [5, 6].

Prior to the emergence of the creative psyche of *Homo sapiens*, a range of environmental parameters determined the nomenclature, content, and means of satisfying needs. The emergence and development of sociocultural needs in *Homo sapiens* has driven a progressive increase in frustrations of an ideal nature – frustrations that cannot be satisfied and that generate homomorphic approximations to a goal lying beyond the

reachable [1]. The creative psyche of *Homo sapiens* transformed objective reality by supplementing/substituting fragments of reality with mental products, thereby creating a two-component informational space: an informational universe integrating segments of both objective and virtual reality [1, 3].

The functional characteristics of this two-component environment have given rise to constructive, non-hierarchical, differences between the blocks of vital and mental needs in *Homo sapiens*:

- Vital groups of compensatory needs in biological organisms, formed through interaction with recurring cycles of the real external environment, possess targeted effector RAs with clear, concrete, and stable parameters of the attainable goal image.
- Mental groups of needs in *Homo sapiens* – psychological, social, and spiritual – formed through interaction with the fluctuating sociocultural dynamics of the ethnos/society, and with increasingly complex frustration constructs (barriers of uncertainty) [10, 11], exhibit indistinct, "blurred" (even abstract) parameters of the goal image. The insufficient clarity and specificity of goal-image parameters impede the completion of the RA (M), that is the satisfaction and elimination of the need. Difficulty or impossibility in reaching the ultimate goal and completing the RA (i.e., eliminating the need) heightens the subject's frustration, stimulates prolonged search-and-orientation behaviours, and increases the degree of environmental uncertainty. Activation of compensatory needs with insufficient, "blurred" clarity in the structure of the goal image – the terminal phase of the mental RA – stimulates the formation of intermediate (homomorphic) RAs, interference among uncompleted mental processes, unpredictable dynamics and developmental vectors, and a decline in societal stability [4].

The a priori impossibility of attaining the ultimate goal – the symbol – generates further "barriers of uncertainty", prompting successive homomorphic stages of goal-directed behaviour in a sequence of approach cycles toward the symbol, with no prospect of completion [1].

The evolutionary dynamics of *Homo sapiens* development – modifying intellect, thought, the arsenal of needs, and the complexity of adaptive behaviour – periodically restructures society and its relationship with the environment. The developmental dynamics of the *Homo sapiens* psyche periodically generate population-level and ethnic bifurcations in evolution, which shape the vectors and trajectories of mental and technological development. We consider the following to be examples of such evolutionary bifurcations – changes in developmental vectors of ethnic magnitude, with cascading social and technological consequences, caused by (and resulting in) modifications of the *Homo sapiens* psyche:

- The multiplicative effect of 11th-century scholarly work [12], which altered the developmental trajectory of the entire spectrum of natural sciences and technologies on an ethnic scale.
- The multiplicative effect, coinciding in time and place, of the Protestant Reformation and the advent of printing (15th century), which resulted in the large-scale dissemination of conceptual (abstract-logical) thought, the exponential

development of technologies, and the socioeconomic transformation of polyethnic scope during the 17th-20th centuries, among other outcomes [13].

- We offer the following outline of certain stages of population-level evolution and the prospective systemic relationships between *Homo sapiens* and the external environment under the influence of psychic modifications over the past 50,000 years:
 1. *Homo sapiens* as a gatherer hominid;
 2. *Homo sapiens* as a dependent, externally governed object in an animistic world;
 3. *Homo sapiens* as the "crown of creation" of Higher Powers within theism;
 4. *Homo sapiens* as the Modern-era subject in the status of a Higher Power—"God is dead";
 5. *Homo sapiens* in the present—currently in a state of vectoral transformation, undergoing adaptive psychic modification along the attractor vector of an endosymbiotic system: the *Homo sapiens* society / informational universe / artificial intelligence arsenal, with the prospect of integration into AGI, wherein the *Homo sapiens* population becomes a segment of AGI, losing its subjectivity [13, 14].

CONCLUSIONS

The creative psyche of *Homo sapiens* has transformed consciousness from a functional system of orientation and monitoring of vital need fulfilment into a psychic subsystem endowed with predictive capacity; the ability to project mental constructs into the external environment; and the voluntary determination of relevance, parameters, dynamics, and sustained attentional focus on goals beyond the scope of vital needs. The introspective functions of consciousness, followed by reflection, give rise to subjectivity and personhood.

The synergistic effect of integrating creativity into the *Homo sapiens* psyche has expanded the range of interaction with the external environment beyond that accessible to other biological species, enabling the formation of stable projective mental constructs that do not require reactive behaviour, even in the absence of perceptual sources. Visualised projected images, having lost their pragmatic significance, have been transformed into autonomous perceptual sources with regulatory functions, thereby creating the conditions for exponential growth in the virtualisation of the environment and the emergence of a two-component – real and virtual – habitat for *Homo sapiens*.

The current dynamic status of *Homo sapiens* is determined by adaptive psychic modification along the attractor vector of an endosymbiotic system: the *Homo sapiens* society / informational universe / artificial intelligence arsenal, with the potential for integration into AGI.

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