



# Regulatory Algorithms as a Constructive Element of the Psyche Homo Sapiens and Agi: Part 2

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## ABSTRACT

The structural unit of the unified homeostatic continuum (HC) of biological organisms is a heteronomous metamere in the form of an updated regulatory algorithm (RA). The stimulus for RA updating is violation of the HC information symmetry. Information fields of extra/interoception are of an external nature to the psyche. The psyche's main function is to recognize, objectify, and eliminate significant information asymmetries in the reflected continuum of the external environment. The deterministic reaction of the psyche to disturbances in the HC is the updating of the interaction interface in the psyche/external environment system, consciousness. Interface updating stages are described in the text. In the mental RA of the socio-cultural genesis of Homo Sapiens, as frustration constructs become more complex, the accuracy and clarity of the constructive parameters of the goal image, the final phase of RA completion, decreases/loses. The result is epigenetically-developed psychological constructs of socio-cultural genesis, one of which is the need for permanent scanning of the external environment through the exertion of arbitrary attention (consciousness) with insufficiently clear parameters of the goal image, the completion phase of the RA. The mechanisms of development of "intuitive psychology" and understanding of cause-and-effect relationships are given. Constructive (non-hierarchical) differences between vital and mental homeostatic needs are considered. Some principles of the structure of the psyche are presented, which it is advisable to consider when constructing AGI architectonics.

**Keywords:** Homeostasis, metamere, regulatory algorithm, information symmetry, AGI architectonics.

## Abbreviations

HC: homeostatic continuum, RA: regulatory algorithm, AA: arbitrary attention, HS: Homo sapiens, M: metamere, CI: confidence interval.

## MATERIALS AND DISCUSSION

The unified homeostatic continuum of biological organisms (HC) consists of both psychophysiological and mental components. The structural scale unit of the HC is a heteronomous metamere in the form of an updated regulatory algorithm (RA). The stimulus for updating the RA is a parameter imbalance, a significant violation of the information symmetry of the reflected external environment's unstable equilibrium. We believe that the information

fields of both extra and interoception are of an external nature to the psyche of biological organisms. The psyche scans external environment parameters through sensory information channels. Interestingly, repeated combinations of feature dynamics reduce the sensitivity and reactivity of peripheral attention to changes in the parameters (symmetry) of the external environment (1). In other words, repeated parametric characteristics of an object's dynamics are recognized and identified. In the absence of parametric resonance with the goal parameters, AA updating is absent, and the object is not reflected in the conscious levels of the psyche.

In the zone of primary imbalance exceeding the boundaries of the parameter norm zone (CI), the information channels of the psyche integrate, focus, and update arbitrarily attention (AA), in the process initiating a systemic interaction – psyche/external environment. In other words, the information asymmetry of the external environment updates (switches on) consciousness, the interface of interaction of the system - psyche/external environment.

The main function of the psyche of biological organisms is to recognize, objectify (2), and eliminate the information asymmetry of the external environment's reflected continuum, thus ensuring systemic homeostatic equilibrium. In the wakeful state, the psyche permanently processes (receives > processes > generates) large volumes of intero/exteroceptive information according to the algorithm: peripheral scanning > asymmetry zone selection > afferentation > divergence/convergence > efferentation > restoration of the information field symmetry. In the state of sleep, consciousness inversion, the psyche functions according to other algorithms (3).

The repeatability of the subthreshold structurally identical/close disturbances of the information symmetry of the reflected external environment is the constructive basis for building regulatory algorithms where repetitions of the disturbance structure are qualified as a pattern, forming stable RA structures without involving conscious levels of the psyche. We consider this mechanism to be the basis for intuitive recognition (parametric resonance) and the appearance of an arsenal of "emergent abilities" when scaling learning architectures.

A deterministic reaction to a significant disturbance in the current homeostatic continuum is the "switching on" (updating) the interface of the system psyche/external environment - consciousness. The stages of updating (on/off switching) of consciousness as a system interface are as follows:

1. Scanning of the external environment with sensory information channels, scattered peripheral attention;
2. Detection of a fragment of the reflected information field with signs of asymmetry;
3. Integration, focusing of information channels of the psyche in the asymmetry zone, isolation of an object from the environment (inclusion of AA, apperception);
4. Objectification, object recognition, RA updating;
5. Action/interaction in the psyche/external environment system;
6. Restoration of the information symmetry of a selected segment of the external environment;
7. AA disintegration, activation of peripheral attention;
8. Scattered scanning of the external environment, "waiting" mode of the psyche.

Vital RA (M) of all biological species have clear parametric characteristics of start/length/finish (balance restoration).

In the mental RA of HS, as socio-cultural development progresses, frustration constructs (barriers of uncertainty, BU) (4,5), become more complex the structural parameters of the "goal", the final boundary of the RA, become less clear, "blurred". Difficulty/impossibility of achieving the final goal, the stage of parametric resonance of the "code" of the need (goal image) and the "code key" (dynamic images of goal achievement) (6), completion of mental RA - increases the subject's frustration tension. This results in continuous tentative-search forms of behavior, a permanent state of activity, tension of the integrated AA (consciousness) in search of the parameters of the final goal, need satisfaction. A temporary reduction in the subject's frustration tension is achieved by an arbitrary fixation of the AA: communication of all kinds, rituals, gadgets, etc. In other words, an arbitrary change in the object of perception, focusing and fixating the AA on an object that replaces the "goal image", forms an incoming information flow that temporarily displaces the information constructs of the current RA (M) from the interface (from perception/reflection) and reduces frustration.

Thus, we state that HS has a psychological construct of socio-cultural genesis: the need for permanent scanning of the external environment through AA with insufficiently accurate parameters of the final stage, the completion of RA (M).

In this paper, we examine some constructive (non-hierarchical) features of the blocks of vital and mental homeostatic needs.

1. Vital groups of needs (physiological/psychological) are phylo/ontogenetically developed by repeated cycles of imperative dynamics of the external environment, forming adaptive RA with clear stable parameters of start/length/finish M. Parameters of the current RA (M) are determined by fixed coordinate characteristics of the external environment: calendar cycles (agriculture, etc.); hierarchical systems (flock, family, rituals, military, etc.). These RA develop in interaction with external parametrically stable systems that structure adaptive RA, record the coordinates of the subject's position in the system and allow predicting future dynamics. Structurally, this category of M is discrete, cyclic, sequential constructs with clearly defined start/dynamics/finish parameters.
2. Mental groups of needs (psychological/ social/spiritual) develop in interaction with the socio-cultural dynamics of an ethnic group/society; they have insufficiently specific (often abstract) parameters of RA goals that prevent the completion of M, reducing the stability of the homeostatic regulation system. These RAs have unclear structural parameters of the goal, preventing completion of the final phase. In these RA, continuous tentative-search forms of behavior (unclosed gestalts) develop with forced permanent scanning of the virtual sector of the external environment (strata of culture, science, subjects outside hierarchies, etc.). Updating of abstract goals (symbols), insufficient clarity of the structure of the final phase of mental M, is a stimulus for the development of intermediate homomorphic RA, interference of incomplete M, unpredictable dynamics of individual/group socio-cultural development.

These evolutionarily new, epigenetically developed qualities of the HS psyche expanded the range and functions, qualitatively transformed "consciousness" (initially the interface of the psyche/external environment system) into an autonomous subsystem of the psyche with the ability to arbitrarily direct and hold (manage) the AA and, derivative from this function, the potential for introspection (inversion of consciousness) and personality development.

Complication and expansion of the virtual segment of the external environment, the emergence of new cultural codes, and thinking dynamics [7,8,9] have developed social strata in which there has been a reduction of some discrete vital Ms (safety, food production, etc.) and an expansion of the range of mental socio-cultural Ms (mythology, religion, "egalite, fraternite, liberte" and derivatives). We believe that the dynamics of the evolutionary development of HS has expanded the range of stable clusters of motives regulating the behavioral continuum of biological species, making significant qualitative additions to each of the 5 groups of motives (the most significant in the groups being "psychological" and "social") [10].

Parametrically different sectors of HS society have developed epigenetically-determined psychological and behavioral differences.

In hierarchical subsystems of society with fixed systemic frames (ethics, aesthetics, normative), stable RAs develop that determine adaptive (within the coordinate system) forms of behavior. We believe that the ordered structures of these strata allow subjects to perceive as sequences (i.e., "understand") the causes and consequences of actions/interactions in these coordinate systems, developing psychological mechanisms of analysis, prediction, and vector behavior. As such, the qualities of forecasting, understanding cause-and-effect relationships, and "intuitive psychology" develop, are implemented outside the conscious levels of the psyche, and are described using Bayesian machine learning models (11). Hierarchized social structures (family, religion, etc.) develop epigenetically fixed regulatory algorithms. The dimension of these (RA) M is determined by the permissible range of activity, predicted goals that have clear design parameters and are within the limits of what is achievable.

Socio-cultural strata of subjects/groups of subjects that are outside rigid hierarchies and that lack stable limiting system frames develop RA without clear constructive boundaries of the goal image. Consequently, the RA in these strata, where the amplitude of the acceptable/unacceptable (frames) has no clear limitations, receive the potential for branching, changing goals and vectors, interference with unpredictable results. We believe that it is precisely these psychological constructs that contain the potential for creativity, non-standard solutions, and the dynamics of HS evolution.

We believe that when constructing AGI architectonics based on the principles of the psyche of biological organisms (the topic of the next article), it is important to incorporate some of the provisions we have formulated (12):

### CONCLUSIONS

1) The main goal of the psyche is to create and balance the homeostatic continuum (HC) of the organism; 2) Instrumentally, the regulatory functions consist of recognition, objectification and

elimination of significant asymmetry of the continuum of the reflected external environment; 3) Information fields of extra/interoception are of an external nature to the psyche; 4) Regulation of significant disturbances of the continuum occurs through the updating of consciousness, the interface of the psyche/external environment system; 5) The updated regulatory algorithm is a structural unit, a metamere of the homeostatic continuum; 6) The psyche of Homo Sapiens functions in a two-component environment (virtual/real), perceived as a single unit; 7) The impulse to initiate action, updating of the regulatory algorithm arises as a result of a significant violation of the HC information symmetry; 8) The actual regulatory algorithm contains a conscious encoded information equivalent of the need – the goal image; 9) The goal image is the motive for goal-oriented behavior, the expected result of which is satisfaction of the need, restoration of the information symmetry; 10) Homo Sapiens' goal image, going beyond vital needs, develops frustrating constructs that create homomorphic behavioral patterns (HBP); 11) Mental regulatory algorithms of socio-cultural genesis have insufficiently clear parameters of the final phase: the goal image, which initiates a qualitatively new need - permanent scanning of the external environment through arbitrary attention; 12) The dynamics of HBP cycles, approaching a motivating goal (symbol/frustration) going beyond vital needs, has no prospect of completion.

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