19th Annual Gathering in Biosemiotics

Moscow, Russian Federation
July 1-5, 2019

Faculty of Philosophy
Lomonosov Moscow State University

Monday July 1

15:00 - 16:00 Registration
16:00 - 17:30 Welcome and Opening
18:00 - 20:00 Reception

Tuesday July 2

9:00 - 9:30 Favareau, Donald
ON THE PROMISE AND THE CHALLENGES OF USING PEIRCE'S SIGN THEORY IN BIOSEMIOTICS
9:30 - 10:00 Kull Kalevi
A BIOSEMIOTIC MODEL OF SEMIOSIS
10:00 - 10:30 Karatay, Vefa and Denizhan, Yagmur
BIOLOGICAL INDIVIDUALITY: A PROCESSUAL PERSPECTIVE

Coffee break (10:30 - 11:00)

11:00 - 11:30 Vehkavaara, Tommi
THE FIRST AND THIRD PERSON PERSPECTIVES AND THE RELATION OF PERCEPTION AND SIGN-ACTION IN BIOSEMIOTICS
11:30 - 12:00 Sharov, Alexei
NOTION OF AGENCY IN ENACTIVISM AND BIOSEMIOTICS
12:00 - 12:30 Sherman, Jeremy
FOCUS ON BIOSEMIOTIC FOUNDATIONS

Lunch break (12:30 - 13:30)
Visit the Main Building, Posters (13:30 - 14:30)

14:30 - 15:00 Tønnessen, Morten
HOW RELATIONALITY CONNECTS THE INDIVIDUAL AND ECOLOGICAL LEVEL OF BIOLOGICAL STUDY
15:00 - 15:30 Maran, Timo
REFRAMING WOLF AS AN ESTONIAN NATIONAL ANIMAL. PROCESS AND CONTENTIONS FROM AN ECOSEMIOTIC PERSPECTIVE
15:30 - 16:00 Magnus, Riin and Mäekivi, Nelly
THE ECO- AND ZOOSEMIOTIC ASPECTS OF SPECIES REINTRODUCTION: THE CASE OF THE EUROPEAN MINK IN ESTONIA

Coffee break (16:00 - 16:30)

16:30 - 17:00 Fejzić, Sanita
A SLOW CULTURAL REVOLUTION AT THE INTERSECTION OF BIOSEMIOTICS, ENVIRONMENTAL ETHICS AND CULTURAL PRODUCTION
17:00 - 17:30 Rodríguez H., Claudio J.
AGAINST UNIVERSALISM IN BIOSEMIOTIC THEORIES

17:30 - 18:00 Editorial Board Meeting

19:00 - 21:00 Excurssion to Theater square, Red Square, GUM, and Park Zariadie

Wednesday July 3

9:00 - 9:30 Bennet, Tyler James
CULTURAL IMPLICATIONS OF PROTOSIGNS: BIOSEMIOTICS AND STRUCTURAL SEMIOLOGY
9:30 - 10:00 Alexander, Victoria
GROUP THINK: THE DIFFUSION OF SIGNALS
10:00 - 10:30 Fomin, Ivan
MULTI-LEVEL ICONIC SIGNS IN THE PROCESSES OF BIOLOGICAL AND CULTURAL EVOLUTION

Coffee break (10:30 - 11:00)

11:00 - 11:30 Ilyin, Mikhail
DOUBLE-EDGE IMPLICATIONS: Relevance of gene expression models to studies of human communication and applicability of linguistic dichotomies to genetic information research
11:30 - 12:00 Chávez Barreto, E. Israel
A PATHWAY FROM HJELMSLEV'S SEMIOTIC THEORY TO DEACON'S EMERGENT DYNAMICS
12:00 - 12:30 Schumann, John H.
WALKER PERCY'S SEMIOTIC THEORY AND THE ISSUE OF NON-MATERIALITY

Lunch break (12:30 - 13:30)

Excursion to Pushkin Museum of Arts (15:00 - 17:30)

Excursion to Poklonnaya Gora Park or Free time (17:00 - 19:00)

Moscow Sightseeing River Cruise (19:00 - 21:00)

Thursday July 4

9:00 - 9:30 Gontier, Natalie
COMMON ROOTS OF BIOSEMIOTICS AND APPLIED EVOLUTIONARY EPISTEMOLOGY
9:30 - 10:00 Hendlin, Yogi Hale
DISTRIBUTED AGENCY, COMPOSITE IDENTITY, AND MICROORGANISM INFLUENCE: A view of world affairs from a biosemiotic interpretation of the extended evolutionary synthesis
10:00 - 10:30 Sukhoverkhov, Anton V.
PROCESS AND SEMIOTIC APPROACHES TO INHERITANCE AND EVOLUTION: IN SEARCH OF AN INTEGRATED THEORY

Coffee break (10:30 - 11:00)

11:00 - 11:30 Chebanov, Sergey
INTERPRETATION TECHNIQUES IN LIVING ORGANISMS
11:30 - 12:00 Gare, Arran
BIOSEMIOSIS AND CAUSATION: DEFENDING BIOSEMIOTICS THROUGH ROSEN'S THEORETICAL BIOLOGY
12:00 - 12:30 Bruni, Szura
THE EVOLUTION OF CONSCIOUSNESS. SUBJECTIVITY AND IT'S PLACE IN NATURE

Lunch break (12:30 - 13:30)
Visit MSU Botanical Garden, Posters (13:30 - 14:30)

14:30 - 15:00 Decker, David Frank
UMWELTEN AND COUNTERPOINTS: ON THE THRESHOLD OF MEANING
15:00 - 15:30 Faltýnek, Dan and Owsianková, Hana
GENETIC ANALYSIS OF ALL CABBAGE AND RELATED CULTIVATED PLANTS USING BAG-OF-WORDS MODEL
15:30 - 16:00 Bushev, Stanislav
TO BE ANNOUNCED

Coffee break (16:00 - 16:30)

16:30 - 17:00 Pharoah, Mark
FROM BIOLOGICAL MECHANISM TO MEANING
17:00 - 17:30 Kolmogorova, Anastasia, Kalinin, Alexander, and Malikova, Alina
THE RESTRICTIONS THAT THE FASCINATION THEORY IMPOSES ON THE METHODOLOGY OF TEXT DATA SENTIMENT ANALYSIS
17:30 - 18:00 ISBS Annual Meeting

Friday July 5

9:00 - 9:30 Cárdenas-García, Jaime F. and Ireland, Timothy
A NEW BIOSEMIOTICS PARADIGM: BATESON INFORMATION
9:30 - 10:00 Spirov, Alexander V.
THE COMPLEXITY, SPATIAL DISTRIBUTION AND HIERARCHY OF THE PROCESSES FOR THE GENETIC INFORMATION UNFOLDING IN AN EMBRYO
10:00 - 10:30 Shklovskiy-Kordi, Nikita E., Finn, Victor K., and Igamberdiev, Abir U.
NATURAL ALGORITHMS, COMBINATORIAL POWER, AND GENERATION OF MEANING IN THE SEMIOTIC STRUCTURE OF THE GENETIC LANGUAGE

Coffee break (10:30 - 11:00)

11:00 - 11:30 Zolyan, Suren
ON THE GRAMMAR AND GRAMMATICAL CATEGORIES OF THE GENETIC CODE
11:30 - 12:00 Lacková, Ľudmila and Faltýnek, Dan
HOW TO DO THINGS WITH PROTEINS: A PRAGMATIC VIEW ON PROTEINS
12:00 - 12:30 Castro Garcia, Òscar
FROM PROTOSEMIOSIS TO EUSEMIOSIS: IN SEARCH OF A MINIMAL COGNITION IN BACTERIA AND SLIME MOLDS

Lunch break (12:30 - 13:30)
Visit the Mineralogical Collection, Posters (13:30 - 14:30)

14:30 - 15:00 Delahaye, Pauline
ME, YOU & ALL THE OTHERS: WORKING WITH EMOTIONS IN SEMIOTICS
15:00 - 15:30 Velmezova, Ekaterina
ANOTHER BIOSEMIOTICS? ANALYZING THE INTELLECTUAL HERITAGE OF BIOLOGIST LEV BERG

15:30 - 16:00 Scalia, Jeremiah Cassar
ANATOMY OF A PRIMORDIAL SYNECDOCHISM: MIMESIS, BODY PLASTICITY AND THE EVOLUTIONARY EMERGENCE OF LANGUAGE

Coffee break (16:00 - 16:30)

16:30 - 17:00 Zhukov, Leonid
BIOSEMIOTICS AS A THEORETICAL DISCIPLINE
17:00 - 17:30 Kostikova, Anna
TO BE ANNOUNCED
17:30 - 18:00 Official Closing

ORAL PRESENTATIONS

GROUP THINK: THE DIFFUSION OF SIGNALS

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Keywords: signal diffusion, thermodynamics, information flow, self-organization, emergence

At past gatherings, I have focused on the signaling of *individual* selves (cells or organisms), arguing that semiosis is virtually identical to intentionality. I define sign-action as the process wherein a self encounters a sign-vehicle and responds to it (i.e., transduces it, interprets it) in such a way that there is a reinforcing effect (which I consider the sign object) on that response toward that sign. Such sign-readings lead to semiotic habits. I have also noted that a self can misread a sign-vehicle, due to a coincidental similarity to a familiar sign-vehicle (icon) or due to an association with an object that is coincidentally proximal (index), and this can lead to novel adaptive behavior if a new object (i.e., a new reinforcing effect) results. The semiotic tendencies that constrain readings/misreadings constitute selfhood, and, thus, automated and adaptive behaviors are self-created. Taken together the two aspects of sign-reading, habits and changes of habit, directionality and originality, produce the intentionality of an individual self.[1]

What interests me now is how *groups* of selves (or cells), experiencing more or less the same conditions, send and receive signals (as above) such that waves of coordinated activity emerge. Biologists typically use the term "communication" to refer to the thermodynamic diffusion of energy or material from an area of high to low concentration. I will explore how semiotic habits are created/reinforced through self-organizing processes, during which the local decisions of a biological "algorithm," state changes in a cell, simply tend to flow to the lowest energy state, and global wave-like behavior emerges from this. At the same time, due in part to the semiotic freedom and constraints of each local sign reading, the wave behavior can suddenly switch to a different regime and start reinforcing a different semiotic habit and new coordinated behavior. Emergent switches are a diverse and widespread mechanism behind, e.g., embryonic cell differentiation, edge detection by visual neurons, and animal coat/butterfly wing patterns.

I propose that differential emergent global organization is possible because—unlike abstract machine computation, in which the algorithmic state changes must be precisely defined and strictly logically—material biological computation uses analog sign-receptor engagements that are not precisely correct so much as like enough (as with metaphor) and probable enough due to spatial proximity (as with metonymy). I argue sign action flows efficiently due to the flexible poetic nature of signs used in biological computation. Furthermore, because somewhat indeterminate, self-organized semiosis can be creative but can also be irrational, if the result is not subjected to external selection. This might help explain why bad ideas propagate or why biological systems might spontaneously malfunction.

Biosemiotic research has focused on cell-to-cell or intracellular sign action, but a few researchers have begun to study global signal diffusion. What can biosemiotics add to research on information flow? Can this research be applied to a range of systems, from cells to societies?

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[1] See "Creativity: Self-referential Mistaking, Not Negating," *Biosemiotics* 6: 253-272, 2013; *The Biologist's Mistress: Rethinking Self-Organization in Art, Literature, and Nature*, Emergent Publications, 2011 and "The Poetics of Purpose," *Biosemiotics* 2: 77-100, 2009.

CULTURAL IMPLICATIONS OF PROTOSIGNS: BIOSEMIOTICS AND STRUCTURAL SEMIOLOGY

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ABSTRACT: Recent decades of progress show that the way forward in general semiotics entails the integration of findings in cognitive and natural science, and that some of the classic strictures from structural semiology need to be revised accordingly. Conversely, tendencies in cognitive and biosemiotics toward the excision of structural semiology – to the extent even of proposed total mutual exclusivity – are to the detriment of both branches. Paul Cobley's recent work, *Cultural Implications for Biosemiotics* (2016), is one landmark on the road to better relations. Downplaying the hard epistemological break away from structural semiology, Cobley emphasizes that "biosemiotics offers the prospect of a renewed cultural analysis" (Cobley 2016: xii), but a definitive sticking point persists between the two branches, unaddressed in Cobley's book: what exactly constitutes a sign? More specifically, to what extent are signs dependent upon symbolic, linguistic, and/or code-based articulation? Are icons and indexes signs in themselves, or only when they are articulated by a symbol? There is a spectrum of responses. Kalevi Kull maintains that icons and indexes are signs proper and can be spoken of on their own terms. He aligns with Sebeok in this regard, whose simplistic Peircean sign model is also a compositional-developmental one, where more complex signs are built of simpler ones, and in which signs can be used to describe both ontogenetic and phylogenetic thresholds. Sebeok and Deely also cast their applications of Peirce as a hard break away from structural semiology. Frederik Stjernfelt on the other hand extends the symbol to even the most basic instances of what he considers to be the fundamental unit of semiosis, the dicisign. An icon and an index there naturalistically prefigure linguistic propositional structure, but this proposition is always articulated by a symbol. Stjernfelt presents this position explicitly against that of the compositional-developmental account of sign types, in the sense that dicisigns are not merely composed of simpler signs, nor can those constituents of signs be applied to ontogenetic or phylogenetic levels. In this way, Stjernfelt hews more closely to the structural semiological position regarding the necessity of symbolic articulation to all signification, while still being acutely critical of extant fusions of the two branches posed by for example Umberto Eco. Toward the end of better relations, concomitant theoretic revisions include the matters of the compositional-developmental account of Peirce's typology of signs –Peirce's 'quasi-sign' bears upon this matter. The quasi-sign is a dyadic sign allegedly missing its interpretant, and one which is characterized by lack of deliberation over the object. Sharov and Vehkavaara (2015) develop the biosemiotic quasi-sign, in what they call the protosign, a sign characteristic of simple forms of life, also a dyadic sign, but in this case missing its object dimension instead of its interpretant. The protosign does give an instructive parallel to the quasi-sign Peirce was talking about, but consider that the latter is located in the relatively complex human behavior of military obedience, given in Peirce's 'Ground Arms!' example. There are numerous models from structural semiology geared toward the critique of such quasi-signs in culture as Peirce was talking about. The difference between these types of quasi-signs is here elaborated. Seriously responding to the unanswered questions of the classic structural semiological models of ideology critique – *what exactly is being mystified under ideology? How can it be described independent of symbolic articulation?* – requires also the tools of Peircean cognitive biosemiotics.

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THE EVOLUTION OF CONSCIOUSNESS. SUBJECTIVITY AND IT'S PLACE IN NATURE

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The Holy Grail of the philosophy of mind and the cognitive science - the so-called "Hard problem of consciousness" - still waits for it's resolution. How to connect theoretically: the physical world with spaces of subjective experiences? How to surpass the famous "explanatory gap", in way to include the first-person perspective to the coherent picture of reality? And is the subjectivity a forever impenetrable ground for the scientific inquiry - or maybe grasping it doesn't necessary remain beyond our intellectual possibilities?

Without any doubt, to face the problem of subjectivity as a biological phenomenon, non-anthropocentric and evolutionary approach is needed. The very goal for the future would be the creation of a coherent model which could contain all the variety of natural phenomenologies (subjective worlds), all being shaped by strict evolutionary principles. Although such cognitive kaleidoscope at first glance could seem mind-blowing, it's existence turns to be a highly logical conclusion.

Wherever we trace a subjective (ego-centric) point of view, a fundamentally different *umwelt* appears - would it be based on chemical, electrical, sound, visual or language signals. Therefore such endeavor would be about phylogenesis - not of the morphology however, but of the phenomenology of species. In other words, about the evolution from the first-person perspective.

Along with the biosemiotics' intuitions and regarding to the basic understanding of the *semeion* concept - that is, something that stands for something other than itself - a hypothesis of "information resonance" is proposed. It would be a phenomena common to every living being, realized through the organism's subjectivity - namely the process where given signals acquire given meanings, *ipso facto* becoming informations. A pheromone sign has it's meaning for an ant, becoming an information about the food location; a circulating shadow in the sky means danger for a mouse; a smile means friendliness for a human. All these signals "resonate" and become informations however only through the evolutionary shaped subjective perspectives, remaining unnoticed to many others - as human doesn't understand ants' pheromones, mouse doesn't get any smiling, and ant doesn't see any danger in the sky. There is no information out of the perspective; no meaning without the interpreter.

Because of the evolutional trajectory of species, they all live in different semiotic niches. Evolutionary shaped meanings and affordances would be in fact what their existence is based on - that is why it is "the subjective perspective" of an organism would be a teleological, goal-directed factor, being surrounded by evolutionary acquired meanings coming from it's environment.This would be the key issue regarding the problem of the evolution of subjectivity: as over time not only physiological features of species evolve, but also the whole subjective worlds they live in.

From such perspective the subjectivity would be an essential factor of every living being; it would be the subjectivity through which the environment is perceived, meanings are acquired, affordances are presented and behavior is realized.

A NEW BIOSEMIOTICS PARADIGM: BATESON INFORMATION

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The field of biosemiotics is rich and diverse in its interdisciplinarity, its dependence on Peircean semiotics (Peirce 1998), its concern for biological (or intrinsic) information, and its positing that life and semiosis are coextensive. One example of this richness is that of cybersemiotics (Brier 2008), where Brier "… argues that information (as it is understood in cybernetics) is not enough to explain the phenomena of experience, communication, and knowledge." (Sharov 2010: 1051). This approach combines Shannon's information (Shannon 1948) with a Peircean perspective to account for syntactic information and semantic information, respectively. Syntactic information is quantitative/objective, while semantic information deals with meaning which is qualitative/subjective.

In contrast, the goal of this presentation is to establish a more fundamental *biosemiotic information paradigm* based on the definition of information by Gregory Bateson, which states, "In fact what we mean by information – the elementary unit of information – is a difference which makes a difference..." (Bateson 1972: 321). As will be explained, Bateson information incorporates a quantitative/objective perspective with a qualitative/subjective perspective. These perspectives develop into Impersonal/Objective/Absolute Information (IOA-I) and Personal/Subjective/ Relative Information (PSR-I), which result in Shannon/Distilled Information (SD-I). Leading to the contention that *Bateson information is enough* to account for syntactic information and semantic information. In other words, Bateson information subsumes Shannon information. Additionally, Bateson information may be used to dispute the assertion by Wiener that information is a third fundamental quantity of the Universe (Wiener 1948). A widespread belief that is not accurate. The idea that *Bateson information is enough* to account for syntactic and semantic information results in the posing of the Fundamental Problem of the Science of Information: i.e., the problem of explaining how human beings came to our current state of phylogenetic and ontogenetic development. How a self-referential process leads humans to develop from a state in which their knowledge of the organism-in-its-environment system is almost non-existent to a state in which the organism not only recognizes the existence of the environment but also sees itself as part of the organism-in-its-environment system. This impacts our ability to engage with the environment so as to navigate effectively through it. In this process we are able to transform our environment to make it amenable to our distinct needs as living beings. This is what we as human beings do on a daily basis, fully dependent on the Bateson information process. Recognizing this as a fundamental problem that we need to address is the first step leading to a Unified Theory of Information (UTI). The definition of information by Bateson is the key toward such a goal as well as fully supporting the notions relevant to biosemiotic distributed cognition (Cardenas-Garcia & Ireland 2017).

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FROM PROTOSEMIOSIS TO EUSEMIOSIS: IN SEARCH OF A MINIMAL COGNITION IN BACTERIA AND SLIME MOLDS

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Currently, in experimental biology, we have shown that certain activities of organisms without a nervous system resemble those of organisms with a nervous system. Some examples of adaptive behavior that require continuous information processing are: the recognition of spaces travelled, the detection of change, decision-making, or the memorization of stimuli. Biosemiotics has developed key concepts for understanding the dynamics of activities at the cellular level. It has classified not only semiotic physiology as an aspect of code, but it has also attempted to define and describe "sentience" in organisms. To do this, it is necessary to further refine and redefine the semiotic concepts involved in the minimum cognitive processes in both prokaryotes and eukaryotes. If we could do this,, then we could begin to understand the link between minimal semiotics and minimal cognition.
The proto-cognitive physiology underlying the cognitive characteristics of these organisms is important. There can be no cognitive processes if they are not based on a concept of “architecture” or on what we call "proto-cognitive foundations,” e.g., the mechanotransduction and haptic sensitivity. The proto-cognitive processes are interrelated with the proto-semiotic developments that generate a molecular semantics, which is indispensable for the normative functioning of the agent. The proto-cognitive development of the cell depends upon the structural scaffolds of the cellular morphology, cytoplasm and its semiotics, the variation of the homeostatic stability, and cellular coherence. The role they each have, both the cell morphology and the “cytosemotic” processes, influence - both directly and indirectly - the cognitive processing of adaptation of both unicellular and "denervated" pluricellular organisms. I will focus on examples of the adaptive behavior of certain bacteria such as slime molds as fundamental examples of the minimum cognitive principles in (eu)semiotic agents.

Keywords:
Allorecognition phenomena, Cognition distributed Kin-recognition (Kin-discrimination), cytosemiotics, proto-cognition, proto-semiosis, eusemiosis, endosemiotics, *Physarum*, *Dictyostelium*, *Prokaryotes*.

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A PATHWAY FROM HJELMSLEV'S SEMIOTIC THEORY TO DEACON'S EMERGENT DYNAMICS

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The Hjelmslevian notions of *form* and *substance* make up one of the main dichotomies upon which his structural theory of signs was built. In simple terms, substance corresponds to material reality while form refers to the systemic organization of such reality via a semiotic system. It seems fair to say that the Hjelmslevian opposition is mainly epistemic: the distinction between form and substance works mainly at the level of analysis but it makes no assumptions regarding the ontological nature of the analyzed object. This dichotomy was reformulated, in cognitive terms, by semiologist and linguist Luis J. Prieto. It seems possible to interpret Prieto's reformulation of the opposition between form and substance from a semiotic realism point of view that shifts from a structural to a more dynamic stance, although retaining some structural considerations. Under this approach, substance comprises the actual ontological features of material reality. A given system will select only a small set of those material features and it will render them as pertinent. The set of features borne by the object's materiality that are pertinent for the system are what Prieto calls form. Thus, substance refers to the inherent constraints of matter that are imposed to a semiotic system, and form (inasmuch it is *in-formed* substance) becomes the system-specific reality. Since the relation established between form and substance is a proper semiosic relation, it is not reducible to either one of its terms (it is in this sense *suprasubjective*, following Deely's usage of this term); form is dependent upon substance, or to put it in other words, the system-specific reality is dependent upon the material reality of the system's extrinsic conditions. The shift proposed by Prieto enables the opposition between form and substance to function as one of the main axis within a general model of semiosis that could be successfully applied to semiosic phenomena other than anthroposemiosis (although the possibility of building a model of semiosis beyond human semiosis was not taken into account by Prieto). As such, the aim of this presentation is to provide a possible link between the theory of form and substance and the biosemiotic theory of *emergent dynamics* proposed by Terrence Deacon. The claim this presentation will put forward is mainly that teleodynamic organization provides a system with the capacity of shaping substance as form. To do so, teleodynamic organization creates a pertinence principle which selects the relevant features of the system's extrinsic conditions and classifies them to ensure the system's preservation. The combination of these approaches is seemingly absent from current biosemiotics theories and thus it constitutes an asset for biosemiotics, as it brings Saussurean inspired theories into the field and at the same time revitalizes the structural tradition within general semiotics.

References:

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INTERPRETATION TECHNIQUES IN LIVING ORGANISMS

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One of the central and at the same time highly debatable problem of semiotically perceived biology (understood either as biosemiotics, or as biohermeneutics, or in some other way – Pattee, 2012) is the question of the presence of interpretation in biological phenomena. They are trying to give some conceptual answer (Chebanov, 1998). But you can go the other way, namely, to demonstrate the mechanisms that ensure the implementation of interpretation.
Such a path seems very promising due to the fact that G.I.Bogin carried out an inventory and systematization of interpretation techniques (Bogin, 2001). Its essence is as follows. A collection of interpretation techniques was created (which were used mainly in European culture from antiquity to the present day; a total of 106). This collection is open for replenishment. These techniques are combined into 6 groups:
A. Techniques of discretion and construction of meanings
B. Techniques of the "reflective bridge" generated through the use of textual means that evoke reflection over ontological pictures not directly related to the explored epistemological phenomena
C. Disjoining mixed constructs (separation of closely connected components)
D. Interpretation techniques
E. Transfer and replacement techniques
F. Exit to a new spiritual state.
It is argued that if you use at least 2-3 techniques from each group, you will receive a satisfactory understanding of the text. This work by G.I.Bogin was carried out on the basis of an understanding of the text in the natural human language by a rather highly educated person who has the ability to reflect. At the same time, the nature of the formation of such a person, the features of his reflection, the place of intuition, etc. are discussed explicitly. Implicitly, in unexplored form, it is assumed that a person possesses a homonoidal (but, say, not zauromorphic) thesaurus, bipedalism (but not tetrapedalism), color (but not monochromacy) vision, lives in an anthropomorphic Lebenswelt (but not in some species-specific umwelt – J.von Uexküll), etc. However, if not another person acts as an understanding being, but some other living being, then all such characteristics of this living being will be different. Accordingly, the abilities important for interpretation will be realized in a completely different way (for example, the intendation at the subcellular level will not be due to attention, but due to the high affinity of the functional groups of signal molecules). Given this rethinking of the techniques of understanding considered by Bogin, it can be argued that living organisms have interpretation techniques associated with both endosemiosis and exosemiosis (Th.Sebeok), which belong to at least 4 of the 6 selected interpretation techniques (groups A, B, D, E). Apparently, in living organisms there are no techniques of "putting up" mixed constructs (which not every person owns even with a university education – group C) and the subject of heated discussions (for example, on the problem of the presence of cemeteries among African elephants) is the question of the availability of techniques for entering new spiritual state (group F). The paper will consider the most illustrative examples of different interpretation techniques in biosemiotic processes.

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UMWELTEN AND COUNTERPOINTS: ON THE THRESHOLD OF MEANING

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In this presentation, I will argue that in admitting that subjectiveness does not only belong to the human species, it is their meanings that matter to us and in a way that our meaning about the reality of the world significantly changes. On the one hand, I will assert that the theory of *Umwelt*, including the concept of *counterpoint*, by biologist and protobiosemiotician Jakob von Uexküll, entails an unavoidable opening for subjectivity, and on the other hand, I will consider that the qualities of objects are interdependent with respect to subjects; however some of them may have the intuition or the presumption that all objects have a quality that does not depend on the subjects and, in addition, some of them may have the presupposition of a physical monism. For these issues that fit into the fields of life studies, I will then suggest that it is an interdependent exploration, where subject and object should not only be present at the same time, but by means of comparison they should also be thought to be interchangeable at each moment. Those approaches, which conversely consist in rigidifying and immobilizing the subject or the object in these fields miss something, like a blind spot in our visual field. I will support this point by two paradoxical thought experiments. The first one will begin by the thought of a cosmos where all forms of life are lacking, thus excluding any significant or meaningful information in the absence of *cogito* or any interpretative entity. The second one is the attempt to rethink semiotically the Cartesian thought experiment in its solipsist crisis in the *First Meditation*. As a result of each of these thought experiments, I will clarify to what extent the ontological premises of these two thought experiments cannot precede semiosis and how this can be generally related to both Uexküllian concepts of *Umwelt* and *counterpoint*.

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ME, YOU & ALL THE OTHERS: WORKING WITH EMOTIONS IN SEMIOTICS

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Emotions are part of what Umberto Eco used to call the "black box", an area of the mind impossible to access from the outside in any kind. Of course, semiotics can try to access and understand them, like it historically did with physical areas inside the human body at the beginning of the medicine. But unlike an ulcer or a cirrhosis, which are objective phenomenon, emotion is, per se, a subjective thing and studying subjectivity with objective signs is always a difficult matter.

In this presentation, I will firstly address few general questions about the problem of working with and on emotions with a semiotics point of view.
The first one, at the very root of semiotics, is indeed to ask if external signs are a valid and pertinent way to categorize and name internal phenomena.
If so, what happens when the name and process are not strictly equal? If an emotion's name is missing in a language or a culture, is this culture lacking this emotion? On the opposite point, can we create an emotion just by creating a new name and an associate definition (I will discuss the example of "compersion")?
And, in all this work of categorization, how to understand and study the different nuances in various emotions: how many can be named, how many are necessary, what happens to people having emotions but lacking nuances?

Secondly, I will address the more specific aspect of emotions in animals, of the zoosemiotics of emotions, and the different but related problems that occur in this more particular case. How to name a subjective phenomenon that is not even of our species? Why should we have names for animals' emotions, and should they be the same for humans' ones?
In a more experimental way, we are now quite familiar with studying animal abilities we are lacking (seeing outside of our visible spectrum, echolocation, magnetism sensibility etc.), but how can we understand and study the possibility of emotions they may have as we do not?
I will end this communication by a presentation of cross-species studies, progress and boundaries about pathologies of emotions.

GENETIC ANALYSIS OF ALL CABBAGE AND RELATED CULTIVATED PLANTS USING BAG-OF-WORDS MODEL

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In this study, we want to introduce analytical method Bag-of-words which is mainly used as a tool for the natural language analysis (document classification, authorship attribution etc.). Quantitative linguistic methods similar to Bag-of-words (eg Damerau-Levenshtein distance) were used for mapping language evolution within the field of glottochronology. We would like to attempt to apply this method in the field of biological taxonomy - on the *Brassicaceae* (Cruciferae) family. The subject of our interest is well-known cultivated crops, which at first sight are morphologically very different and culturally perceived as objects of different interests (eg oil from oilseed rape, turnip as animal feed and cabbage as a side dish). Despite the phenotypic divergence of these crops they are very closely related, which is not morphologically obvious at the first sight. For this reason, we think that Brassicaceae crops are appropriate illustrative example for introducing the method. For the analysis we use genetic markers (ITS and matK). Till present, the Bag-of-words has not been used for biological taxonomisation purposes, therefore the results of the Bag-of-Words analysis are confronted with the existing very well-developed *Brassica* taxonomy. Our goal is to present a method, which is suitable for language development reconstruction, and could possibly be usable also for biological taxonomy purposes.

ON THE PROMISE AND THE CHALLENGES OF USING PEIRCE'S SIGN THEORY IN BIOSEMIOTICS

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American logician and philosopher Charles Sanders Peirce (1839-1914), along with Estonian physiologist and theoretical biologist Jakob von Uexküll (1864-1944), is one of the two major "precursor" theorists whose ideas have been most central to the development of the contemporary project of biosemiotics, since the inception of the project in its current form by Thomas Sebeok in the late 1970s and early 1980s. Trained in chemistry, astronomy, geodesy and mathematics, Peirce today is most known for his lifelong attempt to develop of logic of sign relations that could be used to develop "a naturalistic but nonreductive account of the human mind, and to explain and defend the claim that the sciences are objective in their mode of inquiry and in fact yield knowledge of an independently existing reality" (Short 2007: *ix*).
Peirce's far-seeing anticipation of what we now might think of as the ability of negentropic systems to direct or bias material efficient causation towards their own independently established ends, and to establish not only the reality of, but even the fundamental necessity for, the establishment of naturally occurring sign relations operative at every level in the living world, has long been seen as a viable conceptual toolbox with which to
refute the reductionism and the nominalism that both Peirce and contemporary biosemioticans see as the biggest "block to inquiry" for the development of a mature biological science.

Peirce toiled ceaselessly on this project for over 40 years, leaving behind a legacy of over 80,000 manuscript pages that have yet to be fully organized and published, much less satisfactorily analyzed as a coherent whole (although a number of long-term attempts at doing so are in progress). Not surprisingly, then, even amongst the most learned of Peirce scholars, disagreements reign as to how to understand, much less apply, his insights.

In this talk, I want to examine two such attempts at using Peircean sign theory in biosemiotics that start from the same reference texts, but wind up espousing diametrically opposed understandings of how Peirce's trichotomy of icon, index, and symbol relations is to be understood as being operative in the world of living systems.

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A SLOW CULTURAL REVOLUTION AT THE INTERSECTION OF BIOSEMIOTICS, ENVIRONMENTAL ETHICS AND CULTURAL PRODUCTION

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Abstract: My paper considers the implications of biosemiotics to humanities, with an emphasis on cultural studies in an age of global anxiety, risk management and debate around climate change. I ask the question: why does the work of biologist-biosemiotician Jakob von Uexküll continue to excite the imagination of philosophers such as Elizabeth Grosz almost a century later? His concept of the lifeworld (*Umwelt*) was taken up by Deleuze and Guattari, who build on his work to talk about "centrality" and "species-specific milieus" to account for the ways in which particular species experience their lifeworlds. Uexküll argues that animals are not immersed wholesale into a given milieu, engaging instead with certain features of that milieu that are of significance to them—he calls these features "counterpoints" which come with their own corresponding organs to the species. This theory of elegant symmetry suggests a deep material and ontological entanglement between species and their milieus that are involved in its "coevolution." Every object, according to Uexküll, becomes something different upon entering a new Umwelt. Uexküll understands the Umwelt and all of nature as being part of a grand symphony, or what he calls the *Weltgesetz*, "the musical laws of nature." The Weltgesetz allows Elizabeth Grosz to argue that art is the highest form of intensification of chaos because of its resonant, rhythmic, sounding quality. If the whole of the cosmos is a reverberation of sound (an argument that modern science also suggests through the Big Bang theory), then according to Grosz who builds on Uexküll, we, animals, humans, ticks and spiders are its instruments.

This model of the world decentralises humanistic understandings of the Cartesian self, moving instead toward a posthumanist more-than-human self that is always already entangled with its Umwelt. It also opens up avenues for bioethical social and political organization, on top of providing new signs and symbols for cultural production. If we accept the possibility that we do not create art in response to, or as representation of, nature—then what are the implications of saying *nature plays us*? Grosz sums it up eloquently when she says, "For Uexküll, the music of nature is not composed by living organisms, a kind of anthropomorphic projection onto animals of uniquely human form of creativity; rather, it is the Umwelten, highly specifically divided up milieu fragments that play the organism" (43 *Chaos, Territory, Art*). Each organism is highly specialized by its organs to play a precise tune its milieu has composed for it, like different instruments of a larger orchestra. My paper concludes by asking: how do high and low cultural products that reach international masses and localized audiences alike—and not just philosophy and science—contribute to a sense of bioethical ecological community while simultaneously changing our language and relationship with nonhuman beings?

Short bio: Sanita Fejzić is an award-winning poet, writer and playwright, as well as a PhD candidate in Cultural Studies at Queen's University specializing in environmental ethics and biosemiotics. Using research-creation as her mode of inquiry, her work asks the question: if it is true that we are physically continuous with animals, plants and elements such as water and land, then how have our signs and symbols evolved to reflect our more-than-human entanglements in popular culture? Her work has been published in magazines and journals across the country, including most recently in the University of Ottawa's feminist journal, *Canthius*. She is also the lead editor of two critical anthologies, *Refuge(e)* (2016) and *Dis(s)ent* (2018) published by Carleton University's *In/Words Magazine and Press*. Her first book of fiction, *Psychomachia*, Latin for "battle of the soul," was shortlisted for two national book awards. Her first play, *The Blissful State of Surrender*, was workshoped in March 2018 by the prestigious National Arts Centre in Canada's capital. It will be read in June 2019 at the Ottawa Arts Court.

MULTI-LEVEL ICONIC SIGNS IN THE PROCESSES OF BIOLOGICAL AND CULTURAL EVOLUTION

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The study proposes a semiotic model that generalizes various attempts to theorize about evolutionary "building blocks" that emerge in the processes of cultural, cognitive, social and biological development. Charles S. Peirce's fundamental category of *metaphor* is used to reduce all those entities to two-level iconic signs in which a certain "primary" acts of semiosis function as semiotic Vehicles to represent the Objects that are constituted by other acts of semiosis that are similar to those "primary" semioses. Peirce's concepts of Habit ("a general rule operative within the organism"), Dynamic Interpretant ("the *actual event* that some signs by virtue of really acting as such bring about") and Final Interpretant ("that Habit in the production of which the function of the Sign, as such, is exhausted") can be used in order to show that any evolutionary process can be modeled as a process that relies on the functioning of such metaphoric hypoicons. In metaphoric hypoicons some past acts of semiosis appear as the Object that is iconically designated by the Vehicle that constituted by some current acts of semiosis. The Dynamic Interpretants of such metaphorical hypoicons are some future acts of semiosis in which the past acts of semiosis are taken into account, while their Final Interpretants are certain regularities in accordance with which future semioses occur. Based on this model, the metaphorical hypoicons can be argued to be the mechanisms that make possible the emergence of *intermediate stable forms* that, according to Herbert Simon, are key elements to boost the dynamics of evolution. The examples of such intermediate forms that are iconically reproduced can be found in various developmental processes. In particular, in cultural evolution such entities appear as symbols (in Yuri Lotman's terms) and myths (in Roland Barthes's terms). In biological evolution similar role is played by protein domains, organisms and species. In the processes of social development the same functions are performed by institutions. In individual cognitive development a similar role is played by cognitive templates.

BIOSEMIOSIS AND CAUSATION: DEFENDING BIOSEMIOTICS THROUGH ROSEN'S THEORETICAL BIOLOGY

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The claim by Marcello Barbieri that Peircian biosemiotics is not genuine science raises anew the question: What is science? When it comes to radically new approaches in science, there is no simple answer to this question, because if successful, these new approaches change what is understood to be science. This is what Galileo, Darwin and Einstein did to science, and with quantum theory, opposing interpretations are not merely about what is the right theory, but what is real science. Peirce's work, as he acknowledged, is really a continuation of efforts of Schelling to challenge the heritage of Newtonian science for the very good reason that the deep assumptions of Newtonian science had made sentient life and human consciousness unintelligible, the condition for there being science. Pointing out the need for such a revolution in science has not succeeded as a defence of Peircian biosemiotics, however. In this paper, I will defend the scientific credentials of biosemiotics by relating it to the relational biology and related notions of causal entailment of the theoretical biologist, Robert Rosen. I have argued elsewhere that Rosen's relational biology should also be seen as a development of the Schellingian project to conceive nature in such a way that the emergence of sentient life is intelligible. Rosen has made a very strong case for the characterization of his ideas as a real advance not only in science, but in how science is understood, and I will argue that it is possible to provide a strong defence Peircian biosemiotics as science through Rosen's defence of his relational biology.

An effort to reconcile Barbieri's code biology with Peircian biosemiotics through Rosen's relational biology has already been made by Frederico Vega, however, and Barbieri responded to this, rejecting Vega's arguments. My argument will differ from Vega's by focussing on the concept of causation and causality and the ontology associated with this that Rosen claimed to have arrived at, but was unable to present before his untimely death. Rosen argued that Newtonian science is weak in entailment and for this reason is unable to model final causes. By developing the mathematics able to model systems that have models of themselves, Rosen was able to model final causes. Rosen was doing more than this, however. Advancing beyond his earlier work in hierarchy theory, he was showing how to model the immanent causation of processes that are components of each other but not reducible to each other. My claim is that this is the causation involved in semiosis as Peirce described it, and for which he himself was searching. Peirce offered penetrating critiques of received ideas on causation, critiques that have been further elaborated by Menno Hulswit, but neither Peirce nor Hulswit defended immanent causation, and Hulswit argued against Peirce's efforts to explain semiosis causally. My argument will be that Rosen's work on causation fills a gap in Peirce's metaphysics, and strengthens it. Furthermore, I will suggest that in doing so this synthesis of ideas should facilitate the advance of the Schellingian program to radically transform science so that humans as characterized by Herder, Fichte and Hegel can be understood as having emerged within nature, enabling nature through humans to achieve consciousness of itself. This should facilitate the extension of the Peircian concepts being developed in biosemiotics into both the physical sciences and the human sciences, while bridging the gap between the sciences and the humanities, which I will suggest is required to create an ecological civilization.

COMMON ROOTS OF BIOSEMIOTICS AND APPLIED EVOLUTIONARY EPISTEMOLOGY

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Evolutionary Epistemology and biosemiotics share common ancestral roots in their attempts to define the evolution of knowledge and information in organisms. Though the distinction is far from rigorous, one might say that (bio)semiotics follows a more inward approach by examining meaning formation within organisms, while evolutionary epistemology follows a more outward approach by investigating how organisms relate to the environment and how that relation in itself is a knowledge relation. Both furthermore are dissatisfied with Neo-Darwinian and gene-centered evolutionary frameworks for their disregard of the organism, and both acknowledge that evolution needs to be understood from within hierarchical system theories. During the first part of the talk, distinctions and convergences between these approaches will be examined. In the second part, and from within applied evolutionary epistemology, we define evolution in a selection-neutral way as the process whereby units evolve at levels of an ontological hierarchy by mechanisms and we examine how this definition provides a methodology useful for organism-centered approaches relevant to both bio-semioticians and evolutionary epistemologists.

DISTRIBUTED AGENCY, COMPOSITE IDENTITY, AND MICROORGANISM INFLUENCE:
A view of world affairs from a biosemiotic interpretation of the extended evolutionary synthesis

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The extended evolutionary synthesis (EES) emerging from decades of work in ecological evolutionary developmental biology has opened a window on the lives of organisms, and how they change through interaction with each other and their environments. Taking up a basic tenet of biosemiotics, that each organism constitutes part of the *Umwelt* for other organisms, EES has developed several insights applicable to biosemiotic studies, including the recognition of holobionts (selection based on the cluster of organisms including bacteria that compose the super-organism of animal or plant), reciprocal causation (environment and organism shape each other), and non-random phenotypic variation (evolution as situationally useful adaptions rather than "mere" mutation).[1]

This paper, after giving a brief background on the history and current state of EES and its relevance for biosemiotics, will apply the insights of this research program to the dilemma of the human organism. It will hypothesize that many of the ideological struggles leading to human and social strife and ecological destruction find partial origin in the influence of parasitic organisms overrunning human body ecologies. Just like James Lovelock and Lynn Margulis's Gaia theory of bacteria creating hospitable environments for themselves and their evolution through changing the composition of the earth's atmosphere via their metabolic activity,[2] it will argue that the current calamities facing the earth and humans result from dysbiosis, sick systems caught up in increasingly necrophagic/philic parasitism. The paper speculates on causes, through looking at the symptoms, and connects the mental illness epidemics of societies trapped in the separation of antagonistic individualism to the biological activity occurring at the micro-level in humans living in these societies.

Surveying the effects of amoebas, worms, bacteria, spirochetes, viruses, and other parasites becoming increasingly common across the planet in humans and other animals, the paper draws two conclusions. First, that global politics and systems that are destroying the earth and harming people are not just the role of bad human actors, but that their practices, which cultivate certain endo-semiotic interactions that influence their actions to tend towards creating more death, are themselves influenced by the semiosic effects of microorganisms which have become them. This means that in order to ameliorate global political problems such as wealth disparity, political exclusion of residents, xenophobia, ecological destruction, and climate chaos, we must attend to the endo-semiotic activity of micro-organisms occupying the body ecology of the partly-human but parasitized decision-makers. Second, that observing the diets, practices, and customs, of certain populations that have been resistant historically to living outside of their ecological limits and unaccustomed to colonial aggression to serve as possible models for progress should also include in-depth analysis of their symbionts and parasites, including gut bacteria and other fortifying organisms that occupy ecological niches in the human body that otherwise could be infiltrated by parasites.[3]

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DOUBLE-EDGE IMPLICATIONS: RELEVANCE OF GENE EXPRESSION MODELS TO STUDIES OF HUMAN COMMUNICATION AND APPLICABILITY OF LINGUISTIC DICHOTOMIES TO GENETIC INFORMATION RESEARCH

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Extended semiosis embraces information flows within biological organisms and human communities. While similarities are evident differences remain quite distinct. Although information circulates both within and between organic bodies' cells they are nothing like human beings with their free will and linguo-cognitive capacities. Respectively cells do not have individual capabilities to personalize information into subjective messages and cognition but their information processing is far more visual and coherent than human.

With all the differences and similarities, it is tempting to use direct analogies to study both types of semiosis. Very often it is the case surface to mention besides loose metaphors like "reading of genome", or calling genome "a language of God", also quite regular terminological reference to genetic code, translation, transcription, messenger RNA, response element, reading frame etc. Biological metaphors and terms are also current in linguistics (generative grammar, survival of extinction of languages, language tree etc.). The paper addresses the question if the respective metaphors, terms or analogies remain random and selective or they can be combined into a conspicuous system of epistemic representation of the common domain of extended semiosis. The question can sound differently – Is there a single extended semiosis or with all their essential parallels biological and social semioseis remain distinctly different domains?

The paper poses further questions. A first set of queries further augments a customary interpretation of genetic phenomena through the lens of language ("reading of genome" etc.). But to this effect the paper resorts not a layman vision of language and superfluous analogies and metaphors, but to highly functional linguistic dichotomies like Saussurean distinction of lingual structure (*langue*) and speech (*parole*) or Hjelmslevian opposition of the content plane (*indholdsplanet*) and the expression plane (*udtryksplanet*). What genetic phenomena correspond to generative system of rules (*langue*) and to actual information flows (*parole*)? How Hjelmslevian notions of content and expression planes, figures etc. can be applied to genetic phenomena? What are lingual correspondences to genotype and phenotype?

Another array of questions focuses on the relevance of genome structure and gene expression models to studies of human communication. That is comparatively novel or largely unfamiliar perspective. What genetic principles and models are helpful to better understand phenomena like grammar or discourses, language functions and their actual functioning? The questions invite genetic researchers to interpret human language and speech to provide new departures in linguistics.

The paper is an attempt to advocate a single extended semiosis. To bridge the gaps between biological and social aspects of semiosis the paper suggests a more abstract and formal distinction of on-line semiosis and off-line semiotic setup. It also advocates generalized distinctions that extend beyond that of substance and form through expression and content planes to inner and outer forms of semiosis. It furthermore evokes an option to extend beyond unhappy separation of matter and information, body and mind by semiotic linkage of sense and reference by sign vehicle or representamen.

BIOLOGICAL INDIVIDUALITY: A PROCESSUAL PERSPECTIVE

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The origin of life has been the subject matter of many discussions among scientists for quite a long while. Today the debate continues mostly in the form of various theories with different suggestions as to which component of life came first (such as membranes, metabolism, nucleic acids, proteins etc.), and how the rest followed to give rise to life as we know it. On the other hand, there exists a general consensus that life emerged on Earth some 3.5 - 4 billion years ago out of an inert, non-living nature, the basic laws of which have not changed significantly ever since. The fundamental difficulty in accounting for the transition from chemical to biological evolution lies not only in the fact that very limited evidence is available about these earliest stages, but worse, that we do not really know what life may have been like back then. Trying to solve this riddle, science can only rely on the assumption that -against all odds- some aspect of life must have been conserved. It should be noted that specifying the aspect of life that is conserved right from the beginning is tantamount to proposing a definition of life.

In that regard, our position -inspired by Gilbert Simondon's theory of individuation- is to look for the conserved aspect at a categorically different level of abstraction beyond the typical arguments used in evolutionary biology discourse. Accordingly, we suggest that it is a specific operational mode of the process of individuation that emerges during abiogenesis, and is conserved thereafter. Biosemiotic discourse is not unakin to the notion of individuality and to phenomena closely associated with it, such as biological lifespan. However, in face of evidence from current biological research that reveals a rather diverse distribution of such phenomena across different life forms, it seems difficult to maintain a definition of individuality that relies only on simple structure-based criteria. For better compatibility with findings of modern science, we promote Simondon's approach to the process of individuation, where key concepts like metastability and internal resonance serve as criteria of individuality.

THE RESTRICTIONS THAT THE FASCINATION THEORY IMPOSES ON THE METHODOLOGY OF TEXT DATA SENTIMENT ANALYSIS

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According to the fascination theory [1], any signal system adapted by the human society consists of two components: the informational component (meaning of the message) and the fascination component (influence of interpreted message on the interpreter). The latter is the object of sentiment analysis method largely used for the automatic text mining.

As the sentiment analysis implies algorithmized attribution of texts to the particular "emotional class" based on statistically relevant verbal markers of an emotion, its methodology requires the initial expert labeling of a limited collection of instances (the training set) by the group of informants. Relying on his introspective feelings each expert assigns an emotional "label" from the list of emotions (sadness, anger, joy, etc.) suggested by the classifier designers to the each text of the collection. Statistically accurate models obtained from the training set are usually applied to the whole set of similar data.

The text tonality is a type of fascination which is external to recipient of text. If we consider that there are 3 types of interaction between the external and the internal fascinations [2] – 1) the internal fascination reproduces the external putting the subject in a state that the external sender wants to impose on him; 2) the internal fascination as the defense against the external (the contre-fascination); 3) the internal fascination brought about by the external without reproducing it, emerges within the autocommunication – we need to speak about at least 3 types of cognitive strategies of the "marker experts". Some of them label the text "obeying" the emotion verbalized, intentionally or not, by the text sender. Some are driven by the internal rejection of this verbalized emotion ("It's nothing but drama" one of our respondents said ironically as soon as he put the fragment classified by most of the participants as "sad" into the "disgust" class); others mark up the text according to their internal emotional state which was involuntarily activated by the images of the text just read and which could not coincide at all with the emotional impact expected by the sender.

Such triple approach to the expert evaluation 1) allows us to make assumptions about the heterogeneity of the status of verbal markers exploiting in sentiment analysis algorithms – some of them can induce emotions different from those verbalized by the author of text, while others only generate the similar ones due to "the contagion effect", 2) questions the validity of an anonymous and in some way impersonal expert evaluation when forming the training set.

The paper suggests the interpretation of the results obtained in a qualitative analysis of interviews and questionnaires provided by assessors in comparison with their labeling.

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A BIOSEMIOTIC MODEL OF SEMIOSIS

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The existing models of semiosis do not describe the conditions for semiosis in necessary details, and this is a reason why the identification of existance of semiosis is still largely impossible for many biological or artifical systems. In particular, the insufficient description concerns the mechanism of abduction by an epistemic agent in organisms, in the cellular or intercellular processes.

As we have argued earlier, the abductive aspect of semiosis is equivalent to the simultaneity of incompatible codes. This results the necessity of choice (choice understood here in a general sense as picking one of simultaneous options, as decision-making that may not require consciousness). The situation is similar to the non-commutative observables as described in quantum physics. We have also argued that there exists the lower semiotic threshold zone, which means that semiosis is an emergent phenomenon, approximately limited to living systems. This implies that semiosis (and accordingly, mind) is not a quantum-level phenomenon.

These two assumptions (A – that semiosis, as well as consciousness, should not be reduced to quantum physics, and B – that semiosis includes some features that are similar to those described by some models of quantum physics) have been used by Harald Atmanspacher and his colleagues when developing a 'weak quantum theory'. We consider whether their approach can be applied in biosemiotics.

Particular phenomena that can be described using the weak quantum theory include indeterminacy, temporal "entanglement", and Zeno effect – the "stopping of time", also free choice. All these phenomena can be seen as general for semiosis. Thus we can speak about physiological Zeno effect that may be responsible for creating true semiosis. Atmanspacher is using as an example the bistability effect in the perception of Necker cube, which is understood as a special case of a general feature of all cognitive processes.

Concluding: semiosis has some formal similarities with quantum effects, however based on different (just analogical) mechanisms, in macro-level cellular processes.

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HOW TO DO THINGS WITH PROTEINS: A PRAGMATIC VIEW ON PROTEINS

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We would like to present linguistic-pragmatic arguments for the understanding of proteins as semiotic units. The semiotic nature of proteins is guaranteed by the arbitrariness and function (proteins as basic functional units of organisms), yet to complete the whole semiotic description of proteins, it is important to focus also on their pragmatic character. Pragmatics is one of the basic components of semiotics (in the model by Ch. Morris), especially when dealing with biosemiotics descriptions of biological phenomena pragmatics becomes a crucial domain to consider: organisms represent the world they live in by creating and changing it actively. Thus, our proposal is to apply the theory of speech acts by Austin and apply it to proteins as pragmatic results of the genetic code interpreting. Similarly to speech acts in natural language, proteins are in the same way signs and actions. In our presentation proteins will be described as signs from semiotic and pragmatic standpoint. Besides the pragmatic nature of proteins, following fundamental questions will be proposed. What can be considered a dynamical and immediate object in case of proteins? What types of signs are proteins: are they more of iconic or indexical character? Rather than presenting direct answers to the questions, we prefer to approach them in a form of discussion.

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THE ECO- AND ZOOSEMIOTIC ASPECTS OF SPECIES REINTRODUCTION: THE CASE OF THE EUROPEAN MINK IN ESTONIA

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Species reintroduction is currently a widely used, yet one of the most controversial nature conservation endeavors. The reasons include transformations of ecological relations and changes in the umwelten of reintroduced animals, the high mortality rates of the reintroduced individuals, and attitudes and perspectives of (local) people. Eco- and zoosemiotics have a high potential in offering analytical tools to target these controversies in a complex manner. We will explore the possibilities to address above issues by studying the case of the reintroduction of the European mink (*Mustela lutreola*) in Estonia on the island of Hiiumaa. In order to achieve our goal, we will apply the research platforms offered e.g., by Jakob von Uexküll (1982, 1992) (the question of the overlapping of umwelten), Almo Farina (2004; Farina, Belgrano 2006) (the degree of correspondence of the search image and eco-field), Timo Maran (Maran 2015, 2016) (perception of alien species and hybrid environments). Our empirical research will rely on interviews, archival materials and media texts.
In the presentation, we will address the following questions:
* What are the conditions for a species to become accepted and/or adapted or problematic? What role does the distinction between local and non-local and the overlapping of human and non-human umwelten play?
* How is the ideal of local nature perceived by different interest groups (hunters, nature protectors, animal protectors)?
* How have the attitudes of people towards reintroduction changed in time?
Since the reintroduction of the European mink to the island of Hiiumaa can be considered as a success, we aim to develop suggestions for further reintroduction plans, particularly for the further reintroduction of the European mink in other regions of Estonia.

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REFRAMING WOLF AS AN ESTONIAN NATIONAL ANIMAL. PROCESS AND CONTENTIONS FROM AN ECOSEMIOTIC PERSPECTIVE

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Ecosemiotics is "a branch of semiotics that studies sign processes as responsible for ecological phenomena" (Maran and Kull 2014: 41). Ecosemiotic research field can be considered as consisting of entities with different semiotic complexities (texts, cultures, humans, animals, environments, material artefacts) whereas various relations between these (communication, separations, encounters, entanglements, transmissions, translations, projections, etc.) are a primary object of the study (Maran 2015).

In this presentation ecosemiotic approach is employed for analysing changes in the ecology, cultural meanings and conservation discourse of the wolf (*Canis lupus*) in Estonia. The case study is based on relevant content of newspapers and other media. The research focuses on the media event in April 2018, where wolf was declared to be the national animal of Estonia. The quite controversial election process (that included fraud in public internet vote) was supported and partly managed by the conservationists and environmental officials.

This election process can be interpreted as related to the changing ecology of the wolf. In 2014 the African swine fever severely reduced the population of wild boars in Estonia. The diminishing food supply resulted in a growing number of wolves' attacks on sheep and cattle. This led to negative sentiments against the wolf and in this context one aim of the election campaign was to reframe the wolf from an "outlaw" to having more positive cultural meaning.

Although the campaign of reframing the wolf as the national animal can be considered successful, it has also had several implications that can be analysed from an ecosemiotic viewpoint. The campaign brought along the growth of symbolic significance of the wolf (so-called *flagship species*) as well as the blending of species conservation discourse and that of national identity. Both changes can be connected to the ecology and behaviour of the wolf as a semiotic agent. The heightened symbolic status appears to conflict with the factual ecology of the wolves (e.g. their poor health condition where 30% of animals are infected with canine scabies (Sarcoptic mange, Veeroja, Männil 2018: 73) and it may also become a ground for conflicts between different interests groups. Blending the discourses may introduce ideological themes to nature protection, e.g. the opposition of our/alien nature that does not match well with the habit of wolves to roam freely over the eastern boarder of Estonia. On the other hand, the blending of discourses may open interesting long-term perspectives by introducing environmental concern and conservation to the national identity discourse.

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FROM BIOLOGICAL MECHANISM TO MEANING

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Jacob von Uexküll emphasised the importance of meaning in understanding life. But decades on, naturalising biological meaning, in all the varied ways in which meaning is characterised in living organisms, remains a principle challenge for biosemiotics. What is it about the nature of biological processes that they should instantiate distinctive kinds of meaningful relations to and about the world? What is it about a biological mechanism that qualifies the specific characteristics of a particular kind of meaning?

There have been a number of authors that have explored the possibility that there are distinct categories of meaning in biology and that they might be classified. For instance, Vehkavaara, Emmeche, Ferriera, and Kull have all consider the concept of meaning in terms of how biological mechanisms determine various 'kinds of knowledge' about the environment. But a comprehensive theory has proved elusive.

In a paper published in Biosemiotics (Dec 2018 - https://rdcu.be/bcfXi), I echo Stjernfelt's sentiment that biosemiotics can qualify a formal ontology for emergence that can cater for various classes of biological meaning. The argument I make is that there is a hierarchy of discrete and distinctive biological mechanisms—a hierarchy which I categorise—that generate particular kinds of meaning about the environment which include characteristics associated with mental content.

In looking into these kinds of meaning, I call on the work of biosemioticians, researchers and philosophers such as O'Connor, Wong, Thomas Nagel, Chalmers, Cassirer and Merleau Ponty. I identify three distinct categories of knowledge and argue that in each category, the acquisition of knowledge requires a unique kind of discourse actualised by a particular class of interactive biological mechanism. Importantly, each category leads to the emergence of a unique ontological status for its members. This status is articulated in terms of the character of its meaningful relation with the world. These categories I label the physiological, the phenomenal and the conceptual. In regard to phenomenal content, the explanation does not tell us 'what it is like' to be a particular experiencing creature, but, in being a deductive-nomological account, instead allows us to understand why creatures have a 'what it is like' and why that experience phenomenon is characterised spatiotemporally and qualitatively. In a similar vein, the explanation does not address the particulars of any given subjective self-identity, but instead addresses why it is that subjective perspectives of the objective world exist.

In effect, my proposal provides a model that categorises biological meaning and mental content. This entails the explication of a hierarchy of distinct categories which qualify, 1. the qualitative attribution to the physical world, 2. the spatiotemporal delineation of that qualitative relation to the world and 3. the revelatory recognition of an individual's Being, embedded in a spatiotemporal and qualitative world. My claim, therefore, is that the model provides a first step to bridging the objective–subjective gap.

AGAINST UNIVERSALISM IN BIOSEMIOTIC THEORIES

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The frontiers of biosemiotics are inconspicuously blurry. This is a feature and not a bug of the discipline in that it allows us to ask questions beyond certain boundaries, enriching both our knowledge beyond semiotic theories and the possibility of covering new ground through them. Yet, explanatory power should be something of a concern for biosemioticians looking to plant flags around different heights. The paths cleared by backwoodsmen should hold up to scrutiny, and in order for biosemioticians to examine these paths, some of the features of semiotic theory should work as reminders of what the aim of semiotic theory is.

This presentation will explore one particular issue when it comes to building biosemiotic theories, namely, the idea that the semiotic comprises a universal and basal quality in a hierarchy of elements assumed to give rise to other, more complex things. The metatheoretical problem at its core will be defined as the unnecessary expansion of semiotic attributes in order to give them enough explanatory power to either provide semiotic theories of everything or give a semiotic basis to theories that do not, in principle, require it.

Keywords: metatheory, semiotic theories, scientific explanations

ANATOMY OF A PRIMORDIAL SYNECDOCHISM: MIMESIS, BODY PLASTICITY AND THE EVOLUTIONARY EMERGENCE OF LANGUAGE

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This paper approaches the object of the origin of language from a wide lens "holo-semiotic" perspective (following from Thomas Sebeok's global semiotics), locating it within a coevolutionary complex whereby: *biological impulse* (bio-/zoo-semiotic), operating through certain *physio-anatomical systems of constraint* (embodied, kinesio-semiotic), deployed against the *ecological forces* that ever-define an organism's peri-personal area (ecosemiotic) could give rise to *symbolical insight* (anthroposemiotic). It is argued that evolutionary semiotic processes hinge, crucially, on mimesis —as the primary (iconic) mode of information transmission (1)— in evidence across cultural and biological phenomena, in its social imitative sense and in its biological replicative and adaptive senses; a mimetic faculty (cognitive) will be explored as a requisite preadaptation underlying a capacity for symbolic reference in language (2). The primary intersectional focal point where these processes will be explored is the physiological and potentially coevolutionary interrelation between the brain (prefrontal cortex) and the extra-encephalic constituent parts of the greater corporeal whole (i.e. - the human/hominin body) with specific regard to those parts that have exhibited a higher articulative/communicative competence. To this end, a hypothetical model is developed wherein a mimetic exaptational process may occur on the back of a deep structural (or "deep plastic") analogue existing between the respective articulatory inventories of body (whole) and tongue (part) insofar as the gestural plasticity of the tongue (with co-auxiliary support from other speech anatomy) finds articulatory parallel with that of the body in its entirety.

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WALKER PERCY'S SEMIOTIC THEORY AND THE ISSUE OF NON-MATERIALITY

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In the first part of this presentation, I explore the symbol theory developed by Walker Percy. Percy was born in Birmingham Alabama in 1916; he died at the age of 73 in Louisiana in 1990. He attended the University of North Carolina at Chapel Hill and in 1941 he received a medical degree from Columbia University. He converted to Roman Catholicism in 1947. He was a writer, perhaps best known for his novel, *The Moviegoer*. He was also deeply interested in semiotics and language in general. In this work he was strongly influenced by Carl Sanders Peirce. His major publication in semiotics is *The Message in The Bottle.*

Percy became fascinated by the story of Helen Keller and her discovery that things had names. It was then that he pursued the understanding of the symbolic process of naming with a focus on the triadic relationship of symbol – object – interpreter. He conceived of the relation as a triangle with an interpreter at the apex. Until his death he struggled to define the interpreter. He argued that in naming, the symbol developed quasi-identity with the object, but in another mode of existence. He argued that the symbol-object relation was nonmaterial and different from the physical sign-object relation which he considered dyadic, linear, and representing cause-and-effect. What interests me most is Percy's contention that a symbolic triad is nonmaterial/nonphysical, and it is outside the domain of science. He argues that science can deal with dyads, but it cannot account for symbolic processes. Here he was especially critical of the ability of experimental science associated with behaviorism to explain the symbolic world. Percy argued that the symbolic triad was the source of mind, meaning, consciousness, language, knowledge, art, music, and religion.

The second part of the presentation, I will relate Percy's perspective to some of my work on symbolic processes and non-materiality (Schumann, 2018). I focus on the observation that the human brain is capable of creating nonphysical entities such as concepts, conceptualizations, constructions, ideas, idealizations, ideologies, categories, and superordinate categories. These entities are represented by highly abstract terms such as confusion, mediocrity, truth, democracy, law, language, perversity, absentials, zero, mind, symbol, relation, materiality.

These entities are degenerate in the sense they can be characterized by synonymy (the same or similar meaning expressed by many different terms). They also may be pluripotential in the sense they may be characterized by polysemy (one term may express many different meanings). Given the non-materiality of these entities and given that they are unobservable as concepts, but only as tokens, they are inherently ambiguous, fuzzy, indeterminate. I suggest, like Percy, that they may not amenable to ultimate resolution by science. Even if scientific techniques (experiments etc.) are used in the study of these symbolic entities, they still seem to resist definitive characterizations. Abstract symbolic entities belong to the arts, humanities, and the social sciences. Their study and exploration rely on and require the human abilities for interpretation, imputation, association, and assertion. No teleology or ultimate resolution should be expected, but the meanings and the issues such symbolic concepts carry don't go away. Thus, the epistemological question of whether, in its current construal, science is adequate for the study of nonmaterial symbolic concepts remains an important issue.

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NOTION OF AGENCY IN ENACTIVISM AND BIOSEMIOTICS

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Keywords: Biosemiotics, Agency, Autonomy, Autopoiesis, Enactivism.

The notion of agency has been developed almost independently in two interdisciplinary research areas of enactivism (E) and biosemiotics (BS). Both of them attempt to overcome the Cartesian dualism of body and mind and expand the notion of mind to animals and other organisms. Also, both of them include conflicting factions, which makes it important not only to defend theoretical principles within the same research area, but also look for similar ideas in a sister discipline. The strong point of E is in its constructivist stand towards cognition. According to E, there are no passive representations of reality; instead, agents actively construct and reproduce sensorimotor patterns in their interactions with the outside world. BS is still struggling on its path towards constructivism due to its incongruity with the objectivist philosophy of Peirce. However, Peirce's semiotics helps BS to avoid the pitfall of radicalism which often borders with solipsism. E attempts to develop a strongly monistic theory of agency on the basis of physics and logic, following the footsteps of Rosen, Maturana, and Varela. All agents are assumed to be autopoietic, which means that each component is renewed exactly through the activity of other components. As a result, agency and autonomy become reduced to autopoiesis, which is a physical process, and this idea is the main obstacle for merging autopoietic E with the semiosis of evolution and learning. BS offers a non-physical notion of agency by referring to goal-directedness and meaning-making in the interaction of agents with their environment. Goals and perceptions are signs because they point to something else, which may not yet exist or accessible but can be reached or constructed. Agents can redefine the boundary between self and non-self, and delegate some functions to subagents. Autonomy of agents is always partial because they are constructed by using other agents either for assistance or as resources. Multiple agents may coexist in the same body by tolerating each other's functions. According to BS, many agents are not autopoietic (ribosomes, mules, human neuro-somatic system), and thus, autopoiesis is not the essential feature of agency in general. I see the non-physical notion of agency as a future meeting point of BS and E.

FOCUS ON BIOSEMIOTIC FOUNDATIONS

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Like building foundations, research foundations are typically hidden, load-bearing and expensive to correct as we build atop them, story upon story. At present, biosemiotics teeters on two foundational assumptions: (1) that semiotics is physically reducible to physical switch-and-arrow toggling as in inanimate computers and (2) that semiotics is physically irreducible, consistent with the conventional understanding of sign relationships as responses about something for a living agent's benefit. This teetering foundation echoes the current equivocation in all research that spans the chasm between the physical and life/social sciences. It suggests a crypto-dualism to span the chasm as though non-material algorithmic idealizations (res cogitans) are instantiated in non-degenerative material mechanisms (res extensa) by means of variations on analytic geometry, the conventional approach taken for example, in cognitive science.

The plate that rests upon a true biosemiotics foundation was identified by Darwin as the "struggle for existence," to be interpreted as self-regenerative work to prevent degeneration, whereby any sign relationship could be of adaptive benefit for an organism. Darwin's theory assumed but didn't explain the foundation upon which this plate rested – the physical origin of the struggle for existence. Darwin concluded the Origins merely stating that life was "breathed into a few forms or into one." Since Darwin, researchers have alternated between assuming and assuming away the struggle for existence, often by means of ambiguous cover for example, "selfish genes" as though molecules or molecular patterns are struggling for their own existence.

Terrence Deacon's Emergent Constraint Theory is an attempt to build biosemiotics up from a firm foundation, an explanation for how the struggle for existence could emerge from physical causality. This presentation will provide an overview of the Emergent Constraint Theory approach to providing a firm foundation for biosemiotics with methodological implications and suggestions for how to expand the influence of biosemiotics across research domains.

Keywords:
Semiotic approaches in theoretical biology, The implications of biosemiotics to philosophy and humanities, Semiotic agents across scales and networks, Simplexity and agent power, Habits, codes and learning, Methodology of biosemiotics, Pre-evolution and evolution of semiosis, Endosemiotics, Teaching biosemiotics, Semiotic aspects of Anthropocene and bioethics

NATURAL ALGORITHMS, COMBINATORIAL POWER, AND GENERATION OF MEANING IN THE SEMIOTIC STRUCTURE OF THE GENETIC LANGUAGE

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The genetic system of biological organisms is characterized by the semiotic structure which corresponds to the general principles of linguistics established by Ferdinand de Saussure. The genetic information is contained in the form of text based on the molecular alphabet and a linear sequence presented as a combination of four nucleotides. Many terms describing this language called the DNA code were borrowed from linguistics. Information in DNA is written ultimately as the order of the nucleotide letters acting as signs. This semiotic system can be defined as the genetic language. We suggest to analyze the mechanisms for interpretation of genetic texts based on the universal model of operation of the programs in computers as initially suggested by Efim Liberman. Ontogenetic development is realized at the level of reading of genetic texts by the structure named by Liberman et al. [1] as a molecular computer of the cell (MCC) which includes DNA, RNA and the corresponding enzymes that work with molecular addresses searching for optimal configurations within the semiotic system of meanings [2]. The basic feature of the biological computation is the combinatorial search for addresses using the thermal Brownian motion and the complex formation of weak bonds without the cost of free energy. The implementation of genetic programs takes place not only in the course of individual development, characterized by the encoding of the sequences of reading proteins, but also in the execution of behavior of biological systems and their adaptation to changing environment. It takes place via forming the anticipatory model of external world which has the semiotic meaning by itself and which possesses a flexibility via the selection of the spectrum of meanings in the course of adaptation [3]. The description of external reality occurs in terms of the genetic language in all living beings, while at the higher level of evolution, the reality is universally described in the new semiotic system of the human language. In both cases, the description is implemented in the form of using models, which application allows predicting the future of the simulated reality and its management. The success of such control depends on the choice of model and the correct scale, which determines the energy and time spent on the measurement of external reality and the internal calculation of optimal mode of adaptation. This quantity, equal to the production of energy and time, is related to the fundamental constants of physics. We discuss the attempts to describe a semiotic system of the genetic language, for which we introduce a deliberately narrowed but instrumental definition of "text" and "meaning".

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THE COMPLEXITY, SPATIAL DISTRIBUTION AND HIERARCHY OF THE PROCESSES FOR THE GENETIC INFORMATION UNFOLDING IN AN EMBRYO

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In this communication, we consider the principles of molecular processes for the genetic information unfolding in a multicellular embryo. We consider regulation of gene activity in embryogenesis and focus on its informational aspects. Attempts to explore the information processes in embryogenesis have been made for a long time. But with each decade, substantially new results appear, demonstrating how much more complex these processes are than we have thought before. The current level of understanding of the processes indicates its immanent complexity and this should be reflected in semiotic studies. The gene is not only the “carrier of genetic information,” but it typically includes an extensive (scattered along the chromosome) set of regulatory elements involved in the control of gene activity. Regulation determines which genes, at what time and intensity will be active in each at type of embryonic cells. At the basic level, genes are turned on or off when transcription factor proteins specifically bind to their DNA targets (gene regulatory elements). These are direct regulations. In addition, other proteins that, in particular, can interact with transcription factors or act on chromatin organization, are involved in gene regulation. Noncoding RNA is also involved in regulatory processes. As a result of all regulatory signals, direct and indirect, the gene is activated at this time in a given cell and with certain intensity. The changing set of indirect regulatory inputs is naturally understood as regulatory context.

It is crucial that the processes of gene regulation unfold not only in time (according to the stages of the embryo development), but also in the space of the embryo. The spatial dimension is extremely important. Gene regulation occurs first in a single-cell zygote and then in a set of early embryo cells that are functionally and physically connected to each other. Further, the processes unfold in increasingly autonomous embryonic primordia (often defined as morphogenetic fields).

With an increase in the number of cells in the embryo and with further autonomization of an increasing number of individual morphogenetic fields, another level of control of gene activity appears. This is a cellular signaling: embryonic cells begin to exchange specific chemical "signals", which ultimately also leads to turning on or off genes in target cells. That is, regulatory connections become even more distributed in the embryo space. Accordingly, the context that determines the response of gene regulatory elements to regulatory macromolecules extends beyond a single cell.

In parallel with the multiplication of nuclei (and cells) and the formation of morphogenetic fields (primordia), epigenetic regulation mechanisms are unfolding. This is when nuclei, often neighboring (or even daughter) cells, became able to modify differently the molecular machinery of chromatin (chemical modifications, first of all). This gives another level in the unfolding of genetic information, qualitatively complicating the spatial dimension of the intercellular connections of gene regulation.

We believe that the growing spatial distribution of the gene regulatory processes, the growing contextual dependence and the growing multiplicity and hierarchy of the “languages” (codes) of instructions require further in-depth study from the semiotics point of view. In our opinion, this diversity of processes and mechanisms for the transmission of hereditary information is not adequately covered by the current phytosemiotics (the vegetative semiosis). This is especially important in the context that neuronal regulation, including the formation and further functioning of the central nervous system, is also largely based on the complex biomolecular processes outlined here.

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PROCESS AND SEMIOTIC APPROACHES TO INHERITANCE AND EVOLUTION: IN SEARCH OF AN INTEGRATED THEORY

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There are at list two main approaches to understanding the nature of inheritance in biological and social systems: semiotic and process approaches. The semiotic one focuses on "semiosis of evolution" and on sign systems' function to store and transmit heritable information. It also prescribes causal and regulative role to sign systems because of their ability "repeatedly and consistently regulates or guides the actions of organisms" in form of "multilevel" and "expanded semiotic networks" (A. Sharov). Process approach focuses more on dynamic of development (developmental systems) and on epigenesis of particular living systems. It emphasises that development unfolds and is not preformed and *processes* rather than systems of entities reproduce themselves (P. E. Griffiths, K. Stotz). These two perspectives on inheritance and evolution are usually interwoven and can be compared with the debate over the nature of light: is it a particle or a wave? It is argued that both semiotic and process approaches are effective for description and explanation of inheritance, especially non-genetic (extended) inheritance. However, in most studies of evolution, even in the framework of Extended Evolutionary Synthesis, we can see persistent 'bottom-up', gene-centered and organism-centered models of biological and social evolution. This paradigm in science could be complemented by 'top-down' and 'metasystem' models of evolution that embraces *superindividual* biological and social systems. Such approach should take into account non-genetic codes and transgenerational and intersubjective heritable 'traits' (ecological, behavioral, cognitive, cultural). An effective theoretical and methodological equipment for an integrated approach to understanding of inheritance and consolidation of process and semiotic approaches could be supplied by: theory of four inheritance systems (genetic, epigenetic, behavioral, and symbolic) of E. Jablonka and M. Lamb', "semiotic threshold zones" (K. Kull), concept of "universal sembiogenesis" (N. Gontier), studies of "metasystem transition" (V. Turchin, J. Maynard Smith, E. E Szathmáry) and developmental systems theory (P. E. Griffiths, K. Stotz).

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HOW RELATIONALITY CONNECTS THE INDIVIDUAL AND ECOLOGICAL LEVEL OF BIOLOGICAL STUDY

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Relationality – the ways in which organisms are involved in relations to other organisms – is a crucial aspect of ecology, and biology at large. From the vantage point of Biosemiotics, the logical starting point is to define *biosemiotic* relations as relations that involve methodical (regular or recurring) sign exchange. Organisms that are connected by such relations are biosemiosically linked. By mapping and describing the biosemiotic relations a specific organism engages in, and thus what it relates to as carrying meaning for it, we by and largely describe what being that organism amounts to. Biosemiotic relationality helps us understand ecological complexity because, in combination with organisms´ biosemiotic agency, it allows for complex, dynamic living systems. Biosemiotic relationality can furthermore help us understand how the individual and ecological level of biological study are interconnected. From the individual organism´s point of view, its particular form of relationality is an expression of its "operating space", to borrow an expression from Rockström et al. (2009). It is important for the complexity and integrity of ecosystems, and it is also significant for the integrity, and the living conditions, of the individual organism.

In our time of massive anthropogenic environmental change, as succinctly expressed by the term "Anthropocene" (Steffen et al. 2011), a major challenge is to work out how von Uexküll´s "subjective biology" can be applied in the context of global human ecology. From a relational point of view, we can observe that human beings take part in several co-dependent relations with animals, ranging from livestock to pets. We rely on their animal products or social company, and they rely on our good treatment and husbandry, and in some cases our social company. In the current scientific discourse, topics related to individual human and animal welfare are largely disconnected from topics related to environmental sustainability. Biosemiotic relationality can contribute to showing how these different topics are connected. Borrowing again from Rockström et al. (2009), we could set out to determine the "safe operating space" of organisms in terms of their biosemiotic relationality. This would amount to addressing questions such as: To what extent is organism X´s relationality flexible? When considering the significant relations organism X engages in, which ones of these are irreplaceable, and which ones are replaceable or amendable? Under current ecological circumstances, many biosemiotic relations are bended or broken by extreme breeding, automated machine-handling, homogenous social environments, industrial-style indoor environments (in animal husbandry), and depleted wildlife. What are the limits for such bending of significant biosemiotic relations, in terms of environmental sustainability and individual welfare?

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THE **FIRST AND THIRD PERSON PERSPECTIVES AND THE RELATION OF PERCEPTION AND SIGN-ACTION IN BIOSEMIOTICS**

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Biosemiotics studies cognition and communication of animals and other living systems or agents and its peculiar point of view is to take seriously the "1st person perspective" of the organism or system itself. Such an attitude is one uniting feature of the early classics of Copenhagen-Tartu school of biosemiotics, C.S. Peirce, Jakob von Uexküll, and Gregory Bateson. However, in practice and especially in molecular biological studies, the "1st person perspective" of the studied system and *our* 3rd person perspective to it become conflated. I will argue that it is inevitable that a kind of "objectified 1st person perspective" *de facto* actual and unavoidable in biosemiotics.
The mixture of the 1st and 3rd person perspectives is especially confusing when it comes to the supposed objects or referents of the studied biosemiotic signs (if such is relevant for the used idea of sign relation). Do we assume the identity of these objects as somehow determined by or independent of "the 1st person perspective" of the system? I will argue that biosemiotics should take the first choice, if its semiotic concepts are supposed to have theoretical role rather than be just heuristic or illustrative decorations. Especially Peircean object of sign should be determined as "collaterally observable" by the studied semiotic agent itself as Peirce himself required. The consequence of such restriction would be that the scope of application of Peirce's logical theory of signs is much more limited than e.g. Hoffmeyer and Stjernfelt (2016) apparently assume and some other kind of concept of sign must be derived for those phenomena that assumedly have semiotic character (e.g. Vehkavaara 2003, 2006, Alexander 2013, Sharov & Vehkavaara 2014). Another consequence is that perception is the requirement for (Peircean) sign-action contrary to what e.g. Stjernfelt (2014) claims. Despite of the close relationship of percepts and signs in Peirce's logical theory of cognition, percepts are not signs for Peirce (1903) – in Peirce's vocabulary, there is no such term as "the object of perception" or "perceptual object", and if there were, that would not be the equivalent of "the object of sign" but the *interpretant*.

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ANOTHER BIOSEMIOTICS? ANALYZING THE INTELLECTUAL HERITAGE OF BIOLOGIST LEV BERG

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Semiotics as a scientific discipline can refer not only to the science of studying signs, but also to a "holistic science", a kind of "methodological umbrella" uniting a number of disciplines (it was in this sense that semiotics was understood by the representatives of the Moscow-Tartu semiotic school par excellence). If biosemiotics is a science exploring the properties of signs and sign systems (sign processes) in living systems, by analogy one can assume that another possible (not alternative, but complementary) definition of biosemiotics would refer to such a "methodological umbrella" under which a most significant space would be allotted to biological models and research methods. Biosemiotics as understood by this second definition as a particular science does not exist today; in the history of ideas, its existence is contained to the USSR of the last century (even if the word *biosemiotics* was not used at that time). One of the key figures in this regard was Soviet biologist Lev Berg (1876-1950). Berg's anti-Darwinian model of evolution, advanced in the 1920s, immediately sparked a great deal of interest amongst the representatives of the Soviet humanities, in whose works it was particularly reflected in models of convergence, developed at the time in both linguistics (N.Marr and his school) and literary studies (O.Frejdenberg). (Based on the principle of epistemological neutrality proposed by French historian of science S.Auroux, we will set aside the question of the effectiveness and verifiability of these models, considering them primarily from the point of view of the history of sciences). One of the "proofs" of the "correctness" of scientific theories at that time was the possibility of transferring relevant models and methods from one discipline to another, and not only did representatives of the humanities use information gathered and developed through biology, but biologists used to appeal to the humanities as well. Among the topics considered interesting to the era's representatives of both the humanities and biology, one finds not only convergence models of evolution, but also the concept of the norm, the interdependence of forms and functions / senses, the correlation of external and internal factors of evolution, the notion of teleology, etc. When Stalin intervened in Soviet linguistics in 1950, thereby putting an end to the dominance of Marrist theories and provoking a significant change of academic paradigms, one of the very few scholars who dared to openly protest the dictator was Berg. In a letter written to Stalin, he wrote fearlessly that even the mistakes of Marr and his pupils do not detract from the importance of Marr's linguistic theory for other fields of knowledge.
After Stalin's criticism, similar holistic theories seemed to come to naught in the Soviet sciences for several decades. However, interest in holism didn't disappear completely at that time: it was partially revived in the Moscow-Tartu semiotic school; its researchers (Ju.Lotman, Vyach.Ivanov, V.Toporov, amongst others), as well as the organizers of the conferences on linguistics and biology in Estonia (K.Kull, A.Sharov), were much interested in the scientific heritage of adherents to the holistic approach in the first half of the twentieth century. If today biosemiotics does not refer to a holistic discipline in the sense in which it was interesting to Berg and his supporters in the past century, with the modern interest in interdisciplinarity the possibility that similar models will be back in the near future cannot be excluded. Therefore, by analogy with semiotics as an "integral" science a holistic science of biosemiotics can emerge – a biosemiotics also rooted in the intellectual past.

BIOSEMIOTICS AS A THEORETICAL DISCIPLINE

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A whole array of diverse disciplines related to gnoseology emerged circa the middle of 20th century. They included the philosophy of knowledge by Kuhn, Popper, and Polanyi; cognitive sciences; postnonclassical science (Styopin), cybernetics and informatics (Wiener), as more specific theories. Other examples are: the theory of non-equilibrium systems (Prigogine), the general systems theory (Ludwig von Bertralanffy), the biological autopoiesis theory (Maturana and Varela), the social theory (Weber, Parsons, Luhmann etc.) and psychoanalysis (Freud), which laid foundation to many psycho-therapeutic theories. Finally, it can be mentioned that even theoretical physics (Einstein, Bohr, Feynman etc.) was involved in gnoseological discussions. The hallmark of these disciplines is their emphasis on theory (as opposed to experimental sciences), and I call them 'theoretical sciences'.

Theoretical sciences are orientated toward object-processing recursion[1] as a subject of study, in contrast to the traditional method of objective science; a process creates substance and then we observe processes in this substance. Thus, the origin and existence of substance is described as a process. What is important is that description of this kind of recursive phenomena inevitably involves circular description of descriptions. In particular, a researcher is being observed and researched. German sociologist Niklas Luhmann called these theories 'universal' because they embrace the integrity of reality. Nothing can stay outside. External theory describing an object at some point becomes integrated with the object of study.

This recursive thinking became common in biology from the Darwinian evolutional theory. Based on this theory, which seems objective and independent from the researcher, organisms are assumed to adapt to objectively existing environment based on the law of natural selection. However, the theory cannot inherently avoid some form of Lamarckian evolution because selection requires variation (diversity) generated by organisms. Consequently, evolution is always directed somewhere. On one hand, evolution seems to be not directed, and on the other hand, organisms adapt and thus create directionality. Moreover, organisms create their own comfort environment, thus the emergence of atmosphere on Earth is not accidental. So what does an organism adapt to in the long term? Answers to this type of questions have been debated at the seminar on theoretical biology under the direction of Alexander Levich in the seventies at the biological faculty of Moscow State University, oriented on general theory of systems and on theory of sets. Now these discussions continue in biosemiotics and code-biology. The question is whether cybernetics can be applied to sign systems embedded in biological organisms. What is the process of semiosis if it is not a sign shaping recursion, which in cybernetic terms can be seen as signals integrated with information-processing algorithms? The goal of theoretical biology seems to be in deciphering of biological algorithms and constructing new ones, which is consistent with modern biology and applied branches of bioengineering and genetic engineering.

[1]By 'object processing recursion' I mean an object with a cyclical process of self production, which is being investigated.

ON THE GRAMMAR AND GRAMMATICAL CATEGORIES OF THE GENETIC CODE

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1. We address the possibilities of the description of the genetic code as a sign system: thus is - to identify its grammar and vocabulary. We suggest making a shift from usually used context-free grammars for formalized languages to context-sensitive rules and categories.
2. The main distinctions of our approach from the previously suggested grammars are:
   a) We make a differentiation between "language" and "speech," between a system of abstract syntagmatic and paradigmatic relations, and its actual manifestation. It can also be represented as a dichotomy of biochemical substance and semiotic form.
   b) Instead of linear context-free linguistic models, we suggest using some form of categorial grammar, where items are considered to be context-dependent variables and, simultaneously, context-forming operators. (as it was foreseen by R. Jakobson (Jakobson 1970: 439).
   c) As a minimal unit of the alphabet, we consider distinctive features of nuclei acids: 1) number of bonds – 2 vs 3; 2) type of base – purine vs pyrimidine.
   d) The strong distinction is drawn between units of the vocabulary (nuclei acids) and the categories of grammar: the empty positions within triplets (first, second, third), each of them is endowed by its codon-forming functions regardless of which nucleotide it is filled with.
3. The distinction between vocabulary (nucleotides) and categories of grammar (empty positions within triplet) allows to identify the formation rules for the significant units of the genetic code (doublets and triplets) and explicate their compositional semantics (correspondence rules between codons and amino acids). The principle of context sensitivity allows describing cases when biochemically same sequence of nucleotides, depending on their location, acquires a different meaning and performs a different function.

POSTERS

EMPOWERING/ENGENDERING CATEGORIES: POLITICS AND SPIRITUALITY IN CONSTRUCTING LIFE IN ARMONY, COMMUNITY, JUSTICE AND PEACE

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The ethical-political challenges and epistemic critiques of neoliberal capitalist regimes of power and knowledge still hegemonic not only in the Global North but also in the Global South, enacted by social movements, subaltern communities and critical intellectuals, engendered the emergence of rationalities of life, subjectivity, knowledge, spirituality, aethetics, economy, and govermement, which build upon non-western ways of living and understanding *the good life*, against the grain of the dominant order of power. In the context of the crisis of the failed promises of progress, development, democracy as defined and rehearsed by western forms of production and distribution of power, wealth, representation and recognition, alternate principles of living and relating such as: *Sumay Kawsay* (living in harmony in Kichwa) based on synergy with the life-cycles of Pacha Mama (mother earth and as such time-space) in the Andean world; *Ubuntu* (literally meaning-I am because we are, in Zulu language) connoting a similar sense of harmony with cosmic processes; *Ahimsa* (signifying action without violence in Sanskirt) hence in an analogous vein of signification. However, the semantic, semiotic, political and epistemic values of these three vernacular categories and the like, has become contested, in so far as the neoliberal establishment composed by states, transnational corporations, and multilateral institutions (such as the World Bank and the U.N.) are trying to colonize and westernize their meanings and practical implications. In this presentation we will contrast the semantic, semiotic, political and epistemic values of each of these three vernacular categories that signify rationalities of life—namely Sumay Kawsay, Ubuntu, and Ahimsa, comparing as they are use by states and the transnational neoliberal establishment, with the meanings and values they have in the theories and practices of subaltern communities, social movements, and critical intellectuals, thus engaging in an ecology of knowledges by means of a translocal intercultural dialogue to explore the possibilities of robust constructions of community, justice and peace, indeed of susbtantive cosmic harmonies that in the new common sense of emancipation are define as *the Good Life*, spelling-out an ethics of harmony, love and life, to effectively oppose the rationalities of war, competition, death and destruction that are so overwhelming in these times of global crisis of capitalist civilization. This inquiry will neccesarily look into the entanglement of the economic, political, cultural, epistemic, ethical, aesthetic, and spiritual dimensions of these *Rationalities of the Good Life* which have familiar resemblances among them, at the same time that they are historically specific.

ON THE NATURE OF THE LIVING STATE: The biophysical significance of biosemiotic molecules

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Among the primary aims of research in molecular biology must be to understand the biophysical causes of the living state and its diverse biofunctions. In the presence of nutrition the living state is observed to be both autonomous and spontaneous. There is wide agreement that information is a defining property of living systems. Walker and Davies put it as follows, "Although it is notoriously hard to identify precisely what makes life so distinctive and remarkable there is general agreement that its informational aspect is one key property, and perhaps the key property." (Walker and Davies 2013).

To date the role played by biosemiotic information in the life of the living state has not been satisfactorily explained. This paper addresses the biophysical function of information in living systems. The observed spontaneity of the living state implies that from a biophysical point of view all the biosemiotic processes are kinetically allowed and thermodynamically spontaneous. This paper recognizes the kinetic and thermodynamic significance of biosemiotic molecules within the context of the living state. The physical constraints of biosemiotic molecules constitute 'information' variously described as 'sign' and/or 'symbol'. The Brillouin negentropy principle of information recognizes that where entropy decreases information is made (Brillouin 1953). Therefore biosemiotic information has the inherent state property of thermodynamic negentropy. This fact has the specific biophysical significance of allowing the biosemiotic programming of specific biophysical ends where ends are interpreted as biofunctions.

In addition the cell has its own unique and specialized energy system located in mitochondria where nutrients are transformed into the energy currency of the cell, ATP etc, through the biosemiotically programmed Krebs Cycle and the electron transport chain. ATP contributes to the kinetic and thermodynamic spontaneity of the living state through biophysical interventions that are always specific.

The fact of autonomy indicates the presence of a programmed state within the boundary conditions of the cell membrane. The code script of DNA constitutes the primary 'biosemiotic programming language' of the cell. In this context the genome is a vast database of programs (and memory of species) that dynamically respond to complex systems of regulation and signalation.

Therefore the primary cause of the living state is the precisely regulated expression of biosemiotic information within the constraints of specified cellular contexts wherein the ATP energy currency of the cell functions only to bridge any thermodynamic deficits necessary to ensure the spontaneity of the biosemiotically prescribed biofunctions of the living state.

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BIOSEMIOTICS IN CONTEXT OF THE TWO CULTURES IDEA

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In the late fifties, C. P. Snow formulated an idea called *The Two Cultures Problem*, where the notion *cultures* represents principally different scholar universes. Back then, the author used his insight and shed light on boundaries that were arising and strengthening right before his eyes, as he was closely in touch with a diverse spectrum of scholars. Snow recognized that despite a comparable intelligence potential there is no dialogue, but rather mutual misunderstanding and disrespect. In his time, he could watch the culture of self-styled (literary) intellectuals usurping the significance and aura of the word "intellectual". On the other side, there was a culture of scientists isolated within their own world accessed through experiments and observations.
Because of its interdisciplinary characteristics, the field of biosemiotics forms a natural environment where diverse perspectives meet. Inspired by the idea of Snow, we further develop the discussion with regard to following concepts and ideas and by concerning more recent issues. For our purposes, we build our argumentation in line with commonly accepted shift and extension in original scientists and writers dichotomy to the more up-to-date dichotomy of sciences and humanities. On selected topics, we point to differences that arise from various working environments of scholars, their theoretical and practical background. Thus, we are able to uncover the problematic areas of mutual communication and to evaluate biosemiotic research activities as the potential outcomes of the idea of the so-called *Third Culture.*

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ANTHROPOSEMIOTICS, ZOOSEMIOTICS, PHYTOSEMIOTICS. RELATIONS BETWEEN SPECIES AND EVOLUTIONARY ISSUES IN SEBEOK'S THOUGHT THROUGH THE LENS OF SPECIESISM

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The Sebeokian distinction of semiosis in anthropo, zoo and phytosemiotics leads to the questions of speciecism and anthropocentrism.
Already from a summary analysis, we realize that the thought of the father of biosemiotics is far from being pervaded by speciecistic/anthropocentric visions, and that what appears as a rigid categorization of species is actually a practical distinction aimed at to highlight the species-specific realities, that see in human semiosis a unique peculiarity in the animal kingdom but not from a discontinuistic point of view.

THE SYLLOGISM IN THE MACHINE: BIOMETRIC ART, A SEMIOETHICAL CRITIQUE OF THE COMPUTATIONAL FACE

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Keywords: algorithmic bias, biometric art, data behaviorism, digital art, facial recognition, fuzzy logic, physiognomy, semioethics, syllogistic reasoning

An ever-increasing amount of digital art uses facial recognition both as its medium and as its message (both "how" the artwork is made and "what" it is about), in order to tactically critique how it encloses meaning ("the way it works") through codes as well as channels. In this golden age of Orwellian phantasms and panoptical overwatch, governmental and institutional oligarchies more and more employ facial recognition. They do so, in principle, to mediate the identities of undesirable (non-)citizens, not only by their sex or race, but on the basis of face and affect. Such data behaviorism produces a symbolic logic for organizing complexity and operationalizing predictability of facial signals, signs and symptoms through standardized models. In answer to this algorithmic condition, art about face can act to challenge the degrees of freedom, frames of relevance, and scales of resolution by which these semiotic agents represent facial behavior, either opening up or closing off how we understand and experience our living face.

Concrete practices and particular configurations, therefore, can help to make transparent the underlying poetics behind today's accelerating usage of techno-labor for abstracting data capital from outer facial behavior and inner emotion phenomena. With this paper, I put forward how the digital art that uses facial recognition is consistent enough so as to constitute an aesthetic and rhetorical genre. I call this genre Biometric Art. This theoretical research is based on my own practical experience, both in the field as a face coder and doing facial recognition development, as well as upon open-ended, semi-structured qualitative interviews. I present how Biometric Art, while highly variable in code and channel, has a well-prescribed and widely-practiced computational logic. Applying a framework from intellectual history, cultural studies and biosemiotics, I trace the contemporary genrefication and historicizing genealogies for what I call Biometric Art. I problematize how these aesthetic-rhetoric figurations are organizationally stabilized through socio-culturally agreed upon conventions, whereby societal values lead to algorithmic biases in both causal laws and universal classifications (both what facial behavior "can" make visible and what it "should"). Especially, I propose that most programming languages behind facial recognition are made operational by the fuzzy logic and syllogistic reasoning that has been principal to the study of the face since the pseudo-Aristotelian treatise on *Physiognomics* in the fourth century BCE, and that it is this convention that most characterizes Biometric Art. And, finally, I probe the extent to which Biometric Art, by critiquing how facial recognition represents face, serves again to guide social actions, and thereby comprises not only an intellectual activity but also an ethical act.

Devon Schiller (born in Boston and based in Vienna) is a media rhetorician and visual semiotician, with degrees in art history from the Kansas City Art Institute and digital art history from Danube University. His scholarship centers on studies of the face done at the intersection between art, science and technology. Devon is also certificate trained in the Facial Action Coding System (FACS) at the University of California Berkeley, as well as the Neuropsychological Gesture Coding System (NEUROGES) at the German Sport University Cologne, and has conducted grant-supported research on automated facial expression recognition at the Fraunhofer Institute for Integrated Circuits (IIS). For details about his publications, visit: https://independentscholar.academia.edu/DevonSchiller.