

Vegetative semiosis

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Abstract:

In “An introduction to phytosemiotics”, a masterwork of integration, Kalevi Kull defended Martin Krampen’s notion of phytosemiotics. In doing so, he developed the notion of vegetative semiosis. In a later work, he argued that vegetative semiosis is not a branch of semiotics, and so should not be identified with phytosemiotics. Rather, vegetative semiosis is a basic form of semiosis and the condition for animal semiosis, which in turn is the condition for cultural semiosis. All multi-celled organisms, including plants, animals and humans, are characterized by vegetative semiosis. While clearly influenced by Aristotle (and Thomas Aquinas), this characterization of vegetative semiosis makes it easier to relate biosemiotics to current science, to integrate current science into biosemiotics, and thereby to greatly expand the research potential of biosemiotics.

Keywords: phytosemiotics, vegetative semiosis, morphogenesis

In defending phytosemiotics, Kull critically examined Jakob von Uexküll's comments on plants, largely accepted by Krampen. Von Uexküll accorded meaning in the relationship of plants to their habitat, allowing choice of stimuli from the "dwelling-integument" [*Wohnhüller*], but denied that plants have specialized receptor organs, function circles or *Umwelten*. This claim led Krampen to conclude that plants only have "sensors" associated with feedback cycles, as understood in cybernetics. Kull rejected this, arguing that plants do have *Umwelten*, and in doing so, offered a detailed analysis of all that is implied in semiosis. To begin with, he pointed to what are now well known features of plants, that they move in a way that is coordinated with the life process of the individual, and have specialized cells or structures for recognizing external signals. This involves intercellular communication to effect coordination between individual cells, which have *Umwelten* of their own. It is in this context that he not only developed the notion of vegetative semiosis, but analysed the essential features of all semiosis.

A major part of vegetative semiosis is epigenesis, the differentiation of cells and the generation of biological form. It involves inter-organismal communicative structures, recognition, and symbiosis. The relatively primitive nature of such semiosis enabled Kull to identify what distinguishes semiosis from mere physical processes. Firstly, it is easy to see that such epigenesis cannot be the result of chance variations and selection resulting in a collection of cybernetic mechanisms that fortuitously work to support each other. As Kull noted, "in all plants [...] the permanence of the inter-cellular communication system is an obligatory requirement for the life cycle to run"¹. Semiosis associated with the generation of form serves various ends, as when the shape of the crowns of trees, consisting of leaves shaped to channel water, along with the growth of roots, serve to maximize the trees' access to water. The output (for instance, the growth of roots) is not determined by the input as in a cybernetic mechanism, but is a response to the expected input. There is anticipation, as characterized by Robert Rosen, implying purpose. The forms grown are interpretants. To understand this it is necessary to recognize the reality of biological needs, whether necessary, useful or just desirable, as an essential aspect of semiosis.

For vegetative growth to constitute a sign relation, the same factor responded to must be able to cause different effects in the same system, and different factors must be able to lead to the same effects, since only then can a factor stand for something else. This is why they have to be conceived of as signs. As such, there must also be memory so that a current response can be a response to a previous effect. During the formation of a need, the connection between the input and output becomes canalized, but not determined. There is also a potential to seek and realize alternative possibilities. In the process of development and evolution, needs generate

¹ Kull 2000: 337.

further needs, characterized as biological functions involving new sign relations. Kull suggested that all biological purposes originate in vegetative needs. Classification of components of sign systems has to be carried out through meronomy, not taxonomy, since such components are only identifiable as such in the context of systems of signs. "Information" in this case, is as Gregory Bateson characterized it, a difference that makes a difference, not a mere structural difference. Kull concluded: "Meaning is made by part-whole relations, and, therefore, semiotics is meronomy. There is no signification without functional differentiation"².

The notion of vegetative semiosis aligns semiotics with C.H. Waddington's work on epigenesis through canalized paths of development, enabling a synthesis of semiotics with such work. Waddington's work inspired the development of the catastrophe theory of René Thom and helped advance complexity theory, including Prigogine's work in thermodynamics, hierarchy theory, Robert Rosen's work on anticipatory systems, and edge of chaos theory. The maintenance of paths of development involving downward causation has been made intelligible through the study of oscillations and their interactions, to begin with, by Waddington's student, Brian Goodwin and more recently by Denis Noble. Complexity theory led to Stuart Kauffman's work on organisms' exploration and utilization of "adjacent possibles" to solve problems, revealing at the same time the limits of mathematical models in science. These developments of science make intelligible final causes (eliminating energy gradients while maintaining and developing the forms that facilitate this), and thereby needs and purposes in organisms, the irreducible reality of functions and selection between alternative possibilities, just as Kull characterized them.

Explaining vegetative semiosis through these advances in science in turn brings into focus the distinctive nature of signs and what they make possible. Signs are not simply effects of what they signify but imply memory, anticipation and the possibility of creativity in their interpretance. Once this is understood in vegetative semiosis it is a relatively simple matter to explain animal and cultural semiosis while acknowledging their unique features, while seeing animal and cultural semiosis as grounded in vegetative semiosis frees us from any tendency to view culture, and minds, as disembodied.

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² *Ibid.*: 343.

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Сэмiose végétative

Résumé:

Dans le travail «An introduction to phytosemiotics», un chef-d'œuvre de synthèse, Kalevi Kull défend la notion de phytosémiotique de Martin Krampen. Ce faisant, il développe la notion de sémiose végétative. Dans un travail ultérieur, il soutient la thèse que la sémiose végétative n'est pas une branche de la sémiotique et ne devrait donc pas être identifiée à la phytosémiotique. La sémiose végétative est plutôt une forme basique de la sémiose et la condition de la sémiose animale, qui à son tour est la condition de la sémiose culturelle. La sémiose végétative est propre à tous les organismes multicellulaires, y compris les plantes, les animaux et les humains. Clairement influencée par Aristote (et Thomas d'Aquin), cette caractéristique de la sémiose végétative permet de relier plus facilement la biosémiotique à la science actuelle, d'intégrer la science actuelle dans la biosémiotique et ainsi d'élargir considérablement le potentiel de recherche de la biosémiotique.

Mots-clés: phytosémiotique, sémiose végétative, morphogenèse

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Вегетативный семиозис

Аннотация:

В работе «An introduction to phytosemiotics» – настоящем шедевре научного синтеза – Калеви Куль выступает как сторонник концепта фитосемиотики Мартина Крампена. При этом он разрабатывает понятие вегетативного семиозиса. В более поздней работе он утверждает, что вегетативный семиозис не является областью семиотики и поэтому не должен отождествляться с фитосемиотикой. Скорее, вегетативный семиозис является основной формой семиозиса и условием животного семиозиса, который, в свою очередь, является условием культурного семиозиса. Вегетативный семиозис характерен для всех многоклеточных организмов, включая растения, животных и человека. Эта характеристика вегетативного семиозиса – где явно обнаруживается влияние Аристотеля (и Фомы Аквинского) – облегчает установление связи между биосемиотикой и современной наукой, интеграцию современной науки в биосемиотику, что значительно расширяет исследовательский потенциал биосемиотики.

Ключевые слова: фитосемиотика, вегетативный семиозис, морфогенез