

Lessons from Uexküll's antireductionism and reductionism: A pansemiotic view

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Introduction

Biosemiotics¹ is trying to extend semiotic concepts to biological phenomena and demarcate the biological sphere from the non-biological sphere using the applicability or inapplicability of semiotics as the demarcation criterion. We could call it antireductionist² in the first part of its enterprise as the world of life is interpreted in quasi-human terms; and we could call it reductionist in the second part of its enterprise as, for example, causality is excluded from the semiotic sphere.

This article promotes a view according to which applicability of semiotic concepts cannot serve as a demarcation criterion to partition reality plainly because the extensions of the concepts of *semiosis*, *cognition*, *subjectivity*, and — surprisingly — *causality*, coincide. Both positive and negative lessons will be taken from Jakob von Uexküll's ideas by both developing and criticizing them.

More about antireductionism and reductionism

The concepts of *antireductionism* and *reductionism* appear to presuppose that the world is divided into different levels, and for each level specific standards of explanation and/or a specific conceptual framework are needed. Then antireductionism transfers some standards of explanation or conceptual framework from higher to lower levels, whereas reductionism transfers them from lower to higher levels. So in the case of biosemiotics, as mentioned in the Introduction, semiosis and cognition (which ordinarily are taken to be specific to humans) are antireductively attributed to all organisms and even living cells (and why not to 'bio-molecules'). From the other side, biosemiotics attacks the reduction of life to physical causality and insists on a non-physical conceptual framework and non-causal explanation for the biological sphere. If it is

thought — as I do — that the ‘anthropomorphic’ conceptual framework could be extended even to the non-biological sphere then the reductionist character of biosemiotics becomes apparent: it obstinately denies the legitimate right of the non-biological sphere to be conceived in semiotic terms.

My own view is that the distinction between levels of reality does not require another conceptual framework for each level. Instead the same conceptual framework is to be retained for all levels but used in accordance with specific application standards (such as explanation standards) for each level. In this article standards will be delineated for six different levels allowing at each level different conceptual frameworks to be used compatibly. Thus this viewpoint is both antireductionist and reductionist as to the conceptual frameworks, and is neither antireductionist nor reductionist as to the application standards.

**Lesson one: The functional circle is a non-human semiosis;
The human semiosis is like a functional circle**

Let Uexküll himself describe the functional circle.³

The whole life of animals occurs in the form of actions by the animal as the subject upon its meaning-carrier as the object. As I have shown it is possible to reduce all actions by animals to a very simple schema which I called the functional circle.⁴ From the object's certain qualities, which I describe as perceptual cue carriers, stimuli depart which are received by the sensory organs (also called receptors) of the subject. In the receptors the stimuli are transformed into nervous excitations running towards the *perceptual organ*. As we know from ourselves, in the perceptual organ sensations start ringing which we in a very general way will call *perceptual signs*. The perceptual signs are projected outside by the subject and are transformed to either optic, or acoustic, or tactile qualities of the object according to the sensory circle they belong to. These qualities constitute the *perceptual cues* of the subject.

If the perceptual organ is differentiated enough to form associations of perceptual signs which could be called *perceptual schemata* then it also is capable of attributing a form corresponding to the perceptual schema to the object. The *operational organ* is influenced by the perceptual organ. In the operational organ certain *impulse series* are elicited which give rise to nervous excitation rhythms. When they meet the muscles of the executive organs of the effectors then the muscles are occasioned to fixed movement series, which manifest themselves as an accomplishment, by the animal. In a way not yet found out these processes as an accomplishment tone are stamped onto the perceptual cue, which only this way obtains its real meaning.

The accomplishment aimed at by the movement series always consists in that an *operational cue* is attributed to the object. The object's qualities concerned with the operational cue are described as *operational cue carriers*. Between the operational cue carriers and the perceptual cue carriers of the object its objective connecting structure is placed which is meaningful to the subject only insofar as it connects the qualities carrying operational cues with the qualities carrying perceptual cues. This connection provides that each action comes to its natural end, which always consists in that the *perceptual cue is extinguished by the operational cue*. This closes the functional circle.⁵ (Uexküll 1980: 371–372)⁶

Why is the functional circle a semiosis? Let us turn to the definition of *semiosis* in the programmatic article by Kull:

I define semiosis as a process of translation, which makes a copy of a text, suitable to replace the original text in some situations, but which is also so different from the original text that the original cannot be used (either spatially, or temporally, or due to the differences in text carrier or language) for the same functions ... I also state that the one carrying out the translation (the translator, which includes memory) is itself a text, i.e., the result of some translation process. (1998: 302)

As mentioned, the text is to be used for some functions. We can see that the translator text has translation as its function. In the same article we read: 'another fundamental feature of the asymmetric semiotic triad is that each of its three members is a participant in other semioses, albeit in a different function. For instance, ribosomes in cells are functioning as translators when making new proteins, but they are themselves products of another translation process which synthesizes ribosomes' (1998: 303). Here the word 'function' apparently refers to the position of a text in Kull's semiotic triad, which involves the original text, the product text, and the translator text. Further, Kull appears to assume that its carrier individuates a text. The carrier is a spatiotemporal entity (a process). The semiosis connects the carrier of the product text with the carrier of the original text. It is difficult to individuate the carriers. For instance, the translator text should be able to survive many semioses, and its carrier should be the same through all its semioses. I suggest concentrating on copies instead of carriers. The original text and the product text are two different copies. I also suggest conceiving a semiosis by a translator text as a copy of the translator text. Then a semiosis is the product text of the translation process in which the translator text translates itself into the semiosis (and the original text into the product text). Each copy of the translator text is a semiosis. The translator text is the subject of the semiosis. The 'life' (translation activity) of a translator text consists in its copying itself.⁷ According to my conception below, every text is the translator in some semiosis.

Let us scrutinize the functional circle from this viewpoint. First, we should notice that according to Uexküll there is no common world scene,⁸ and that the functional circle is to be described on the basis of our own Umwelt (i.e., our own world scene). We ‘observe the animal in our Umwelt, which is its environment, intending to learn to know its Umwelt’⁹ (Uexküll 1980: 322). According to Uexküll, the cue carriers of the animal are constituted by our cues. Our task is to reconstruct the animal’s cues constituting its Umwelt. ‘Though the existence of the Umwelten is due to the perceptual signs and schemata projected outside, they are quite real and material entities just like our own Umwelt having the same origin’¹⁰ (1980: 324). Further, according to Uexküll, the task of the biologist is to ‘discover relations between the material and the immaterial, between object and subject, between perceptual cue and perceptual sign’¹¹ (1980: 325). The words ‘subject’ and ‘object’ have a double use. First, the subject is the animal acting upon an object in its environment and our Umwelt. Second, the subject is the animal acting upon the object in its own Umwelt. The subjective (in the first sense) side of the functional circle (and the animal’s life, as it consists of functional circles) consists of signs including perceptual signs and impulses (described as impulse-to-operation-signs [*Wirkzeichen*] in T. von Uexküll 1986: 1133), and cues. In terms of the last two quotations, the signs are immaterial and subjective (in the second sense) for the animal and the cues constituting the animal’s Umwelt are material and objective (in the second sense) for the animal. We understand the animal’s Umwelt as a representation of objects (in the first sense).

What about our own Umwelt? Uexküll suggests that it is a special case of the Umwelt of an animal. My own view is that it is expedient to modify Uexküll’s conception of the human Umwelt in order to understand how the human observer understands an animal’s Umwelt. Therefore, let me build anew a suitable conception of the human Umwelt. First of all, the human lives in its own subjective world, her Umwelt, just like the animal lives in its own subjective world, its Umwelt. The animal’s inner (subjective) reality consists of signs that have complex relations to each other, and its outer (subjective) reality — its subjective world or Umwelt — is an interpretation of its inner reality. The signs have meaning: there is a plan-like functioning of perceptual forms and operational patterns. The human’s inner (subjective) reality is a complex world picture, a model of what and how there is, there was, and there will be, and her outer (subjective) reality — her subjective world or Umwelt — is an interpretation of her inner reality. The picture has meaning: what there is, is an expression by subjects. The animal’s Umwelt is meaningful or functionally relevant. The human’s Umwelt is meaningful or hermeneutically relevant.

The animal's meaning-carriers are functionally relevant objects included in functional circles. The human's meaning-carriers are hermeneutically relevant subjects included in hermeneutic circles. The animal's meaning-carriers are represented by forms and patterns in the animal's *Umwelt*. The human's meaning-carriers are represented by inhabitants of the human's *Umwelt*. She is able to understand both animal subjects and human subjects due to her *Umwelt* constructed by her understanding. The animal subject perceives forms and operates in patterns. The human subject understands subjects and expresses herself in order to be understood by subjects (animal subjects are understood as having partial understanding).

Uexküll's view is that the human observer has an animal *Umwelt* including the animal's environment. He describes this *Umwelt* as material, implying that the animal's inner reality (though including the animal's *Umwelt* material for the animal itself) is immaterial for the observer. Nevertheless, if we want to describe the *Umwelt* as material by definition, and if we want to admit the animal's inner reality as part of our *Umwelt*, we, paradoxically, must describe the animal's subjective reality as material. And according to my interpretation of the human *Umwelt*, we must describe the objective reality of the animal (involving its environment and body) as immaterial. Thus another task for us is implied: We are concerned with the relations between the subject and the object (in the first sense), between the material and the immaterial within our own subjective reality. In Uexküll's description of the functional circle, at first sight, the subject seems to be delimited from the object by the animal's body.¹² But the subject proper seems to be located in the perceptual organ and the operational organ. And even so, these organs seem to carry both subjective and objective processes. So the subject seems to be constituted by subjective signs and cues associated with the perceptual organ and the operational organ. Then the question arises: Why are the subject and the object harmonically related while they have no impact on each other? Uexküll's standard answer to this sort of question is that there is a plan involving the subject and object;¹³ they are melodies related to each other as point and counterpoint. According to my interpretation, in the functional circle we have a semiosis where the object (the objective process) is the original text, and the subject (the subjective process) is the product text. The functional circle is a copy of the translator text. The translator text copies itself according to a plan forming a functional circle of 'a new organism' including the original text and the product text as its parts. So the copy of the translator text is a whole consisting of two copies — the original text and the product text — as its parts. This is the characteristic way how the text

copies relate to each other in *functional semioses* (i.e., semioses that are functional circles).

In fact, we performed an act of understanding. We attributed what was happening in the functional circle to a subject — the animal subject (the translator text). This subject's life consists of all of the animal's functional circles occurring either in different times or synchronously and involving different objects, different 'new organisms'. Its life is a whole consisting of all its copies (functional circles) as its parts. This is the way we understand an Uexküllian living subject (an animal): It is a whole consisting of its subjective life and its objective life as its parts. Its objective life is included in our inner reality, and its subjective life is included in our Umwelt. To understand the animal means to project its objective life within our inner reality into its subjective life (including its Umwelt) outside of our inner reality. Of course, the result of the projection representing another subject is included in our Umwelt. The act of projection is an act of translation where the original text is the animal's objective life in our inner reality, and the product text is the representation in our Umwelt of the animal's subjective life outside our Umwelt. I, the subject of my subjective reality, am the translator text. Further on, to understand the 'pre-established harmony' of the different animal Umwelten we attribute it to the life of a 'world subject' consisting of the lives of all animals ordered according to a plan.¹⁴ However, this does not explain how human subjects can represent in their Umwelten other subjects outside of them.

Now let us return to the second sense of the words 'subject' and 'object': The subject is the animal acting upon the object in its own Umwelt. In the subject two translation processes are found. First, perceptual schemata (consisting of perceptual signs) and perceptual forms (consisting of perceptual cues) are translated into impulse series (consisting of impulses) and patterns consisting of operational cues. '*Perceptual signs and impulses are the carriers of the life melody of the animal*'¹⁵ (Uexküll 1980: 375). The plan of the translator is the melody it plays as its copy. The melody is played in two parts — the perceptual part and the operational part. Second, schemata are translated into forms (and impulse series into patterns). The subject's inner reality consisting of signs is translated into its outer reality consisting of cues. This is the process of 'constructing the Umwelt'. The animal does not construct its Umwelt from scratch but on the basis of its schemata. The process is similar to how the observer constructs a representation of a subject in the process of understanding.

I conceive *understanding* to be characteristic of human semiosis. If human semiosis is like functional semiosis characteristic of animals it has

to consist of circles of understanding or *hermeneutic circles*. Just as the animal's functioning in the world occurs in its own subjective reality, so the human's understanding of the world (including subjects) occurs in her own subjective reality. The human subject is a translator text, and its semioses are acts of understanding which are copies of the translator text. The human subject's life consists in that she understands herself and expresses herself to herself. Strictly speaking, she does not understand other subjects, though in her understanding herself, other subjects are represented (this justifies the use of the expression 'hermeneutic circle'). How is such representation possible? Analogously to how all animal subjects can be conceived as parts of a text (a symphony) involving all the world, all human subjects can be conceived as products of a text's understanding itself.

**Lesson two: We cannot escape our Umwelten;
Our Umwelten are not Uexküllian**

Now we can see that our task is understanding — ultimately understanding ourselves. We cannot understand the world in a way radically different from the way we understand ourselves and each other. And in order to understand what we do understand we also have to understand understanding. This is what semioticians cannot avoid doing.

What does it mean to understand the world? It seems to me that this means to find explanations to everything. And this 'everything' itself is a product of understanding. Thus we are trying to understand the products of our understanding. Is this chain of understanding endless? It is and it is not. There is no beginning of understanding where there would be nothing to be understood, and there is no end of understanding where everything would have been understood. However, understanding has its beginning and its end.

Let us see how we understand speech. Our understanding goes in several steps (which may be synchronous). Step one: We identify something as a copy of a linguistic text. Step two: We identify the phonologic or graphemic structure of the text. Step three: We identify the lexical and grammatical (including syntactic) form of the text. Step four: We identify the message of the text (what is asserted or asked or demanded). Step five: We understand the text as a poetic expression. Step six: We take the text mystically to embody a subject. Each step presupposes the preceding step (step one presupposes taking something as existing). Of course, we need not take all these steps in each case.

The way we understand the world is similar. Step one: Sensations are given to us. Step two: Sensations are ordered by relations. Step three: Familiar forms are recognized. Step four: Things and their properties are perceived, imagined, and conceived. Step five: The things are taken to be a symbolic expression (the steps in this step — understanding proper — are as described in the last paragraph). Step six: The world is taken to be a creation.

To each step a specific type of subject and of understanding and explanation corresponds. The sensations are the Type One subjects. They are the first component of our subjective reality. Each sensation is the understanding of it and explains itself. A plurality of sensations is a sensation again. The second component of our subjective reality is constituted by relations between sensations or between relations. The relations are the Type Two subjects; understanding them provides an explanation for sensations and their relations. The third component of our subjective reality simulates the Uexküllian Umwelt. Here Type Three subjects (plan subjects), if understood, provide explanation for relations and plans. The fourth component of our subjective reality is constituted by Type Four subjects — things with their properties they change in their adaptation processes, advancing new models. Understanding them provides an explanation for plans and models. The fifth component of our subjective reality (the human Umwelt, as I understand it) is constituted by expressions. Understanding the (Type Five) subjects of these expressions provides an explanation to models and expressions. The sixth component of our subjective reality is a product of constructing of some Type Six subject — some creator of subjects and what is beyond the subjects. Understanding the creator is limited to taking everything as created by the creator. The way this subject ‘perceives’ and ‘operates’ is not understood. Understanding this subject provides an explanation to subjects and what is beyond the subjects.

So the human understanding understands all types of subjects. We understand the subjects of Type One to Four to have partially the way of understanding we have, and the Type Six subjects to have a more complete understanding than we have. My suggestion is to generalize the Uexküllian concept of Umwelt by stipulating that the Umwelt of a subject of a given type includes the part of its inner reality, representing the subjects involved in the semiosis of this type. For instance, the Umwelt of a Type Two subject contains relation members, and the Umwelt of a Type Four subject contains properties.

Let me propose a formula for the simple links between the conceptual frameworks of semiosis, subjectivity, cognition, and causality. *The translator text is the subject and cause¹⁶ of the semiosis, and it cognizes*

the original text. A semiosis is explained by its cause. A list of the first three types of subjectivity (and semiosis, cognition, and causality) follows.

Type *One: Infrasubject*. The semiosis *is* the translator. The original and the product *are* the translator. The semiosis *is* its own cause. Cognition is possible since the subject *is* the object.

Type *Two: Relational subject*. The semiosis is a *relation member* of the translator. The original and the product are *relation members* of the semiosis. The cause of the semiosis is a *relation* involving the original and the product (and itself and the semiosis). Cognition is possible since the subject is *related* to the object.

Comment. According to the physical world picture, according to a strong causality events are determined by preceding events. This sort of causality is thought to be non-semiotic. It is, however, generally ignored that if the event A causes the event B then this causation is mediated by the relational event C consisting in that A causes B. The event C is the subject causing that A causes B. So causation is a triadic relation. The subject of causation translates one text into another as if according to an algorithm of translating a state of the world into the next state of the world. Analogously, any case of algorithmic translation is explained by a relational subject.

Type *Three: Autonomous or functional subject*. The semiosis is a *part* of the translator. The original and the product are *parts* of the semiosis. The cause of the semiosis is a *whole* having the original and the product (and the semiosis) as its *parts*. Cognition is possible since the subject and the object are parts of a *whole* according to a *plan*.

Comment. 'If we describe the unlocatable relational center of a thing as its *sense* then we may say: The plan contributes to the sense's accomplishment by ordering all material means'¹⁷ (Uexküll 1980: 378).

We understand the world according to the ontology of subjects determining the character of our Umwelt. Therefore I contend that Uexküll is mistaken when trying to reduce all subjectivity to Type Three. This reduction also is a reason why Uexküll cannot accept Darwinian arguments — 'speculation with ancestors'¹⁸ (Uexküll 1980: 384); they presuppose some Type Four subject.

Conclusion

In my view it turns out that the biological sphere and the non-biological sphere, similar to the alleged semiotic sphere and the alleged non-semiotic sphere, form a continuum where both life and semiosis are involved from the very beginning. This is due to the circumstance that both biological

and semiotic concepts are a general means and a product of human understanding in the human Umwelt.

In my opinion biosemiotics could be the first step in a general semiotic understanding of the world, which takes into consideration that everything we understand about the world, is included in our Umwelt and determined by its structure. This synthesis would bridge the gaps between physics, biology, and humanities.¹⁹

Notes

1. The classic of contemporary biosemiotics is Hoffmeyer (1996).
2. I learnt the word 'antireductionism' from Chebanov (1988: 160). According to Chebanov, antireductionism as a variety of reductionism is reduction of 'simple' matter to 'complex matter', whereas reductionism proper is 'reduction of complex matter to simple'.
3. Uexküll describes the functional circle (Funktionskreis) many times in different versions.
4. See Uexküll's figure of 'functional cycle' at the beginning of this issue.
5. 'Das ganze Leben der Tiere spielt sich in Form von Handlungen des Tieres als Subjekt mit seinem Bedeutungsträger als Objekt ab. Es ist, wie ich gezeigt habe, möglich, alle Handlungen der Tiere auf ein ganz einfaches Schema zurückzuführen, das ich den Funktionskreis genannt habe (Abb.1). Von bestimmten Eigenschaften des Objektes, die ich als Merkmalträger bezeichne, gehen Reize aus, die von den Sinnesorganen (auch Rezeptoren genannt) des Subjektes aufgenommen werden. In den Rezeptoren werden die Reize in Nervenerrregungen verwandelt, die dem *Merkorgan* zueilen. Im Merkorgan klingen, wie wir das von uns selbst wissen, Sinnesempfindungen an, die wir ganz allgemein *Merkzeichen* nennen wollen. Die Merkzeichen werden vom Subjekt hinausverlegt und verwandeln sich, je nachdem, welchem Sinneskreis sie angehören, bald in optische, bald in akustische oder taktile Eigenschaften des Objekts. Diese Eigenschaften bilden die *Merkmale* des Subjektes.

Falls das Merkorgan genügend differenziert ist, um Verbände von Merkzeichen auszubilden, die man *Merkschemata* nennen kann, ist es auch befähigt, dem Objekt eine dem Merkschema entsprechende Form zu verleihen. Vom Merkorgan wird das *Wirkorgan* beeinflusst. In diesem werden bestimmte *Impulsfolgen* ausgelöst, die sich in nervösen Erregungsrhythmen auswirken. Wenn diese die Muskeln der ausführenden Organe der Effektoren treffen, werden diese zu ganz bestimmten Bewegungsfolgen veranlaßt, die sich als Leistung des Tieres äußern. In noch nicht aufgeklärter Weise werden diese Vorgänge dem Merkmal als Leistungston aufgeprägt, das dadurch erst seine wahre Bedeutung erhält.

Die von den Bewegungsfolgen erzielte Leistung besteht immer darin, daß dem Objekt ein *Wirkmal* erteilt wird. Die vom Wirkmal betroffenen Eigenschaften des Objekts werden als *Wirkmalträger* bezeichnet. Zwischen Wirkmalträgern und Merkmalträgern des Objektes schiebt sich sein *Gegengefüge* ein, das für das Subjekt nur insofern von Bedeutung ist, als es die wirkmaltragenden Eigenschaften mit den merkmaltragenden verbindet. Durch diese Verbindung ist dafür gesorgt, daß jede Handlung zu ihrem natürlichen Abschluß kommt, der immer darin besteht, daß das *Merkmal vom Wirkmal ausgelöscht wird*. Dadurch ist der Funktionskreis geschlossen'.

6. I borrow the translations of Uexküll's terms from T. von Uexküll (1986). In that article a semiotic interpretation of the functional circle is given that is somewhat different from mine.
7. Consider Kull's example with protein synthesis (Kull 1998). In protein synthesis, genetic information is translated from mRNA to the newly synthesised protein molecule. Ribosomes (included in polyribosomes), tRNA, and enzymes participate in the process. Therefore, it is not quite correct to identify the ribosome as the carrier of the translator text in protein synthesis. The correct identification is very difficult. However, we can say that the translator text is the subject of this translation, and the translation process is a copy of it.
8. 'Instead of many special world scenes, in which the life of many individual humans occurs, the mechanicians admit only one world scene common to everybody'. — 'Statt der vielen Spezialweltbühnen, in denen sich das Leben der einzelnen Menschen abspielt, erkennen die Mechanisten nur eine, allen gemeinsame, Weltbühne an' (Uexküll 1980: 306).
9. 'wir ein Tier in unserer Umwelt beobachten, die seine Umgebung ist, mit der Absicht, seine Umwelt kennenzulernen'.
10. 'Die Umwelten sind, obgleich sie ihre Existenz hinausverlegten Merkzeichen und Schematen verdanken, durchaus reale und materielle Größen — genauso wie es unsere eigene auf gleiche Weise entstandene Umwelt ist'.
11. 'Beziehungen zwischen dem Materiellen und dem Immateriellen, zwischen Objekt und Subjekt, zwischen Merkmal und Merkzeichen zu entdecken'.
12. This is how the words 'subject' and 'object' are used in Uexküll's text. In what follows I extend the object to the animal's body. The reason is that the object's qualities, in fact, are internal qualities of the complex involving the animal's body and the object in Uexküll's sense.
13. The object may or may not be an organism. 'Between living beings there exists a plan-likeness that manifests itself everywhere and can go so far that when two organisms meet then before our eyes a new organism including the two partners and having an integral anatomy and physiology seems to arise'. — 'Es existiert zwischen den Lebewesen eine überall zutage tretende Planmäßigkeit, die so weit gehen kann, daß bei Zusammentreffen zweier Organismen vor unseren Augen ein neuer, beide Partner umfassender Organismus zu entstehen scheint, der eine einheitliche Anatomie und Physiologie besitzt' (Uexküll 1980: 339). 'For there is no even small difference in the plan-like involvement by the functional circles between organic and anorganic objects'. — 'Es besteht nämlich nicht der geringste Unterschied in der planmäßigen Erfassung durch die Funktionskreise zwischen den organischen und den anorganischen Objekten' (Uexküll 1980: 339–340).
14. 'Like the living cells constitute the elementary building-stones of all living beings which composed according to certain construction plans give rise to the subject capable of constructing an Umwelt, the Umwelten constitute the building-stones of the next higher order which in accordance with suprasubjective construction plans build the edifice of living nature'. — 'Wie die Zellen die elementaren Bausteine aller Lebewesen bilden, die nach bestimmten Bauplänen zusammengefaßt das Subjekt hervorbringen, das die Fähigkeit in sich trägt, eine Umwelt zu erbauen, so bilden die Umwelten die nächst höheren Bausteine, die, übersubjektiven Bauplänen gehorchend, das Gebäude der lebenden Natur errichten' (Uexküll 1980: 341). Describing the construction plans of living nature as 'suprasubjective' he means that they are supraindividual, associated with no individual organism. Uexküll seems to avoid attributing them to a subject since the 'creator has lost his credit' ('der Schöpfer in Mißkredit kam') (Uexküll 1980: 378).

15. 'Merkzeichen und Impulse sind die Träger der Lebensmelodie des Tieres'.
16. According to the contemporary use which has it that a preceding event in a causal chain is a cause of a succeeding event, it would be more natural to describe the original text as the cause of the product text. However, I prefer a more Aristotelian concept of causality.
17. 'Wenn wir den räumlich nicht faßbaren Beziehungsmittelpunkt eines Gegenstandes als seinen *Sinn* bezeichnen, so dürfen wir sagen: Der Plan verhilft durch Ordnung aller materiellen Mittel dem Sinn zur Leistung'.
18. 'Ahnenspekulation'.
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