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Simple Animals and Complex Biology

The double von Uexküll inspiration in Cassirer's philosophy

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It is a well-known fact that Ernst Cassirer was inspired by his colleague, the biologist Jakob von Uexküll at the university of Hamburg: references to von Uexküll may be found scattered around Cassirer's mature work, beginning from around 1928 and until his death in 1945.ⁱ But what did this inspiration amount to? The point I want to make in this paper is that this inspiration was double – affecting both Cassirer's philosophical anthropology and Cassirer's epistemology of biology, but in two rather different ways.

The relevance aim of this paper is also double – partly, it intends to shed light on a corner of the history of the development of German thought of the interwar period – and partly, it may have an actual interest because both Cassirer and Uexküll enjoy, for the time being and each in their way, a renaissance. More specifically, the nascent discipline of biosemiotics studying the use of signs in biology, being inspired especially by von Uexküll but also to some extent by Cassirer, might profit from a clarification of the interrelations between their doctrines.

It should immediately be said that the evident course of influence between the two seems to be primarily one-way, from the older von Uexküll to the younger Cassirer – even if an influence the other way around can of course not be precluded.ⁱⁱ Both of them were professors at the young university of Hamburg during overlapping periods. The university was founded only in 1919 by the first democratically elected city council in Hamburg (with a social democrat majority) and with an emphasis on interdisciplinarity, made possible by cooperations with, e.g., Aby Warburg's famous *Kulturwissenschaftlicher Bibliothek* and A.M.Bartholdy's *Institut für Auswärtige Politik*. The university of Hamburg quickly rose to international fame during its short flowering period in the Weimar years until the Nazi takeover in 1933. Cassirer was a philosophy professor in exactly that period, from 1919-1933, serving as rector in 1929-30 (being the first Jew in German university history to occupy such a position), and the older Uexküll enjoyed a late recognition as a professor from 1925-40, from 1926 presiding his own innovative *Institut für Umweltforschung*. The parting of their ways is obvious: as a Jew, Cassirer fled Germany already in the spring of 1933 briefly after the *Machtergreifung* to follow an exile career taking him to England, Sweden, and the USA, while Uexküll's ambiguous or complicated relation to Nazism is less well known and probably not even sufficiently researched to this day. These political sides of their careers may be indicated by the comparison of their doctrines in political science: Cassirer's posthumous *The Myth of the State* (1946) is an unraveling of the philosophical origins of Nazism and provides an analysis of the resurrection of myth as a decisive force in mid-20 Century politics, while von Uexküll's *Staatsbiologie* (1933, an extended 2nd version of the 1921 original) is a political

science sketch built on the metaphor of the state as an organism and in some respects amounts to nothing but a fascist theory of state.

Philosophically speaking, both of the two are Kantians, even in rather different ways. Cassirer, of course, was the so to speak "professional" Kantian, biographer of Kant, Kant publisher and erecting the whole of his own philosophy on a sophisticated further development of the Marburger Neo-Kantianism of Hermann Cohen and Paul Natorp. Uexküll, on the other hand, was rather a sort of home-made Kantian, less well-versed in the body of Kant's writings, but with an original Kant interpretation which is both fertile and problematic. We might schematically say that while Cassirer is an epistemologizing Neo-Kantian with strong objectivist tendencies, Uexküll is a naturalizing Kantian with strong subjectivist leanings – a sort of interesting chiasm to be explained in further detail

Uexküll explicitly attempted to generalize Kant's philosophy from its basis in the faculties of the human mind in two related directions: by extrapolation 1) towards the body, taking the bodily *Bauplan* and its anatomy and physiology to play an important role in the shaping of the mind inhabiting that body, thus making him a forerunner of the *embodiment* trends in actual philosophy; and by extrapolation 2) towards other kinds of living beings, taking each animal species to possess a specifically formed environment, an *Umwelt*, determined by its specific *Bauplan* and the possibility it yields for classes of perceptions and actions. Seen from his point of view, an obvious meeting point with Cassirer might be the possibility of constructing a complexity ladder of *Umwelten* in different species (just like Cassirer contemplates a complexity ladder in the unfolding of symbolic forms during the cultural development). As an anti-Darwinist, Uexküll vacillated, however, with respect to the feasibility of constructing such a ladder – his romantic vitalist tendency rather predisposed him to see each animal's *Umwelt* as a monadic phenomenon *sui generis*, hard to compare with other *Umwelten*.

Cassirer also worked to generalize Kant's doctrine, but in quite another direction: taking his point of departure in the Neo-Kantian core discipline of epistemology, of theory of science, he maintained that Kant's idea of the constitutive role of mind should be extrapolated to cover all other fields of human intellectual activity, language, myth, science, art, technology, as is evident in Cassirer's famous general notion of "symbolic forms". These different cultural devices should be grasped as different means of world constructing, parallel to that of science. His *Aufklärung* contention that science constituted the highest and most explicit of such devices made him immune, however, to relativism, and in much of his work objectivism plays a strong role, leading him to the idea that philosophy must constantly survey all special sciences, from physics to history of art, in order to track the crucial conceptual innovations in the ongoing objectification process of human thought. Cassirer himself struggled to achieve such an overview over the special sciences of his day, with remarkable success, and it is probably not too much to say that he, as a polyhistor, was second to very few minds in his period. A meeting point with von Uexküll is that the simplest human symbolic forms, according to Cassirer, are the always emotional expressions (*Ausdrücke*) which are shared with higher animals - only in turn systematized by man in myth,. Only the next step in cultural development, representation (*Darstellung*), creates independent objects by means of the subject-predicate distinction inherent in language, and only the final step, pure meaning (*reine Bedeutung*) takes the decisive anti-metaphysical step beyond language by dissolving the metaphysical distinction between subject and predicate in order to leave behind only functional relations between entities.

Cassirer's references to Uexküll are to be found especially in two different loci, one discussing philosophical anthropology, using Uexküll's biology as a contrast, the other discussing the epistemology of biology.

von Uexküll in Cassirer's philosophical anthropology

The former von Uexküll influence has its first and major appearance in the outlines of a fourth volume of *Philosophie der symbolischen Formen*, originally written around 1928 and published only recently in first volume of Cassirer *Nachlass* (Cassirer 1995). The existing texts from that project fall in two categories. One is a large, completed essay on the metaphysics of symbolic forms, originally meant to figure as a closing essay in vol. 3 – the second is a bundle of notes using the conceptual apparatus outlined in the first three volumes of the *Philosophie der symbolischen Formen* (1923-29) in a piece of contemporary philosophical criticism. The former essay already opens this discussion with a sharp, polemical opposition between *Geist* and *Leben* as a preface to the outline of a philosophical anthropology set out to bridge this opposition. In the latter notes, Cassirer's overall idea was to go into further detail with a criticism of the then current and politically influential fads of vitalism each in their way celebrating *Leben* and attacking *Geist* (Bergson, Scheler, Klages, Heidegger, et. al), based on the contrast to his own brand of philosophical anthropology and his doctrine of symbolic forms.ⁱⁱⁱ Here, the references to Uexküll thus function to provide a biological contrast to his own basic understanding of man – and, in turn, to function as an argument against the anti-Enlightenment vitalists who tend to make mere animal being a sort of utopian state for man to pursue. Man is thus, by contrast, the *animal symbolicum*. The same use of Uexküll as the biologist providing decisive arguments for the contrast between man and animal recurs in Cassirer's attempt at a systematic philosophy of method in his *Ziele und Wege der Wirklichkeitserkenntnis* (written around 1940, only recently published in Cassirer 1999), as well as in his American recapitulation of the doctrine of symbolic forms under the title *An Essay on Man*, written in his Yale exile to be published in 1944.

Let us investigate Cassirer's argument in the planned parts of a fourth volume of *Philosophie der symbolischen Formen*. As a Kantian, Cassirer turns against the monist idea taking meanings to develop continuously from natural beings (38). A central human artifact like tools presuppose the existence of possible objects (detached, in turn, from their correlative subjects) – and the *Umwelt* of man hence can not be constructed on the basis of the *Bauplan* of human anatomy, unlike the case in animals whose *Umwelten* are exactly so defined (41)^{iv}: "Das Werkzeug kann erst dort entstehen, wo der Geist fähig geworden ist, ein "mögliches" Objekt zu ergreifen und zu konzipieren, statt sich direkt an ein wirkliches herzugeben und an dasselbe zu verlieren." (40). While the animal is locked in its direct perception-action chains to certain aspects of reality, aspects functioning as "signals" only, never as objects (42), man is able to step back and contemplate – and indeed constitute – worldly objects at a creative distance. Man is so to speak driven out of the paradise of *Umwelt* with its close-knit perception-action circuits and he is thus condemned to build his own *Umwelt* (43), which he may do because he is "der Form fähig", he has a competence for form (44). Thus, there is a sharp contrast, no continuity, between *Geist* and *Natur* – quite on the contrary, the *Geist* must *use* nature as a contrast in order to obtain

understanding of itself (as against the irrationalisms of Bergson and Driesch recommending different ways of circumventing or even abolishing mind in order to reach back into a natural state) – while the world of the animal remains pre-mythical, pre-linguistic, and pre-theoretical. Only through an "Abbau" of the Symbolic Forms (52) used in reality construction, we may hope to reach the "echte and ursprüngliche Metall der Wirklichkeit" – the genuine and original metal of reality (49).^v

Thus, unlike man, animals do not have objects. Cassirer quotes an example from the biologist Hans Volkelt concerning a spider catching a fly, able to recognize its prey only when it lies struggling and shaking, caught in the net, and not at all able to recognize it when presented to it as a freshly killed but quiet specimen (63). The fly as an object in itself does not exist for the spider. Thus animals, by contrast, only have "Reizketten" – chains of emotional stimuli (62) – and hence they may never entertain any correspondence between pure objects and a pure ego as required in Kant (62). Animals thus live in the present now only (just like Cassirer's despised *Lebensphilosophen* required as a utopian perspective for man to pursue), and this implies that the animal *Umwelt* forms an impenetrable shell around the animal, quite unlike the plastic and malleable human *Umwelt*, subject to ongoing further elaboration, investigation, and construction (69).

In these lines of argument, Cassirer takes over Uexküll's preference for using primitive animals as prototypes for animals as such – obviously because his argumentative interest is *contrastive* and dualist. Even if animals and man alike do in fact have *Ausdrücke*, unlike human beings animals have no possibility for synthesizing them into a mythical world view. Thus, while man from there undertakes the whole span of cultural development of symbolical forms, no analogous biological evolution of such forms is conceived. Man erects his own counterworld (*Gegenwelt*) by turning from mere *an-sich-Sein* to *für-sich-Sein* (59), from states to objects, meanings, and states-of-affairs (60) – gradually *das Tun* of man becomes more and more satiated with mental forms (*geistigen Formen*). Man is thus estranged or alienated from immediate being – but at the same time this alienation is the price worth paying for the enlightenment and emancipation process unfolding in culture – and for this reason the dreams of return to immediacy of the vitalists are not only impossible but decidedly reactionary. Funny enough, from Uexküll's far right-wing position it is equally tempting to thus emphasize the difference between immediate animal being and alienated man – but with a completely opposite aim: to highlight the tragedy of man being estranged from his natural basis by the ever-growing thicket of intermediary constructions of culture and technology, so as to form a pessimist, conservative version mirroring Cassirer's enlightened optimism. While Uexküll sees the openness and indefiniteness of human culture as a dark destiny taking man still further away from his paradisiac embeddedness in nature, Cassirer celebrates it as the emancipation of man from finite, brute animal being into the infinity of ideal forms. Even if the two of them thus hold completely opposite versions of the animal-man relation, they share the same underlying structure: both of them are engaged in emphasizing the difference and thus prefer very simple animals as prototypes for animals as such.^{vi} One of von Uexküll's favourite examples is that of the tick, whose *Umwelt* consists of the perception signs of light (as a sign of the upward direction in which to crawl), bucolic acid (as a sign of mammal sweat), heat (as a sign of the thinness of the skin of its host) and the action signs of creeping to a high position on a grass straw or branch, dropping, possibly to hit upon a passing mammal, crawling to the thinnest skin location, biting and sucking blood to become able to procreate by parthenogenesis. In such an *Umwelt*, perception and action signs are extremely

closely linked with a minimum degree of interpretational variability. The generalization of this example permits von Uexküll to maintain his claim that all animal *Umwelten*, even if more complicated, basically possess the same character of tightness and closure – and it permits, in turn, Cassirer to inherit the same sharp distinction between animal closure and human openness.

It is interesting, however, that here, in the very beginning of his von Uexküll influence, Cassirer, as honest as he is, does in fact admit the existence of a specific problem with the abilities of higher animals: "Und die Gesamtheit dieser Leistungen lässt sich keineswegs einfach am "Bauplan" des Menschen, etwa am Bauplan des Gehirns und des Nervensystems, ablesen. Uexküll hat seine Forschungen vor allem im Gebiet der niederen Tiere durchgeführt – und aus den Resultaten, die er hier gewonnen hat, ist jenes allgemeine Schema abgeleitet, durch welches er den "Funktionskreis" der Lebewesen bezeichnet." (41) So Cassirer perfectly realizes the danger in generalizing too far on the basis of very simple animals – because their close-knit function circuit tends to dissolve in higher animals: "Eben diese Geschlossenheit des "Funktionskreises", dieses Ineinander von "Bemerken" und "Bewirken", scheint sich indess um so mehr zu lockern, je mehr wir uns der Welt des Menschen nähern, - bis zuletzt in dieser Welt selbst, das Band, das überall sonst die Einheit des Organismus ausmacht, geradezu gesprengt zu werden scheint." (42) This is the only place Cassirer approaches the issue of the evolution of the specific human openness via intermediate degrees of openness in higher animals, giving rise to a striking observation like: "Wenn man daher von höheren Tiere sagen kann, das sie die Augen benutzt, so müsste man von der Pilgermuschel vielmehr sagen, daß die Augen das Tier benutzen." (61) – the lack of objects correlates with the lack of subject in simple animals, while both tend to emerge in higher animals: the constitution of an I and an object are interdependent, and object consciousness and self-consciousness necessarily appear together (64). What characterizes higher animals is that, in them, sensory and motor systems are no longer completely independent, so that the sensory system becomes able to know about the actions of the motor system, forming a feedback facilitating the "... eigentümlich-reflexive Verhältnis [...], gemäß welchem jedes höhere Lebewesen Leib "ist" und zugleich einen Leib, als den seinigen, "hat"." (63).^{vii} Seemingly, after these early admissions in his very first discussion of von Uexküll, Cassirer forgets or underplays the problem, seemingly because animal *Umwelt* closeness fits his dualism so well – in the 1940 *Ziele und Wege*, he thus approaches the same issue much more sceptically: "In der Beurteilung der Einzelercheinungen, z.B. der sogen[annten] "Intellegenzleistungen" der höheren Tiere [,] mag diese Grenze [between mere expressions and representations] oft als flüssig und als strittig zu erscheinen." (145). And already in the planned fourth volume *Symbolische Formen*, these interesting ideas are bracketed in order to emphasize the sharp distinction of its conclusion between mere animal action circles and plastic human "Gesichtskreise", between the Kantian duality of Nature and Freedom with which the essay ends.

von Uexküll in Cassirer's epistemology of biology

The other central locus for Uexküll references in Cassirer has a very different character and occurs in his magisterial history of epistemology from the 17th Century to the present day, the enormous *Das Erkenntnisproblem* whose fourth volume was written in 1940^{viii}. The 100-page second book of that volume, with the title "Das Erkenntnisideal der Biologie und seine Wandlungen" ("The ideal of knowledge in

biology and its changes”) contains Cassirer’s impressive account of the epistemology of biology. Just like Cassirer’s first use of von Uexküll, this second use lies in his last period, even simultaneously with one of the works displaying that first use (*Ziele und Wege*). Here, Uexküll plays a different role – here, he is the one who saves the sane elements of vitalism in a brand of organicism functioning as the *Aufhebung*, the mediation, of the tension between simplifying mechanicism and mystifying vitalism – and with the zoologist and philosopher Hans Driesch as the radically vitalist counterfigure. The confrontation between the two takes place towards the end – and conclusion – of Cassirer’s large treatise on biological epistemology in which he briefly charts the development of modern biology from its philosophical roots in Kant’s *Kritik der Urteilskraft* and Goethe’s plant morphology over the idealist morphologists of early 19. Century, the rise of Darwinism and the theory of evolution, the late 19. Century causalist attempts at constructing an “developmental mechanics”, to terminate in the *Vitalismusstreit* of early 20. Century where vitalists like Driesch and von Uexküll introduce new sorts of vitalism against Darwinism. Cassirer’s overall aim is, of course, not only historical. As always, his interest in the history of science is guided by a philosophical interest: he wants to subject the concepts produced in the development of the sciences to a philosophical, purifying critique in order to bring forth which valid symbolic forms have in fact been produced in that scientific development. And the final part of this presentation, in the biological case, takes up the strife over vitalism in order to solve it and bring further the discussion. Cassirer’s overall aim is here to find a mediate position between purely (would-be) causal-mechanical Darwinism on the one hand and its vitalist, teleological opponents on the other. To him, the vitalists are right in attacking Darwinism for overlooking the irreducible specificity of biological concepts like *organism*, *inner causes*, *self-organization*, *anatomy*, etc. which may never be reduced to mechanical concepts only; on the other hand, Darwinists are equally right in attacking vitalists for assuming the existence of mystical forces without any empirical or positive basis whatsoever. In Cassirer’s mediation attempt, von Uexküll’s special version of vitalism plays a conciliatory role as opposed to the more radical vitalism of Hans Driesch. Driesch was, of course, the main proponent for vitalism in the strife over vitalism having broken out again in the biology of the interwar period inspired by Bergson and other philosophical vitalists, and he was famous for his assumption of special, yet unknown forces being responsible for the specificity of biology, as expressed in concepts like “soul” “entelechy” and “psychoid”, non-spatio-temporal forces suggested to inhabit all living beings.^x Cassirer takes care to present the basics of Driesch’s viewpoint by comparing them to his predecessor Wilhelm Roux and his idea of an “Entwicklungsmechanik”. Roux was, in his own self-understanding, a materialist reductionist, but Cassirer’s ingenious analysis of his position brings to light its inner contradictions. Roux’s account for embryogenesis involved a reinterpretation of Aristotle’s concept of *dynamis*, of potentiality: the animal has an “Anlage”, a disposition, determining its typical growth, and on the basis of this idea, Roux demands that this growth is described in functional terms referring to a whole series of self-determinations and self-organizations, “Auto-Ergasien”, performed by the organism. The determination of such self-government is possible only because it is based on of Roux’s fundamental distinction between inner and outer causes affecting the organism, and the very description of embryogenesis is deemed impossible without such concepts. Contrary to Roux’s own idea, however, Cassirer points to the fact that there can be given no purely mechanical reason for the distinction between outer causes and inner, self-organizing causes. Thus, Roux’s idea of a “causal

morphology” as a substitute for the tradition of ”idealist morphology” is simply a *contradictio in adjecto*, Cassirer argues: form may not be reduced to cause. Now, Driesch’s basic idea is to make clear the inheritance from Roux: he realizes, just like Cassirer, that the very idea of a ”developmental mechanics” does in fact embrace incompatible elements. Driesch’s overall strategy to cope with this discovery is to construct a metaphysical dualism, separating in two realms what was confusedly mixed in Roux. In addition to mechanical causes, a primary teleology must therefore be assumed. Driesch’s experiments showed that even very severe spatial distortions of embryos had no effect on their grown-up destiny, and this led him to the strange idea of such teleology to be a sort of force relying outside space, a non-observable force known only in its effect which is to influence the direction of other physical forces (originally a Cartesian idea), so to speak to turn the directions of other forces and thus constraining them to work together. The formal analogy with the mind-matter problem led Driesch to call this force a ”soul”, later to be replaced by his own version of Aristotle’s ”entelechy” or his own concept ”psychoid”. Even if Driesch himself understood his own position as a further development of Kant, calling himself a ”critical idealist”, Cassirer is predictably harsh on his metaphysical vitalism. While Kant, in the 3rd Critique, outlined two different organizing points of view on reality, cause and purpose, with each their set of rules, Driesch commits the error of hypostazising these two ways of organizing into two competing sets of metaphysical forces. But entelechy is a free invention, as Cassirer says, it is both insensible and suprasensible at one and the same time, and hence it is only describable in the negative. In short, Driesch falls prey to the transcendental illusion, we could say, he assumes we have a special intuition giving us direct access to suprasensible entities – and such a quasi-theological ability is of course completely ruled out in Cassirer’s cool neo-Kantianism. In comes von Uexküll. Cassirer perfectly realizes he is another vitalist and that he even counts Driesch and himself as two of a kind. So Cassirer’s trick is now to turn von Uexküll against his own self-picture, made possible by the fact that von Uexküll’s vitalism differs from Driesch’s at a very decisive point. While Driesch is a physiologist and hence with a preference for dynamics, von Uexküll is anatomist with a preference for statics, in the tradition of the idealist morphologists from Cuvier. This is why the former claims the autonomy of *Wirken*, the latter of *Form*. Cassirer takes care to quote how von Uexküll argues that biological form has a status parallel to that of *geometry* – irreducibly spatial relations which may never be reduced to their material basis. Geometrical form is thus a level fallaciously rejected by Darwinism and materialism – but any true biological description must necessarily resort not only to force and matter, but also to form. Thus, it is only form and the closely related concept of ”typical development” which allows biology to perform deductions. Thus, von Uexküll’s research program is seen as one of *Strukturforschung*, and its implicit dismissal of a Drieschian entelechy notion opens the gates for a completely new knowledge interest in von Uexküll: that of form as an autonomous problem. Purpose is here taken, not as a separate force, but as *Zweckmässigkeit*, purposivity, lying in the very structural composition of biological entities, in their *Planmässigkeit*, their plan-like structure. In this account, every living being has its point of gravity within itself:

”Er kann das *Kausalproblem* der Physik und Chemie freigegeben, sofern beide nur anerkennen, daß in ihm nicht das Ganze der Naturerkenntnis aufgeht, sondern daß es ein selbständiges *Formproblem* gibt, für das die Biologie eigentümliche Begriffe und Denkmittel auszubilden hat. Gibt man Uexküll das zu, so ist für ihn die Streit im

”Mechanismus” oder ”Vitalismus” gelöst. Worauf es ihm ankommt, ist, daß es eine nicht-stoffliche *Ordnung*, eine *Regel des Lebens* gibt, die dem Stoff erst sein Gefüge verleiht.” (209)

Cassirer obviously picks a friendly reconstruction or even modification of Uexküll’s special brand of vitalism as his brother-in-arms in this struggle. Uexküll’s emphasis on anatomical structure, on form, on function, and his parallelism between physical forces and organization in physics and biology, respectively, are applauded as sane methodological constructions delimiting the objectivity of biology as a field – while, contrastively, Driesch’s parallel notions of entelechy, force, ontogenesis, and his contrast between physics and supposed non-spatial forces are taken to be metaphysical constructs to be discarded. One cannot help but think that this is *ein rettender Kritik*, a saving criticism, of Uexküll which Cassirer sets out to perform here. True to the doctrine of Kant’s outline of a theoretical biology in *Kritik der Urteilskraft*, there can not be posited any real teleology in nature, in art as well as in biology we only have *Zweckmäßigkeit ohne Zweck*, and the pervasive teleology assumed in primitive vitalism must be replaced by the notion of organized wholes with interrelated parts, by the integration of functions into a system. While Driesch thus posits the autonomy of a *global*, biological *force*, analogous to psychological intentions on a larger level, we could say, Uexküll is taken to stress the autonomy of biological *form* on a *local* level only, ”eine nicht-stoffliche Ordnung” (”a non-material pattern”), localized only in the specific, circular animal-*Umwelt* system. Thus, Cassirer appreciates the construction on this basis of a whole series of concepts specific to biology: the distinction between inner and outer causes, ”Anlage” (disposition), ”organism”, ”system”, ”function”, ”typical development” ... etc., none of which may be defined causally/mechanically only. Related ideas, of course, are already to be found in Driesch, but here such biological concepts are uncritically globalized and ontologized, while von Uexküll, in Cassirer’s account, subjects biological concepts to a critique avoiding such metaphysical pitfalls. The common Kantianism, as many differences between the two as there remain, of von Uexküll and Cassirer seems to be what allows for Cassirer to construe a sort of cleansed, sanitized von Uexküll in his epistemology of biology: Cassirer’s appreciation of Uexküll as an epistemologist of biology is constructed after the orthodox pattern of Kant’s 3rd Critique where the concept series of physics/ constitutive rules/ mechanics/ mathematics/ deduction is counterposed to biology/ regulative rules/ teleology/ description/ induction.

Functioning as the last step before Cassirer’s conclusion, the introduction of von Uexküll has a central function in Cassirer’s overall argument: it is what allows him to generalize the Uexküllian form concept to the concept of whole (”Ganzheit”), covering also field physics and gestalt psychology, and which allows him further to specify this concept of wholeness in biology:

”Bei der Erforschung der Organismen eine teleologische *Methode* anwenden, heißt nicht anderes als die Vorgänge in ihm daraufhin zu untersuchen, wie weit in ihnen der Charakter der Ganzheitserhaltung sich zeigt. [...] Der Ausdruck der ’Ganzheit’ hat den Vorzug daß er völlig hypothesenfrei ist. Er enthält nichts ’Seeliches’ und er behauptet keineswegs, das Lebensgeschehen müsse in jedem Falle so verlaufen, daß der höchste Grad von Zweckmäßigkeit dadurch erreicht werde.” (219)

Thus, the introduction of wholeness, of Aristotelian potentiality, of animal-Umwelt-systems as Leibnizian monads, and much more., all this suspiciously metaphysical import in the concept networks of biology is deemed innocent, as long as it takes place within the confines of form and function. Driesch's metaphysical concepts of "constellation harmonies, causal harmonies, and functional harmonies" in biology similarly should be reinterpreted as categories of form, not of cause. Form in this account thus generally functions as a sort of secularization of all sorts of vital forces – also because it, contrary to the mysticism inherent in all versions of "vital forces", opens the gates for empirical research:

"In dieser Feststellung der "ganzheitlichen Ordnung" handelt es sich einfach um ein *Phänomen*, das als solches mit rein empirischen Mitteln aufweisbar ist. Keine erkenntnistheoretische Skepsis kann uns an der Anerkennung dieser Ordnung, als etwas tatsächlich-Gegebenes, verhindern." (220).

Cassirer's sophisticated correction to Darwinism thus amounts to the fact that biology without forms and wholes and a whole series of related concepts is simply impossible. This gives him the occasion for a funny turning the table against Darwinism which commits, for him to see, the same error as the vitalists when it violently tries to force every organ or every single feature of a living being to possess immediate utility and selection value (221). Cassirer's criticism of biological vitalism is trivial to-day, less so his criticism of Darwinism. Yet, it seems to be validated if you use the Cassirerian method and simply look at what is today produced in biology, from biophysics and molecular biology up to ecology and ethology: nowhere are form and whole concepts absent, and even if biologists may tell you they are mere metaphors which might easily be discarded, it is, for a Cassirerian, a revealing fact that they are not so, in actual science, discarded.^x

The problem of Form in Cassirer

Thus, Cassirer's Uexküll references taken together paint a double portrait of Uexküll the biologist:

- 1) Uexküll as the biologist who provides contrast material to a philosophical anthropology: animals as such living beings which, contrary to man, are confined to closed *Umwelten* and which do not have access to "geistige Formen".
- 2) Uexküll as the biologist providing (parts of) an organicist solution to the tension between mechanicism and vitalism in the epistemology of biology, thereby showing biology to display the same irreducible duplicity between cause and form as do the *Kulturwissenschaften*.

Put together, these two doctrines leads to the result that animals have forms – but they do not know it. Cultures do not, either, have immediate access to their own symbolic forms by means of which the construct themselves, but they may learn about them in the process of enlightenment, forming at the same time a development and unfolding of symbolic forms and an *Abbau* of these same symbolic forms, a construction and a deconstruction, so to speak.

How the passage from animals caught within the closed confines of circular chains of expressions and to man, opening the world for himself by means of *Darstellungen*, is undertaken during evolution, this question is simply not asked in Cassirer except at the locus already quoted, due to his framing of the elements of this question in terms of his Kantian dualisms: the semiotic "missing link" between expressions and representation is consequently not posed as a problem.

In his use of Uexküll as animal biologist, Cassirer downplays the problems of higher animals and their ability of recognizing neutral objects (objects not directly relevant to any immediate biological need), a tendency which emphasizes the strong (but not the only) tendency in Uexküll not to recognize the existence of neutral objects in the *Umwelten* of higher animals. He so to speak makes animals simpler than they are, because of his use of him as provider of biological contrast to his own philosophical anthropology.

In his use of Uexküll as an epistemologist of biology, on the other hand, Cassirer's appreciation of von Uexküll as an organicist comes at a price. von Uexküll's many vitalist features must be ignored; thus Cassirer benignly overlooks Uexküll's ardent anti-Darwinism, even anti-evolutionism, and his romanticist idea of the complete perfection and harmonious perfect fit of the living nature (which is, of course, related to the neutral objects issue: if all functions in the functional circle of a living being immediately find their perfect *Umwelt* counterpart and are thus satisfied, then no neutral objects are perceived). Cassirer so to speak makes Uexküll less vitalist than he in fact is because of his use of him as a contrast to Drieschean vitalism and thus performs a saving criticism of von Uexküll as a basis of his own sophisticated organicism, realizing the high complexity of biology as against simpler mechanicism as well as simpler vitalism.

While the first of these von Uexküll versions does in fact correspond to substantial parts of Uexküll's writings^{xi}, they crudely simplify – from our days' point of view – reality to the extent that the cognitive and behavioral abilities of higher animals are, as a tendency, reduced to the simple set of interrelated perceptions-reactions of a tick. The second of these uses, on the other hand, makes the best of Uexküll's vacillation between a crude vitalism and a more sophisticated organicism.

While both of these tendencies in Uexküll might peacefully coexist in a reconstruction of von Uexküll's theory, because they operate on the object and method levels, respectively, it is interesting that the ambiguous von Uexküll portrait resulting from the comparison between Cassirer's two Uexküll versions points back to an ambiguity in the notion of Form in Cassirer himself:

- 1) On the one hand, Cassirer claims that the distinction between form and cause is a basic tension in all sciences, at least in all sufficiently complicated sciences, as witnessed in Cassirer's amazing 1945 structuralism article, where structure/Gestalt concepts are charted as a lineage of form thinking ranging from Goethe's botanic sketches over Maxwellian field theory in physics and Gestalt Theory in psychology to Jakobsonian structural linguistics – and, of course, in the cultural sciences in general (thereby, as a matter of fact, generalizing the physics/biology distinction in Kant's 3rd Critique to cover causal and structural aspects of all sciences). The distinction is thus basic also in the sciences of culture – as claimed in the *Logik der Kulturwissenschaften* (1942).^{xii}

2) On the other hand, the Form concept is of course central to Cassirer's general notion of "Symbolic Form" – which is a concept comprising *both* causes and forms as principles of understanding (in myth, art, science, language, politics, technology). Symbolic Forms are not necessarily explicit, rather, as a rule, they are implicit, but while animals may never achieve the abilities for explicit form shaping – they are not the "Form fähig" – , man may, during the development of cultural processes, constitute his whole range of symbolic forms allowing him to objectify his surroundings. Subsequently, man even has the possibility of becoming conscious of these forms in an ongoing quasi-Hegelian loop of self-interpretation via the ongoing interpretation of man-made symbolic artefacts. The aim of enlightened philosophy and science, in Cassirer's account, seems to be nothing less than to support this making explicit and hence more controllable and evolvable the bouquet of symbolic forms developed through history.

There is obviously a tension between the two: form as opposed to cause as different methodologies of (primarily scientific) understanding of the same matters; and form as the constructive device of the human mind as such, comprising both cause and form in the former sense. Maybe there need be no tension between the two: the symbolic forms in Cassirer are precisely not passive moulds which form experience at a remote and unreachable location deep within the human mind, such as Kantianism may easily claim. Quite on the contrary, the symbolic forms are, at the same time, vehicles for action, they are constructive, causative tools – and by highlighting this notion and the productive aspect of human culture, Cassirer as a matter of fact, without saying it explicitly, aims to mend that fateful lack of modern epistemology from Descartes and Locke onwards that they tend to marginalize or even completely eradicate action, with all the well-known sceptical implications. Just like in von Uexküll or in Peircean pragmatism, perception is inextricably interlinked with action in Cassirer's account. So in some sense, Symbolic forms are not only forms, but causes and purposes at one and the same time.

A related issue is the reality status of the "intermediate" form concepts of biology which the whole Uexküll construction was aimed at legitimizing. The Kantian dance on a knife in the third Critique may be read as denying such concepts any objectivity; such is not the case in Cassirer's contention, even if he maintains the difference between such objects and physical objects. But if form, function, and signs in biology are indeed objective, for which Cassirer argues very convincingly, the question is why not we might prefer a sort of Husserlian middle way in order to secure such concepts against nominalists: – the issues of biology are not merely epistemological but pertain to regional ontologies which are nested within each other on top of physical ontology. Of course, concepts like form, sign, and function do not have the same status as concepts covering physical entities, but they should not, on the other hand, be seen as mere epistemological conventions only. Cassirer's reconstruction of von Uexküll on this point should be taken to pertain to materially ontological concepts belonging to the regional ontology of biology, which is, in turn, dependent upon physical ontology. Thus, there is no need on the other hand to dualistically oppose causes and teleology, because the latter is a local concept only, defined by the more or less complicated function circles of the organism in question and which depends upon the former. Thus, I agree with Cassirer that organicism is the middle way to pursue,

and that concepts like "order" is simply indispensable in biology - but such concepts might be interpreted realistically, corresponding to the actual claims of biosemiotics that semiotic vocabulary in biology is ineradicable, or the claim by current theoretical biologists like Stuart Kauffman that evolution presupposes evolvable order, not the other way around.

To Conclude: Neutral objects and the complexity of biology

Finally, Cassirer's two Uexküll versions indirectly address an issue which is delicate to both of them: that of the existence of neutral objects in the *Umwelten* of higher animals. As we argued, both of them cling to a sharp dichotomy between animal and human capabilities, albeit for directly opposed reasons – Uexküll celebrating the perfection of animal fit into the surroundings and contrastingly attacking the wildways of technology and civilization, Cassirer celebrating man's form-shaping capability and the ensuing development of culture, and contrastingly attacking the animalist political and philosophical utopias of the vitalists of his time. But both of them hesitate to fully approach the issue of a gradualist (even if evolutionarily quick) transition from animal to man. Uexküll may ignore this for the very basic reason that he is simply no Darwinist, so an evolutionary explanation of the specificities of human mind is deemed out of bounds beforehand. Cassirer, of course, is an evolutionist, but due to his sharp Kantian dualisms he sees the human capacity for form as a faculty complex *sui generis*, opposed to animals closed within their cause-like association chains so that it does not occur to him to investigate further the evolution of the former out of the latter.

In the *Theoretische Biologie*, it is true, Uexküll admits that some animals with complex *Umwelten* do in fact have access to neutral objects. This idea is, however, seems rejected again later in the *Bedeutungslehre* (cf. Stjernfelt 2001), probably due to the tension between this idea and Uexküll's perfect fit idea of the relation between animal and Umwelt. For a neutral object is, of course, defined by its being grasped by the organism in question, on the one hand, without immediately entering into any specific perception-action circle, on the other. The existence of neutral objects is thus the prerequisite for the formation of stable *Umwelt* territory mappings (a map necessarily involving lots of features which have no direct bearings on any actual action series performed by the animal, features which have the status of merely possibly entering into future action sequences), and at the same time, neutral objects form the prerequisite of any kind of learning exceeding mere association conditioning. Neutral objects give the organism in question a sort of representations involving blank slots which may be filled in by means of further experience. Thus, a whole series of capabilities only present in higher animals are intimately connected to the appearance of neutral objects: mappings of surroundings, attention, memory, flexible ontogenetic learning, possibility of the opening and expansion of the closed *Umwelt* of lower animals.

In the cognitive ethology tradition developed since Cassirer and Uexküll, research has shown without any possible doubt that neutral objects are simply widespread in higher animals (see, e.g. Beckoff et al. 2002)^{xiii}. To that extent, any strife pro and con neutral objects in higher animal *Umwelten* has long since been decided empirically, so the issue has ceased to be subject to purely philosophical discussions. This does not mean, on the other hand, that these results have yet been philosophically interpreted in a satisfying manner. For what does the increasing recognition of surprising degrees of cognitive capabilities in higher animals entail for

philosophical anthropology? That discussion is only about taking its beginnings – a couple of actual answer attempts are Terrence Deacon’s idea that the ability to process Peircean symbols is what largely distinguishes animal and human cognition, or Michael Tomasello’s idea that the faculty of shared attention is a human privilege which sets us apart from even our most able primate relatives. Here, as we saw, Cassirer’s idea would be the introduction of language facilitated by the appearance of the subject-object distinction along with the predicate-subject distinction. I myself would name Peircean ”hypostatic abstraction” as a good candidate, but it is to this day unclear what would be the precise criteria for a common solution to this issue – maybe some of the solution proposals quoted are simply equivalent? Must we not assume intersubjectivity as a prerequisite to pure subjects and objects? Is not shared attention required for any sophisticated language learning? Are not the mastering of abstract symbols needed for language acquisition? The answer is, in any case, far more complex and specific than the mere appearance of neutral objects, but that answer must necessarily obey Cassirer’s epistemology of biology rather than the crude biology he paints in the background of his anthropology. For it would be strange to admit a complex biology inhabited only by simple animals.

References

- Beckoff, Mark, Colin Allen, and Gordon M. Burchardt** (eds.) 2002 *The Cognitive Animal. Empirical and Theoretical Perspectives on Animal Cognition*, Camb.Mass.: MIT Press
- Cassirer, Ernst:** 1944 “The Concept of Group and the Theory of Perception”, in *Philosophy and Phenomenological Research* 5: 1-35 (original French version 1938), 1944
- 1944 *An Essay on Man* New Haven: Yale University Press
 - 1945 “Structuralism in Modern Linguistics” in *Word*, vol. I, nr. II, N.Y. 1945
 - 1954 *Philosophie der symbolischen Formen* I-III, Darmstadt 1954 (1923-29)
 - 1956 “Zur Logik der Symbolbegriffs”, in *Wesen und Wirkung des Symbolbegriffs*, Darmstadt (1938)
 - 1961 *Zur Logik der Kulturwissenschaften*, Darmstadt (1942)
 - 1985 “Das Symbolproblem und seine Stellung im System der Philosophie”, in *Symbol, Technik, Sprache*, Hamburg (1927)
 - 1985 “Die Sprache und die Aufbau des Gegenstandswelts”, in *Symbol, Technik, Sprache*, Hamburg (1927)
 - 1991 *Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit. Von Hegels Tod bis zur Gegenwart (1832-1932)*, vol. IV Hildesheim: Georg Olms (1957, written in 1940))
 - 1995 *Zur Metaphysik der symbolischen Formen*, Hamburg: Felix Meiner (written around 1928-29)
 - 1999 *Ziele und Wege der Wirklichkeitserkenntnis*, Hamburg: Felix Meiner (written around 1940)
- Cassirer, Toni** 1981 *Mein Leben mit Ernst Cassirer*, Hildesheim: Gerstenberg Verlag (1949)
- Driesch, Hans** 1905 *Der Vitalismus als Geschichte und als Lehre*, Leipzig. Verlag von Johann Ambrosius Barth
- Emmeche, Claus and Jesper Hoffmeyer** 1991 "From language to nature - the semiotic metaphor in biology" *Semiotica* 84 (1/2), 1-42

- 1992 “Code-Duality and the Semiotics of Nature”, in Anderson and Merrell (eds.) *Semiotic Modeling*, Berlin: Gruyter
- Friedman, Michael** 2000 *The Parting of the Ways. Carnap, Cassirer, and Heidegger*, Chicago and La Salle, Illinois: Open Court
- Heusden, Barend van** 2001 ”Jakob von Uexküll and Ernst Cassirer”, in *Semiotica* 134-1/4, 275-292
- Kauffman, Stuart**, 1993 *The Origin of Order*, New York: Oxford University Press
- 2000 *Investigations*, Oxford: Oxford University Press 2000
- Rivas, Jesús and Gordon M. Burghardt** 20002 ”Crotalomorphism: A Metaphor for Understanding Anthropomorphism by Omission”, in Beckoff et al. 2002, p. 9-18
- Stjernfelt, Frederik** 2001 ”A Natural Symphony? To what extent is Uexküll’s *Bedeutungslehre* actual for the semiotics of our time?”, in *Semiotica* 134-1/4, 79-102 (in prep.) *Diagrammatology. Investigations on the Borderline of Phenomenology, Ontology, and Semiotics*, Dordrecht: Springer
- Uexküll, Gudrun von** 1964 *Jakob von Uexküll, seine Welt und seine Umwelt*, Hamburg: Christian Wegner Verlag
- Uexküll, Jakob von** 1928 *Theoretische Biologie*, (2nd completely reworked edition) Berlin: Verlag von Julius Springer
- 1930 *Die Lebenslehre*, Potsdam: Müller &/ Kiepenheuer Verlag
- 1933 *Staatsbiologie. Anatomie, Physiologie, Pathologie des Staates*, Hamburg: Hanseatische Verlagsanstalt (2nd extended version)
- 1956 *Streifzüge durch die Umwelten von Tieren und Menschen - Bedeutungslehre* (originally from 1921 (2nd version) and 1940, respectively) Reinbek: Rowohlt
- 1982 “The Theory of Meaning” (transl. of *Bedeutungslehre* (1940)), *Semiotica* 42-1 25-82
- Uexküll, Thure von** 1982 “Introduction: Meaning and science in Jakob von Uexküll’s concept of biology”, *Semiotica* 42-1 (1982) 1-24

ⁱ As indicated in van Heusden 2001. As the extended 2nd version of Uexküll’s *Theoretische Biologie* came out in 1928, it is possible that Cassirer’s knowledge of him is prompted by his reading of that book. Cassirer later also refers to *Umwelt und Innenwelt der Tiere* (1909) as well as *Die Lebenslehre* (1930).

ⁱⁱ The only reference I have found to von Uexküll’s relation to Cassirer stems from von Uexküll’s widow who, in her biography of her late husband (Gudrun von Uexküll 1964), writes about two incidents connecting the two men. The first relates how von Uexküll gave a lecture, apparently in the early 30’s, about dogs taking everything within their smelling field as their property – a lecture which was subsequently condemned by Goebbels in the party press. Cassirer was in the audience and remarked that Rousseau’s saying the first man claiming private property should have been killed, now ought to be extended to dogs. (168) The second, more interesting, anecdote relates how von Uexküll protested over Cassirer’s flight from Hamburg in early 1933. Gudrun von Uexküll makes, not surprisingly, a huge point about her husband’s opposition to Nazism and how anxious he was to do something about it. What he did, according to her, was to write a letter in May 1933 to Eva Chamberlain, the widow of the racist ideologist and main Nazism inspirator Houston Stewart Chamberlain. According to Gudrun von Uexküll, her husband’s idea was that this letter should reach Hitler, based on the close relation between the *Führer* and the Chamberlains. In this letter, von Uexküll complained that Chamberlain’s ”idealism”

was being converted into the "brutest materialism" in contemporary German politics (171), and took the Cassirer case as an example:

"Von der Hamburger Universität ist Professor Cassirer, der als Philosoph Weltruf genießt, entlassen worden, obgleich gerade er sich die größten Verdienste um die Neubelebung der Philosophie Kants erworben hat. Eine ganze Generation von Studenten ist von ihm in die idealistische Denkweise unseres größten deutschen Philosophen eingeweiht worden. Sein Fortgang bedeutet einen nicht wieder gutzumachender Verlust für das deutsche Geistesleben." (172) von Uexküll goes on to protest about other excellent Jewish scholars who have been sacked ("Das ist krasse Barbarei ..."), and ends his letter by encouraging Ms. Chamberlain to go to Hitler: "Sehr verehrte Freundin, Sie haben Einfluß auf Hitler. Schreiben Sie an Hitler, damit er das erlösende Wort endlich spricht, das wie ein Blitzstrahl allem undeutschen Wesen ein Ende bereiten würde." (173)

von Uexküll's own general antisemitism, however, seems to be well-established, and the reconstruction of his precise points of view on this issue and their development over his career merits a whole separate investigation into which we can not here go any further.

The parallel Cassirer biography by his widow Toni Cassirer (1981) does not mention von Uexküll.

ⁱⁱⁱ It should be remarked in the passing that this critique of different philosophies of life is absolutely stunning and possess an acute actuality even today when Cassirer's arguments may easily be repeated against various brands of (de-)constructivism and other current irrationalisms.

^{iv} Uexküll was no standard Watson-Skinner behaviourist, but his *Umwelt* methodology has strong behaviourist features. The *Umwelt* of a species should be constructed, not on the basis of any empathy with animal minds, but on meticulous studies of animal physiology and behaviour, charting which phenomena the animal in question is able to perceive, and which phenomena it is able to act upon. The result is the "functional circle" of that animal defining its *Umwelt* by the set of interlinked perception-signs and action-signs relating it to its surroundings.

^v Here lies an interesting idea in Cassirer's notion of symbolic forms: the whole set of cultural devices of course function as so many tools of world construction – but science seems to play a special, enlightened role because in addition to all this building of symbolic constructs, science adds the possibility of analyzing them through a process of "Abbau" making man conscious of his own symbolic form use – and thus enabling him to emancipate himself from arbitrary constraints in those symbolic forms. This is how we must conclude Cassirer renders the tension between the symbolic forms of myth, language, art etc. on the one hand, and science on the other – in a classical enlightenment figure placing science as that which may look through more cloudy symbolic forms. But the solidaric appearance of language and art as means of representation seem to play a similar critical role with respect to myth – so maybe a whole enlightenment interaction – we dare not say "dialectics" – is constantly working within the development of symbolic forms.

^{vi} At the end of the 30's, Cassirer attempted to write a systematic companion to the three domain-based volumes of *Philosophie der symbolischen Formen* (on language, myth, and science, respectively) which should instead, as indicates the title, focus on different methodological ways of approaching reality. The notes have been published as *Ziele und Wege der Wirklichkeitserkenntnis*, and it is curious to see that even if written almost simultaneously with the fourth and last volume of Cassirer's

impressive history of epistemology *Das Erkenntnisproblem* with its completely different use of von Uexküll, *Ziele und Wege* remains in the exactly the same interpretation as we just discussed: von Uexküll as biologist providing contrast material to philosophical anthropology. *Ziele und Wege* thus draws the direct line between the *Philosophie der symbolischen Formen* and the *Essay on Man*.

^{vii} We quote Cassirer's admissions about these issues, also because they show that an evolutionary account for the emergence of Umwelt openness in the animal kingdom is not necessarily prohibited in his thought.

^{viii} The publication history of the four volumes of the chronologically disposed *Das Erkenntnisproblem* is in itself a tangled issue spanning half a century. The first two volumes appeared as early as 1906 and 1907, respectively, the third volume came out in 1920, but the fourth volume dealing with epistemology in contemporary special sciences (mathematics/physics, biology, and historiography, respectively) was finished only around 1940. Its publication, however, was prevented by the war, and it only came out posthumously in an English translation in 1950. Finally, the German version appeared in 1957.

^{ix} Driesch interestingly began his career as an anti-vitalist, but his experimental findings during the 1890s made him change his position. Especially one experiment is associated with Driesch's turn to vitalism: his separation of a two-cell sea urchin embryo into its two cell components which turned out to give rise to each their grown-up sea urchin, as against earlier assumptions by Wilhelm Roux that such cells would develop into two halves of a mature organism (see Driesch 1905, 185ff). To Driesch, this proved the impossibility of a purely mechanical explanation of such biological phenomena and led him to assume a sort of organizational wholeness force acting outside spacetime to govern biological ontogenesis.

^x Structurally, it is the exactly same argument which has been forcefully made by current biosemioticians, e.g. Jesper Hoffmeyer and Claus Emmeche: biology never stops using semiotic vocabulary (genetic code, DNA information, RNA messenger, transcriptase, etc. etc.) – so we might as well take such expressions seriously and make a thorough investigation of the roles of signs in biology.

^{xi} von Uexküll also vacillates on this issue; in the earlier *Theoretische Biologie*, he is more surprisingly more favorable towards neutral objects than it the late *Bedeutungslehre*. Why he, doing so, tends to downplay the intelligence of higher animals in his later work, is difficult to determine. We remarked that in his political musings, he tended to embrace the same sharp distinction between animal and man as did Cassirer (albeit for opposite reasons), so we can not exclude a political motivation for this tendency in von Uexküll.

^{xii}). Here lies, in Cassirer's account, a problem with mathematics – for is it not the case, now, that it pertains to cause only and not to form? The source for such an idea seems to be the *Kritik der Urteilskraft* again, and it is found in another parallel version in Husserl's idea of the "vague morphologies" (from the second edition of the *Logische Untersuchungen* and onwards) which may never be charted by means of mathematics. As a counterweight, take as an example Jean Petitot's idea that the sophisticated mathematics of qualitative dynamics may formalize and objectify structures and forms – as a specific case under the more general argument that mathematics is just as indispensable in form descriptions as in cause descriptions.

^{xiii} In the bouquet of papers here displaying state of the art of cognitive ethology, a striking amount of intelligent behaviours are charted, each of them highlighting aspects of what appeared as the "neutral object" issue in von Uexküll. To name a few,

the ingenious tactics used by ground squirrels to assess their snake predators, involving judging their size and temperature while they're partially hidden; the hunt strategy of jumping spiders involving long sneaking detours out of sight crossing more obvious pathways in order to attack dangerous prey from behind; antilopes protecting their offspring by letting them urinate in the mother's mouth, having them standing still while the mother is luring predators away, constantly supervising their activity; orientation by means of cognitive maps and concept formation (such as in the recognition of human letters apart from size, color, position or font) in honey bees; the existing of general, abstract signs in pigeons, and much more. So, complicated cognitive-behavioural competences seem copiously to transgress what was expected by von Uexküll (and by Cassirer), and all of them involve aspects of neutral object perception and action because aspects or objects of the surroundings which are not immediately involved in perception-action-circles are necessary for their completion. Both von Uexküll and Cassirer thus seem to have fallen prey to what is here called "anthropomorphism by omission" (Ries and Burghardt 2004, 10ff), that is, the idea that the *Umwelten* of animals are basically rather close to ours which easily leads to the idea that the abilities of animals in that world is far inferior to ours. Curiously, this kind of anthropomorphism – contrary to its "normal" form – often leads to the assumption that the animals in question can do considerably *less* than what they can in fact do. von Uexküll's sticking to the tick as prototype thus seems to be a grave case of "anthropomorphism by omission", and the appearance of object neutrality seem to begin at much lower levels in the animal kingdom than expected, including even insects.