

A World Beside Itself

Jakob von Uexküll, Charles S. Peirce, and the Genesis of a Biosemiotic Hypothesis

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CHAPTER 2.

Uexküll's Umwelt and the Disappearance of Subjectivity

According to Uexküll's theory of biology every organism ought to be conceived of holistically, in partnership with the specific Umwelt that defined its environment. Uexküll originally introduced the term 'Umwelt' in order to discriminate between the specificity of those markers of perception and behaviour that were available to different species. Since different species were endowed with different characteristics correspondingly their sense of a world must also diverge, meaning that the sense of a world available to forms of life other than human beings radically diverged. On the basis of this realisation, Uexküll argued that only by scrutinising the anatomical and physiological features of an organism's body could some genuine insight into the perception and behaviour of living creatures be gained. He conceptualised the integral unity of these somatic characteristics by means of the German word *Bauplan*.¹³⁰ In theory, the physiology of every individual organism conformed to a basic template that determined in advance the construction of the species to which it belonged. In practice, those variations that emerged between individuals of the same species would seem to undermine Uexküll's notion of a unified plan, but the biologist was prepared to overlook this possibility, and instead focused on the generalisations that could be successfully applied to the majority of members of a particular species. On the basis of its *Bauplan*, each organism could be assigned a field of significance that circumscribed a particular version of a world, a frontier inseparable from its entwinement together with the apparatus that made the manifestation of its surroundings possible. By enveloping the organism the Umwelt becomes the site of its perception and behaviour, amalgamating its sense of acting and being acted upon within a single framework, as determined by the particular physiological characteristics of the species to which a creature belonged.

The crux of the bond between an organism and its corresponding Umwelt was what Uexküll called the functional cycle. This concept developed out of Uexküll's experimental research into muscular regulation. His early reputation as a scientist was secured by his discovery that the excitation of nerves cells is directed towards outstretched muscle, maintaining what would later become known as reafferent control.¹³¹ This discovery demonstrated that the brain of an animal maintained a regulatory causal link with the muscular

¹³⁰ Jakob von Uexküll, *Environment [Umwelt] and Inner World of Animals* [1909], translated by Chauncey J. Mellor and Doris Gove, excerpts in *Foundations of Comparative Ethology*, edited by Gordon M. Burghardt (New York: Van Nostrand Reinhold, 1985): pp. 5 – 7; 223 – 224.

¹³¹ T. Rütting, 'History and significance of Jakob von Uexküll' in *Sign Systems Studies* 32, 1/2 (2004): pp. 39 – 40.

capacity of its limbs, enabling it to receptively adjust its movements in conjunction with changes to the objective of its activity. By supplying an example of the decisive role of negative feedback within a biological system, Uexküll's research in this direction has been identified as a notable precursor of cybernetics. Taking the mechanism of negative feedback as a paradigm for their investigations, those active at the Macy Conferences in the 1940s and 50s sought to elucidate parallels between technological and physiological processes, modelling the interactions between systems, information, and environments in a manner that would prove influential for both biosemiotics and ecological science. Yet, so far as Uexküll, himself was concerned, even more profound than the quantifiable dimension of this physiological dynamic, was the realisation that it must also be invested in a qualitative cognitive framework.

As Brentari recounts, the notion of the functional cycle represented something of a watershed in Uexküll's thinking: the replacement of a chapter on 'The reflex' with that entitled 'The functional cycle' in the second edition of Uexküll's *Umwelt und Innenwelt der Tiere* attests to the importance of this shift.¹³² The introduction of this concept enabled Uexküll to integrate a sequence of stimulus and response together with the environment in which these interactions gained cogency, and to expose the question of the underlying cause of behavioural acts, which reflex models of behaviour failed to adequately confront.¹³³ The functional cycle illustrated the means by which the capabilities of a particular organism and the features attracting its attention slotted into one another, comprising a systematic whole.¹³⁴ It schematised the process whereby the animal was at first able to recognise the implications of a particular object or event, and thereafter couple this manifestation with a practical response. As Uexküll outlined in a diagram of the functional cycle, each impulse for action was arranged in a self-contained feedback loop, dividing the inner world of the organism into two halves.¹³⁵ One half received those impressions derived from external stimuli, establishing a facet of the world as sensed, the other converted this information into a practical response, creating a world of effective action. The rules that dictated which features were available for recognition, together with the functions they triggered, were always specific to a particular species, being intransigently determined by the bodily organs this species possessed. This meant that the categories and values which human beings took for granted when making sense of their surroundings were inappropriate when it came to apprehending the *Umwelt* of another species.

Building upon his concept of the functional cycle, Uexküll realised that this form of embodied self-reference not only allowed animals to control their movements, but also

¹³² Brentari, *Jakob von Uexküll*: pp. 97 – 98.

¹³³ Brentari, *Jakob von Uexküll*: p. 98.

¹³⁴ Jakob von Uexküll, *A Foray Into the Worlds of Animals and Humans* [1934], with *A Theory of Meaning* [1940], translated by Joseph D. Neil, introduction by Dorion Sagan (Minneapolis, Minnesota: University of Minnesota Press, 2010): p. 10.

¹³⁵ Jakob von Uexküll, *Theoretical Biology*: pp. 155 -156.

amounted to an indispensable prerequisite for the composition and coherence of their perceptual experience.¹³⁶ The word *Umwelt* denoted the corresponding encapsulation of the organism within a field of stimulus and response, or, as Uexküll would put, it *Merkmal* and *Wirkmal*, which in conjunction with one another circumscribed a creature's capacity for interacting with those forms, events and processes that described a physical locality. In addition to an *Umwelt*, encapsulating all relevant objects and properties within the external environment, in some species this was partnered with an 'Innenwelt'. Uexküll identified an *Innenwelt* with the animal's capacity to register its own bodily processes and thereby build up an internal sense of the world outside. Consisting of those specialised biological structures which enabled certain organisms to map out various features of their perception, an *Innenwelt* allowed a select group of so-called 'higher animals' to represent the circumstance of their surroundings within an integrated structure.¹³⁷ Crucially the interdependence of these two structures created a closed unity, peculiar to those attributes through which the animal was able to make sense of and respond to its environment. Consequently, it was not only a portion of the area surrounding the animal, a fragment of objectivity demarcated by metrical coordinates of space and time which defined its *Umwelt*, rather it was the lived experience of the organism itself. So far as Uexküll was concerned the presumption of a single-shared world in which every being participated unreservedly no longer amounted to an adequate basis for biological science (especially in so far as that world was assumed mastered definitively in human perception). Only by scrutinising the 'Bauplan' (construction plan) of each organism, Uexküll argued, as articulated in the anatomy and physiology that made possible its integration within an *Umwelt* and *Innenwelt*, could life as lived be genuinely appreciated.

The earlier work of Claude Bernard in the 1860s had set a precedent for this kind of distinction by discriminating between a *milieu extérieur* and a *milieu intérieur*.¹³⁸ In this way Bernard opposed the inorganic surroundings of the organism to the environment of membranes and circulating fluids enclosed within its own body.¹³⁹ By preserving homeostasis, this inner environment maintained the individual's relative autonomy despite the variable conditions of the world outside. This refined model of the medium of living processes was an incentive for new forms of biological experimentation, but Bernard also remained attached to a mechanistic

¹³⁶ Rütting, 'History and significance of Jakob von Uexküll': pp. 50 – 52.

¹³⁷ Uexküll, *Theoretical Biology*: pp. 126 – 127.

¹³⁸ In fact, Bernard's reputation in his own lifetime was secured by his many experimental innovations, while his ideas about the internal environments of organisms were not explicitly adopted until more than fifty years after their first formulation. In the first decades of the twentieth century several prominent physiologists would make use of the concept, including J. S. Haldane and Walter B. Cannon. See Charles G. Gross, 'Claude Bernard and the Constancy of the Internal Environment', *Neuroscientist*, 4 (1998), pp. 380–385.

¹³⁹ Claude Bernard, *An Introduction to the Study of Experimental Medicine*, translated by H. C. Greene ([New York]: Henry Schuman, 1949): pp. 63 – 64.

conception of life which neglected the organism's own perspective on this division between an outer and inner world.¹⁴⁰ As Spitzer put it, through Bernard's division of the organism's milieu determinism was insinuated even 'under the skin of the individual':

Man is at the mercy, not only of the *milieu extérieur* of which he is the product, but also the *milieu intérieur* which his own organism has produced (and any possibility of equilibrium, of harmony, between the two *milieux* is granted only to the lower orders of creation); man must realize he is a given sum total.¹⁴¹

By contrast, Uexküll's *Innenwelt* was not a microcosm containing the material medium of the organism's metabolism, rather it referred to an organism's physiological capacity for elaborating a depiction of its external surroundings in accordance with the Umwelt which predetermined their significance. In higher animals the knowledge afforded by an *Innenwelt* depended upon a network of neurological pathways which together organised stimulations spatially and in terms of different sensory categories. The resulting impression of a world was not isomorphic with external reality, nor was it equivalent to a psychological 'representation' of the environment, instead, what emerged from the mediation between stimuli and their reception was a sign, a relation organising the conveyance of sensory information from environmental events and the organism's corresponding reaction to this stimulus:

[I]n the nervous system it is not the stimulus itself that sets forth, but, instead, there appears a completely different process, which has nothing to do with environmental events. This has to be read as a *sign* that a stimulus is present in the environment and that it has encountered a receptor. Nothing is said about the quality of the stimulus. Stimuli from the external world are globally translated as a nervous sign language.¹⁴²

In accordance with the translation of stimuli into signs, another no less vital characteristic of each Umwelt concerned its further differentiation into what Uexküll called the 'Merkwelt', as the environment of sensory awareness, and the 'Wirkwelt', as the environment

¹⁴⁰ 'Now, a living organism is nothing but a wonderful machine endowed with the most marvellous properties and set going by means of the most complex and delicate mechanism. There are no forces opposed and struggling one with another; in nature there can be only order and disorder, harmony or discord.' Bernard, *Experimental Medicine*: p. 63.

¹⁴¹ Spitzer, 'Milieu and Ambience, cont.': pp. 183 – 184.

¹⁴² Jakob von Uexküll qtd. in translation in Brentari, *Uexküll*: p. 86. The original text reads: 'Er kann nur als Zeichen dafür dienen, daß sich in der Umwelt ein Reiz befindet, der den Rezeptor getroffen hat. Über die Qualität des Reizes sagt er nichts aus. Es werden die Reize der Außenwelt samt und sonders in eine nervöse Zeichensprache.' Uexküll, *Umwelt und Innenwelt*: p. 192.

of behaviour and effective action.¹⁴³ With this distinction Uexküll addressed the underlying separation between those sensory organs, such as the eye, that supplied information about the organism's surroundings, and those effector organs, such as the muscles and limbs, by means of which the organism reacted to stimuli. An Umwelt served to integrate these two contrasting, yet complimentary aspects of a single lived world. By articulating the relation between an organism and its environment, not only in terms of a passive reception of forces and information, but equally through the capacity of a creature to actively intervene within its surroundings, Uexküll opened up the connection between life and its setting as a dynamic hinging on interpretation. What mattered was not just the organism's ability to sense and so have its behaviour determined by particular stimuli, but the predisposition to register and respond to these sources of sensation in a manner which might render their apprehension meaningful.

Throughout his life Uexküll continued to develop the connotations of his concept of Umwelt, refining through experiment its implications for biology, and in some cases elaborating philosophical dimensions not necessarily explicit in its initial formulation. What remained critical within his work was the assertion that biology should proceed by means of a subjectivist epistemology, directed towards conceptualising the organism's capacity to grasp the objects of its subsistence, rather than treating the organism itself as if it were no more than a markedly complicated object.¹⁴⁴ Conversely, to attend solely to the *Umgebung*, the objective domain or geography which science tended to take for granted, but which was in fact simply the projected surroundings of the human Umwelt, was to neglect the intricate configurations of existence which, in actuality, delineated the living world.¹⁴⁵ Whilst these myriad facets of reality intersected, they could not straightforwardly communicate; their cooperation was predicated upon the compatibility of each organism's *Bauplan*. Supposedly, only human beings were endowed with the unique privilege of representing and articulating the state of their surroundings as they might be viewed independently of any single subjective perspective.

As for those organisms which lacked nervous systems, and so could not possibly establish a unified picture of their surroundings, the notion that such creatures inhabit an Umwelt may seem less valid. Yet, arguably, this concept is all the more appropriate in so far as it captures the degree to which biological entities are not wholly self-contained, but always caught within the scope of an environment that selectively orientates their activity. Strictly speaking, Uexküll aligned an Umwelt in the fullest sense only with those animals of sufficient complexity to coherently model their surroundings. Lacking the rudiments of the neurological framework which made reflexes possible, single-cellular organisms, plants, and some other

¹⁴³ Uexküll, *Theoretische Biologie*, 2nd revised edition, (Berlin: Verlag von Julius Springer, 1928): p. 111.

¹⁴⁴ Jakob von Uexküll, *Theoretical Biology*: pp. xi – xvi.

¹⁴⁵ Jakob von Uexküll, *Environment [Umwelt] and Inner World of Animals*: pp. 240 – 241.

forms of multi-cellular life, did not possess the capacity to reproduce a unified form of their environment as an *Innenwelt*, in the same manner as animals. Instead, lacking true synthesis, their interaction with external events was enacted only at the level of essential stimuli, apprehending the properties of objects, rather than distinguishing objects themselves as ensembles of properties.¹⁴⁶ Yet, so far as identifying organisms not just with their physiological attributes, but with the organisational plan that contextualised their existence, and guided the selection of stimuli from a given environment, the same principles applied across all forms of life.

Between the life of lower-organisms and that of their descendents Uexküll interposed a psychological barrier in the form of the ‘Gegenwelt’, the counter-world by means of which physiologically more complex beings could consolidate an internal representation of their environment. A primitive indication of the kinds of developments that might give rise to this counter-world was apparent in the neurology of earthworms, in which the distribution of ganglia into two separate centres suggested a means of discriminating between left and right. From this foundation, more sophisticated counter-worlds could be conceived as modelling the Umwelt of other species, depending upon the organisation of their nervous systems. Nuclei predisposed to successive excitation implied motorreception, the drafting of images upon the retina iconoreception, and accompanying distinctions of colour chromoreception, as an intensification in the intricate arrangements of nerve-endings was reflected in the sophistication of the organism’s counter-world.¹⁴⁷ For lower organisms such as the sea urchin, on the other hand, the lack of a continuous nervous system meant that not so much as a unified impulse could be attained; with the exception of shadows, all other stimuli generated only weak undifferentiated excitations. As a consequence of this lack of sensory unity, as far as a sea urchin was concerned it was apparently the ‘legs which moved the animal’, rather than, as we are accustomed to expect, the animal which moved its legs. Yet, in spite of its apparent disarray, Uexküll maintained that the contiguous construction of this ‘reflex republic’ was enough to draw the relevant features of the sea urchin’s surroundings into an organised Umwelt.¹⁴⁸ So long as an organism could receive stimuli and transform them into excitations Uexküll contended that they were able to form a function-cycle and correspondingly a specialised version of the world. It was the conditional unity of this Umwelt which sustained the life of the

¹⁴⁶ Uexküll did sometimes attribute a form of Umwelt to single cellular organisms, including within his *Theoretical Biology*. This makes his denial that plants possess an Umwelt, being immersed, instead, within a *Whonhülle*, a ‘dwelling integument’ that curtailed their relationship with the external world, somewhat puzzling. For a more detailed discussion of this question see Kalevi Kull, ‘An Introduction to Phytosemiotics: Semiotic Botany and Vegetative Sign Systems’, *Sign System Studies* 28 (2000), pp. 326-350.

¹⁴⁷ Jakob von Uexküll, *Environment [Umwelt] and Inner World of Animals*: pp. 235 – 236.

¹⁴⁸ Jakob von Uexküll, *Environment [Umwelt] and Inner World of Animals*: p. 231.

organism as a whole, suggesting that in the form of a nexus of signs, the lived environment obtained a precedence, which could not be subordinated to the mind, body, or soul of the creature in question.

The Lesson of the Tick

More than once in his writings Uexküll drew attention to the condition of the female tick following its fertilisation through mating:

The theme of life of the tick is simple. For her eggs to mature she needs warm blood. Mammals all have warm blood. To get warm blood the tick has to attack a mammal of any kind. How does the tick recognize a mammal?¹⁴⁹

As Uexküll explained, the tick has none of the so-called five senses in the form we might commonly understand these organs. Instead its sensory access to the world is differentiated only by those carriers of significance sufficient to complete the final stage of its life-cycle: reproduction followed by death. In addition to the dermal photosensitivity necessary to orientate a climb upwards towards sunlight, and thereby secure a vantage point from which it can drop onto a suitable host, in its fertilised state the tick's Umwelt consists of three other *Merkmalträger*, each of which induces a specific response. Firstly, the butyric acid which emanates from the skin glands of mammals, announces the proximity of the tick's approaching prey, and thus signals that it must release itself from its promontory, allowing either gravity or physical contact to guide it onwards. Secondly, having met with some kind of surface, attention to temperature allows the tick to detect whether it has encountered anything that is likely to be warm-blooded. Finally a degree of tactile awareness and sensitivity to texture enables the arachnid to locate a site unobstructed by hair, where it can bury its mouthparts beneath the skin, engorging itself with blood. All other possible indicators of a world beyond the tick's own impulses, ensuring the survivability of its eggs, recede into an indistinct background, a perimeter of absolute shadow. Those effects which might ordinarily be assumed to invoke the 'nature' of the tick's environment - the sound of birdsong, the scent of blossoms, the rustling of leaves in the wind – remain obscure. Even the chemical makeup of the liquid consumed is ignored; the tick lacks all sense of taste and will ingest any fluid of the right temperature.¹⁵⁰ If, having been dislodged from its post, the tick does not encounter anything of a suitable temperature then it will simply attempt to begin its ascent once again, thereafter potentially

¹⁴⁹ Jakob von Uexküll, 'The New Concept of Umwelt: A Link Between Science and the Humanities' (1936) *Semiotica*, 134, 1/4 (2001): p. 119.

¹⁵⁰ Uexküll, 'A Stroll Through the Worlds of Animals and Men': p. 7.

waiting without nourishment for up to eighteen years, until the scent of butyric acid brings an end to its suspense.¹⁵¹

As Giorgio Agamben has remarked, in its dedication to a single project the tick establishes a passion, together with these very few, intensely determined relations, that seems incomprehensible when weighed against the many layered intricacies of human consciousness: ‘The tick is this relationship; she lives only in it and for it’, fastidiously trailing those cues that instigate its movements, living only in the tension of their incorporation.¹⁵² In keeping with Martin Heidegger’s interpretation of Uexküll’s ideas, Agamben argues that what is most immediately striking about this Umwelt is its narrowness, a perceived poverty which defies empathy to the extent that it seems quite possibly absurd to associate it with any kind of awareness, or even to regard it as a ‘world’ at all.¹⁵³ Yet, Uexküll himself would not necessarily have appreciated this characterisation of his work. It was not simply the labelled parts of the tick’s *Bauplan* that should be acknowledged, nor should the restricted constituents of its Umwelt be emphasised in isolation, rather what deserved emphasis was that ethos of life which drove these distinct elements and sustained their relation to one another; in this sense Uexküll affirmed not only the poverty of the tick’s world, but its security, order, and vitality. What bound these distinct elements together was the tick’s own biology; its integral commitment to a set of laws structuring its environment, and the specific *Bauplan* that acted as a cipher, hinting at the rule of life that its physiology followed:

The tick’s life history provides support for the validity of the biological versus the heretofore customary physiological approach. To the physiologist, every living creature is an object that exists in the human world. He investigates the organs of living things and the way they work together, as a technician would examine a strange machine. The biologist, on the other hand, takes into account each individual as a subject, living in a world of its own, of which it is the centre. It cannot therefore, be compared to a machine, but only to the engineer who operates the machine.¹⁵⁴

This quotation helps attest to the role of what can be found at the centre of Uexküll’s biological understanding of life. What remained critical within his work was the assertion that biology should proceed by means of a subjectivist epistemology, directed towards

¹⁵¹ Uexküll, ‘A Stroll Through the Worlds of Animals and Men’: p. 12.

¹⁵² Giorgio Agamben, *The Open: Man and Animal*, translated by Kevin Attell (Stanford, California: Stanford University Press, 2004): p. 47.

¹⁵³ See Martin Heidegger, *The Fundamental Concepts of Metaphysics: World, Finitude, and Solitude*, translated by William McNeill and Nicholas Walker (Bloomington, Indianapolis: Indiana University Press, 1995).

¹⁵⁴ Jakob von Uexküll, ‘A Stroll Through the Worlds of Animals and Men’: pp. 7 – 8.

conceptualising the organism's capacity to grasp the objects of its subsistence, rather than treating the organism itself as if it were no more than a markedly complicated object. In addition to analysing the set of causally connected physical apparatuses described by physiology, Uexküll sought to appreciate the being that he purported must operate this device. This 'subject' did not necessarily amount to an immaterial reflective consciousness as in the Cartesian cogito. Instead it was defined primarily by the fact that it had 'a world of its own', the plot of a 'life history'. What gave rise to this world was the physiological capacity of this 'subject' to register phenomena as immanently significant, for example detecting the chemical presence of butyric acid as an invitation to 'let go' and relinquish a relatively secure position for the sake of a more pressing urge. It was the difference sustained by the relation of the 'subject' to its world that engendered meaning: for Uexküll's tick, butyric acid was not just a collection of molecules, but the sign of something other than itself, the presence of a mammal that, in turn, was not just a class of animal, but a creature possessing warm-blood, the tick's potential host and prey. In the same way that a machine must not only be engineered to be autonomous, but also triggered or switched on and thereby operated in order to function, through the corporeal interpretation of its world the organism endows the attributes of its body with a purpose ('Zweckmässigkeit') or directedness ('Zielstrebigkeit'), the anticipated telos of its drives, instincts and desires. As Uexküll's own phrasing has it, indications of stimuli, in their immanent connection with objects, 'enable the animal to guide its movements, much as the signs at sea enable the sailor to steer his ship', and the animal 'by the very fact of exercising such direction, creates a world for itself'.¹⁵⁵

According to Uexküll a 'subject' was not necessarily connected with an ego, in the psychological sense of a unified and self-conscious process of apperception. From a biologist's point of view, the subject was to be seen solely from the outside, a formation cohesive only in so far as its existence could be extrapolated from physiological facts. The subject's agency could only be determined hypothetically, without reference to its quality, as the inaccessible source of those ordered impulses directed towards the exterior.¹⁵⁶ It is through attention to these considerations that a decisive question arises: what is the nature of the 'subject' which is being exposed here? If, at its simplest level, the definition of this subject rests upon no more than the fact of it having a world, specifically the Umwelt which lends some organic coherence to otherwise incommensurate stimuli and excitations, then what makes this subject anything more than an inflection of the observer's perspective, the equivalent of a syndrome abstracted from diverse yet disparate symptoms? In Uexküll's account of it, the answer to these questions depended upon the 'natural factor' which enabled the cell, the basic framework of organic life,

¹⁵⁵ Jakob von Uexküll, *Theoretical Biology*: p. 126.

¹⁵⁶ Jakob von Uexküll, *Theoretical Biology*: pp. 226 – 227.

‘to be a law unto itself’ and thus to select indicators in keeping with its *Bauplan*.¹⁵⁷ Given that the impulses responsible for implementing this ‘natural factor’, and maintaining its framework, were supposedly irreducible to any material or mechanical basis, and so essentially inexplicable, this answer alone does not seem satisfactory.

From the outset of his *Theoretical Biology* Uexküll made plain his debt to the Kantian epistemology which he insisted had inspired his thought, stating that ‘[a]ll reality is subjective appearance’ and that ‘before any single piece of knowledge can be received, its form must already be prepared in the mind’.¹⁵⁸ As Geoffrey Winthrop-Young has observed, Uexküll’s representation of Kantian philosophy, here and elsewhere, is somewhat lacking in detail: Uexküll was not primarily concerned with conforming to those distinctions technically fundamental to Kant’s system, for example he did not consistently discriminate between the transcendental and the empirical, or the analytical and the synthetic, in the manner of an orthodox Kantian.¹⁵⁹ In fairness, at least initially, Uexküll did not intend to produce a philosophical rationalization of subjectivity, and he did not claim any particular expertise concerning this topic, rather he hoped to make possible a science attuned to the irreducibility of an organism’s relation to its world. However, as Winthrop-Young also observes, arguably just as interesting as the debt of Uexküll’s epistemology to the philosophical tradition, is the relationship of his biological theories to those media inventions which were helping to transform the makeup of the human Umwelt as the twentieth century began.¹⁶⁰

The networks of concepts which Uexküll strung together, in order to animate and ventriloquize the physiological attributes of organisms, had their counterpart in those telegrams, telephones, phonograms, and cinemas, which had begun to proliferate in conjunction with the growth and self-organisation of modern society.¹⁶¹ Diverted through an ever expanding grid of wires, screens, microphones, and speakers, these means of mechanically reproducing information were together colonising a new kind of Umwelt in their own right. Nevertheless, it is not enough to suppose that Uexküll’s ideas were simply a by-product of his time, an

¹⁵⁷ Jakob von Uexküll, *Theoretical Biology*: pp. 232 – 233.

¹⁵⁸ Jakob von Uexküll, *Theoretical Biology*: pp. xv – xvi.

¹⁵⁹ Geoffrey Winthrop-Young, Afterword to Jakob von Uexküll, *A Foray Into the Worlds of Animals and Humans* [1934], with *A Theory of Meaning* [1940], translated by Joseph D. Neil, introduction by Dorion Sagan (Minneapolis, Minnesota: University of Minnesota Press, 2010): p. 231. Brentari’s critical account of the role of Kantian concepts in Uexküll’s work, including the transcendental, is much more detailed.

¹⁶⁰ Winthrop-Young, Afterword to *A Foray Into the Worlds of Animals and Humans*: pp. 235 – 239.

¹⁶¹ As an early commentator on Uexküll’s work, Herbert Spencer Jennings noticed a reliance on machine-like conceptions of the organism’s workings, which persisted despite Uexküll’s critique of mechanistic explanations of life. Although, for his part Jennings recognized older forms of technology. ‘Main tubes, feeders, reservoirs, valves, etc., are devised and represented by diagrams, till we finally get figures which resemble the plan for a dye-works or a flour mill.’ ‘The Work of J. von Uexküll on the Physiology of Movements and Behavior’, *Journal of Comparative Neurology and Psychology*, Vol. 19, Issue 3 (June 1909), pp. 313-336: p. 326.

example of socially constructed science, and hence no more than the contingent effect of a historical cause. Certainly, new technologies facilitated the attempts of Uexküll and other biologists to model the behaviour and cognition of non-human animals, from both an experimental and conceptual point of view.¹⁶² Yet the invention of these technologies was reciprocally informed by those physiological characteristics of human beings, which, in turn, had been inherited and adapted from the legacy of non-human forms of life. Critically, the biology of human beings, as an addendum to that which orientated the course of life in general, included a propensity for seeking out, assessing, refining, recalling, and passing on signs, a propensity had its roots in those physical processes that had incited matter to organise itself in the first place. Arguably Uexküll's most technologically advanced idea was one of his first, the feedback loop of the *Functionkreis*, and his theories were, in a number of other respects, ill-timed, harking back to an ancient ideal of harmonious nature, as much as they pre-empted a growing emphasis on information and relativity.

Beyond this technological dimension of Uexküll's thought, and no matter the attempts of later theorists of life and mind to develop systematic conceptions of the environment within a more positivistic or materialist framework, a sense of subjectivity, which could not be subsumed in objective analysis, was key to the biologist's understanding of the *Umwelt*. For Uexküll, regulating every functional cycle, and so leading the way at the centre of each *Umwelt*, was the subject. It was this subjective aspect of the organism that animated an environment, enriching it with meaning, and converting what would otherwise remain an undifferentiated surrounding, into the lived experience of a world. By virtue of its subjectivity, every animal, from the simplest to the most complex, formed a perfect couple together with its *Umwelt*. As a law unto itself, even an individual cell could be deemed a subject, since its activity followed a set of prescribed rules which Uexküll insisted were irreducible to any mechanical process. What varied was the degree of complexity this relationship entailed: the simple animal inhabited a simple *Umwelt*; the multiform animal dwelt within an *Umwelt* as richly articulated as its own physiology. In either case, it was this subjective core which ensured that the organism as a whole acted in accordance with nature's plan.

The problem that this conviction seemed to entail was that of ever finding empirical evidence of where this spirit of subjectivity might originate. Although Uexküll was happy to attest that the subject 'lies concealed, eternally beyond the reach of knowledge', on occasion he seemed unable to resist the temptation to provide proof of this inexplicable essence of life.

¹⁶² For an account of late nineteenth and early twentieth century attempts to simulate life and model intelligence using machines, prior to the advent of cybernetics, as well as details of the context of research into neurology which influenced Uexküll, see Roberto Cordeschi, *The Discovery of the Artificial: Behaviour, Mind and Machines Before and Beyond Cybernetics*, (Dordrecht; London: Kluwer Academic, 2002).

He veered closest to vitalism when contrasting the mysterious qualities of protoplasm with the functional framework in which this material was contained.¹⁶³ As the remarkable “living” substance enshrined in every cell and apparently capable of spontaneous regeneration, protoplasm seemed to embody a transcendent subjectivity directing life.¹⁶⁴ Through the course of the nineteenth century many scientists had come to see living processes as a consequence of the organising properties of protoplasm, and this trend persisted during the first half of the twentieth century. Unlike those, such as Thomas Huxley, who had viewed protoplasm as verifying the materiality of vital forces, Uexküll pursued the opposite conclusion: the morphogenesis of protoplasm represented evidence of ‘supermechanic properties’ which resisted empirical analysis.¹⁶⁵ The ‘perfect machine’ embodied by the organism’s physiology was created, ruled, and regulated, by the non-material order inaccessibly embedded in.¹⁶⁶ In fact, as genetics would eventually establish, neither account of protoplasm was adequate, although the flaw in both a materialist and neo-vitalist approach to the question of an essence of life runs deeper than a failure to examine the chemical composition of cells in enough detail.

What obscures matters in the analysis of protoplasm, eliding the depth of Uexküll’s own insight, is the identification of the subjective aspect of an organism as a *cause* in a sense already unduly diminished by the prejudices of scientific modernity. The difficulty was not the postulated existence of a biological factor supplementing the sequential execution of a physical cause and material effect, so much as the push to establish the cause of that which, apparently by definition, was without a cause. Understood in these deterministic terms it was inevitable that Uexküll’s reference to an unknowable natural factor must perpetuate a self-defeating pattern of circular reasoning, and make it difficult to avoid the conclusion that, much like the Cartesian cogito, the presence of an irreducible subject was presumed to be relevant before the question of its existence was even asked. Merleau-Ponty memorably compared Uexküll’s conception of the subject to ‘a pure wake without a boat’, a transient sign of absence which, despite the trace of turbulence that it leaves behind, cannot be authentically attributed to any retreating presence.¹⁶⁷ By consolidating a chain of objects within experience without itself becoming an object, Uexküll’s sense of subjectivity was founded on the sign of a disturbance without evincing the involvement of anything other than a phantom culprit. Yet, this apparent

¹⁶³ Jakob von Uexküll, ‘A Stroll Through the Worlds of Animals and Men’ [1934], translated by C. Schiller, in *Instinctive Behaviour: The Development of a Modern Concept*, edited by C. Schiller (London: Methuen, 1957): p. 80.

¹⁶⁴ Jakob von Uexküll, *Theoretical Biology*, translated by D. Mackinnon, (London: K. Paul, Trench, Trubner & co, 1926): p. 114.

¹⁶⁵ Brentari, *Uexküll*: pp. 65 – 70.

¹⁶⁶ Uexküll, *Theoretical Biology* (1926): p. 123.

¹⁶⁷ Maurice Merleau-Ponty, *Nature: Course Notes from the Collège de France*, compiled and with notes by Dominique Séglaard, translated by Robert Vallier (Evanston, Illinois: Northwestern University Press, 2003): p. 176.

lacuna in Uexküll's work is itself instructive, in so far as it subverts the model of a fixed border surrounding a central point of reference, along with the corresponding opposition of a subjective interior to an objective exterior which typifies conventional accounts of the environment. In its place, and with reference to the diverse corporeal means of establishing significance preoccupying those lives that Uexküll sought to open up, a sense of inhabitation and the lived environment is evoked that accentuates the labyrinthine dispersal of meaning in a variety of different directions and forms. What is then left, following the dispersal of subjectivity, is not the undead remains of an idealised ego, but the nexus of those processes of interpretation which proliferate in the wake of this succession.

To reinforce a sense of the semiotic role played by subjectivity in Uexküll's biology, attention should be drawn to a particularly peculiar passage, overlooked by Heidegger and Agamben. As if, in an anthropomorphic misstep, to emphasise the analogical continuity between the animal's relation to its world and events of human significance, Uexküll compares the tick's selective behaviour to that which guides the preferential taste of an individual's palate.

Like a gourmet who picks the raisins out of a cake, the tick has selected butyric acid alone from among the things in her environment. We are not interested in knowing what taste sensations the raisins give the gourmet. We are interested solely in the fact that the raisins become sign stimuli in his world, because they have special biological meaning for him.¹⁶⁸

For Uexküll, the important point stemming from this analogy is that an analysis of the manifold structure uniting Umwelt, organism, and sign, cannot convey the content of a specific meaning from the point of view of its recipient. It can only provide a model for explicating the sequence of events by way of which a stimulus enters and orientates the world of an organism, becoming a sign with its own special biological meaning. However, Uexküll's simile '[l]ike a gourmet' is also interesting for its introduction of an aesthetic dimension into the analysis of the organism's behaviour. The notion that the selective activity of organisms is akin to the discernment that supposedly guides activities connected with taste and by extension art (both its creation and its appreciation) is not unusual in Uexküll's work, but more commonly it is with reference to music that this association is made. Uexküll denies that the taste sensations themselves are relevant, and it would seem necessarily so since these taste sensations must remain inaccessible, locked within another creature's Umwelt. Yet, the persistence of aesthetic metaphors within his work deserves greater scrutiny. Unintentionally, by comparing the behaviour of a tick to the disposition of a kind of aesthete, Uexküll introduced an element of

¹⁶⁸ Jakob von Uexküll, 'A Stroll Through the Worlds of Animals and Men': p. 13.

interpretation, flexibility, and hence indeterminacy into his otherwise rule-bound assessment of the organism's Umwelt.

Though, from a physiologist's point of view a tick's behaviour is unequivocally compulsive, being embedded in reflex rather than a more elaborate and unpredictable form of cognitive decision-making, conceiving of its selective activity *as-if* it were due to taste flags up the chimerical possibility that this tick might have made a different choice. So far as an individual tick's actual relationship with its surroundings is concerned this possibility is almost certainly an illusion (a fact that can be confirmed by laboratory experiments on ticks, as well as with reference to their anatomy): the failure to make the right choice, to either adopt a preference for another kind of acid, or eschew acid altogether, would inevitably result in a failure to reproduce, and so it is debatable whether a tick adopting these maladaptive practices is even worthy of the name. Yet, when this idea is connected with the broader context of ecological and evolutionary change, the association of biological processes with that indeterminacy inherent within aesthetic judgements potentially seems less absurd.

Uexküll's Contested Legacy

What was radical about Uexküll's concept of the Umwelt was that it established a continuity between different forms of life, not just at a physiological level, in terms of the evolution of species, but at a cognitive, or, in fact, semiotic level, through the means by which each and every living organism made sense of its surroundings. Crucially, this continuity was founded on the basis of the contextualised interaction between an organism and its environment; it did not just involve abstracting the idea of human consciousness, and projecting an analogous form of interiority onto the lives of other animals. The split form of the human being – at once abject, as just one objective body among others, and yet valorised, as the sole bearer of a sentient subjective mind – could thereby be genuinely challenged. No longer was the emergence of a subject necessarily predicated on some form of withdrawal or exemption from a world, rather the world itself in conjunction with mind could be conceived of as a dynamic form of sense-making in which physical and mental processes must intermingle, reshaping or redirecting one another. This is not to say that Uexküll understood his own ideas in exactly these terms, and it would be all the more anachronistic to directly identify Uexküll writings with those art installations that emerged later in the twentieth century.

By promoting the notion that all of existence is ultimately subjective, an overly crude interpretation and consequent misunderstanding of Uexküll's theories simply reinforces one aspect of Descartes' split conception of mind and world. Whether animal or human, when erroneously detached from its origins within an environment the essence of subjectivity appears inexplicable and so recedes beyond investigation. Uexküll was no Cartesian, but his scepticism

concerning Darwinian accounts of evolution, together with his neo-Kantian explanation of life's organisation, did not provide an entirely satisfactory account of the development of sentience and purpose on behalf of biological organisms. Summing up this point of view, in his *Theoretisch Biologie*, Uexküll stated that:

There is, then, a non-material order which first gives to matter its structure – a rule of life. This rule becomes apparent only when it is creating the structure, which is formed along strictly individual lines, according to the material properties of the protoplasmic animal concerned.¹⁶⁹

On the one hand, this contention introduces a transcendental justification of life's self-organisation, specifying a structural formation which is not beyond empirical manifestation, but rather presupposed in the rationally ordered appearance and behaviour of the organism. As such, it implies an autonomously generated form of causality, which resists explanation in terms of purely extraneous physical forces as in Newtonian mechanics, but which nonetheless retains a sense of natural processes as empirically explicable.¹⁷⁰ On the other hand, coupling the idea of a 'non-material order' with reference to 'the material properties of the protoplasmic animal' imparts a paradoxically constitutive role to that which has already been defined as incorporeal. It is this suggestion of an organic substance that somehow defies the laws of chemistry and physics which makes it difficult to avoid the impression of a supernatural element or principle guiding life, and it is this hint of an inexplicable ingredient which leaves Uexküll vulnerable to the charge of espousing an unverifiable vitalism. Arguably then, only part of the process of overcoming the assumptions attached to the legacy of Cartesian science can be deduced from Uexküll's theories. To fully avoid a presupposition of biological order and purpose as attaining rational self-determination through effectively unfathomable means, what needs to be teased out in more detail is a sense of the evolutionary reality of those relations which organise living systems.

Together with surreptitiously supporting Classical conceptions of representation, which remained predicated upon the withdrawal of mind from world, aspects of Uexküll's work also promoted an idea of an essential and immutable human nature, which was inexorably divided from that of other animals. This privileging of the human was not necessarily Uexküll's intention. As he demonstrated in *Umwelt und Innenwelt der Tiere*, the image of the Umwelt of each species of animal encapsulating that of simpler creatures, as in a series of ever more

¹⁶⁹ Uexküll, *Theoretical Biology*, (1926): p. 123. Translation modified.

¹⁷⁰ For a philosophical history of this alternative account of causality which diverges from Newtonian mechanics see Alicia Juarrero, *Dynamics in Action: Intentional Behaviour as a Complex System* (Cambridge, MA: MIT Press, 1999): p. 147. Qtd. In Hoffmeyer, *Biosemiotics*: p. 177.

expansive concentric circles, invoked continuity as well as a hierarchy distinguishing different forms of life.¹⁷¹ Unsurprisingly, Uexküll situated human beings at the summit of this hierarchy, with access to a broader and richer Umwelt than any other species. Scientific knowledge represented the frontier of the human Umwelt, surpassing the limitations of bodily perception through the mediation of technology, and approaching an ever more refined objective perspective on the world. Yet, Uexküll also emphasised the diversity of human perspectives, from the astronomer examining stars and planets, visualised over vast distances, to the nuclear physicists studying a sub-atomic universe. Nor did he restrict this plurality of worldviews to scientists, noting, for example that a musician would recognise distinct harmonies, where an acoustician might foreground the spectral characteristics of these sound waves, and a lay listener simply acknowledge a familiar tune.¹⁷²

Despite this promise of a cosmopolitan conception of human experience, some of those who applied Uexküll's theories to humanity would instead fixate on the idea that the biological superiority of human life was tied to a preordained structure. In 1937, the developmental psychologist Eduard Spranger praised the concept of an Umwelt as rectifying the erroneous idea of a milieu, criticising the latter's association with theories of evolution, and advocating the former's influence as substantiating a preformed frame.¹⁷³ Another review written in 1936, by the Hamburg University professor Gustaf Deuchler, had explicitly identified milieu theory with the Bolsheviks, while suggesting Umwelt research reflected the world view of National Socialism.¹⁷⁴ Naturalising the deterministic role of the environment in this manner potentially nurtured a sense that human beings ought to find unity within a racialised national plan, while allowing for the identification of those who deviated from this order as inherently pathological. Although he would eventually seek to distance himself from the Nazi preoccupation with race, Uexküll had humoured comparable views in his *Staatsbiologie* first published in 1920, a text which opposed the pathology of political forms such as democracy and communism, to the

¹⁷¹ 'Und wenn man sich die Tiere als Beobachter denkt, so wird jedesmal die Umwelt des höheren Tieres als die Umgebung des niederen Tieres gelten können, in der es von diesem beobachtet wird. Dem Beobachter stellt sich das niedere Tier zusammen mit seiner Umwelt als seine geschlossene Einheit dar, während die Einheit des höheren Tieres mit seiner Umwelt niemals vom niederen Tiere erfaßt werden kann. Diese Auffassung der Tierreiche erzeugt die Vorstellung von immer größeren Kreisen, die den nächst kleineren umschließen.' Uexküll, *Umwelt und Innenwelt* (1909): p. 252.

¹⁷² Jakob von Uexküll, 'A Stroll Through the Worlds of Animals and Men' [1934]: pp. 76 - 80.

¹⁷³ Jui-Pi Chien, 'Of Animals and Men: A Study of *Umwelt* in Uexküll, Cassirer, and Heidegger', *Concentric: Literary and Cultural Studies* 32.1 (January 2006), pp. 57-79. Spranger's relationship with Nazism was a lot more fractious than Chien acknowledges. Though the quotations Chien takes from Spranger's commentary on Uexküll do demonstrate a racialised interpretation of the biologist's theories, such an interpretation was not characteristic of Spranger's work. Eduard Spranger, '[Editorial remark on] Uexküll's, 'Die neue Umweltlehre: Ein Bindeglied zwischen Natur- und Kulturwissenschaften'' *Die Erziehung, Monatsschrift für den Zusammenhang von Kultur und Erziehung* 13.5 (1937), pp. 199-201.

¹⁷⁴ Anne Harrington, *Reenchanted Science: Holism in German Culture from Wilhelm II to Hitler* (Princeton, New Jersey, and Chichester: Princeton University Press, 1996): p. 69.

healthy biology of a strong monarchical state.¹⁷⁵ As Jonathan Beever and Morten Tønnessen document, a shift from a descriptive to a normative analysis of culture, supposedly justified on the basis of biology, had also been pursued in Uexküll's 1917 essay on 'Darwin und die Englische Moral', and earlier still with the 1915 essay 'Volk und Staat'.¹⁷⁶ Uexküll's ongoing correspondence with the philosopher, Houston Stewart Chamberlain, had provided an impetus to develop these connections between biological and political issues, but in a 1933 letter to Eva Chamberlain, the philosopher's widow, Uexküll denounced the purge of intellectuals and the persecution of Jews, perhaps in an attempt to reason with the Nazi state.¹⁷⁷

Interpretations of Uexküll's biological theories which stress their affinity with racist and fascistic doctrines cannot be divorced from the advantage of historical hindsight, yet, even beyond this line of reasoning, other elements of his work may reinforce, rather than challenge, received ideas concerning the intellectual sovereignty of the human species. Another friend of Uexküll's, the philosopher Ernst Cassirer, offers a good example of this still persistent inclination to uncouple the human mind from the distinctive continuity relating life to an Umwelt. Cassirer stands out here, not because of the weakness of his logic, but because he goes a long way towards accommodating Uexküll's reasoning within his approach to human nature, and for the most part presents a very convincing account of the specificity of the world inhabited by humanity.¹⁷⁸ In the second chapter of *An Essay on Man*, a summation of the comprehensive account of culture developed in his *Philosophy of Symbolic Forms*, first published in 1944, Cassirer asks whether Uexküll's theories are appropriate for a description and characterisation of the human world. Although he concedes that this world must be no exception to the biological rules governing other forms of life, Cassirer nonetheless insists that the Umwelt of man has not only quantitatively enlarged, but qualitatively changed, enabling him alone, as an *animal symbolicum*, to adapt to his environment in an unprecedented manner, securing 'a new dimension of reality'.¹⁷⁹ In the following chapter, 'From Animal Reactions to Human Responses', Cassirer surveys research into animal intelligence. He warns against accepting human culture as a given fact, and finds several examples of intelligence and symbolic processes in animal behaviour, observing that more sophisticated forms of indirect response to

¹⁷⁵ Jakob von Uexküll, *Staatsbiologie (Anatomie – Physiologie – Pathologie des Staates)* (Berlin: Gebrüder Patet, 1920). Harrington, *Reenchanted Science*: pp 59 – 62.

¹⁷⁶ Jonathan Beever & Morten Tønnessen, "'Darwin und die englische Moral': The Moral Consequences of Uexküll's Umwelt Theory', *Biosemiotics* 6 (2013), pp. 437-447. Jakob von Uexküll, 'Darwin and the English Morality', translated by Morten Tønnessen, *Biosemiotics* 6 (2013), pp. 449-471.

¹⁷⁷ Harrington, *Reenchanted Science*: p. 70.

¹⁷⁸ For further analysis of the personal and intellectual relationship between Cassirer and Uexküll see Barend van Heusden, 'Jakob von Uexküll and Ernst Cassirer', *Semiotica* 134, 1/4 (2001), pp. 275-292.

¹⁷⁹ Ernst Cassirer, *An Essay on Man: An Introduction to the Philosophy of Human Culture* (New Haven & London: Yale University Press, 1944): p. 24.

stimuli on behalf of animals are indisputable.¹⁸⁰ All the same, Cassirer recurrently avers that the propositional language of human beings is without parallel in the lives of other organisms. In his consequent concern to set symbols apart, he seems to conflate other kinds of ‘signs’ with ‘signals’; despite disputing Edward Thorndike’s portrayal of animal intelligence as merely reactive, and denying that higher animals may only solve problems mechanically via trial and error, Cassirer’s presentation of both signals and, by implication, non-symbolic signs, as ‘operators’ implies a purely functional role, which elides the significance of the relation between organism and Umwelt as something more than a matter of material circumstance.¹⁸¹

Cassirer was right to distinguish linguistic communication as a peerless attribute of the human species, amounting to a symbolic system which allows for detachment from the corporeal basis of individual expression, and the elaboration of extraordinarily sophisticated forms of conceptual abstraction. It is not just the basic distinction between expressive sounds and their meanings, as governed by convention, which makes this intricacy and flexibility possible, but the structured relations between entire systems of reference, able to encompass both audible and visible elements, which opens up a new means of articulating thought and representing the world.¹⁸² As such, human language is not just a substitute for other forms of communication, such as gesture, it is genuinely original. What can perhaps be disputed is the idea that this particular difference in kind, even in the unique form of articulate language, is inimitable enough to carve out an unbridgeable gap between human culture and the nature of life in general, when compared to the various and no less extensive differences between the Umwelten of other species. The difference between the Umwelt of a human being and that of another primate is surely no more radical than the gulf separating the world as encountered by a paramecium from that experienced by an elephant. What might be lost if excessive due is given to the symbolic systems organising human interactions, particularly as entrenched within the imagined, i.e. world-picturing, perspective of the individual, is a sense of the more primal role of the relationality of signs as a means of collectively inhabiting and transforming an environment.

Cassirer envisaged linguistic thought and communication as a ‘third link’ inserted between the receptor system and the effector system which govern an animal’s response to stimulus, but he fails to ask and so to properly address what, prior to the advent of human language, connects and contextualises the difference between these two systems.¹⁸³ Language and culture are not gifts belatedly granted to humanity, facilitating both intellectual and

¹⁸⁰ Cassirer, *An Essay on Man*: pp. 27 – 28.

¹⁸¹ Cassirer, *An Essay on Man*: pp. 31 – 33.

¹⁸² Hoffmeyer, *Biosemiotics*: p.274. While noting Cassirer’s definition of the human as a symbolic animal, in his account of human language Hoffmeyer refers primarily to Terrence Deacon’s work *The Symbolic Species: The Coevolution of Language and the Brain* (London: Allen Lane, 1997).

¹⁸³ Cassirer, *An Essay on Man*: p. 24.

instrumental mastery over the natural world, but systems of signs that prefigure and compose the emergence of the human mind, as intimately coupled with the Umwelt into which each human being is born. Citing Herder, Cassirer approaches this view, asserting that '[s]peech is not an object, a physical thing for which we may seek a natural or supernatural cause. It is a process, a general function of the human mind.'¹⁸⁴ What is more suspect is Herder's claim, taken up by Cassirer, that, through the reflective thought facilitated by language, man's soul can 'segregate from the whole ocean of sensation', gaining access to an ideal world beyond biological needs and practical interests.¹⁸⁵ On the contrary, the world of human language, however complex, is forever and at every level interlaced with the reality of those signs that are already at work in sensory as well as intellectual experience, and embedded in the genetic inheritance and neurophysiology that structures and situates the logic of these signs. Once again, to foster a more grounded account of the development of human culture a more refined understanding of the biological roots of these semiotic relations is required. As Hoffmeyer suggests, as far back as our distant prehistory, the unavoidable separation of speech from what is spoken about must have unsettled the sense of human beings that they belonged to the world, making precarious the relation between the materiality of an inhabited environment and its intelligibility.¹⁸⁶ Retaining a sense of the reality of signs coupled with that of the independently existing world which orientates their meaning – in other words, maintaining a complete comprehension of the cultural roots of human life – entails repairing rather than further severing the link between Umwelt and organism.

As for art, while there is no clear evidence that Uexküll's theories directly influenced those artists who would seek to radically overhaul art's dependence on traditional aesthetic values, his ideas do bear closer comparison with the work of a poet who approached these conventions in a different manner, and who was in fact a personal friend of Uexküll's.¹⁸⁷ With works like 'Der Panther', 'Archaischer Torso Apollos', and his *Duineser Elegien*, Rainer Maria Rilke devised a poetry that persistently questioned the relation between the interiority of mind and the exteriority of the world, grasping this relation as integral to the existence of art in the first place. Although Rilke maintained a tangential relationship to art movements, preferring to understand his art as a solitary pursuit, it is still possible to connect his work with the influence of Romanticism and Symbolism, as well as the broader context of Modernism which developed through the first half of the twentieth century. As Schwitters example of the Merzbau demonstrates, the inventions of Modernism pre-empted and perhaps helped prompt the

¹⁸⁴ Cassirer, *An Essay on Man*: p. 39.

¹⁸⁵ Cassirer, *An Essay on Man*: p. 40.

¹⁸⁶ Hoffmeyer, *Biosemiotics*: p. 266.

¹⁸⁷ Malte Herwig, 'The Unwitting Muse: Jakob von Uexküll's Theory of Umwelt and Twentieth-century Literature', *Semiotica* 134, 1/4 (2001), pp. 553-592.

proliferation of post-war and contemporary artworks explicitly challenging the boundaries of the gallery and the frame. Rilke's poetry was not formally experimental to the same degree as some of his contemporaries. He did not experiment with typography and lyrical form in the manner of Apollinaire or Mallarmé, the taste for the absurd and the unusual which characterised Dada and Surrealism, and especially the ecstatic celebration of technology that inspired Futurism, would all diverge from his interests. Yet, by exploring the connection between the situated perception of living creatures and the point of view provided by a text, the subject matter of Rilke's poems does approach those difficulties inherent in relating mind to world.

As epitomised by Uexküll's theories, the reorientation of the environment and the organism, from a structure of linear determinations to a system of reciprocal coordination, would prove fundamentally important for the development of the life sciences in the twentieth century. Nevertheless, those of his contemporaries, such as Jacques Loeb and Herbert Spencer Jennings, who commended Uexküll's example in attempting to study organism and environment as an integrated whole, would endeavour to dispense with the vitalism they perceived compromised the concept of an Umwelt in favour of a more deterministic perspective. Even as he affirmed the influence of the whole on the parts of the organism, Loeb criticised those, including Driesch and Uexküll, who explained particular processes in physiochemical terms, while presenting their unity as the expression of non-physical agencies.¹⁸⁸ Loeb reverted to a definition of the environment as 'a rather rigid combination of definite forces', and the tropisms which he described as motivating each organism were likewise explicable as determinate mechanisms of cause and effect.¹⁸⁹ Jennings was more circumspect, acknowledging that physico-chemical explanations were at the time still limited, and arguing that an organism must be understood not just synthetically, through assembling its particular material properties, but analytically, by way of its overall functional organisation.¹⁹⁰ Nonetheless, Jennings maintained that an attempt to explain this organisation based on what Uexküll called his *anschaulich* method, rather than empirical verification, was ill-advised, and so dismissed the ambition of proceeding beyond a conventional causal explanation of biology.¹⁹¹ Even Konrad Lorenz – who borrowed extensively from Uexküll's theories in his

¹⁸⁸ Jacques Loeb, *The Organism as a Whole from a Physicochemical Viewpoint* (New York: Putnam's Sons, 1916): pp. 2 – 10.

¹⁸⁹ Jacques Loeb, *The Mechanistic Conception of Life: Biological Essays* (Chicago, Ill: University of Chicago Press, 1912): p. 195.

¹⁹⁰ Herbert Spencer Jennings, 'Diverse Ideals and Divergent Conclusions in the Study of Behavior in Lower Organisms', *The American Journal of Psychology*, Vol. 21, No. 3 (July, 1910), pp. 349-370.

¹⁹¹ Jennings noted Uexküll's aversion to 'anything vague, ill-defined or mystical', and praised his dedication to observation of the living organism in its environment, but he did not pursue the idea that an Umwelt might amount to something more than a set of physical conditions. Herbert Spencer Jennings, 'The Work of J. von Uexküll on the Physiology of Movements and Behavior', *Journal of Comparative Neurology and Psychology*, Vol. 19, Issue 3 (June 1909), pp. 313-336.

early works on ethology – would eventually reject any attempt to define an Umwelt as the subjective lived environment unique to a species, in favour of privileging an objective field of research determined by purely mechanistic hypotheses.¹⁹² What was neglected, in these efforts to banish those remnants of vitalism that were perceived to be unscientific, was a complete conception of the Umwelt as a relational setting of mind as well as matter. Perhaps for this reason, the influence and legacy of Uexküll’s ideas fractured, and the singular character of his contribution to biological science was no longer widely grasped.

¹⁹² See for example Konrad Lorenz, *The Natural History of the Human Species: An Introduction to Comparative Behavioral Research: The “Russian Manuscript” (1944 – 1948)*, trans. By Robert D. Martin (London: The MIT Press, 1996): pp. 195 – 196. For an account of Lorenz’s criticisms of Uexküll throughout his career see Carlo Brentari, ‘Konrad Lorenz’s Epistemological Criticism Towards Jakob von Uexküll’, *Sign System Studies* 37, 3/4 (2009), pp. 637-662.

Pragmatic Parallels

As Canguilhem notes in his account of ‘The Living and its Milieu’, the approach Uexküll pioneered had further parallels in the earlier development of American pragmatism at the end of the nineteenth, which likewise emphasised ‘the role of values in relation to the interests of an action’.¹⁹³ Canguilhem draws attention to John Dewey’s reversal of the relation between organism and milieu: external influences were not simply *imposed* upon living organisms, instead the existence of the organism was predicated on its capacity to *propose* its own orientations, actively adapting to its surroundings.¹⁹⁴ Just as Uexküll would realise, Dewey recognised that the constitutive role of the organism in making sense of an environment indicated not only a physiological explanation of life’s dynamics, but a naturalistic approach to epistemological questions. Yet, in drawing this parallel Canguilhem does not mention any of those other pioneers of pragmatism whose work supported and inspired Dewey’s conclusions. In an autobiographical essay Dewey singled out James’ *Principles of Psychology* for having provided a ‘specifiable philosophical factor’, imbuing his thought with ‘a new direction and quality’, which Dewey explained as combining a critically inclined subjectivism with a progressive biological conception of the psyche.¹⁹⁵ Again the similarities to those ambitions guiding Uexküll’s research are well apparent, though Uexküll would not have approved of the anthropocentric bias connected with the idea of the psyche. Furthermore, although James did assign an important role to the environment of the organism in his *Principles*, this concept retained a predominantly mechanistic function connected with those Lamarkian explanations of evolution which James sought to criticise.¹⁹⁶ In a later essay, broaching a sustained discussion of this topic, James defined the environment in Darwinian terms as a tangible ‘perfectly known thing’, to be contrasted with the ‘molecular’, ‘invisible’, and ‘inaccessible’ causes motivating the organism on the basis of its inherited variation.¹⁹⁷ While taking up the Spencerian view that the unity of mental and bodily life consisted in the adjustment of inner to outer relations, in his struggle to repudiate Spencer’s anachronistic and fatalistic ‘philosophy of force’ James

¹⁹³ Canguilhem, *Knowledge of Life*: p.110.

¹⁹⁴ Canguilhem does not cite a specific text, but this principle can be found throughout Dewey’s work. An early formulation of this theme is developed in ‘The Reflex Arc Concept in Psychology’ in which Dewey criticized the notion that passive stimulation caused awareness and hence an automatic response, as effectively a reiteration of the Cartesian doctrine dividing mental and physical properties. Instead, he argued that the organism actively integrates sensory and motor responses in order to guide itself through an environment. John Dewey, ‘The Reflex Arc Concept in Psychology’, *Psychological Review* 3 (1896), pp. 357-370.

¹⁹⁵ John Dewey, ‘From Absolutism to Experimentalism’ in *Contemporary American Philosophy: Personal Statements*, edited by George P. Adams and W. Pepperell Montague (New York: Macmillan Co., 1930): pp. 24 – 25.

¹⁹⁶ William James, *Principles of Psychology: Volume 2* (London: Macmillan, 1891): pp. 626 – 627.

¹⁹⁷ William James, ‘Great Men and their Environment’ in *The Will to Believe: And Other Essays in Popular Philosophy* (Cambridge, Massachusetts: Harvard University Press, 1979): pp. 242 – 281.

neglected to develop a more robust concept of the environment itself. No matter whether material or social in form, as a site of extraneous conditions James' notion of the environment lacked the distinctive role of Uexküll's Umwelt as a domain integral to the organism's sensibility and agency.

Along with James, Dewey was strongly influenced by Charles Peirce, who in the 1880s had lectured him on mathematical logic and the philosophy of science at John Hopkins University.¹⁹⁸ James had popularised the idea of pragmatism with reference to Peirce through an 1898 address delivered at Berkley on 'Philosophical Conceptions and Practical Consequences'.¹⁹⁹ He cited Peirce's 1878 article 'How to Make Our Ideas Clear' for having introduced the word 'pragmatism' in connection with the assertion that beliefs are really rules for action, and for defining truth on the basis of the behavioural conduct it inspires. James understood this doctrine as continuing an older philosophical trend he affiliated with English philosophers such as David Hume and John Stewart Mill, which involved forsaking metaphysical speculation and abstraction for the sake of clarifying the practical consequences of thought.²⁰⁰ Yet, Peirce would subsequently seem to distance himself from this affiliation, distinguishing his own version of this doctrine as 'pragmaticism', and stressing his debt to Kant and Leibniz, while criticising both Hume and Mill. While Dewey's acknowledgement of the extent of Peirce's influence came later, in works such as his *Logic: The Theory of Inquiry* (1938) and *Knowing and the Known* (1948) it was Peirce, rather than James, who Dewey identified as having laid the groundwork for his approach to philosophy.²⁰¹ Contrary to aspects of James' account of pragmatism, and certainly in opposition to its subsequent reception by figures such as Richard Rorty, Dewey and Peirce ultimately shared a conviction that it was not enough to regard truth as the contingent result of satisfactory consequences; what was needed was an explanation of those ends which motivated satisfaction, and this demanded a much more vigorous interrogation of traditional conceptions of subjectivity, while refining, rather than diminishing or dispensing with, definitions of truth and meaning.²⁰²

¹⁹⁸ For an account of the influence of both William James and Charles Peirce on the early development of Dewey's thought see James Scott Johnston, *John Dewey's Earlier Logical Theory* (Albany: State University of New York Press, 2014): pp. 22 – 27.

¹⁹⁹ William James, 'Philosophical Conceptions and Practical Results' (1898) in *The Heart of William James*, edited by Robert D. Richardson (Cambridge, Mass.: Harvard University Press, 2010).

²⁰⁰ James, 'Philosophical Conceptions and Practical Results': pp. 200 – 202. With a title that lay emphasis on the familiarity of the empiricist doctrine he associated with both Peirce and Dewey, William James developed this theme further in his 1907 lectures on *Pragmatism: A New Name for Some Old Ways of Thinking* (Cambridge, Mass.: Harvard University Press, 1921).

²⁰¹ John Dewey, *Logic: The Theory of Inquiry* (New York: Henry Holt and Co., 1938). John Dewey and Arthur F. Bentley, *Knowing and the Known* (Westport, Connecticut: Greenwood Press, 1975).

²⁰² For a presentation of Peirce's pragmaticism versus the pragmatism of Rorty, see Susan Haack, 'Peirce and Rorty in Conversation' in *Manifesto of a Passionate Moderate* (Chicago: University of Chicago Press, 1998).

If it were not for his already well established influence on biosemiotics the position of Peirce in this thesis might seem misplaced, given that he relatively rarely referred to the ‘environment’ as a distinct concept, and he is not well known for having developed a critical account of this idea. When Peirce did make use of this term it was often with reference to competing versions of evolutionary theory, including those of both Lamarck and Darwin (CP 1.104, 1.397, 2.86, 6.17). Occasionally Peirce also mentioned the ‘environment’ in conjunction with his own concept of the index, as a point of reference common to interlocutors assessing the truth of a proposition (CP 2.318). Most significantly, Peirce promoted the ‘operation of the environment’ in his Lamarckian account of the evolution of mind, with this setting acting as a means of breaking up those mechanistic routines of habit which had grown lethargic, rendering the mind lively, and thereby facilitating originality through ‘exercise’ and the ‘transaction of learning’ (6.301).²⁰³ Although these references do align with an anti-Cartesian correlation of mind with world – in the same context Peirce affirmed both the mind’s continuity, and the belief that all matter is really inveterate mind – they do not attain the same level of specificity as Uexküll’s sense of Umwelt, as a domain at once formed *by* and giving form *to* an organism’s activity. In fact, Peirce’s conception of the role of the environment in evolution, as inciting free-play, is seemingly at odds with Uexküll’s linking of each Umwelt with an ineffable rule of life.

Nonetheless, because Dewey continually situated a critical concept of the environment at the heart of his philosophy, his reception of Peirce’s thought does suggest that a framework for mind akin to Uexküll’s Umwelt may be derived from Peircean principles. Defining ‘Environment and Organism’ in one of his contributions to Paul Monroe’s *Cyclopedia of Education*, Dewey began by stipulating that these terms were strictly correlative, with the process of life encompassing both of these concepts. Although he continued to define the environment in terms of ‘conditions’, these were to be understood as actively entering and directing the functions of living beings, while so far as the larger part of its physical surroundings were concerned the organism may remain impassive.²⁰⁴ Accordingly, in the later version of his *Logic* Dewey stressed that organism and environment were not given as divided entities, bound together only as the mind of a creature strived toward coordination with its physical setting. Rather than being simply situated *in* an environment, life occurred *because of* its interrelation with a specific formulation of a world:

²⁰³ Habit was also a favourite topic of William James, and his detailed treatment of this subject in the fourth chapter of his *Principles*, describing living creatures as ‘bundles of habits’, demonstrates an approach close to that of Peirce. William James, *Principles of Psychology: Volume 1* (London: H. Holt, 1890): pp. 104 – 127.

²⁰⁴ John Dewey, ‘Environment and Organism’ in *A Cyclopedia of Education*, edited by Paul Monroe (New York: The Macmillan Company, 1911): pp. 486 – 487.

In fact, the distinction [between organism and environment] is a practical and a temporal one, arising out of the state of tension in which the organism at a given time, in a given phase of life activity, is set over against the environment as it then and there exists. There is, of course, a natural world [i.e. in Uexküll's terminology, an *Umgebung*] that exists independently of the organism, but this world is *environment* [i.e. Umwelt] only as it enters directly and indirectly into life-functions.²⁰⁵

Through *Knowing and the Known*, authored collaboratively with Dewey, Arthur F. Bentley makes an analogous argument, this time with explicit reference to Peirce, though admittedly in terms of a more anthropocentric focus. According to Bentley, while the majority of logicians, including Rudolf Carnap, Morris R. Cohen, and Ernest Nagel, effectively took for granted the categorical division of 'men', 'things', and 'an intervening interpreting activity', Peirce derived from this 'cosmic pattern' a single continuous process.²⁰⁶ Quoting Peirce's declaration that '[t]he woof and warp of all thought and all research is symbols, and the life of thought and science is inherent in symbols' (CP 2.220), Bentley argued against the assumption that a third principle, created by virtue of the 'talk products or effects of man', was crudely inserted between mind and world.²⁰⁷ Instead, logical thought emerged directly through those symbols and signs that actively participated in the realisation of a world – hence Peirce went on to claim 'that it wrong to say that a good language is important to good thought, merely; for it is of the essence of it' (CP 2.220). As such, the mind of man did not consist in the theoretical 'transmutation' of the living organism into a 'putative 'psyche'', as Bentley put it, rather the life and so the very existence of the organism was itself derived from the practical expression of signs in relation to those things that manifestly composed a shared environment.

In *Knowing and the Known* Dewey and Bentley included a footnote briefly referring to Uexküll's work, together with that of other authors such as Kurt Goldstein and J. H. Woodger, who they understood tacitly supported their 'transactional' approach to knowledge.²⁰⁸ This approach involved thinking through the co-operative unity of the articles of knowledge and the process of knowing, which, in the case of physiology, entailed grasping 'the full living procedure of the organism' rather than simply reducing it to 'minor specialized processes'.²⁰⁹

²⁰⁵ Dewey, *Logic: The Theory of Inquiry*: p. 33.

²⁰⁶ Arthur F. Bentley 'Vagueness in Logic', *Knowing and the Known*: pp. 3 – 4.

²⁰⁷ In view of Peirce's self-professed predilection for triadic forms of reasoning, the move to replace a three-realm ('word, idea, and object') structure with a two-realm ('men and things') structure, by Bentley, is likely more confusing than helpful. Yet, the overarching point still stands: irrespective of their philosophical dissection, it is the reciprocal and integral unity of these elements, rather than their presupposed separation, which makes thought possible. Bentley 'Vagueness in Logic', *Knowing and the Known*: p. 5.

²⁰⁸ Dewey and Bentley, *Knowing and the Known*: p. 140 nb. 11.

²⁰⁹ Dewey and Bentley, *Knowing and the Known*: p. 125.

More frequently cited was the American psychologist Edward C. Tolman, with Dewey and Bentley admitting the proximity of his stance to their own position on the techniques of inquiry.²¹⁰ Tolman's influential essay, 'The Organism and the Causal Texture of the Environment, co-authored with Egon Brunswik during a stay in Vienna, is highly reminiscent of Uexküll's work, albeit in the form of a new idiom applied to psychology.²¹¹ Yet, notwithstanding the affinity at least indirectly implied by Dewey and Bentley, neither Uexküll nor Peirce made any reference to one another's research in their own writings. Although Dewey lauded Peirce for having linked the inferences of logical inquiry with basic biological function – a connection he found to be lacking in both Hume's doctrine of habit and J. S. Mill's 'propensity' to generalise – it would not be accurate to claim that Peirce thereby anticipated Uexküll's theories.²¹² However insightful, Peirce's understanding of biological organisms was not rooted in the empirical experimental research which Uexküll would go on to conduct. What Peirce's work did offer (which retrospectively may be understood to bridge some of the gaps in Uexküll's thinking), was a more detailed and tractable analysis of those organisational relations, i.e. signs, which composed the relationality of living processes. To this effect, the abstraction inherent within Peirce's system and method represented its strength, since this organic (i.e. self-organising) and plastic (i.e. adaptable) framework could be applied to a variety of contexts and conditions, without being too readily and obscurely embedded in the facticity of the organism's physiology. Peirce was able to advance a formal investigation of the logic of signs as both a consequence and an impetus for the evolutionary emergence of evermore complex forms of mind.

Semiotic Freedom and the Constraints of an Umwelt

Uexküll showed that, as lived, the environment was something more than the outline of a physical context and an accident of nature; in the form of an Umwelt, it was the product of a concerted effort on behalf of a living creature to occupy and inhabit its locality, imbuing this domain with signs. Bringing to the fore the decisive contribution of an organism to the conception of a world derived from its environment discloses the autonomy, agency, or indeed freedom which this relationship makes possible. Freedom in this sense is not synonymous with the human will, but can be understood through the embodied activity of other forms of life. Hoffmeyer's idea of semiotic freedom epitomises this perspective: when opting to swim right instead of left in a gradient of nutrients, even a bacterial cell can be viewed as having made a

²¹⁰ Dewey and Bentley, *Knowing and the Known*: p. 117.

²¹¹ Edward C. Tolman and Egon Brunswik, 'The Organism and the Causal Texture of the Environment', *Psychological Review*, Vol. 42 (1), (January, 1935), pp. 43-77.

²¹² Dewey, *Logic: The Theory of Inquiry*: p. 12.

choice in so far as it interprets a significant feature of its Umwelt.²¹³ This act of interpretation, being in fact based on the determinations of a complicated chemotactical system, is not to be confused with human thought, and the resulting behaviour is not defined by consciousness. Yet, in so far as the bacterium's apprehension of its surroundings results in an orientation that is at once intelligible, but not wholly predictable, the notion of a modicum of 'choice' remains applicable. Hoffmeyer justifies this reference to choice with two further contentions:

(1) Considered as an evolving species the bacterium does in fact have a choice in the sense that it might have evolved differently; and (2) even single bacterial cells are complex systems that exhibit truly unpredictable (chaotic) behaviour and, in fact, mutant cells might behave differently in the same situation.²¹⁴

For Uexküll the transcendental character of life's freedom was dependent on protoplasm; it was an essential property of living organisms, inexplicable in mechanical terms, rather than a consequence of the duration and stochastic character of evolutionary processes. The peculiar consequence of this stance was that a single-celled organism must represent a more radical expression of individual liberty than a mammal: while in the early decades of twentieth century the biochemistry of cellular activity was yet to be revealed in detail, the physiological functions of larger animals could be much more readily explained with reference to efficient causality. Nevertheless, there is an important insight to be taken from Uexküll's assertion that 'an amoeba is less of a machine than a horse'.²¹⁵ As again attested by Hoffmeyer, at one level the formation of eukaryotic cells, in conjunction with the evolution of multi-cellular forms of life, did curtail the freedom and autonomy available to individual prokaryotic cells. Nevertheless, at a higher level of complexity and as a coordinated whole, this sacrifice of one form of freedom made viable a whole host of new possibilities, as embodied in the diversity of animal and plant species.²¹⁶ As such, the Umwelt afforded to a mammal is replete with a much more varied and refined selection of signs than that available to an amoeba, and this animal is able to register and respond to these signs in a more nuanced fashion than its primitive ancestors. In the conjunction between an organism's physiology and the events or objects of interest arising in its environment, it is the scope and variety of signs available to a species which defines the depth and the character of choices it may make. As Hoffmeyer puts it,

²¹³ Jesper Hoffmeyer, 'Semiotic Freedom: An Emerging Force', *Information and the Nature of Reality: From Physics to Metaphysics*, ed. by Paul Davies and Niels Henrik Gregersen (Cambridge: Cambridge University Press, 2010).

²¹⁴ Hoffmeyer, 'Semiotic Freedom: An Emerging Force': p. 163, nb. 5.

²¹⁵ Uexküll, *Umwelt und Innenwelt*: 26.

²¹⁶ Jesper Hoffmeyer, *Signs of Meaning in the Universe*, trans. by Barbara J. Haveland (Bloomington, Indianapolis: Indiana University Press, 1996):

semiotic freedom ranges ‘from pheromones to birdsong and from antibodies to Japanese ceremonies of welcome’ – it channels the expansive gestures of attraction as well as the refined strategies of defence.²¹⁷

While Hoffmeyer’s conception of semiotic freedom helps to emphasise the distance of Uexküll’s theory of the Umwelt from rigidly reductive and deterministic accounts of the environment as a purely physical domain, this should not elide the other more narrowly circumscribed aspect of Uexküll’s theory. At the same time as acting as linking points with the world, securing an environment as a medium for movement and communication, Uexküll observed that the signs derived from an Umwelt served to bar extraneous aspects of the world outside. No less than serving to open up a unique perspective on the world on behalf of a particular form of life, an Umwelt constrains the conditions of this domain, placing many elements of existence beyond immediate accessibility. Since multiple iterations of different functional cycles encompass every possible aspect of a creature’s experience, chaining together every item of perception, along with every instance of behaviour, the scope for experience out of step with the organism’s Umwelt is perpetually curtailed. With cycles devoted to the physical medium through which movement took place, along with food, shelter, the threat of predators, and the attraction of reproductive partners, amounting to some of the most important functions eliciting and directing activity.²¹⁸ In effect, each animal is enclosed within a sphere of interlocking circles, a sphere commensurable with that occupied by individuals of the same species, but utterly inaccessible so far as the immediate experience of other forms of life was concerned. As Uexküll put it, as a summation of its functional cycles the Umwelt of an organism formed an invisible soap bubble, completely surrounding the creature within.²¹⁹ Operating as both barrier and filter, the inner membrane of this bubble acted as a one-sided screen, behind which the depths of infinity were hidden.

Uexküll recognised that human beings tended to virtually cut loose from the Umwelt into which they were born, founding a view of the objective world on the basis of symbolic abstraction, and thereby building up an image of reality which surpassed the immediate experience of their senses.²²⁰ Nonetheless, he also regarded this idea of objectivity as in the end provisional, being predicated upon those basic functional cycles which both compelled and allowed human individuals to negotiate their surroundings. The technologically mediated existence which, already in Uexküll’s time, had come to typify modernity, instituted an especially hubristic idea of the objective, since it tended to detach and distort the distinct

²¹⁷ Hoffmeyer, *Signs of Meaning*: p. 61.

²¹⁸ Jakob von Uexküll, ‘The Theory of Meaning’ [1940], translated by Barry Stone and Herbert Weiner, intro. by Thure von Uexküll, in *Semiotica* (1982) 42, 1: p. 33.

²¹⁹ Uexküll, *Theoretical Biology* (1926): p. 42.

²²⁰ Jakob von Uexküll, ‘The New Concept of Umwelt: A Link Between Science and the Humanities’ (1936) *Semiotica*, 134, 1/4 (2001): pp. 109 – 110.

Umwelten into which individuals were embedded. At base humans were strangers to one another, unable to see past the contingencies colouring their view of reality. With this idea in mind, Uexküll compared the human Umwelt to a theatre:

It is most unfortunate that we can never behold the consciousness-stage of another living being; nothing would be more instructive than to see the world through the schemata of another. But at least let us never forget, as we watch our fellow-men going to and fro around us, that they are treading the boards of our stage, and we theirs. The stages are never identical; in most cases, indeed, they are fundamentally different. And we can never hope to play on the stage of others the role that we play on our own.²²¹

While the occupant of each stage might believe they are immediately encountering the objective features of their environment, in fact these perceptions must conform to the standards set by prefabricated schemata, as in props and scenery derived from the wings and rigging-loft of a theatre. From this point of view, despite the bond organising their proximity, each Umwelt remained inviolable, since the individual it contained could only communicate with its peers by proxy, i.e. in accordance with those prescribed forms which governed its relations.

Besides this somewhat grim depiction of human relations, another metaphor deployed by Uexküll does allow room for a more constructive conception of the role of the Umwelt in guiding and organising the trajectory of life. While proposing that the limits of an Umwelt ensconced each organism within a dividing wall, shutting out all extraneous features of the world, Uexküll also compared these walls to those of a house that the organism had itself constructed.²²² Unlike the image of spontaneously formed bubbles, which, for all their charm, cannot endure any substantial deformation of their outer membrane without bursting, and so evaporating, contained within the idea of a self-built house is the active investment and participation of its occupant, as well as the prospect of extending or remodelling this construction to suit different purposes. From this perspective, the commonplace activity of fashioning a shelter from hazardous aspects of the environment can be seen as more foundational to life than even the most familiar examples of burrows, nests, dens, and hives, might indicate. Even a bacterium is perpetually endeavouring to make itself at home in so far as its movements pursue those facets of an environment conducive to its survival and reproduction.

Further, no less important than the functional attributes of an organism's relation to its environment, as in the aggregation of material promoting growth and the exclusion of that

²²¹ Uexküll, *Theoretical Biology*: p. 97.

²²² Uexküll, *Umwelt und Innenwelt*: p. 212.

which proves noxious, the *significance* of each of these components of an Umwelt must, from the perspective of its inhabitant, be registered from the outset. In this respect, that aspect of a shelter, dwelling, or habitat, which might otherwise be seen as supplementary, if not superfluous, is shown to be paramount. The appearance or form of an inhabited world is not just a side-effect of life's biochemistry, it is this craft of at first parsing and then reassembling the signs of an environment into a composite image which has precipitated both the endurance and the elaboration of life. The German language is perhaps better suited to conveying this point, through a trajectory moving from *Bild*, as in an image, shape, or depiction, to *Bildung*, a form of self-cultivation, habit, and education.²²³ Here, the relevance of the connection between those apparently extraordinary animal activities which resemble art, on the one hand, and, on the other, those human artistic and recreational activities which do not simply picture, but intervene or install themselves within an environment, becomes clearer. These examples are not just exceptional; they are paradigms of the semiotic logic which organises, orientates, and originates life.

The opposable thumbs of primates, and the sustained bipedalism of homnids, helped to distinguish a form of life for which prosthetic and instrumental relations to the environment can proliferate, while also granting new degrees of independence from the sanctuary of these built structures.²²⁴ Perhaps it is this success that has nurtured the delusion that the act of constructing an inhabitable environment principally represents an advanced practice, perfected through human art, architecture, and culture. The same anthropological bias might lead one to dismiss the patterning of an environment as incidental, with the question of decoration amounting only to a contrived afterthought. Yet, for the majority of organisms this process of making oneself at home remains much more firmly anchored within the limits of embodiment. In its pursuit of nutrition, a bacterium is not simply in a state of departure, moving on, as if it were taking up a new position within the Cartesian coordinates of empty space, but in fact shifting and so resettling the textured medium of its Umwelt. Those organisms which from our perspective appear sedentary, from a continuous mat of moss to the arborescence of a tree, are no less involved in figuring out the borders of the world in which they are immersed. From our limited point of view, trees grow up and out towards the light, but the subterranean spread of roots, and the overall filling out of a volume by means of branching, invokes a dimension of life beyond

²²³ This concept was already well-established in Romanticism, especially within Goethe's conception of *Bildung* as 'product and process', though Hegel's use of the word reinscribed a stricter separation of human and non-human life in this idea. See for example, Johann Wolfgang von Goethe, *The Scientific Studies*, edited and translated by D. Miller (Princeton: Princeton University Press, 1995): p. 63.

²²⁴ An extended development of this topic, connecting hominisation with the freeing of hands for gesture and tool-use, is to be found in Bernard Stiegler's work, and especially his interpretation of André Leroi-Gourhan's anthropology. Bernard Stiegler, *Technics and Time: The Fault of Epimetheus*, translated by Richard Beardsworth and George Collins (Stanford: Stanford University Press, 1998).

the static and the vertical. Moss, meanwhile, takes advantage of the shade, layering itself in a cool, dark design of retained moisture, the furnishing of a semiotic niche which amounts to more than happenstance. In each case, what gardeners and horticulturists call ‘habit’, as in the outer shape of the plant, is more radically a form of shaping, a means of coming to terms with the signs of life which are available in a given space and time.

In his attempt to derive a theory of the subject from Canguilhem’s writings on the history of the life sciences, Alain Badiou concludes that the nature of this creature, ‘dissatisfied with meaning and fitted for moving the configurations of its objectivity’, is that of ‘a somewhat *displaced (déplacé)* living being’.²²⁵ Taking stock of Canguilhem’s engagement with Uexküll’s conception of life leads to a related, though restructured conclusion. Badiou quotes Canguilhem’s statement that ‘the natural milieu of men is not situated in the universal milieu like a content in its container. A centre is not resolved into its environment’.²²⁶ The echo of Uexküll’s idea of the *Umwelt* is here pronounced, each living being must maintain a partial, but perspicuous presentation of a world to negotiate the more extensive background of the environment, without fading away entirely into this inorganic setting. Yet, Badiou’s inference that the scientific assessment of life must involve an abrupt break with this centring, staging a clash between ‘two absolutes’, the needs of the individual and the ideals of the universal, should be treated with caution. The key to preserving a properly biosemiotic understanding of life’s *Umwelt* is that it cannot and should not be fully translated into the physiochemical, or even sociocultural *milieu* which surrounds and circulates through each form of life. As such, life is displacement, but life is also emplacement, a persistent move to find and make new ways of being at home, a series of strategies which guard against the homesickness inherent in the demands of survival, not only complication and discontinuity, but consolidation.

To accentuate the inseparable relationality of organisms and environments Hoffmeyer repeatedly invokes the image of a pattern woven into a carpet. A woven carpet carries a patterned form which cannot be materially parted from the medium in which this figure is embedded; to ask for the origin of life – the pattern – is then always also to ask for the origin of the environment – the carpet.²²⁷ Yet, as Hoffmeyer goes on to attest, this relation between organism and environment also carries a fundamental asymmetry inscribed in the origins of life. This asymmetry was initiated by the formation of a closed membrane, which, while preserving the autocatalysis of an open-system, also heralded a decisive difference – indeed a difference-making difference – between inside and outside articulating the subjective disposition of the living organism. Maintaining this difference, and so reserving its existence

²²⁵ Alain Badiou, ‘Is There a Theory of the Subject in Georges Canguilhem?’, *Economy and Society*, 27:2-3 (1998), pp. 225-233: p. 233.

²²⁶ Alain Badiou, ‘Is There a Theory of the Subject in Georges Canguilhem?’: pp. 226 – 227.

²²⁷ Hoffmeyer, ‘Semiotic Freedom: An Emerging Force’: p. 162.

against the perturbations of the exterior, involved the elaboration of increasingly complex forms of self-reference on behalf of the organism. But far from signalling a retreat into itself, this asymmetrical condition prompted the ‘never-ending *interest*’ of life in the environment, the world beside itself, beyond its own boundaries. Another way of conveying the chiral dynamic of this asymmetry, as both process and product, is through the idea of persistently pursuing an explorative existence in order to return to and remain at home. Uexküll’s theoretical biology of the Umwelt provided a very advanced account of at least one half of this equation, not only by investigating the organism’s need to construct a meaningful setting for itself, inhabiting the sense of those signs which structured its perception and behaviour, but by understanding the integrity of the organism as a consequence of this enduring formation.