

Expanding discussions of architecture and ecology, two drawings by Siegfried Ebeling and Cedric Price are considered to conceptualise space, energy, and enclosure in qualitative ways.

Dice of sensation: envisioning the phenomenological dimension of ecology

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A transfer of tools from ecology to architectural design started more than five decades ago. Since then, ecological trends in architecture have been dominated by a scientific determinism oriented towards the quantification of processes. With increasing regularity, architectural design is making use of ecology-related parameters, inventories, formulas, indicators, and technologies to provide an environmentally sustainable response. So much so that, as of today, it is usually supported by an ecological approach: energy consumption is optimised, the emission of harmful gases is prevented, biodiversity is conserved, and so on. But it is not only related to the design process. Different auditing processes often measure and assess environmental impact parameters in order to provide buildings with eco-labels that are demanded and appreciated by the real estate market. Therefore, a spiral of environmental parameters is being promoted by most agents involved in the production of architecture.

These quantities do not often translate into architectural qualities. Parameters usually remain independent from the construction of form, and when a form is generated by algorithmic processes, its complex result is generally disconnected from the experiences of the real space. In both cases, it seems that such forms are condemned, from the start, to a renouncement of their representative vocation – understanding representation simultaneously as a sum of images and experiences. This article asks: can the ecological impact of global change be mitigated only by technology-dependent efficiency indicators? And, beyond this, does the ecological approach have nothing to offer to architectural image, experience, and inhabitation?

Philosophers including Bruno Latour and others have asked for a sense of collective responsibility to face global change, and that this is unlikely to happen if our responses are not accompanied by a reassessment of the experiences and meanings associated with the built environment.¹ This article examines a theory of ecologically oriented architecture, not derived from current trends, but through two archetypical projects: Siegfried Ebeling's

Wohnkubus (1926) and Cedric Price's *Generator* (1976–9). Both are approached here as effective representations of a constitutive logic of an ideal form. While similar in shape, these archetypes do not have a specific historical relationship to each other; rather, each of them embodies, at a precise moment in recent history, an attempt to understand the global environment. Thus, this article will study if, and how, the two projects, as complex models inherently attached to the moment when they were created, could suggest the need for an updated archetype of environmental design. This looks inevitable if we realise that *Wohnkubus* and *Generator* were separated by a fifty-year gap, the same time gap that separates *Generator* from present day. Which model could synthesise today's environmental archetype? What can we learn from, and which would be the topics unveiled by such a model, in relation to those unveiled by *Wohnkubus* and *Generator*? Is architecture today capable of producing exemplary representations committed to the ethical dimension of global change, like those produced by Ebeling and Price? Is it indeed even equipped to do so? To address such questions, the article first examines Ebeling's biological theory of architecture developed in the wake of early interwar environmentalism. Then, it critically analyses Price's conceptualisation, developed during the last breath of environmentalism in the 1960s and 1970s, in order to discuss the attitude in architecture towards the construction of the global environment and to discover pioneering views of the hybrid landscape of the Anthropocene. Lastly, it argues in favour of an ecological conception of architecture based on a broader concept of energy, leading to a contemporary critical assessment on the topic.

Energy, body, architecture

The Wohnkubus, 1926

The first archetype we examine is a constructivist drawing, on the cover of the book *Der Raum als Membran*, published in 1926 by Siegfried Ebeling, a Bauhaus student [1].² This is a compelling book that formulates its argument from philosophical and scientific ideas and technological innovations.



1 Siegfried Ebeling, cover page for *Der Raum als Membran*, 1926.

It remained almost unnoticed in the history of architecture until Fritz Neumeier demonstrated its influence on Mies van der Rohe, and some analyses of its content have since appeared.³ Ebeling develops his theory of architecture in the classical sense, with the aim to define architecture by stating how it should be executed and understood.

The cover of *Der Raum als Membran* was designed by Ebeling himself and it is a suggestive iconographic summary of the theory developed in the book. In fact, the cover can be considered as a conceptualisation of the biological principles of Ebeling's architecture, analogous to the conceptualisation of the tectonic principles of Marc-Antoine Laugier's architecture represented by the frontispiece of *Essai sur l'architecture*.⁴ At the centre of the illustration, we find what the author refers to as a *Wohnkubus*, a minimal living pod shaped like a regular hexahedron that is the embodiment of his ideas on biological architecture. The figure is shown in isometric projection, and its six square congruent faces are transparent so that only the edges give the building definition.

Thus, three types of recognisable elements are in the drawing: first, a human body situated at the very centre of the composition; second, around this body and subtly bordered by the edges, is

the *Wohnkubus*; and finally, the entire cosmos depicted as a kind of *energy whole* in the sense that every phenomenon is portrayed graphically as a manifestation of energy. Ebeling blends energies, cube, and human figure in order to describe the intricate system that characterises his archetype; compared to conventional forms of architecture that remain passive in the face of fluctuations in the environment (such as those that appear to the right and left of the drawing), his model displays a profound logic of adaptation between the energy of the cosmos and the energy of the human body.

This inhabited hexahedron seems to be a critical reaction to other analogous forms produced at the Bauhaus. Its transparency is far from the solidity of the hexahedron chosen for the cover of the first issue of *Bauhausbücher*, Walter Gropius's *Internationale Architektur* (1924).⁵ Also, it is a construction culturally distant from Johannes Itten's *House of the White Man* [*Haus des weißen Mannes*] (1920), a drawing charged with idealistic and romantic meanings. Behind the nuances of such characteristic Bauhaus' shapes, there are profound differences in forms and aesthetic inquiries among the three examples.

A further reading of Ebeling's essay allows a widespread understanding of the meaning of the

cover's drawing, as Spyros Papapetros has developed.⁶ The first aspect that is slightly disconcerting is the way that Ebeling uses several different graphic tools to highlight the cube's ability to manage energy transformations between the interior and the exterior. Thus, the interface of one of the faces, while still transparent, is striped and coloured red in an apparent attempt to portray some kind of change of energy, 'perhaps indicating changes in temperature, humidity or light conditions'.⁷ As the only obvious item of technology, the aerial on the upper face of the polyhedron aims to convey the capture and emission of radio waves. Second, our attention is drawn to the radical depiction of the area surrounding the archetype where the land and the atmosphere are visualised through the use of scientific symbols to express forces, trajectories, and movements. While 'the cube rests on or rather floats over the Earth', depicted as a field of seismic waves in red and black strips, the 'intangible' space of the atmosphere is conceptualised by means of a few crosswise lines that represent the infinite cosmic rays that reach the biosphere from every point in space.⁸ The sun, the source of many of these rays, is depicted as a body with a red aureole. In fact, red is used to represent heat, and it also appears on the face of the polyhedron described above as well as in the geological depths.⁹ Finally, a plus sign in the remote reaches of the universe and a minus sign at the Earth's core indicate the opposite poles of the electromagnetic environment and its ionised atmosphere.

However, the environment represented by Ebeling includes more than just the rays, tectonic forces, and air currents from which the individual seeks refuge; we also see a somewhat disconcerting human figure floating in the atmosphere, similar to the one that inhabits the interior of the cube. This floating figure is transparent and much larger in size. The silhouette and the cosmic rays are depicted on the same level in an apparent attempt to equate man's activities with the geological forces of Nature – that is, the silhouette can be understood as another manifestation of organised energy. Ebeling, who lived through the First World War, perhaps had assumed that by the 1920s, humankind had already demonstrated power of such magnitude that it could make transformations on a planetary scale. Thus, with humankind having been elevated to the level of a geological force, the door was opened to questions about the role of people in building the environment. In contrast to the mechanistic idea of nature as a finished product determined exclusively by natural processes, the exteriorisation of human force led Ebeling to imagine a creative interpretation thereof. This conceptualisation is a surprising and early expression of what we now identify as the Anthropocene. In this sense, Ebeling unequivocally points out that human beings and nature are closely intertwined, if not assembled, and form a cohesive unit.

Based on this energetic conceptualisation of the environment, Ebeling describes how the *Wohnkubus* is configured and how it takes form. At the end of his essay, he writes that 'the house is to be perceived

as a conducting medium (*Durchgangsmedium*) channelling a continuous stream of forces' and that 'in the centre of this play of forces, in each instance, are organisms subject to both physiological and psychological laws.'¹⁰ Previously, Ebeling states: 'Biological architecture [...] is a three-dimensional membrane – biologically defined – between our body [...] and the latent minute forces of the spheres.'¹¹ For him, order between architecture, technology, and art must be 'restored' in a 'simple, integrated space that relates all parts to each another and adjusts automatically to the external world'.¹² 'This means', he wrote, 'nothing less than understanding and designing the house as its own energy source.'¹³ Thus, we find both the human being (Ebeling cited from Nietzsche that 'we have rediscovered the bodies') and an energetic environment that goes beyond what the eye can see – 'a new concept of nature.'¹⁴ In addition, the architecture is in the middle, 'a space-cube that activates corresponding spatial tension', a multidimensional artefact that takes advantage of the physiological and psychological potentials of human bodies in their *inner worlds*.¹⁵ That is, worlds that are interdependent from the human bodies' perceptive and appreciative constraints. According to Ebeling, this means of configuring the form is determined by a 'new conception of order': 'It is not pathos, but ethos, that gives thing form.'¹⁶

Energy-constituted forms

Ebeling's theory inscribes architectural form in a built environment that is defined by the 'superfluidity' of energy. Indeed, it was precisely the scientifically inspired idea of superfluidity that governed the representation of energy in visual arts between the 1910s and 1930s. These depictions were illuminated by an early 'energetic' environmentalism linked to the appearance of the first modern ecological ideas. An example of this phenomenon is the energy *captured* by Paul Klee in his illustrations for *Candide, ou l'Optimisme*, Voltaire's philosophical tale, in which Klee uses 'swarms of scribbles' to embody man as a densification of nervous energy.¹⁷ His drawings fuse the human bodies with their environment into *one unit* and underline their material and relational extension, evoking the double dimension of energy as *content* and, at the same time, as *what it works*. Oliver Botar has defined this early environmentalism in art as a cartography of mutual influences between *Lebensphilosophie* ('philosophy of life'), neo-vitalism, monism, and organicism-holism.¹⁸ The major influential period of this trend of thought occurred in Germany between the First and Second World Wars, while German-speaking parts of Switzerland, Hungary, and Austria were also involved in the movement.¹⁹ Theories such as Wilhelm Ostwald's energeticism, Ernst Mach's vitalism, Jacob von Uexküll's ethology, and even, albeit less popular, Vladimir Vernadski's geology all helped to introduce fundamental concepts of ecology, although it was not formally recognised at the time.²⁰ Something similar occurred with

tektology, the science of universal organisation, developed by Alexander Bogdanov in the early years of the Russian Revolution, which led to a short-lived encounter between ecology and Marxism in Russia.²¹ Some scientists thought, as Ebeling's drawing, that the cosmos is a continuum of energy that extends throughout space and time – an idea that prevailed in the visual arts even after energetics declined and quantum mechanics consolidated as a theory. In this way, bodies, whether living or inanimate, emerge in their physical individuality as densities of energy. They are corporeal forms that, despite what the human eye might have us believe, are constantly connected with the other energies, forming a constituent and continuous part of an energetic whole.

In opposition to the hexahedron, the human body's scope of action and perception have traditionally been portrayed as a sphere. Also, spherical forms are related to radiations, addressing invisible forces flowing in the cosmos. It is not surprising, then, that Ebeling designed a 'Spherical House in the Ocean' or an 'All-metal circular house'.²² So, if Ebeling insists on radiations, spheres, and energy-constituted forms, why is he drawn to synthesise his spatial theory is a (seemingly rigid) 'space-cube'? Ebeling's choice of a hexahedron and that shape's very faint depiction by means of its edges denotes an elemental conceptual model rather than an actual formal design. One might conclude that the *Wohnkubus* is the model used to represent the particular quality of the architectural action of forming, organising, deforming, and straining that sphere – an inherent condition of living bodies – around the human being. Ultimately, Ebeling's architectural action theory proposed in *Der Raum als Membran*, seems to transform the natural flow of energies from a sphere to a hexahedron. Thus, Ebeling's cubic model seems to seek the bonds between humans bodies' *inner world* and *outer worlds* in its spaces; the space should be perceived, in Ebeling's words:

*as a negative, as something that merely creates the physiological preconditions under which the individual, in accordance with his physiological make-up, can develop in complete autonomy, free from all external influences, into a self-contained being-for-onself [Für-sich-sein] – a microcosm.*²³

Ebeling continues: 'among these external influences one would include the pathos of spatial form [Raumform].'²⁴ He concludes that 'architecture [...] relates to the human body more directly than ever, as a creative form that is increasing infinitely within the sphere of a magical environment.'²⁵

Ebeling's hexahedron of biological architecture can be understood as a hexahedron of energy that takes its consistency from the superfluidity of nature – to which the human is physically and culturally embedded. But this is a complex form: energy does not only constitute architectural forms in their materiality, but also constitutes architectural shapes in their sensations – and both components are deeply correlated.²⁶ If the human body is physiologically and psychologically

constrained (it only perceives a few of the thousands of 'latent radiations in the universe' that build its big little world, while other species inhabit other worlds limited by their own bodily constraints), architecture can potentially become a device that orders energies and amplifies – or extends – the body's sensitiveness.²⁷

To this point, the understanding of Ebeling's biological ideas has evidenced his deep ecological thinking. In her study on the role of art and architecture in Deleuze's philosophy, Elizabeth Grosz states that 'Art is, for Deleuze, the extension of the architectural imperative to organise the space of the Earth.'²⁸ She continues, 'this roots art not in the creativity of mankind but rather in a superfluosity of nature.' Inspired by Deleuze and Guattari (and they, in turn, by Uexküll's biological theory), Grosz stated that:

*art, and especially the first and primordial of all of the arts, architecture, is thus a particular linkage between living bodies and the forces of the earth. Art is the direct connection between the forces of the living body and the forces of the earth, formed above all thorough rhythm. Architecture is the first art, the art that is the condition for the emergence of all the other arts, for without some cordoning off of territory from a more generically conceived earth, no qualities or properties could be extracted, and no properties could resonate with, intensify, effect or transform bodies.*²⁹

If Deleuze and Guattari think of architecture as an act of territorialisation of uncontrollable forces (energies) of the Earth – that is, it 'establishes territory out of the chaos that is the Earth' – its result will be the emergence of 'blocs of sensations', 'compounds of sensations', or 'dice of sensation'.³⁰

Ebeling writes that the energies he wanted to mediate in his biological architecture did not simply focus on the physical protection of bodies from the weather. He also explains how the somatic dimension causes sensations to be constructed; in his view, the landscape of architecture should create preconditions in a way that complements physical comfort to allow for the development of 'a boundlessly expanding sensuality' inherent in the 'flesh-and-blood human being'.³¹ In other words, in their archetype, the architectural organisation of energies has a dual role of functionality (quantifiable, technical) and of sensibility (somatic, interpretative). Ebeling states that a 'building' was 'a sensually tangible spatial image [Raumbild] in a three-dimensionally layered surface', but biological architecture forms as spatial radiation that 'is entirely effects [Wirkung]'.³² For Ebeling, 'one of the most difficult and least resolved question of phenomenology' is respond to a 'new conception of nature' that,

[...] would be as far removed from the old feeling for nature as 'concept' and 'feeling' are from each other in the metaphysical core of our spiritual being, i.e. in our unconscious. The infinitely rich capacity of nature to act upon us is matched by our infinitely rich ability to respond to it creatively, converting its effects into spiritually bound material [...] It is therefore hardly correct to speak of more or less right [...]. It is all merely

*the rhythmic antagonism of coordinative principles that are based on 'nature' as such.*³³

The *Wohnkubus* may be a phenomenological way of representing how humans construct their surroundings, not just from a physical point of view (actual intervention in the space) but in a way that includes the meaning of what is perceived. Following Nietzsche, Ebeling's theory over-emphasises the body. According to him, it:

*represents a triumphant new truth, precisely because this exaggeration restores to us, as individuals, inner access to the deepest secret of the natural body of our person and therefore of our naked existence.*³⁴

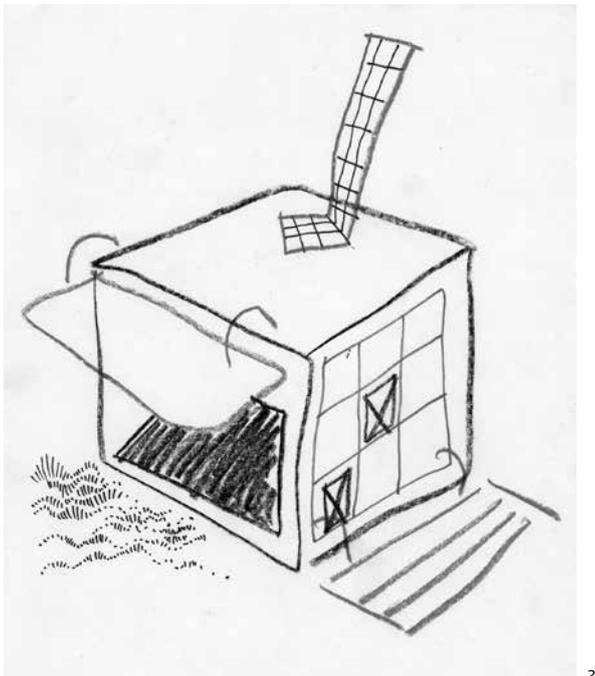
This allows the idea of a space-cube to stretch from the specific field of house to the more general area of the human being's radius of sensory

perception.³⁵ Ebeling's archetype visualises major concepts from early phenomenology, and thanks to those concepts, his archetype is still able to represent the Deleuzian (environmental) definition of architecture: 'dice of sensation'. This archetype is particularly visible when Grosz states (regarding Deleuze and Bernard Cache) that 'architecture is the creation of frames as cubes, interconnecting cubes, cubes respected or distorted, cubes opened up, inflected or cut open. The frame separates. It cuts into a milieu or space.'³⁶

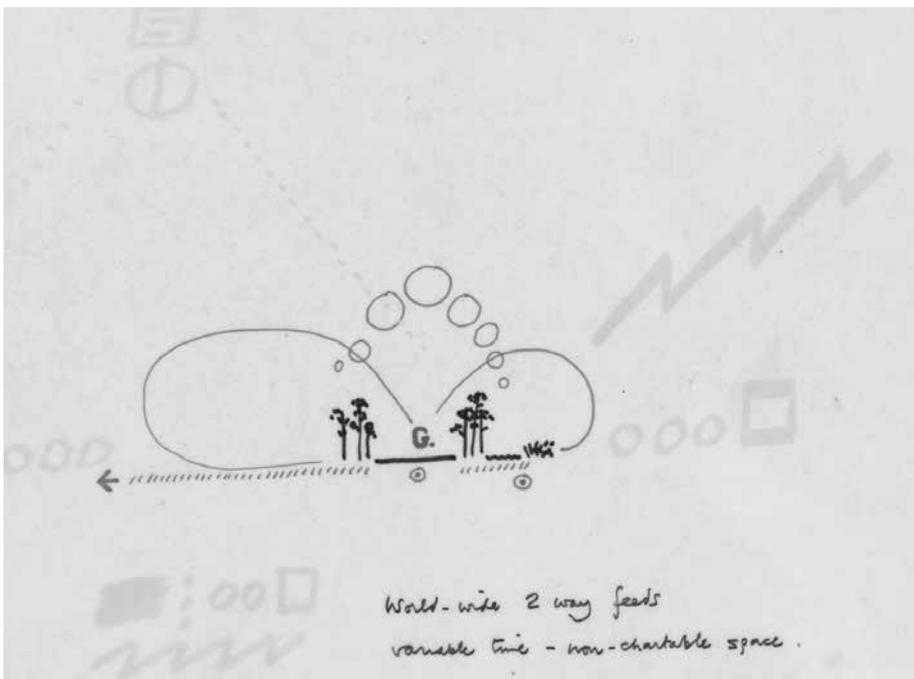
Environment, ecology, aesthetics

Generator, 1976–9

The apparent similarity of the *Wohnkubus* to another ideal hexahedral architectural representation, the sketch of the never-built *Generator* module, an experimental project conceived by the British architect Cedric Price between 1976 and 1979, is surprising [2].³⁷ The picture once again shows a regular hexahedron whose six faces unfold in relation to a combination of possible relationships with the adjacent surroundings. With a less abstract approach than that of Ebeling, the options shown range from contact with the grass to letting in the afternoon breeze or adapting one of the walls in line with the sunlight. In addition, we once again have the aerial as the only object outside the formal cube, clearly referencing the model's connectivity to the virtual universe. *Generator* was conceived as an activity centre – 'for thinking, dreaming, working, talking, playing music, and experimenting' – for small groups of visitors. This project was located at White Oak Plantation, a rural and coastal site in Yulee, situated on the border of Georgia and Florida.³⁸ Price conceived *Generator* as a computerised environment that could be continuously reconfigured through user interaction and further become an 'intelligent conscience' that would be able to learn and remember. In this plan, the model module was



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2 Cedric Price, *A Prototype Unit for Generator*, c. 1976.

3 Cedric Price, *A Study Sketch on Principles for Generator*, c. 1976.

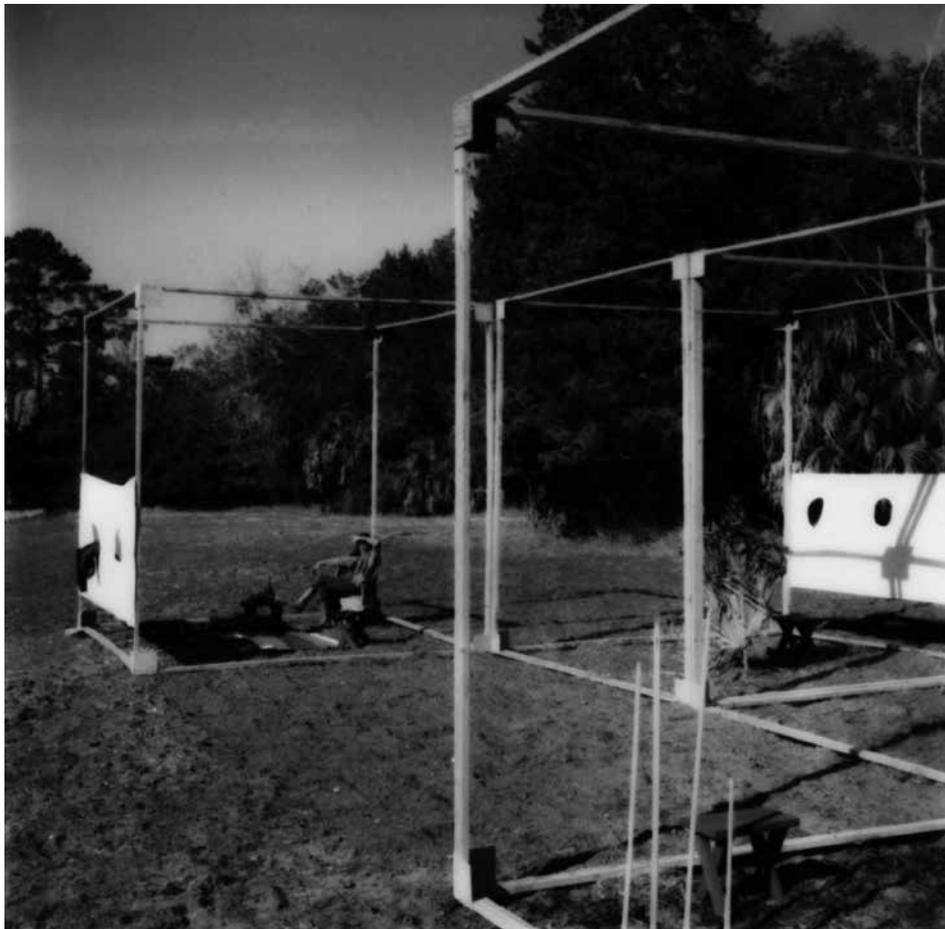
conceived to colonise the territory under its control with the means of a cybernetic logic of multiplication, combination, and transformation.

In order to explain how Generator is inserted into the global environment, we must look at a second drawing [3]. Here, Price further explores energy and information relations and depicts the forces and flows that define the main bonds between the project and its setting. A letter G positions Generator as a settlement, and the annotation in the margin, 'worldwide two-way feeds', powerfully reflects the idea of globality in regard to considering the surrounding context. Price depicts the in-flows of energy and information from the outside in yellow. However, Price shows that Generator not only gains energy from the exterior but also emits energy in a two-way cooperative process on a worldwide scale.³⁹ The transformed energy that Generator returns to the environment is drawn in red as three channels of dissemination that are inverse to those that it takes from the exterior. In this way, the project's overall concept assumes that the output of energy actually changes the environment, highlighting the inextricable relationship in which the in-flows affect the out-flows and vice versa.

Generator was conceived in the decade in which ecology became a science. Since the 1960s, the main advocates of modern ecology had emphasised the fundamental importance of environmental hypotheses in books, journals, television, and other media, both specialised and popular. However, this

was also when environmental thinking and its phenomenological basis became dissociated from each other in both popular culture and applied sciences. For example, influential scientists such as the ecologist Howard T. Odum and the biophysicist Harold J. Morowitz defended the notion that the complex order of man and nature was explained by means of a simple and scientifically determined concept: the flow of energy. According to them, quantitative models of the flows of energy allow us to understand the world and make political and economic decisions.⁴⁰ In turn, the official ecological discourse also made its contribution: the term 'environment' was socially re-associated with a pre-ecological representation of nature and was used to defend conservationism and protection as the only valid methods. The common environmental trend was to use the new ecological tools to protect what was considered the delicate balance of a threatened nature.⁴¹ Only a limited number of architects such as Price acted with a phenomenologically oriented notion of the environment and addressed the complex and blurred boundaries of the natural and artificial and of the individual and environmental dichotomies. These architects designed environments as life experiences thought to depend as much on the material or biological environment as on human constructs such as economic, social, and cultural relationships.

In September 1972, *Architectural Design* published the monographic issue 'Complexity', with Royston



4 Cedric Price, Generator project, White Oak Plantation, Florida: view of mock-up, c. 1979.

Landau as the guest editor. This issue brought together concepts and tools to transfer the agenda of architecture from environmentalism to design and planning.⁴² Landau selected expert contributors on cybernetic and systems thinking such as ecologist Odum, psychologist Gordon Pask, scientists Hasan Ozbekhan and Larry Peterson, academic Stanford Beer, theorists Geoffrey Vickers and Rusell Ackoff, and Cedric Price himself. In the approaches, concepts, and tools presented by the authors, there exist different nuances and contradictions, but Landau set them aside to build a higher order argument. In his opening article, Landau identified three scientific changes that would lead the following initiatives in architecture and plans to adopt 'a radically new look': '(1) Increasing approval for a shift-in-approach from *Atomism* to *Holism*; (2) growing the influence of *General Systems Theory*; and (3) the emergence of the *Value* topic.'⁴³ The confrontation between atomism and holism echoes the scientific debate between atomists and energetists that occurred around 1900 and was led by some early environmental scientists. This debate also recalls the fundamentals of both scientific methods. Then, based on this confrontation, Landau criticised atomism as 'a simplistic interpretation of man that was mechanistic, deterministic and conceived as a linear stimulus response idea.'⁴⁴ He also suggested a kind of relation between holism and phenomenology sketched through some methodological problems within philosophy, the pure sciences and psycho-sociology.⁴⁵

The agenda proposed by Landau allows a further analysis of Generator. While Price's drawings do not include the human body, the photographs of the full-scale model built at White Oak Plantation address this gap [4]. Each cube is defined exclusively by its edges – made of wooden slats – and a woman is seated inside each of these cubes next to picnic items such as a rug and a basket. Price pointed out that 'the usefulness of this architecture is to remind its users that the major resource to be conserved is the human spirit.'⁴⁶ The corporal dimension is a constant in all of Price's work, and it must be remembered that Generator's very transformability is described as being the result of 'the individuals' needs and wishes' and their 'enjoyment and pleasure'.⁴⁷ In a text written at the end of his career, Price was still saying,

*However, there is a vast range of human delight and understanding that at present is left to chance sensory encounters. The passing of time, the speed of the seasons, the changes of weather, the growth of intelligence and the ageing of the body are usually compensated for by architecture rather than used as constituent parts of a menu for extending the value and usefulness of human life.*⁴⁸

Together, these ideas frame a way of ecological thinking in which human experience is defined by its ability to appreciate or to assign value.

To advance in this subject, it is relevant to enlarge the study's focus by introducing new frames in order to make a leap from the hexahedron to the landscape. Price created an enigmatic series of imagined landscape drawings. Through these

representations, Price reveals to us the true nature of his cube: it was transformed into frames, screens, modules, and other figures over a clearing in the woods. Landau wrote that

*Spaces and enclosures would be created, using orthogonal and diagonal geometries, with walls, screens and gangways, and the volumes would be fully serviced by systems including air-conditioning and communications channels.*⁴⁹

Price studied systems of experience and explored the scope and possibilities of the user. In addition, the quality of this experience denotes the size, richness, consistency, and structural qualities of his hexahedron. His cubes of sensation are multiplied and dissolved in a landscape of energies. How does this shift occur?

Generator is a highly speculative *tabula rasa* project that moves beyond the scant physical features of the site and only takes on hypothetical constraints that derive from the use of computational instruments in the planning process. Price consulted John Frazer for the design of a computer-assisted programming system with which to create a mathematical model that would increase, combine, and transform the settlement by repeating the hexahedrons. The result was one of his most well-known and interesting cybernetic diagrams. The citizens and their needs and desires were to be the inputs with which the system's formulae would work to organise the evolution of the built space in a suitable fashion:

*an extension [...] to generate unsolicited plans, improvements and modifications in response to users' comments, records of activities, or even by building in a boredom concept so that the site starts to make proposals about rearrangements of itself if no changes are made. The programme could be heuristic and improve its own strategies for site organisation on the basis of experience and the feedback of user response.*⁵⁰

Based on that awareness, Price draws his landscapes. He starts with two sketches of scenes from the natural setting where Generator would be located in theory, and he photocopies those sketches in order to produce a series of montages and sketches. The drawings evoke multiple aspects, changes, and eventualities of the built landscape at a single location. The first series was based on a drawing of the clearing in the wood 'looking to the north-east of the site' of the Generator project. The first of these drawings, entitled 'activities and services', uses the colour red to signal three different types of elements: extensive activities, immediate activities, and human services. The result is that these elements can be found in the landscape by means of an illegible density of dots and circles floating in space. Price produced another drawing on the same scene, entitled 'screens and frames', in which he included transparent, vertical-edged planes that organise the space based on the ideas of virtuality, lightness, and temporality in equal measures. A third drawing, called 'variable roofs', depicts horizontal transparent planes floating at the level of the treetops, giving the impression that they are built using a wide range of systems and materials. The final drawing of the series is 'anchoring



5 Cedric Price, *Generator: Perspective view of site looking southwest from northeast corner, c. 1976.*

activities', which portrays strips of programmes arranged on three levels or horizontal planes: 'supra-site', 'site-motor' and 'extra-site', high level, ground level, and substratum, respectively, which includes the changes in, and evolution of, the aerial and terrestrial environment of the clearing in the wood. Price's second series is 'looking to the south-west of the site', and it includes two drawings. The first gives an impression of lightweight, temporary architecture based on vertical and horizontal lines that tangle and merge with the vegetation as well as aerostatic devices that also enable the aerial environment to be colonised. The second drawing is a collage with fluorescent yellow and orange stickers with different degrees of transparency and circular and square shapes [5]. It evokes concentrations, or nodes, of energy as though it were establishing an analogy between the built elements and their energy content.

Landscape of energies

From this referential position, Price places the person right at the centre of the planning process. Price not only addresses the area of functional control by designing a very precise computational system, he also introduces the physical well-being factor into his exploration of the surrounding space. Landau noted that 'Generator lies far beyond an investigation into environmental preferences alone' and defined Price's design as a 'built structure with a prototypical artificial intelligence [...] one that serves, in the most sophisticated manner, the purposes of human enabling'.⁵¹ Furthermore, Landau sees this philosophy in all of Price's works:

Price's view of architecture has a deeply ethical dimension, at the centre of which is the effect an architectural design may have upon its occupants

*or observers. He has often stated that architecture can too easily become constricting and damaging for those who use it (socially, psychologically or even physically). But, the obverse must certainly also apply, as architecture can be liberating, enhancing and supportive, and in his projects and writings, Price has consistently asserted and demonstrated the importance of this awareness.*⁵²

As Grosz recalls, according to Straus and Deleuze, landscape drawing can make visible what sensation is able to catch from the invisible: 'Landscape painting does not depict what we see, i.e., what we notice when looking at a place [...] such vision is of the invisible becoming visible.'⁵³ In *Generator*, cybernetic diagrams and landscape pictures, as forms of knowledge, correct each other in a process of regulation or admixture. In Deleuzian terms, the cybernetic organisation could characterise the striated or sedentary space, the space whose location or region is abstracted from its lived qualities. By contrast, the drawings of landscapes refer to the 'space revealed by sensation, which has no fixed coordinates but transforms and moves as a body passes through it.'⁵⁴ From this approach, the reality brought about by scientific knowledge through processes of causality – cybernetic systems of control – is thus critiqued by a number of meanings emerging from sensations during bodily contact with the territory.

Therefore, these landscape drawings play an essential role in Price's environmental design, inasmuch as they introduce a critical position against determinism based on quantification and measurements while avoiding the conception of man as 'a measurable animal with sets of analysable needs' in Landau's criticism of Atomism.⁵⁵ Price

assumes that the consciousness of the living body incorporates vital values, since the human being as a living body associates value to what surrounds it according to whether it introduces advantages or disadvantages in its life.⁵⁶ This could affirm that, for architecture, opportunity resides in the art's qualification as a mediation system, as a device for accessing knowledge through the senses. Since humans always inhabit a space, knowledge through the senses occurs by virtue of the mere presence of the body within that space and – in a primitive case – would not strictly require that anything mediate it. The first landscape, the first act of knowledge, was constructed with the first presence as a biological and cognitive event. However, this situation is only an ideal case. Supplementing the basic framework of presence, the role of architecture is a mediating one, since it alters the physiological and psychological capabilities for perception and signification and thus modify the way in which humans embody their environment. Thus, when discussing immersion and participation in the environment, the areas for exploration that appear here have a substantial potential.

As a mediation mechanism between the individuals and the environment, design leads to a densification of the intercorporeal space wherein human beings exists, while the environment embraces each of them in an experience that reveals new sensations. Grosz affirms that these sensations: *are primarily made up of percepts and affects extracted from the energetic forces generated between subjects and objects [...] Sensations are subjective objectivities or equally objective subjectivities, midway between subjects and objects, the point at which the one can convert into the other.*⁵⁷

Therefore, bright spots, planes of light, or compositions of fluorescent elements are tools to evoke the sensations of the body immersed in the dynamic landscape.

The phenomenological dimension of ecology

In the cover of *Der Raum als Membran*, Ebeling is also referring to an urban environment when he depicts conventional architectures around the *Wohnkubus*. For Ebeling, the creative interpretation of nature that was beginning to emerge had to find a parallel in architectural space:

*The more we reveal nature's material connections, and the more we feel the need to make our cities true urban landscape – that is, nature formed by intellect – the clearer it becomes that the character of the skin or membrane between the exterior space and the dimensions of the body basically relates to the way in which the space is defined and dimensioned on a psycho-physical level.*⁵⁸

By extension, the *Wohnkubus*, as the Generator, could be an archetype for the built-environment instead of an archetype for a house. In short, the everyday aesthetic experience of the human being within its world materialises in the (urban) landscape – physically and psychologically constrained by his own body. And it is from the quality of such experience that the cubes' qualities of size, richness,

consistency, or structure derive. Only from the space of aesthetic experience – a representative form itself – can one understand how Ebeling and Price explore new architectural challenges by fully embracing the ecological thinking.

Without intending to record the history, we can consider the Ebeling and Price archetypes as representatives of two marginal stages in the history of twentieth-century architecture in which an anthropogenic idea of nature was reflected. Furthermore, with regard to the specific link between nature and design, both models are stages of a new path of conceptualisation in which nature and design shape each other. Both archetypes by Cedric Price and Siegfried Ebeling illustrate that in regard to architectural design, the dimension of control and the quantification of variables as distinctive features of ecology is also accompanied by a second, less explored dimension that addresses the formulation of an aesthetic project based on corporal, physical, and meaning-giving experiences. The objective world fades away in favour of sensations. The subjectivation of the objective ends up liaising between scientific and technical methods on the one side and perceptive, intuitive and creative skills on the other. In addition, its effect on architectural space, which was ultimately what was of professional interest to Ebeling and Price, meant moving towards a readjustment of (ecological) functionality and sensibility.

To this end, the ambivalence of the concept of energy became strategically important. Energy as a material, sensitive reality is the substrate making it possible to navigate through the principle of epistemological unity underlying ecological thought. In the concept of energy, we find the basis for ecological continuity.⁵⁹ Since ancient times, energy has played a prominent role as the basis of various cosmological formulae that humans have designed throughout history to provide meaning to their participation in the cosmos.⁶⁰ The continuous symbolic, physical, and metaphorical references to energy in environmentalism considered here are therefore not a mere iconographic source; they served as a reminder of the inherency of the principle of environmental continuity within which human being and the immensity of the cosmos travel indissociably. When environmentalism is understood as a kind of phenomenological dimension of ecology, energy becomes a mirror. From this ambivalent concept of energy emerges an essential idea for any ecologically oriented theory of architecture. Since experiential knowledge is the only way to see ourselves in a mirror between the physical and the physically real, architectural creation must necessarily be placed between the production of sensation and attention to scientific causality, thus creating consciousness.

Facing inordinate detachment from physicality and the ever-growing domination of manifestly abstract, vast, complex, intangible scientific, social and political constructs, how can designers capture an intensity of energy, a sensation, in a representation? When framing a form or a landscape, art introduces rhythms from chaos taking from it the sensory materials that are

(energetic) intensities which affect the human body. Architecture as an art form is the conjugation of rhythms that give meaning to the materials – visual, audible, tactile. Likewise, rhythm is the composition through which we build blocks of space-time that can change what for us is incommensurable into commensurable, giving *sense* to *our* environment. For this reason, architecture committed to global change cannot abandon its role in the creation of exemplary representations – simultaneously in poetical images and aesthetic experiences that provide meanings to our being in the world. The ecological design must be built around a complex interpolation between the

socio-ecological basis and the aesthetic sensibility of the individual. From this point of view, the design process should not only champion an appropriate environmental solution that meets society's functional needs in the context of the technical and scientific knowledge of its time but also explore, or rather facilitate, the emotional adaptation to the environment. Currently, both the world of thinking and the world of ecological sciences are exploring this path anew. In the same way, architecture must elaborate alternative ecological discourses and imaginaries to reconstruct some forgotten but necessary principles to design our future environment.

Notes

1. Bruno Latour, 'Waiting for Gaia: Composing the Common World through Art and Politics', in *What is Cosmopolitical Design?*, ed. by Albena Yaneva and Alejandro Zaera-Polo (Farnham: Ashgate, 2015), pp. 21–33.
2. Siegfried Ebeling, *Space as Membrane* (London: Architectural Association, 2010). Original edition Siegfried Ebeling, *Der Raum als Membran* (Dessau: C. Dünnhaupt, 1926).
3. Fritz Neumeyer, *The Artless Word: Mies van der Rohe on the Building Art* (Cambridge, MA: MIT Press, 1991), pp. 171–9. See also Spyros Papapetros, 'Future Skins', in *Space as Membrane*, Siegfried Ebeling (London: Architectural Association, 2010), pp. xiii–xxi; Christoph Asendorf, 'Bodies in Force Fields: Design Between the Wars', in *From Energy to Information: Representation in Science and Technology, Art, and Literature*, ed. by Bruce Clarke and Linda Dalrymple Henderson (Stanford, CA: Stanford University Press, 2002), pp. 195–212; and Pep Avilés, 'On Membranes, Masks, and Siegfried Ebeling's Environmental Raumkubus', in *Climates: Architecture and the Planetary Imaginary*, ed. by James Graham, Caitlin Blanchfield, Alissa Anderson, Jordan Carve, Jacob Moore (Zurich: Lars Müller Publishers, 2016), pp. 319–27.
4. Marc-Antoine Laugier, *Essai sur l'architecture* (Paris: Chez Duchesne, 1755).
5. For Spyros Papapetros, 'the "cube" on the cover is apparently a quotation (and thus critical inversion) of the white and red cube on the cover of Gropius's *International Architektur*.' See, Papapetros, 'Future Skins', p. xxii, note 15.
6. Papapetros, 'Future Skins', pp. xv–xviii.
7. *Ibid.*, p. xvi.
8. *Ibid.*
9. There are also some yellow nuances in the image. They might represent a different kind of radiation, presumably produced by technological devices.
10. Ebeling, *Space as Membrane*, pp. 32, 33.
11. *Ibid.*, p. 16.
12. *Ibid.*, p. 13.
13. *Ibid.*
14. *Ibid.*, pp. 11, 16.
15. *Ibid.*
16. *Ibid.*, p. 13.
17. For the influence of the energy controversy on Paul Klee, see K. Porter Aichele, 'Paul Klee and the Energetics-Atomistics Controversy', *Leonardo*, 26:4 (1993), 309–15; Sara Lynn Henry, 'Paul Klee: Nature and Modern Science: The 1920s' (PhD dissertation, University of California, Berkeley, CA, 1976); and Sara Lynn Henry, 'Form-Creating Energies: Paul Klee and Physics', *Arts Magazine*, 52:1 (1977), 118–21.
18. See Oliver A. I. Botar, *Prolegomena to the Study of Biomorph Modernism: Biocentrism, Laszlo Moholy-Nagy's New Vision and Erno Kallai's Bioromantik* (Ottawa, ON: National Library of Canada, 1998), p. 217. This period has not been profoundly studied, and framing it from a historiographical point of view has become difficult. Botar notes: 'Because environmentalism has typically been seen (and seen itself) to be a "left-wing" cause since the 1960s, the biocentric aspect of national socialism is still surprising to many and is (usually unconsciously) repressed by environmentalists.' See also Oliver Botar, 'The Biocentric Bauhaus', in *The Routledge Companion to Biology in Art and Architecture*, ed. by Charissa N. Terranova and Meredith Tromble Terranova (London: Routledge, 2017), pp. 17–51.
19. See also Asendorf, 'Bodies in Force Fields: Design Between the Wars', pp. 195–212.
20. On Ostwald's energeticism, see Philip Ball and Mario Ruben, 'Color Theory in Science and Art: Ostwald and the Bauhaus', *Angewandte Chemie*, 46:37 (2004), 4842–6 and Charlotte Douglas, 'Light and Colours: Wilhelm Ostwald and the Russian Avant-Garde', in *Light and Colour in the Russian Avant-Garde: The Costakis Collection from the State Museum of Contemporary Art Thessaloniki*, ed. by Miltiadis Papanikolaou (Cologne: DuMont Literatur und Kunst Verlag, 2004), pp. 427–33. See also Aichele, 'Paul Klee and the Energetics-Atomistics Controversy'. On Ernst Mach's vitalism, see John Blackmore, *Ernst Mach: His Work, Life, and Influence* (Berkeley, CA: University of California Press, 1972); on Uexküll's ethology, see Oliver A. I. Botar, 'Notes Towards a Study of Jakob von Uexküll's Reception in Early Twentieth-Century Artistic and Architectural Circles', *Semiotica*, 134 (2011), 593–97; on Vernadski's geology, see Jacques Grinevald, 'Introduction: The Invisibility of the Vernadskian Revolution', in *The Biosphere*, Vladimir I. Vernadsky (New York, NY: Copernicus, 1998); and Sanford Kwinter, 'Combustible Landscape', in *Projective Ecologies*, ed. by Chris Reed and Nina Mane Lister (New York, NY: Harvard GSD, 2014), pp. 336–54.
21. See Juan Martinez-Alier and Klaus Schlüpmann, *Ecological Economics: Energy, Environment and Society* (Oxford: Basil Blackwell, 1987), pp. 206–31. For a further insight from the field of arts, see Charlotte Douglas, 'Energetic Abstraction: Ostwald, Bogdanov, and the Russian Post-Revolutionary Art', in *From Energy to Information: Representation in Science and Technology, Art, and Literature*, ed. by Bruce Clarke and Linda Dalrymple Henderson (Stanford, CA: Stanford University Press, 2002), pp. 76–94.
22. See the drawings and comments in Ebeling, *Space as Membrane* and Avilés, 'On Membranes, Masks, and Siegfried Ebeling's Environmental Raumkubus' (note 3).

23. Ebeling, *Space as Membrane*, pp. 10, 11.
24. Ibid.
25. Ibid., p. 34.
26. For Ernst Mach, sensations (as energy for Ostwald) are *what act*, which is precisely how they are defined in the opening remarks on anti-metaphysical considerations in his celebrated book *The Analysis of Sensations*: 'Colours, sounds, temperatures, pressures, spaces, times, and so forth are connected with one another in manifold ways; and with them are associated dispositions of mind, feelings, and volitions. [...] Relatively greater permanency is exhibited first by certain complexes of colours, sounds, pressures, and so forth, as well as the functionally connected in time and space, which therefore receive special names and are called bodies.' Ernst Mach, *The Analysis of Sensations, and the Relation of the Physical to the Psychical* (Chicago, IL and London: The Open Court Publishing Company, 1913).
27. See Brett Buchanan, *Onto-Ethologies: The Animal Environments of Uexküll, Heidegger, Merleau-Ponty, and Deleuze* (New York, NY: State University of New York Press, 2008). From an ethology approach, philosophers such as Maurice Merleau-Ponty, Gilles Deleuze, Martin Heidegger, or Henri Bergson added ecological thinking. They were likely influenced by von Uexküll's concept of environment as *Umwelt*, based on the refusal to consider a distance between living beings and their environment. Formulated in the beginning of the twentieth century and carrying with it a shift in the focus on science and philosophy, the concept of *Umwelt* led to the abandonment of the anthropocentric standpoint by which classical science distinguished its 'only world'. Several authors identified *Umwelt* as the scientific basis of Heidegger's influential notion of 'being-in-the-world'. See also Georges Canguilhem, 'The Living and Its Milieu', *Grey Room*, 3 (spring 2001), 7–31; and Giorgio Agamben, *The Open: Man and Animal* (Stanford, CA: Stanford University Press, 2004), pp. 39–48.
28. Elizabeth Grosz, *Chaos, Territory, Art: Deleuze and the Framing of the Earth* (New York, NY: Columbia University Press, 2008), p. 10.
29. Elizabeth Grosz, 'Eight Deleuzian Theses on Art', in *An (Un)likely Alliance: Thinking Environment(s) with Deleuze/Guattari*, ed. by Bernd Herzogenrath (Newcastle: Cambridge Scholars, 2009), p. 49.
30. Grosz, *Chaos, Territory, Art*, p. 11; Gilles Deleuze and Felix Guattari, *What is Philosophy?* (New York, NY: Columbia University Press, 1991), pp. 184–7.
31. Ebeling, *Space as Membrane*, p. 10.
32. Ibid., pp. 17, 18.
33. Ibid., p. 16, unnumbered footnote.
34. Ibid., p. 11.
35. Maurice Merleau-Ponty, *Phenomenology of Perception* (1945; repr. London: Routledge, 2013).
36. Bernard Cache, *Earth Moves: The Furnishing of Territories* (Cambridge, MA: MIT Press, 1995); Grosz, *Chaos, Territory, Art*, p. 13.
37. Cedric Price, *Cedric Price: Works II* (London: Architectural Association, 1984), pp. 92–7.
38. See a description of Generator in Samantha Hardingham, *Cedric Price Works 1952–2003: A Forward-Minded Retrospective*, Volume 1: Projects (London and Montreal: Architectural Association and Canadian Centre for Architecture), pp. 446–69.
39. Gonçalo M. Furtado Cardoso Lopes, 'Cedric Price's Generator and the Frazers' Systems Research', *Technoetic Arts: A Journal of Speculative Research*, 6:1 (2008), pp. 55–72.
40. Howard T. Odum, *Environment, Power, and Society* (New York, NY: Wiley-Interscience, 1971).
41. Antoine Picon, 'What Has Happened to Territory?', *Architectural Design*, 80:3 (May 2010), 94–9.
42. Royston Landau, 'Complexity and Complexing', *Architectural Design*, XLII:10 (1972), 608–10.
43. Ibid., pp. 608, 609.
44. Ibid., p. 609.
45. In the end, a way of *possibilistic* thinking that has to do with the empiric tradition of the British sciences.
46. Cedric Price, 'Technology is the Answer, but What Was the Question?: Prerecorded Talk, Pidgeon Audio Visual, 1979', in *Cedric Price Works 1952–2003: A Forward-Minded Retrospective*, Volume 2: Articles & Talks, ed. by Samantha Hardingham (London & Montreal: Architectural Association & Canadian Centre for Architecture), p. 331.
47. Ibid.
48. Cedric Price, 'The Invisible Sandwich', in *Re:CP*, Cedric Price and Hans Ulrich Obrist (Basel, Birkhäuser, 2003), p. 12.
49. Royston Landau, 'A Philosophy of Enabling', in *Cedric Price: Works II*, Cedric Price (London: Architectural Association, 1984), p. 15.
50. Letter from J. Frazer to C. Price, 11 January 1979. Cited in Gonçalo M. Furtado Cardoso Lopes, 'Cedric Price's Generator and the Frazers' Systems Research', *Technoetic Arts: A Journal of Speculative Research*, 6:1 (2008), 59.
51. Landau, 'A Philosophy of Enabling', p. 15.
52. Ibid., p. 11.
53. Erwin Straus, cited by Elizabeth Grosz, *Chaos, Territory, Art*, p. 72.
54. Ibid.
55. Landau, 'Complexity and Complexing', p. 609.
56. See Merleau-Ponty, *Phenomenology of Perception*. Value and meaning lie in the nexus; they belong neither to the environment nor to the subject's own body but instead exist by virtue of the link between the two. Value and meaning are neither only perceptions nor only meanings but an incessant negotiation from which the aesthetic compromise, sustained by experience-based life values, arises.
57. Ibid., pp. 75, 76.
58. Ebeling, *Space as Membrane*, pp. 9, 10.
59. Price defines this continuity by borrowing a metaphor from geometry: 'The measurement of three- and four-dimensional space is only achieved through an agreement, if only with oneself, on intervals of both distance and time.' Cedric Price, 'Public Spaces and Private Spaces', *London Architecture Club Magazine*, No. 2 (1978), pp. 20–2.
60. Gernot Böhme and Hartmut Böhme, *Feuer, Wasser, Erde, Luft: eine Kulturgeschichte der Elemente* (München: Beck, 1996).

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