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No more ego-spheres: An interview with Lydia Kallipoliti on ecological design

Toni Pape and Riley Gold

Abstract

A conversation about ecological design with architect, engineer, and scholar Lydia Kallipoliti. Taking her books *The Architecture of Closed Worlds* (2018) and *Histories of Ecological Design* (2024) as starting points, we asked Kallipoliti to share her understanding of ecological design and trace the histories of ecological design thinking. In this context, the interview focuses on design projects of the 20th century which sought to create so-called 'closed worlds': habitats that could function as closed systems where all material resources are regenerated from recycled waste. In addition to explaining the motivations for these projects, Kallipoliti addresses their practical limitations and the theoretical conclusions we can draw from them. Kallipoliti furthermore reflects on the notions of mediation and scale in design thinking and on the politics of the cycle.

Keywords

ecological design, recycling, cycle, closed worlds, scale, mediation

On the occasion of our #Cycles section, we invited architect, engineer, and scholar Lydia Kallipoliti to an interview. Dr. Kallipoliti is Associate Professor of Architecture at The Cooper Union in New York City and director of the design and writing studio ANA*cycle*. Her latest book, *Histories of Ecological Design: An Unfinished Cyclopedia* (Actar, 2024), explores the emergence and conflicting definitions of ecological design from the 19th century to the present. Beginning with Ernst Haeckel's coinage of the term ecology in 1866, the book chronicles 18 subsequent movements or schools of ecological design: from *autonomists* to *world planners*, *biofunctionalists* to *subnaturalists*, *home economists* to *garbage architects*. Altogether, it provides a fascinating account of how designers have mobilised the environmental sciences toward a range of technological and political goals.

NO MORE EGO-SPHERES: AN INTERVIEW WITH LYDIA KALLIPOLITI ON ECOLOGICAL DESIGN

The project builds on Kallipoliti's previous book and exhibition, *The Architecture of Closed Worlds, Or, What is the Power of Shit* (Lars Müller, 2018a). Here, Kallipoliti highlights rich case studies from the history of science, technology, and architecture in which actors sought to create closed worlds, i.e. habitats that could function as closed systems where all material resources are regenerated from recycled waste. *Synthetic naturalism* is the term Kallipoliti gives to these architectural attempts at recreating the self-organising cycles of natural ecosystems within built spaces. *The Architecture of Closed Worlds* shows that such experiments tend to fail, often in insightful ways.

Thus, Kallipoliti's work addresses key issues for thinking with cycles, including the politics of self-sufficiency, the promises of recycling and regeneration, and the role of technology – both medial and architectural – in environmental attunement and control. The following interview has been edited for length and clarity.
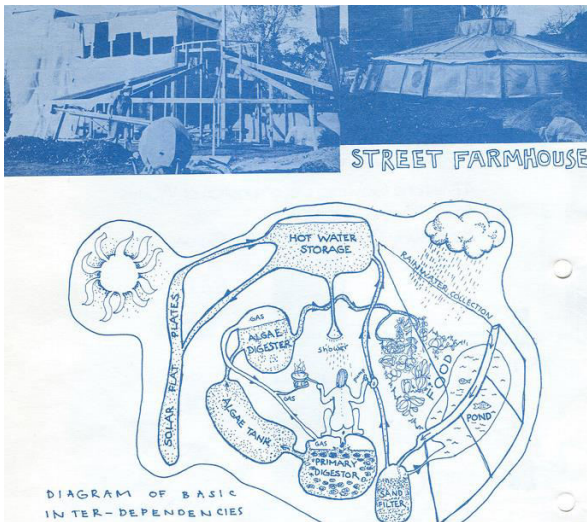
Fig. 1: Diagram of Basic Inter-Dependencies from Graham Cain and the Street Farmers Ecological House, 1972.

Riley Gold: To begin, we are interested in your definition of *ecological design*. What does this term convey? Where does it originate? Who uses or used it and to what ends?

Lydia Kallipoliti: Thank you so much, Riley, for this question. It correlates with my forthcoming book *Histories of Ecological Design: An Unfinished Cyclopedia*. It was never my idea or desire to write a total history of ecological design. I have always considered dubious the idea of encircling knowledge and writing a definitive, *one*, history. I was asked to do so by the *Oxford English Encyclopedia of Environmental Science* many years ago and although I

originally hesitated I took upon the daunting challenge. In the end it was a very beautiful, though painful project, that allowed me to see that in architecture and design circles, 'ecological design' is a very recent term. It was only in 1996 that Sim van der Ryn and Stuart Cowan used the term in their book *Ecological Design*. This was surprising considering that ecological thought and environmental design have been parts of the jargon of the discipline of architecture from the 1960s onward; still, the term had not been officially used. But the term *ecology* was coined in 1866 by German naturalist Ernst Haeckel. What was interesting to me about both these definitions, 150 years apart, is that they establish ideas of harmony and balance. Ecological design was really about a sense of integration of organisms and structures with the natural environment and a sense of a seamless continuum that unfolds, say, between buildings as objects and their environment. This is the main way that the term has been used.

For me, on the other hand, ecology is not about balance. In fact, it is about imbalance and depicts a fragmented view of the world. This becomes more visible when natural ecosystems start to be reproduced in an artificial way, either through technology or by design. So, in the book I define 'ecological design' as the struggle of reproducing natural systems, as well as the understanding of the designed world as flows rather than an accumulation of objects. The book has 18 short chapters, each of which looks at different approaches or schools of thought. Putting all these perspectives together creates a thick overlap of different worldviews, because each one of these groups is not just a different mentality; it is also a desire and vision of what the world should be. So, should the world be whole or in parts? Interconnected or fragmented? Should the environment be left untouched or not? And in most cases, these kinds of worldviews are accompanied by different cultural and political positions that are also recirculating, or cycling in time. There are threads that connect some stories. This is why histories is in the plural in the book title.

Toni Pape: You emphasise imbalance as opposed to balance. Can you say more about why imbalance is important in ecological thinking?

Kallipoliti: I think the whole notion of circular reasoning, balance, and ecology, the idea of a harmonious totality, constitutes a discipline of thought and ideology that does not correlate with the material reality of the world. I have an engineering background, so in my previous book I was keen on studying the biology and the technical reports of different case studies. In many cases, what becomes really important in ecosystems is redundancy and excess. For example, the more you have in an ecosystem (in most cases), the more it thrives by substituting components. Sometimes ecosystems kill certain parts. So, there are a lot of visceral, material realities that have not been inscribed in this ideological formation

of what we understand as ecology. I think the very raw version of what happens on the
ground is something that I am trying to bring back into the way that I see and write. Also,
many important environmental humanities writers, like Anna Tsing and Donna Haraway,
have constructed their arguments based on knowledge and observation of biological and
earth sciences. I am particularly interested in this scholarship that enacts the material
world. In one of my favorite books, *The Mushroom at the End of the World*, Tsing narrates
stories of matsutake mushrooms to speak of commoditisation, globalisation, and eventually
the precarity of life and survival amidst environmental devastation, near the end of the
world. And this position is not about balance and totality. But yes, it is darker and rightfully
so.

Pape: To connect this to the theme of our special section, I'd like to ask how the cycle,
alongside cyclical thinking, became an important figure in your work. What is the value that
this notion has for you? And what are the limits of thinking with cycles? For instance, in the
introduction to your new book, you make a distinction between cycling and encircling that
was insightful to me.

Kallipoliti: Yes, this is a very big topic for me, one that's been going around and around in
my head for a very long time. It is obvious that the culture of neoliberalism and the pro-
gressive optimisation of work is based on a linear model of productivity and on the model
of success based on progress. That's something very straightforward and evident in the
way that people operate in the world. This logistical machine has become the *modus op-
erandi* in defining success. I am interested in cycles because as a designer and as a scientist
you cannot but derail from that line. Design is an inherently fractured process that requires
cycles of thought, circles in one's mind, and there's no method to, say, eliminate risk. Design
cannot be prescribed in a series of processes or protocols, similarly to other creative prac-
tices. Also, the mind does not move in linear progressive optimisation models. We have
become *The Organisation Man*. It's one of my favorite books that tracks the emergence of
middle-class corporate culture in postwar America. In it, William H. Whyte shows that our
mind, subsumed by organisations, is trained to operate in a way of serial protocols.

At the same time, I was interested, very early on, originally as an engineer, in questions of
recycling and how to transform matter to yield new life. Recycling implies a different ver-
sion of life, where instead of life having a beginning and an end, new life is *re*generated.
Also, if the linear version of life suits a political system [neoliberalism's progressive optimi-
sation], circularity implies a different political reality where materials and ideas can cycle
and generate new materials, ideas, and alliances. Cycling is both a material and an ideologi-
cal reality.

Yet, having worked with actual materials, there is also a dead end to the process of material recycling. Cycles cannot operate perpetually, similar to the impossibility of perpetual motion machines; they cannot be spearheaded by energy continuously, because there is friction, and we know this from the second law of thermodynamics. In a similar way, recycling can never operate fully in a cycle, and I started noticing the impossibility of that scheme as well. But still, it is a preferable modality of thinking about the world in cycles, rather than in lines. For this reason, I am bringing into my new book the difference between cycles and encirclement. If you encircle something, it is a finite system; the world is closed. It is a finite system where resources cannot escape. It does not allow for avenues of derailment, or avenues where things can happen outside of the circle.

Fig. 2: Bruno Zevi's diagram of the history of architecture.

I'm thinking in shapes right now. When I was doing my Ph.D., I encountered a diagram by Italian architect Bruno Zevi. It was a spiral, representing historical evolution, architecture

as space and worlds giving rise to other worlds. The diagram was part of a course on the history of architecture, where most diagrams were based on tree analogs, and overlapping lines. The cycling in Zevi's historical space was striking, yet it was purely symmetrical and progressive. It gave me, nevertheless, the motive to think of a different version where circles could exist in multiple levels or in orbits, that sometimes touch and intersect and at others times lead to unknown destinations. This revised diagram represented to me a more nuanced understanding of the arrangement of thoughts and ideas and the ways in which they evolve in time; in cycles that somehow operate in different scales, different levels, and different orbits. I realise that this seems very abstract. But as an architect I tend to think in materials and shapes. And the way that I interpret figures and materials and engineering facts informs unavoidably the way that I think and write.

Gold: Maybe we can circle back to ecological design. In *Histories of Ecological Design* and also your 2018 article for *The Oxford Research Encyclopedia for Environmental Science*, you sketch three phases of ecological design: naturalism (c. 1866-Second World War), synthetic naturalism (c. 1966-2000), and dark naturalism (c. 2000-now). It would be helpful to hear you describe these periods and their various actors. What were the historical conditions in which each phase emerged? What events mark the boundaries between them?

Kallipoliti: I don't want to start with a disclaimer, but I do want to say that even though I have defined three periods in the 2018 *Oxford* piece and the book, the boundaries between these periods are extraordinarily loose and I was only doing this for the sake of others entering into a very complicated and vast history of ideas. So, it's not so much three periods that are distinctly and chronologically set, where a big rupture happens in the world and a new modality of thought appears. It's definitely about overlaps. In many cases I found myself saying that, for instance, dark naturalism is a 21st century endeavor, but I go all the way back to the 1990s. I do this back and forth all the time. Even though the three eras responded to *Oxford's* request for an encyclopedia entry, where one needs to establish periods, there are groups within the same period that conflict and groups from different periods that are conceptually linked.

But in certain ways there are also specific characteristics of each period. So for example, in the 19th century when Haeckel was writing about ecology, ecological ideas were about mapping the world, understanding the composition of its living stock and documenting it, while creating hierarchies and schemes of how living species are organised and what is the constitution of life. In many ways, this came out of naturalists' very long journeys in which they observed, documented, and mapped species and living systems. Naturalists established in many ways and forms the hierarchy of life, where natural entities like a tree or a flower also become figurative and organisational structures for the ordering and hierarchy of species. So, in the book I discuss extensively the role of diagrammatic representations of life. The tree, for example, was not just a living thing, but it was also a

figure of branching and bifurcating, which then offered a plan for how the pieces of the world could be allocated in an order and what species precede others.
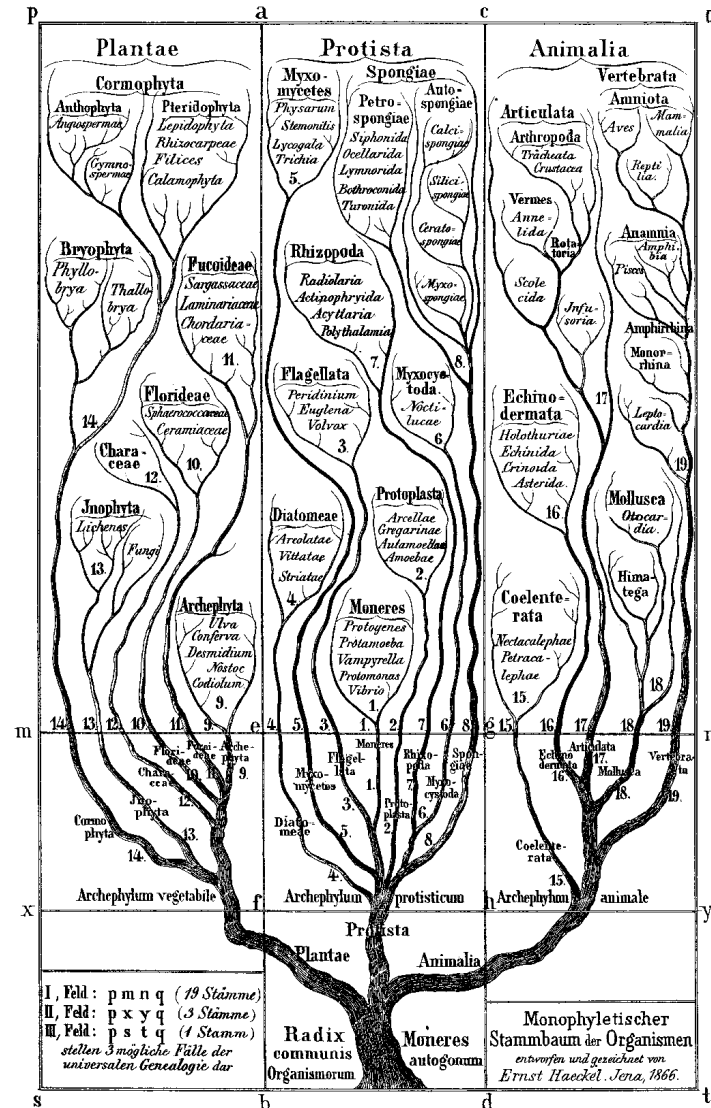

Fig. 3: Ernst Haeckel's tree diagram of life.

At the same time, I address how these hierarchies depict a colonial and contested project. Most naturalists were white affluent European men. Moreover, the very act of putting the

world in pieces, in a tree, and deciding what is further up in the hierarchy, exemplifies the entitlement of how we, as a species, can and may curate and design life in all its dimensions. This is where natural history originates from. I had to delve into these histories in order to write about them and to critique them, in order to offer counter-narratives, other ways of looking into the world. I have new chapters on acclimatisation, which focuses on the colonial project of transferring plants, and home economy, which is about female scientists and their revolutionary ecological practices from inside the house; this is where they could perform their experiments. And by adding these chapters, the book doesn't just focus on the long journeys of naturalists like Alexander von Humboldt, no matter how illuminating his maps have been.

So that's naturalism: the documentation of the world's living stock, in numbers and shapes and the use of natural entities, like the tree, as a figuration of a hierarchy for social class, different species, racial order, and culture. And, of course, man is always on the top; not just any man, but European white man.

After the Second World War, I think the significant shift in ecological design practices was the confrontation of the planet as a physical entity that was viewed in the photographs of the earth. Ecological theories were given physical substantiation in a kind of picture, which didn't exist before. This image changed a lot of things, but mostly it fostered the idea that we should redistribute world resources, and that the new stage set for design was the planet itself. People like Buckminster Fuller, John McHale, and others understood the whole planet as a design system. In this light, natural systems were seen as analog structures to be replicated via technological instrumentation, under the rubric I tentatively use of synthetic naturalism. So how can we create a space or an environment, using certain methods and techniques, so that it operates like an ecosystem? How can buildings and cities operate in this way? I think that this is a very important distinction that takes place, also because there's a boom in technology after the war.

And finally, dark naturalism was an enticing lens to think through the present. This period is not nihilistic; it is about the end of the world and catastrophe. It really is about acknowledging: here's the shit that we've done. And what do we do with the world as it is now? And how do we deal with the microplastic that we unwittingly eat, the carbon emissions that have raised global temperatures, and other facets of the devastating climate crisis? Dark naturalism refers to the Anthropocene, which is a very contested term. But it also refers to a period which comes after the modern utopia. It resists utopia, the sense of utopia which was enacted when the Earth was viewed. At that point in time, we were hoping to use environmental activism as a type of social activism and as a response to crisis. This kind of direct and causal response is no longer the case. People seem (hopefully) humbler and more aware of what has happened; suggestions are more local, more

instrumental, surgical. As Anna Tsing would say, we are living in the ruins of modernity and let's see what we come up with, how to continue in the future.

Pape: Your previous book, *The Architecture of Closed Worlds*, is dedicated in great part to the failures of circular design. You present 42 projects, from aqualungs to Biosphere II to Masdar City, that sought to design closed systems in which resources are recycled through feedback loops that are internal to the system. Yet, many of these case studies were unsuccessful and you list the 'key failures' of each project. In general terms, what were the theoretical and/or practical reasons for these failures? Do such projects expose a tension between theory and practice? Differently put, is this idea of encircling just an abstract fantasy that never bears out in reality?

Kallipoliti: Yes, it is a perpetual fantasy, and that's why I wrote a whole book. I was interested in failures for the following reason: even though the idea of the circle or the cycle is basically describing an impossibility, something that doesn't work, its existence is soothing and hopeful. Even if circularity does not work materially, it has become a kind of contract about the way we think and the way that environmental policies and ideas are publicised and digested by large audiences. For that book, I was studying a range of different prototypes, examining the technical reports of each one and there were technical issues with all of them. Whatever the goal was, the objective of what it would do and how it would perform never took place in reality. And yet, we persist in conceptualising circular systems and implementing them. There's a fascination with the culture of circular reasoning, independently of the obstacles. So there's a different level of how certain ideas attain value, which is beyond their physical realisation. It's about what we wish the world would be like, even though it's not. And in many ways, we wish the world would be circular because the earth is figured in a sphere, but that doesn't apply necessarily to the subparts of the systems at play. Despite the failures, the persistence of circularity is astonishing to witness and analyse.

Pape: Could you say a bit more about what it is that fails in concrete terms? I'm thinking of the subtitle of the book: 'What is the Power of Shit?' What can we learn from shit?

Kallipoliti: That was literally one of my favorite moments in academia: deciding the subtitle of this book. And it's really wonderful that the publisher supported it because not a lot of publishers would. But Lars Müller was very open. He said at one point: 'Well, there's a good balance.' *The Architecture of Closed Worlds* is a very proper title. It goes back to Reyner Banham, and everybody uses 'The Architecture of Something' in their book titles. The subtitle is 'ugly', he said, but that was a good thing. It keeps things in perspective. But I proposed it, after thinking with Eva Franch i Gilabert, who was at the time the Director of the Storefront for Art and Architecture in New York, where the exhibition took place before the book. Following our discussions, I saw that the ground reality of the projects that I am

discussing in the book, which is really about artificial ecosystems, is a kind of counter-history of architecture, design, engineering of the 20th century. This history is not just about ideas of integration with nature, but about reconstructing natures inside these earth-bubbles, the way that architecture can *produce* nature – or the fantasy that architecture can produce nature and the realisation that it really can't. And a lot of these realisations, when examining different case studies, were about *stuff*, the physical reality of stuff on a microscale.

For example, early living experiments for space capsules had people asphyxiating inside them. People couldn't breathe, although the capsules were built to be inhabited for months. Only one month in, they had to leave. Biosphere 2 is the most famous example of a failed enclosed environment. Several strange unexpected things were happening in enclosed ecosystems, and a lot of these occurrences were about output byproducts, material *stuff*, which coagulated in new bodies that were not calculated in the system's original flow chart, and this is a very important way to look at ecosystems. Shit is literal and metaphorical, right? It really is about the byproducts of human bodies. And ecology is a lived experience that is about moving bodies that sweat and leak and excrete; they have heat and shit. And this is part of the ecology of inhabitation, that's the material reality of it. But it also is a kind of metaphor for the study itself, that there's shit that happens, right? It doesn't work. And that's why I thought that subtitle was important.

I'll give you another example; one of my favorites that I studied when I went to the National Archives in Washington DC studying NASA's early space capsules or 'living simulators' – early ecological life support systems from the 1960s. There, I saw a short film [made by NASA] about how to live in space called 'The Case for Regeneration', and the space capsule was part of this project. And so the movie presents a heroic model of 'Man' to go to the stars and conquer the universe, a space outside his physiological boundaries. With a very stern voice, the narrator mentioned that it's really important to not just invent rockets and power sources to colonise outer space, but also to reinvent and redesign human physiology. Because we can't carry whole water tanks up there. So recycling was the only way.

They built these early living simulators and put people in there, monitored them in a kind of 'Big Brother' experiment. They were four men and they had to do certain routines every day: shave a certain way, put all their waste in certain departments, do X, Y, Z, and they were going to live for four months in the NASA Langley Simulator in 1960. And it was terrible. It didn't work. A few days after the experiment started, the inhabitants couldn't breathe, they had headaches. It was really an issue even though everybody did everything right. The crew followed the protocols and did as instructed. The problem was that many things occurred that weren't accounted for in the simulation. The material flow chart simulations that they were given are theoretical speculations, mathematical equations of what would and should happen, and it didn't work that way. Because stuff coagulated in the

air from their sweat, for instance. I don't remember all the details, but there was a process of small particle coagulation that stuffed the reactors – and it just clogged certain systems, making the air unbreathable.
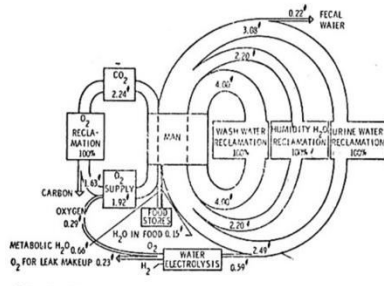

Fig. 2. Water reclamation with electrolysis to complete oxygen cycle and help compensate for cabin losses.
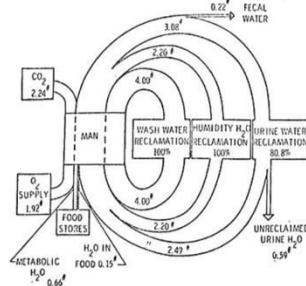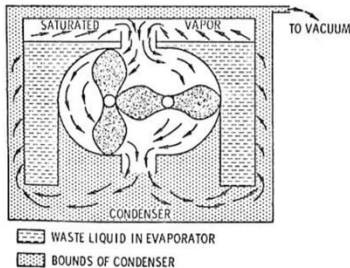
Fig. 1. Water reclamation for water balance only.

Fig. 7. The principle of vacuum compression distillation.
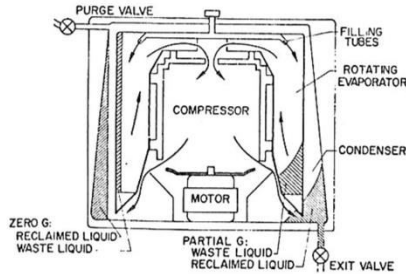
Fig. 9. Water reclamation system.

Fig. 4: Diagram of water and waste subsystems from the NASA Langley Simulator, 1960.

In Biosphere 2, there are many theories as to why the mission participants couldn't breathe. One theory was about the curing of concrete. When concrete is curing it absorbs more oxygen, and these occasional absorptions were not calculated within the flow chart of the system. Other theories were about crazy ants. All in all, these small details are part of the living world, right? And in an ecosystem, these are absorbed by the redundancies, the things that are part of the material world. In an artificial ecosystem, there is no benchmarking or there's no plan for things like that. And that's part of the problem of what I call the 'shit', because shit is not just what we excrete from our own bodies. It is also all of that stuff that escapes and becomes part of new realities.

But the failures were not just material. Sometimes they were about a social group of people; let's say a group of people that go and found their own commune. They would operate as a social group in ways similar to the material system, but at a different scale and with its own internal dynamics. Sometimes they would fight and not agree on certain things, because the protocols of communication and the protocols of interaction have not been fully

determined. This would lead to a kind of disaster in the social dynamics of the group. So, there are different kinds of failures and I think I have many different versions of how one would define failure, but it's definitely an important tenet of the book. I get this question a lot!

Pape: Well, I just wrote down that for you shit means 1) excrement, 2) contingency, and 3) entropy. Those could be three meanings summarised in that term.

Kallipoliti: That's actually very good.

Gold: In *The Architecture of Closed Worlds*, you write that the synthetic naturalist phase 'signaled the end of nature as an autonomous field and the rise of ecological design as a replication of self-organizing cyclical systems instrumentalized through *technological mediation*.'[1] We are curious what the term mediation means in your work. Relatedly, we wonder how you understand the role of media technologies in shaping the (attempted) closed systems of synthetic naturalism.

Kallipoliti: When I say mediation, I don't necessarily have any intention to allude to the way that a work becomes known to a public or how it gets disseminated and how it is perceived. In that phrase, I was talking mostly about representation, and that's because in architecture and design the role of representation is very critical, as an intermediate step between an idea and its realisation. So, when I say mediation, I think I mean representation. The kind of ways in which something becomes real and becomes constructed. And the usual means of representation for architects is drawing, which ranges from hand drawing to computer drawings, models, renderings, and AI.

In many ways, the different case studies in *Closed Worlds* were all representations or mediations of larger systems. All of them were testing models of larger realities. The scope was to literally reproduce chunks and parts of the world in a smaller scale. And this is a kind of mediation; this is how I perceive the word. Biosphere 2 was a representation of the earth. And Melissa was a representation of a lake ecosystem. Mars 500 was a representation of a space colony. All these living experiments simulated in different ways and formed a larger reality, scaling it down. Therefore, mediation is critical.

In the case of *Closed Worlds*, representation is not just about drawing or models. It's sometimes about the disjunction between the material reality that takes place in an experiment and the simulation model, which is a mathematical formulation or a flow chart, and the way that systems are envisioned to operate in these simulations. And that's where it gets very interesting: these things are not always the same and they're at points highly divergent from each other. That's my sense of mediation. It's not about: who and what knows this and how? But it is about what it represents.

Pape: That makes sense. *Media* and *mediation* are notoriously difficult to define, which is why the field of media studies has dozens of definitions for those terms. So your understanding of mediation totally works for me. But I was also thinking of mediation as a technological processing of the world. Simply put, one could say that the human civilisation and its life environment, the earth, are 'out of sync'. There is a tension or even conflict there. And technology can be used to mediate between the environment and us – for instance through the speculative technology of carbon capture or even more radical forms of geo-engineering. So then mediation is the actual processing of worldly matter by means of technology. That's how I read *technological mediation* in your text.

But what I like about what you said just now is that representations are also worldly matter arranged in a certain way with the help of technology. So representations are also operations – operations that mediate certain ideas – and by disseminating these representations in our culture, we already begin to do certain things to the world, to process it according to the ideas we represent. You explained nicely how one can get from the idea of mediation as representation to a consideration of what representations actually do in the world, how they mediate certain materialities.

Kallipoliti: Yes, absolutely.

Gold: You also mentioned scale. Can we say that the history of ecological design is also the history of a revelation about design as always immanent to some broader ecological condition? Subsequently, does all design become ecological? Among other things (insides and outsides, parts and wholes), this brings up questions of scale. I would be interested in hearing your thoughts about how ecological design lends itself to multi-scalar practice and what frictions one encounters when attempting to jump scale in design projects, i.e. the mediation of environmental processes at another scale.

Kallipoliti: This is a very important question for architects with a long legacy in design thinking: how things happen at different scales. Think of *The Powers of Ten*, for example. Every architecture student knows this film. It is amazing because it reveals different entry points in viewing the world. It is not about what you see with your own eyes, but the simultaneity of perceptual lenses to access realities by zooming in and out. At the same time, the movie was also a representation of systems theory and of the expectation that things are connected at different scales. The premise was that you can find the same information in the nanoscale and the galactic scale, and that there is a natural order of systems and subsystems that fit together in different scales.

The logic of scaling things up and down was extremely important to several case studies that I investigated for *Closed Worlds*. For example, Biosphere 2 in Arizona was inspired by

the bottle experiments of a microbiologist. The tour guide explained this when I visited, showing us an ecosystem in a bottle and its ability to self-organise on that scale. But when the scale changes to a giant infrastructure that has hundreds of animals, species, oceans systems, and people inside, scaling is not just more complicated, but also a rupture in the relationships between all living things. The alliances between organisms change so dramatically that scaling things up and down in ecosystems is another case of impossibility.

Architects commonly scale things up and down based on the concept of geometric similitude. A triangle, let's say, can have the same proportions and attributes in different scales. It doesn't matter how big it is, the principles and immanent relations are the same. But what applies to shapes and geometry does not apply to ecosystems, and Biosphere 2 is a striking example of these discrepancies in scaling living systems.

Nonetheless, the idea or the intention of understanding different scales as a designer is critical nowadays, because it forces one to go beyond the normative notion of design as a kind of object inside an environment and forges an understanding of flows. Where do materials come from, what are the realities that a design unfolds, and what are the ramifications of these realities territorially and geopolitically? Unfolding the larger realities, as well as the smaller realities, is a critical practice today and in that way it is ecological.

(MILES) 10^8
sun—
mars—
venus—
(at nearest approach)

10^8 (MILES)
SUN
pioneer IV (in solar orbit)
venus probe (in solar orbit)

interplanetary space

10^7

10^7

10^6

10^6
lunik I (in solar orbit)

moon—
lunik II (moon impact)

cislunar space

10^5

10^5

explorer VI

terrestrial space

10^4

10^4
vanguard I
explorer I
echo I

10^3
courier
discoverer I
trios I
soviet cosmonaut

10^3

aurora polaris—

10^2
mercury astronaut

10^2

noctiluscent clouds—
stratosphere—
manned aircraft (x-15)

sounding balloon
nacreous clouds—
propeller aircraft
troposphere—10
occupied balloon
cirrus clouds—
kite
highest land—
Mount Everest
(conquest by man)

helicopter

snow—1
hail—
1
lightning—
rain—
fungi—
timber line—
SEA LEVEL
SEA LEVEL
hydrosphere—
combat submarine

diving bell
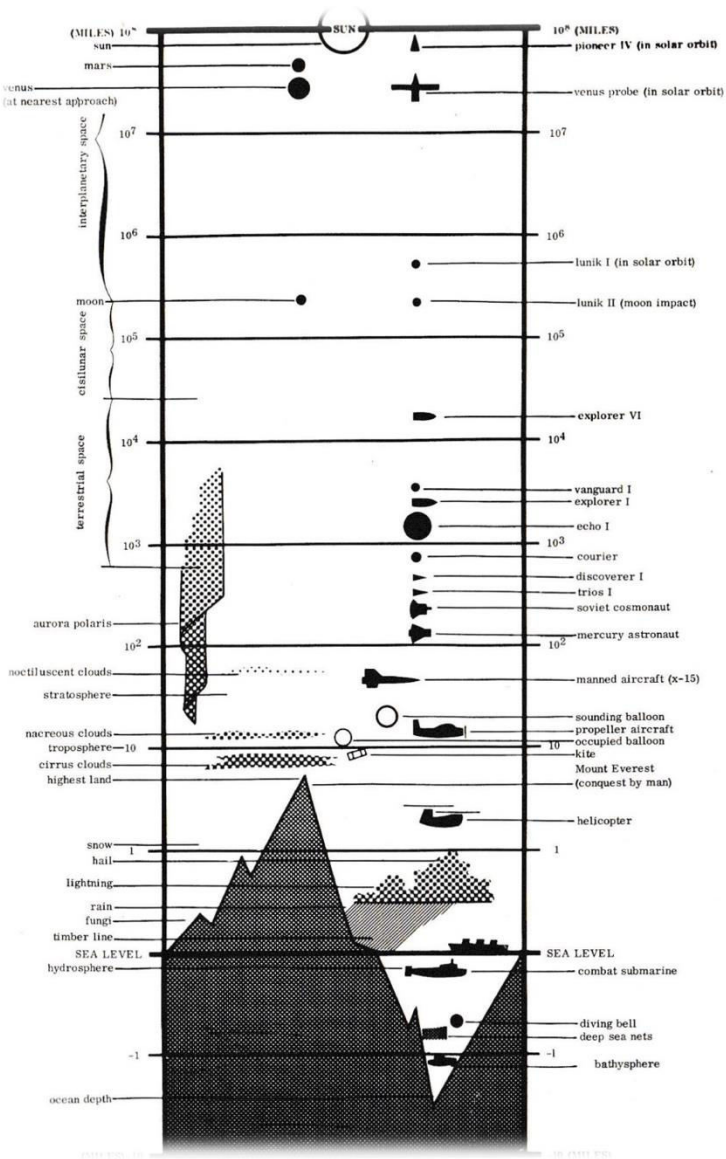deep sea nets
−1
−1
bathysphere

ocean depth—

Fig. 5: John McHale's Super Scale Survey Diagram.

I always ask my students to think in different realities, and I show them a section by John McHale which is called the Super Scale Survey Diagram. It's a section from the bottom of the sea to the stratosphere. And it shows how small and thin our footprint is on the Earth,

but also how our actions affect all these other scales. But I also tell them that you can't know everything that happens in all of these scales, and you will never know. You can know an episode in one scale, but there are gaps between the different scales and you have to work while knowing these gaps and understanding some parts of the problem, but not all of the problem. As a designer, you cannot understand all of the interrelated realities from the nanoscale to the global scale. It is in the realm of impossibility. But you can know some parts and speculate or conjecture on how these episodes may become part of your practice.

Pape: I really like that. It takes away some of the anxiety when dealing with these monumental challenges. I have one last question about the politics of cycles. In "Histories of Ecological Design," for example, you write that the design discourses of synthetic naturalism (ca. 1966-2000) picked up and emphasised the notion of *autonomy*, which was crucial to off-the-grid living communities and libertarian projects alike.[2] What political values are affirmed through the notion of the cycle? How does capitalism or nationalism seek to instrumentalise natural cycles or ecological thought? Is (re)cycling instrumentalised in ways that you find problematic? What are the politics of the cycle from an architect's perspective?

Kallipoliti: They're very complicated, I'll tell you that. When I was doing my Ph.D., I wanted to do two very different kinds of research. I had to review documents at the NASA archives, which are traditional chaotic archives. And the other part of the research was oral histories. I traveled to find people that did underground design experiments with materials, and interviewed them and spent time with these authors. One of the first people I interviewed – and it was a pilgrimage to find him – was Graham Caine. He was part of an anarchist group of thinkers and architects in England in the 1970s called the Street Farmers. They wrote a manifesto magazine called *Street Farmer* and they were the ones that introduced me into what the cycle meant to them as a kind of political scheme. Caine said that the linear mode of productivity is about capitalism in the modern world, while the cycle signified the regeneration of resources and the idea to live off the land. I am oversimplifying it here. For these countercultural groups cycles signaled a radical response to urbanisation networks, which they saw as networks of centralised control. So I'm talking about power supply chains, the electrical grid, the way that power, electricity, and water comes to you, when you are a part of the grid. They were interested in generating their own energy and their own water and their own food supplies to detach themselves from the grid. And for them, this was a political statement against authoritarianism and centralised government. And that's what it was for many counterculture circles at the time.

At the same time, I have to say that a number of people in America who live remotely in their houses, people that are armed and vote for Trump, are also part of a circular system off the land. But they are supporting a very different political ideology, which is about individualisation. Because if everyone becomes an individual entity, that's not a

representation of democracy either. So, in time I've come to think that the early version of
the circle as a kind of resistance to authority was a very interesting moment rooted in the
1970s. But in reality, if you want to change political systems, you need webs; you need
federations and microgrids. You can't have hundreds of different circles that each operate
on their own. And that's something that wasn't rigorously considered by the Street Farmers.
But whatever the omissions, they were great. They had energy.

The circle as a figure is not married to a certain political system. Circular ecosystems do not
directly represent leftist countercultural groups, despite the 1970s manifestos. The cycle
represents antithetical political agendas. Therefore, it is not a political scheme; it is an
ideational scheme and an epistemological construct. It does not directly correlate with a
certain reality. The counterculture groups were using the recycling principles of NASA
spaceships, and NASA spaceships were about conquering outer space and colonising it, in
the framework of Cold War politics. So, different groups used the same techniques, systems,
and principles to sponsor antithetical political directions. Possibly, in this case, the cycle is
about human desire, to close and encircle knowledge.

Pape: I like that. It's a reminder for scholars of culture, for instance in the humanities, to
pay attention to how certain ideational figures and schemes like the cycle get picked up by
different interest groups instead of buying into a particular notion of the cycle in general. I
also really appreciated what you just said: 'You can't have hundreds of different circles that
each operate on their own.'

Kallipoliti: 'No more ego-spheres' would be another way to think about that.

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Notes

[1]   Kallipoliti 2018, p. 17 (emphasis added).

[2]   Ibid., pp. 26-28.