

constructing an endless interior: a relentless, unbuilt modernism

Craig McCormack

The University of Melbourne

[0000-0001-7324-5488](tel:0000-0001-7324-5488)

abstract

Manfredo Tafuri, writing on Piranesi's prison etchings, contests that from the period of the Enlightenment, the understanding of the city-as-inside and nature-as-outside has been permanently altered: the built environment is now everywhere, and nature subjugated within its global system. Through a series of increasingly complex artificial habitats, this ongoing terrestrial project of global interiorisation has extended outwards, culminating in the extraordinary vernacular space architecture of the International Space Station (ISS).

On the one hand, this nascent cosmic extension of Piranesi's labyrinth represents the summit of Earth's interiorisation—a process that extends to incorporate its orbital systematisation and the transposition of its instrumentalised environment. However, as this essay illustrates, the built environment's access to outer space is not only the acme of terrestrial interiorisation but also the genesis of a potentially limitless, unbuilt interior project.

This visual-based research essay deploys a series of hand-drawn illustrations that reference and pay homage to the engraved plates of the Carceri series and Émile-Antoine Bayard's illustrations that accompanied Jules Verne's proto-modern fiction. Concrete poetry mediates and informs the relationship between these illustrations and the written text. This doubly illustrative methodology seeks to synthesise and augment the abstract aspects of the essay visually. The purposeful ambiguity inherent in the referenced graphic style of the selected illustrators advances the viewer's interpretation. As per its graphic precedents, it provides a tangible spatial reference for the progressive conceptual interiorisation of outer space as a consequence of the built environment's expansion beyond terrestrial horizons.

keywords

outer space; interiority; horizon; corridor; modernity

cite as:

Craig McCormack, 'Constructing an Endless Interior: A Relentless, Unbuilt Modernism,' *idea journal*, 21.1 (2024), pp. 59–76, <https://doi.org/10.37113/ij.v21i01.560>.

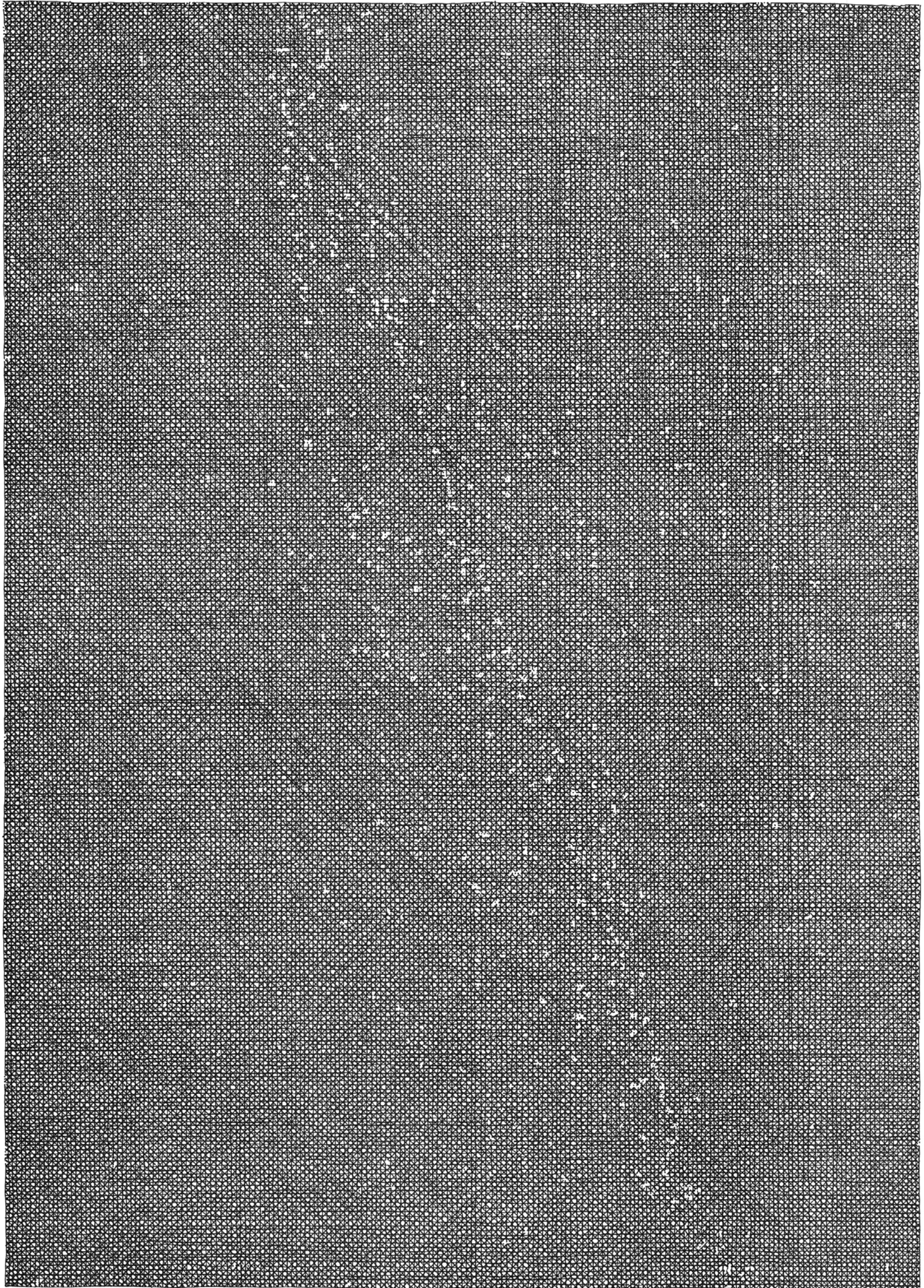
The lines represent the limit to humanity's understanding. They are the attempt to break things down to the overlapping, intersecting and unseen

t r a s j ' e c t v e r c i t e s ,
f o r c e s ,

... systems devised by humanity to make sense of the world but ultimately limited by physiological comprehension.

Their resolution is representative of the incomplete picture that we have of the cosmos. The gaps in the lines created by placing, lifting, and re-placing the pen to the paper consciously mimic those lines in a wood cut engraving that, through a consistent ambiguity, provide enough information to allow the viewer to perceive an image. Such an image requires the viewer to engage their imagination and to make it their own.

Laugier's *Primitive Hut* represents architecture set against nature and is an early, graphic representation of the dialectic between the two.¹ While the text, along with its pictographic frontispiece, provides a key architectural precedent, it no longer adequately represents the form and function of terrestrial architecture and the built. As the latter assume a domineering position in relation to the natural, world they find themselves on the periphery of the Earth's environs, only returning to the condition of the primitive hut via a context of a significantly different scale: the infinity of outer space. This tentative foothold has thus far manifested itself in a series of artificial satellites of varying capability and complexity, from mid-twentieth century vernacular architectures, in Low Earth Orbit (LEO) to the present-day International Space Station (ISS). These orbital space stations are examples of contemporary vernacular space architecture, but they are also a continuation of the terrestrial built environment, dominated by utility and infrastructure.

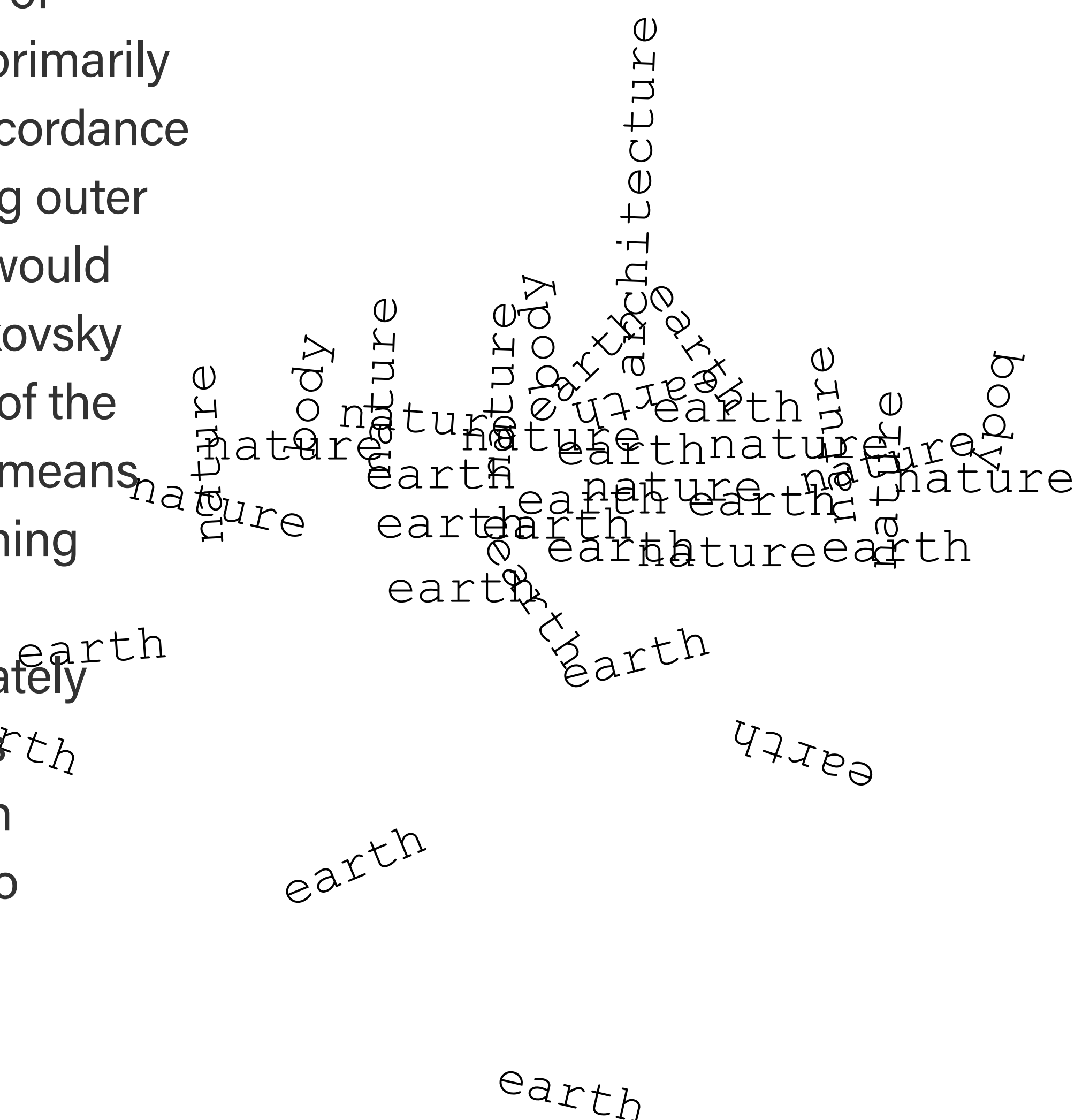


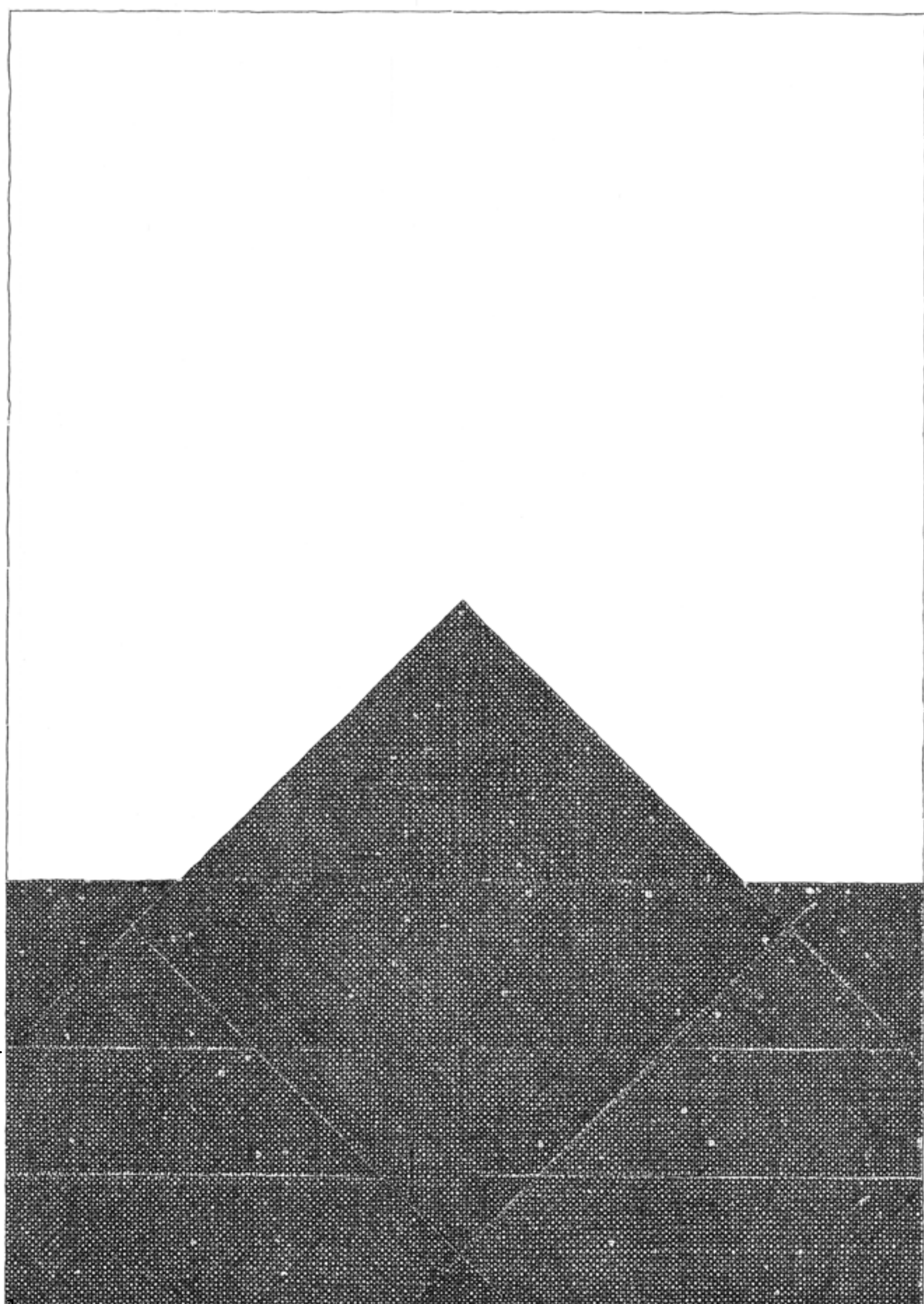
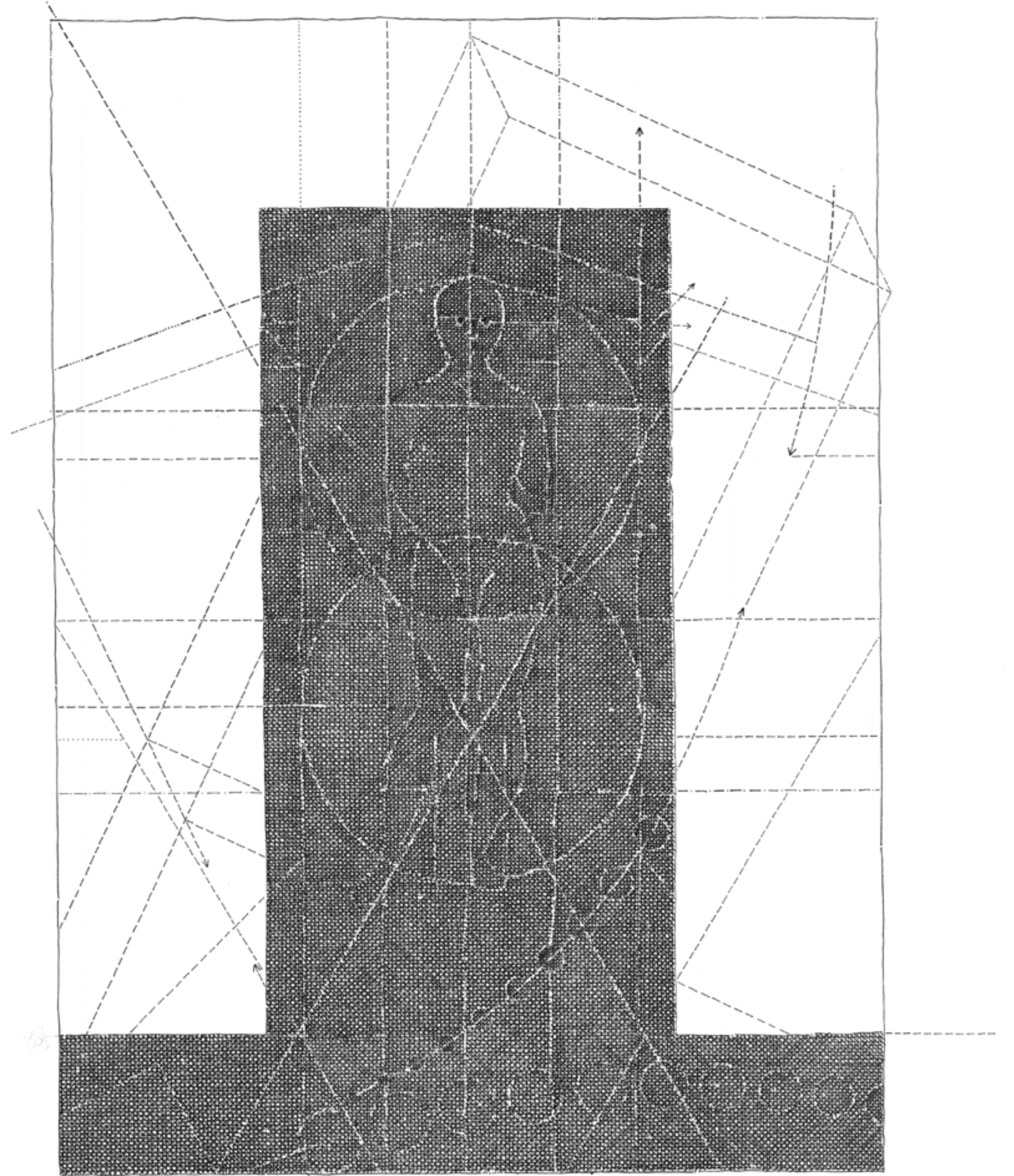
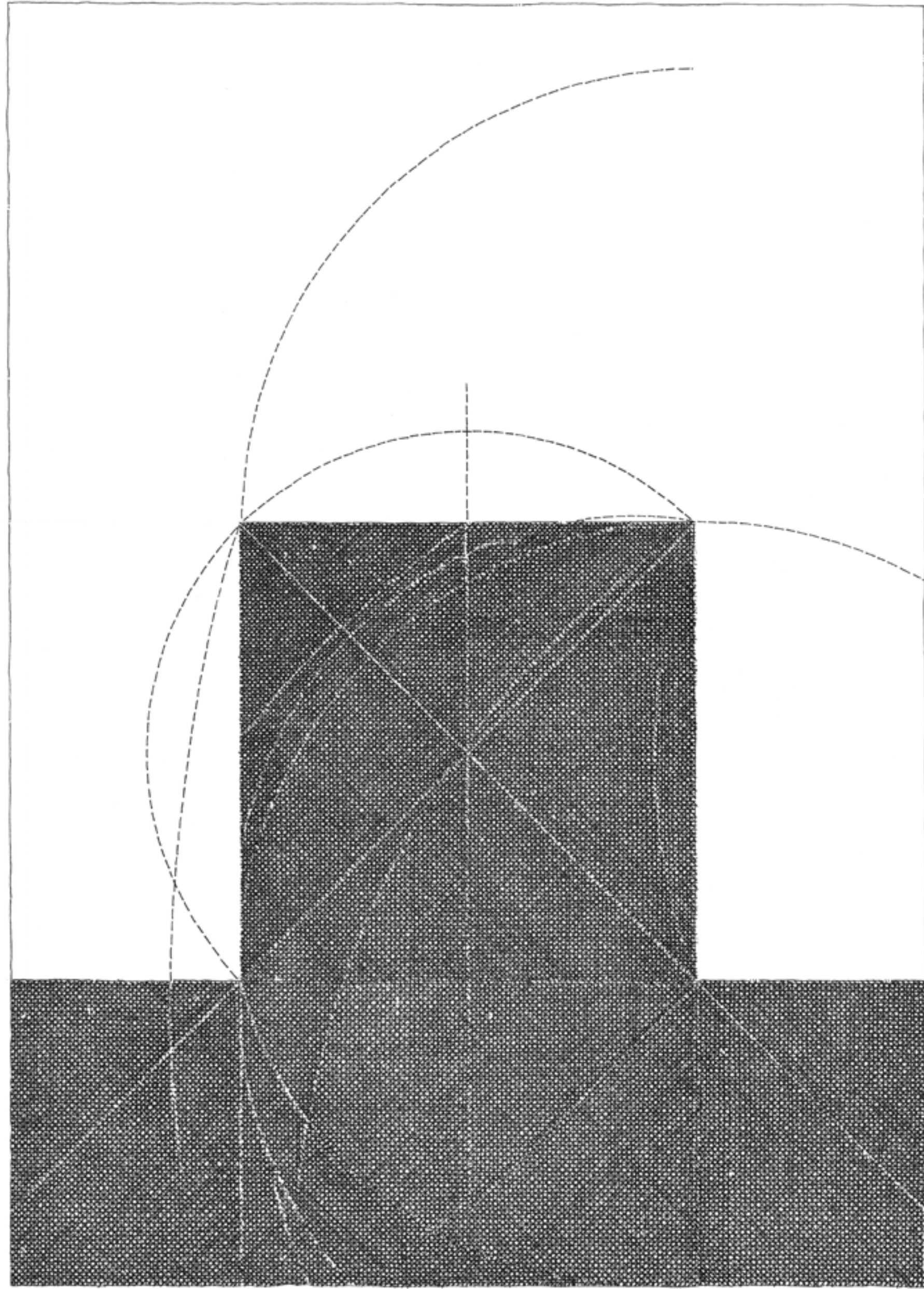
I understand architecture to be an expression of humanity in built form for good or for bad. It has emerged from within the Earth governed by nature's rules as its precedent and has, for thousands of years, moved outwards with ever-increasing velocity.

Timber, bricks, concrete, steel, humans, economics, hopes, dreams, pneumatic tyres, waste removal services, and the internal combustion engine are but several of the complex confluence of forces that have contributed to the outward trajectory of the built environment that now encapsulates our little rock.

Theorists have long conjectured upon architecture's meaning by drawing out its correspondences with the human body. In his *De architectura*, Marcus Vitruvius Pollio (writing in 30–20 BCE) argued that the development of architecture should refer to the proportions of the ideal human body, particularly in the design of temples, as a model of natural perfection.² Initially, the body was used as a system of measurement to understand the external world and, as a result, to internalise it. This body-based metrology was developed in Vitruvius' text and reappears in Leonardo da Vinci's Vitruvian Man, Neufert and Dreyfuss's statistic bodies, and Corbusier's account of the Modulor Man.³ However, transferring the body to the environment of microgravity would radically destabilise and decentre it, undoing the possibility of anthropocentric metrology and the human as an organising punctum.

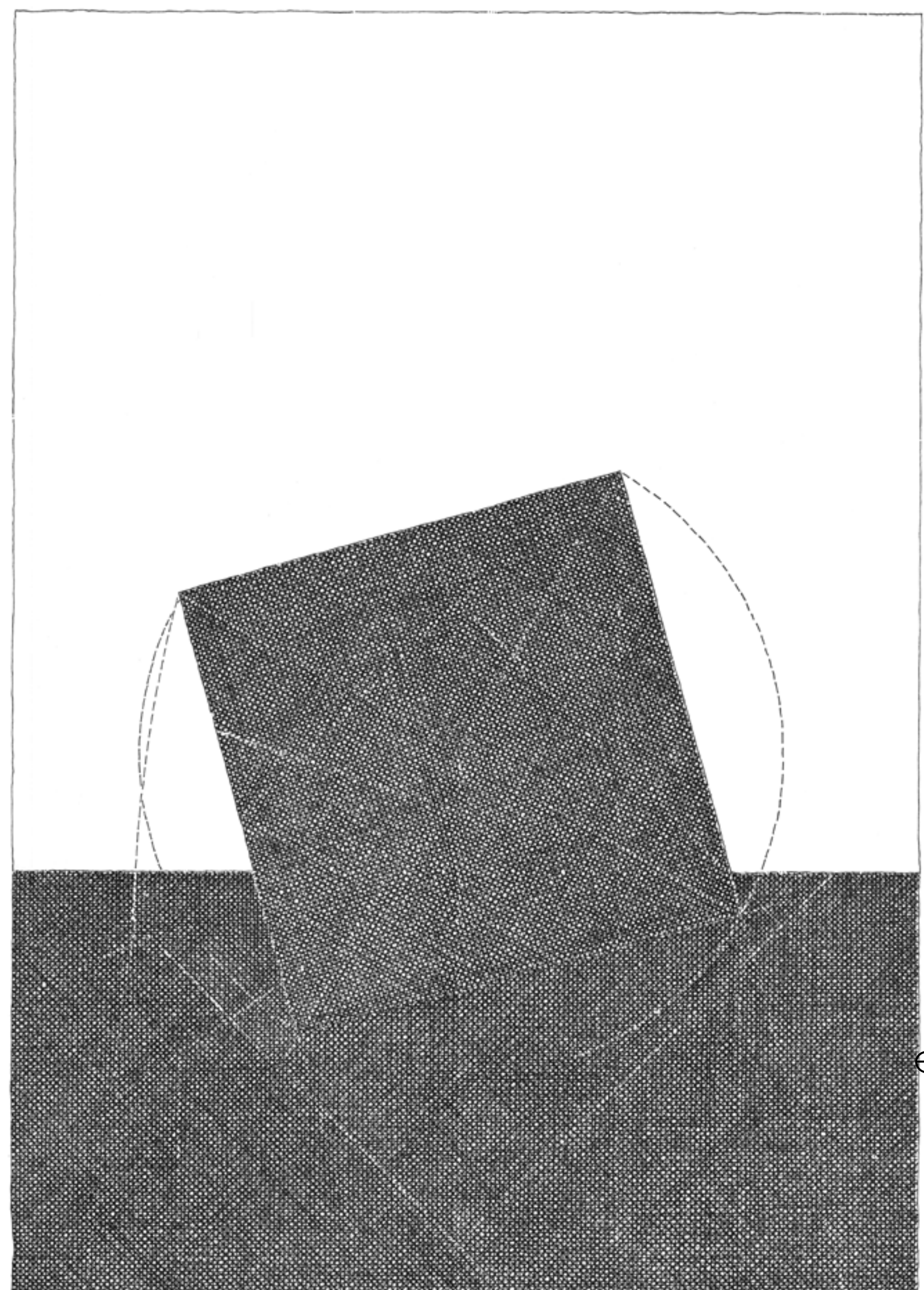
At the core of this decentring is the loss of the terrestrial gravity that defines the body's order (and its environments). Prior to the abandonment of this condition in the late twentieth century when humans arrived in space, figures including the Russian Cosmists understood gravity as an element that would be transformational in its absence.⁴ Konstantin Tsiolkovsky, the Russian 'father of rocketry', did not see the body entering space as either a primarily military or colonial strategy of expansion. Instead, and in accordance with Cosmist beliefs, he understood the potential of visiting outer space was to provide freedom to the human body, which would no longer be restrained by the Earth and its gravity.⁵ Tsiolkovsky thought of space as a vehicle for the purposeful evolution of the body and that visiting outer space would provide it with a means of liberation. He and other Cosmists believed that overcoming terrestrial gravity and entering space would equate to the determination of humanity's own destiny and would ultimately elevate humanity to a god-like status.⁶ Melding aspirations and pragmatics, Tsiolkovsky would also be instrumental in developing the scientific theory that would allow rockets to overcome the force of gravity.



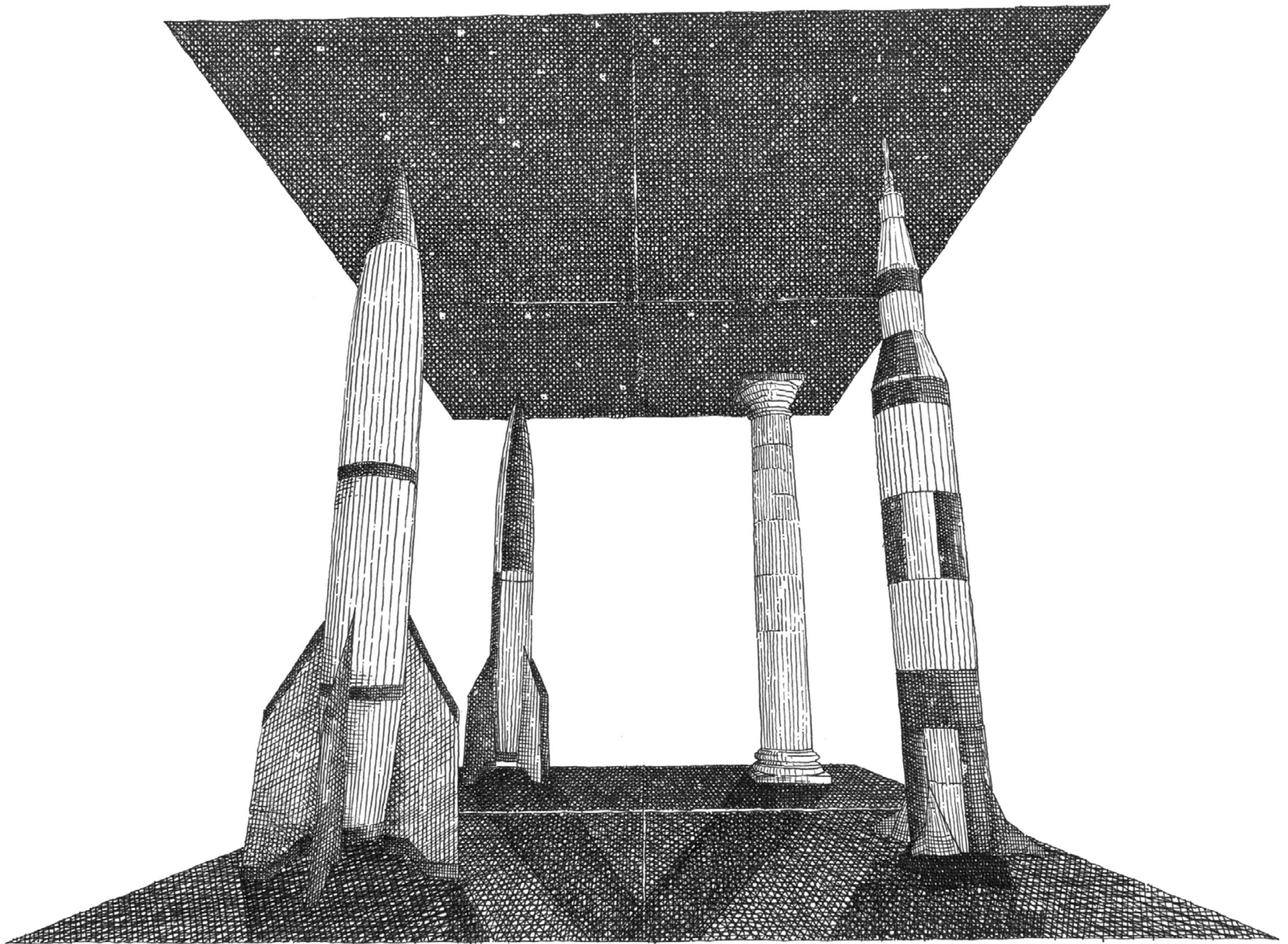


earth

earth



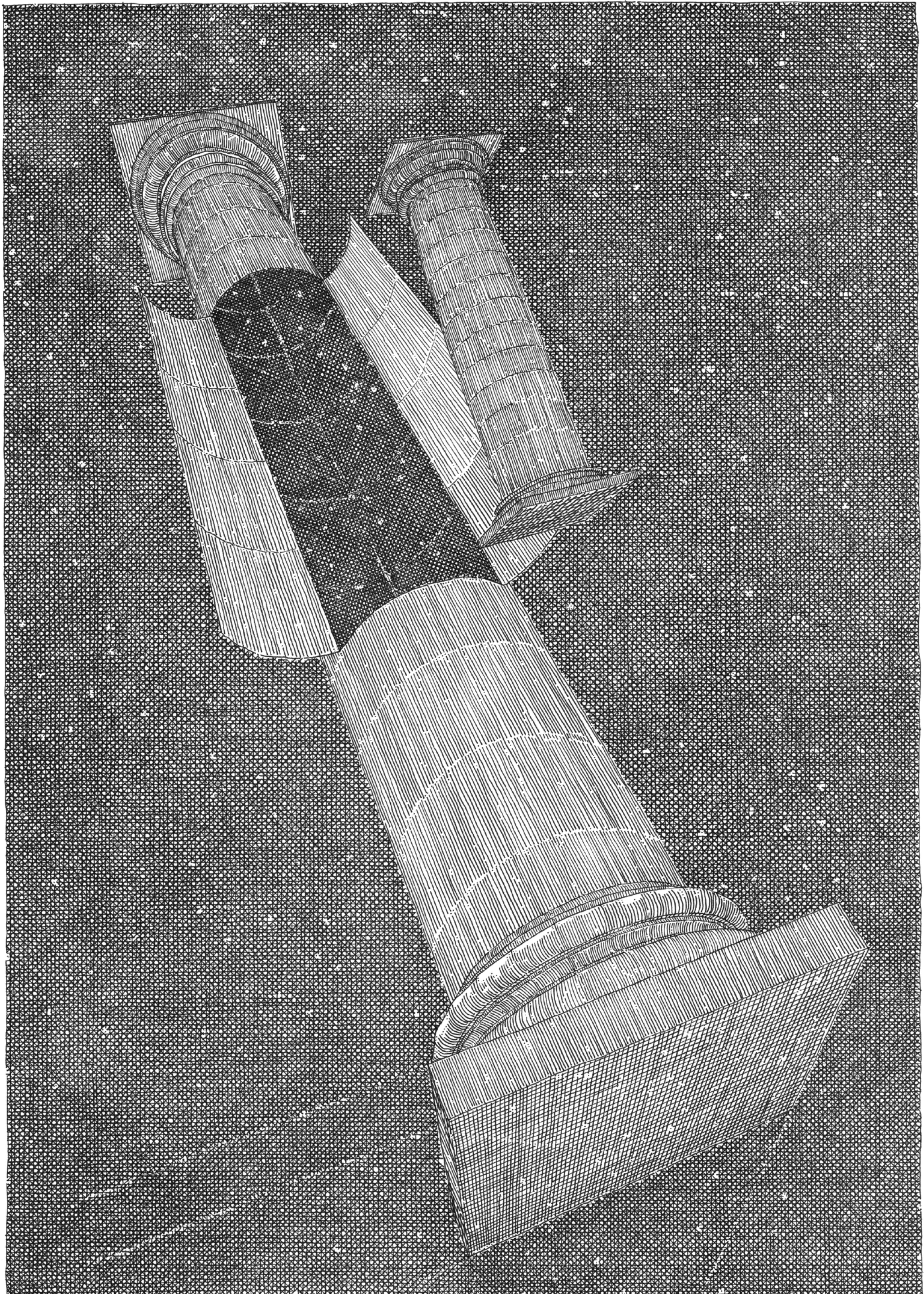
earth



Yet by pursuing existence among the stars, the body brings its terrestrial environment along with it in the belly of the rocket. The term ‘cabin ecology’ was initially used ‘in the late 1950s to describe the environment inside a space vehicle.’⁹ American ecologists and brothers, Eugene and Howard Odum, would introduce systems theory into cabin ecology research ‘By diagramming the flow of energy in the natural world as input and output circuits in a cybernetic ecosystem.’¹⁰ The Odum brothers believed the way to construct a closed environment was to relieve the Earth of ‘a little piece of [its] biosphere [...] and try to build a wall around it so that it would be materially closed but not closed to energy flux.’ It was Howard Odum who referred to these systems as being ‘steady state,’ suggesting a predetermined limit of a particular space vehicle’s ‘carrying capacity.’¹¹ Lydia Kallipoliti describes these steady-state environments as ‘closed resource regeneration systems’ or ‘closed worlds.’¹² She explains that, in ‘contrast with an open system, which is part of an exterior world and linked to its surroundings, a closed system [...] implies an architecture of “un-rootedness”; it suggests not only a physical reality secluded in its geographical and spatial borders, but also an existential separation of the individual from the urban fabric and eventually from the social sphere.’¹³

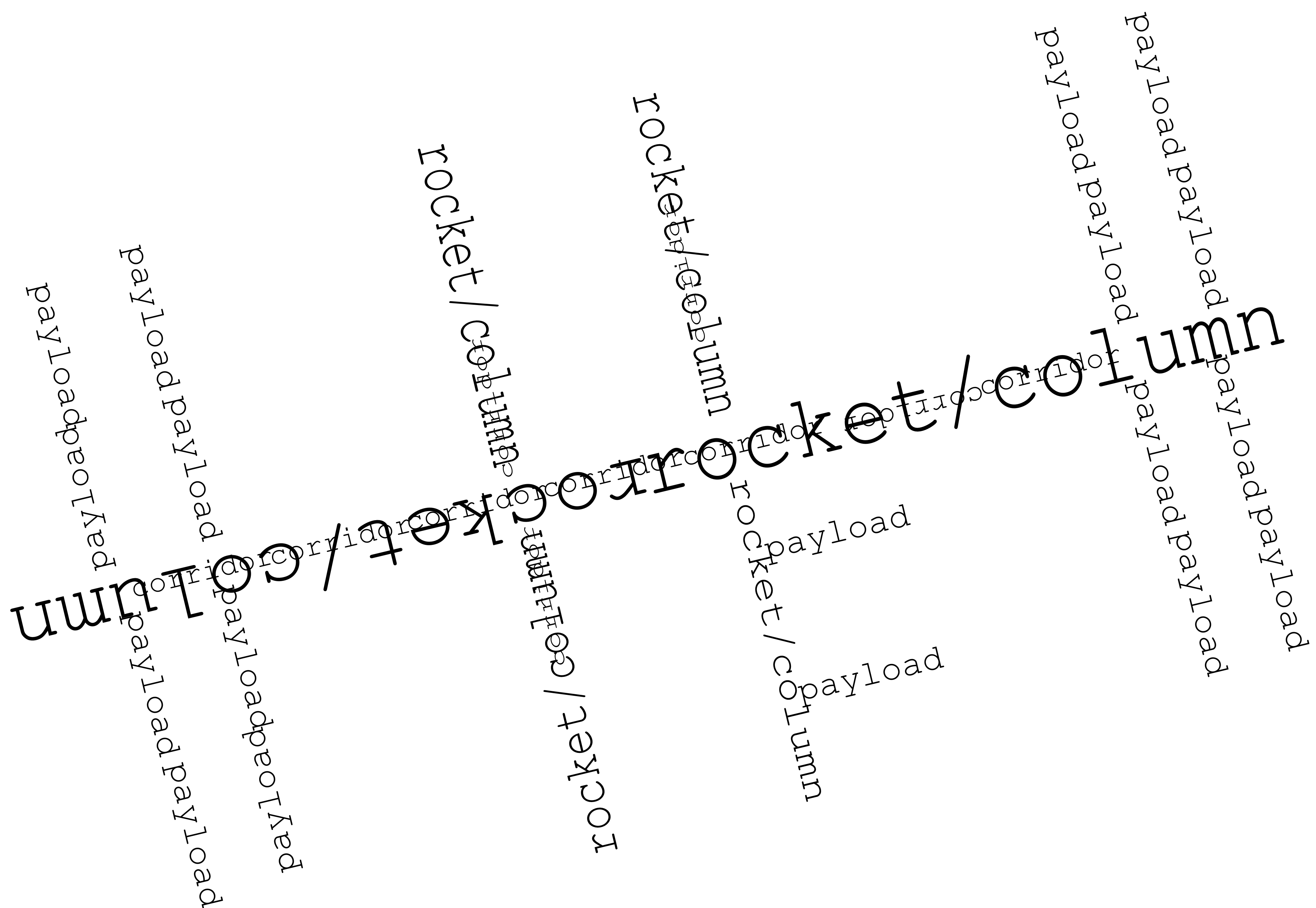
The synthesis of nature and natural processes requires a systematisation of the body. The reduction of the individual in the rocket to that of a series of inputs and outputs manifested ‘a new integrated structure where [hu]man—the physiology of his ingestion and excretion—becomes part of the system [it] inhabits, as a combustion device.’¹⁴ The body becomes, quite literally, an ancillary device like a water pump in an engine bay, where at times, such as for the processes of urination and defecation, the body must physically connect to the system. Far from providing a release from a terrestrial condition, the rocket transposes it, along with a newly enmeshed and instrumentalised physiology, to an environment that can never be intimately engaged with. It becomes the ultimate, if paradoxical, instance of terrestrial interiority.

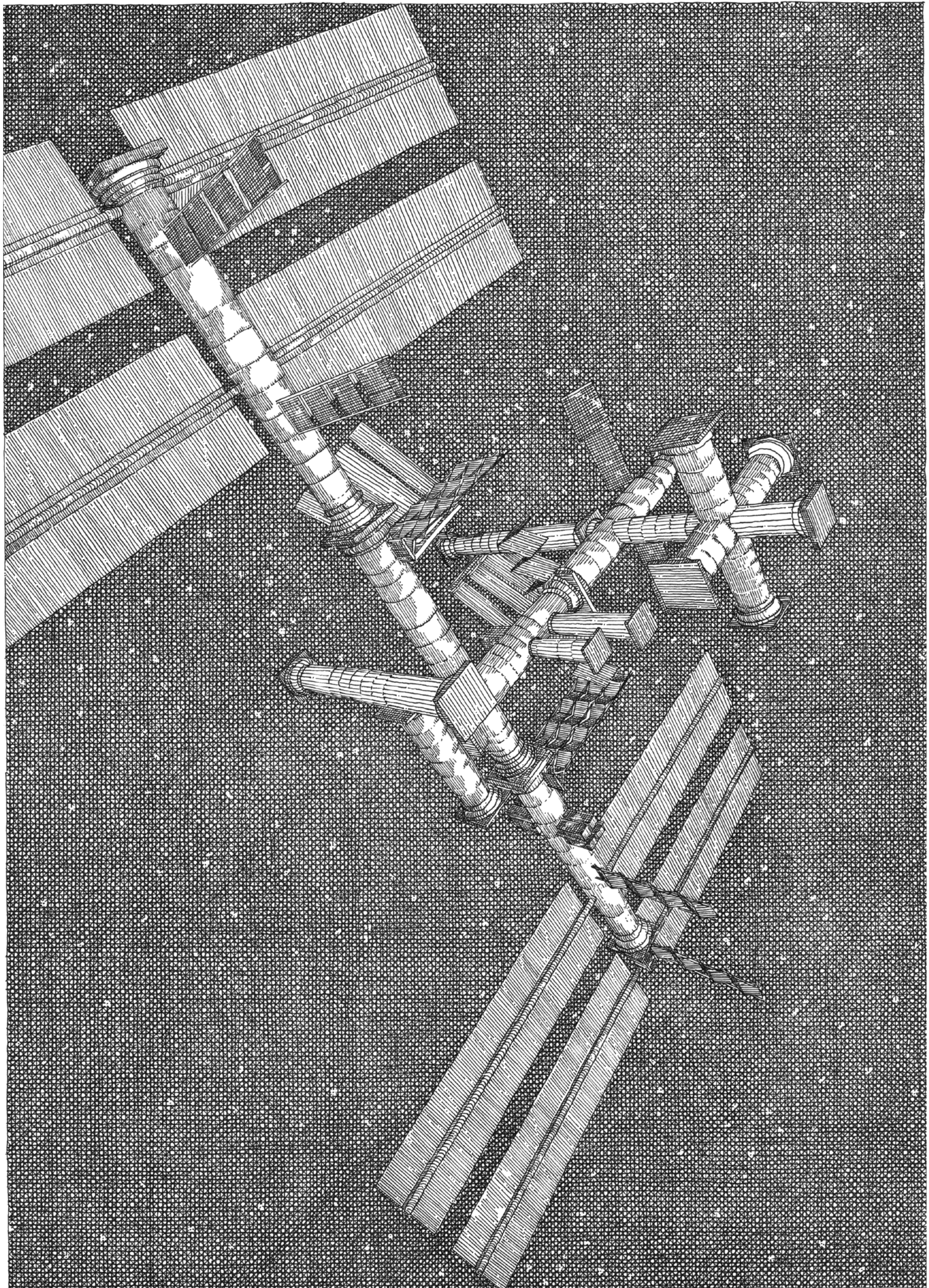
These rockets have hollow bellies
and when sent into space we
have often sent them expectant
with other little rockets in
formal influence only, vessels
of atmosphere, never having to
resist gravity like their parents.
If they were alive, they might
be scared about being birthed
into infinity. And also, because
humans can feel pretty useless without
gravity to provide original
purpose, a human becomes a rocket.



Beginning with the earliest, single-module space stations including the Russian Salyut space station and the US Skylab space station and continuing to the contemporary, modular space stations that include Mir and the ISS, the corridor has been established as the primary architectural typology within the vernacular type of space architecture. This result is primarily due to the modular construction methods enforced by the strict, volumetric limitations of a rocket's cargo bay. Cylindrical rockets, possessing cylindrical cargo bays, have historically delivered payloads in the form of modules with a cylindrical external boundary. Conversely, the ISS's internal storage systems have resulted in a rectilinearly rationalised internal space.

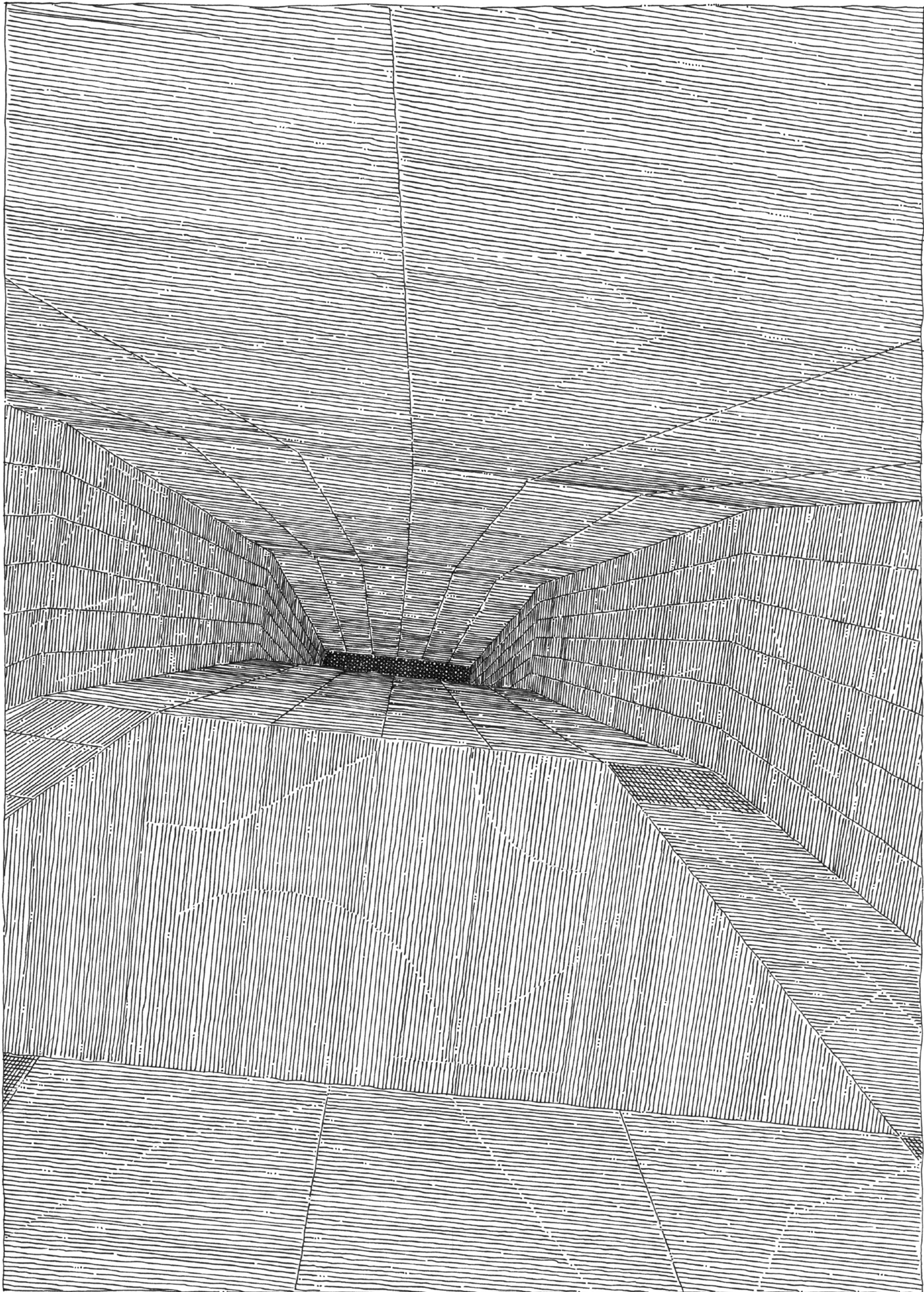
As the rocket and its payload (the module) leaves the influence of terrestrial gravity their orientation is released from the relevance of orientation in the microgravity environment of outer space. Here it is subject to the application of the programmed orientation. The terrestrial, or localised, verticality of the rocket and its progeny is replaced with a localised horizontality with respect to each of the modules in the majority of orbital space stations. The alteration in the orientation is a direct result of the application of a terrestrial physiognomy of space onto the space station interior by the astronauts who inhabit it and the designers who are responsible for the internal layout. The result is an internally corridoric condition in space stations constructed from a series of multiple interconnected modules. This state is opposed to a shaft condition where the internal volumes are orientated in a vertical, rather than horizontal, manner.

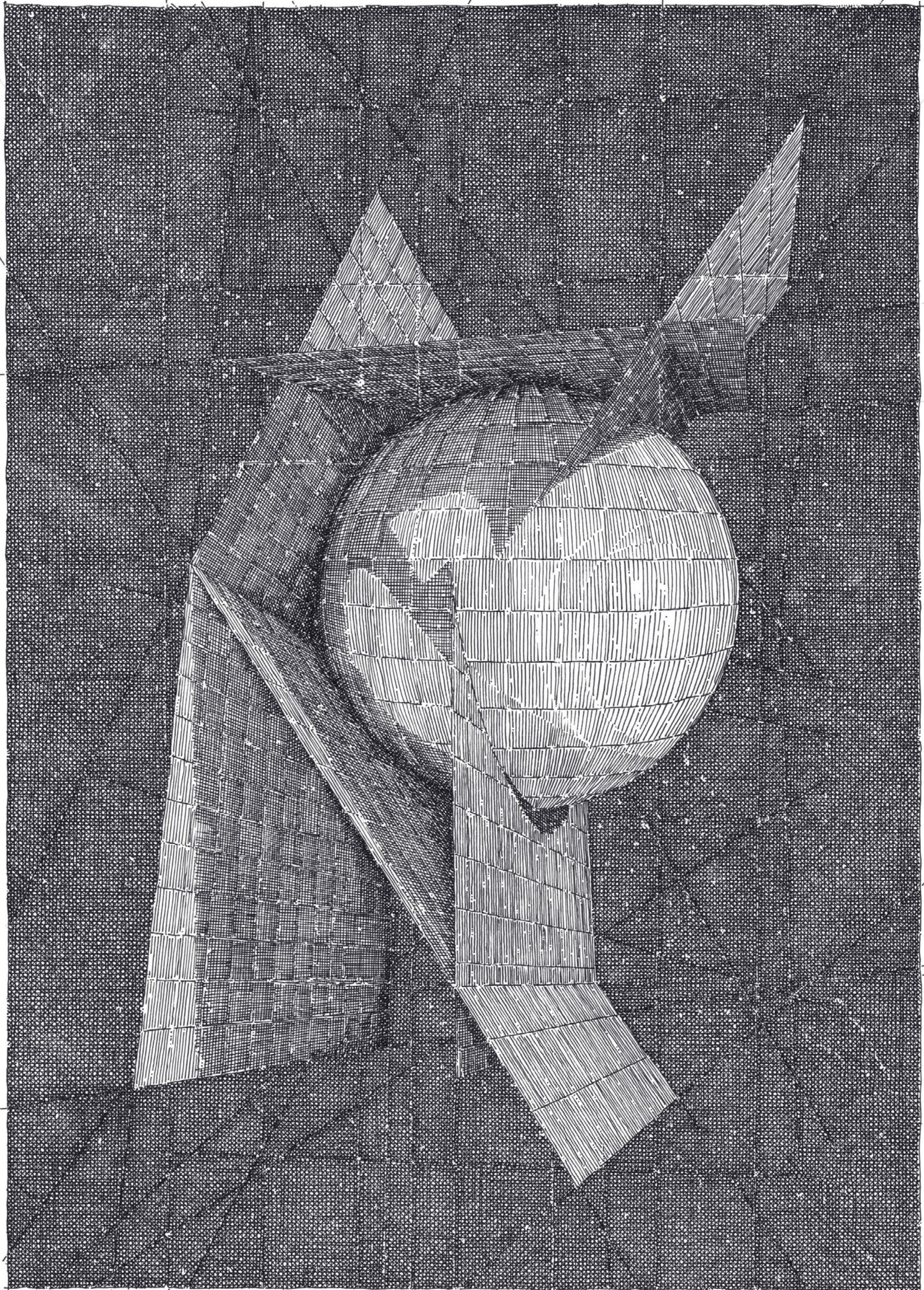




This interior, corridoric condition, appears as an instance of a persistent modernity in outer space, with Mark Jarzombek affirming the corridor as modernity's ultimate architectural index, and its instrument.¹⁵ A space of relatively recent development that finds its origins in the fourteenth-century Spanish *corridor*, a courier who was employed to deliver information, the corridor evolved into a military context, to allow for battlefield reports. Later, in the seventeenth century it was included as an architectural element where previously there had only been interconnected rooms. The corridor was now a place of reception and entertainment. It then evolved into a space that ran deep into a building, becoming part of its circulation system and, in turn, losing its significance as a large, grand space. It had become a place of movement and incidental meetings. Corridors in literature are places where secrets were exchanged, and clandestine rendezvous occurred; hierarchies disappeared in corridors. Corridors then evolved again to become ubiquitous, utilitarian spaces for buildings, associated with maintenance, ducts, heating, ventilation, and cooling services. It is here, due to its association with communication, speed, power, and industrialisation that Jarzombek describes the corridor as indexical of modernity.¹⁶

A sprawling corridoric vernacular has proliferated within science fiction films including *Alien*, *Red Dwarf*, *2001: A Space Odyssey*, *Solaris*, and *Silent Running*. Here the corridor often delineates a meagre, damp, leaky, inescapable claustrophobic existence, creating conditions of fear for what might be both beyond and within. Outside science fiction, without anti-gravity technology to right oneself, and despite designers' intentions, the high-tech corridor of outer space abandons the natural delineation of walls, floors, and ceilings, and is further diminished to become simply an enclosure for an artificial environment. Such a corridoric condition would appear to foreshadow humanity's potential future life in the microgravity environment of outer space, an internal maze-like existence devoid of horizon, and orientation to an external nature. Indeed, despite the infinite expanse of nature beyond it, the corridor in outer space is akin to a tunnel under the earth.

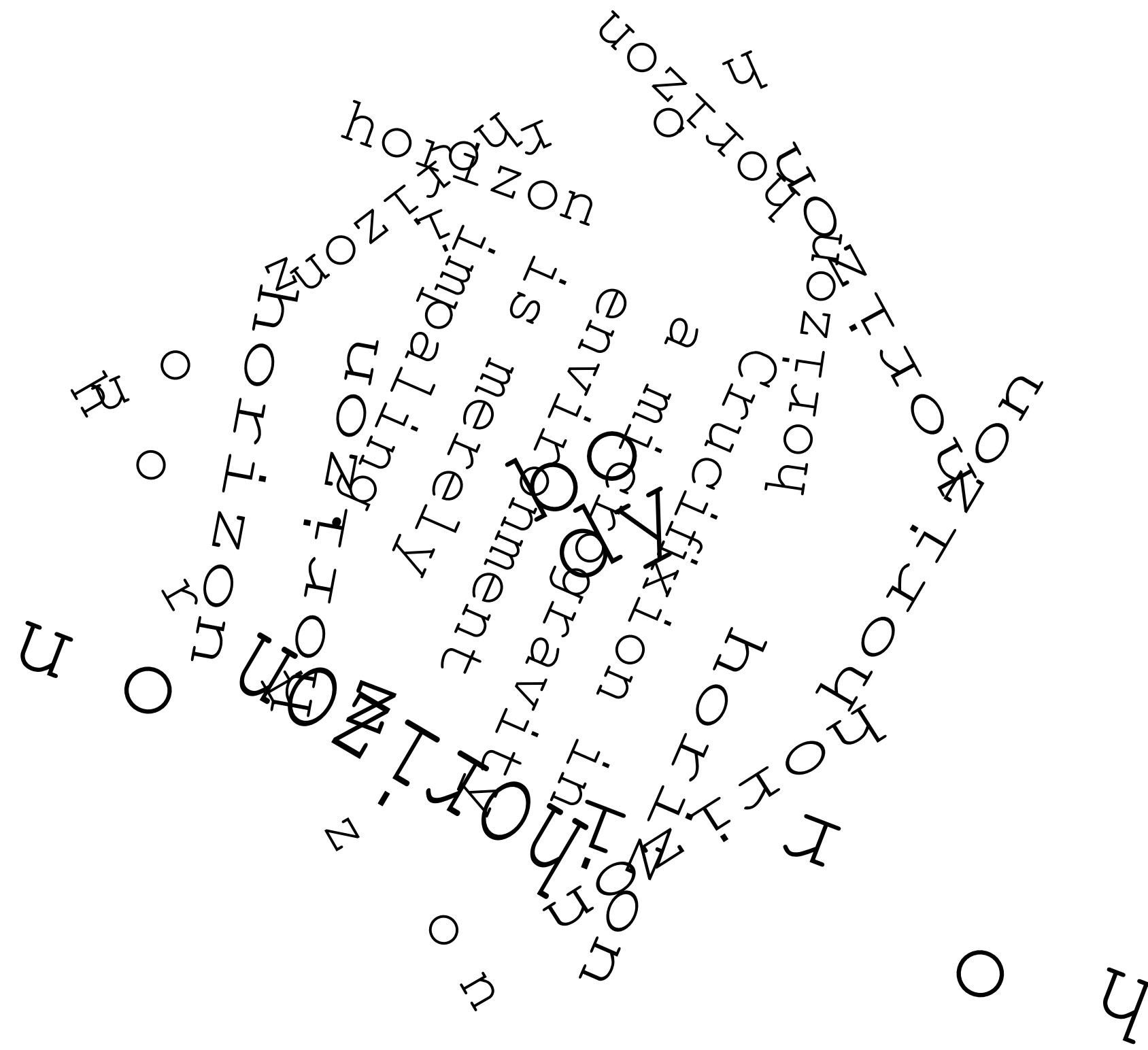




satellite

satellite

satellite



u o z r o h

In her prologue to the 1958 *The Human Condition*, Hannah Arendt writes that the desire to leave the Earth was symptomatic of the modern condition.²⁰ Though Arendt does not name Gagarin in her 1961 *Between Past and Future: Eight Exercises in Political Thought*, she accurately describes the astronaut, 'shot into outer space and imprisoned in his instrument-ridden capsule.'²¹ For Arendt, the astronaut assumes the position of the once-imagined celestial observer of the objective horizon, as well as that of all other objective scientific postulations, including those of Copernicus, Newton, and Einstein. When Gagarin momentarily emerged beyond the horizon, he did so in an engineered total-built environment that may well have been an extension, or continuation, of the all-encompassing modern project, which foreshadowed Superstudio's *Continuous Monument* project, as it sought to take an opportunistic foothold in the newly entered territory of outer space.

Yet the instrumentalised astronaut finds themselves devoid of any new horizon; they are trapped within the physiognomy, and thus the horizons, of their supposedly abandoned terrestrial condition. The astronaut now inhabits an Archimedean point that was once imagined but has now been reached and is unable to be supplanted by another due to its limitless and ungraspable cosmic environment.

Such an instrumentalised existence within a systematised environment corresponds with the reduced stature of humanity Arendt described in her account of the astronaut and the increasingly meaningless reality of the terrestrial condition.

The interiority that a vernacular space architecture poses in relation to the Earth, one that grows out of modernity's fascination with interiorisation and is anticipated already in Piranesi's *Carceri* prison etchings, coincides with the impossibility of delineating exterior and interior, as only the latter is an option. If modern architecture was predicated on the provision of machinic living through developments in engineering, technology, and functionality, then outer space is the vehicle for its continuation. Yet it is one that now demands a totalising interiorised built environment.

Reflecting on the text, Tafuri suggested the spectator of the *Carceri* was 'invited [...] to participate in the process of mental reconstruction proposed.'²² It is the current author's optimistic hope that through the accompanying visual methodology, the reader not only engages with the conceptual notion of an endless interior but is also prompted to construct one that will likely remain infinitely unbuilt.

acknowledgements

Thanks to Dr Nigel Westbrook and Dr Lucy Benjamin for their constructive feedback and support throughout the development of this essay, and to the valuable assistance provided by the *idea journal* editors. All images were produced by the author.

author biography

Craig McCormack is a lecturer in architecture at The University of Melbourne. His research concerns the limits of architecture in microgravity environments and involves a variety of drawing, theoretical, and ficto-critical writing.

notes

- 1 Marc-Antoine Laugier, *Essai Sur L'architecture* (Duchesne, 1755).
- 2 Vitruvius Pollio, *Vitruvius: The Ten Books on Architecture* (Dover Publications, 1960), pp. 72–75.
- 3 V. Murtinho, 'Leonardo's Vitruvian Man Drawing: A New Interpretation Looking at Leonardo's Geometric Constructions', *Nexus Network Journal*, 17.2 (2015), pp. 507–24, [doi:10.1007/s00004-015-0247-7](https://doi.org/10.1007/s00004-015-0247-7); Ernst Neufert et al., *Architects' Data*, 4th ed. (Wiley-Blackwell, 2012); Henry Dreyfuss, *The Measure of Man: Human Factors in Design / Henry Dreyfuss* (Whitney Library of Design, 1959); Fondation Le Corbusier, *Le Corbusier – The Modulor* (Birkhäuser, 2000).
- 4 Boris Grois (ed.), *Russian Cosmism* (EFlux-MIT Press, 2018).
- 5 Konstantin Tsiolkovsky, *Beyond the Planet Earth*, trans. by Kenneth Syers (Pergamon Press, 1960).
- 6 David Pitt and Paul R. Samson, *The Biosphere and Noosphere Reader Global Environment, Society and Change* (Taylor and Francis, 2012).
- 7 Eusebi Casanelles, *Nueva Vision de Gaudi* (Ediciones La Poligrafa, 1965), p. 212.
- 8 Joseph Rykwert, *The Dancing Column* (MIT Press, 1996), p. 24.
- 9 Peder Anker, 'The Ecological Colonization of Space', *Environmental History*, 10.2 (2005), p. 240.
- 10 Peder Anker, 'The Closed World of Ecological Architecture', *The Journal of Architecture*, 10 (2005), pp. 527–52 (p. 528).
- 11 Howard T. Odum, 'Limits of Remote Ecosystems Containing Man', *American Biology Teacher* (1963), pp. 429–43.
- 12 Lydia Kallipoliti, 'Closed Worlds: The Rise and Fall of Dirty Physiology', *Architectural Theory Review*, 20.1 (2010), pp. 67–90 (p. 67).
- 13 Kallipoliti, *Closed Worlds*, p. 68.
- 14 Kallipoliti, *Closed Worlds*, p. 68.
- 15 Mark Jarzombek, 'Corridor Spaces', *Critical Inquiry*, 36.4 (August 2010), pp. 728–70 (p. 768).
- 16 Jarzombek, 'Corridor Spaces.'
- 17 NASA, 'April 1961 – First Human Entered Space' <<https://www.nasa.gov/image-article/april-1961-first-human-entered-space/>> [accessed 25 November 2024].
- 18 <https://www.physics.unlv.edu/~jeffery/astro/celestial_sphere/horizon_types_formula.html> [accessed 25 November 2024].
- 19 John C. Rosemergy, *Celestial Horizons: A Concise View of the Universe* (Allyn and Bacon, 1977).
- 20 Hannah Arendt, *The Human Condition* (University of Chicago Press, 1998).
- 21 Hannah Arendt, *Between Past and Future: Six Exercises in Political Thought* (Faber & Faber, 1961), p. 277.
- 22 Manfredo Tafuri, *The Sphere and the Labyrinth: Avant-Gardes and Architecture from Piranesi to the 1970s* (MIT Press, 1987), p. 26.